TECHNOLOGICAL CHANGE AND JOB REDESIGN: IMPLICATIONS FOR THE QUALITY OF WORKING LIFE

A Qualitative Case Study into Employee Experiences during the Digitalization of Radio and Television Program Production

Niina Rintala

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© Niina Rintala
niina.rintala@hut.fi

Helsinki University of Technology
Department of Industrial Engineering and Management
Laboratory of Work Psychology and Leadership
P. O. Box 5500
FIN-02015 HUT
Finland
Phone: +358 9 451 2846
Fax: +358 9 451 3665
Internet http://www.tuta.hut.fi

ABSTRACT

Technological advances have brought about extensive changes in work over the last few decades. In many industries, work has changed from specialized, often monotonous, manufacturing work to non-routine, complex and autonomous knowledge work that produces outputs characterized by information content. Simultaneously, job descriptions have increased in scope and autonomy. Technological development and job redesign continue to change work in many industries. Both the use of new technology at the workplace and job redesign also influence the quality of working life and alter the factors that promote work-related well-being and/or induce stress. This study examines employee experiences during technological change and job redesign in terms of the quality of working life. The data are derived from 32 thematic interviews, mainly with journalists and editors in three units of a national broadcasting company during the digitalization of radio and television program production technology.

Initially, the study set out to examine *how technological changes are experienced* in terms of the quality of working life. To answer this question, a qualitative content analysis of the interviews was performed. The data were analyzed first within cases and then across cases using both inductive and deductive approaches. The analysis revealed that the technological change was connected with experiences relating to (1) technological implementations, (2) changes in job descriptions, (3) learning to use new technology and (4) using new technology. It was found that the technological change was accompanied by job redesign, which enriched journalistic job descriptions and narrowed down editorial job descriptions. The results were examined in the frameworks of the Job Characteristics Model (Hackman & Oldham, 1980) and Job Demand-Control Model (Karasek, 1979). As these models did not capture negative experiences related to enriched job descriptions, a new research question was posed: "*What stressors are experienced in job redesign?*"

By conducting a situational analysis, stressful work situations were identified and examined. Stressors were categorized according to the Balance Model (Smith & Carayon-Sainfort, 1989), in which the work system consists of five elements: task, technology, organization, environment and person. Enriched job descriptions were connected with stressors in all of the elements, whereas narrowed job descriptions only with organizational stressors. Stressors were also categorized in terms of their elements: excessive breadth and depth of demands, contradiction and changes in demands, social conditions, lack of organizational support and the moderating stressor, lack of work motivation and ability.

The study also examined *ways of experiencing technological change with job redesign* in terms of the quality of working life. A phenomenographic analysis indicated six ways of experiencing digitalization as a technological change with job redesign: as a revolutionary change, as an interesting change, as hardly a change at all, full of uncertainties and images, as an interesting but stressful change, and as a difficult change.

The main findings of this study were that technological changes can be accompanied by social and organizational changes that have a significant influence on the quality of working life of individual workers and work units, and that enriched job descriptions are not inevitably experienced as positive in terms of the quality of working life in knowledge work. The results of this study suggest that, in knowledge work, the same factors contribute to well-being and induce stress, which means that job redesign cannot anymore focus on simply eliminating stressors but should focus on balancing the work to suit the needs of the individual. The methodological contributions of this study suggest the use of qualitative methods, the use of multiple analysis methods and the use of complementary research strategies in studying the quality of working life. The practical implications of the study include enabling employee participation in technological changes and job (re)design, implementing changes gradually, as well as providing employees with training and support in meeting new skill requirements.

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CONTENTS

1 INTRODUCTION

Technological development in the workplace changes work conditions and influences the quality of the working life of employees. Mechanization was first applied to the processing of industrial products, but spread to the office in the second half of the 19th century in the form of telephones, dictating machines and typewriters (Giuliano, 1991). The invention and development of microelectronics started to shape workplaces extensively in the 1970's. New technologies, which this technological revolution brought about, had two general forms in the workplace. The first was advanced manufacturing technology (AMT), which included a wide range of equipment contributing to the manufacturing process, for example, robots, automatic guided vehicles (AGVs) and computer numerically controlled (CNC) machine tools. The second was office technology, such as word processing equipment. (Arnold, Cooper & Robertson, 1998, 466-467.)

With the introduction of new technology to offices, generally referred to as "office automation", work in offices became so-called information work, using sophisticated technological tools (Wainwright & Francis, 1984, 13). The first office computers were crude and very expensive by current standards. They were designed to serve a single purpose, to prepare text, for example, or access stock-market data or make air-travel reservations. Thus, the first terminals served as complete work stations only for people who were engaged in more-or-less repetitive tasks. Thereafter, the capabilities of the work station were extended by developments in the technology of information processing, in communications and in enhancements of the software, due to which a variety of resources and functions became accessible from a single work station. (Giuliano, 1991.) Also, the number of computers rose dramatically in the early 1970's from one computer per organization to nearly all clerical employees having access to a work station (Feldberg & Nakano Glenn, 1987). Throughout the 1980's, computing in offices included two major forms: computer-based information systems, with which transaction-level data was entered and retrieved, and word processing systems (Iacono & Kling, 1987).

Today, as computer systems are standard technology, the innovation cycle of hardware and software is far from coming to an end; rather, it is continuously accelerating (Hamborg & Greif, 1996). Now, the focus is on trying to understand technological change that builds on earlier technology, also termed *continuous implementation* (Korunka, Zauchner & Weiss, 1997). As an increasing proportion of employees have been "computerized" – use computers in at least simple operations –

the focus of research into technology and the quality of working life is inevitably directed towards studying situations in which the aim is to upgrade technology. In the rapidly changing world of technology, research into working conditions and their effect on the quality of working life among employees using technology has been regarded as being of special importance (Bijleveld, Andries & van Rijckevorsel, 2000).

How has the work changed with the introduction of new office technologies? In the 1980's, there were two ways of viewing work trends resulting from the introduction of new technology in the office: it was becoming more simplified and it was becoming more enriched in variety, scope and autonomy (Hamborg & Greif, 1996; International Labour Office, 1984, 8-12). Although some researchers argued that office automation might even lead to the end of clerical work, studies have not confirmed this view. According to the review by Arnold et al. (1998, 471), jobs were usually changed in some respects by new technology. New technology sometimes enriched jobs and sometimes simplified them with the potential of both effects occurring within one workplace. Simplification was suspected to be more common than enrichment, at least for shop-floor manufacturing jobs. Concerted and well-developed managerial strategies to influence job characteristics via new technology were rare, and although new technology was able to produce enriched jobs, some individuals were still working according to the old simplified job descriptions. Also, developments in information and communication technologies have been noticed to change work towards knowledge work, which is non-routine and complex, requiring individual and external knowledge to produce outputs characterized by information content (Järvenpää & Eloranta, 2001).

As the previous studies suggest, the introduction of new technology has been found to result in different, even contradictory, changes in work. This might be due to the different properties of different technologies, but also due to so-called mediating variables, such as decisions about work organization, goals and psychosocial assumptions of decision makers (Buchanan & Huczynski, 1997, 559) and the design of task demands (Hamborg & Greif, 1996). Thus, the paradigm for studying technological change has shifted away from technological determinism, which assumes that work has to be organized to meet the requirements of machinery, to a perspective according to which technological innovations trigger an organizational decision-making process that ultimately determines the organizational consequences of the technological change (Buchanan & Huczynski, 1997, 559).

This study began to examine the quality of working life in a technological change. In the media industry, the production of radio and television programs was in transition from analog to digital technology. The study set out to explore how this process of

digitalization was experienced in terms of quality of working life. However, the technological change was accompanied by changes in job descriptions and, in addition to the technological change, the quality of working life was connected with job redesign. As experiences of stress were especially connected to job redesign, a need for examining the stressors related to job redesign became apparent. Part II of the thesis concentrates on studying the stressors connected to job redesign, especially enriched job descriptions. Stressors were studied by performing a situational qualitative content analysis of the interview data. As in this study, the technological change and the changes in job descriptions did not occur in isolation and apart from each other, but were interrelated and produced combined experiences related to the quality of working life, an integrated examination of the quality of working life during technological change *with* job redesign was seen as necessary. A phenomenographic analysis was performed on the data, which produced six different "categories of description", that is, ways of experiencing the changes in work due to interrelated changes in technology and job descriptions. These experience-types are described in Part III of the thesis.

The aims of the study are threefold.

(1) The study aims at describing and understanding *how a technological change is experienced* in terms of the quality of working life.
(2) Secondly, the study aims at identifying, describing and understanding *the stressors experienced in job redesign*.
(3) Thirdly, the study aims at describing and understanding how the technological change and job redesign are experienced in terms of quality of working life. More specifically, it examines *which ways of experiencing technological change with job redesign can be identified in terms of the quality of working life*.

The study has both scientific and practical objectives. It has a theory-building goal: it aims at contributing new theoretical elements and insights to the scientific discussion of the quality of working life, well-being and stress and the relationship of these to technological change and job redesign. Also, the results of this study are examined within existing theoretical frameworks and the theoretical models are evaluated in the light of this study. Thus, even though the study is inductive, it also incorporates some qualitative theory-testing aspects.

The study also aims at contributing new guidelines and models for practitioners and employees. By describing the quality of working life, well-being and stress experiences during technological change and job redesign, it aims at assisting for example managers, trainers, human resource professionals, technological designers, as

well as workers themselves, to introduce new technologies and job descriptions in ways that take into account, increase and promote the quality of working life. It also has an emancipating goal of providing workers themselves with the conceptual tools with which they can understand their own quality of working life during technological and organizational changes.

1.1 The Research Context: Technological Change and Job Redesign

The context of this study is the transition from analog program production technology to digital program production technology in the media industry, more specifically in radio and television program production. In this study, following Cummings and Srivastva (1977, 51), technology is defined as follows:

- *Technology is a system consisting of "the tools, techniques and methods of doing that are employed for task performance". The technological system "has meaning only when social groups bring it into existence and bestow it with meaning".*

The technology on which this study focuses resembles traditional office technologies. In the process of *digitalization,* new equipment, including digital sound and video-editing software, digital recorders and cameras, digital sound editing tables, databases, graphic arts software, communicating software and semi-automated broadcasting devices, was introduced into the workplace. Thus, digitalization consisted of information systems, for instance, as well as automation, processing and editing technology. However, the technological change can be described as a "continuous implementation" (Korunka et al., 1997) as the employees had already used personal computers with, for example, word processing and communicating features.

In this study, technological change is viewed from a socio-technical perspective, which sees organizations as open systems consisting of two subsystems: social and technical. The social-plus-technical system must relate to its environment if it is to function and develop (Cummings & Srivastva 1977, 49); at the same time, studying a productive system requires detailed attention to both technological and social components (Emery & Trist, 1969, 281-284). On the relationship between technological and social subsystems, this study adopts a view similar to that of Carayon-Sainfort (1992) and Carayon and Karsh (2000), according to whom the characteristics of a technology can have both direct and indirect influences on the quality of working life. According to the model of Carayon-Sainfort (1992), the indirect influences of the technology characteristics on the quality of working life are mediated by job characteristics. Figure 1 illustrates this socio-technical model for

conceptualizing technological change.

TECHNOLOGY

TECHNOLOGY CHARACTERISTICS	JOB CHARACTERISTICS	QUALITY OF WORKING LIFE

TECHNOLOGICAL CHANGE PROCESS
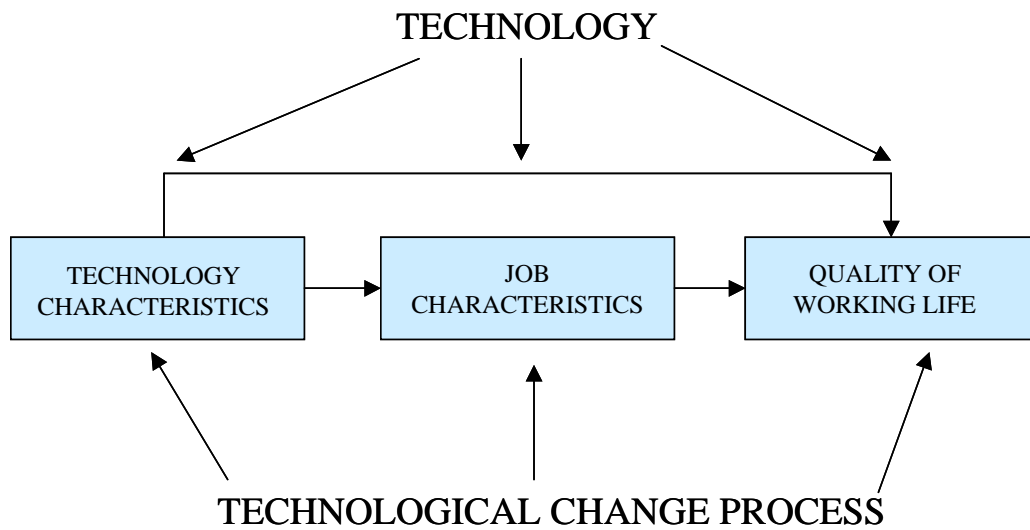
FIGURE 1. Socio-Technical Model for Technological Change of Carayon (1992).

The introduction of new technology and the accompanying job redesign have been found to have extensive effects on the social subsystem, e.g., job tasks and skill requirements, as well as authority and power relationships in organizations (Martinsons & Cheung, 2001). It has been argued that these and other nonspecific social changes in the work place and work procedures, which are often profit-oriented and go hand-in-hand with the introduction of technology, have been overlooked when defining the impacts of technology (Garner & Fidel, 1990; Kraut, Dumais & Koch, 1989). This study focuses on both the further technological changes and the changes in jobs that occur concurrently with, or result from, technological change.

In this study, it is acknowledged that the influence of technological change on work and on the quality of working life does not conform to simple models. The process of *implementing*, that is, *carrying out* (Webster's New Century Dictionary, 2001), a technological change in an organization is often more complicated than is typically imagined. Firstly, technology is complex. It not only includes computer hardware and software but also work procedures, management practices, physical/architectural arrangements, as well as productivity and quality specifications (Kraut et al., 1989), and thus both the technological and the social subsystems of an organization. Also, technological change and its social consequences may be caused not only for technological reasons, but may be driven primarily by productivity-enhancement goals (Haddad, 1996; Kling, 1990; Mikkelsen, Øgaard, Lindøe & Olsen, 2002), which may conflict with existing organizational structures and values. In this study, the experiences relating to the quality of working life during technological change are

roughly divided into two categories: experiences related to changes in technology and experiences related to changes in job descriptions.

The second reason for the complex nature of technological change is the fact that organizations are complex. Companies are not rational enterprises, but intricate, changing, and primarily social systems driven, not only by clearly articulated common goals, but also by a host of varied, and often conflicting, personal aspirations (Clement, 1990; Kraut et al., 1989). Due to different work settings and work cultures, technological change has various influences on work and on the quality of working life. While information and communication technology may increase productivity, it can degrade the work lives of those who use it. Moreover, implementing identical hardware or software within a single organization can have positive effects on one job and negative effects on another, depending on, for example, the status of the profession in question, and the same technological change can even have mixed effects on different aspects of the same job (Kraut et al., 1989).

In this study, connections between job redesign and stress are also examined. This study approaches job design from a psychological perspective and with the assumption that employee effectiveness and efficiency are correlates of a high quality of working life. The psychological approach emphasizes the role of the person and his/her experience instead of environmental factors, such as operator-machine systems and work methods, on which the human-factors approach to job design focuses (Jewell & Siegall, 1990, 239-258).

Currently, there is a general trend towards technology-enabled job redesign. This means that, with new technology, some tasks may become easier to perform, enabling one individual to control all components and phases of work more easily. Technology can also become more economic to acquire. Even though technological changes have different characteristics and are implemented for various purposes, changes in work and job descriptions have similarities across businesses and technologies. It has been observed that work in many businesses is in transition from a bureaucratic model to a post-bureaucratic model (Heckscher, 1994), from an industrial model to an information model (Carlson, 1999) or from the Industrial age to the Network age (Denning & Dunham, 2001). These categorizations describe the same phenomenon: a transformation of the organization of work that has begun or is about to occur.

Generally, job redesign that results in an increase in job scope and autonomy has been viewed as beneficial. The extensiveness of the job description has been found to have a positive connection to the quality of working life: the more extensive the job description, the higher the level of quality of working life. Researchers have been quite unanimous about job enrichment and job enlargement being motivators rather

than stressors (e.g., Chung & Ross, 1977; Conant & Kilbridge, 1965; Cozan, 1959; Hackman & Oldham, 1980; Hales 1987; Karasek, 1979; 1990; Pierce & Dunham, 1976). These findings, confirming the positive connection between high job scope and high quality of working life, have been found across a variety of samples and research instruments for the different job characteristic dimensions, as well as for various measures of job scope (Bechtold, Sims & Szilagyi, 1981).

In terms of job redesign, the focus of this study is especially on redesigning journalistic and editorial job descriptions. In this study:

- A job description refers to *a statement of the tasks and responsibilities that an employee is expected to carry out* (Webster's New Century Dictionary, 2001), as well as to *the cooperation that occurs across job descriptions*.

This study examines job descriptions in terms of job content and tasks, job demands, job characteristics and job design. The focus of the study is on the ways in which job redesign is experienced in terms of the quality of working life rather than on job descriptions as such. The following definition is used for job redesign in this study:

- Job redesign is *the process of reorganizing the various elements that go together to form jobs* (Webster's New Century Dictionary, 2001).

One central concept of this study is *job enrichment*. In this study, the concept of job enrichment refers to combining tasks and vertically loading the job (Hackman & Oldham, 1980, 135). The definition of job enrichment is as follows:

- Job enrichment is *the process of changing the job description by enlarging it to include more, or more extensive, tasks while simultaneously increasing autonomy and responsibility in work*.

As job redesign is studied in the same context as the related technological change, and as they occur concurrently, it is difficult, even if possible, to rule out the influence of technology when studying job redesign. In this study, it is not even seen as necessary, as they are in interaction with each other: the technological change enables some changes in job descriptions as some tasks may come to require less effort due to the implementation of digital technology. Here again, job redesign has influence over the types and number of technologies used within each job description. Thus, it can be seen that the two elements, technology and job descriptions, are just perspectives – spectacles through which the quality of working life is examined.

1.2   The Research Phenomenon: The Quality of Working Life

The quality of working life (QWL) is a concept that is complex and covers many interrelated factors. It refers to the impact of the entire work situation on the individual (Jewell & Siegall, 1990, 524) and can be shortly defined as "the evaluative state of all aspects of work" (Riggio, 1990, 214). Both well-being and work stress influence the quality of working life of employees. For example, an employee who feels a great deal of work-related well-being and very little job distress is apt to have a high quality of working life, and vice versa (Riggio, 1990, 214). The concept of the quality of working life has been seen as not only descriptive, but also normative, implying that studying it entails eventual attempts at "corrective" action (Boisvert, 1977). The quality-of-working-life approach consists of identifying those aspects of work that are seen as desirable by organizational members (aspects that enhance the quality of life at work) and incorporating that information into initial design considerations (Levine, Taylor & Davis, 1984).

Generally the quality of working life is determined by multiple factors such as a safe and healthy work environment, quality of interactions among various organizational members, opportunities to participate and advance within the organization, degree of satisfaction with the work situation, characteristics of the organization, job security and the compensation and benefits employees receive (Jewell & Siegall, 1990, 524; Riggio, 1990, 214). In this study, the concept of *quality of working life* includes the two previously mentioned fields, namely well-being and stress. It refers primarily to the mental quality of working life, to the exclusion of physical health and safety aspects. Furthermore, aspects of compensation, wages and workers rights are not included in the definition of the quality of working life in this study.

The focus of this study is on the quality of working life related to technological change and job redesign. Quality of working life is hardly a new research subject. Far from it; stress, for example, has elicited studies over fifty years and is still an issue in academic discussion and public debate. A significant body of knowledge has been accumulated from countless studies, enabling researchers to deepen their understanding of the origins, forms and consequences of the quality of working life, as well as helping practitioners to design jobs that are motivating and promote the quality of working life. Is there a need for another study about the quality of working life and, more specifically, work-related well-being and stress? The approach of this study to the quality of working life differs from traditional stress research in three ways.

Firstly, rather than studying a few specific variables and their interrelations, this study adopts a holistic view and attempts to form a "big picture" of the quality of working life. Traditional studies of work stress have been quantitatively oriented and focused on examining the covariance, or lack of it, between a limited number of pre-determined variables. This has led to stress research neglecting some work stressors that employees experience in terms of their quality of working life, but which have not yet been clearly identified in previous studies (Crump, Cooper and Smith, 1980).

Secondly, instead of viewing the quality of working life as a physiological, objectively measurable subject, this study views it as groups of psychological and individual experiences related to specific work situations. Looking at the quality of working life as a subjective phenomenon, the relevance of physiological measures can be questioned. If it can be assumed that the quality of working life is individually experienced, then research should concentrate on the *experience* of the quality of working life.

Thirdly, rather than studying the quality of working life in traditional manufacturing work, the quality of working life in this study is examined in a new context. Established work-design theories were developed principally from studies of male shop floor employees working in large-scale manufacturing plants in the US and UK conducted in the mid-20th century (Parker, Wall & Cordery, 2001). During the past decades, business environments, organizations and work have changed. A new economy has emerged and changed the prerequisites for success and competitiveness across industries. This new economy is characterized by interrelated phenomena such as rapid changes, internationalization and growing international competition, changing workforce, complex and changing work environments, continuous innovation, as well as the development and use of new technologies. At the organizational level, organizations are replacing vertical hierarchies with horizontal networks; linking together traditional functions through interfunctional teams (Donnellon & Scully, 1994), and forming strategic alliances with suppliers, customers, and even competitors (Hirschhorn & Gilmore, 1992). Centrally coordinated, multi-level hierarchies are being set aside while a variety of more flexible structures are being preferred (Miles & Snow, 1992). As a result, work and work environments have changed. According to Carayon and Smith (2000), the implications of this transformation on work organization and on the quality of working life have not been studied and taken into account in the design and implementation of new organizational types, such as the networked organization. Carayon and Smith (2000) emphasize the need for further research in order to examine the interactions between different work systems of new organizational structures and their impact on employees and on the quality of working life. Similarly, Parker et al. (2001) find that the changes occurring within the organizational

landscape render the topic of work design one of continued and even greater importance. Also Bradley (2001) encourages researchers to conduct normative research that focuses on issues related to welfare and quality of life in a technological work and living environment. In this study, the quality of working life is examined in information and knowledge intensive work during a technological change and job redesign. Both of these processes are entwined with the contemporary changes described above.

1.2.1 Theoretical Background on Understanding the Quality of Working Life

Research into the quality of working life has a longstanding history, especially from the viewpoint of stress at work. According to Fraser (1983, 55), research on work stress suggests that an individual "has to contend both with a physical component of his working environment and a psychosocial component; that conditions in either or both may be unacceptably stressful, and that work, whether physical or skilled, may constitute an unacceptable stress". Thus, stress is always present in working life to a greater or lesser degree and, paradoxically, the total absence of apparent stress can become in itself a stressor. According to Nitsch (1981, 51), stress has three biological implications in life. Firstly, stress is *unavoidable* in life as every life event induces stress to a certain degree. Secondly, stress is *necessary* for living as it maintains human functional capacity, raises the physiological and mental capacity to adapt and perform, and builds up individual opportunities for development. Finally, stress is a *life threat* as long-term exposure to intense stress can be harmful, as excessive interventions for stress prevention inhibit development, and as an incorrect relation between the means and ends of adaptation can induce maladjustment to the environment.

Three different scientific approaches to the study of stress have been categorized and described by Cox (1978), Dijkhuizen (1980), Nitsch (1981), and Sutherland and Cooper (2000), among others. The different approaches – the response-based, the stimulus-based and the transactional definitions and models – have a similar basis, but differ in the way they define stress as the studied phenomenon, and in the methods they adopt for studying stress.

The studies with *a response-based approach to stress* treat stress as a dependent variable for study, describing it in terms of the person's response to disturbing or noxious environments. Stress is most commonly defined as a response in biology and medicine (Lazarus & Folkman 1984, 14) and usually viewed from a physiological perspective (Sutherland & Cooper, 2000, 51). Response-based studies tend to be concerned with the specification of the particular response or pattern of responses,

which may be taken as evidence that the person is, or has been, under pressure from a "disturbing" environment (Cox 1978, 4). Stress is considered to be a dependent variable, which is operationalized through specific physiological, psychical or behavioral disturbance and adjustment reactions, regardless of the way in which stress is induced (Nitsch 1981, 43). The response-based view received its initial impetus from Selye (Cox 1978, 5; Dijkhiuzen 1980, 1), who defined stress simply as "the non-specific response of the body to any demand" (Selye 1979, 12). In Selye's model of General Adaptation Syndrome, physiological stress response does not depend on the nature of the stressor but is a universal non-specific pattern of defense reactions, which progresses through three stages: alarm reaction, resistance and exhaustion (see, for example, Selye, 1981, 166, and Selye 1983, 4-15). The General Adaptation Syndrome Model has been criticized for not attempting to address the issue of psychological response to events or the cybernetic notion that a response to a potential threat may, in turn, become the stimulus for a different response (Sutherland & Cooper, 2000, 52). Levi (1974, 31, 43; 1981, 195) used Selye's definition of stress and concluded, on the basis of his findings, that stress is not an entirely physiological phenomenon: non-specific psychosocial environmental stimuli and non-specific physiological mechanisms may have a central role in the production of a variety of diseases. This perspective has been challenged due to its generic definition of stress (Sutherland & Cooper, 2000, 52). A third response-based definition of stress that has received much attention is stress as performance degradation, which has been a popular way to define stress in studies of external environmental factors related, for example, to noise and lighting. The perspective of stress as performance degradation has been found to be inconsistent, especially in terms of short-term stress, which might actually improve performance (Cox 1987, 12.)

The *stimulus-based approach to stress* describes stress in terms of the stimulus characteristics of disturbing or noxious environments, i.e. stressors, and thus usually treats stress as an independent variable for study. According to the stimulus-based definition of stress, certain situations are considered normatively stressful (Lazarus & Folkman 1984, 14). Stress is operationalized as an independent variable over specific characteristics of stimuli, situations, conditions, events or environments, which can be assumed to trigger a functional disturbance (Nitsch, 1981, 42). The stimulus-based view of stress received its impetus from rapid industrialization, which prompted research into stressors in blue-collar work (Sutherland & Cooper, 2000, 53). It has its roots in physics and engineering and it views stress from an engineering analogy, in which external stresses give rise to a stress reaction, or strain, within the individual. Similarly, as physical systems have an elastic limit, people have some built-in resistance to stress: up to a point, stress can be tolerated, but when it becomes intolerable, permanent physical and psychological harm may result (Cox, 1978, 12-13). Thus, when an individual is bombarded with stimuli from the environment, just

one more, apparently minor, event can alter the balance between coping with demand and a breakdown of the system (Sutherland & Cooper, 2000, 53).

Criticism has been directed to the stimulus-based approach as well. According to the stimulus-based view, durability in the face of stress is seen as being related to factors of heredity, past experiences and later learning (Cox 1978, 13), but still the stimulus-based model of stress has not been seen to sufficiently explain individual differences in reacting to the same stressful situation. Purely objective measures of environmental conditions have been considered inadequate and incapable of fully explaining the response to observed stress (Sutherland & Cooper, 2000, 53). According to Cox (1978, 15), "unless the stress-strain relationship functions both unconsciously and automatically, we have to accept some intervening psychological process which does mediate the outcome of the relationship". Furthermore, proponents of the engineering analogy of the stimulus-based approach to stress assume that an undemanding situation is not stressful and is a prescription for a maximum level of quality of working life. This assumption has been largely criticized as it has been discovered that undemanding situations are to most persons as stressful as situations in which demand is excessive (Cox 1978, 14).

The response-based and the stimulus-based approaches have been fused in order to provide a reasonably comprehensive account of the stress system. However, this fusion has still been seen as too mechanistic, as it views the person as essentially passive in the operation of stress (Cox 1978, 17). The third approach to the study of stress, *the transactional (or interactional) approach*, views stress as a subjective experience, which is contingent upon the perception of a situation or event. Stress is the reflection of a lack of fit, imbalance or mismatch between the perceived demand of the environment and the perception of one's ability to meet the demand. (Sutherland & Cooper, 2000, 55.) Stress in this form is studied in terms of its antecedent factors and its effects and seen as an intervening variable between stimulus and response (Cox 1978, 17; Nitsch 1981, 45). Thus, stress as such is not a sufficient cause of disease. As Lazarus and Folkman (1984, 17) note, a person does not become ill merely as a result of noxious agents in the environment – viruses and bacteria, for example, are always present – but as a result of being vulnerable to those agents. As the transactional or interactional approach sees stress resulting from the relationship between the person and the environment, it demands that stress should be studied as an individual phenomenon. Thus, situations cannot simply be labeled as stressful or non-stressful. Rather they may be potentially stressful or may be more likely to be stressful for persons with certain kinds of individual characteristics or in certain kinds of environmental conditions (Cox 1978, 24). The way in which a situation or event is individually perceived depends upon factors such as familiarity with the circumstances, previous exposure to the event, learning, education and training, and

the presence or absence of other people or work colleagues (Sutherland & Cooper, 2000, 55).

This study adopts the transactional approach to studying the quality of working life. More specifically, the definition of the quality of working life of this study rests on the person-environment fit approach by French, Caplan and Harrison (1982) and the transactional model by Lazarus and Folkman (1984).

1.2.1.1 The Person-Environment Fit Approach

The person-environment (P-E) fit approach has become widely accepted among organizational stress researchers (Edwards & Cooper, 1990). This heuristic construct has prompted more than 100 empirical studies (Savickas, 2000) and forms the core of many widely accepted theories of organizational stress, such as those presented by French, Caplan and Harrison (1982) and Karasek (1979) (Edwards & Cooper, 1990). In the context of stress research, the P-E fit model of French et al. (1982) is perhaps one of the most widely cited and extensively tested theories in field research (Shirom, 1982).

The P-E fit approach treats the P-E fit as a social exchange process. Two modes of the P-E fit can be identified: the fit between the environmental supplies and personal motives, values and goals and the fit between the environmental demands and personal skills and abilities (French, Caplan & Harrison, 1982, 6). The fit between demands of the environment and the relevant abilities of the person determines the shape of human action, while the fit between personal needs and environmental opportunities for getting rewards and resources determines the motivation to perform in particular ways. Behavior is motivated by both the experienced fit of contemporary needs to contemporary opportunities and by the anticipated fit of the future needs to future opportunities. (Rice, McFarlin, Hunt & Near, 1985.)

The P-E fit approach characterizes stress as a lack of correspondence between characteristics of person (e.g., abilities, values) and the environment (e.g., demands, supplies). A stressful work situation, a mismatch of P and E, includes both too much and too little ability or supplies. According to French et al. (1982), P and E can be described objectively and subjectively, with objective P and E referring respectively to these variables as they exist independently of the individual's perceptions, and subjective P and E referring to these variables as they are perceived by the individual. The French et al. (1982) model further states that the greater the subjective misfit, the greater the psychological, physiological and behavioral strain. (French et al., 1982, 4-6.) This study views the quality of working life from the perspective of the *subjective*

misfit, focusing on workers' perceptions of their work situations and themselves. Further, this study concentrates mainly on *psychological experiences* but reports also some psychosomatic stress disorders when they are described by the participants of the study.

Edwards and Cooper (1990) have argued that studies of the P-E fit approach are repeatedly plagued with theoretical problems, mostly due to the inadequate emphasis of the distinctions between the different modes of fit and different forms of fit. Firstly, the fit between environmental supplies and personal motives, goals and values, as well as the fit between environmental demands and personal skills and abilities, are not separated in empirical studies but are treated as distinct processes only at a theoretical level. As this study focuses on studying subjective experiences of the quality of working life, it is assumed that the two modes of fit are not consciously separated by the employee who perceives the fit or misfit, but are interrelated and should be treated as such in inductive research.

Secondly, according to Edwards and Cooper (1990), studies of the P-E fit approach present three basic forms of fit, which represent different theoretical perspectives on the relationship between P-E fit and strain. (1) The discrepancy form focuses on the discrepancy between P and E, indicating that strain increases as the characteristics of the environment deviate from the characteristics of the person. (2) The interactive form focuses on the interaction between P and E, indicating that strain occurs when environmental characteristics are combined with certain person characteristics. (3) The proportional form focuses on the proportion of P that is fulfilled by E, indicating that strain increases as this proportion becomes lower. (Edwards & Cooper, 1990.) The approach to the quality of working life of this study incorporates, at least in part, all of the above forms of fit.

1.2.1.2 The Transactional Model

Consistent with the P-E approach, the transactional model emphasizes the relationship between the person and the environment, taking into account the characteristics of the person on one hand and the nature of the environmental event on the other. Psychological stress is defined according to the transactional model as "a relationship between the person and the environment that is appraised by the person as taxing or exceeding his/her resources and endangering his/her well-being". (Lazarus & Folkman, 1984, 19, 21.)

The transactional model approaches stress from a cognitive perspective. Stress is understood as a subjective experience – although certain environmental demands and

pressures produce stress in substantial numbers of people, individual and group differences in the degree and kind of reaction always exist. According to Lazarus (1966, 44) and Lazarus and Folkman (1984, 23), in order to understand variations among individuals under comparable conditions, stress theories must take into account the cognitive processes that intervene between the encounter and the reaction, as well as the factors that affect the nature of this mediation. Lazarus and Folkman (1984, 31-32) distinguish three types of cognitive appraisal of a situation: (1) primary appraisal, (2) secondary appraisal and (3) reappraisal.

Primary appraisal consists of the judgment that an encounter between the person and the environment is irrelevant, benign-positive or stressful. Stressful situations can take three forms: harm/loss (e.g., sustained damages), threat (e.g., anticipated harm and losses) and challenge (e.g., events that hold the possibility of mastery and gain), with threat and challenge being separate but often concurrently occurring phenomena. (Lazarus & Folkman, 1984, 32-34.)

Secondary appraisal is a judgment concerning what might and can be done in a stressful situation. This complex evaluative process takes into account the degree of threat, the available coping options, the likelihood that a given option will accomplish what it is supposed to, and the likelihood that one can apply a particular strategy or a set of strategies effectively. Secondary appraisals of coping options and primary appraisals of what is at stake interact with each other in shaping the degree of stress as well as the strength and quality of the emotional reaction. (Lazarus, 1966, 25; Lazarus & Folkman, 1984, 32-34.)

Reappraisal refers to a changed appraisal based on new information from the environment and/or the person. A reappraisal is simply an appraisal that follows an earlier appraisal in the same encounter and modifies it. Sometimes reappraisals are the result of cognitive coping efforts; these are called defensive reappraisals and are characterized by an attempt to reinterpret the past more positively or to deal with present harm and threats by viewing them in less damaging and/or threatening ways. (Lazarus & Folkman, 1984, 38.)

This study conceptualizes the quality of working life as resulting from *primary appraisal* and from *the relationship between primary and secondary appraisal*. The scope of this study includes the primary appraisal process, that is, the evaluation of the work situations as irrelevant, benign-positive or stressful. The quality of working life conceptualization of this study extends also to the relationship between the primary and secondary appraisal processes. According to Lazarus and Folkman (1984, 35), the interplay between secondary appraisals of coping options and primary appraisals of what is at stake can be quite complex. For example, other things being

equal, if the person is helpless to deal with a demand, stress will be relative high because the harm/loss cannot be overcome or prevented. If the person has a high stake in the outcome, that is, if the outcome touches a strong commitment, helplessness can be devastating. On the other hand, challenge appraisals are more likely to occur when the person has a sense of control over the troubled P-E relationship, as "the joy of challenge is that one pits oneself against the odds" (Lazarus & Folkman, 1984, 36). In this study, the quality of working life is not conceptualized as resulting from the secondary appraisal process as such, nor are the potential and actualized coping options examined.

In relation to the P-E fit approach, the transactional model is noteworthy in that it incorporates elements of both modes of the P-E fit. The fit between environmental demands and personal skills and abilities comes about in the very definition of stress as involving a P-E relationship in which environmental demands are appraised by the person as taxing or exceeding his/her resources and endangering his/her quality of working life. The values component of the fit between environmental supplies and personal motives, goals and values is apparent in the concept of commitment, which reflects the pattern of goals, motives and values held by the person. According to the transactional model, situations that demand, tax or exceed resources (i.e., demands-abilities misfit), are characterized as stressful only when the meeting of these demands will enhance or preserve a person's commitment. Thus, the transactional model integrates the two modes of the P-E fit, indicating that stress-related transactions between the person and the environment involve *both* a misfit between demands and abilities as well as a misfit between supplies and values. (Edwards & Cooper, 1990.)

1.2.2 The Perspective of this Study on the Concept and Mechanisms of The Quality of Working Life

This study adopts a person-environment, transactional view of the quality of working life. The study concentrates on the *psychological* quality of working life in work organizations, to the exclusion of physiological and physical factors, such as noise, vibrations and exposure to toxic substances. The focus is primarily on employees' *perceptions of their quality of working life*, not on the consequences of these perceptions or experiences, such as coping processes. The quality of working life is conceptualized following the transactional model (Lazarus & Folkman, 1984), the person-environment fit approach (French, Caplan & Harrison, 1982), Shirom's (1982) definition of organizational stress and McGrath's (1976) paradigm for the study of stress as arising from the reciprocal and multidirectional transaction between an employee and his/her work situation as appraised by the person. The definition of

well-being follows the definition made by Levi (1987), according to which it is a dynamic state of mind characterized by reasonable harmony between a worker's abilities, needs and expectations and environmental demands and opportunities. More specifically:

- *The quality of working life is a subjective psychological experience of all aspects at work, which is determined by the proportion and relevance of work-related stress and well-being.*

- *Stress is a subjective negative psychological experience that is caused by a misfit between the perceived aspects of the work environment and the person's cognitions of his/her characteristics.*

- *Work-related well-being is a subjective positive psychological experience that is caused by a sufficient fit between the perceived characteristics of the environment and the person's cognitions of his/her characteristics.*

Figure 2 illustrates the concepts of quality of working life, stress and well-being and their relationships.
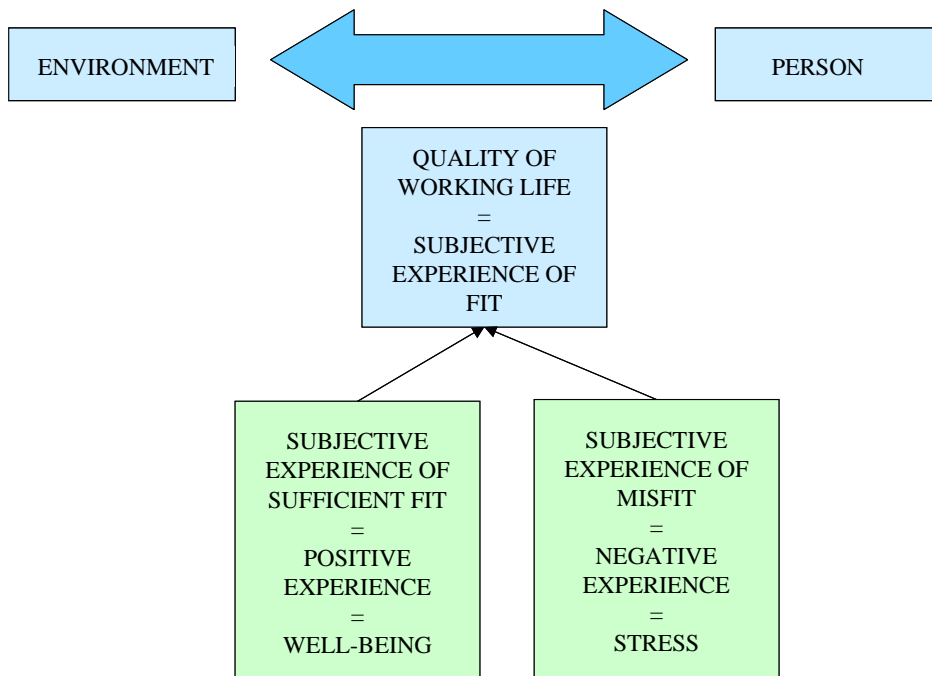
FIGURE 2. Key Concepts of the Study and their Relationships.

It is assumed that a work situation becomes stressful if it is perceived by the focal person as leading to some undesirable state of affairs if left unmodified (McGrath, 1976). The environmental factors potentially leading to an undesirable state of affairs (e.g., demands and constraints) are conceptualized as *stressors*. Stressors are studied mainly in Part II of this study. However, stressors are not considered to be normative (as in the stimulus-based approach to stress) but *interacting and transacting with the individual* (as in the transactional approach to stress).

This study follows the transactional model (Lazarus & Folkman, 1984) focusing on the primary and secondary appraisal processes, excluding reappraisal and coping. Moreover, following McGrath's paradigm for studying stress, the *experience* of stress or well-being as a *subjective state* is viewed as a function of the cognitive appraisal – whether the appraisal is "objectively" accurate or not. As the experience of the quality of working life consists of cognitive elements and dimensions as well as affective and emotional ones, the term "experience" is used rather than "feel" (cf. Parasuraman & Alutto, 1981; 1984).

According to Cox (1978, 92), the effects and costs of stress (a low quality of working life) can be (1) subjective (e.g., anxiety, boredom, depression, irritability, low self-esteem, loneliness and tension), (2) behavioral (e.g., accident proneness, drug taking, emotional outbursts, restlessness, excessive drinking and smoking, excessive or loss of appetite), (3) cognitive (e.g., inability to make decisions and concentrate, frequent forgetfulness, hypersensitivity to criticism and mental blocks), (4) physiological (e.g., increased heart rate and blood pressure, difficulty breathing, numbness and hot and cold spells), (5) health-related (e.g., asthma, coronary heart disease, headaches and migraine, neuroses, insomnia, psychosomatic disorders and psychoses) and (6) organizational (e.g., absenteeism, poor industrial relations and poor productivity, high accident and labor turnover rates, poor organizational climate and job dissatisfaction). This study focuses mainly on *subjective and cognitive* experiences, but also reports some *psychosomatic* disorders (e.g., health-related strains) related to stress.

The findings of this study – the experiences related to the quality of working life during technological change and job redesign – are examined within existing theoretical frameworks. The Job Characteristics Model of Hackman and Oldham (1980), the Job Demand-Control Theory of Karasek (1979) and the Balance Theory of Job Design by Smith and Carayon-Sainfort (1989) are used in particular. These theories reflect the transactional approach to stress by emphasizing the importance of the interaction between the person and the environment in producing the experience of quality of working life. The Job Characteristics Model and the Job Demand-Control Theory focus on work characteristics, unlike the two other influential theoretical constructs in work design research, namely the Two-Factor Theory and the

Socio-Technical Systems approach to autonomous work groups (Parker et al., 2001). In addition to having a transactional orientation to the quality of working life, the Balance Theory can be described as a socio-technical model (Carayon & Smith, 2000). The models are described in detail later on: the Job Characteristics Model in Section 3.5.1, the Job Demand-Control Theory in Section 3.5.2 and the Balance Model in Section 4.1.1.

1.3   The Research Design: Qualitative Methods

The mainstream studies of the quality of working life have employed a quantitative, deductive research design. As an example, according to Brief and Atieh (1987), the typical job stress study can be characterized in the following way: Questionnaire respondents are asked to report their perceptions of the job conditions that the researcher has *a priori* labeled as stressful. Next, in the same questionnaire, respondents are asked to report their job-related affective states. Then, the relationship between "stressful" job-condition perceptions and job-related affective states is statistically ascertained and, if the detected relationship is statistically significant, the researcher concludes that a source of job stress (or a job stressor) has been identified. In addition, perceptions of supposed stress inhibitors or reducers (e.g., social support), as well as individual difference characteristics of the respondents (e.g., locus of control), may be measured and analytically treated as potential moderators of the job stressor - job strain relationship.

The traditional research design has contributed significant, relevant and interesting findings to the theoretical knowledge of the quality of working life. However, Schuler (1982) states that the quality of working life research should not foreclose different methodological approaches, which, in fact, could prove to be more effective. Crump et al. (1980) criticize deductive *a priori* research settings and note that many of the existing measures of stress and strain have been designed without involving the relevant subject population. This has resulted in two fundamental disadvantages: important stressors at work (as experienced by the employees) are excluded and the importance or valence of those that are included is distorted. Thus, the validity and reliability of these measures can be questioned.

Brief and Atieh (1987) suggest on the basis of their literature review four methodological improvements. They propose that (1) researchers examine relationships between objective and perceptual measures of job conditions, (2) researchers examine how workers themselves label the conditions of their work, (3) researchers go beyond theorizing about individual coping mechanisms and study them

empirically and that (4) job conditions and perceived distress are studied with markedly different methods.

This study approaches the quality of working life from a qualitative, inductive perspective. The quality of working life is examined with a case study design. Detailed case studies have been called for, especially in work-design research with the newest forms of work, the properties of which are still relatively unknown (Parker et al., 2001). Job conditions producing well-being or stress are not set *a priori* but are determined by the workers in thematic interviews. Thus, the aim is not to objectively define or measure job conditions, but rather the quality of working life is defined in terms of subjective experiences that result from the interaction of the objective work environment and the subjective perceptions of the worker. Due to the focus on subjective experiences, objective measures of job conditions are seen as somewhat irrelevant in terms of the etiology of the stress or well-being, as the experience is believed to always be subjective, individual and socially constructed. The qualitative method also enables the inference of causal relationships between the perceived work conditions and the experiences related to the quality of working life. As Luthans and Martinko (1987) point out, qualitative techniques are not a throwback to the old quantitative approach, but instead offer the opportunity to obtain needed, rich data relating to interactive human behavior in real, complex organizations.

1.4   The Structure of the Report

Hermeneutic philosophy of science views reality as a social construction (see, for example, Papineau, 1996). Reality is constructed in social interaction and often comes about in narratives and texts that individuals produce on the basis of their individual backgrounds. Narratives are a central element in qualitative studies also. This is evident when thinking about, for example, non-structured interviewing as a data-gathering method: the interviews are full of narratives and stories, which concretize the studied phenomena.

The traditional way of reporting scientific research does not serve the hermeneutical and qualitative worldview. Firstly, narratives within a theme or a research question are constructed in dialog between theory and empirical findings. This dialog is disrupted by presenting theory and results separately, with theory at the beginning of the report and results at the end of the report. Secondly, a qualitative research report itself can be comprehended as a narrative, a story. Due to presenting the material and methods of the study in the middle of this story (between the theoretical and empirical parts of the study), the intensity of the story becomes scattered.

The structure of this report differs somewhat from the traditional manner in which research, especially quantitative research, is reported. The report begins with reporting and describing the data, as well as the data gathering, analyzing, validating and reporting methods. Thereafter, the report is divided in three sections.

In Part I (Chapter 3), *how technological changes are experienced in terms of the quality of working life* is studied. Four empiria-based themes relating to experiencing technological changes in terms of quality of working life are presented. Each theme begins with the introduction of previous research and findings, continues with the empirical results of this study and ends with a discussion of the relationship between the results and previous scientific findings. This structure is recommended for reports such as this thesis, in which the study is based on several small-scale theories rather than one large-scale theory, and in which the research proceeds with the presentation of phenomena rather than the presentation of the chronological phases of the research process. The structure forces the researcher to synthesize the results and think about the connections the separate findings have with one another. (Eskola, 2001.) Moreover, the structure supports the notion that a qualitative theory-building study does not begin with a conceptual framework but rather aims to end up with one (Miles & Huberman, 1994, 298). The four themes represent the most significant highest-level categories obtained from analyzing the data according to inductive and deductive qualitative content analysis. The themes are: Experiences of Technological Implementations, Experiences of Changes in Job Descriptions, Experiences of Learning to Use New Technology and Experiences of Using New Technology. The themes are followed by a discussion section, which covers further discussion of the results of Part I in relation to previous theoretical models and concepts.

One of the conclusions of Part I is that both the technological change *per se* and the job redesign that accompanied it elicited experiences related to the quality of working life. As especially stress experiences were connected to job redesign, a second research question was posed: *"What stressors are experienced in job redesign?"*. Part II (Chapter 4) presents extant literature and empirical results related to experiencing job redesign, especially enriched job descriptions in terms of stress. The results are presented in a framework by Smith and Carayon-Sainfort (1989), according to which stress can decrease the quality of working life by disrupting one or more of the five elements of a work system: the task, technology, organization, individual and environment. The results are also discussed in the light of previous theoretical findings. Thus, the thesis has a cumulative structure, as results reported in Part I provide the justification and basis for issues in Part II.

The experiences of quality of working life related to both the technological change and job redesign are examined together in Part III (Chapter 5) in terms of *ways of experiencing the technological change with job redesign that can be identified in terms of the quality of working life.* Part III presents six ways of experiencing digitalization as a technological change with job redesign.

After presenting the empirical findings of the study in Parts I, II and III, the scientific and practical contributions of the study are discussed, along with incentives for future research.

The dissertation thesis ends with an evaluation of the reliability and validity of the study and the transferability of the results of the study. The structure of the report is illustrated in Figure 3.
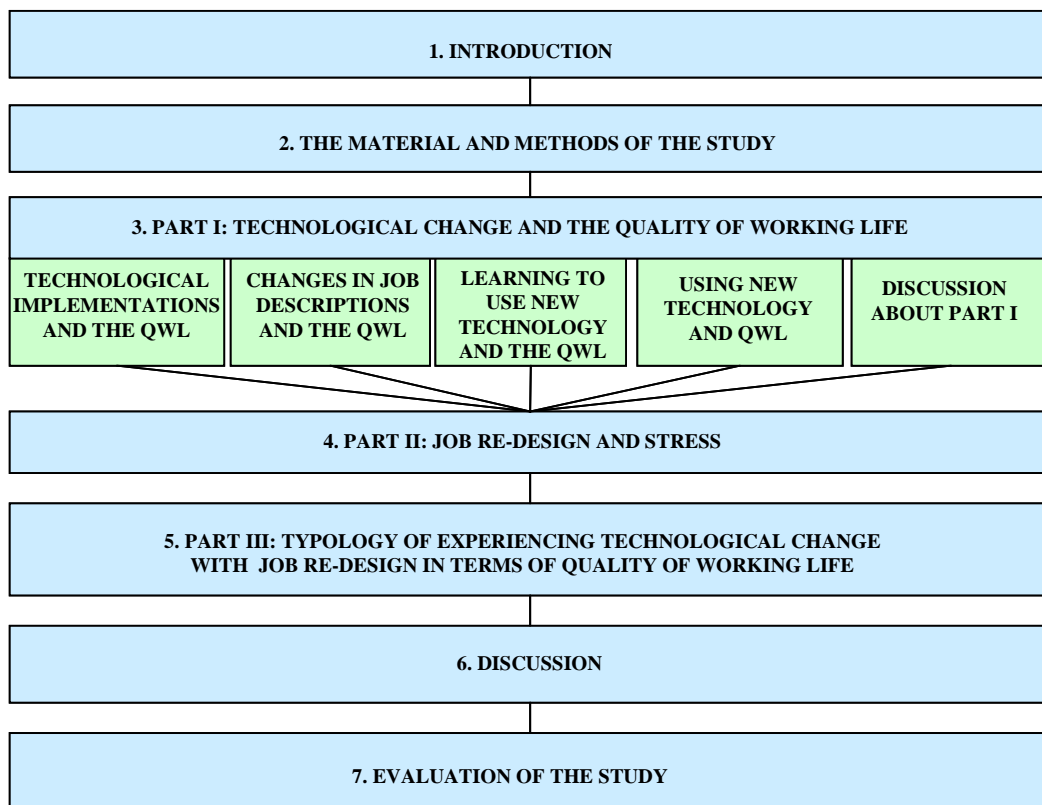
FIGURE 3. Structure of the Report.

2 THE MATERIAL AND METHODS OF THE STUDY

The traditional methodology for studying issues of quality of working life utilizes a quantitative, deductive *a priori* research design, which employs questionnaire surveys and tests as the main data-gathering methods (Brief & Atieh, 1987). This study adopts an inductive, qualitative case design methodology and the main data is gathered by conducting in-depth thematic interviews to employees.

2.1   The Research Questions of the Study

The research questions of this study are the following:

1. How are technological changes experienced in terms of the quality of working life?

2. What stressors are experienced in job redesign?

3. What ways of experiencing technological change with job redesign can be identified in terms of the quality of working life?

2.2   Ontological and Epistemological Considerations of the Study

The central phenomena of this study are quality of working life (including work-related well-being and stress), technological change and job descriptions. The nature of these phenomena and of reality in general are viewed from an ontologically idealist perspective. Thus, rather than adopting a realist approach and postulating an objective reality independent from human perception (see, for example, Boyd, 1996), this study assumes an idealist, relativist approach, according to which reality is constructed by human perception and by the conceptual systems with which reality is described. Thus, according to the idealist philosophical position, the very notion of a reality independent of human awareness is incoherent (Papineau, 1996, 3). The quality of working life consists first and foremost of subjective, individual experiences. Work and work organization are also subjective by nature, although it is assumed that there can be shared and collective ways in which work arrangements, for example, are experienced.

Johnsson and Cassell (2001) have argued that work psychology is currently dominated by a particular form of positivist epistemology that encourages an exclusive focus upon deductive and often quantitative methodologies. In this study, subjectively-constructed reality is approached from an epistemological perspective that falls between objectivist epistemology (which states that knowledge can be obtained objectively and which aims at eliminating the subjective elements that are created when gathering data) and subjectivist epistemology (which states that knowledge is always filtered through subjectivity and which does not see the subjective elements as something to be eliminated but as something to be explicated). On the one hand, this study aims at describing well-being and stress experiences authentically as they have been described in the interviews. Thus, the subjectivity of the researcher, the researcher "bias", is minimized by, for example, using researcher and analyst triangulation in data gathering and analysis (Patton 1999). On the other hand, a subjectivist viewpoint is adopted as the researcher ultimately cannot be objective and non-existent when conducting a study. Thus, in this study, it is realized that knowledge cannot be obtained and processed in an objective way but is always socially constructed.

The epistemological perspective has, however, different emphasis throughout this study due to the different methodological choices. The qualitative content analysis, which is used in the data analysis of Parts I and II of this study, has a more objectivist epistemology than Part III, as the methodology is based on gathering information from the interviewees and thereby setting apart the experiences from the individuals who experience them. Part III adopts a more subjectivist epistemology, as the experiences of the technological change and job redesign are treated jointly, while the subjective context in which they are experienced is left untouched.

The dispositions and values of the researcher may and, especially in the case of qualitative research, will influence the ways in which data are gathered, analyzed and interpreted. In this study, the emphasis is on the subjective quality of working life, that is, on employee well-being and stress experiences. The bottom-up (employee) approach is reflected in the data gathering procedures of the study, for example in the selection of interviewees, and thereby also influences the type of results obtained. Three managers participated in the expert interviews, which were used for describing the case units, but the main data of the study consisted of interviews with 32 employees.

2.3   The Research Approach

In the study, quality of working life was examined using an open-ended qualitative theory-building research approach. Arguments have been made according to which pre-designed and structured instruments blind the researcher to the site, leaving the most important phenomena overlooked or misrepresented. Moreover, they are often context-stripped in order to be universal, uniform and comparable. (Miles & Huberman 1994, 35.) In this study, it was expected that, with qualitative open-ended data-gathering methods, it would be possible to get better acquainted with the reality of the interviewees: to study employee experiences as well as examine processes related to technological changes and job redesign more successfully than with a quantitative method (see, for example, Lehto, 1996, 151).

Experiencing change processes has traditionally been viewed from a modernist perspective, according to which it is assumed that everyone shares the same objective and homogenous reality and that differences in, for example, resistance to change reflect either misunderstandings about the change or individual characteristics that are "in the way" of the change. Presently, a postmodernist, constructivist perspective is emerging, which argues that the reality is interpreted, constructed and enacted through social interactions and that the individual realities and worldviews result in different experiences of change processes. (Ford, Ford & McNamara, 2002.) The division between the modernist and postmodernist worldview is connected to research methods. Two kinds of measures have been used in the organizational development research: hard-criteria, which include psycho-physiological measures of worker behavior, productivity and profitability, and "soft-criteria", i.e., attitudinal and perceptual measures drawn from questionnaires and interviews (Nicholas & Katz, 1985).

As the aim of this study was to examine employee experiences of technological changes and of job redesign, soft-criteria were used. The ontological and epistemological assumptions of qualitative, hermeneutic methodology agrees with the postmodernist, constructive perspective of experiencing change processes, which gives further assurance that the methodology adopted in this study is appropriate. The study was also based on the notion that studying work organizations requires a more understanding approach than yielded through a traditional survey; although it is not possible to generalize from single opinions and experiences, the qualitative method produces a richer representation of the diverse reality than mere quantitative measurements (Pyöriä, 2002). Moreover, as the objective measures of the future impacts of a phenomenon such as technological change are even more elusive than the current subjective factors, it has been suggested that the quality of working life

should be studied from a qualitative subjective perspective, involving a deep understanding of employee experiences (Arzt, 1996).

Barnett and Brennan (1995) state that researchers working with particular disciplines and paradigms tend to focus on a limited set of job stressors, resulting in a patchwork of findings concerning the job stress - mental health relationship. Similarly, Hales (1987) argues that the research concerning the quality of working life has been characterized by experimentation from among a range of measures in isolated settings and among particular groups of employees. The qualitative open-ended methodology utilized in this study attempts to link the single and detached theoretical constructs and empirical findings into a more integrative framework. Barnett and Brennan (1995) also note that there is considerable variation in how the quality of working life is methodologically approached: with outside expert ratings, employees' objective ratings of job conditions, or employees' assessment of the extent to which objective work conditions are experienced as "rewarding" or "of concern".

This study was carried out as a cross-sectional, inductive qualitative case study. Yin (1994, 13) defines the case study as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident". Eisenhardt (1989, 534) describes the case study method as "a research strategy that focuses on understanding the dynamics present within single settings". Thus, the case study research strategy is used in order to deliberately cover contextual conditions that are relevant to the studied phenomenon. In this study, experiencing the quality of working life was seen as a highly context-dependent research object and, in order to fully understand it and its elements (well-being and stress), it was necessary to understand the work context in which well-being and stress were experienced.

According to Yin (1994, 6), the case study method is a preferable research approach when "how" and "why" questions are being posed and when the research focus in on a contemporary phenomenon within some real-life context over which the researcher has little control. This study is a descriptive and exploratory examination of subjective experiences. Although posing also one "what" question, the goal related to this research question was to understand the phenomenon (stress in job redesign) in a qualitative way, rather than examine quantitative occurrences. Also, the aim of this study was to build theoretical constructs rather than merely test them. Mukherjee, Mitchell and Talbot (2002) suggest that an interpretative case study research design should especially be used if the research area lacks a universally understood definition and measurement of the research object. According to Voss, Tsikriktsis and Frohlich (2002), case studies especially contribute to theory-building research as, "unconstrained by the rigid limits of questionnaires and models, it can lead to new

and creative insights, and development of new theory". Furthermore, Voss et al. (2002) argue that theory-building research should be conducted with a few focused, in-depth case studies. In this study, three cases were seen as sufficient work units to be studied, as they provided three research views on technological change and job redesign, but still allowed an in-depth examination of the quality of working life in each unit.

According to King (1986), the most reliable knowledge about the specific social consequences of technological changes comes from field studies of specific technological systems in specific social and organizational settings. Using the case study made it possible to gather information of the job contents and their changes in real-life contexts. Kraut et al. (1989) have also noted that technological change should be studied in different settings and work cultures, as it has inconsistent influences on work and the quality of working life, both positive and negative at the same time. By choosing to use the case study method, similar processes of technological changes could be studied in various settings. With the case study design, it was also possible to take a socio-technical approach into consideration, which assumes that the effective use of technology requires concern for not only the technical context but also the social context of work (Carlson 1999). Further, by using the case study design, it was possible to attach the individual and detached interviews to a larger activity system (Mäkitalo, 1997, 55; Eisenhardt, 1989), that is, the case unit in question. Finally, the decision to use a case study design was also supported by the notion that the technological change progressed in a different way and at a different pace in different media and units.

The focus of this study was on employee experiences related to the quality of working life during technological change and job redesign. The focus could have also been journalistic work: the ways in which the work of journalists has evolved and the theoretical constructs with which it has been described in earlier studies. However, the work of Finnish journalists has been studied extensively in terms of the quality of working life by The Finnish Institute of Occupational Health (for the latest review see Leppänen & Tuomivaara, 2002). Also, the emphasis on technological change and job redesign was seen as more relevant both for scientific discussion and organizational development. Similar development trends, enriching job descriptions, for example, and adopting new technological tools and methods, occur in many industries and organizations. The decision was also justified by the similar findings of previous cross-occupational studies examining stress. Occupational studies for nurses, teachers, caregivers, occupational therapists, firefighters, hospital staff and others have produced a striking degree of similarity in the nature of the stressors from one occupation to another, even in studies that use a more inductive qualitative methodology (Ganster & Schaubroeck, 1991). Thus, the emphasis on the

contemporary trends in working life was more relevant and useful than identifying the occupation-specific characteristics of journalistic work in relation to technological and work organizational changes.

2.4   Data Selection Methods

In qualitative research, data are not sampled statistically, but theoretically, by selecting subjects relevant to the research questions (Eisenhardt, 1989; Eskola & Suoranta, 1998, 61). The data selection of this study included selecting cases, professions and interviewees for the study by using several criteria.

The data were gathered at the Finnish Broadcasting Company (Yleisradio Oy), a limited company, 99,9% state-owned. The company is supervised by the Administrative Council of 21 persons appointed by the Finnish Parliament. The status, assignments and responsibilities of the company are determined by the Act of Yleisradio Oy. The aim of the Finnish Broadcasting Company as a public service organization is to ensure, through its program production, equal opportunities for all citizens to gain knowledge, experiences and enjoyment, as well as to educate and develop themselves. Among companies focusing on electronic communication, the Finnish Broadcasting Company is, in terms of its turnover and personnel volume, the largest mass-media company in Finland (Hansén, 2000, 25). At the time of the study in 2002, the turnover of the company was 374 million euros (The Annual Report of the Finnish Broadcasting Company, 2002). At the end of 2002, 3 719 permanently employed employees worked in the organization. Forty-five per cent of the personnel were women and 55% men. Seventy-four per cent of the employees worked in program production with the rest of the personnel working in auxiliary and administrative activities. (The Personnel Report of the Finnish Broadcasting Company, 2002.)

At the time of the study, the company was in transition from analog program production technology to digital production technology. The process of digitalizing radio and television program production began in Finland in the late 1990's. Public service broadcasting was thereafter digitalized using the terrestrial transmitting networks of the Finnish Broadcasting Company, since this was seen as the only way to reach the whole nation quickly and cost-efficiently (Blomberg, Silvo, Soramäki, Vakkilainen & Wiio 1998, 10-12). Digital radio broadcasts began in October 1998 with the Finnish Broadcasting Company launching the first digital radio channel in Finland, "Radio Peili". Channel "Ylen Klassinen" was launched in April 1999 and the

third digital radio channel, "Radio Aino", in November 1999 (http://www.yle.fi/digiradio/palvelut.htm, cited 27.11.2003). In the television program production, digitalization occurred later than in radio program production. The Finnish Broadcasting Company launched its five digital television channels in August 2001. The two analog channels "YLE TV1" and "YLE TV2" could also be viewed digitally as channels "TV1-D" and "TV2-D". Other digital channels included the around-the-clock news and current affairs service "YLE24", the channel for cultural, educational and science programs, "YLE Teema", as well as a channel focusing on programs in Swedish, "FST".

2.4.1 Selection of Cases

According to Yin (1994, 46), cases in a multiple-case study design must be carefully selected either to predict similar results or to produce contrasting results, but for predictable reasons. The former is referred to as literal replication and the latter as theoretical replication (Yin, 1994, 46). The case selection method used in this study resembles the theoretical replication method, as different types of cases were selected in order to achieve richer data. The cases were selected in cooperation with representatives of the Finnish Broadcasting Company. Three selection criteria were used.

The first criterion was that the research should cover cases from both radio and television program production, as they were the main business branches. Studying the two branches was interesting from a scientific perspective as well, as it made possible the study of how somewhat different technological changes in different branches were experienced in terms of the quality of working life.

The second criterion of case selection was the type of program production. In the organization, two principal types of programs were produced: topical programs and documentaries. It was decided that at least one case study should deal with topical program production and one case with documentary program production.

The third criterion for the case selection was the phase of the technological change. It was seen as important to study an ongoing change. It was thought that if employees had not experienced changes due to the technological change or job redesign, they could not describe how the changes were experienced in terms of well-being and stress. Also, if the technological change or job redesign had occurred a considerable time ago, the employee experiences could be biased as the current well-being or stress experiences, for example, could influence the way in which the quality of working life

was remembered retrospectively. This view was also supported by previous studies, which suggest that retrospective questions should not be used when studying the effects of technological change. According to Kraut et al. (1989), workers tend to assimilate their previous attitudes to their current states and base their interview responses on their views about the effects that technology should have. Therefore, cases were chosen in which digitalization was in progress. Case Ylen Ykkönen was a radio channel concentrating on documentary programs; case YLE24 represented television program production of topical (news) programs and case YLE Teema was a television channel with a documentary focus.

After selecting the cases, two interesting dimensions were found. Firstly, the transition of both well-established and new units to digitalization could be studied. Ylen Ykkönen was a channel in which digitalization was not accompanied by changes in personnel, whereas YLE24 and YLE Teema were new units formed to meet the needs of digital production.

The second interesting feature was that the cases enabled the study of the transfer among older and young employees as well as "aged" and "young" work units. In the case Ylen Ykkönen, the average age of the employees was fairly high (52 years), while the employees of YLE24, in particular, were quite young (39 years). Both of these dimensions, the dimension of established/new units and the dimension of aged/young units, were interesting from the viewpoints of quality of working life. The selection criteria and additional dimensions of the cases are described in Table 1.

TABLE 1. Differences in Characteristics of the Studied Cases.

CHARACTERISTICS OF CASES			
	YLEN YKKÖNEN	**YLE24**	**YLE TEEMA**
TYPE OF MEDIA	RADIO	TELEVISION	TELEVISION
TYPE OF PROGRAM PRODUCTION	DOCUMENTARY	TOPICAL	DOCUMENTARY
TYPE OF TECHNOLOGICAL CHANGE	EARLY PHASE/ ONGOING	ONGOING	EARLY PHASE
PHASE OF THE ORGANIZATION	ESTABLISHED	NEW	NEW
AVERAGE AGE OF THE EMPLOYEES	HIGHEST (52 YEARS)	LOWEST (39 YEARS)	MODERATE (46 YEARS)

2.4.2   Selection of Occupational Groups

As with the selection of cases, the selection of professions was also carried out in cooperation with representatives of the Finnish Broadcasting Company. Two criteria were used to select different professions for the study. Firstly, while the professions had to be highly involved in program production, the auxiliary and administrative professions were seen as clerical jobs, which have been extensively studied in terms stress during technological changes. Therefore, the study did not significantly focus on these job descriptions.

Secondly, the professions had to be changed by the technological change. This criteria turned out not to be problematic as nearly all jobs in program production went through some technological changes. The main occupational groups that were studied were journalists, media journalists and editors.

2.4.3   Selection of Interviewees

The selection of interviewees was carried out in case Ylen Ykkönen by the researchers[1]. In cases YLE24 and YLE Teema, the interviewees were selected in cooperation with the managers of the work units. The two selection methods are further discussed in Section 2.5 when describing the data-gathering methods of the study.

The criteria for the selection of interviewees were fourfold: gender, age, occupational status and work experience. Previous studies showed that technological changes might be experienced differently due to factors such as the level of experience with technology (Freudenthal, 2001), gender (Venkatesh & Morris, 2000), age (Morris & Venkatesh, 2000) and status in the organization (Zachry, Cargile Cook, Faber & Clark 2001). Women and men of different ages were selected to the interviews so that different views of the connections between the technological change and the quality of working life would be revealed. In addition to permanent staff, temporary employees were also interviewed. Moreover, the interviewed employees had been

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[1] Two researchers, Niina Rintala and Sanna Suolanen, participated in the design of the study and in the gathering of data. Data analysis was divided, with Niina Rintala focusing on the quality of working life and Sanna Suolanen on specific changes in competencies and job descriptions. The two analyses were also partly overlapping as the themes were interrelated. The analyses were then compared and their consistency checked to increase the reliability of the study.

working in the Finnish Broadcasting Company for years and had experience of both analog and digital production technology. This ensured that the interviewees had undergone changes related to digitalization and so had views on their experiences in the technological change and job redesign also. Altogether, 32 employees were interviewed.

2.5   Data Gathering Methods

The data of this study were gathered from the Finnish Broadcasting Company. The data were gathered in the "The Lifecycle of Competencies" project of Helsinki University of Technology, TAI Research Centre (see, for example, Suolanen, Helminen, Järvenpää, Immonen & Rahko, 2002). The project began in March 2001 and ended in June 2002. The research project examined how the digitalization of radio and television program production affects job descriptions and skill requirements, and how digitalization is experienced from the viewpoint of the quality of working life. This study focuses on the interviewees' well-being and stress experiences of the technological changes and job redesign interventions connected to digitalization.

The data-gathering phase was proceeded by examining previous studies related to the quality of working life during technological changes. Literature about radio and television program production was studied in order to gain an understanding of the work processes and the changes in work the technological change might bring about. Moreover, documents of the Finnish Broadcasting Company were studied in order to get to know the context in which the process of technological change, i.e., the digitalization of production technology, was occurring. These documents included unpublished and confidential intra-organizational surveys and technological reports. Previous studies, literature and documents were examined in March and April 2001. Having comprehensive knowledge of the studied phenomenon was considered essential, even though the quality of working life was approached in an open and inductive way. Also, this phase of research was guided by the notion that when studying the relationship between technology and the quality of working life, instead of using technology or not using technology, the level and types of use of a particular technology should be taken into consideration (Salanova & Schaufeli, 2000). Thus, it was recognized that the features of technology must be thoroughly understood in order to link the experiences of the interviewees to the technology or technologies in question.

The case studies were carried out consecutively. Work processes of both radio and

television program production were observed and expert interviews of managers were carried out in order to gain a better understanding of the work, changes in work and experienced changes in work. Observation data and expert interviews served as background material, while the thematic interviews of 32 employees formed the main source of the study data. Data gathering was conducted by two researchers. Thus, triangulation was used (Jick, 1979), which – according to Eisenhardt (1989) – enhances the creative potential of the study as well as increases its reliability. The main data were collected using thematic interviews, in which the general themes of the interviews were determined, but specific questions and the order of the questions varied according to the interaction between the interviewer and the interviewee. The methodological choices are supported by Yin (1994, 8) and Eisenhardt (1989), who state that the case study approach uses mainly documents, observations and interviews as evidence. By using a more open approach rather than conducting all interviews in the same strict pattern, it was possible for the interviewees to define the concept 'quality of working life' by themselves. The definitions of well-being and stress were not presented to the interviewees *a priori*. An open-ended approach is emphasized by Eisenhardt (1989), according to whom, theory-building research should begin as close as possible to the ideal of no theory under consideration and no hypothesis to test. The thematic interview also contributed to the studying of processes, their reasons and consequences. Themes of the interviews dealt with job descriptions, changes in job descriptions, skill requirements, changes in skill requirements, as well as well-being and equality during the technological change in question. The themes are illustrated in Table 2.

TABLE 2. Interview Themes of Thematic Interviews.

THEME: BACKGROUND
How have you ended up working with this job description in the Finnish Broadcasting Company?
THEME: JOB DESCRIPTION
Describe your job description and your tasks in the Finnish Broadcasting Company.
THEME: DIGITALIZATION
What does digitalization mean in your work?
THEME: SKILL REQUIREMENTS
What do you have to know in your work?
THEME: CHANGES IN SKILL REQUIREMENTS
How has digitalization changed skill requirements?
THEME: CHANGES IN JOB DESCRIPTIONS
How has digitalization changed job descriptions?
THEME: WELL-BEING
How have you experienced digitalization in terms of well-being?
THEME: EQUALITY
Have all the employees had equal standing during the digitalization?

At the beginning of the interview the research aims and methods were explained. The themes of the interviews were talked through in the order that seemed natural in the interview situation. If the interviewee did not experience some theme as meaningful, it was given less attention. However, the quality of working life was a significant theme for all the interviewees.

The discussion of each theme began with an opening question, after which the discussion was lead, as much as possible, by the interviewee: the aspects (s)he considered to be important were discussed. Specific questions were formulated for the interview and these were used with interviewees of few words (see, for example, Eskola & Suoranta, 1998, 90). At the end of the interview, the interviewee was given an opportunity to add viewpoints that (s)he considered important and felt had not received enough emphasis during the interview. Only a few interviewees raised additional questions, indicating that the interviews were probably quite comprehensive. If the interviewees seemed insecure about the confidentiality of the interviews, they were given the opportunity to read the results of the case study in question before the case report was made public. The duration of an interview was approximately 50-90 minutes. As mentioned, a total of 32 interviews were carried out. All the interviews were tape-recorded and transcribed.

2.5.1   Case Descriptions and Data Gathering

In this study, three cases were examined: Ylen Ykkönen from radio program production and YLE24 and YLE Teema from television program production. The descriptions of the studied cases at the time of the study were based on expert interviews conducted with three managers and one employee, on observations, employee statistics acquired from the HR department of the studied organization, as well as on written material from the Internet. The case descriptions are presented below. Since the data was gathered, some of the cases underwent some organizational and strategic changes. Here, however, it is more relevant to describe the situation during data gathering, as the description of cases enables the reader to better understand the context of the changes in work and the experiences related to the quality of working life.

2.5.1.1   Case Ylen Ykkönen

The radio channel Ylen Ykkönen, presently known as YLE Radio 1, was a national 24-hour channel for classical music, art, culture, drama, education and science. Administratively, the channel was divided into three units: the Department of Speech

Programs, Department of Radio Theatre and Department of Classical Music. Ylen Ykkönen was at that time the only radio channel in Finland broadcasting individual programs from 10 minutes to 1,5 hours, which were not interrupted by advertisements or jingles. The channel was hosted by an announcer (http://www.yle.fi/ylenykko/ryytiedot.html, cited 10.10.2002).

The interviewees that participated in the study were selected from the Department of Speech Programs. At the time of data gathering in May 2001, 49 radio journalists, sound editors and announcers worked permanently in the department. Fifty-nine per cent of the employees were women and 41% men. The age of the employees ranged from 35 to 62, and over two-thirds of the employees were over 50 years of age. The average age of the employees was 52 years. (FBC Statistics, 8.5.2001.)

The production technology of Ylen Ykkönen had been gradually digitalized. The first digital work station for editing audio programs was acquired in 1992. Journalists working in the Department of Speech Programs got personal computers in 1995, at which time some employees began to practice digital editing. In these cases, digital editing software was installed in their PC's so they could edit audio material in their offices. The first editing software was "SAW". In 1998, the sound studios in which speech programs were recorded were equipped with computers and networked together. At this stage, editing in the sound studios was still performed with analog technology. (Typpi, 2002.)

At the time of the study, the analog technology of sound studios was replaced with digital technology. When the case study was carried out, the production of audio programs was not fully digitalized as digital material was still edited roughly first in analog format, after which it was digitalized and edited further. (Typpi, 2002.) At the time, the SAW-editor was also extensively taken into use in the editorial office. Training for digital editing was arranged for the journalists in 1998 and for the sound editors some months later. Training in the use of digital recording systems in sound studios was provided for the sound editors in May 2001. (Expert interview, 4.4.2001.)

At the time of the data gathering, it was clear that further technological changes would bring changes in work in Ylen Ykkönen in the future as well. In 2002, approximately one year after the data had been gathered, Ylen Ykkönen transferred to an integrated production and broadcasting system. The new system required switching over from the editing software "SAW" to "Radioman QuickEditPro". It was planned that the studios would be equipped with "Sadie"-editors, which enable the versatile editing of sound. (Typpi, 2002.) Broadcasting studios were digitalized in order to enable announcers to broadcast the program flow independently. (Expert interview, 4.4.2001.)

The data gathering was preceded by a two-day observation to understand the work process of different occupational groups. Researchers observed the work of journalists, sound editors and announcers. Observation was mainly non-participatory, with researchers observing the work silently, but a few observed employees also explained the work methods to the researchers, in which case, the observation resembled participatory observation. An expert interview was also carried out, as the researchers interviewed one managing editor of the Department of Speech programs.

Digitalization brought about different changes to different professions. Journalists had previously needed a sound editor to record the interviews that journalists carried out in the field and to edit the sound later on. Due to the digitalization of production technology, journalists used digital recording devices when they interviewed in the field. They could then use digital sound editing software, with which it was possible to edit sound in an audiovisual way: the editing was carried out by listening as in the analog program production, but this could also be edited visually from the sound wave presented in the computer display. Also, sound editors changed over from analog cutting devices to the new digital sound editing software. Nevertheless, the transfer to digital production technology did not occur immediately. At the time of the study, announcers still recorded the sound with the analog production technology, and, when archive audio material was used, they edited the sound with analog technology. Broadcasting had not yet been fully digitalized, as is was still done in cooperation with an announcer and sound editor, the former being responsible for the content production of the broadcasting and the latter answering for the technical quality of the broadcasting. A digital sound studio was to be introduced later and the vision was that, in the future, announcers would solely and simultaneously both produce the content and carry out the technical production of the broadcasting. (Suolanen et al., 2002.)

From the radio channel Ylen Ykkönen, eleven employees participated in the study; of these, six were journalists, of whom four were men and two women, four were sound editors, of whom two were men and two women, and one was a male announcer. The average age of the interviewees was 47 years, four years less than the average age of the employees in the work unit. This might be due to the selection of interviewees, which emphasized that the interviewees should have some experience of using both analog and digital production technologies. As the majority of the employees using digital technology were younger employees, the average age of the interviewees was not the same as the average age of the unit. The effects of digitalization on the work of announcers were not completely clear, but this profession was nevertheless included in the study for two reasons. Firstly, some future plans regarding their work

had already been made and, secondly, the employees of the profession were more involved in the program production process than the clerical employees.

Some interviewees asked to see the themes of the interviews beforehand and the themes were sent to them by e-mail. Thinking over the themes might have helped answering the questions in the interview, but no notable differences were identified between interviews for which the themes had been delivered beforehand and those for which the themes had not been sent. Notes were taken during the interview, but only to outline the interview during the interaction situation. Notes were not treated as data, i.e., they were not analyzed in any way, as they were made selectively and were therefore biased.

The interviews began with the interviewer describing the study, its goals and reporting. The interviews mainly took place with no problems. The atmosphere in the interviews was pleasant and the interviewees were discussing even personal and difficult subjects openly. In two interviews, the interviewees were first doubtful about the recording of the interview, but agreed to it when they were told that the interviews would be anonymous and that it would be difficult to use the interview as data if it was based on selective notes only.

2.5.1.2 Case YLE24

Digital television channel YLE24 was launched in August 2001. The channel focused mainly on national and international news, but also on topical programs and press conferences. News programs included news of specific themes, e.g., economical news, cultural news and news in sign language. (http://www.yle.fi/yleista/tv_yle24.shtml, cited 27.11.2003.)

In September 2001, the channel consisted of approximately 50 employees (Expert interview, 4.4.2001), but due to the need for more human resources and to organizational arrangements, the number of employees had risen to 268 employees at the beginning of May 2002. By then, analog production personnel had also been integrated administratively to YLE24. Fifty-four per cent of the employees were women and 46% men. The average age of the employees was 39 years. (FBC Statistics, 6.5.2002.)

At the time of the study in September 2001, YLE24 produced news for various media: the teletext, Internet, analog and digital television channels and mobile receivers, such as mobile phones and PDAs. Almost half of the news broadcasts were also transmitted with analog technology via the YLE TV1 channel. Re-runs of

documentary programs were transmitted on the digital channel between news broadcasts, aired on the hour. The personnel consisted mainly of journalists and media journalists. Media journalists were assigned to three shifts, directing and transmitting broadcasts, editing video and audio material and producing graphics and illustrations. (Expert interview, 20.9.2001; Suolanen et al., 2002.)

The work process began with a news editor assigning stories and subjects to employees. A news piece was produced by a journalist and a media journalist. The journalist created the textual content of the piece, while the media journalist searched and edited video material suitable for the piece in question. Due to digitalization and the implementation of the software "Avstar", editors could search video material from national and international archives and databases, which were provided by major international news agencies (e.g., AFP), for example. They were also able to edit the video material digitally with the software. The journalists could follow the current international news headlines in "Avstar" and watch video clips. The journalist and sound editor could also communicate by writing short messages and comments and sending them via the editing system. Meanwhile, media journalists in the graphics shift produced illustrations such as tables, figures and maps with Photoshop on specific templates. Finally, a media journalist in the directing shift transmitted the news broadcast with semi-automated digital software, "Omnibus". Media journalists had to pre-program the video clips to be broadcast by the software and could then broadcast the material independently by merely controlling the broadcast and intervening in case of technical problems. (Expert interview, 20.9.2001; Suolanen et al., 2002.)

After the data were gathered, a new editing system was taken into use. Previously, it was not possible for a journalist or media journalist to edit video material directly in the editing system; this was only possible for editors. The new system, "Media Browse", enabled journalists and media journalists to do more than view the video material by carrying out rough editing. The material is then finished off with "NewsCutter". (Expert interview, 20.9.2001; Suolanen et al., 2002.) This phase of digitalization was not included in the study as it occurred after the data gathering.

The case study began with interviewing the channel director of YLE24, who described the development of digitalization and its effect on the work processes. Organizational documents relating to television program production and its digitalization were studied. Thereafter, an expert interview of one media journalist was carried out, in which detailed knowledge about the work of different professionals was obtained. The work of media journalists was observed during a one-day period, during which the work processes involved in editing video material, as well as related technical possibilities, were demonstrated.

In the case of YLE24, the interviewees consisted of employees who the managers thought worthwhile interviewing. The interviewees had to be selected in cooperation with the managers in order to fit the interviews into the work schedule of the employees. This selection method ensured that the interviewees had experience both of analog and digital production technology. This was disadvantageous in two ways: firstly, it was impossible to guarantee the anonymity of the interviewees and, secondly, there was no way of knowing whether the managers had selected only compliant employees for the interviews. The latter was viewed as a possible disadvantage, especially with respect to issues relating to the quality of working life. This doubt was eliminated when carrying out the interviews, in all of which both positive and negative experiences were freely expressed.

From the digital television channel YLE24, ten employees were interviewed: six media journalists, one journalist, one news editor and two employees from special professional occupations. Seven of the interviewees were women and three were men. One of the interviewees had a temporary work contract, while the others were permanent staff. The average age of the interviewees was 40 years. This is fairly consistent with the average age of the employees in the work unit, 39 years. However, it must be noticed that the average age of the employees in YLE24 was calculated in May 2002 after organizational restructuring, and does not directly coincide with the average age of the unit at the time of the study. Demographic data about the employees in the unit could not be accessed retrospectively.

The interviewees in YLE24 were contacted by e-mail. All the interviewees had a positive attitude towards the study. One employee criticized some of the interview questions, emphasizing that the changes in job descriptions were brought about due to economic reasons rather than technological change. The data-gathering method was elaborated in one respect: the classification of the results of Ylen Ykkönen formed the basis of questions to be asked when fuller responses were required from an interviewee.

2.5.1.3 Case YLE Teema

Digital television channel YLE Teema was launched simultaneously with YLE24, in August 2001. YLE Teema provided cultural and educational programs, documentaries and drama. The channel also offered classical films, classical music shows and cultural theme evenings. (http://www.yle.fi/yleista/tv_teema.shtml, cited 27.11.2003.)

YLE Teema consisted of three competence centers: those of science, education and culture. These produced programs for several media and channels. At the beginning of May 2002, the channel had 81 employees, of which 84% were women and 16% men. The average age of the employees was 46 years. (FBC Statistics, 6.5.2002.)

The interviewees were selected from the competence centers of education and culture. The competence center of education was previously known as The Editorial Office of the Educational Programs of TV1. The personnel of the competence center of culture were mainly from The Editorial Office of the Culture Programs of TV1. At the time of the study in January 2002, the competence center of education had four production groups – Languages, Adult Education, School TV and Multimedia – to which employees and programs were assigned. The competence center had a program manager and each production group had a leader. There were approximately forty employees working permanently in the competence center of education. In addition to the manager and the leaders of production groups, there were slot producers who were responsible for a weekly program or several programs, production managers accounting for production design and financial management, program assistants, sub-editors and journalists, of which some were journalist-directors. In the Multimedia unit, a multimedia journalist and a media assistant were also employed. (Expert interview, 18.12.2001.) The competence center of culture consisted of 23 permanent and 12 temporary journalists. The personnel included one program manager, secretaries, slot producers, project producers, directors and journalists. There were also so-called "multi-professional" employees, such as a journalist-director-presenter. (Expert interview, 5.12.2001; Suolanen et al., 2002.)

By January 2002, digitalization had not advanced as quickly as expected. The development of digital receivers and set-top-boxes had been slower than expected and consumer markets had not formed, due to which the transfer to using digital production technology was also slower than the company had planned. At the time of the study, YLE Teema had some digital cameras and video editing studios, but the equipment was scarce. There were only a few journalists who had opportunities to use digital cameras to record their own material and later edit the video and audio material digitally; in most cases, the video editing was still done in analog studios by editors. Another major challenge at the time of the study was versifying material into different programs and for different media. (Expert interviews, 5.12.2001 and 18.12.2001; Suolanen et al., 2002.)

Data were gathered in YLE Teema in January 2002. In this case study, observation was not carried out, as researchers had already become acquainted with television program production in case YLE24. The interviewees were selected as in the case YLE24 by selecting the interviewees with the managers. As in the case study YLE24,

the interviewee selection seemed unbiased in terms of the compliance of the interviewees as both positive experiences and critique were freely expressed in the interviews.

From YLE Teema, eleven employees were interviewed; six were journalists and five producers, of whom eight were women and three men. The average age of the interviewees was 47 years, which fits well with the average age of the employees in the work unit, 46 years. The invitations to the interviews were delivered by e-mail. The data were gathered using the same procedures as in the other two case studies.

The interviews had a positive and open atmosphere. The interviewees were interested in the study and wanted to contribute to it. No problems arose regarding the recording of the interviews or the design of the interview questions.

2.6   Data Analysis Methods

According to Eisenhardt (1989), theory-building case study research is characterized by a frequent overlap of data collection and data analysis. In this study, data analysis was conducted in each interview situation, at some level at least, as the researchers mentally compared the experiences of the interviewees. The written analysis began with transcribing the recorded interviews into text. Repetitions and other linguistic phenomena that contained no significant information for this study were not transcribed, as neither conversation analysis nor discourse analysis was applied.

The transcribed data were read through several times before beginning the analysis. Having a comprehensive general impression of the whole data was considered an essential foundation of the later analysis.

Three kinds of data analysis methods were used. Data was analyzed in Part I of the study by qualitative content analysis. The qualitative analysis adopted in this study aims to construct models representing the studied phenomenon in a summarized form in which the phenomenon can be conceptualized. As a result of the analysis, categories, concepts, hierarchies of concepts or models could be produced. (Kyngäs & Vanhanen, 1999.) Data analysis of Part I included within-case and cross-case analyses. The same data was reanalyzed for Part II with a situational content analysis, which focused specifically on stressful situations and stressors. Finally, the data was analyzed with a phenomenographical data analysis method, in which experiences of technological change with job redesign were categorized and ways of experiencing the changes were identified.

2.6.1   Within-Case Analyses for Part I of the Study

Part I of the study examined *how technological changes are experienced in terms of the quality of working life*. The analysis began by conducting a within-case analysis of the data. According to Eisenhardt (1989), the aim of within-case analyses is to become intimately familiar with each case as a stand-alone entity, in order to reveal the unique patterns of each case before the researchers generalize patterns across cases. In this study, the within-case analyses were conducted by using both inductive and deductive qualitative content analysis.

In the first case study, Ylen Ykkönen, the analysis began inductively from the data. The first stage of the analysis was (1) the reduction of data (Kyngäs & Vanhanen, 1999). Experiences relating to the quality of working life during the technological changes were identified and coded. The naming of the codes was also inductive, as code names were derived from the interview. The reduction phase was followed by (2) the grouping of codes (Kyngäs & Vanhanen, 1999), in which individual codes were grouped to form code networks and categories according to their similarities and differences. The aim of organizing the codes was to reach the highest-level concepts. In the conceptualization of data, which refers to making interpretations of the connections between codes (Kyngäs & Vanhanen, 1999), understanding the theoretical background of the studied phenomenon contributed to the analysis, as it helped the researcher to make relevant interpretations of the codes that were overlapping or connected and codes that were detached or unconnected. Therefore, the analysis was, in a way, also deductive. (3) Code hierarchies were then elaborated, ensuring that the codes were named and assigned correctly and that the analysis contained no analogical codes. Finally, (4) the analysis was written. Each code network was consecutively constructed into text. The structure of the written analysis complied with the code hierarchy obtained through the analysis. The higher-order categories of the analysis were "experiencing the implementation process", "experiencing the technological changes", "experiencing learning", "experiencing training" and "experiencing the changes in job descriptions".

During the observation, the expert interviews and the employee interviews, it was noticed that the changes in the television program production were similar to changes in radio program production. Therefore, the classification produced in the analysis of the first case, Ylen Ykkönen, was used as a basis for the analyses in the following case studies YLE24 and YLE Teema. Thus, the classification served as an analysis framework (Kyngäs & Vanhanen, 1999). However, inductive analyses for YLE24 and YLE Teema were also carried out in order to ensure that potential new experiences

were captured and identified.

Firstly, (1) the data were classified deductively to the higher-order categories of the case study Ylen Ykkönen. Thus, experiences relating to the implementation process, the changes in technology and tools, learning, training and changes in job descriptions were searched for systematically. After assigning experiences to the categories, two kinds of inductive analyses were performed. (2) Coding was done within the categories. For example, the category "experiencing learning" was inductively analyzed and new codes such as "excessive learning" and "gradual learning" were found. When the data had been deductively grouped into categories, and the categories had been inductively analyzed, (3) the remaining data were analyzed inductively to discover new categories and sub-categories. In the analysis of YLE24, one new category was found and named "experiencing changes in working pace". The inductive analysis of data from YLE Teema also produced one new category, "experiencing changes in work methods". Figure 4 illustrates the order in which within-case analyses were performed, the degree to which the qualitative content analysis was inductive/deductive, the number of interviews that were analyzed in each within-case analysis, and the higher-order categories that resulted from the analyses.

CASE 1: YLEN YKKÖNEN	CASE 2: YLE24	CASE 3: YLE TEEMA

Method(s):
- Inductive Data Analysis
 	
Data: 11 Thematic Interviews
 	
Results: 5 Categories
- Experiencing the Implementation Process
- Experiencing the Technological Changes
- Experiencing Learning
- Experiencing Training
- Experiencing Changes in Job Descriptions
	Method(s):
	- Deductive Data Analysis
	  (based on the framework of Case 1)
	- Inductive Data Analysis
	
	Data: 10 Thematic Interviews
	
	Results: 5 Categories of Case 1
	1 New Category
	- Experiencing Changes in Working Pace
		Method(s):
		- Deductive Data Analysis
		  (based on the framework of Case 1)
		- Inductive Data Analysis
		
		Data: 11 Thematic Interviews
		
		Results: 5 Categories of Case 1
		1 New Category
		- Experiencing Changes in Work Methods

FIGURE 4. Within-Case Analyses.

In analyzing all the case studies, the software "Atlas/ti" was used. Atlas/ti made the extensive data easier to handle and enabled the precise classification of the data. Codes could be marked and saved to the software and it was possible to form code hierarchies, "code families". After the coding phase, code lists and code hierarchy lists, as well as code hierarchies with citations, could be viewed and printed. Thus, using this software, examining the content of the codes and studying the interactions between the codes was easier than when using normal word processing software (see, for example, Moilanen & Roponen, 1994).

During the analyses, it was noticed that experiences relating to the quality of working

life came up both in inductive and deductive analyses. On one hand, due to the open approach of the study, the interviewees were able to determine the concept of 'quality of working life' subjectively. This unfolded experiences inductively. But as the research project also had research questions related to skill requirements and job descriptions, and the thematic interviews had themes congruent with the research questions, experiences of skill requirements and changes in job descriptions related to the quality of working life were also expressed. These perspectives on the quality of working life could have arisen inductively as well, but the fact that they could also be deductive was taken into account.

2.6.2 Cross-Case Analysis for Part I of the Study

After the within-case analyses, a cross-case analysis was performed in order to examine how technological changes were experienced in terms of the quality of working life. Miles and Huberman (1994) note that the aims of the cross-case analysis are twofold: firstly, to understand and explain the within-case analyses and, secondly, to enhance generalizability. Eisenhardt (1989) states that the goal of the cross-case analysis is to force the researcher to go beyond initial impressions, especially through the use of structured and diverse lenses on the data. Another goal, she argues, is to counteract information-processing biases, such as the tendencies towards selectiveness and excess generalization, by looking at the data in many divergent ways (Eisenhardt 1989). Thus, the aim of the cross-case analysis is to achieve a higher level of transferability and reliability of results.

The cross-case analysis of this study was not performed on the original data, but the results of within-case analyses were used as research data. The analysis began by tabulating case-specific results in order to form a cross-case display suggested by Miles and Huberman (1994, 174). It was noticed, however, that it was difficult to tabulate the detailed and diverse case results without losing information in the analysis process. The data were too rich to be tabulated. That is why another method was selected for the cross-case analysis.

Eisenhardt (1989) proposes three strategies for conducting a cross-case analysis: to look for similarities and differences across cases within a category, within a pair of cases or within a data source. In this study, the first strategy was employed and the cross-case analysis focused on examining the properties of cases within the categories obtained in the within-case analysis phase. More specifically, the cross-case analysis was performed in the same way as the within-case analyses: experiences were inductively identified and coded, after which the codes were inductively and deductively grouped to form larger entities. This was yet more difficult than in the

within-case analyses due to two reasons. Firstly, the data of the cross-case analysis (the results of the case studies) originated from a series of inductive and deductive analyses, and from writing and rewriting these analyses into text. This narrative was difficult to break down to separate units, which could be analyzed later. The text had to be partly rewritten. Secondly, using the software Atlas/ti was inconvenient, since the analysis required editing text, which Atlas/ti did not allow. Therefore, the analysis was carried out with more traditional tools, such as paper and scissors. The texts were cut to separate experiences, to the smallest possible units, which were then grouped and piled together with possible similar experiences from other case studies. Similarities and differences within and between categories of experiences were evaluated and explicated to specify the classification.

The cross-case analysis resulted in four categories: "experiencing technological implementations", "experiencing changes in job descriptions", "experiencing learning to use new technology", and "experiencing using new technology". The category "experiencing changes in working pace", which was inductively obtained from the data analysis of case YLE24, was assigned in the cross-case analysis to the category "experiencing using new technology", as the work pace was connected to the transfer to digital program production and digital work tools. The category "experiencing changes in work methods", which was identified in the inductive data analysis of case YLE Teema, was assigned to categories "experiencing using new technology" and "experiencing changes in job descriptions".

 New work methods, mainly the versification of material and programs, were addressed in the two contexts from different perspectives. On one hand, versification was approached from a technological viewpoint, from which the enabling effects of technology on versification were discussed; on the other hand, it was approached with a job description perspective, in which the focus was on the connection between versification and job descriptions. As can be seen, the names of the higher-order categories were changed to better describe the content of the category. The cross-case classification also resulted in fewer categories than the within-case analyses, as some categories had similar contents and were converged. For example, the new category "experiencing learning" included the former categories "experiencing learning" and "experiencing training", since both of these categories primarily dealt with experiences relating to learning to use new technology. Even though the classification was elaborated, the goal was only to find ways to describe the experiences relating to the quality of working life more accurately and coherently. The experiences were reported, despite the re-organization of former categories, as inductively as they were obtained from the data analysis. Figure 5 illustrates the cross-case analysis as a result of the within-case analyses. The figure describes the degree of inductiveness and the

data used in the cross-case analysis, and the higher-order categories produced in the cross-case analysis.

CASE 1: YLEN YKKÖNEN	CASE 2: YLE24	CASE 3: YLE TEEMA
Method(s): - Inductive Data Analysis Data: 11 Thematic Interviews Results: 5 Categories - Experiencing the Implementation Process - Experiencing the Technological Changes - Experiencing Learning - Experiencing Training - Experiencing Changes in Job Descriptions	Method(s): - Deductive Data Analysis (based on the framework of Case 1) - Inductive Data Analysis Data: 10 Thematic Interviews Results: 5 categories of Case 1 1 New Category - Experiencing Changes in Working Pace	Method(s): - Deductive Data Analysis (based on the framework of Case 1) - Inductive Data Analysis Data: 11 Thematic Interviews Results: 5 categories of Case 1 1 New Category - Experiencing Changes in Work Methods

CROSS-CASE ANALYSIS

Method(s): Inductive and Deductive Data Analysis

Data: Results of the Within-Case Analyses

Results: 4 Categories
- Experiencing Technological Implementations
- Experiencing Changes in Job Descriptions
- Experiencing Learning to Use New Tech.
- Experiencing Using New Technology

FIGURE 5. Cross-Case Analysis.

2.6.3   Situational Analysis for Part II of the Study

When answering the research question of Part I, that is, "*How are technological changes experienced in terms of the quality of working life?*" a significant and interesting new research question emerged. Thus, Part II of the study addresses, "*What stressors are experienced in job redesign?*". In order to answer the research question, a new analysis was performed on the research data. At this analysis phase, the data were not classified into cases. The whole data were analyzed as a complete entity and the unit of analysis was an individual employee.

Part I of the study was conducted with a qualitative inductive research approach, which emphasizes and values everyday working situations in which the quality of working life is experienced. In examining the connections between enriched job descriptions or narrowed job descriptions and stress, this situational view was considered essential. Thus, a situation-based analysis perspective was selected as a basis for the analysis of Part II for two reasons. Firstly, by studying stressors specifically relating to working situations, the full spectrum of experiences could be

examined. Thus, it was assumed that examining stressors specific to some task would provide more information than general stress-related experiences, such as general anxiety at work. It was also thought that the general experiences were more likely to be connected to stressors outside the work domain, e.g., non-work areas, such as the personal sphere of life. Secondly, by approaching stress from the situational point of view, the stressors were put into a context, and it was easier to conclude what the source of the stress was. The decision to study stress related to specific tasks and settings is supported by Taber and Alliger (1995), who argue that a job is not a unitary entity but a collection of many distinct tasks, which contribute (or do not contribute) to job satisfaction in different ways and to different degrees.

The analysis began inductively. Stressors experienced in specific situations were identified and listed. The description of the situation, the related experience, and the potential behavioral or emotional consequences were identified. The stressors connected with different changes in job designs, with enriched job descriptions and narrowed job descriptions, were separated. The situational approach ensured that vague expressions (e.g., mentions of general stress), which were not given a context or a reason, were left outside the analysis. It was believed that experiencing work-related stress was induced by specific factors, of which some were more conscious and explicit for the interviewees than others. Table 3 shows two extracts from the situational analysis.

TABLE 3. Extracts from the Situational Analysis, in which the Situation, the Related Experience and the Behavioral or Emotional Consequence are Described.

	DESCRIPTION	EXPERIENCE	CONSEQUENCE
SITUATION 1	Journalists use several displays and appliances concurrently when performing a task	Cannot concentrate, feels stressed	Wants to specialize in some tasks
SITUATION 2	The cooperation between journalists and editors is decreased	If in a problematic situation, there is no practical or emotional support, the person is insecure and feels stress	Makes sure that there is always someone near-by who can help

When an inductive listing of the situational stressors was yielded, the analysis continued deductively by using the Balance Theory of Smith and Carayon-Sainfort (1989) as an analysis framework. The Balance Theory is described in Section 4.1.1. Selecting the Balance Theory was supported by its system-theoretical nature, which was sufficiently open-ended for qualitative theory-building research. The Balance Theory was also specifically created for examining stress and well-being, whereas the Hackman and Oldham (1980) Job Characteristic Model, which is described in Section 3.5.1, concentrates mainly on explaining the existence and creation of internal work motivation and job satisfaction. The Job Demand-Control Model of Karasek (1979), presented in Section 3.5.2, examines stressors, but is a rather unspecific model explaining the health implications of the interaction between job demands and job decision latitude. Thus, the Balance Theory was seen as a structure within which stressors could be studied in an unrestricted but structured way. The deductive analysis meant that the work system elements were used as classification criteria, according to which stressors were grouped to form higher-order categories. Thus, the stressors related to enriched and narrowed job descriptions were classified into environmental stressors, task-related stressors, technological stressors, organizational stressors and individual stressors. Table 4 shows the classification of the two exemplary extracts into stressor categories.

TABLE 4. Classification of the two example Situations into Stressor Categories.

	DESCRIPTION	EXPERIENCE	CONSEQUENCE	STRESSOR
SITUATION 1	Journalists use several displays and appliances concurrently when performing a task	Can not concentrate, feels stressed	Wants to specialize in some tasks	Category: Technology Description: The need to use numerous technologies simultaneously
SITUATION 2	The cooperation between journalists and editors is decreased	If in a problematic situation, there is no practical or emotional support, is insecure and feels stress	Makes sure that there is always someone near by who can help	Category: Task Description: The decrease in cooperation

Due to the system-theoretical nature of the Balance Theory, the analysis produced qualitatively differing stressors, which were not separate but highly interconnecting stressors within and across the elements of the work system. This was seen as a strength rather than a limitation of the study, as the complex and interconnected

nature of the model is assumed to more adequately represent the complexity of real-world stress situations.

The nature of the stressors was also examined. The stressors were analyzed and inductively classified in terms of their elements that cause the experience of stress. The stressful situations were analyzed and the nature of the stress factors was defined. The causes of stress were further categorized into four broad higher-order categories: "the nature of demands", "social problems", "the lack of organizational support" and "lack of individual motivation or ability".

2.6.4   Phenomenographic Analysis for Part III of the Study

The research question of Part I, "*How are technological changes experienced in terms of the quality of working life?*", and the research question of Part II, "*What stressors are experienced in job redesign?*" were answered by using a qualitative content analysis approach to data analysis. In Part I, the analysis began by performing three within-case analyses, after which the cases were compared to a cross-case analysis. In Part II, a situational analysis was performed, in which the data analysis focused on stressors experienced in specific settings and situations relating to job redesign. Overall, the qualitative content analysis produced descriptions about the experiences of the quality of working life during technological change and job redesign. However, the qualitative content analysis treated the data as a whole and did not produce descriptions about the integrative ways in which each interviewee had experienced the technological change with job redesign. In order to understand *the ways of experiencing the technological change with job redesign in terms of the quality of working life*, a phenomenographic analysis was performed on the data.

Phenomenography was developed about 35 years ago by a group of Swedish researchers whose goal was to identify a qualitative, non-dualistic research approach that focused on people's understanding of their experience of the world around them (Barnard, McCosker & Gerber, 1999; Uljens 1989). This research approach has been used in educational sciences and within health care disciplines especially.

According to Barnard and Gerber (1999), phenomenography is not a scientific theory or even a method but rather "a distinct second-order qualitative research approach that focuses on reflective meaning". Defining it as a "second-order" research approach refers to the way in which it describes the world: not only by taking into account the experiences of a single person but also the experiences of other persons related to that single experience (Amadeo, 1999). In that sense, phenomenography emphasizes

collective meaning rather than individual experience (Barnard & Gerber, 1999). As an approach to qualitative research, phenomenography is the process of describing the variations in people's experience of phenomena through their own discourse (Barnard & Gerber, 1999). Thus, phenomenography studies the variation in experiences and explicates the basic meaning structure of the experiences (Sandberg, 2000). Barnard and Gerber (1999) define the goal of phenomenography as "to describe the qualitatively different ways in which we understand our experience of phenomena in the world around us". Moreover, the aim is to examine experiences in a hierarchical way in order to reveal the interrelations between experiences (Amadeo, 1999). Thus, the phenomenographic analysis should produce a hierarchical classification of experiences.

Figure 6 describes the differences between the qualitative content analysis and the phenomenographic analysis. In the case of the qualitative content analysis, interviews were coded and separate codes were detached from the interview narratives and classified into hierarchical categories. In the phenomenographic analysis, the interviews were treated as integrated entities, which were grouped into categories. In the hypothetical Figure 6, the phenomenographic analysis produces three categories, of which one consists of three interviews, one of two interviews, and one interview forms an entirely new category.
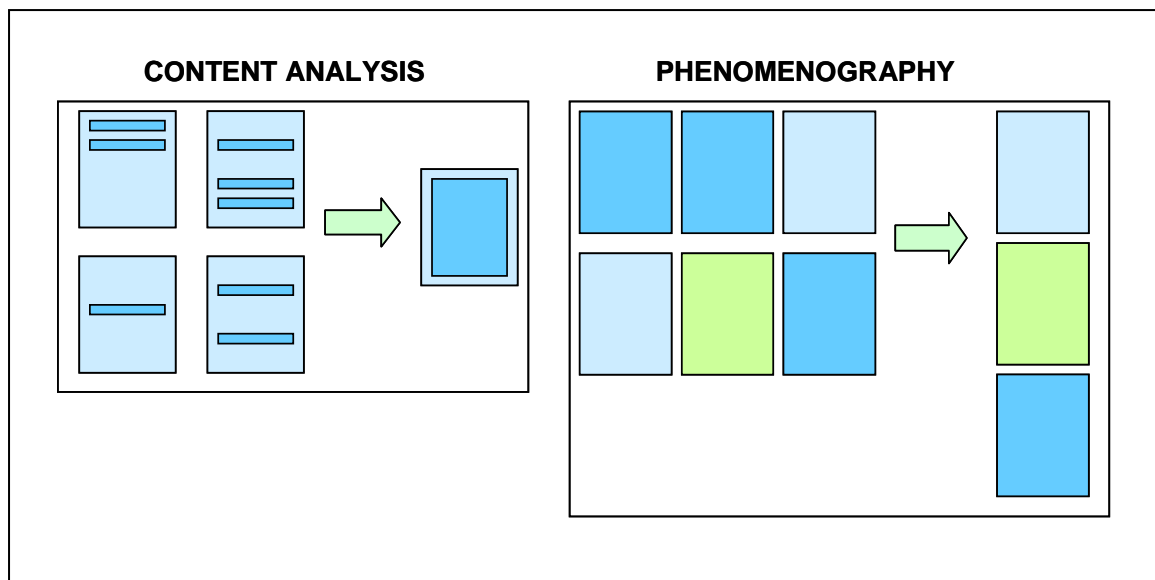
FIGURE 6. Different Logics of the Qualitative Content Analysis and the Phenomenographic Analysis.

In this study, the phenomenographic analysis consisted of five main phases which were applied from Uljens (1989) and the study of Sandberg (2000). The analysis began by (1) getting re-acquainted with and organizing the data. The data were, of course, already familiar, as thorough analyses had been conducted earlier, but the aim was to analyze the data once again from a new perspective. Going through the data also helped conducting the analysis. The experiences relating to the quality of life of each interviewee were summarized in order to enable the more effortless comparison of the contents of the interviews. Moreover, in this summarizing phase, experiences were thematically grouped so that experiences with similar contents were written in the same textual paragraph. Separate, as well as grouped, experiences were then arranged under descriptive headings in order to assist the comparisons of the interviews.

After reading through, summarizing and organizing the data, (2) the interviews were compared and grouped with each other. The comparison began by identifying expressions of emotions, thoughts and actions relating to the quality of life during technological change with job redesign. These experiences were not, however, compared as such, but were proportioned to the context of the whole interview: the general ambiance and overall experience that came across in the interview. Interviews with similar contents and with similar overall experiences were grouped together. On the other hand, differences between the interview contents and experiences were also searched for in order to explicate the categorization. The classification process was conducted three times until the categorization seemed to be valid. As a result of the first two iterative classification rounds, some interviews were allocated to another, more appropriate group.

When the classification had been yielded and revised, (3) the similarities and differences between the groups of interviews were verbalized. According to Barnard and Gerber (1999), this analysis phase results in "categories of description", which represent the central meaning of experiences, as well as describe similarities and differences across them. During the process of producing the categories of description, the classification of the interviews was evaluated again, but it remained the same and thus was considered sound. (4) The groups were named with a term or phrase which best described the content of the categories and their relation to each other. Finally, (5) the interrelations between the groups were hierarchically examined. The groups were organized according to the extent to which the quality of working life was experienced positively or negatively. Although the phenomenographic research approach is highly qualitative, the quantitative distribution of interviewees into the categories of description can also be reported (e.g., Sandberg, 2000). The quantitative reporting was used in this study in order to further increase the

understanding of experiencing the quality of working life during technological change with job redesign.

The result of the phenomenographic analysis can be illustrated graphically. Barnard and Gerber (1999) call such an illustration the "outcome space", which emerges from the research process and is a diagrammatic representation of the logical relationships between conceptions. The phenomenographic analysis of this study ended with the production of the outcome space of the analysis, that is, with a graphical presentation of the hierarchical classification of the ways in which technological change with job redesign were experienced.

2.7   Data Validation Methods

The data and analyses were validated firstly by sending the analyses to three interviewees at their request. These interviewees felt insecure about what they had said and how the recorded interview was going to be reported. The analysis was sent to the interviewees by e-mail about one month after the interview. One of the interviewees contacted the researchers and asked them to change a few words in order to guarantee the anonymity of her colleagues about whom she talked in the interview. These minor changes were made. As the analysis and the interpretations that were made from the data required no major changes, they were assumed to be valid.

Further validation was achieved as the results were reported to the case units. Interactive reporting sessions were organized both for the managers and for the personnel. Results were also reported to various interest groups of the case company, for example, to the occupational safety commission, the equality commission and the cooperation consultative committee of the organization, as well as to the executive group of the research project. Moreover, further validation of the data, the analysis and the results occurred as the researchers discussed the results with individual representatives of the company, such as a work psychologist, a trainer and a personnel manager. The feedback received from these different audiences – employees, managers, HR professionals, commissions and committees – was used for eliminating misunderstandings and specifying the terms used in data reporting.

2.8   Data Reporting Methods

Ethical issues were taken into consideration while carrying out the research. The interviewees had the right to decline the interview; two employees did so due to an excessive workload. The researchers explained the aims of the study openly to the interviewees before the interview began. The researchers also sent the analyses of the data to the interviewees when requested. The results were reported at all organizational levels from the top management to the "shop floor".

Ethics also had to been taken into account in the written reporting of the data. Ensuring the anonymity of the interviewees was seen as highly important in order to gain their trust. In all the case units, the identity of the interviewees could have been disclosed if the citations were accompanied by too many pieces of descriptive information, such as reporting the gender and age of the interviewee. That is why the results had to be reported without comprehensive demographic information about the interviewees. Anonymity of the organization did not need to be concealed as the Finnish Broadcasting Company permitted the use of its name and the names of the cases when reporting research results.

The results of the study are reported mainly at a cross-case level. It was thought that separate within-case reports were not necessary as many features of the technological changes and job redesign interventions were experienced similarly across the cases. The narrative of individual within-case analyses would have been full of repetition. However, in reporting the results, the experiences relating to the quality of working life were connected to the case context in question.

The report was written in language non-native to the researcher. The descriptions of the data, as well as details of the data-gathering and analyzing methods, were first written in Finnish and then translated into English. The same procedure was used to report the results of the study. At first, reporting the study in English was seen as a weakness of the study: it was thought that some information would be lost when translating the text. This turned out not to be the case. Writing the report in a foreign language required more effort and more concentration than writing a report in native language. However, concentrating on the linguistic form of the dissertation did not lessen the attention paid to the content. In fact, refining the language and text ensured that the researcher enhanced the content of the study – the concepts and definitions used, for example – as well as the structure according to which the content was organized. The notion of Miles and Huberman (1994) proved to be correct: "Reporting is not separate from thinking, from analysis. Rather, it *is* analysis".

Citations of the interviews were translated from Finnish to English. This was seen as more problematic as the content of the citations had to be translated as accurately and precisely as possible. The citations were translated only to provide evidence and to enliven and concretize the results. The translation does not reduce the reliability of the study, as the main analyses were performed on the original data in Finnish. To increase the reliability and validity of the study, original interview citations used in reporting this study are presented in Appendix 1. Reporting the citations makes it possible for Finnish readers to go through the original sentences and wordings used in the interview, while reporting them in the Appendix enables fluent reading for the English-speaking audience of the report.

3 PART I: TECHNOLOGICAL CHANGE AND THE QUALITY OF WORKING LIFE

The connection between technological change and the quality of working life was examined by conducting a qualitative content analysis of the 32 thematic interviews. Four themes were formed as highest-order categories in the cross-case analysis: Experiences of Technological Implementations, Experiences of Changes in Job Descriptions, Experiences of Learning to Use New Technology, and Experiencing Using New Technology. These categories are presented in this chapter separately by reporting their theoretical background, empirical results and discussion of the relationship between the results and the theory under each theme. If the results differ across cases, these differences are reported. The theme *Experiencing Technological Implementations* is presented first as it includes general experiences of the change and serves as an ample introduction to the other themes. Thereafter, experiences of the quality of working life related to *changes in job descriptions* are presented, as these experiences bring about the task changes that occur in the work. *Experiences of Learning to Use New Technology* are especially connected to changes in job descriptions, as often the emergence of new tasks require also new skill requirements and learning. *Experiences related to using new technology* can be seen as the most concrete and specific and are therefore presented after the more general experiences have been presented. Figure 7 illustrates the highest-order categories formed in the data analysis and are reported in this chapter.
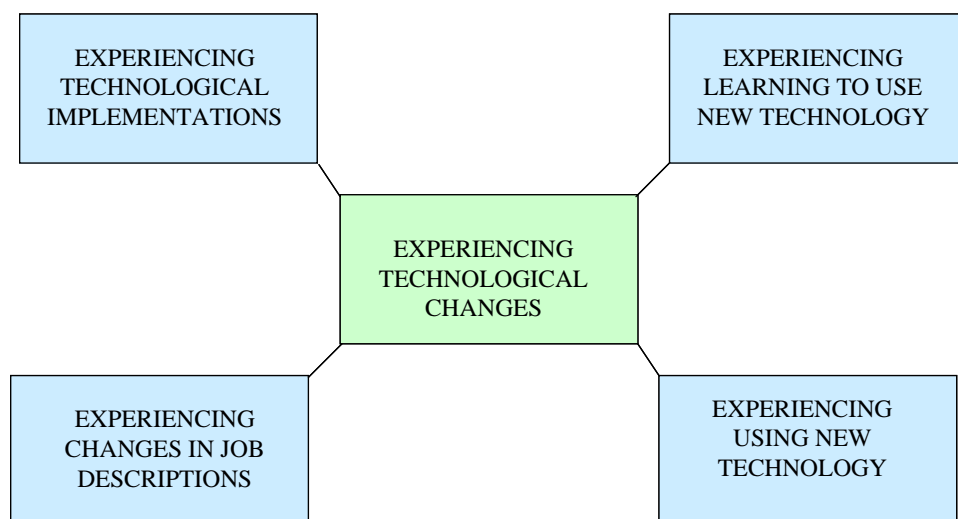
FIGURE 7. Highest-Order Categories of Experiencing Quality of Working Life during Technological Change.

The themes are different perspectives on the same studied phenomenon, the quality of working life during technological change; therefore, the findings are interrelated across the themes. However, rather than being repetitive, they can be seen to complement each other and provide a deeper understanding of the studied phenomenon. Section 3.5 is a concluding chapter, in which the results are combined and examined in the theoretical frameworks of the Job Characteristics Model by Hackman and Oldham (1980) and the Job Demand-Control Model by Karasek (1979).

3.1 Technological Implementations and The Quality of Working Life

Today, technological changes are common to almost all business sectors and industries. These changes begin to form an essential part of the work and they are carried out at an increasing pace. In addition to the effects of technological changes and their organizational by-products on the quality of working life, factors relating to the implementation process of technological changes can also influence employee experiences. Moreover, as organizations are social constructions with individual structures, values, goals and cultures – and with competing structures, values, goals and cultures – changes are different and are experienced in different ways in different organizations and settings. In this section, some critical factors involved in implementing technological changes in terms of the quality of working life are identified.

3.1.1 Theoretical Background on Experiencing Technological Implementations

The implementation projects and technological choices are usually designed and carried out by the managers with personnel participating to varying degrees. Studies into the relationship of implementations of both manufacturing technologies and office technologies and the quality of working life have shown that often implementations fail because they have a top-down mandate, which creates resistance (Carlson, 1999) and induces stress (Karasek & Theorell, 1990, 245; Korunka, Weiss & Karetta, 1993). Similarly, Carayon and Karsh (2000) have found that employee participation in designing and implementing new technologies is positively associated with job satisfaction after the change.

Another issue critical to the successfulness of technological changes seems to be the degree to which the social environment of the technological change is taken into account. Studies on information systems reveal that technological changes can fail if the implementers treat technology as a solely technical issue, ignoring the organizational structure, the corporate culture and the human resource policies within which the application must operate (Carlson, 1999; Mahmood, Burn, Gomoets & Jacquez, 2000). The successful implementation of a technological change requires consideration of both adapting the appropriate technology to the organizational environment and adapting the organizational environment to the appropriate use of the technology. From a socio-technical perspective, technological changes do not occur in isolation, but are accompanied by changes in work processes, work structures and work methods.

Moreover, technological changes can fail if technology is not legitimized in the organization. The adoption of new technology is, or should be, connected to convincing people of the benefits to be derived from the technology and the information systems to be introduced (Mahmood et al., 2000). The visions of future work, which are described to the workers by managers and designers, should be realistic in order to avoid unrealistic and excessively negative and/or positive interpretations of the meaning of the technological change. According to a study on computer anxiety and ICT-based industrial information networks, the introduction of new technology also involves coaching, teaching and encouraging individuals to ensure that they have the requisite skills and confidence in their skills to be successful in using them (Mikkelsen et al., 2002). Providing the employees with positive learning opportunities, as well as realistic and constructive feedback, increases their feeling of competency. Coaching may require trend-setting behavior, or at least a positive attitude from the managers, as research findings on implementing an automated office recording system suggest that employees are more likely to experiment and try new ways of using technology when managers encourage such behavior (Kraut et al., 1989). The way in which the change is portrayed is connected to the way it is experienced. According to Rose (1995) and a study conducted on the implementation of information systems, if a technological change is not presented as a final change but as the next move in a chain of changes, employees are more willing to accept change. Thus, resistance to change and "change stress" (see, for example, Karasek 1979) are also probably lower and experienced more seldom if the change in question is presented in this way.

Individual thoughts, beliefs and expectations of the employees connect with the way a technological change is experienced. Attitudes towards new technology affect the experience of the technological change and the implementation of information systems (Mahmood et al., 2000). According to Haddad (1996), the most significant factors influencing employee attitudes towards new technology and information systems are formal advance notice of planned technological change, the structure of jobs and status-power differences at the time that the technology is introduced, as well as the nature of the work culture.

 As the previous factors indicate, organizational rather than technical factors emerge as the most salient predictors of how employees view new technology. However, a technological change can affect the attitudes of the employees despite the effects it actually has on work. If a technological change, such as a new manufacturing system or an information system, symbolizes development and has acquired legitimacy, the personnel can embrace it even if it does not actually cause any major positive changes in the work (Avgerou, 2000; Hogarth, 1993; Kraut et al., 1989).

The beliefs and expectations of the influences of a technological change might be connected to the way in which the implementation of the change is experienced. Employees, who suspect themselves excluded from the company after the technological change, may experience the technological change as especially difficult. According to the study of Roskies, Liker and Roitman (1988) on the implementation of automated manufacturing systems, these employees feel that there is an uncertain relevance of their jobs to the new mission of the company and that they are not offered enough specific job-related technical training. In contrast, employees who, by virtue of position and skill, have a high degree of job control and influence in an organization, are far less likely to fear adverse consequences of technology, information systems in particular, than those whose jobs are more fragmented and expendable (Haddad, 1996). Moreover, in a study of Axtell et al. (2002) on the introduction of an automated sorting system requiring more operator decision-making, it was found that greater exposure to technological change increases the openness to change and prevents a reduction in the quality of working life, whereas less opportunity to experience the change means a decline in these outcomes. Thus, the more employees participate in the implementation, the more likely they are to welcome changes and to experience the change positively in terms of their quality of working life. The effects of attitudes towards the use of technology are not unidirectional. Attitudes influence the degree to which technology is used, but it has also been noticed that the use of computers affects the beliefs about, and attitudes towards, technology. As employees use computers with information systems more frequently, they become more confident and believe they are more knowledgeable about them (Kraut et al., 1989; Mahmood et al., 2000).

The culture and the size of the workplace can also be in interaction with the introduction of new technology and the quality of working life. Kraut et al. (1989) have found that in a culture in which technological information systems are used more rather than less, and which is professional rather than low in autonomy and flexibility, work satisfaction and work quality (including variety, autonomy and challenge) can be higher. The size of the workplace also interacts with the way in which this kind of new technology is experienced. In smaller work units with better management, technology can increase the quality of working life more and decrease job challenge less than in large work units. Employees working in a small department may also be more confident about using computers, and view the management and training in a more positive way. (Kraut et al., 1989.) These findings may be related to the level of participation the employees are allowed during the implementation: in a small work unit with caring management, the employees are probably more involved in the implementation; having control over the technological change also contributes to their quality of working life.

Finally, it should be noted that generally the uptake of new technology is slow. According to the human factors perspective of Damodaran (2001), this may result from resistance, but far more often from other factors such as the need to adapt to new ways of working, insufficient support for learning, inadequate communication and, most frequently, from a failure to create an organizational culture that encourages technology acceptance. Traditional ways of carrying out work tasks may be persistent and, if learning is not sufficiently supported, they might stay dominant, even though work tools change and require new work methods.

3.1.2 Empirical Results on Experiencing Technological Implementations

The interviewees viewed the technological change in a positive and realistic way. On the one hand, some employees understood digitalization only as *a technological transition*, a change of work tools, in which the work process and its phases did not change. Changes were experienced in the methods of work as the work tools changed, but even these changes were experienced as minor and understandable:

"It has changed somewhat, but it is really the work method [that has changed], the work has not changed but it is done in a different way. Of course, my work has changed during my career here as the work tools have changed, but I don't see it as a change of work, I see it as a part of this occupation. I don't think that the work has somehow changed, I think that this world has changed." [1] (A sound editor, 27 years)

On the other hand, some employees experienced the technological change as *an extensive technological and organizational transition*. These views were more connected to the organizing of work and to adding new tasks to the traditional job descriptions than to the merely technical changes in work. Changes in job descriptions induced stress, which was related to the fear of not being able to perform the work and not being able to maintain the high quality level of work outcomes. These fears reduced as the visions of multi-professional job descriptions were not fully realized, at least at the time of the study:

"I am not in the editorial office every day, but in my opinion there has been a lot of muttering. It has not been painless and maybe the worst was when there was this slogan at the beginning that everyone will do everything, but fortunately now there are some [employees] who do only shifts for teletext because they can do it and are good at it." [2](A television news journalist, 47 years)

Technological change induced feelings of insecurity and stress in all case units, in the radio channel Ylen Ykkönen, in the television news channel YLE24, as well as in the

television channel YLE Teema. In Ylen Ykkönen, insecurity was experienced by some journalists, who had not begun using digital tools, by sound editors, whose job description was questioned due to the introduction of editing software, as well as by announcers, who were expected to begin to broadcast programs autonomously. All these professional groups felt *insecure and stressed about the future of their work and career*. In YLE24, insecurity was felt by the inexperienced users of digital technology. Interestingly, the technological change induced feelings of stress also to those employees who were experienced in using digital technology, as they had to help their inexperienced co-workers in completing their work. As the technological change altered job descriptions and skill requirements, work and work roles had to be partly reorganized, which caused conflicts and tension in the newly launched channels YLE24 and YLE Teema, and induced feelings of stress for individual employees. The interviewees also stated that the atmosphere of the work units had deteriorated. Some interviewees felt stressed and feared that their status in the work unit would be lower after the technological change, as some of their skills and knowledge became obsolete. According to the interviewees, there had been arguments in the work units as the jobs were reorganized and as employees tried to safeguard their positions and their roles as experts in their fields. Role conflicts were not found in the well-established Ylen Ykkönen, in which no changes in personnel due to the technological change had occurred.

As well as positive attitudes, there were also *doubts about the timing of the change*. The interviewees wondered whether the technological change was carried out at too early a stage, as consumer markets for digital radio and television receivers were not yet developed. In Ylen Ykkönen, some employees saw that the digitalization of production technology would have great advantages in the future, but at the time of the study, the technical features of tools for digital program production were not developed far enough. In YLE Teema, some interviewees doubted whether the Finnish Broadcasting Company had enough resources to maintain both analog and digital channels simultaneously and whether there was a demand for all the channels. The timing of the technological changed had caused stress and insecurity:

"I cross my hands in the evening and include in my evening prayer 'Dear God, let our managers be right about this digitalization, because if it is a mistake, it is one of the biggest failures in the history of the company." [3] (A television producer, 52 years)

The low ratings of viewers of the new digital channels caused frustration, stress and decreased work motivation among the interviewed personnel in YLE24 and YLE Teema, especially among employees who produced programs only for the digital channels. These experiences can be linked to launching new channels, as similar feelings did not come about in Ylen Ykkönen. There again, there were also positive

views of the low ratings in YLE24 and YLE Teema, as this situation was seen to be suitable for practicing the use of new production technology.

The quality of working life during technological change was also connected with *the way in which the change was carried out*. Some interviewees stressed that individual backgrounds and needs had been acknowledged during digitalization, which was naturally viewed as beneficial to their well-being. The level of employee experience in using digital technology and the level of motivation to learn to use the new tools had been paid attention, and employees had been given opportunities to learn to use new technology at their own pace. In Ylen Ykkönen, employees had been able to convert to digital technology at their own pace. In YLE24, individuality had been taken into account during training: the learning of one work phase at a time had been made possible if requested. This had been organized by allocating work shifts to meet the learning needs of the employee. In YLE Teema, attention was paid to individuality as the technological change was carried out; employees had not been forced to convert to digital production technology. On the contrary, those who were interested in digital program production had been given opportunities to become acquainted with digital work methods if they so wished. However, in all the studied cases, the interviewees emphasized that digital production technology had been introduced from the point of view of technical tools and projects rather than of personnel, work and of developing the contents of the work; the interviewees felt that they were not as important as the technology. This induced stress. The feeling of being secondary to technology was expressed, for example, in the following way:

"It is inevitable that the fancier the appliances, the more secondary the content production, at least it feels like that at the level of this channel or at the organizational level of the company; development is continuously on the agenda and the first thing which comes is the equipment. It does give the personnel a feeling that we are not essential, but this equipment is." [4] (A radio journalist, 38 years)

The interviewed personnel also felt that *the usability of new tools* was poor and that the technology was therefore controlling the work excessively. In Ylen Ykkönen, some interviewees saw that the development of new technology was engineering-oriented and more concerned with developing technical functionalities than usability. It was felt that the employees were largely at the mercy of the designers of work tools, which caused feelings of stress and helplessness. In YLE Teema, it was mentioned that the dialogical connection between the designers of software and hardware and the content producers was not sufficient and should be developed.

The interviewees determined the communication between the employees and the implementers as essential for the quality of working life, and in all the cases, the *need for more communication* concerning the changes in the workplace emerged. In Ylen

Ykkönen, it was said that future visions and plans were mainly passed on as rumors in the work unit, which increased insecurity and stress:

"I think they [visions] are quite wobbly and in a way it does stress me as I am the type of person who would like to have a clear framework so I know within which framework I can operate. And clearly now there isn't one, which is a bit overly stressful for me. [5] (An announcer, 37 years)

In YLE24, the interviewees also expressed stressful feelings of ambiguity due to a lack of communication, and it was thought that even the managers did not have answers to all the questions raised by technological changes. In YLE Teema, some interviewees had noticed that the more information employees got about technological changes, the less resistance they had, which contributed negatively to the quality of working life. Therefore, it was suggested that the extent of communication would be increased in order to decrease resistance to change.

"It is no more odd than in any other change, when people know too little of it, it is resisted but when it is concretized, the possibilities for doing something new are seen." [6] (A television journalist, 59 years)

Some interviewees also considered that clearer and more extensive communication in the organization during digitalization would have reduced feelings of stress, insecurity, ambiguity and resistance.

Results presented in this chapter related to experiencing the technological implementations are summarized in Figure 8. The results are further classified into experiences relating to the nature of implementations, timing of implementations and implementation interventions. The darker rectangles in the Figure 8 represent stress experiences, while the lighter rectangles illustrate well-being experiences relating to the quality of working life during technological implementations.
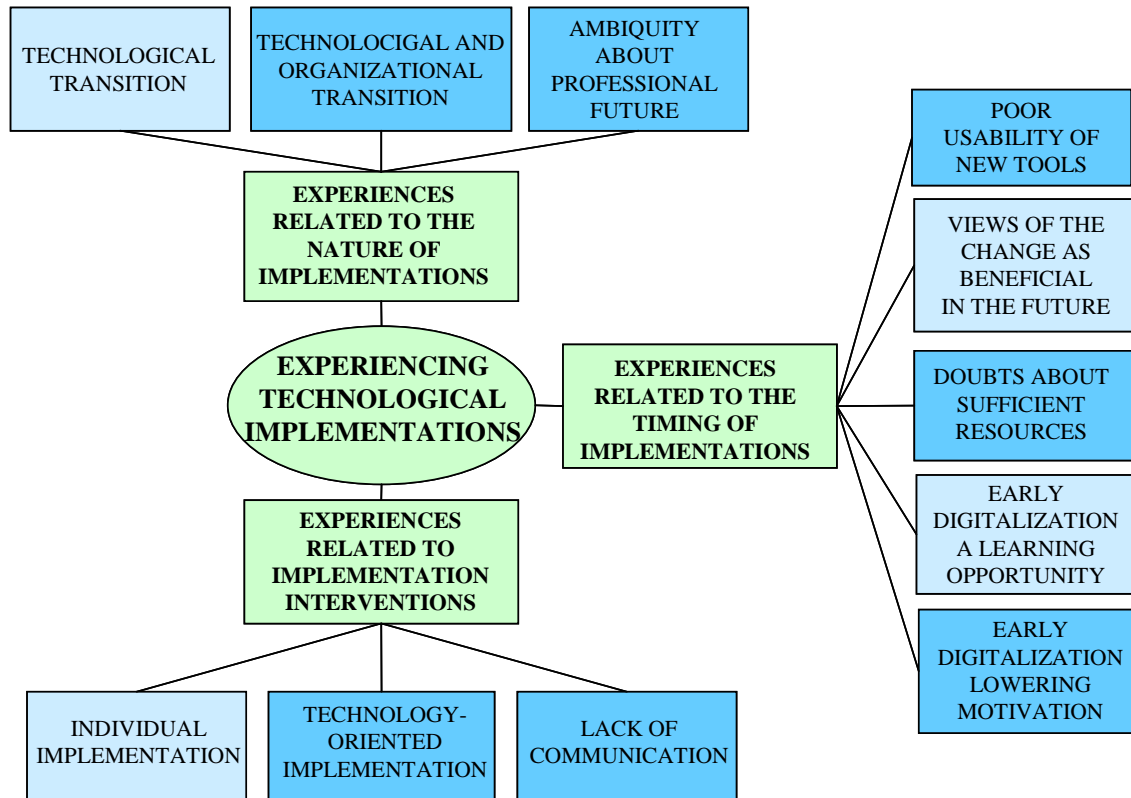
FIGURE 8. Results of Experiencing Technological Implementations (Darker Rectangles Represent Stress Experiences and Lighter Well-Being Experiences).

3.1.3   Discussion of Experiencing Technological Implementations

Technological change was experienced as minor by some interviewees, but others experienced it as an extensive and difficult technological and organizational transition, the latter of which could also be described as a socio-technical transition. The fears and negative feelings and emotions were more concerned with changing organizational work procedures, that is, changes in job descriptions, than with the change in technology itself. The interviewees in new work units (the new television channels YLE24 and YLE Teema), in which technological changes were accompanied by organizational changes, suffered from stressful role conflicts. These observations fit well with the notion of Haddad (1996) that organizational, rather than technical, factors emerge as the most salient predictors of how technology is experienced.

The interviewees experienced that the technological change had been implemented from the viewpoint of technology rather than that of personnel, work procedures or work contents. The implementations were to a high degree designed and carried out by managers. This was experienced negatively in terms of the quality of working life. Carlson (1999) identifies a top-down mandate of technological changes as one of the most common causes that lead to failure in implementing changes. He also notices that technology is often treated as a solely technological issue ignoring the organizational context and environment in which the technology will operate (Carlson 1999). Eason (2001) notices that, even though the design process of the implementations of technological changes has improved due to the adoption of user-centered methods, information and communication technologies remain techno-centric and the organizational outcomes of technological implementations are often unplanned and undesirable. In this study, it also seems that the focus of technological change was on technology, while the organizational factors were not sufficiently considered and/or communicated sufficiently to the personnel.

The lack of communication about the changes increased insecurity. Haddad (1996) includes the formal, advance communication of the planned technological change as one of the most significant factors influencing employee attitudes towards technology. In this study, the importance of communicating about the planned changes came about clearly.

The insecurity, that the interviewees experienced, was also connected with the professional status of the employee. Some interviewees experienced the job description of sound editors being questioned due to digitalization. The new production technology enabled journalists to begin editing their programs and, as editing tasks were transferred from editors to journalists, the job description of the sound editors narrowed down and their status was lowered. This had negative effects on the quality of working life of the sound editors. Roskies et al. (1988) reached similar conclusions, arguing that employees, who suspect themselves excluded from the company after the technological change, experience the change as especially difficult. Also inexperienced users of digital technology experienced insecurity, which was also noticed by Dolan and Tziner (1988) in the context of introducing word processing and record systems. The insecurity of the inexperienced employees may be connected to their low status in the organization. An inexperienced employee usually has an inferior status regardless of the amount of technological experience, as his/her practical professional competence is not high. On the other hand, if an otherwise novice employee has technological skills appropriate to a technological change, his/her status may rise considerably and rapidly. By contrast, an experienced employee with a low level of suitable technological experience may find that his/her professional status is lowered due to the technological change and the changing skill

requirements. Thus, it is possible that, if a process of implementing technology lowers the professional status of an employee, then the technological change will be more probably experienced as more stressful than a process that maintains or raises his/her professional status.

In the interviews, positive appraisals were linked to the way in which individuality was considered in the technological change. The interviewees experienced being given opportunities to start using digital production technology according to their own schedule. Some, however, experienced the stress and fear of not being able to continue in the same profession after the technological change. These fears might suggest a doubt as to whether individual differences in skills and individual needs during technological change can be managed at a practical level. According to Mikkelsen et al. (2002), adopting new technology requires coaching, teaching and encouraging individuals to ensure that they have adequate skills and confidence in them. The lack of confidence of interviewed employees in their skills might have been due to the early stage of the technological change: for many interviewees, the learning process had just begun. It could be assumed that the employees' confidence in their skills would build up as practical experience from utilizing the skills accumulated.

3.2   Changes in Job Descriptions and The Quality of Working Life

Technological changes, together with other driving forces, have enforced and enabled extensive changes in organizations. The changes in job descriptions in many industries and companies are radical rather than incremental. Currently, there is a trend towards technology-enabled job redesign. It has been identified that work in many industries is in transition from a bureaucratic model to a post-bureaucratic model (see, for example, Heckscher, 1994), from an industrial model to an information model (Carlson, 1999; Giuliano 1991) or from the Industrial age to the Network age (Denning & Dunham, 2001). According to Gray (2001), the very nature of the psychological and moral organization of work into jobs and careers is changing due to the introduction of new technology and due to the emergence of the new global, competitive and networked business environment. The traditional view of a career, which belongs to a world in which professional knowledge changes relatively slowly, may no longer be valid, as career paths are no more limited by organizational boundaries (Chang Boon Lee, 2002) or stable knowledge (Gray, 2001). In this chapter, new emerging ways of work organization and their implications to the quality of working life are described.

3.2.1   Theoretical Background on Experiencing Changes in Job Descriptions

The bureaucratic form of work has dominated work organization since the 1950's. This form of organizing work can be defined using the core features of bureaucracy: hierarchy, specialization and workflow formalization. In the traditional bureaucratic organization, the hierarchy of occupational titles makes manifest differences in power and authority (Hirschhorn & Gilmore, 1992). The work is highly specialized: split into tasks performed by employees of specific skills and training. Independent functional departments coordinate pools of specialized expertise (Hirschhorn & Gilmore, 1992). The traditional bureaucratic form of work especially can be characterized by formalization, that is, the extent of written rules, procedures and instructions (Adler & Borys, 1996). The bureaucratic organizational structure is rigid but has a singular advantage: the roles of managers and employees within this structure are simple, clear and relatively stable (Hirschhorn & Gilmore, 1992).

Research findings as to the connections between bureaucracy and the quality of working life have been contradictory and two-fold. Firstly, bureaucracy has been evaluated as negative in terms of quality of working life due to its coercive nature and its ability to override individual autonomy. Rousseau (1989) found in her study that formalization – the extent to which written rules and procedures govern employees'

activities – was negatively related to job satisfaction and innovation but positively related to, for example, psychological and physiological stress. Similarly, Arches (1991) found that reliance on hierarchical authority and formalization – formal rules and regulations – was negatively related to job satisfaction. Secondly, a more positive stream of research that highlights the technical, instrumental function of bureaucracy can be identified. According to this view, it is assumed that work can be fulfilling rather than an inconvenience and that a bureaucratic organization can be cooperative rather than one that overrides individual autonomy. If employees experience as least some overlap between their goals and organizational goals, they can view formalization as contributing to the efficiency of work and positively embrace formal work procedures that are appropriately designed and introduced. (Adler & Borys, 1996.) For example, Organ and Greene (1981) have found that formalization reduced role ambiguity and enhanced identification of employees with organization. Also, a contingency theory has been proposed, according to which high levels of formalization connected with routine tasks and low levels of formalization connected with non-routine tasks are experienced as positive in the quality of working life, and according to which formalization is experienced as negative, often due to the misalignment of task requirements and organizational/job descriptions (Adler & Borys, 1996).

Bureaucracy has been criticized for limiting professional autonomy. By appealing to the negative ways in which bureaucratic work may be experienced in terms of quality of working life (such as the low degree of innovative behavior, the lack of upward and lateral communication, as well as low individual responsibility), an anti-bureaucratic orientation has characterized a number of studies dating back to late 1950's (Engel, 1970). Participatory systems have been spreading during the past 40 years. In the 1960's, the first breaks in the Taylorist/bureaucratic paradigm involved adding vertical responsibility to individual jobs. As this innovation showed its limits, it led in the 1970's to broader efforts to mobilize employee ideas in discussion groups; a decade later, there was a strong growth in teams with authority to shape their own work. Finally, in the late 1980's and early 1990's, there appeared total organizational paradigms that pulled together shop-floor participation with management de-layering and a reduction of rules (Heckscher, 1994).

Thus, as Heckscher and Applegate (1994, 1) put it, the search for an alternative to bureaucracy is almost as old as the concept itself. During the 1980's, a transformation occurred or, rather, began (Heckscher & Applegate, 1994, 2; Shamir, 1999), as both scientists and practitioners reported witnessing the death of the bureaucratic organization and the emergence of a new post-bureaucratic form of organization – referred to as an entrepreneurial organization (Maravelias, 2003), a network-shape organization (Bradley, 2001; Miles & Snow, 1992), a flexible organization

(Hirschhorn & Gilmore, 1992), a knowledge-creating organization (Nonaka & Takeuchi, 1995; Symon 2000), a boundaryless organization (Shamir, 1999), an open organization (Tapscott & Ticoll, 2003, 73), a lateral organization (Mohrman & Cohen, 1995, 365) or an adaptive organization (Hall & Mirvis, 1995).

 The overthrow of the bureaucratic organization and the rise of the post-bureaucratic organization have resulted from an interaction of many factors. Shamir (1999), Hirschhorn and Gilmore (1992), as well as Davis (1995), propose that the faster pace of environmental and technological change, combined with the growth of knowledge, the trend toward globalization and the opportunities created by information and computer-mediated technologies require, and indeed already produced, more flexible organizations in the dawn of the 21st century and revolutionized business relationships. Thus, technological development, rapidly changing businesses and industries, as well as deregulation – more specifically, globalization – have been seen as the driving forces for a change in work from bureaucratic to post-bureaucratic organizations.

The post-bureaucratic organization differs from the bureaucratic organization in that it has a lower level of hierarchy, a lower degree of specialization and, especially, a lower degree of formalization. Post-bureaucratic organizations are flatter and leaner than bureaucratic (Symon, 2000). In the traditional bureaucratic company, job description boundaries are rigid (Dess, Rasheed, McLaughlin & Priem, 1995). In order to guarantee the functioning of the organization, each job description has to be clearly specified by the organization and workers must adapt to the pre-defined roles (Heckscher, 1994, 20). The segmentation of bureaucracy has three major limitations. Firstly, as workers are only responsible for their own jobs and tasks, (1) the organization uses only a small fraction of the capacity of its members. Secondly, as the formal links of the bureaucratic structure are too impoverished to support the work, (2) "informal" organizations, which are hidden from the bureaucratic control systems, emerge. Thirdly, (3) bureaucratic structures do not effectively manage processes over time: they do not evolve smoothly but in "fits and starts". (Heckscher, 1994, 20-23.)

The post-bureaucratic organization is an organization in which everyone takes responsibility for the success of the whole. Transforming organizations into post-bureaucracy requires that the basic notion of regulating relations among workers by separating them into specific, predefined functions must be abandoned. (Heckscher, 1994, 24.) A post-bureaucratic organization consists of *empowered experts*. Instead of focusing on adherence to regulations and job descriptions, employees in post-bureaucratic organizations are empowered to achieve work goals within the guiding principles and values of the organization. The bureaucratic model of work perceives

specialization and routinization of jobs as essential for efficiency and productivity, whereas the post-bureaucratic organization sees these trends as unnecessary and even counter-productive (Baytos & Kleiner, 1995). Separate and explicit job descriptions are replaced by fluid, ambiguous and deliberately ill-defined tasks and roles (Dess et al., 1995). The work force is multi-professional and flexible enough to switch over to new tasks as the environmental conditions of work change. Multi-professionalism might pose a threat to the quality of working life as extreme qualitative flexibility, the idea of one person handling a work process without the input of other specialists (Schabracq & Cooper, 2000), is desirable in terms of efficiency and autonomy. On the other hand, the implementation of it has been seen as no more than wishful thinking, as this way of working lessens the likelihood that each phase of work would be handled effectively (Smith-Faison, 1996).

Work in the post-bureaucratic organization is seen from a process orientation, which means that the workflow is no longer strictly linear and workers more independently self-manage their tasks (Carlson, 1999; Giuliano, 1991; Mark & Wulf, 1999). New ways of working emphasize creative problem solving, for example, and explicit engagement in the task due to which employees should feel more confident and grow in self-esteem (Carlson, 1999). Post-bureaucracy can also be characterized by *the dialogical nature of decision-making processes.* In a post-bureaucratic organization, decisions result from a thorough mixing of the intelligence found throughout the organization. Employees communicate directly with each other rather than hierarchically (Symon, 2000) and the organization is characterized by back-and-forth dialogue rather than one-way communication (Heckscher, 1994, 24). Moreover, post-bureaucratic structures create a framework for (3) *greater responsiveness to environmental changes due to temporary arrangements*. Most of the organizational tasks are accomplished in temporary project teams (Symon, 2000), which is why post-bureaucracy has been described as an "adhocratic" era as it favors contingent arrangements (Rousseau & Wade-Benzoni, 1995, 300). Work is organized in teams and projects that are constructed to meet specific goals and that can be disbanded after the goal is achieved. Project-like work can give constantly new challenges and motivations, but it also poses threats to the quality of working life, as the professional identity, which is a core element in both psychological stability and social cohesion, will divest its meaning (Gray, 2001). Also, the project-nature of work may be experienced as temporarily deskilling: projects may require somewhat different skill sets, which can leave certain skills obsolete for the duration of the project (Tikkanen, 2002).

There are also critical views about the empowering nature of post-bureaucracy. Organizations may carry out empowering interventions, which do increase autonomy to some degree but do not increase dialogue among various parts of the organization

(Heckscher 1994, 29). The critical management theory sees the post-bureaucratic organization as only superficially more emancipating than the bureaucratic organization, as it has "less apparent but no less disciplinary technologies of control" (Maravelias, 2003). Bradley (2000) has noticed that power is invisible in the new forms of organizations: "power has no outward manifestation and is not reflected to the same extent as before in properties and gadgets linked to leadership". Ideological forms of control have emerged, with which workers are controlled implicitly by forcing them to adopt shared goals and cultures, and handing them the responsibility for separating the occupational and personal spheres of life (Maravelias, 2003). According to Maravelias (2003), the increase in stress-related problems connected to work signals the difficulty of maintaining a balance between work and non-work.

Thus, the development trend towards post-bureaucratic job descriptions leads to employees being limited only by the shared goals and identities of the organization, and therefore being able to ultimately construct their own job descriptions. Findings of the relationship between the post-bureaucratic features of work and the quality of working life are scarce. In this study, the central driving force behind the changes in job descriptions is a technological change. In terms of the quality of working life, technological changes that are accompanied with extensive changes in job descriptions and qualification demands have been found to be experienced in a more negative way by employees with low decision latitude and a high external workload (Korunka, Weiss & Zauchner, 1997). Thus, it seems that the less job design supports the quality of working life, the more problematic technological implementations are experienced. The interrelation of changes in technology and job descriptions, as well as the quality of working life, is not, however, this simple and unidirectional. According to studies of VDU and VDT work in information intensive organizations, the connection between technological changes and job descriptions, as well as the interpretation of the changes in terms of the quality of working life, differ due to the features of technology and the needs for which technology is acquired (Aronsson, Dallner & Åborg, 1994; Järvenpää & Immonen, 1998; Korunka, Weiss, Huemer & Karetta, 1995). Furthermore, technological changes such as the introduction of computer-integrated manufacturing systems can have different influences on work depending on the profession and status of the employee (Agnew, Forrester, Hassard & Procter, 1997).

The changes in job descriptions and skill requirements enabled by the introduction of new technology can bring about both positive and negative experiences related to the quality of working life. According to studies conducted on implementing information systems, some employees can feel that they cannot and will not make the shift to new work roles (Martinsons & Cheung, 2001) and ultimately leave the organization (Rose, 1995). A general reluctance to change roles and responsibilities may be due to

inadequate skill sets of employees (Martinsons & Cheung, 2001). As findings on introducing distributed computing systems show, some personnel may feel role ambiguity in technological changes (Sawyer, Eschenfelder, Diekema & McClure, 1998) when roles have not yet been clarified, and some employees may experience their status in the organization as descending. When implementing technologies such as information systems, some employees may become single-dimension performers who adhere persistently to old work methods and are barriers to change (Rose, 1995; Lewis, 1999). Moreover, because communication is highly mediated by technology and there are fewer opportunities to pose questions to clarify ambiguities and misunderstandings, instrumental as well as emotional support from managers and colleagues may be reduced (Mikkelsen et al., 2002). If the channels of communication with other people are restricted and the opportunity to develop strong social support networks are denied due to employees being restricted to workstations, stress can be experienced (Sutherland & Cooper, 2000, 98). On the other hand, some employees may experience role changes in a positive way. They can see that their status is being raised due to changes in job descriptions. They may also demonstrate a passion for learning new skills and behaviors. Moreover, employees may feel in charge of their careers and become more aware of their skill sets and of the need to keep these skill sets competitive.

Changes in job descriptions due to the implementation of new information systems can be positively connected with the quality of working life at first, but induce negative, stressful experiences such as anxiety and lack of work motivation later as the employee becomes more experienced in the new job description and sees its benefits and limitations in practical work situations (Pettingell, 1995). Longitudinal research designs of introducing advanced manufacturing technology have also produced contradictory results, according to which experiences of stress are a reaction to the changes at work and therefore occur during the implementation of technological change and diminish over time (Karuppan, 1995). At worse, the anxiety experienced due to changes in job descriptions may result in employees experiencing fear of becoming redundant. Anxiety is then triggered by the belief that technology, such as an administrative IT system, will replace employees in the organization (Tolsby, 2000). However, the reverse of this process may be the case: employees may experience stress and anxiety due to changes in job descriptions during the implementation, but may find the job descriptions interesting later, as they are stabilized, defined and established.

3.2.2   Empirical Results on Experiencing Changes in Job Descriptions

Job descriptions changed in all three cases. At the time of the study, some changes had already occurred in work due to the introduction of digital production technology, some changes had been planned in the organization but were yet to be implemented and some were still concepts at the planning stage. Traditionally, work processes were divided into separate functional phases, which were carried out by different professional groups. Journalists produced the content of the program. In the radio program production, the programs often included interviews, discussions or sound effects. They were recorded by sound editors. In the television program production, the program consisted of video material, which was filmed by cameramen. After producing and collecting the material for the program, the material was edited: audio material by sound editors and video material by video editors, who also engineered the sound for video material. When finished, the program was broadcast. In radio program production, broadcasting was done by sound editors, who were responsible for the technical quality of the broadcast audio programs, and by announcers, who hosted the radio broadcasting. In television program production, programs were broadcast by a broadcasting team including representatives from several professional groups: a director, for example, and a script girl, an audio editor, a video mixer, cameramen and a video broadcaster.

Together with the introduction of new technology – the transfer from analog to digital program production technology – job descriptions were changed. In radio channel Ylen Ykkönen, journalists, in addition to their traditional tasks of designing and producing the content for the programs, began to edit the sound, previously the job of sound editors. It was planned that announcers, in addition to hosting the broadcasting, would also be responsible for the technical quality of the broadcast sound without sound editors. Thus, the job descriptions of the journalists and announcers were enriched, whereas the job description of sound editors was narrowed down as editing tasks were transferred to journalists and broadcasting tasks to announcers. At the time of the study, training sound editors to be journalists was not planned. In the television channel YLE Teema, similar changes had occurred as journalists had begun to record and edit video material. The job description of journalists was added to with new tasks of a technical nature, while, simultaneously, the job descriptions of editors and cameramen were in danger of being reduced. In television channel YLE24, the changes in job descriptions were different. A new job description of media journalists was created. This job description consisted of several job descriptions of analog production, mainly of job descriptions of editors, graphic artists and directors. Media journalists worked in three shifts with job tasks relating to editing, producing graphics and also directing and broadcasting. The boundaries between the job descriptions of

media journalists (who had tasks similar to those of audio and video editors from analog production) and journalists had changed somewhat, as searching for appropriate video material from archives was transferred from journalists to media journalists. According to the interviewees, the aim of the job redesign was, or at least had been, to train all journalists to be media journalists, capable of not only producing content but also recording, editing and broadcasting material autonomously. Some professionals in the television cases had not experienced changes in job descriptions: the job description of television producers in YLE Teema had not yet changed due to the digitalization of production technology; in contrast, some separate, specialized job descriptions and professions had always been entirely linked to digital production, an Internet producer, for example. Figure 9 illustrates the changes in job descriptions during the digitalization of radio and television program production.

JOB DESCRIPTIONS IN ANALOG PROGRAM PRODUCTION

| CONTENT PRODUCERS: JOURNALISTS | → | RECORDERS: SOUND EDITORS, CAMERAMEN | → | EDITORS: SOUND & VIDEO EDITORS | → | BROADCASTERS: ANNOUNCERS, EDITORS |
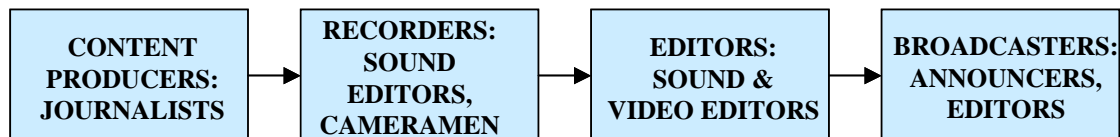
JOB DESCRIPTIONS IN DIGITAL PROGRAM PRODUCTION

| CONTENT PRODUCERS: JOURNALISTS & MEDIA JOURNALISTS |

| RECORDERS | → | EDITORS | | ANNOUNCERS |
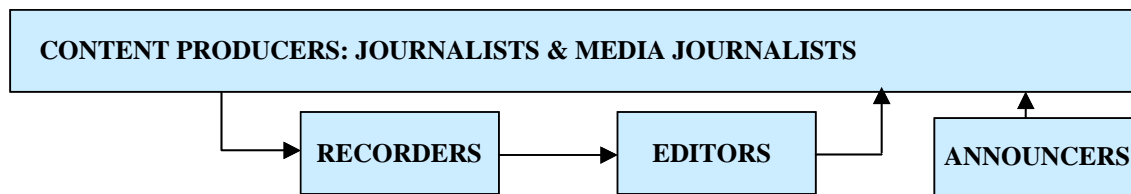
FIGURE 9. Changes in Job Descriptions in Studied Work Units.

With the changes in job descriptions, the *autonomy of work increased*, which the interviewees experienced as contributing positively to well-being and to the quality of working life. In Ylen Ykkönen, the journalists could produce programs in a more independent and autonomous way and the announcers began to broadcast programs by themselves, without the technical support of the sound editors. A journalist described the increase in the autonomy of work in the following way:

"When I worked with c-tapes I had to make a tape chart and go to the studio and work with a sound editor. The change, which is solely positive, is that I get to do the entire program by myself from the beginning to the end and I have a sound editor for the work, which I consider to take time unnecessarily and excessively from my other tasks, such as this finishing. But all the editing, which I can do in my office, I feel as a plus, as positive without a doubt." [7] (A radio journalist, 37 years)

In YLE24, the work of media journalists (of whom the equivalent job description in the analog organization of work had been mainly an editorial job description) became more autonomous, as they could search for video clips themselves before editing the appropriate material. In YLE Teema, the filming by journalists made the journalistic work more autonomous and less dependent on the schedules of professional cameramen. The editing of sound and video material by journalists made the journalistic work more flexible because the journalist could pre-edit the program and the professional editor could thereafter do the final editing. One journalist saw that video editing had changed extensively due to the introduction of new technology and that these changes were positive:

"This digital editing is a fantastic revolution as you can change the order [or video clips]. It is unbelievable how we have done things [before] and it is a pity that these youngsters today, who can directly use digital technology, cannot understand how much effort we have had to put into making these [programs]. It is fantastic, this digital [system], because it is possible to transfer and set and take and bring video clips. And now when I have it at home, it is, it is fantastic, I don't know how any journalist can oppose learning to use it. It doesn't change the fact that you can take your material to a professional editor, because he sees things differently, but the editing is more profound as I know the material so well, but then again every journalist is an individual and some may find it so unpleasant to touch those appliances that (s)he still goes to the studio with his/her bags. But I think that doesn't happen, that there is no time to wind the tapes over there. The thinking has to have been made earlier." [8] (A television journalist, 54 years)

Some interviewees expressed the opinion that, due to the changes in job descriptions, traditional *cooperation between different professionals had been reduced*. The interviewees felt that, due to digitalization and the more independent job descriptions, work had become lonelier, which induced stress and feelings of isolation. In Ylen Ykkönen, the cooperation between journalists, between journalists and sound editors, and between sound editors and announcers was diminished. The overall cooperation in the jobs of these professionals decreased and the interviewed journalists experienced that they got less feedback from their colleagues regarding their work. In the following citation, a journalist describes the danger of becoming isolated due to the increased autonomy in job descriptions:

"And you should really have a work group with which you communicate. There is a danger, which I recognize as well, that you bury yourself too deeply in what you do and there should be social communication and dialog (…) because just by concentrating on your own tasks you go blind.
Q: Is that a negative aspect here [in digitalization] this isolation?
Yes, and these nerd phenomena do exist and it is the same if it happens with computer games or any other material, with every material you can get stuck to just bustle by yourself." [9] (A radio journalist,

38 years)

In YLE Teema, changes in job descriptions included changes from the job description of a television journalist to the job description of an Internet journalist. Due to these changes, some interviewees stated that work became lonelier because making appointments and conducting interviews were no longer included in the job description. In YLE24, experiences of work becoming lonelier did not emerge.

Moreover, the interviewees said that the diminished cooperation *increased demands for concentration*, which induced stress. As tasks were added to the job descriptions of journalists, media journalists and announcers, causing cooperation to decrease, these employees had to take more responsibility for the work process. Some interviewees experienced this as stressful, as the responsibility that the employees had to take on was experienced as excessive. The interviewees felt incapable of controlling their work. Excessive demands for concentration were experienced in Ylen Ykkönen by announcers beginning to manage broadcasting by themselves, in YLE24 by journalists beginning to edit and learning to use new equipment and in YLE Teema by journalists beginning to film video material. An announcer described the increase in responsibility as being due to "loosing a backup":

"I feel that it is a pity because broadcasting goes well in co-operation between a sound editor and an announcer. And now I am thinking what we will lose (…) If we think that some day an announcer manages a broadcast by himself even for two hours, then he is there, sitting by himself and there is no one else around. And then a backup is lost. Now that both the announcer and the sound editor are conducting the broadcast always one or the other ensures and asks if he does not know how to do something." [10] (An announcer, 37 years)

Some journalists, media journalists and announcers experienced fears of *excessive responsibilities*. Some interviewees saw that the job enrichment was a managerial goal, which was driven by economic factors rather than factors concerning production, best practices and high quality. Enriched job descriptions were opposed by appealing to the excessive demands for learning and concentration, as well as to the maintenance of high quality. One interviewee said that employees do not want to work with the enriched job descriptions as they are excessively stressful.

" In my opinion it is clear that people do not want to be multi-professionals, they want to have only a few tasks."
Q: "Can you tell me why?"
"It is too stressful. If you are just producing news for teletext and Internet there are several software that you have to use. There are ten different views on the display, programs and references and tools

and picture programs and archives and everything. It is too much for an average person." [11] (A television news journalist, 24 years)

Another interviewee doubted his/her learning capabilities and was concerned about the quality of work. This interviewee resisted the job description changes strongly:

"Well, taking into consideration that I have been a journalist for 37 years and learnt these last technical issues as an adult, I see that it is improbable that I can edit directly on air and, besides, the qualitative level which I aim at is so high that I would not do it [edit] unless by force. Of course I can do it if I am forced to but I will fight till the end for being able to work using a sound editor unless the program is aired live."[12] (A radio journalist, 54 years)

Some interviewees believed that, as the journalistic job descriptions were supplemented with new editorial tasks, the pace of work would slow down and the quality of work outputs decrease. Even though the commitment towards work might increase, the quality of work would be lower than before the job redesign.

"Illusions of the synergetic advances are overestimated and it will soon be discovered that television program production has certain processes that one worker has to do and they do not speed up but rather slow down if an unskilled person is assigned to perform tasks that another person is capable of doing, it has been a process industry so far and this resembles a revolution, and if workers are assigned to do all tasks, the commitment towards work may increase somehow and the work may be experienced as more of one's own if one participates in doing all the work phases, but as all of these work phases are quite complex and difficult, the end result will not be the same."[13] (A television news journalist, 36 years)

Some interviewees believed that whether or not an employee favored the changes in job descriptions was an individual matter: some employees preferred concentrating on specific tasks and some favored multi-professional job descriptions.

"Well-being in multi-professionalism is an individual thing. If you want to do a little bit of everything, then this multi-professionalism benefits well-being, but if you want to concentrate on some specific thing and do it more carefully, then this has surely had negative effects on enjoying work." [14] (A television journalist, 36 years)

The stressful experiences due to decreased cooperation and increased loneliness were partly replaced with *new forms of collaborating*. Some interviewees stated that the technological change created a new need for cooperation, which led to the emergence of new kinds of informal cooperation. For example, the unreliable technology required collective problem solving within work units: as employees were faced with technological difficulties they turned to their colleagues for help. It was not unusual for a group of employees to be gathered around a computer, trying to think of a

solution to a malfunction. According to the interviews, some employees made new social contacts and relationships as they asked advice from someone technically more experienced. In the case of Ylen Ykkönen, knowledge was shared in these unofficial ways between journalists, between journalists and sound editors, and between sound editors. In television news channel YLE24, some interviewees built informal relationships and 'networks' in order to cope with technical problems collectively. This type of knowledge sharing interconnected the work units of Ylen Ykkönen and YLE24 in a new fashion and resulted in new social relationships. One sound editor described technical problems as having brought sound editors together, but the issues that initiated the cooperation were usually negative:

"Has this [cooperation] been replaced by transferring the programs [electronically] from one work station to another?"

"Yes, people do not meet anymore and someone is just in some other room and notices that 'now it [the material] came here'. But now a new thing has emerged and replaced the previous. As there are all kinds of bustle and problems in those [machines] it has brought people together. When someone wonders about something - previously we just wondered about the rush and busyness and everything worked - but now when something happens, everyone gathers around to see and then we all go and ask someone, if (s)he knows what to do. There can be ten editors thinking about something, this has replaced the previous situation. But the things that bring us together are usually negative. It is stronger but there is a different kind of tension, the work used to be more exciting than it is now." [15] (A sound editor, 35 years)

At the time of the study, the digitalization of production technology had not progressed far in YLE Teema, which could explain why these informal learning groups had not emerged. The need to share knowledge in general across professional and age groups was, however, expressed by some interviewees.

Editorial job descriptions were reduced; interviewees understood that this involved *risks to the meaningfulness of job descriptions* in Ylen Ykkönen and YLE Teema. The interviewees expressed the view that, if the job description of editors becomes too narrow and they only finish off the programs pre-edited by the journalists, the editorial work will become more uninteresting due to the technological change. Thus, some interviewees mentioned that the job descriptions of sound and video editors were in danger of becoming monotonous and consisting of routine tasks. According to the interviews, this was not the case with media journalists in YLE24, even though they had tasks similar to those of editors, as media journalists had other tasks also, such as producing graphics and transmitting and directing broadcasts. Rumors about the future of the editorial job description were experienced as stressful and lowered the quality of working life of editors. Some interviewees said that, as the new production technology was introduced and job descriptions were changed, the need

for professional sound and video editors was questioned implicitly in the organization, which caused stress among the editorial staff. Some sound editors and journalists emphasized that the digital production technology *per se* cannot be substituted for the professional skills and expertise of editors. A sound editor described the experiences related to the rumors in the following way:

Q: "So you have experienced this change [digitalization] as solely positive?"
"I have not experienced it as solely positive, in my opinion there have been misconceptions according to which these computers somehow would replace editors' professional skills. That is not true. There are quite a lot of these misconceptions. Now it is possible to edit in the offices, that is really the change, but it is not so, the computer has no professional skills whatsoever, it is just a stupid machine, which does what it is told. It is not good that somewhere it is thought that the computer replaces some of the professionalism of sound editors. It does not do it, it is a misconception." [16] (A sound editor, 27 years)

Some interviewees saw that the work also becomes more *fragmented* due to features and byproducts of digitalization, such as versifying material into different programs, producing programs and material for different media (such as radio, television, Internet and teletext) and different channels, consulting with technological experts in the organization, as well as using both analog and digital technological formats simultaneously. For example, a television journalist experienced stress due to the incoherence of the work. The work had changed into a collection of different fragmented tasks:

"It feels like the work is somehow a lot more fragmented and there is a huge amount of little things. Previously, especially years ago, you could concentrate on doing your own piece, think about who to interview and how it should be. But now, even doing a piece, in my opinion in the last couple of years, is accompanied by a huge amount of excessive things. You have to pick up the images that are put in the Internet piece to some image files with a graphic artist, or the graphic artist picks them up, but go to the graphic artist and take them and then give headings to the editorial secretary and then take the material to an Internet journalist. And you have to be in interaction with very different sources and there is always a feeling of forgetting something. I think that earlier being a television journalist used to be more about doing your own piece and that's that. And what the journalist did with others, he took a presentation to someone or when you do a piece of course you cooperate with a cameraman and an editor but now there are other things such as delivering information, images, texts or manuscripts about the piece here and there. That is in my opinion a clear change." [17] (A television journalist, 41 years)

The changes in job descriptions led to decreased cooperation, as mentioned earlier. However, some interviewees also experienced that the fragmentation of work resulted in an increase in the number of contacts necessary to carry out the work process but these *contacts were more superficial* than the previous cooperation with editors. Thus, the quantity of social contacts increased but the quality of social contacts decreased.

The enriched job descriptions and the fragmentation of job descriptions had both positive and negative implications on the quality of working life. The interviewees expressed the view that, as job descriptions became more fragmented, work on the one hand became more varying and work motivation, as well as well-being, was increased; on the other hand, feelings of stress and insecurity increased. One television news journalist had had doubts about training for enriched job descriptions:

"I have sometimes wondered if it was a mistake starting to train myself to become a multi-professional, because I feel that I am dragged to different directions, but on the other hand it has brought about a kind of variety, which keeps me working, today I am doing this, tomorrow something else. I like the Internet shifts because I can be in closer interaction with the journalists." [18] (A television news journalist, 24 years)

Results relating to experiencing changes in job descriptions are summarized in Figure 10. The results are further classified into experiences relating to (journalistic) enriched job descriptions, to (editorial) narrowed job descriptions and to cooperation. The darker rectangles in Figure 10 represent stress experiences, while the lighter rectangles illustrate well-being experiences relating to the connections between changes in job descriptions and the quality of working life.
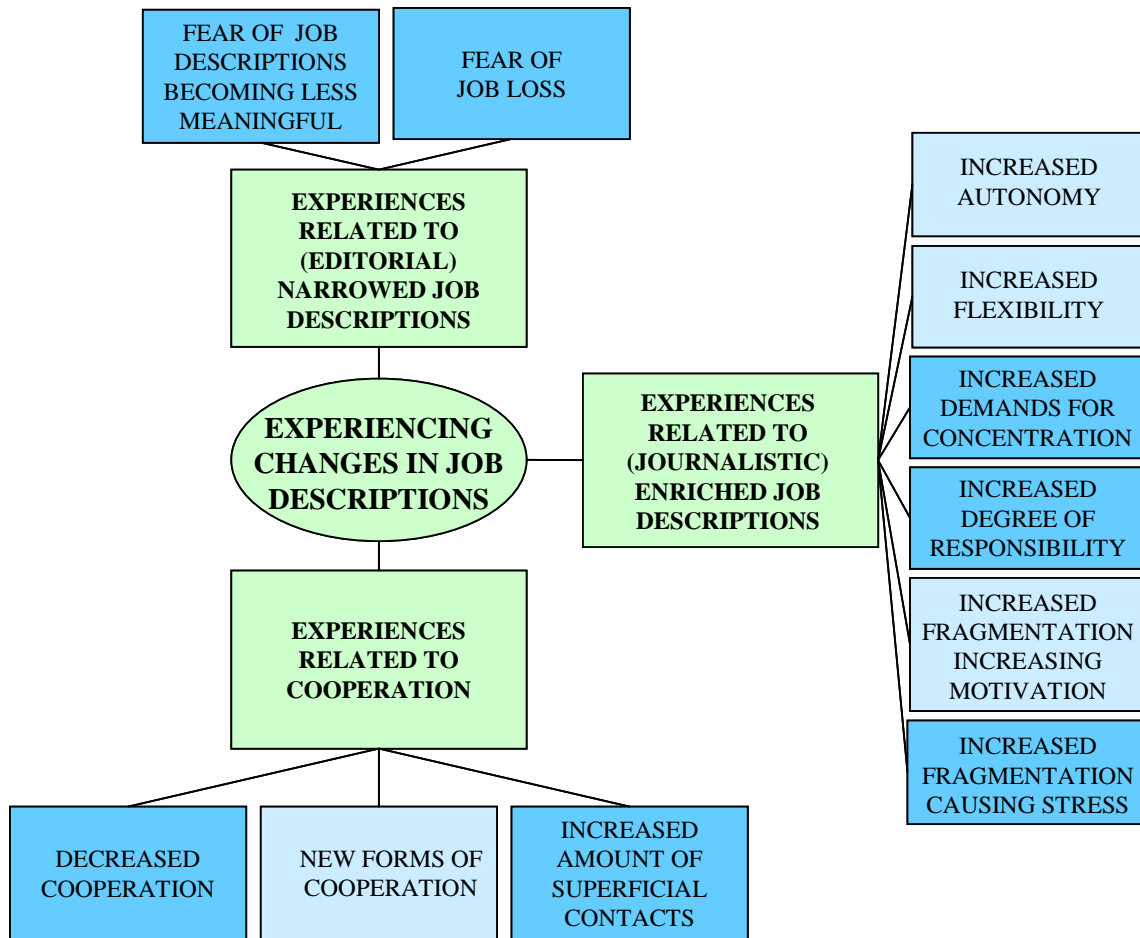
FIGURE 10. Results of Experiencing Changes in Job Descriptions (Darker Rectangles Represent Stress Experiences and Lighter Well-Being Experiences).

3.2.3   Discussion of Experiencing Changes in Job Descriptions

Before the digitalization, the job descriptions of radio and television program production resembled the bureaucratic model of work, in which, according to, for example, Heckscher (1994), each job description is clearly and explicitly specified and the work process is fragmented into relatively autonomous components managed by different professionals. In the three studied work units, job descriptions and skill requirements were changed along with the process of introducing new technology, a development trend, which is noticed widely in the contemporary work life (Martinsons & Cheung, 2001). The interviewees experienced that the changes in job descriptions had been initiated by technological changes as well as managerial goals and productivity-enhancement goals. Although often ignored (Garner & Fidel, 1990; Kraut et al., 1989), the interviewees realized managerial actions had an important influence on the changes in job descriptions.

The changes in job descriptions were relatively radical, altering the traditional functional division of work tasks. The changes in job descriptions were different for different professional groups. The job descriptions of journalists, announcers and media journalists were enriched and these professionals carried out the work process more comprehensively and autonomously. As they also began to perform editing, recording and broadcasting tasks within the work process, they were able to make decisions about their work methods and schedules more independently. The job descriptions of these professions began to resemble the post-bureaucratic model of work (Heckscher, 1994), in which workers self-manage their tasks more independently (Carlson, 1999; Giuliano, 1991). As with the post-bureaucratic model of work (Heckscher, 1994), the employees were increasingly empowered to achieve work goals independently within the framework of the guiding principles and values of the organization. However, the work did not become entirely post-bureaucratic, as even the existence of explicit job descriptions could be seen as bureaucratic.

The job descriptions of sound and video editors narrowed down, as editing, recording and broadcasting tasks were transferred to journalists. Thus, the job descriptions of these professions remained similar to the bureaucratic model of work, as the work consisted of only one limited phase of work. It has been argued that the introduction of automated technology to the bureaucratic model of work may be positive in terms of the quality of working life as the work most likely to be automated is routine work (Kraut et al., 1989). The implementation eliminates jobs that require low skill, as well as the boring and repetitious tasks of skilled jobs. Nevertheless, in this study, technological change altered the organization of work, causing the job descriptions of editors to be experienced as negative in terms of the quality of working life. Further, the need for professional sound and video editors was questioned in the organization, which induced stress and fear of job loss for the editors. Tolsby (2000) notices the same: the belief that technology will replace employees in the organization triggers anxiety. The future of the profession of editors remains unsure. In the television channel YLE24, the job descriptions of the employees who had previously worked as editors had actually enriched as tasks of graphic artists and directors had been added to their job description. These media journalists had also been allocated content-production tasks such as the searching for video material for programs. In the radio channel Ylen Ykkönen, the sound editors had not been trained as journalists, but had not lost their job positions either.

Along with introducing new digital production technology, the job descriptions of journalists, announcers and media journalists became more independent and autonomous, which was experienced as positive in terms the quality of working life. But again, work was seen to become lonelier as traditional cooperation diminished. This was experienced as inducing stress and influencing the quality of working life in

a negative way, as the level of social contacts and feedback decreased, even though the number of contacts, according to some interviewees, increased. Mikkelsen et al. (2002) noticed the same phenomenon: as communication is mediated by computers, there are fewer opportunities to pose questions to clarify ambiguities; therefore, instrumental, as well as emotional support from managers and colleagues, may be reduced. In this study, the subject of a decrease in managerial support and communication did not come up, but the decline in communication between co-workers was highlighted in the interviews. The decrease in social interaction may also have implications on the decision-making properties of the work communities: if the decision-making processes also become post-bureaucratic, informal and dialogical (Symon, 2000), there might be a consistent decrease in the opportunities for employees to take part in the decision-making processes if they do not have sufficient contact with their colleagues. To compensate the diminished cooperation, new, informal forms of cooperation emerged, due especially to technological uncertainty and malfunctioning. The emergence of informal networks may also result from the increased post-bureaucratic features of the organization (Shamir, 1999; Symon, 2000) or from the inability of formal links to support the work (Heckscher, 1994). In YLE24, work was not perceived to become lonelier. This might be due to the type of program production (as news production requires intensive information sharing and cooperation), due to the type of the workspace (as the personnel worked physically close to each other in an open-plan office), due to the minor changes in job descriptions (as the number of entirely new job descriptions created and of tasks transferred from one job description to another were minimal) and due to the average age of the interviewees (the average age was seven years younger than in other case studies).

As job descriptions became more varied and employees began to train themselves to be multi-professionals, the qualitative flexibility (Schabracq & Cooper, 2000) of employees increased, but the demands for information processing and concentration also increased in a stressful way. This notion agrees well with previous findings, which state that the distribution of workload can change with the introduction of new digital technology in the workplace (Mikkelsen et al. 2002). The increase in the cognitive demands of work were emphasized more by interviewees working with the enriched job descriptions (journalists, media journalists and announcers) than sound editors, whose job description was narrowed down.

Interestingly, some interviewed journalists mentioned that, with the process of job redesign, their work had become more fragmented, as well as more independent, as a result of versifying programs, producing material for different channels, using several formats and communicating with technological advisors. The fragmentation led to somewhat increased social contacts but the quality of these was not sufficient to

replace the previous cooperation with editors. Moreover, enriched job descriptions were seen as interesting but excessively stressful, as the learning of new tasks was experienced as difficult and enriched job descriptions were experienced as negatively linked to both the pace of work and to maintaining a high level of quality of programs. These views can be related to the observation of Smith-Faison (1996), according to which the idea of multi-professional job descriptions is desirable, but only wishful thinking in its implementation, as it lessens the likelihood that each phase of work would be handled effectively.

3.3   Learning to Use New Technology and The Quality of Working Life

Technological change is often swift and continuous, and so gives rise to a need for ongoing training and the learning of new skills. Professionals in technology-intensive businesses face even increasing risks of being made obsolete because of the erosion of skills in rapidly developing industries (Chang Boon Lee, 2002). As changing and unpredictable circumstances characterize organizations and their environments, there is an increasing need for employees, managers and organizations to become more flexible and adaptive than in the past (Vicente, 2000). It might be due to the ongoing change of work tools, that employees working with technology experience lower professional self-esteem (Kalimo, 2000) and a greater need for further education (Blom, Melin & Pyöriä, 2001) than other employee groups. Continuous technology-driven learning can also lead to experiences of stress (Gard, 1990; Kalimo, 2000; Korunka et al., 1997). The transfer from rigid, specialized bureaucratic job descriptions to loosely defined and extensive post-bureaucratic job descriptions requires multiskilling: workers must master several jobs rather than only one narrow task, as was the case during industrialization (Howard, 1995, 35). Continuous development of skills seems to be, therefore, vital in work with technology. The employee must have learning skills in order to adapt to the evolving work environment and to maintain his/her competence level in the future. As the nature of expertise changes from stable to rapidly changing, new models for training have been introduced. For example, Hall and Mirvis (1995) suggest that lifelong learning should be promoted by keeping people moving through a number of career cycles of exploration-establishment-maintenance-disengagement, rather than trying to prolong the maintenance stage of their career.

Experiencing learning technological skills is influenced by the features of the new technology, the features of informal and formal training as well as the features of individual learners and learner groups. In this study, skills, which the employee acquires through learning, refer to micro-level phenomena – to the qualification demands of sets of tasks of different employees and professionals – rather than as macro-level corporate competencies. In this study, skill is defined according to Ellström (1997) as including cognitive elements (such as context-specific knowledge), meta-cognitive elements (such as problem-solving and learning skills), as well as non-cognitive elements (such as values, interests and personality traits). Following the P-E fit model of stress (French et al., 1982), it is assumed that from the perspective of employee quality of working life it is essential that the skills of an employee correspond with job demands. The feelings of expertise the employee has give protection against work-related stress (Toppinen & Kalimo, 1997). The qualification

levels of employees' occupations also determine which characteristics of work are critical from the point of view of well-being in work using new technology and visual display terminals (Lindström, 1991). For example, the well-being of employees with a lower qualification level (e.g., customer service and office employees) can be determined by control over the VDT work situation, scheduling, control and autonomy of work, whereas the well-being of the more qualified employees (e.g., ADP experts) can be determined more by job-related factors, such as the difficulty of tasks, poor supervisory practices and haste at work (Lindström, 1991). Learners may lack confidence in using new technology, and they may also lack skills and attitudes of learning independently and consciously (Lewis, 1999). Also, research into introducing record systems and word processing found that the level of experience in using technology was connected with the way employees experienced learning and training. Learning caused the inexperienced users higher levels of stress associated with work contents and aspects related to their career path, whereas the experienced users felt higher levels of stress associated with contextual aspects of work, such as training and instruction (Dolan & Tziner, 1988). Moreover, technological change may obviate the traditional competency of an employee almost completely. Changes will be experienced as especially stressful if the new technology is under the control of other professionals, such as the implementers or the designers. In this case, according to a study into the implementation of a database system (Haines, 1999), the employees can be dependent on the technical skills and knowledge of other occupational groups, and unable to perform their work autonomously.

In this section, previous studies relating to learning to use new technology are presented using three approaches. These approaches were selected according to their perceived relevance to the empirical results derived from experiences of learning to use new technology. Firstly, two hypotheses of the impacts of technology on work and skill requirements, namely reskilling and deskilling, are examined. According to the early critique of Braverman (1974, 443), the breakup of craft skills and the reconstruction of work as a collective or social process destroys the traditional concept of skill and leads to a situation in which mastery over work develops only in and through scientific, technical and engineering knowledge. The technological change can be deskilling when technology takes over some skills of employees and leaves the work unchallenging (Kraut et al., 1989). Reskilling (or upskilling) claims the opposite: the use of technology requires new skills, and work becomes more interesting and motivating (Haines, 1999; Hollanders & ter Weel, 2002). Secondly, previous studies have identified some new skill requirements brought about by the use of new technology and by transition towards the post-bureaucratic form of work, which alters the fields of know-how and strongly supports the reskilling hypothesis. The need for higher specialization as well as general, multipurpose skills is highlighted (Gray, 2001; Denning & Dunham, 2001; Haines, 1999). This

contradiction, i.e., the need for, on the one hand, specialized and, on the other, multi-professional, knowledge and expertise, is discussed below. Thirdly, experiencing the ways of dealing with reskilling, i.e., training and learning during technological changes, are discussed.

3.3.1 Theoretical Background to Experiencing Learning to Use New Technology

In general, technological changes have been found to have twofold influences on skill requirements: utilizing new technology in work has been seen to decrease and simplify skill sets but also increase and enrich the variety of required skills. On one hand, deskilling has been noticed. At an individual level, the deskilling hypothesis implies that the overall quality of jobs as experienced by employees decreases. As technology, especially automated technology, incorporates some skills of the employees they feel less challenged by their jobs (Kraut et al., 1989). The effects of deskilling can be subtle and complex, as the employees themselves may not recognize the potential for deskilling and may participate in their own deskilling (Carroll, 1997). If technology incorporates some of employee decision-making privileges, the autonomy of employees is decreased. To the extent to which technology makes the jobs more routine, employees experience less variety in their work. If employees must coordinate their activities through databases rather than through direct communication, some of the social satisfaction of work decreases as employees become less connected to their primary work groups. Finally, as is often the case, if the introduction of technology renders some skills obsolete, while requiring employees to learn new ones to operate the new technology, employees may doubt the adequacy of their primary training. (Kraut et al., 1989.)

With technological change, work can become increasingly routine, fragmented and simplified (Agnew et al., 1997). The proponents of deskilling argue that deskilling can and will occur during technological changes. However, there are a number of studies suggesting that although deskilling might occur, there is also an extensive set of background variables that moderate the relationship between technology and perceptions of deskilling (Coovert, 1995, 178). Thus, the fundamental reasons for deskilling cannot be reduced to technology alone.

On the other hand, technological change has been found to lead to employees becoming more knowledgeable, more productive and more skilled (Haines, 1999; Hollanders & ter Weel, 2002). Looking at high-skill professionals, this reskilling, or upskilling, of the workforce is even likely to be due to an emerging "skill gap", as many companies are expecting difficulties in finding enough skilled professionals (Hall & Mirvis, 1995, 327). Reskilling brings about changes that are experienced as

positive in terms of the quality of working life: employees can increase their direct knowledge of company activities, their work can improve in terms of volume and speed and their skills can be developed. The technology-enabled opportunities to increase professional competency and expertise and to develop work are usually experienced as positive in terms of the quality of working life (Leppänen, 1997). More challenging and complex jobs also increase creativity and innovativeness (Oldham & Cummings, 1996). In a study on implementing an information system, the increase in qualification demands lead to a situation in which employees experienced the work as more interesting after the introduction of technology than before it (Palmini, 1994). Reskilling and deskilling hypotheses can be connected to different kinds of technological change: reskilling is likely to occur when introducing complex and interactive technology, whereas deskilling can take place when introducing technology that can be defined as simple automation and simple information systems, such as credit management systems (Parkinson, 1999) and customer control records (McIntyre, 2001).

Due to technological change, both deskilling and reskilling can occur (Haines, 1999), even in the same work unit with technology enhancing the quality of work for some employees and degrading the work of others (Agnew et al., 1997). The nature of the effects technological change has on jobs has been argued to be much of a managerial choice. According to Agnew et al. (1997), a number of studies conducted into the effects of introducing new technology in the workplace have shown that technological change can be implemented without deskilling taking place. These studies indicate a significant role of managerial choice in determining the effects on the quality of working life and on levels of productivity. Apart from being caused by poor management, the deskilling hypothesis has also been criticized for lack of precision in defining skills and competencies (Agnew et al., 1997).

The increase and change in skill requirements along with technological change can be considerable (Haines, 1999). New technologies have enabled the creation of so-called knowledge-based or knowledge intensive forms of work. They are characterized by increasingly complex demands of work on employees and an increasing need to deal with new and unanticipated situations (Vicente, 2000). Unanticipated situations increase the importance of solving problems that take different forms and rarely repeat themselves (Vicente, 2000) by using "best judgment" to navigate through choices (Carlson, 1999). The search for flexibility in knowledge and skills in working life puts new demands on the contemporary adult work force: an employee is required to consider learning as a lifelong process of constructing and applying knowledge in contextualized and specialized problem areas (Mikkelsen et al., 2002). Learning to learn has become a critical capability in terms of competence development today and in the future (Vicente, 2000).

The competence field is at the moment governed by conflicting tendencies. At a time when specialized, especially technological, knowledge is more important, but also quickly obsolete (Sawyer et al., 1998), work requires increased so-called general and multipurpose skills, intellectual, for example, and social (Gray, 2001; Denning & Dunham, 2001; Haines, 1999). These general skills have been defined as including, for example, business skills, technology management skills (e.g., those that deal with systems as a whole, setting standards for database entry and hardware troubleshooting), interpersonal skills (such as cooperation and communication skills), as well as cognitive and operational problem-solving skills (such as decision-making, discerning patterns in bodies of information, staged problem solving and deductive/inductive methods of thinking) (Carlson, 1999; Clement, 1990; Haines, 1999; Lee, Trauth & Farwell, 1995; Lewis, 1999; Mikkelsen et al., 2002; Sawyer et al. 1998). General skills are also referred to as soft skills or value skills (Denning & Dunham, 2001). If a skill is defined according to Ellström (1997) as including cognitive and meta-cognitive components (intellectual skills) as well as non-cognitive components (e.g., values, interests and personality traits), general skill requirements also cover attitudes, such as flexibility, tolerance and adaptability (Carlson, 1999) and reflective skills (Tikkanen, 2002). Moreover, general skills can be related to understanding the work of colleagues and other experts. A general understanding of other domains helps an employee to better understand the goals of the work tasks of other members in the work group/unit and enables him/her to offer feedback for work colleagues. The employee is also better able to incorporate and exploit the valuable assets of other domains in the development of his/her own work. A general knowledge of other work areas is vital in managing and working with a team of specialists, aiding in more effective communication as a shared understanding of the work contents and methods is reached (Smith-Faison, 1996).

In a rapidly changing work environment, advancing individual learning capabilities is vital for the competitiveness of an organization and for the quality of the working life of its employees. The principal ways of maintaining a high level of employee skills in order to better respond to changing work demands are learning through formal training and through informal communication and support.

It has been noticed that a lack of training is a major reason for the lack of success in technological changes. Training is essential from the viewpoint of the quality of working life: training programs are likely to increase the confidence of an employee in his/her ability to use technology and reduce technology-related anxiety (Igbaria, Iivari & Maragahh, 1995; Mikkelsen et al., 2002). Lack of learning opportunities and adequate coping experiences during his/her working career may reduce the capacity of an employee to utilize new technology in an effective way (Martinsons & Cheung,

2001; Mikkelsen et al., 2002). This may further result in a decline in the quality of working life. On the other hand, the availability of opportunities for learning and acquiring new skills during a technological change tend to have a positive connection on the quality of working life (Järvenpää, 1997; Leppänen, 1997; Palmini, 1994). Technological change and adequate training can motivate, challenge and stimulate the employees, as well as broaden their competence scope. As learning is constant, it is increasingly experienced as "natural", that is, as something taking place almost every day, and something that does not necessarily require conscious awareness and energy (Tikkanen, 2002). Thus, learning becomes one work task among others. Belonging to the job description, it is not experienced as "extra work" and stress related to it is likely to be lower.

In addition to formal training, learning for technological change may occur informally between colleagues and within work groups. Informal learning can be viewed as being internal, rather than external, training, in other words, being created from a 'pull' for learning instead of a 'push' for learning. Moreover, informal learning can be seen as including more tacit and implicit than explicit learning, as it more likely will resemble apprenticeship or mentoring rather than traditional teaching. Learning can also occur through active individual self-study (Tikkanen, 2002). Studies conducted in the contexts of office automation (Clement, 1990), as well as technology-intensive clerical and engineering work (Tikkanen, 2002), have found that collegial communication and reflection, and self-initiated and directed learning may be strongly preferred and more effective in terms of how much employees learn compared to formal training. Informal learning is more responsive to the immediate needs of employees, and is therefore more individual than formal training. It provides support for employees trying to learn new skills (Tikkanen, 2002). Informal learning from peers is concrete and bound to real-life contexts since it is driven by problems occurring in the work process. Also, it is gradual and ongoing. As informal learning is conducted within the work context, the transfer of skills from training to work may not be a problem (Mulholland, Zdenek, Domingue & Hatala, 2000), but may need special attention (Hall & Mirvis, 1995, 351). Informal learning is more intensive in so-called "critical incidences", such as new or rare situations like encountering mistakes and problems, as well as in figuring out corrections and solutions for them (Tikkanen, 2002). On the other hand, learning to use new technology from colleagues can be experienced in a negative way as well, as when, for example, experienced and knowledgeable employees experience constant interruptions in their work because of the need to instruct work colleagues in their work (Paulsson & Sundin, 2000). Encouraging informal learning is an integral part of a learning organization, a concept that is highlighted in present organizational development. Senge (1990, 242) emphasizes the importance of team-based learning, in which individuals become observers of their own cognitive actions, as an essential part of a learning

organization. According to Argyris and Schön (1996, 21), social interaction enables double-loop organizational learning, in which changes occur in the explicit action strategies of organizations, but also in the implicit values of the organizational theories-in-use as well as in their strategies and assumptions. Informal learning can be seen as a kind of an "emergent property" of organizations as it occurs in different contexts and does not have to be formally rewarded.

Some barriers to effective training and learning in technological changes can also be identified. As the workload and work demands are rising, and technology changes constantly, there might be an uncertainty about the future skill requirements that induces stress (Martinsons & Cheung, 2001) and a lack of time for training, studying and learning (Ellström, 2001; Paulsson & Sundin, 2000; Tikkanen, 2002), even though it would result in more effective work methods and ultimately decrease the workload and work pace. The lack of time to attend formal training may be the reason for the development of informal learning groups and networks. Technical problems during training sessions might also hinder learning, as they take time away from it (Paulsson & Sundin, 2000). As studies in public organizations and companies suggest, employee attitudes towards technology are connected with the effectiveness of training: training and learning are less effective when employees have negative or fearful attitudes towards technology and more effective if they view technology in a positive and anticipated way (Harrison & Rainer, 1992; Torkzadeh, Pflughoeft & Hall, 1999) and training as advantageous rather than costly (Larwood, Ruben, Popoff & Judson, 1997).

Involving employees in designing technological implementations can facilitate skill acquisition and professional development as well as offer opportunities for social interaction, which have positive connections to job satisfaction and negative connections to job stress (Mikkelsen et al., 2002). Implementation and training projects and programs should not overemphasize the benefits to be gained from technology (Mahmood et al., 2000), as this may be experienced negatively in terms of the quality of working life during and after the technological change. In addition to the task-specific skills of employees, also the learning skills of employees, their readiness for change (Ellström, 2001; Vinberg, Gelin & Sandberg, 2000) and change motivation of managers and leaders have been seen as vital to employee productivity and the quality of working life in information-intensive companies, especially in organizations with a flat organizational structure.

Even in the case of introducing automated systems, changes in skill requirements may result in employees feeling themselves less adequately trained and skilled to do their jobs, and more likely to come across problems that they do not know how to solve. Some of the skills of the employees become obsolete or less relevant, while using new

technology requires new skills that they have to develop. (Kraut et al., 1989.) In a technological change such as implementing distributed computing, both workers and managers may have problems in identifying how to best gain new skills and how to balance resources between learning specialized and general skills (Sawyer et al., 1998). Therefore, training as well as developing and clarifying job descriptions are important in terms of the quality of working life before, during and after a technological change.

3.3.2   Empirical Results on Experiencing Learning to Use New Technology

In all the three studied work units, the learning of new skills was embraced. The interviewees experienced learning as *motivating*. An aged journalist described the learning process relating to the digitalization of production technology as natural and motivating.

"When I had to learn it, I did. And after that I could not give up the computer. This is just an example of new things emerging. We learn how to drive on the left-hand side and it does not take long. And other thing as well, we get new equipment and we learn, why wouldn't we learn at work. Sure we do as these [machines] are made by human beings for human beings – or I am not sure if engineers are human beings. But these are so much more handy than the old ones. It is interesting in work that you don't always have to do the same thing, twist the same nut." [19](A radio journalist, 60 years)

Some interviewees experienced learning as *laborious* because of the lack of routines in using new technology. Interviewees revealed that different individuals experienced the digitalization of production technology in different ways, but, overall, employees who had been working with analog production technology for a long time but were inexperienced in using digital technology experienced the introduction and the use of digital technology as especially difficult. The interviewees did not believe that the degree of difficulty experienced in digitalization was directly connected with age, but it was mentioned that often employees who had a high level of experience with the analog technology, but a low level of experience with the digital technology, were aged employees.

According to some interviewees the feeling of incompetence together with the limitations in meeting new skill requirements induced stress. In radio program production, the interviewees experienced insecurity related to working with technology, as well as *fear of not being able to acquire new skills*. For example, a sound editor described fears related to recording tasks in the following way:

"The threshold is higher, how do I describe it, I'm not sure if you can understand the transfer from a completely different work method into another. Understanding the idea of a computer requires a lot, as previously the sound tape was concrete and you saw or knew that when you had recorded it, it was on the tape, but then the sound went into the computer and I got this frightening feeling many times that where do I put the sound and save the sound and do I find it there, and this is exactly it, as you know, that when you are unlucky, you don't find the sound from the computer and these are the most difficult situations. " [20] (A sound editor, 55 years)

In addition to insecurity relating to using new technology due to a lack of skills, the interviewees expressed *uncertainty about learning new skills*. The interviewees thought that some employees might not have the right disposition for the new job descriptions and for learning new tasks. An announcer expressed concerns relating to employees who might not be able to acquire all the new skills required:

"We are required or will be required to have skills that we have not expected when we have been recruited. Skills, which we do not possess as different persons. This is well said. Certain types of persons apply to our group, to announcers and they are not necessarily technically oriented. And if we are expected something, a contradiction emerges. Exactly this using machines and stuff, you may learn it, of course, but not necessarily all of us are going to learn it. And are there some of us who won't learn it? What happens to them?" [21] (An announcer, 37 years)

In the television program production, some interviewees had experienced *fear of being left alone to cope with digital technology*. Interviewees expressed the view that they could not rely on their own skills and needed professional support. For example, a journalist working in television news production described stress and even psychosomatic disorders related to the lack of confidence in skills and expressed a need for social support:

"The fear I had and still have in the back of my head is that I don't manage it [work] properly and I try to ensure that there is someone near me, who I can ask, because otherwise you are quite alone with the computer. It was not nice when I started to do these, I almost had a stomach ache half a week before [the broadcasting] as I knew I had to go there [to the broadcasting studio] and it was because of lack of training. If I would have had the opportunity to rehearse properly and in peace, of course there would be less anxiety." [22] (A television media journalist, 47 years)

Some individual perceptions were related to the formal training offered by the organization. The organization of training, as well as training methods and contents, were different in each work unit. In all three cases, some interviewees experienced *training as easily accessible, individual and successful*. A journalist described the individual support given by the trainer in the following way:

"In my opinion, if one is willing, we have this trainer who trains the editors and their supervisors and she is the sort of person who comes right away. In that sense you can get help. And she makes these copies, which contain summarized directions for use. There is this kind of support." [23] (A radio journalist, 37 years)

The interviewees experienced the gradual introduction of new appliances and software as contributing to learning and well-being. In radio channel Ylen Ykkönen, journalists began to edit sound digitally in their own offices according to their own schedule. At first, only simple editing functions were learned and used; thereafter more advanced editing became the subject of learning. Learning to use digital production technology was gradual for sound editors as well. Initially, only digital editing software was introduced to the job description; this was followed by digital mixing consoles. According to the interviewees from YLE24, digital technology was introduced gradually and the managers allowed opportunities to learn to use one technology at a time by organizing particular shifts for particular employees. Some interviewees reported that learning was concurrent, as they worked in different shifts and learned to use several technologies and equipment at the same time. In YLE Teema, perceptions related to gradual learning were not emphasized in the interviews.

On the other hand, in all the studied work units, some interviewees also experienced stress related to training. Training was considered to be *insufficient* and more training related to the use of new technology, especially digital editing, was needed. Some employees also thought that the formal training was *organized too early*. The installation of new tools had not been finished when the training had begun; this obstructed learning, as described by a sound editor:

"And now the training began when all appliances had not been fully connected and programmed and all appliances were not in place. The other group [of sound editors] had been trained the week before, and the appliances didn't work even this week. There were technicians and engineers all the time setting something up and asking us to move and asking when they could come. The whole time was like this. Trainers discussed what was still missing and what was wrong. There was no peace to go through things." [24] (A sound editor, 54 years)

According to the interviews, training in the television news channel YLE24 was organized by using peer-training: the experienced workers in the work unit trained the inexperienced ones in addition to performing their work tasks. Although the interviewees regarded this as *an individual and concrete way of learning*, they also had experienced its disadvantages, the foremost of which was the *proneness of the learning situation to disruptions*. The interviewees reported that, as the "teacher" had to work and teach simultaneously, there was little time for answering questions and demonstrating functions to the learner. If the learner did not understand, (s)he

sometimes avoided asking questions to give the trainer an opportunity to accomplish the work task in hand. Moreover, some interviewees experienced assignment as a teacher even when they felt insecure about using new equipment themselves. The interviewees thought that more training was needed. They expressed the need for training related to using digital production technology in general, and to performing new tasks created by job redesign in particular. For example, some journalists felt they needed training about filming and editing tasks, which were transferred over from the editorial job descriptions to the journalistic job descriptions. Also simultaneous training for entire work groups of journalists and editors was seen as important, but the interviewees also believed that carrying out training for work groups was impossible within the present environment, as the work pace was too intense.

Due to the intense work pace, some interviewees experienced *participating in training* programs and *the rehearsing of new skills* after training as very difficult and almost impossible. The interviewees experienced this as extremely stressful. A television news journalist noted that employees had to make the shift from using traditional technology and working according to traditional job descriptions to using new technology and new job descriptions without sufficient preparation.

"In editing as well as in broadcasting they [the machines] are incomplete in my opinion. We are already living in a world, which in reality does not exist. This [digitalization] has been largely technology-oriented at the expense of the content."

Q: "And how have you had, for example, training?"

"Varying, and it feels that everyone has had to make the shift without preparation, and that has created insecurity of course." [25] (A television news journalist, 44 years)

Another interviewee remarked that not having had time to practice new skills had caused frustration:

"It is a matter of when to train, the training must be timed so that you can thereafter use, rehearse (…) it is frustrating [not having time to practice]."

Q: "The work pace does not allow it?"

"This job description is one in which there is not that kind of flexibility." [26] (A television journalist, 42 years)

The lack of opportunities to learn resulted in employees feeling stress and insecurity. The interviewees expressed the view that the amount of training and rehearsing they had had was insufficient to prepare to meet the new qualification demands.

Although training in the television news channel YLE24 was gradual for some employees, some interviewees felt that there were too many learning processes going on at the same time and that *the capacity to learn had been exceeded.* According to the interviewees, learning to use the new technology required memorizing and remembering a great amount of detailed information. Because the capacity of information processing was overloaded, learning had become slower and more difficult. Interviewees experienced the new functions as easily forgotten and they had to rehearse them continuously in order to remember them. Moreover, some interviewees characterized the work in YLE24 as being experimental and subject to continuous technological changes, which, in turn, increased the learning requirements. One journalist described the cognitive overload in the following way:

"I just don't, I just cannot even take on the enormous amount of information any more. I do not want to learn every little detail, I just cannot do it. The whole time there are changes and something new comes and it is really hard, at least for me." [27] (A media journalist, 24 years)

In the radio channel Ylen Ykkönen and television news channel YLE24, the interviewees saw the learning as *a continuous part of the work*, which made the work interesting but also induced stress. In YLE Teema, this view did not come up, as the implementation of the technological change was only beginning. In Ylen Ykkönen and YLE24, some interviewees expressed the view that learning to use new technology – new appliances and software – becomes easier in the course of time because the employee already has basic experience in using digital production technology. It was seen that, at the beginning of the learning process, technology controls the work, but, in time, the employee starts to gain control and to manage the work thereafter.

According to the interviews, the job redesign and changing skill requirements resulted in *reorganized work and altered work roles*, which were experienced as stressful in the work units of YLE24 and YLE Teema. Some interviewees revealed that, at the time when digital channel YLE24 was launched, employees had experienced stress, which affected the quality of working life and the atmosphere of the work unit in a negative way. In YLE Teema, the interviewees said that the changes in skill requirements brought about changes in personnel and in work roles, which later resulted in conflicting situations and resistance to change, as power and expert structures were altered. Some employees, who had had a high status in the work unit before the technological change due to their expertise, had a lower status after the technological change because some of their skills had become obsolete. In Ylen Ykkönen, these problems had not occurred.

In all the cases, interviewees also described experiences of employees *sharing knowledge* with each other during the technological change. In the radio channel Ylen Ykkönen, knowledge was shared between employees of different professions: the journalists and the sound editors helped each other in learning to use digital production technology. Knowledge was also shared between employees of different ages: the aged employees taught the younger ones how to use analog technology and the young employees taught the aged employees how to use digital technology. The interviewees considered informal learning and teaching to be important, especially in the implementation of minor technological changes, as, given the intense work pace and continuously evolving technological environment, it was not possible to give formal training every time minor technological changes were implemented. In the television news channel YLE24, teaching peers and colleagues was adopted as a training method. According to some interviewees, informal learning also occurred between employees as the experienced users of digital technology taught the inexperienced ones. The learning was experienced as stressful by the inexperienced employees, who tried to learn and acquire the new skills, but it also caused fatigue for the experienced employees, who had mastered digital production technology and felt responsible for supporting those who were inexperienced. The fatigue experienced by the experienced employees was described in the following way:

"There are all the time employees who cannot do something and they can learn it, and the rest, who can do it somehow, have to try to cope as well as help and train those, who have yet no skills at all. I think that is one of the reasons why people are so tired." [28] (A television news journalist, 35 years)

In YLE Teema, this kind of knowledge sharing occurred between some individual employees. Some interviewees emphasized the importance of sharing knowledge and expertise between the different competence centers of the channel as well as between employees of different ages. The interviewees expressed a need and desire for sharing knowledge and expertise more extensively in the work unit.

Results related to experiences in learning to use new technology are summarized in Figure 11. The results are further classified into general experiences related to learning, experiences related to training, experiences related to continuous learning and experiences related to social consequences of changes in skill requirements. The darker rectangles in Figure 11 represent stress experiences, while the lighter rectangles illustrate well-being experiences related to the connection between learning to use new technology and the quality of working life.

INFORMAL KNOWLEDGE SHARING	STRESS DUE TO CHANGES IN WORK ROLES		FORMAL TRAINING ACCESSIBLE, INDIVIDUAL AND SUCCESSFUL

LEARNING MOTIVATING AND INTERESTING

EXPERIENCES RELATED TO SOCIAL CONSEQUENCES OF CHANGES IN SKILL REQUIREMENTS

TRAINING INSUFFICIENT

LEARNING LABORIOUS

EXPERIENCING LEARNING TO USE NEW TECHNOLOGY

PEER TRAINING INDIVIDUAL AND CONCRETE

GENERAL EXPERIENCES RELATED TO LEARNING

EXPERIENCES RELATED TO TRAINING

FEAR OF NOT BEING ABLE TO LEARN

PEER TRAINING PRONE TO INTERRUPTIONS

THE FEELING OF INCOMPETENCE

EXPERIENCES RELATED TO CONTINUOUS LEARNING

INSECURITY OF THE PEER-TRAINER ABOUT OWN COMPETENCIES

FEAR OF BEING LEFT ALONE WITH NEW TECHNOLOGY

GRADUAL LEARNING

OVERLOADED CAPACITY TO LEARN

TRAINING AND REHEARSING DIFFICULT DUE TO WORK PACE

FIGURE 11. Results of Experiencing Learning to Use New Technology (Darker Rectangles Represent Stress Experiences and Lighter Well-Being Experiences).

3.3.3   Discussion of Experiencing Learning to Use New Technology

The digitalization of production technology, like technological changes in general (Järvenpää & Eloranta, 2001), offered new learning experiences and changed the skill requirements. It has been noticed, that new skill requirements and opportunities for learning have a positive connection with the quality of working life (Järvenpää, 1997; Leppänen, 1997; Palmini, 1994). This relationship was also identified in this study. Learning was experienced as increasing motivation at work.

However, learning to use new technology was also related to experiences of stress. Employees, who were experienced in using analog technology and work methods, but lacked experience in using digital technology, experienced technological change as difficult. This might be due to some skills becoming obsolete (Chang Boon Lee, 2002) and to the emergence of new skill requirements. These kinds of changes in skill requirements can degrade the overall feeling of competency an employee has, which gives protection against stress according to Toppinen and Kalimo (1997). Moreover, learning and the limitations of meeting new skill requirements induced stress experiences such as insecurity and fear. These feelings are sometimes connected to the lack of confidence of learners in using technology, as suggested by Lewis (1999).

Experiences of formal training were both positive, praising the individual, accessible and gradual nature of training, and negative, criticizing factors, such as technological malfunctions during the training session, and the insufficiency of training, related to the training situation. The hindering effect that technical problems have on learning has also been noticed in previous studies (Paulsson & Sundin, 2000). Simultaneous training for the whole work group or team was seen as important, but it could not be carried out due to the intense work pace. Overall, the workload and work pace hindered participation in training as well as the rehearsal of new skills. Similar previous findings by, for example, Ellström (2001), Tikkanen (2002) and Paulsson and Sundin (2000) suggest that the continuously rising demands of work life may result in a lack of time for training, studying and learning, although they could make the work more efficient. This study showed that, apart from being important for the efficiency of work, training and rehearsing are essential determinants of the quality of working life in a technological change or job redesign situation. McDonald and Siegall (1996) see rehearsing new skills in a technological change as analogous to sport: plenty of experience in practicing new technology and tasks are needed in order to gain confidence in ability. According to a longitudinal study by Lindström, Leino, Seitsamo and Torstila (1997), the mastering of technological applications requires time to build up. They found that mastery of new technology in an insurance company remained at the same level after a two-year follow-up, but became clearly more satisfactory after an eight-year follow-up.

In Ylen Ykkönen and YLE24, some interviewees emphasized that learning and training must be gradual, proceeding one step at a time from learning simple tasks to performing complex duties. In YLE Teema, perceptions related to gradual learning were not emphasized in the interviews. This might be due to the fact that digital production technology was not fully in use in the work unit at the time of the study. Training had not yet become extensive as the technological change and job redesign had not been introduced for all employees and had not yet resulted in major changes in work.

Interviewees described that changes in skill requirements had changed the structure of the work units YLE24 and YLE Teema: some employees who were previously considered as experts lost some of their status as new, technically more experienced, employees had to be recruited. These changes had caused tension and anxiety in the two work units. Similar findings are also reported by Huuhtanen (1985, 167): the implementation of office automation was experienced as especially negative in work units in which the implementation was accompanied by the instability of the social system and by changes in personnel and work roles. In Ylen Ykkönen, these problems had not occurred. It is probable that these difficulties were related to forming new channels, units and work units more than to mere technological changes. As Ylen

Ykkönen was a well-established work unit, which did not undergo changes in personnel during digitalization, conflicting situations were not reported in the interviews.

Learning new skills also occurred informally. Informal teaching and learning occurred between individuals within and across professional and age groups. In the case of the television news channel YLE24, training methods resembled informal teaching and learning as co-workers trained the new recruits. According to Mulholland et al. (2000), the advantage of informal learning is that it is conducted in the work context and the transfer of skills from training to work is not an issue. Even though the training in case YLE24 was carried out in the work context, the employees still felt the need for more time to practice new skills. Thus, the problem in YLE24 might have not been the transfer of skills from training to working but insecurity due to lack of practicing new skills in a quiet and peaceful off-the-job learning environment in which making mistakes was allowed. Peer-training as a training method also induced stress. Paulsson and Sundin (2000) argue that the negative aspect of informal learning and training is the proneness to constant interruptions in the work of the trainer. This was noticed in this study also as the technologically experienced and knowledgeable employees suffered from stress induced by trying to train and help colleagues, in addition to performing their own work tasks. The disruptions were experienced as stressful by the learners also. The trainer sometimes had to interrupt demonstrating the properties of the digital production technology in order to continue with his/her work. This disturbed the learning process.

Learning was seen as continuous and as an integral part of the work. The ongoing nature of learning was seen as a motivator contributing to well-being, but also as a stressor. The fact that learning becomes stressful due to continuously developing technology has been shown in previous studies as well (Gard, 1990; Kalimo, 2000; Korunka et al., 1997). In a situation in which the development of technology and the implementation of technological changes induced constant changes in work, informal training was seen as a way to ensure a high level of competency and a feeling of professional confidence. Thus, the results supported the views of Clement (1990) and Tikkanen (2002), according to whom informal learning methods are sometimes preferred over formal training methods. In this study, some interviewees considered informal learning to be better than formal training, at least in minor changes in work.

3.4   Using New Technology and The Quality of Working Life

Technology has changed work extensively during the past decades. The work-related physical stress has decreased, but work has become more stressful and demanding in terms of mental well-being. Contradictory results derived from the effects of introducing technology on the quality of working life have been reported; these show that work becomes more monotonous and unchallenging as well as more interesting and motivating, and that social interaction becomes easier but also reduced. This section begins with a discussion of the implications the introduction of technology has for the quality of working life. Thereafter, stress in work using technology is described, differences in stress between different gender, age and hierarchical status groups are covered and some coping strategies for stress are explained. Special attention is given to the loss of control in work, as this was highlighted in the interview data. Finally, changes in social structures, along with implementing technological changes, are reported.

3.4.1   Theoretical Background on Experiencing Using New Technology

Introducing new technology to the workplace has been found to have contradicting effects on work and on the quality of working life. Some studies have reported that the introduction of technology results in work becoming monotonous and unchallenging, whereas others have stated that work becomes richer and more motivating. The concern about work using technology being qualitatively low has been linked to work becoming more divided and monotonous, especially in routine office work. It has been believed that technology splits the work into smaller fragments and it then comes to entail only the supervising and facilitating of technology (Braverman, 1974, 129-130). Ultimately, critical views have connected the use of new technology with an inevitable decline in job numbers and with "the end of work" as the technologies of the Information Age replace human beings in the process of making and moving goods and providing services (Rifkin, 1996, 12). The early studies on experiencing technological changes suggested that work becomes less satisfying, less interesting, less challenging and generally of lower quality due to the introduction of automation. Work was also seen to become more abstract: concentrating only on some specific tasks makes it difficult to form a complete general view of the entire work process. Therefore employees may be less able to see the results of their work. There again, some studies take the view that automation will reduce the workload, make tasks easier and lessen the job pressure experienced by employees. (Kraut et al., 1989.)

Views of work becoming more challenging, interesting, various and flexible have been related to introducing technology such as design systems, but not only to this. Computerization and the introduction of advanced manufacturing systems have also been found to make work more effective and challenging, and to give it variety and interest (Järvenpää, 1997; Leppänen, 1988; Seppälä, 1995; Seppälä, Tuominen & Koskinen 1988). Studies on implementing manufacturing and CAD systems have concluded that technology brings about qualitative improvements in work (Hogarth, 1993; Järvenpää, 1991, 168; Korunka et al., 1993). Work becomes more flexible as creating, transferring and storing material becomes easier with technology. Research into introducing digital editing technology to the work of television journalists suggests that the digitalization of production technology enables them to form the material in various ways and into different versions (Puskala, 1999, 81). Technological advances, such as distributed information systems, can also provide independent and free work conditions (Huuhtanen & Leino, 1990) and technological change can help the work become less dependent on space and time (Pyöriä, 2001). Possibilities of telework and ubiquitous technologies have increased flexibility in work arrangements, but also turned the work boundaryless and blurred the boundaries of work in terms of work life and private life. Work life has forced its way into the private sectors of life.

Working with technology can offer new learning experiences, opportunities for developing skills and new interesting tasks (Järvenpää & Eloranta, 2001). Some studies also suggest that, together with the technological changes, hierarchical structures in organizations can be lowered and new autonomous work groups and business cultures can be created or can emerge (Järvenpää, 1991, 176). Moreover, the content of work has also become more extensive and enriched due to the introduction of information technology (e.g., Huuhtanen, 1985, 93-94). However, although information systems, for example, and office automation can provide new tasks and goals that are interesting and challenging (Artz, 1996; Järvenpää, 1997), these tasks might be simultaneously exceedingly demanding in terms of attention and concentration (Järvenpää, 1997), bombarding the individual with random pieces of information that prevent him/her from organizing the information into stable patterns (Artz, 1996). A study on introducing word processing also found that technological change made demands by increasing responsibilities and quality of work requirements (Kivisaari & Vanhala, 1986, 15). The study of Carlson (1999) on introducing information systems concluded that workers may not be suited to these new responsibilities even with additional training. The workload may also increase and become characterized by continuous changes related to technological development (Paulsson & Sundin, 2000). A high psychological workload may reduce the ability and opportunities to develop new skills and knowledge and to successfully respond to new skill requirements elicited by technological changes, thereby enforcing negative

attitudes and anxiety felt at work (Mikkelsen et al., 2002). A high workload, together with low social support, has been found to result in especially high levels of emotional exhaustion, ultimately burnout (Houkes, Janssen, de Jonge & Nijhuis, 2001).

The information overload induced by technology-intensive work has been referred to as technostress (Brod, 1988, 61). Technostress has been defined as a state of psycho-physiological activation experienced when employees perceive their job as stimulating, but at the same time feel that they do not quite master the skills needed to carry it out (Arnetz & Wilholm, 1997). Thus, stress in work using technology is induced by an experience of lack of skills, while, in contrast, adequate skills have been seen as protecting an individual from the feelings of stress. Technostress, or ICT stress, is also characterized by a too heavy or light workload, too much or little information, communication, flexibility, responsibility, dependency or too many or few social contacts and opportunities for development and training (Bradley, 2000; 2001). Information overload (Denning & Dunham, 2001) accompanied by technological changes puts strain on perceptive and memory functions especially and detrimentally affects problem-solving capabilities (Kalimo, 2000). Many of the stressors of human computer interaction at work today are similar to stressors that have historically been observed in automated jobs, increased job demands, for example, and inadequate employee training (Mikkelsen et al., 2002).

The levels of technostress and anxiety have been found to be higher among employees whose decision latitude is low and who do not receive enough training (Mikkelsen et al., 2002) or who associate negative appraisals with technology (Salanova & Schaufeli, 2000). Women have been found to experience more technology-related anxiety than men (Mikkelsen et al., 2002). According to Lim and Teo (1996), a major source of stress for women working with technology arises from fear of making mistakes or from inadequate support from their superiors or peers. Women have more positive attitudes towards work with technology, as they view using technology as contributing a certain status and prestige to a greater extent than men (Teo & Lim, 1996). These attitudes might protect women from experiences of stress. The results concerning connections between age and levels of stress are varied; some studies show that aged employees experience more anxiety than young employees (Mikkelsen et al., 2002) whereas others report that there are no differences in stress levels among employees of different age groups, at least during a technological change (Kraut et al., 1989). Clear differences have been found between different professional groups. Managers and employees with a high education have been noticed to suffer less from technology-related anxiety than other professional groups (Mikkelsen et al., 2002). The stressors have been reported to be dissimilar between different professional and status groups. Stress is induced to full-time

employees and professionals by, for example, excessive working hours, inadequately coordinated tasks, ambiguous and unclear goals, excessively variable and excessively loosely connected tasks, excessively difficult tasks, an excessive number of decisions, risks of making mistakes, as well as working in different and changing teams and environments. For temporary employees with relatively simple tasks, sources of stress are a relatively low income, uncertainty about the future, short work cycles, fragmented activities, under-utilization of skills, low autonomy, relatively low social support and limited scope to realize personal motives. (Schabracq & Cooper, 2000.)

Stress in work using technology is also experienced as a result of technical breakdowns and delayed response times (Johansson & Aronsson, 1984), particularly if the work is demanding and human resources scarce (Lindström & Torstila, 1990; Palmini, 1994). Employees may experience powerlessness when forced to use a rigid, constraining and unreliable technological system (Clement, 1990), in which case technology is not a tool but rather a source of stress. Due to technical malfunctions, the feeling of control in work can diminish (Carayon-Sainfort, 1992; Sparks, Faragher & Cooper, 2001). Overall, technology has been found to have a negative effect on the management of work and on the feelings of control an employee has over work, work methods and work schedules (Kalimo, 2000). Studies on implementing office automation and information systems show that the intensification of work and work becoming essentially machine-paced can be one of the most significant changes to the job in the process of introducing new technology (Agnew et al., 1997; Brod, 1988, 61, 66). Also, the technological changes may result in a situation in which work pace actually becomes slower than it was before the technological change due to factors related to, for example, the usability of information systems (Palmini, 1994). The complexity of use may slow down work processes. However, designing usable systems and technologies is not simple, as preferences for usability features may be fairly individual. For example, it has been noticed that when people work with a computer they feel dissimilar to, they have a tendency to engage in self-serving biases, that is, they tend to blame the computer for failure and take credit for success (Moon & Nass, 1998). However, successful case studies on user participation that suggest it is possible to design new technological systems that are individual and realize the twin aims of enhancing performance and lowering stress, can also be found (Wastell & Newman, 1996).

Coping strategies and the capacity to stand stress are individual. The mental resources an employee has at the time of the introduction of new technology are connected to the individual capabilities of coping and the amount of stress experienced (Huuhtanen, Seitsamo & Vitikkala, 1990). Following the transactional model of stress (Lazarus & Folkman, 1984) and Mikkelsen et al. (2002), individual expectancies of the outcome of available strategies in any given situation determine whether the

introduction of new technology is perceived as a challenge or whether it triggers technology-related anxiety and stress. Thus, positive expectancies of consequences of individual "survival" strategies during technological changes are positively linked to the quality of working life, whereas negative expectancies – the experienced mismatches between the chosen strategy and the situation – are negatively linked to the quality of working life. If mental resources and coping capacities are minimal rather than adequate, technological change is experienced in a more stressful manner. Interestingly, coping strategies for managing stress in work with technology have been found to be gender-bound. According to Lim and Teo (1996), women are more likely to seek social support than men in dealing with stress, whereas men are more likely to use "logic", by, for example, suppressing their emotions, and deal with stress in an objective and unemotional manner.

Finally, technology changes social structures of interaction in the organization. Though technology facilitates knowledge transfer and enables the extension of social networks both in the organization and between the organization and its environment, it has been found to reduce face-to-face social interaction: the employees interact increasingly with the computer, not with the other members of the work community (Bradley, 2000; Mark & Wulf, 1999; Paulsson & Sundin, 2000). This leads to a situation in which contact with colleagues becomes reduced and impersonal (Paulsson & Sundin, 2000) and thus a less frequent and less satisfying component of the work life of the employees. Many opportunities for interaction may disappear and employees may feel isolated (Kraut et al., 1989). The decrease in social interaction and social support induces stress. Traditionally it has been thought that social support is mobilized or elicited when strains are encountered at work. Recent studies show, however, that social support reduces the level of stressors rather than being mobilized when stressors are experienced (Viswesvaran, Sanchez & Fisher, 1999). Thus, existing social networks act as a shield against stress, and should therefore be actively created and maintained in organizations.

3.4.2 Empirical Results on Experiencing Using New Technology

The interviewees experienced *qualitative improvements in work* when using digital production technology brought about. In particular, the recording of video material and the editing of audio and video material became easier due to using new technology. Interviewees in Ylen Ykkönen mentioned that digital sound editing was more precise than analog, as even minor background sounds could be detected and deleted from the graphic sound image in the sound editing software. Fixing and mixing of the sound, as well as editing and comparing different versions of audio material, became more convenient, as editing was not "final" but could be redone.

The interviewees also reported that new editing software enabled various new functions and that editing became more versatile, which increased creativity at work. For example, sound effects could be searched on an archive and added to enliven programs. Moreover, sound editors mentioned that new equipment and their arrangement in the sound studios improved ergonomic aspects of work. Before digitalization the sound studios had computers but they had to be placed on the side of a large analog mixing console. Now, sound studios were reorganized: computers were placed to a center place and the digital mixing console was divided between two sides of the computer. Interviewees also said that the ergonomics of work was increased as editors transferred from using heavy reel-to-reel tapes, to which the tape had to be installed with manual strength, into using computerized editing software. An interviewee described sound editing as effortless compared to editing with the analog technology.

"Here [in the digital technology] it is very easy, faster, to afterwards balance the sound levels. In the other [analog technology] you had to record it again, otherwise you could not change the audio level, you had to fix the part, copy it, record the part again to another machine and set it to its place. It took a lot of time. Here it is very easy. As is mixing, when you do different sounds and mix them together and if you are not satisfied with the result, it is quickly changed. In analog [production], the entire machine is reloaded and you have to re-record the whole thing." [29] (A sound editor, 54 years)

Interviewees in the television news channel YLE24 experienced the editing of video material as becoming easier, simpler and more variated due to using digital production technology. As a result of nonlinear editing possibilities, it was more effortless to arrange video clips and images that enabled versifying material into different outcomes. Thereby video editing increased in flexibility. A journalist had noticed that some editing tasks had become simpler and easier and some felt more difficult. New technology had also increased insecurity in work:

Q: "How has the transfer from the analog to the digital felt?"
"Well, it has brought about more insecurity."
Q: "Is it again because of these malfunctions of the machines?"
"Machines, yes. But otherwise transferring to the digital age is ok, maybe some things have become simpler and it's also easier, like cutting [video material] with avid, here are a lot of tricks, which you would have done for hours with the analog [technology]. Some things have felt easier, some harder. They are quite conflicting but I have a positive attitude towards the future. On the other hand it has brought more insecurity and you cannot be sure of anything anymore." [30] (A television news journalist, 24 years)

Also in YLE Teema, interviewees saw that the use of digital production technology improved opportunities to perform work tasks in different ways. Fixing the sound and

video material was easier than with analog technology. Nonlinear features of digital technology made editing considerably more convenient (see citation number 4).

Some interviewees experienced the use of digital technology as stressful. In Ylen Ykkönen and YLE24, concerns about *the unreliability of digital technology* came out strongly in the interviews. The interviewees related how technical breakdowns had caused frustration and fear. An interviewee assumed that the situation was worst for the employees who have been working with the new technology for quite some time and still feel insecure about the reliability of technology and about their skills for technological problem-solving:

"I think it is worst for those who have been there from the beginning [of the digitalization] and who manage it, but nevertheless the fear is in the background when you go to do the broadcasting and hope the [equipment] works. It has to have an effect; it's the same if you start off with a ragged car, you wish the whole time that 'I hope I get there with this car and that nothing gets broken'. I think that they too have the fear in the background that something happens and the hope that if something happens they can do something about it. These older broadcasting journalists, they don't have other skill-related fears anymore, they are just stressed." [31] (A television news journalist, 47 years)

Some interviewees also experienced that *determining and repairing malfunctions* was more difficult in work using digital production technology; this had lead to stressful feelings of helplessness. A sound editor felt that due to the elusiveness of technology it was more difficult to determine who is responsible for malfunctions and technical problems:

"Now there are a lot of things happening, the reason of which no one knows. In a way there is no responsibility, I feel that, well it's kind of a negative thing actually to be honest, I just now realized it. Earlier when something happened, something got broken, it could be fixed or the problem could be determined, and somebody had been responsible for it. Now there are situations in which something gets broken or a malfunction occurs and no one can explain what happened. And then it's the machine's fault or I don't know whose fault it is, but previously it could be more easily said who was to blame and I think that has been important (…) but if something happens in the machine, it's sort of random who happens to be working there, that the responsibility is clearly somehow out of reach. Everyone is just rolling their eyes not knowing where the error is or something like that." [32] (A sound editor, 35 years)

Moreover, according to the interviews, in Ylen Ykkönen and YLE24, work had become *more abstract,* resulting in difficulties in perceiving the work process as a whole. The interviewees themselves suspected that these difficulties were, in part, caused by the nonlinear features of digital editing technology. In the radio program production, the interviewees experienced difficulties in distinguishing the part of the

material that was already edited and the parts that still had to be edited. These difficulties were not faced in analog audio editing as it proceeded chronologically. In YLE24, interviewees said they had difficulties in perceiving what the material will look like when it is edited, as the video editing was not done in a linear way. In the both units, some interviewees saw the difficulties as being especially related to the early stages of using the new technology and assumed they would decrease as the expertise of the employees in using the technology increased. The adverse effects of technical malfunctions and the experiences of work becoming more abstract did not come up in the interviews of channel YLE Teema.

According to the interviewees, *the demands for information processing and concentration were increased* in a stressful manner in all the studied work units. In Ylen Ykkönen, the interviewees revealed that excessive demands emanated from the poor design of software and, in YLE24, the interviewees linked the stress of increased cognitive demands to using many appliances and software simultaneously. A journalist in Ylen Ykkönen felt that the usability of tools develops as the users become more competent and demand a higher level of usability:

"I think the biggest change has occurred already and it will be followed by people who have difficulties in learning this [digital editing], retiring and being replaced by people who manage it. And when all the employees manage it, new technologies can be created and requirements for the suppliers, engineers and companies become higher, which leads to a need for tailoring the kinds of software, which are designed for the work in question. All that is unnecessary is left behind. And this would be really, we have so much functionality in our equipment that are useless, I use about ten per cent of the functionalities. And it's ridiculous, that there are unnecessary menus and switches that only disrupt and scatter attention." [33] (A radio journalist, 38 years)

In the interviews of YLE Teema, it was felt that excessive demands were caused by many concurrent development trends, such as the implementation of the technological change, the emergence of new media and the versification of programs for both analog and digital channels and for radio, television and Internet. Some interviewees experienced that the fragmented and diverse working situation resulted in feelings of uncertainty and in the fear of forgetting something essential that would harm the work (see citation number 18).

In each of the studied three cases, it was part of the experience of some interviewees that, concurrently with and as a consequence of the digitalization of production technology, *the pace of work became more intense* and more programs had to be produced with decreased human and financial resources. Especially in YLE24, interviewees reported that the rush and the impossibility of familiarizing oneself with the subject of the news induced stress. The interviewees saw that in addition to the

technological change, work pace was influenced by organizational decisions that had resulted in, for example, a lack of human resources or the reorganization of work groups and units. An interviewee described the stress related to the impossibility of performing the work as well as one would like:

"All the people in this branch are in a way journalistically ambitious so they do not want to give out unfinished work, and the increase in deadlines leads to not being able to do the work as well as one would like to and as well as one could. It is automatically manifested in increased work stress and in trying to get too much out of oneself and others and this happens often, this happens all the time, there are always deadlines." [34] (A web expert, 36 years)

In all the case units, it was the view of some interviewees that, although using new technology made editing easier, the work pace was not consequently speeded-up. According to the interviews, this stemmed from factors related to the incompleteness of technological resources (e.g., the low number of digital appliances at the time of the study, the lack of networked work stations and the simultaneous use of both analog and digital formats), from factors related to the inexperience of the users of technology (e.g., the inexperience in using digital appliances and the lack of routines in work with digital technology) and from factors related to the inadequate properties of digital technology (e.g., the poorly designed software, the unreliability of the digital technology, the new possibilities of producing radio and television programs of high quality). In Ylen Ykkönen and YLE24, the interviewees thought that the work pace would speed-up in the future due to the increased usability of digital program productions systems, the networking of work stations, as well as the development of employee expertise in using new technology. At the beginning of the technological change, technology controls the work, but it was seen that, as the employee skills develop, the employee gains control over the technology:

"When one adapts oneself to using work tools, the self-confidence increases and technology is not blamed for the mistakes and it is accepted that the person has made mistakes. It gives a certain security, that one becomes a kind of responsible for or a manager of the bustle, as in the beginning the technology controls." [35] (A media journalist, 38 years)

Overall, stress was experienced by interviewees of different gender, age and professional status groups. Across the case studies, stress was especially experienced by interviewees who had not yet begun to use digital technology, employees who had extensive work experience with analog technology and whose knowledge had become partly obsolete along with the technological change, and employees who mastered the digital technology well and had to take responsibility for their colleagues who did not yet manage the new technology.

Results related to experiencing the use of new technology are summarized in Figure 12. The results are further classified into experiences related to changes in editing, experiences related to the unreliability of new work tools and experiences related to changes in the nature of work. The darker rectangles in the Figure 12 represent stress experiences and the lighter rectangles illustrate well-being experiences related to the connection between using new technology and the quality of working life.
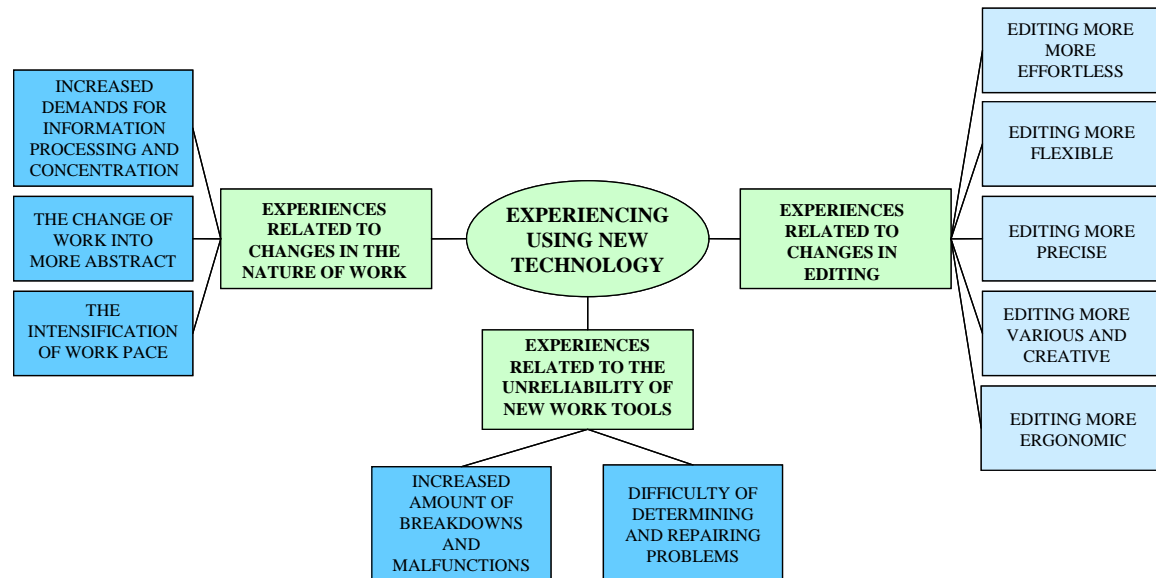
FIGURE 12. Results of Experiencing Using New Technology (Darker Rectangles Represent Stress Experiences and Lighter Well-Being Experiences).

3.4.3   Discussion of Experiencing Using New Technology

The interviewees held the view that, along with the technological change, the work and its methods improved qualitatively. This phenomenon has also been identified in previous studies by, for example, Hogarth (1993) and Järvenpää (1991) in manufacturing and office settings. More specifically, work became more precise and creative, and improved ergonomically. It also became easier and simpler and thereby also more efficient. In his study of computerization in different occupational groups, Seppälä (1995) also noticed a growth of efficiency in performing tasks due to technological change. The interviewees considered that the technology-enabled versification of material, which referred to editing material into different outcomes, was greatly beneficial compared to digital production technology. Versification was also highlighted in the study of Puskala (1991) on journalists' experiences of

introducing digital video editing systems. Overall, using new technology was seen to improve methodological work conditions.

The interviewees experienced the unreliability of digital production technology as stressful. Technical breakdowns caused fear and frustration. Technical malfunctions have been proven to diminish the feeling of control in work (Carayon-Sainfort, 1992; Kalimo, 2000; Sparks et al., 2001). The loss of control was experienced also in this study and the interviewees linked it to the lack of knowledge and expertise in using new technology and to employees' lack of confidence in their competency. Interviewees expressed feelings of helplessness and stress related to using new technology. It seems probable that technological malfunctions and skills have a cyclic relationship: when the employee lacks sufficient knowledge and skills, (s)he is more prone to cause errors in technological equipment, which increases the feelings of incompetence and helplessness and decreases the feeling of control in work.

Interviewees in the radio channel Ylen Ykkönen and television news channel YLE24 also experienced work as becoming more abstract due to using new technology. This resulted from new technological features, such as non-linearity, and the lack of experience in using digital technology. Additional reasons of experiencing work as becoming more abstract could also be considered. Based on a study about introducing office automation, Kraut et al. (1989) state that work may become more abstract as concentrating only on some specific tasks makes it difficult to form a general view of the entire work process. In this study, the job description of sound editors became narrower, which might have been a hindrance in forming of an overview of the work process, resulting in the experience of work becoming abstract. On the other hand, the job descriptions of editors in the television program production (media journalists) did not become narrower, yet they still experienced their work turning more abstract. Another possible explanation for the experiences of abstractness in work might be the overload of information: work tasks might bombard the employee with random pieces of information that prevent him/her from organizing the information into stable patterns (Artz, 1996). This might also be a valid observation in this study, as some interviewees experienced work to be overly demanding in terms of information processing capacities. According to Frese (1987), the abstractness of work may lead to a fear of making errors because the errors are made with a medium that is not discernible. Some interviewees of this study emphasized that it was now more difficult to determine the reasons and responsibilities in situations of technological malfunctions. This was experienced in a negative way. The adverse effects of technical malfunctions and the abstractness of work did not come up in the interviews of the television channel YLE Teema, probably because the new technology was only used by some employees at the time of the study.

The overload of information processing capabilities is closely related to the concept of technostress initiated by, for example, Brod (1988) and further developed by Bradley with the concept ICT stress (2000; 2001). Technostress refers in this study primarily to the excessive amount of workload and information. Information overload is often a consequence of technological changes (Kalimo, 2000), and is closely connected with inexperience in using technology. This was also emphasized by the interviewees: as they were still learning to use the new technology, routines were not formed and working required much concentration and conscious processing.

Concurrently with, and as a consequence of, digitalization, the pace of work became more intense. The intensification of work pace induced stress and was negatively connected with the quality of working life. The intensification of work has also been found in studies on computerization and implementing information systems (Agnew et al., 1997; Brod, 1988, 61, 66). On the other hand, the interviewees did not experience the work pace becoming faster due to using new technology because of factors bound to the lack of opportunities to use it, the inexperience of the users and its relatively poor usability. It has been noticed that the last mentioned factor, the properties of technology and the poor usability of digital systems, can make the work pace even slower than it was before the introduction of new technology (Palmini, 1994).

3.5   Discussion of Part I: Technological Change and The Quality of Working Life

The aim of Part I was to describe and understand how a technological change is experienced in terms of the quality of working life. The data analysis of experiences in the technological change produced four categories: Experiencing Technological Implementations, Experiencing Changes in Job Descriptions, Experiencing Learning to Use New Technology and Experiencing Using New Technology. All four above-mentioned categories were individually examined in the light of previous studies of the quality of working life during technological changes and in using technology. In this chapter, the separate themes are combined and examined comprehensively. Firstly, the results of the study are associated with the Job Characteristics Model of Hackman and Oldham (1980), the concepts of technostress, reskilling and deskilling, with the bureaucratic model and post-bureaucratic models of work, as well as knowledge work and information work. Secondly, the results are studied within the framework of the Job Demand-Control Theory of Karasek (1979). These theoretical frameworks are selected as they are relatively open, allowing the examination of qualitative, interconnected and, also, holistic results, addressing the work as a whole in terms of issues related to the quality of working life, such as job satisfaction and internal work motivation.

3.5.1   Examination of the Results in the Framework of the Job Characteristics Model

The Job Characteristics Model developed by Hackman and Oldham (1980; 71-90) is based on observations that show work can be redesigned to increase internal work motivation, due to which the satisfaction and well-being of an employee are closely tied to how well (s)he performs on the job. Internal work motivation leads to a self-perpetuating cycle of positive work motivation, in which good performance is, in itself, a reward, while poor performance provides encouragement to try harder to avoid negative feelings. In addition to high internal work motivation, other outcomes of suitable job characteristics are personal outcomes such as high general satisfaction and high "growth" satisfaction as well as work effectiveness, which is assumed to be high in jobs with a high motivational potential.

According to the model, there are three psychological conditions beneficial to internal work motivation, general job satisfaction, "growth" satisfaction and work effectiveness. An employee must experience the work as meaningful, experience responsibility for the results of the work, as well as have knowledge of the results of his/her work. The Job Characteristics Model goes further to describe properties of work that foster the three psychological states. The job characteristics related to

meaningfulness are <u>skill variety</u> (the degree to which a job requires a variety of different activities in performing work tasks, for example, using skills), <u>task identity</u> (the degree to which a job requires completion of a "whole" and identifiable piece of work, for example, performing a work phase from the beginning to the end) and <u>task significance</u> (the degree to which the job has a substantial impact on the lives of other people in the organization as well as outside it). The job characteristic related to responsibility is <u>autonomy</u>, the degree to which the job provides substantial freedom and independence in scheduling and determining work and work procedures. Finally, the job characteristic that leads to knowledge of the results of work is <u>feedback</u>, the degree to which carrying out the work activities provides the worker with direct and clear information about the effectiveness of his/her performance. The last two job characteristics, autonomy and feedback, must be present in order to create the positive outcomes of the model. The other characteristics that produce experienced meaningfulness can, to some extent, compensate for low scores on one or even two of the three characteristics: skill variety, task identity and task significance. (Hackman & Oldham, 1980, 78-80.) Overall, the Job Characteristics Model has been criticized for, for example, not accounting for task interdependence (see, for example, Champoux, 1980; Kiggundu, 1981) and for putting emphasis only on task elements and ignoring other important elements of the work system (Smith & Carayon-Sainfort, 1989), for example, organizational factors. Regardless of the criticism, the Job Characteristics Model is still one of the most influential job design models (Parker et al., 2001).

The Job Characteristics Model does, however, acknowledge the moderating effect of some individual factors. Hackman and Oldham (1980, 82-88) suggest that there are individual differences, which affect how workers respond to their work. Firstly, these individual differences include knowledge and skills: in a highly motivating job, workers that have sufficient knowledge and skills have substantially high well-being, as well-being is tightly connected to the outcomes of the work. Secondly, there are differences in the degree to which the workers appreciate opportunities for self-direction, learning and personal accomplishment in work. When working in a job of high motivational potential, workers with high growth need to experience the above-mentioned psychological states more strongly, and respond more positively, to the psychological states compared to their counterparts. Thirdly, there are individual differences in the degree of satisfaction with the work context. Workers who are relatively satisfied with the elements of their work context, for example, pay, job security, co-workers and supervisors, will respond more positively to enriched and challenging jobs than workers who are dissatisfied with their work content. The Job Characteristics Model is illustrated in Figure 13.

```
┌─────────────────┐      ┌─────────────────┐      ┌─────────────────┐
│   CORE JOB      │─────▶│    CRITICAL     │─────▶│    OUTCOMES     │
│ CHARACTERISTICS │      │  PSYCHOLOGICAL  │      │                 │
│                 │      │     STATES      │      │                 │
└─────────────────┘      └─────────────────┘      └─────────────────┘
```

SKILL VARIETY

TASK IDENTITY   ──▶   EXPERIENCED   HIGH INTERNAL
                              MEANINGFULNESS   WORK MOTIVATION
TASK SIGNIFICANCE   OF THE WORK

                                                    HIGH "GROWTH"
                              EXPERIENCED   SATISFACTION
                              RESPONSIBILITY
AUTONOMY   ──▶   FOR OUTCOMES OF   ──▶ HIGH GENERAL JOB
                              THE WORK   SATISFACTION

                              KNOWLEDGE OF
                              THE ACTUAL
FEEDBACK   ──▶   RESULTS OF THE   HIGH WORK
                              WORK ACTIVITIES   EFFECTIVENESS

```
                      ┌────────────────────────────────┐
                      │       MODERATORS:              │
                      │ 1. KNOWLEDGE AND SKILL         │
                      │ 2. GROWTH NEED STRENGHT        │
                      │ 3. "CONTEXT" SATISFACTION      │
                      └────────────────────────────────┘
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FIGURE 13. Job-Characteristics Model of Hackman and Oldham (1980, p. 90).

The findings of this study can be examined within the Job Characteristics Model. Hackman and Oldham (1980, 78) argue that skill variety is an essential element of work. Job tasks should be varying and challenging, and should be experienced as meaningful. In this study, the job descriptions of journalists, announcers and media journalists were enriched to include new recording, editing, and broadcasting tasks, while the employees had to learn new skills. The skill variety of journalists, announcers and media journalists increased, so a reskilling aspect (Agnew et al., 1997) is evident in their work. The technological change, as such, had a reskilling effect on the skill requirements of editors as they had to learn to use the new technology, the sound editing software, for example, and the digital mixing consoles. However, the job description of editors was diminished as some editing tasks were transferred to journalists and announcers. Thus, a somewhat artificial distinction can be made according to which the technological change *per se* was connected with reskilling, while the changes in job description were connected with deskilling in the editorial jobs. It was further assumed by some interviewees, that due to the digitalization of production technology, the job description of editors would include only repetitious and monotonous editing tasks, and therefore the changes in

technology (and job descriptions) would, in future, lead to more deskilling as the technology incorporates the skills of the editorial profession. There again, some interviewees believed that editors would become more specialized and perform only demanding editing tasks with high skill requirements.

The Job Characteristics Model further emphasizes task identity or completeness as an important element of work. According to Hackman and Oldham (1980, 78), task identity should be high, so that the job includes completion of a "whole" and identifiable piece of work, such as an entire phase of the work process. In this study, the job description of journalists was enriched to include recording and editing tasks also, and even broadcasting tasks, and journalists began to manage almost the entire program production. The job description of announcers was enriched as well as they began to perform, in addition to announcing, the technical tasks of broadcasting. The job description of media journalists was also enriched: they began to search and select video material in addition to editing it. Altogether, the job descriptions of journalists, announcers and media journalists were increased in task identity. Task identity can be presumed to be high in the post-bureaucratic model of work, in which rigid boundaries of job descriptions are abandoned (Heckscher, 1994) and workers are increasingly self-managing their tasks (Carlson, 1999; Giuliano, 1991). According to Hackman and Oldham (1980, 83), high task identity is connected with a high level of internal work motivation and job satisfaction. This positive relationship between the high task identity in enriched jobs and the quality of working life has been doubted by, for example, Smith and Carayon-Sainfort (1989), according to whom overload problems may arise if too much is expected from employees. In this study, high task identity was experienced to be positively linked to the quality of working life, but only to a certain degree. The interviewees found that, if task identity is excessive, the quality of working life is threatened due to excessive, stressful, responsibilities and demands, and due to a decrease in the quality of social interaction. Contrastingly, the job description of editors was diminished as editing tasks were transferred to journalists. The task identity of the editors was decreased, which, in turn, had a negative connection to the quality of working life. A low task identity can be linked to the bureaucratic model of work, in which work is highly specialized, being split into limited tasks performed by employees who have had specific training (Heckscher, 1994; Kraut et al., 1989).

Hackman and Oldham (1980, 79) also see task significance as an essential part of a rewarding job. The job should have a substantial impact on the lives of other people in the organization as well as outside it to be experienced as meaningful. The job descriptions of journalists, announcers and media journalists were enriched in terms of job scope and it can be argued that the significance of the jobs was increased. According to the Job Characteristics Model, the increase in task/job significance

fosters well-being and is positively linked with the quality of working life. These job descriptions can be categorized as knowledge work (Aronsson et al., 1994), which is challenging and complex, and thus also usually more significant. The significance of the job description of editors was decreased as their tasks diminished. There were even doubts of whether editors would be needed in the future. It can be presumed that the decrease in task/job significance is negatively linked to the quality of working life. The job description of editors was in danger of turning into performing limited mechanistic tasks, in which case the job description can be categorized as information work (see, for example, Järvenpää & Immonen, 1998), which is less challenging and contains more routine tasks. On the other hand, the interviewees considered that it was possible that editorial work would in the future become specialized, focusing on performing more complex editing functions. In this case, the job description of editors would resemble knowledge work.

Autonomy in the Job Characteristics Model refers to the degree to which the job provides substantial freedom and independence in scheduling and determining work procedures (Hackman & Oldham, 1980, 79). The autonomy of the enriched job descriptions, that is, those of the journalists, announcers and media journalists, was increased. The job descriptions became more independent and autonomous, which supported well-being and contributed positively to the quality of working life. A high degree of autonomy can be associated with the post-bureaucratic model of work (Carlson, 1999; Giuliano, 1991; Heckscher, 1994), characterized by empowerment and high individual responsibility of the outcomes of the work. The autonomy of the job description of editors was decreased as editing tasks were transferred from editors to journalists. The changes in the job descriptions resulted in editors contributing to the work process in a more limited and less significant way. As their contribution decreased they could influence and control the editing less than previously. A low degree of autonomy can be associated with the bureaucratic model of work (Heckscher, 1994; Kraut et al., 1989), characterized by high dependency on other professional and low involvement in the overall work process.

Finally, the Job Characteristic Model views feedback as an integral element of work. Hackman and Oldham (1980, 80) state that performing the work activities should provide direct and clear information about the effectiveness of performance. It can be assumed that the enriched journalistic job descriptions led to an increased amount of feedback, as the employees were able to see the result of their work more clearly. Ultimately, a journalist could carry out the entire work process independently and thus get more feedback from his/her work than before the digitalization of the production technology, when (s)he performed only some phases of the work process and the outcome of work was always influenced by multiple employees. The job description of editors was narrowed down to the performance of only limited tasks. It

can be assumed that they got less feedback from their work as it may have been difficult to perceive the impacts of the finishing touches they performed to the audio material in the editing studios. Hackman and Oldham (1980) also identify another type of feedback. Feedback from other persons who make judgments about the quality of work, "feedback from agents", was in this study decreased in all the job descriptions. As the traditional cooperation diminished, so did the degree of communication between the different professionals. The interviewees experienced that the decrease in communication led to a decrease in feedback. According to the Job Characteristics Model, these changes are negatively linked to the quality of working life (Hackman & Oldham, 1980, 80). Previous studies (Bradley, 2000; Paulsson & Sundin, 2000) state that the lack of social contacts and communication due to technological changes can induce stress. As the worker does not get feedback about the successfulness of his/her work performance, the work may lack motivation and rewards, and may lead to decreased well-being. Moreover, technostress or ICT stress is also characterized by too much communication or by too much or too little workload, information, flexibility, and too many or few opportunities for development and training (Bradley, 2000; 2001). In addition to decreased communication, in this study, technostress was caused by an excessive workload, an excessive amount of information, a lack of opportunities for professional development, and a lack of training, especially for some low-status employees, such as employees with temporary work contracts.

The results of this study are examined within the framework of the Job Characteristics Model in Figure 14. The five job characteristics of the model are illustrated in the five lowest rectangles. The figure consists of two levels of ovals. The first level illustrates the results derived in this study, which are connected to the model. The results relevant to the model are mainly experiences related to changes in job descriptions and learning to use new technology. The second level illustrates the theoretical concepts related to the results. Moreover, the figure includes two kinds of ovals, which represent two different job descriptions. The light-colored ovals represent the changes in job descriptions and skill requirements of journalists, announcers and media journalists. These job descriptions were enriched in the process of introducing digital production technology. The dark-colored ovals represent the job descriptions of sound and video editors, which were narrowed down by the digitalization of program production technology.
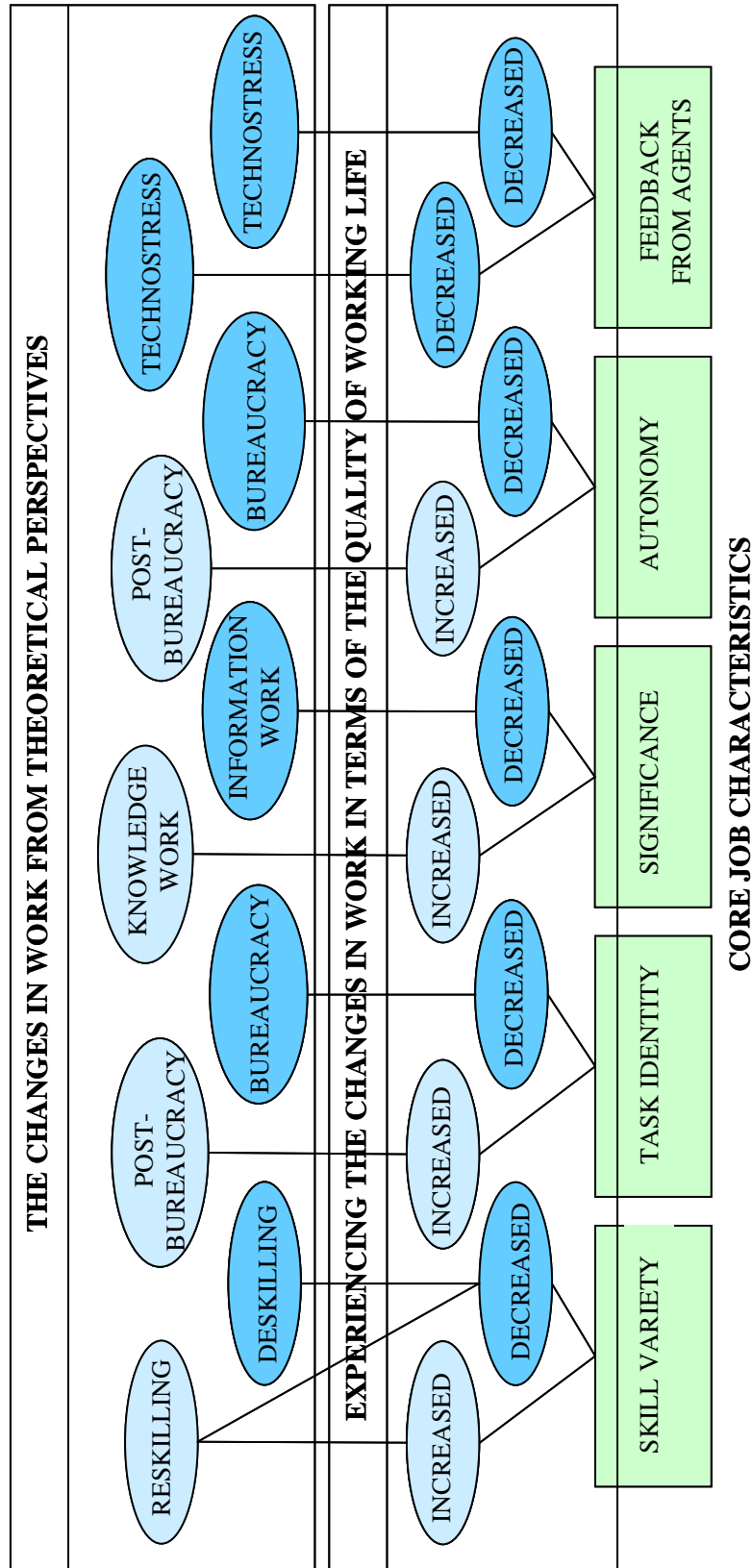
FIGURE 14. Examination of the Journalistic (light ovals) and Editorial (dark ovals) Changes in Work in terms of The Quality of Working Life with Theoretical Concepts.

To summarize the conclusions so far, on the one hand, this study makes suggestions about the concepts of reskilling, knowledge work and post-bureaucratic work, and on the other, about reskilling/deskilling, information work, and bureaucratic work. On the basis of the findings of this study, it seems that technological changes can have at least two kinds of implications for job descriptions and learning: they can enrich job descriptions to include new tasks and skill requirements or they can narrow job descriptions to include fewer tasks and fewer/more specialized skills than before. The theoretical concepts of reskilling, knowledge work and post-bureaucratic work are associated with enriching job descriptions arising from technological changes. Correspondingly, the concepts of deskilling and reskilling, information work and bureaucratic work are linked to job descriptions that are narrowed down due to technological changes.

3.5.2   Examination of the Results in the Framework of the Demand-Control Theory

The Job Demand-Control (JD-C) theory dates back to the late 1970's, when Karasek (1979) presented a job strain model according to which mental strain results from the interaction of job demands and job decision latitude. The model predicts that it is the combination of low decision latitude and high job demands that is associated with mental strain and job dissatisfaction. There are four types of jobs that might result from different combinations of job demands and decision latitude: "passive" jobs with low demands and low decision latitude, "low strain" jobs with low demands and high decision latitude, "high strain" jobs with high demands and low decision latitude, and finally "active" jobs with both high demands and high decision latitude. Figure 15 illustrates the job strain model.
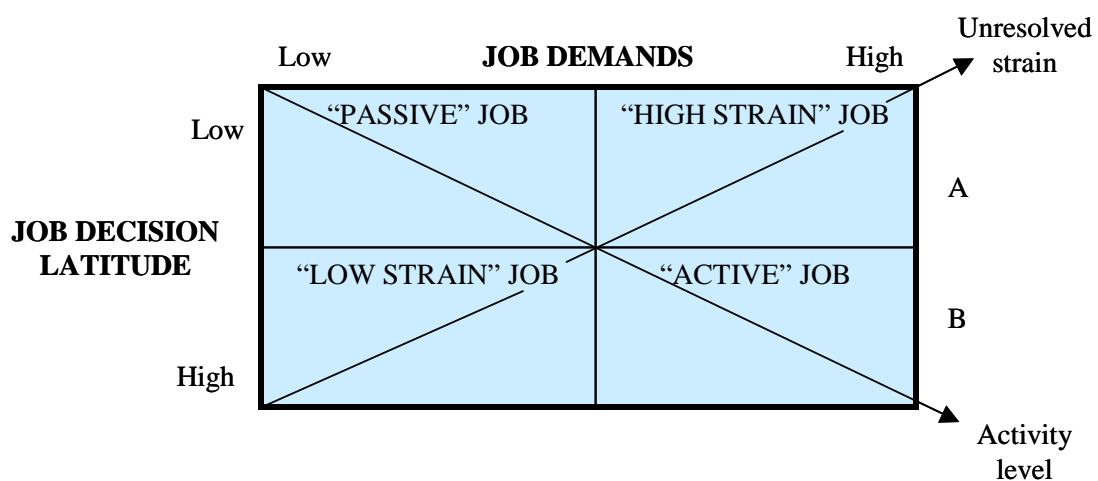

FIGURE 15. The Job Strain Model of Karasek (1979, 288).

The diagonals in the figure represent two interactions: situations in which job demands and job decision latitude *diverge* (low-high combination, "A") and situations in which they are *matched* (high-high combination, "B"). According to Karasek (1979; Karasek & Theorell, 1990), the first situation, when demands are relatively higher than decision latitude ("high strain" job), is of primary importance in predicting mental strain. Moreover, "passive" jobs are dissatisfying, while "active" jobs are associated with satisfaction and reduced depression, even though they are more demanding (Karasek, 1979). An "active" job description is connected with outcomes such as work motivation, involvement, learning and personal growth (Karasek & Theorell, 1990).

The Job Strain Model contradicted earlier views on designing jobs. The emphasis put by the model on high decision latitude in highly demanding job descriptions disproved the industrial and bureaucratic models of job descriptions, in which the worker allowed management to assume tight control of job-related decisions for a promised increase in economic compensation (Karasek, 1979). Furthermore, Karasek (1979) found that the "requirement" or demand of making decisions represented an opportunity to exercise judgment control, and was not a source of stress *per se*.

The Job Strain Model has been widely and comprehensively studied and some aspects of the model have been criticized. Firstly, the concept of demands in the model has been criticized. de Jonge, Mulder and Nijhuis (1999) found interactive effects of job demands between different types of demands and job decision latitude explaining job-related health outcomes. Psychological demands and decision latitude explained job satisfaction, physical demands and decision latitude for job involvement, and emotional demands, together with decision latitude, explained psychosomatic health complaints. The researchers thus argued that in order to fully understand the interaction of job demands and decision latitude in terms of job satisfaction, the concept of demands must be further specified and studied.

Secondly, the concept of decision latitude (control) in the Job Demand – Control model has been criticized. Karasek (1979) examined decision latitude with two measures, "decision authority" and "intellectual discretion", which are similar to the two central components of Hackman and Oldham (1980), namely autonomy and skill variety. The conceptualization of the control construct has been criticized for its broadness and it has resulted in many studies trying to specify the control concept. Barnett and Brennan (1995) found when estimating the relationship between employee experiences of seven job conditions that only two job conditions – job demands and skill discretion – were related to psychological distress. In other words, the "intellectual discretion" or "skill discretion" (the degree to which work is stimulating and allows workers to utilize their skills) of control in the job strain model

induced psychological distress, whereas decision authority did not. Rafferty, Friend and Landsbergis (2001) made similar findings: skill discretion was more strongly and consistently related to burnout than decision authority. These results indicated that stress might be induced in a highly demanding job by the lack of opportunities to use skills rather than by the lack of decision authority. It is possible that a high decision authority is self-evident in many professions and therefore is not experienced as a stress-generating element. Carayon and Zijlstra (1999) have identified various types of control influencing worker strain: task control related to influence over work tasks, resource control related to the context in which tasks are accomplished and organization control over organizational processes, procedures and policies. The task control and organization control were mediated by work pressure and the different dimensions of job control had different roles in influencing worker strain; for example, high task control was related to low work pressure whereas high organization control was related to high work pressure (Carayon & Zijlstra 1999). According to Carayon and Zijlstra (1999), the current models specifying the relationship between job control and strain should be adapted to take into account the different dimensions of job control and the different types of stress and health outcomes.

Thirdly, in addition to criticizing the two elements in the model, some elements have been added to the model. Dollard, Winefield, Winefield and Jonge (2000) suggest the extension of the model to a Demand-Control-Support model, as they found that jobs combining high demands, low control and low social support produced the lowest levels of satisfaction in workers. This finding is consistent with the argument of Karasek and Theorell (1990) that social support from supervisors and co-workers may reduce the effects of job strain.

In this study, job redesign enriched journalistic job descriptions and narrowed down editorial job descriptions. According to the interview data, job redesign was enabled by the technological change, but was also elicited by productivity-enhancement goals. There were two visions about the future of editorial work. According to some interviewees, editorial job descriptions will become more limited and *monotonous*, and, according to others, editorial work will become more limited but more *specialized* with high skill requirements. Thus, editorial work after job reorganization could be categorized either as a "passive" job with low demands and low decision latitude or as a "high strain" job with high demands and low decision latitude. According to Karasek (1979), the high strain job is of primary importance in predicting mental strain. However, if decision latitude is regarded from the view point of Barnett and Brennan (1995), the decision latitude of *specialized* job descriptions is specifically low in terms of decision authority, but not in terms of skill discretion. This might reduce the level of stress experienced by a high-strain job description.

Journalistic job descriptions enriched and resembled "active" job descriptions, in which both the demands and the decision latitude are high. The decision latitude was actually increased by the job redesign as the journalists gained more control and more opportunities for using their skills due to job enrichment. The demands also became higher and the employees reported that the new, enriched, job descriptions were experienced as more stressful than the previous, narrow job descriptions. Figure 16 illustrates the results of this study in the framework of Job Demand-Control Model of Karasek (1979).
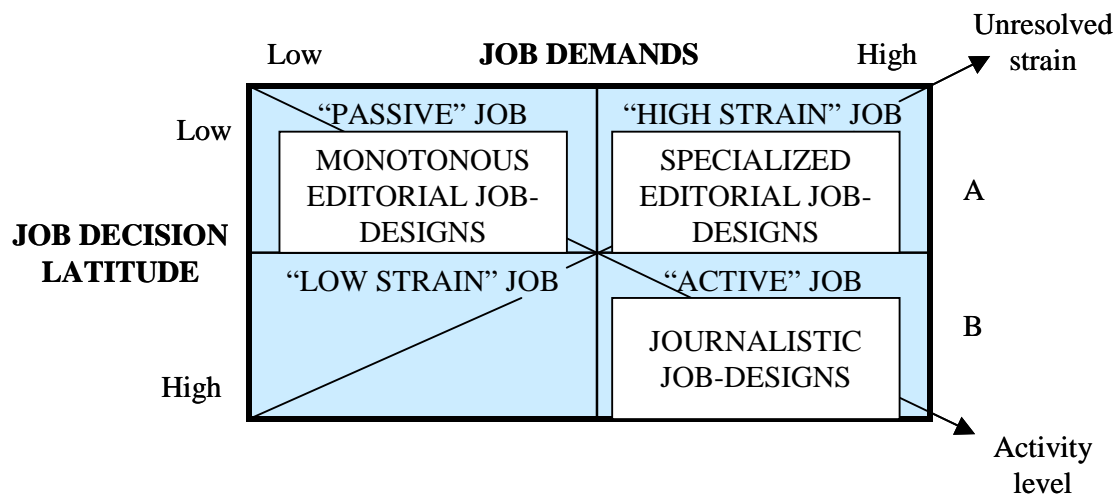
FIGURE 16. Examination of the Journalistic and Editorial Job Descriptions in the Theoretical Framework of Karasek (1979) JD-C Model.

Karasek and Theorell (1990) have connected the "active" job description with high work motivation, involvement, learning and personal growth. However, in addition to these positive outcomes of the high demands-high decision latitude relationship, the results of this study also describe the stressfulness of the "active" jobs due to excessive demands. In the light of this study, the Job Demand-Control model is not sufficient in explaining the relationship between job reorganization and the quality of working life. Part II of this study examines the stressfulness of job redesign, especially job enrichment, which turns job descriptions into "active" jobs.

4 PART II: JOB REDESIGN AND STRESS

In Part I of this study, it was concluded the job descriptions of journalists, announcers and media journalists had been enriched to include new tasks and, correspondingly, the job descriptions of editors narrowed down to include fewer tasks and duties. Enriched job descriptions were connected to new learning requirements (e.g., to a reskilling effect) as well as to increased autonomy and responsibility (e.g., to the post-bureaucratic, information model of work) and narrowed job descriptions were connected with both an increase in technological skill requirements (a reskilling effect) and a decrease in task-related skill requirements (a deskilling effect), as well as with a limited degree of autonomy (the bureaucratic, industrial model of work). The empirical findings of this study on the relationship between task identity and the quality of working life contradicted the Job Characteristics Model of Hackman and Oldham (1980) as a high task identity was also experienced as negative. Moreover, the findings did not seem to fit the Job Demand-Control Model of Karasek (1979) because "active" jobs were, in this study, experienced as highly stressful.

Part II of this study examines the connection between job redesign and the quality of working life, especially from the viewpoint of stress. It focuses on identifying stressors related to job redesign, especially enriched job descriptions. Stressors are not considered to be normative (e.g., a stimulus-based approach to stress) but as factors that have a potential to induce stress. Whether or not stress is actually induced depends on the characteristics of the individual as well as the characteristics of the environment (e.g., a transactional approach to stress).

4.1   Theoretical Background on Job Redesign and Stress

Since the beginning of the industrial revolution, scientific discussion has concluded that excessive specialization of job descriptions has adverse effects on the morale of workers (Conant & Kilbridge, 1965). Job specialization and simplification seemed to fit perfectly the rationale of a highly industrialized business fragmented into singular functions (see, for example, Lehrer, 1957). However, there was a growing concern in the 1950's and 1960's that mass technology virtually destroyed everything in the job that might have been of personal value or meaning to the worker (Cozan, 1959; Schoderbek, 1968). The classical organization theory needed to be revised (Hales, 1987). Job enlargement – the practice of restoring to jobs some of the skill, responsibility, and variety lost through work simplification – was seen as a remedy for

the negative effects of specialization (Conant & Kilbridge, 1965). Job enlargement was often more than just "job extension", adding repetitive tasks to the job description. It emphasized enlarging the job by increasing the variety of tasks performed by the individual in order to reduce monotony, and/or increasing the versatile use of skills, and/or increasing the freedom of the worker (Schoderbek, 1968). Most of the early experiments with the concept of job enlargement in the beginning of 1950's were primarily interested in the psychological impact of the job on the worker and the ability of job enlargement to alleviate the dissatisfaction associated with the highly routine, specialized jobs. During the latter part of the 1950's, several researchers and practitioners began to question the practicality of this "human relations" approach to job enlargement and demanded objectively determinable (economic) results from job enlargement projects. Due to this development, the proponents of job enlargement became divided into two schools: "behavioralist", for which job enlargement was a tool for increasing job satisfaction, and "economist", for which job enlargement was a road to lower costs, greater output and higher profits (Schoderbek, 1968).

Job enlargement was an appealing concept in the highly specialized work environment of the 1960's, but the discussion of job enlargement was also boost by the changes in business economics. At the beginning of the 20[th] century, single-product mass production systems were producing a single standard product repeatedly. Work was organized in a functional form. After that, the desires of the customers became more diversified and the variety of product specifications increased, which led to an increase in the number of multi-product mixed assembly line systems in the 1960's. (Muramatsu, Miyazaki & Ishii, 1987.) The change in business logic, as well as the emphasis on human aspects in the public discussion provided some of the incentive that directed the interests of researchers and practitioners to job enlargement.

It has been suggested that job redesign, by which job descriptions are extended, consists of two separate processes, namely job enlargement and job enrichment. (1) Job enlargement can be referred to as "horizontal job loading", simply adding more task elements to an existing job. The reasons for enlarging job descriptions are usually both humanistic and economic. According to Dubin (1976, 23), job enlargement is not just about encouraging and motivating employees and increasing their quality of working life, but also about increasing efficiency due to improving working conditions and increasing commitment. Similarly, Hales (1987) finds that job enlargement practices are usually as much inspired by instrumental goals (the productivity gains of work rationalization and labor-savings) as by humanistic goals (considerations of humanizing work), although interventions in organizations are probably more often legitimized by the latter argumentation. Moreover, enlargement

practices are often the result of *ad hoc* evolutionary development at unit level rather than purposive, investigated change throughout the organization (Hales, 1987). Already in the mid-1960's, work attributes related to job enlargement have been described. According to Conant and Kilbridge (1965), job enlargement involves an increased number of job tasks, increased variety of job tasks, self-determination of pacing, responsibility for work quality, discretion for working method and completion of work unit. In terms of the quality of working life, especially from the viewpoint of work motivation, job enlargement entails characteristics that affect well-being and stress at work. Job enlargement increases task variety and produces a sense of creating and of using skills in the plural (Hales, 1987), which can be experienced positively as boredom is decreased, but can also induce negative experiences at high levels due to hypertension and loss of control. Job enlargement also increases task identity, which can increase the feeling of meaningfulness of the work. Enlarged jobs usually require more mental and physical abilities, which has positive effects on the quality of working life. Furthermore, job enlargement increases the possibilities for designing the job with worker-paced control, which increases the influence of the worker on work methods and habits, simultaneously increasing the level of work motivation and well-being. (Chung & Ross, 1977.)

(2) Job enrichment, "vertical job loading", allows workers to perform managerial functions previously restricted to managerial and supervisory personnel. Job enlargement is seen as a prerequisite for job enrichment and, in practice, it is difficult to add extra tasks or responsibilities to a job without increasing the amount of discretion, autonomy, decision-making or planning involved in the job (Hales, 1987). Whereas job enlargement practices are applied as much to managerial and skilled staff as to manual workers, job enrichment practices are directed to those who already possess an element of decision-making in their jobs – seemingly a case of "enriching the enriched" (Hales, 1987). Job enrichment contributes to the quality of working life of employees, especially work motivation, by increasing employee participation in organizational decision-making processes, by providing opportunities for the employees to internalize organizational goals, as well as by giving employees autonomy and control over the means of achieving organizational goals. (Chung & Ross, 1977.) However, job enrichment practices do not enhance work satisfaction if skill discretion is extended to trivial aspects of the work, if decision-making is only marginally extended and if job enrichment is not connected to receiving adequate rewards for increased responsibilities (Hughes & Gregory, 1976).

The terms "job enlargement" and "job enrichment" have often been confused in job redesign studies. The term "expanded task design" has been proposed to substitute for the concepts of job enlargement and job enrichment (Pierce & Dunham, 1976). There again, Hackman and Oldham (1980) refer to both job enlargement and enrichment as

"job enrichment". In this study also, the concept of *job enrichment* is used, even though job redesign in this study included both job enlargement (horizontal job loading, e.g., increased number of tasks) and job enrichment (vertical job loading, e.g., increased autonomy of work). Thus, job enrichment in this study refers to combining tasks and vertically loading the job (Hackman & Oldham, 1980, 135).

The influences of enriched job descriptions on the quality of working life have been uniform in some respects and conflicting in others. The extensiveness of the job description has been found to foster well-being: the more extensive the job description the higher the level of well-being. Thus researchers, during a long period of time, have been quite unanimous about job enlargement and job enrichment being motivators rather than stressors (Chung & Ross, 1977; Conant & Kilbridge, 1965; Cozan, 1959; Pierce & Dunham, 1976; Hackman & Oldham, 1980; Hales, 1987; Karasek, 1979; 1990). These results confirming the positive connection between a broad job scope and the quality of working life have been found across a wide variety of samples and research instruments for the different job characteristic dimensions, as well as for the various measures of job scope (Bechtold, Sims & Szilagyi, 1981).

According to Xie and Johns (1995), consistent with the positive connotation of high job scope and the negative connotation of job stress, there has been a general tendency to hypothesize and test a linear, negative relationship between the extensiveness of job description (job scope) and stress. The interactive effects of pairs of job characteristics have also attracted attention, mainly due to the Job Demands-Control Model of Karasek (1979). Very few studies have examined the possibility that job characteristics that are usually thought to be experienced positively by the employees in terms of their quality of working life can provoke stress when present at high levels. Thus the potential stressfulness of job enrichment, or elevated job scope, has also been overlooked to a large extent. (Xie & Johns, 1995.)

A few exceptions can be found. Champoux (1980) found a curvilinear relationship between job scope and psychological response to the job and identified that growth need strength was an important moderator affecting this relationship. Thus, individuals with strong growth need strength (individuals who respond vigorously to a job with high motivational potential) will maintain a higher level of work-related well-being as the job scope broadens than individuals with weak growth needs. Thus, people with strong growth needs possibly can be "stretched" further by their jobs than people with weak growth needs. (Champoux, 1980.) Also, Xie and Johns (1995) found a U-shaped curvilinear relationship between indicators of job scope and emotional exhaustion. In the study, "job enlargement" referred to workers performing what were formerly two jobs that require extra skills (elevated skill variety) or performing more upstream or downstream work in a process (elevated task identity).

The researchers suggest that job description can elicit stress when it provokes either under stimulation or over stimulation. Thus, job descriptions that are too narrow, as well as overly enlarged and enriched job descriptions, are experienced as negative in terms of the quality of working life. The identified curves in the study were slightly asymmetric indicating that the insufficiency of job scope (under stimulation) was more stressful than the excess of job scope (over stimulation). Moreover, it was found that the individuals who perceived a misfit between job demands and their abilities experienced higher stress than those who perceived a fit. (Xie & Johns, 1995.) The individual experience of self-efficacy thus appears to determine, or at least influence, the stress level, which enlarged job descriptions may induce. The moderating effect of the fit between job demands and employee abilities may be overlapping with the moderating effects of growth need strength: a motivated employee may also experience him/herself as more capable, or at least as having more confidence in his/her abilities to learn needed skills.

This study provides more insight into experiencing changed job scope, especially enriched job descriptions, in terms of the quality of working life. The stressors elicited by enriched job descriptions and narrowed job descriptions are studied in the system theoretical Balance Theory of Job Design by Smith and Carayon-Sainfort (1989).

4.1.1   The Balance Theory of Job Design

The Balance Theory of Smith and Carayon-Sainfort (1989) conceptualizes job descriptions and job-related stress based on the balance among job elements. Job descriptions are approached with a system-theoretical view, which aims at a holistic view of job descriptions, their elements and the interaction between the elements.

The Balance Theory was initially introduced in 1989 (Smith & Carayon-Sainfort, 1989) and later revised in 2000 (Carayon & Smith, 2000). According to the theory, work organization results in the design of a work system that has five elements: the individual, task, technology, environment and the organization. The interactions between these different elements can produce various physical and psychological stressors on the individual that then produce a "stress load", which has both physical and psychological components. Stress loads challenge biological resources (such as energy expenditure, biomechanical strain and physical status), psychological resources (such as perception, cognition, decision-making and emotion) and behavioral resources (such as work motivation and coping behaviors). Physical, psychological and behavioral resources are not a fixed and stable set of individual

characteristics but change over time and are influenced by capacity, work motivation, stress responses and the demands of working conditions. (Carayon & Smith, 2000.)

The responses to the load are influenced by the physical capacity, health status and work motivation of the individual. The psychological stress loads are further influenced by personality, past experiences and social situation. The physiological reactions caused by the load produce a strain on the person if they exceed the available biological resources, such as energy resources or mechanical strength. The psychological reactions have emotional, behavioral and biological consequences, which are primarily determined by the individual's perception of his/her ability to meet the demands imposed and upon his/her perception of the "acceptability" of the working conditions. In addition, the person's availability of psychological and behavioral resources, such as work motivation, cognitive capacity and coping behaviors, influence the consequences. The physiological and psychological reactions are not separate but interact, and may even reinforce each other. (Carayon & Smith, 2000.)

The load on the individual can be influenced by the physical demand and psychological response to the demand, as mediated by perception or both (Carayon & Smith, 2000). When the stress load induced by the working conditions becomes excessive, the person displays stress responses, which are emotions, behaviors, and biological reactions that are maladaptive. When these reactions occur frequently over a prolonged time period, they result in physiological and/or psychological health disorders and decreased quality of working life, which in turn reduce the available resources for dealing with the stress load and increase the risk of the load becoming excessive. (Smith & Carayon-Sainfort, 1989.) This repeated circular cycle leads to a breakdown in individual resources, unless external resources are made available or the environmental load is reduced (Carayon & Smith, 2000).

The five elements of the work system can be seen as five loads that working conditions can exert on workers. *Environmental job stressors* entail, for example, noise, air quality, lighting, work-place layout and conditions that produce sensory disruption, which make it more difficult to carry out work tasks and induce stress and emotional irritation. *Task stressors* consist of, for example, content considerations such as the repetitiveness or the meaningfulness of work, workload issues such as overload and underload, work pressure, as well as issues of control. *Technological stressors* are related to excessive or too little load that the technology places on the individual, physiological loads and lack of adequate skills, but also, for example, to the fear over job loss due to replacement by new technology. *Organizational job stressors* include, for example, issues related to work schedules, to work roles, and to organizational support, the latter of which can manifest itself in the lack of training, in

the lack of opportunities for career development, and in job security. *Individual considerations* determine the physical and psychological effects that the previously mentioned elements of the model will produce. Individual resources and loads include, but are not limited to, personality, physical health status, skills and abilities, physical conditioning, prior experiences and learning, motives, goals and needs. (Carayon & Smith, 2000; Smith & Carayon-Sainfort, 1989.) Figure 17 illustrates the elements of the Balance Model.
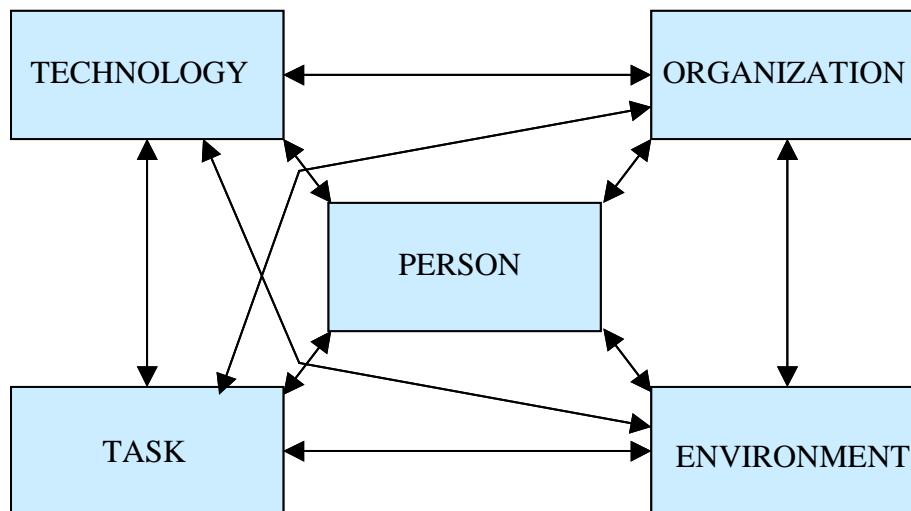
FIGURE 17. The Balance Model of by Smith and Carayon-Sainfort (1989, p. 75).

The essence of the model is to reduce stress by "balancing" the various elements of the work system. There are two aspects of "balance": the balance of the total system and compensatory balance. System balance is based on the idea that a workplace or a job is more than the sum of individual components of the system. The interplay among the various components produces results that are greater (or lesser) than the additive aspects of the individual parts. The way in which the system components are related to each other determines the potential for the system to produce positive results. Compensatory balance is based on the notion that it is seldom possible to eliminate all work factors that cause stress. The essence of the compensatory balance is to reduce the stress load by making changes in aspects of work that can be positively changed to help improve those negative aspects that cannot be changed. (Carayon & Smith, 2000.) Thus, the positive elements that provide the worker with resources are used in order to compensate for poor aspects in other dimensions, which results in balancing the stress with moderating factors that reduce the stress loads perceived by the worker (Smith & Carayon-Sainfort, 1989). For instance, the negative influences of inadequate skills to use new technology can be offset by increased work

training (Carayon & Smith, 2000). Also, the adverse influences of low job content (repetitiveness and lack of task significance) can be balanced by an organizational supervisory structure that promotes employee involvement and control over tasks (Smith & Sainfort, 1989).

4.2 Empirical Results on Stressors in Job Redesign in the Framework of the Balance Model

In this study, stressors related to enriched job descriptions were connected to all the five work system elements. The stressors, which were experienced, were mainly related to task conditions. There were nine task-related stressors: the extensiveness of the job description, the fragmentation of the job description, the rare tasks of the job description, the numerous roles of the job description, the extensiveness of the skill demands, the conflicting skill demands, the increased sense of responsibility, the continuous changes in the job description and the independence of the job description.

The elemental stressor was (1) the extensiveness of the job description, which referred to the difficulty of managing the job description and perceiving it as a whole. With job enrichment, (2) a fragmentation of the job description was also identified. The job description consisted of many concurrent tasks, which scattered attention, overloaded concentration, induced insecurity and the fear of forgetting something important, made the work more superficial and lowered the quality of work as there was no time to create professionalism for all the tasks. As there were numerous tasks to be completed, there were also tasks that occurred less frequently. These (3) rare tasks of the job description made it difficult to maintain a feeling of competency at work and made the work more inefficient, as the worker had to spend time for relearning and revising knowledge related to rarely occurring tasks. The numerous tasks of the job description were connected with (4) numerous roles of the worker, due to which the work was perceived as unclear. The transfer from one work role to another was also experienced as inducing stress. With enriched job descriptions, stress was experienced due to (5) extensive skill demands, which resulted from the insufficiency of training (see also organizational stressors below). The fear of not being able to adopt all new tasks and the distrust in the soundness of professional skills induced psychosomatic stress disorders, such as stomach ache, memory losses and hand tremor. There were also (6) conflicting skill demands as, on the one hand, specialized knowledge of work tasks was required while, on the other, there was a need for multi-professional knowledge of many areas within and outside the scope of the job description. Enriched job descriptions led also to (7) a decrease in cooperation as one worker had

to manage almost the entire work process. The decrease in cooperation induced feelings of loneliness and insecurity as well as decreased collective learning that had been essential for maintaining a high level of competence in work. As the cooperation diminished, there was (8) an increase in the sense of responsibility over work and work outcomes, which brought about insecurity and fear, especially with respect to significant tasks. There were also (9) continuous changes in tasks, which were experienced as stressful. They decreased the feeling of control in work, decreased the feeling of competency and increased feelings of insecurity.

Technology-related stressors comprised four qualitatively differing stressors. Stress was experienced due to (1) the need to use numerous technologies and tools simultaneously. The job description was perceived as technology-driven and controlled, while the use of many technologies and appliances was accompanied by feelings of frustration, helplessness and concentration overload. Stress was also induced by (2) the complexity of technology, which also was experienced as decreasing the control of the worker over the work. Some technologies contributed to work and the quality of working life by automating routine tasks but (3) the automation of tasks was also experienced as a stressor. Especially automating tasks that had previously been completed by a group of individuals, such as broadcasting tasks, were experienced as less interesting, less controllable and more insecure after the introduction of new technology. It was also found that problem solving had become more difficult as it was conducted though human-computer rather than human-human interaction. (4) The continuous changes in technology resulted in an increased doubt of one's competency and a need for training.

Three stressors related to organizational factors were identified. There was (1) a lack of opportunities for training and rehearsing, which resulted in a fear of not coping with the work tasks. Training and learning requirements and needs were extensive, due to which the learning capacity had been overloaded. (2) The lack of resources had obstructed participation in training as well as rehearsing new skills. It had also led to tiredness and a decline in the social atmosphere of the work unit. The lack of resources as well as the task-related consequences of the enriched job descriptions affected (3) the scheduling of work in a stressful manner. The workers felt that they had to push themselves to the limit, accomplishing work tasks superficially, due to the lack of resources, and the extensiveness of the job description, as well as performing tasks with insufficient skills.

Stressors related to enriched job descriptions were accompanied by six individual conditions, which affected the perception of the changes in work and their implications for the quality of working life. The employees experienced a further increase in stress (1) if the worker did not experience enriched job descriptions as

beneficial to him/herself and/or the work, (2) if the worker had a low self-efficacy, that is, doubts about his/her abilities to adopt new tasks, (3) if the worker undervalued, or was not interested in, the new tasks of the job description, (4) if the worker wanted to concentrate on performing only a few tasks with more precision and care, (5) if the worker did not like using new technology, and (6) if the worker had been professionally experienced but was now faced with his/her skills becoming obsolete and insufficient.

Finally, also <u>one environmental stressor</u> was manifested in the data, that is, social interruptions. It was stated that disruptions in a stressful job description increased the stress experience. Interruptions were mainly linked to colleagues asking advise when they were insecure about their own knowledge, so interruptions, even though stressful for some workers, could have been a resource taking the form of a coping mechanism for the workers seeking guidance. Social interruptions were seen as an environmental stressor, as they can be related to factors in the physical work environment, such as noise, even though their causes may be organizational.

Several stressors were linked to enriched job descriptions. Only two stressors were connected with narrowed job descriptions; these were <u>organizational stressors</u> related to the fear of job loss and the fear of work becoming less meaningful. Narrowed job descriptions meant that some tasks were transferred from some workers to others, deskilling workers and making editorial job descriptions poor in content. The fear of job loss was manifested in feelings of being undervalued in the organization, increased job insecurity and even in fear of the end of one's professional career.

The stressors related to enriched job descriptions are illustrated in Figure 18. The stressors are categorized in the framework of the Balance Model (Smith & Carayon-Sainfort, 1989).

TECHNOLOGY
- Numerous technologies
- Complexity of technology
- Automation of tasks
- Continuous changes in tech.

ORGANIZATION
- Lack of opportunities for training and rehearsing
- Lack of resources
- Scheduling of work

PERSON
- Expanded task design perceived unfavorable
- Low self-efficacy
- Disinterest in new tasks
-Need for concentrating on few task(s)
- Dislike of new tools
- Major changes in skills

TASK
- Extensiveness
- Fragmentation
- Rare tasks
- Numerous roles
- Extensive skill demands
- Conflicting skill demands
- Decreased cooperation
- Increased responsibility
- Continuous changes in tasks

ENVIRONMENT
- Social interruptions

FIGURE 18. Stressors Linked to Enriched Job Descriptions in the Framework of the Balance Model of Smith and Carayon-Sainfort (1989).

The nature of the above-mentioned stressors was also examined in order to find out the root causes of the stressors. The stressors were classified in terms of the elements that cause the experience of stress. Stressors that had a similar origin were grouped together. The categorization of the stressors ended up in four broad categories: a) the nature of demands (excessive breadth and excessive depth of demands, contradiction and changes in demands), b) social conditions, c) the lack of organizational support, and finally a moderating stressor d) lack of individual work motivation or ability.

The nature of work demands caused stress related to enriched job descriptions. *Excessive breadth* refers to an excessive horizontal expansion of the job description. It can also be understood as quantitative overload. Stressors related to excessive breadth were extensiveness of the job description, the fragmentation of the job description, rare tasks, numerous roles, extensive skill requirements and numerous technologies. *Excessive depth* refers to an excessive vertical expansion of the job description and a

qualitative overload. Stressors related to excessive depth were increased responsibility and complexity of technology. The stressor "automation" was difficult to categorize as it referred to the changes in the quality of work (some tasks were experienced as less interesting, less controllable and more insecure after introducing automation), but also to changes in the social aspects of work. Therefore this stressor was categorized in two groups: excessive depth and social problems. One stressor referred to *contradiction* between aspects of work, namely conflicting skill demands. Stress was also induced by *changes*, more specifically, by continuous changes in tasks and technology.

Social conditions in the work unit were also factors causing stress. Social conditions related to enriched job descriptions referred to three stressors: decreased cooperation, automation (as especially automation that replaced cooperation was experienced as stressful) and social interruptions.

The *lack of organizational support* also induced stress. The stressors linked to enriched job descriptions were the lack of opportunities for training and rehearsing, the lack of resources and the scheduling of work. Stressors linked to narrowed job descriptions were fear of job loss and fear of job becoming less meaningful.

Finally, stress was moderated by individual factors. One moderating factor was the *lack of motivation* and specifically stressors such as seeing enriched job descriptions as unfavorable, being disinterested in new tasks and in using new technology, and having a need to concentrate on only a few tasks. The *lack of ability*, that is, having low self-efficacy, also induced and increased stress.

Table 5 shows the classification of the stressors related to enriched and narrowed job descriptions according to their stress-inducing elements. The categorization, yielded from analyzing the stressors, is a theoretical simplification, as in reality it may be impossible to draw distinctions between the different elements of the stressors.

TABLE 5. Stressors Related to Enriched and Narrowed Job Descriptions Grouped According to Causes of Stress.

ENRICHED JOB DESCRIPTIONS	Breadth	Depth	Contra-diction	Changes	Social conditions	Lack of org. support	Lack of motivation or ability
Task							
Extensiveness	X						
Fragmentation	X						
Rare tasks	X						
Numerous roles	X						
Extensive skill demands	X						
Conflicting skill demands			X				
Decreased cooperation					X		
Increased responsibility		X					
Changes in tasks				X			
Technology							
Numerous technologies	X						
Complexity		X					
Automation		X			X		
Changes in technology				X			
Organization							
Lack of training and rehearsing						X	
Lack of resources						X	
Scheduling						X	
Environment							
Social interruptions					X		
Person							
Seeing change as unfavorable							X
Low self-efficacy							X
Disinterest in new tasks							X
Disinterest in new tools							X
Need for concentrating							X
NARROWED JOB DESCRIPTIONS	Breadth	Depth	Contra-diction	Changes	Social conditions	Lack of org. support	Lack of motivation or ability
Fear of job loss						X	
Fear of job becoming less meaningful						X	

4.3   Discussion of Job Redesign and Stress

The results of the stressors in job redesign, especially in terms of enriched job descriptions, contradict the mainstream job description research that assumes a self-evident positive relationship between autonomy and task identity, and the level of quality of working life. While identifying a negative relationship between autonomy and task identity, and the level of quality of working life, this study supports the findings of earlier quantitative studies by Champoux (1980) and Xie and Johns (1995), in which a curvilinear relationship between a broad job scope (over stimulation) and the quality of working life has been noticed. However, narrowed job descriptions were connected with only two organizational stressors, namely the fear of job loss and fear of work losing its meaningfulness. The former stressor has been also noted by Carayon and Smith (2000), the designers of the Balance Model. As the narrowed job descriptions were only linked with a few stressors, a curvilinear relationship cannot be assumed from the findings made in this study. It is probable that, if the study had focused on more monotonous job descriptions, such as routine machine-based production work, the negative effects of understimulation on the quality of working life would have been uncovered. On the basis of the earlier studies of Champoux (1980) and Xie and Johns (1995), we can assume that there is a relationship between job scope and the quality of working life, but we do not have specific evidence about the causal nature of this connection. A study by Bechtold, Sims and Szilagyi (1981) confirms that job scope tends to cause satisfaction with work rather than *vice versa*. However, the study of Bechtold et al. (1981) only finds that job scope and satisfaction have a positive causal relationship and that it does not account for the overstimulating stressful effects of job scope. It is not known whether the causal relationship remains the same when it is acknowledged that job scope can also be excessive in nature.

Even though high job scope has not traditionally been considered stressful from a job description perspective, the stress theories have long acknowledged a U-shaped relationship between demands and stress. For example, Selye (1983, 18) includes the constructs "overstress" (hyperstress) and "understress" (hypostress) in his model, Levi (1974, 38) refers to concepts such as "deprivation" and "excess" and Kahn (1974, 58) describes a "role overload". The idea that the optimal level of stress falls somewhere in the middle of a theoretical (low-high) stress dimension seems to apply in terms of job scope and the quality of working life also.

Bradley (1989, 148) has incorporated the concepts of overstimulation and understimulation into her model of the relationship between computer technology, work environment and stress. She has observed similar factors leading to stress due to

overstimulation that were identified in this study related to work tasks: an excessive amount of work, information, contacts, responsibilities, contradicting demands and variety in work; too great demands for development, training and attentiveness; and excessively wide powers (Bradley, 1989). However, some of the factors in Bradley's (1989) model did not come up in this study. These included an excessive amount of physical workload, geographical variation and group cooperation, work being too free and employees being too hard to replace. Only one factor related to the enriched job descriptions was actually caused by understimulation, that is, decreased cooperation. In this study, the narrowed job descriptions were linked to two stressors: fear of job loss and fear of job becoming less meaningful. Corresponding stressors in Bradley's (1989) model were the lack of variety and worker being too easy to replace. In this study, stressors were linked to changes in job descriptions that accompanied the technological change. Thus, according to this study, the model of Bradley (1989) could also be extended to include not only stress related to computer technology and work environment but also stress in job redesign.

Similar findings to the study of Champoux (1980) were found in this study as the individual moderating effects were connected to the way in which job redesign was experienced. The interviewees described, for example, that employees who felt disinterest in new technologies and tasks, and who saw the change as unfavorable, experienced the job redesign as more difficult. Disinterest and negative attitudes towards the change can be seen as motivational properties, resembling the concept of growth need strength of Hackman and Oldham (1980). This finding can also be linked to the P-E fit model of stress (French et al., 1982): the level of stress was seen to be higher if there was a supplies-needs misfit. Another moderating factor in this study was the lack of self-efficacy resulting from excessively high demands compared with employee abilities. Thus, the demands-abilities fit of the P-E fit model (French et al., 1982) also played an important role in determining the level of stress experienced. Xie and Johns (1995) have linked the moderating role of a demands-abilities misfit to the connection between a high job scope and the quality of working life; their notion was supported by this study.

The stressors that were identified in this study are highly interconnected and may in some cases be even overlapping. For instance, an extensive job description consists of multiple tasks, which require multiple roles, multiple technologies and extensive skills. These stressors seem to be closely connected to each other. However, it is not possible, based on these findings, to determine the "critical" stressors: stressors, the elimination of which would result in increased well-being and improved quality of working life. Rather it can be argued that there are numerous and qualitatively differing ways to tackle these stressors. The interrelatedness of the results reflects well the system-theoretical view of the Balance Model. Carayon and Smith (2000)

state that a major advantage of the Balance Theory is that it does not highlight any one factor of the job description (such as shift work) or a small set of factors (such as demand and control), but examines the design of jobs from a holistic perspective. Other researchers have also suggested that the job description-response research should focus more on studying the interdependence of task characteristics rather than examining task characteristics as isolated units, which do not interact with each other (Kiggundu, 1981). Also, the interrelated nature of the stressors gives a more truthful description of the way in which stressors are experienced in real work situations: not separately and individually but in an integrative manner. Stress is determined by the way in which components of the work system relate to each other (Carayon & Smith, 2000).

Based on the Balance Theory (Smith & Carayon-Sainfort, 1989), the stressors of this study can be balanced, compensating some negative stress loads with positive ones. We can expect, for example, that if the amount of training and rehearsing were increased, it would have positive implications in the individual sphere (an increase in self-efficacy, a decrease in the dislike of new technologies and tasks), in the task element (decrease of stress related to extensive skill demands) and in the environmental element (a decrease in social interruptions). Or it is possible that, if the number of work tasks were decreased, task-related stressors (conflicting skill demands, the extensiveness and the fragmentation of the job description, rare tasks, multiple roles, as well as changes in tasks), technology-related stressors (numerous technologies and continuous changes) and environmental stressors (social interruptions) would all decrease.

However, in order to successfully redesign jobs to support and enhance the quality of working life, the positive and individual aspects must also be taken into consideration. In this analysis, the emphasis was on stressors rather than positive experiences related to enriched and narrowed job descriptions. The job description can be balanced more accurately if the sources of work motivation, for example, and joy at work are also identified and promoted. The ways in which employees experience their jobs and job redesign processes are influenced by individual perceptions and dispositions; what is motivating to one employee may be unsatisfactory to another. Designing jobs should be carried out with consideration being given to the individual differences.

Kirk, Downey, Duckett and Woody (2000) recommend job enlargement and job enrichment practices to be used, especially with high achievers and workers who are experiencing burnout. In the light of findings made by Champoux (1980) about the positive relationship between growth need strength and the quality of working life, this suggestion may be valid. However, the results of this study contradict this suggestion, as the enriched job descriptions induced stress in several ways and

required a high feeling of self-efficacy. A person experiencing great emotional exhaustion may not be able to take on the increased responsibilities and extensive tasks. Kirk et al. (2000) further advise that job enlargement and job enrichment can be used in conjunction with each other, or with other career development interventions such as job rotation and temporary assignments. This study urges job designers to carefully consider and evaluate the need for using multiple job description strategies. The connections between the job description interventions and the quality of working life of employees should be studied in order to ensure that the demands placed by the interventions on the employees are not excessive or conflicting. Sutherland and Cooper (2000, 173) suggest horizontal job enlargement to be implemented for older workers, who realize that they have reached a career plateau. According to this study, the potential stressfulness of the enriched job descriptions should be analyzed before carrying out such interventions.

Why were the narrowed job descriptions connected with qualitatively more one-sided stressors? This might be due to several factors. The proportion of the interviewed employees that had experienced the narrowing down of job descriptions was smaller than that of employees who experienced job enrichment. It is also possible that the interviewees interpreted the narrowed job descriptions as more insignificant than enriched job descriptions, as the organizational discussion and communication emphasized the latter as a radical organizational change. This might have resulted in interviewees emphasizing issues related to enriched job descriptions more than issues related to narrowed job descriptions. It is, of course, possible that narrowed job descriptions are connected with qualitative, more uniform, (and quantitatively fewer) stressors. Or the fear of job loss may be such a dominating stressor that it overruns other stressors, at least temporarily.

5 PART III: TYPOLOGY OF EXPERIENCING TECHNOLOGICAL CHANGE WITH JOB REDESIGN IN TERMS OF QUALITY OF WORKING LIFE

Up to now, this study has examined experiences related to the quality of working life during technological change (Part I) and stress in job redesign (Part II). In the subjective experiences of the employees, these two changes do not, however, exist separately. In this chapter, these experiences are examined together by presenting results from a phenomenographic analysis. The analysis was conducted on the original data of 32 thematic interviews in order to find out the holistic experiences of the interviewees in a technological change and a job redesign situation. The justification for a holistic approach is self-evident, as neither the technological change or job redesign are experienced in isolation, but in contexts in which there are multiple factors, both technological and job-related, that create the experience of the quality of working life and bring about well-being and/or stress. The technological change *with* job redesign is referred to as 'digitalization'. As noted in Section 2.6.4, the goal of phenomenographic research is to describe qualitatively differing ways in which people perceive their experience of phenomena (Barnard & Gerber, 1999) and to examine these conceptions in a hierarchical way in order to reveal interrelations between them (Amadeo, 1999).

5.1   Theoretical Background on Typologies of Experiencing Technological Change with Job Redesign

Similar phenomenographic studies that aimed at classifying multiple interviews into groups in terms of experiences during technological changes were difficult to find. Phenomenographic research had been conducted in research areas that were connected to the research field of this study, such as adult learning in workplaces (e.g. Gerber, Lankshear, Larsson & Svensson, 1995) and conceptions of technology, computers and computing (e.g. Barnard & Gerber, 1999; Laurillard, 1993; Nordenbo, 1990). However, the study of Huuhtanen (1985, 143-160) adopted a phenomenographic approach similar to the one in this study. He described the introduction of office automation (payroll computation) in terms of how individual workers managed the change and the new technology. Also in his study, the technological change was connected with changes in job redesign: the job demands were extended so that the worker had to manage the entire work process and learn

new skills. Huuhtanen (1985, 159) categorized the experiences of altogether 24 employees according to two dimensions: emotional intensity and the positiveness/negativeness of the experience. The analysis resulted in four categorizations (with the number of interviewees in each category):

- Emotionally intense – Positive (5)
- Emotionally intense – Neutral (8)
- Emotionally dull – Positive (3)
- Emotionally dull – Neutral (8)

The results of the phenomenographic analysis of this study are compared to the categorization by Huuhtanen (1985).

5.2   Empirical Results: The Categories of Description

The phenomenographical analysis produced six ways of experiencing the digitalization in relation to the quality of working life. Digitalization was seen as (1) a revolutionary change, (2) an interesting change, (3) hardly a change at all, (4) full of uncertainties and images, (5) an interesting but stressful change, and (6) a difficult change.

Some employees experienced digitalization as a (1) revolutionary advancement. These employees viewed digitalization in a very positive manner. They felt that digitalization was a fantastic reformation, which cannot proceed fast enough. The interviewees found it difficult to identify any disadvantages in digitalization as the technological transition was purely positive for them. They had an enthusiastic attitude towards both the changed technology and the changes in job descriptions. One interviewee stated:

"This digital editing is a fantastic revolution, as you can change the order [of video clips] (…) I don't know how any journalist can be opposed to learning to use it." (A television journalist, 54 years) (see citation 8 for a longer extract and a Finnish citation)

When asked about the disadvantages of digitalization, another interviewee answered:

"Disadvantages of digitalization? Shortly put: there are none (gives a laugh)." [36] (A radio journalist, 37 years)

Some interviewees described digitalization as (2) an interesting change. According to them, digitalization was a meaningful change: they enjoyed using the new technology and changes in job descriptions that had accompanied it. However, interviewees in this category had realized that, at least during the period of the study, the technology was not fully developed and did not solve all the problems. Nevertheless, they had not experienced major stress during digitalization. Their attitude towards the technological development in the future was optimistic. One interviewee of this category said that:

"My feelings are positive as I am technically oriented and like new digital technology and it's nice as we haven't had this kind of amount of appliances or variance before, new software and appliances are introduced and of course it is interesting to learn to use them." [37] (A television news journalist, 38)

Another interviewee noted:

"I have been very interested, as when a person who has listened to music in mono all his life is suddenly given a stereo, it is 'wow', a magnificent thing. That's the effect at first and then you find that you are trudging with the same things in the end." [38] (A radio journalist, 38 years)

Some of the interviewees saw digitalization as only (3) a change of appliances and work tools, which did not profoundly affect the work. They felt that digitalization was a natural and unambiguous phenomenon: the world changes and work tools change. They did not manifest strong positive feelings towards digitalization but, on the other hand, digitalization had not caused stress for them either. They believed that digitalization was given a lot of attention because it was new for the employees and because it was a financially significant investment for the organization. The interviewees had an uncomplicated attitude towards digitalization. They experienced that the new technology had to be learned and they could learn it. Changes in job descriptions were seen as mainly positive in this category. One interviewee said that:

"You have to perform the work with the tools your employer has given to you, that's the way it is." [39] (A sound editor, 62 years)

In another interview it was stated that:

"This job has to be done, that is, these work phases and in this way it has to be done also in the future, in my opinion digitalization itself is just ones and zeros." [40] (A television journalist, 54 years)

One interviewee said:

"Technology is always in a way technology (…) you learn it and then you don't really notice it anymore." [41] (A television news journalist, 56 years)

For some interviewees, digitalization was (4) full of uncertainties and images. These interviewees did not have a clear picture of the meaning of digitalization to their work. They saw that digitalization had not yet begun in their work and that the discussions of digitalization were actually discussions of plans and expectations, the realization of which was not for certain. The interviewees did not express either positive or negative experiences of digitalization in terms of their quality of working life. Moreover, they could not comment on the changes in job descriptions, as the nature of these changes and their effects on the work were still unspecified. As an example, one interviewee described the uncertainty in digitalization:

"In my opinion I have not yet faced digitalization (…) but in a way I hope that there would be more views, a messiah somewhere, who would tell what is going to happen." [42] (An announcer, 37 years)

Another interviewee stated:

"It has been kind of theoretical, we read everything on paper (...) but everything has happened notably more slowly than previously thought." [43] (A television journalist, 43 years)

Digitalization was (5) an interesting but stressful change for some interviewees. These interviewees considered technological development to be a process, which enhanced the work, and they did not object or resist the technological change. However, the interviewees had experienced a significant level of stress during digitalization. Stressors had been multiple: new demands due to changes in job descriptions, the unreliable functioning of the new digital technology and the doubts about the timing and necessity of the change. In nearly all of the interviews it was mentioned that the level of stress will become lower as the employees gain more control over the new technology. Even though the technological change was not opposed, the changes in job descriptions were not embraced without doubts and some interviewees openly objected to the changes in the job descriptions.

One interviewee described digitalization in the following way:

"In principle it has been interesting but difficult and I think it has not been sufficiently planned. There is a lot of discussion of problems being solved when we have new appliances but the product development of the digital equipment is not what they [providers of the tools] claim in their advertisements. And I think this [digitalization] has been approached from the wrong angle, as the role

of these appliances has been emphasized at the expense of content." [44] (A television journalist, 44 years)

Another interviewee said:

I would say that nothing feels bad and I have always liked working as a sound editor and I like it still. I haven't got fed up with it and I don't experience it as stressful or unpleasant, this is just a job among jobs, which I do with pleasure. But coming to this transition and digitalization it is clear that the transfer to digital technology for a person of my age has caused at some level, sometimes a kind of feeling of stress but I haven't experienced it as overwhelming." [45] (A sound editor, 55 years)

Changes in job descriptions were commented on as follows:

"Well, taking into consideration that I have been a journalist for 37 years and learnt these last technical issues as an adult I see that it is improbable that I can edit directly on air and, besides, the qualitative level which I aim at is so high that I would not do it [edit] unless by force. Of course I can do it if I am forced to but I will fight till the end for being able to work using a sound editor unless the program is aired live." (A radio journalist, 54 years) (see citation 12 for a Finnish citation)

Finally, there were interviewees who experienced digitalization as (6) a difficult change in a very negative way. Digitalization was experienced as stressful due to the low usability level of the new technology, the unreliability of the technology, as well as the insufficiency of training and the feelings of helplessness and incompetence resulting from it. Two out of three persons within this category had plans to leave the company altogether, whereas one of the three interviewees had survived the most difficult phase mentally in digitalization and continued with the current employer. The interviewees stated that they had experienced a great deal of stress and insecurity, even long-term psychosomatic stress disorders. One interviewee said that:

"The fear I had and still have in the back of my head is that I don't manage it [work] properly and I try to ensure that there is someone near me who I can ask, because otherwise you are quite alone with the computer. It was not nice when I started to do these, I almost had a stomach ache half a week before [the broadcasting] when I knew I had to go there [to the studio] and it was because of lack of training. If I would have had the opportunity to rehearse properly and in peace, of course there would be less anxiety (…) it is not nice, in my opinion, that every time you go to work your hands are shaking first thing in the morning, it is not a nice feeling but now I'm slowly getting over it and I am not a highly nervous person even, at least in the outside." [46] (A television media journalist, 47 years)

Another interviewee stated:

"The only thing which we have been able to do, is support one another but it is a rather bad support if a blind person supports another, but we have had to endure it. Then there are these persons who have some kind of support at home, have children or a husband who have a computer and know the basics, they get some support from there. It's like sitting or having been sat on top of nothing." [47] (A sound editor, 54 years)

5.3   Empirical Results: The Outcome Space

Based on the phenomenographic analysis, digitalization as a technological change and as a job redesign situation was experienced in six different ways. These "ways experiencing" were further examined by classifying them according to a positive/negative dimension. Two categories were analyzed as positive, namely the categories "Digitalization as revolutionary" and "Digitalization as interesting". Two categories were analyzed as neutral, namely the categories "Digitalization hardly a change at all" and "Digitalization full of uncertainty and images". The category of "Digitalization interesting but stressful" was analyzed as consisting equally of positive and negative experiences. Finally, one category, "Digitalization difficult", was analyzed as negative.

Although the phenomenographic research approach is strongly connected to a qualitative research tradition, the categories of description can also be reported quantitatively. In this study, the frequencies of interviewees in each category of description are reported also quantitatively to provide more knowledge about how digitalization was experienced. According to the quantitative analysis, most of the interviewees (n=9) experienced digitalization as "interesting but stressful". Almost as many (8) interviewees experienced digitalization as "hardly a change at all". Five interviewees experienced digitalization as interesting and four as revolutionary. For three of the interviewees, digitalization was still ambiguous and full of uncertainty and images. Three interviewees experienced digitalization as difficult. By combining the quantitative analysis with the classification of the categories of description according to the positive/negative dimension, it is revealed that 9 interviewees experiences digitalization as positive, 11 as neutral, 9 as both positive and negative, and 3 as negative.

Figure 19 illustrates the hierarchical organization of the categories of description, the quantitative distribution of the interviews into the categories of descriptions, and the division of the categories of description according to a positive/negative dimension.

DIGITALIZATION REVOLUTIONARY (4)	POSITIVE EXPERIENCE
DIGITALIZATION INTERESTING (5)	
DIGITALIZATION HARDLY A CHANGE AT ALL (8)	NEUTRAL EXPERIENCE
DIGITALIZATION FULL OF UNCERTAINTIES AND IMAGES (3)	
DIGITALIZATION INTERESTING BUT STRESSFUL (9)	BOTH POSITIVE AND NEGATIVE EXPERIENCE
DIGITALIZATION DIFFICULT (3)	NEGATIVE EXPERIENCE

FIGURE 19. The Categories of Description of Experiencing Digitalization in terms of the Quality of Working Life, the Quantitative Distribution of Interviewees to the Categories and the Nature of the Experience in each Category in a Positive-Negative Dimension.

5.4 Discussion of the Typology of Experiencing Technological Change with Job Redesign in Terms of Quality of Working Life

The typology formed in this study differs somewhat from the categorization of Huuhtanen (1985). In this study, the categories Emotionally intense – Positive ("Digitalization revolutionary" and "Digitalization interesting") and Emotionally dull – Neutral ("Digitalization hardly a change at all" and "Digitalization full of uncertainties and images") were found. However, the categories Emotionally intense – Neutral or Emotionally dull – Positive did not emerge in this study. There was no counterpart for the category "Digitalization difficult" in Huuhtanen's (1985) categorization. Thus, a new category, Emotionally intense – Negative was found. The category "Digitalization interesting but stressful" can be classified as either the Emotionally intense – Positive category of Huuhtanen (1985) or the Emotionally intense – Negative category which emerged in this study.

In this study, the interviewees experienced the technological change with job redesign in six different ways. Firstly, digitalization was experienced as revolutionary. The quality of working life of the interviewees in this category was high. Their experiences were not based on mere images and expectations of digitalization as they had already begun working with the new technology and job descriptions. As they had some experience in using the new technology and working with the new job descriptions, and as these experiences were positive, it was unlikely that similar changes in technology or similar job redesign interventions would decrease their quality of working life in the near future. The quality of working life of interviewees in this category of description seemed secured as far as technical development and similar changes in job descriptions were concerned.

Secondly, digitalization was experienced as interesting. The interviewees in this category of description had identified advantages in the new technology and job descriptions but had also encountered some problems. The interviewees had an interested but realistic attitude towards digitalization and the changes accompanying it. The way of experiencing the technological change and changes in job descriptions was positive and balanced, and thus the quality of working life of these interviewees can be expected to be relatively high in the near future.

Thirdly, it was experienced that digitalization hardly counted as a change. The interviewees in this category of description had a neutral experience towards digitalization. The fact that these interviewees felt capable of learning to use new technology and of performing new tasks supported their quality of working life. The interviewees did not exaggerate the changes in their work and felt that they would overcome similar changes in the future as well. According to Hamborg and Greif (1996), it seems that most people do not bother about technological changes, which may or may not come in the long run, and do not experience these changes negatively. Also those employees who expect to control the aversive nature of the situation, either by avoiding it or learning to manage the technology, will not experience significant levels of stress (Hamborg & Greif, 1996). It can be presumed that the quality of working life of interviewees in this category of description will remain at an adequate level, assuming that the future changes in technology and job descriptions are not considerably more radical than digitalization.

Interviewees in the fourth category of description viewed digitalization as full of uncertainty and images. They had not yet experienced changes in their work due to digitalization and could not imagine the role digitalization will have in shaping their work. Uncertainty was experienced on one hand as negative, but on the other as an opportunity to plan and vision the nature of work in digital production. The

interviewees did not, however, experience strong feelings of stress. The future quality of working life of the interviewees in this category remained as undefined as digitalization was for them. Only when digitalization as a technological and organizational change is clarified and concretized for them, can their experience towards digitalization be determined.

The fifth category of description was "Digitalization interesting but stressful". The stressors within this category mainly related to the implementation interventions of technological changes, that is, to doubts about the financial readiness of the company for digitalizing the entire production and to fears about effects of enriched job descriptions on work. Stress was also connected to the unreliability of technology. It was thought that the level of stress will become lower in the future as the financial situation of the company, the future of job descriptions and the technical work environment become clearer. As the level of stress decreases, the quality of working life for the interviewees in this category will increase. On the other hand, the future development trends can induce more stress: for example, some of the interviewees in this category strongly opposed enriched job descriptions; if these job descriptions become dominant throughout the company, the quality of working life of at least some employees will probably decrease.

Sixthly, digitalization was experienced as difficult. The reasons for experiencing digitalization as negative – the perceived complexity in using new technology, the perceived unreliability of new technology, the lack of training and feelings of incompetence – were mainly connected to changes in skill requirements. Providing more support during the learning process when practicing the use of new technology and providing more support during role changes when transferring from traditional job descriptions to new ones would have contributed to the quality of working life of interviewees in this category. Some interviewees did not see themselves working in the company in the future and ways of supporting their quality of working life were limited. The most difficult phase of digitalization was overcome by one employee, whose future quality of working life depends on the degree to which (s)he gains control over the new technology and job description, and the amount and relevance of technological training (s)he receives in the future.

Although a phenomenographic research approach aims at understanding ways in which people understand their experiences rather than at explaining them, an analysis of explanatory factors within each category of description can be performed. In this study, the previously presented categories of description were not connected to the gender of the interviewees, to the age group of the interviewees or to the work unit in which the interviewees worked; in every category there were men and women of different ages working in different organizational units. Moreover, in almost every

category there were both interviewees who had begun to use new technology and had transferred to new job descriptions and interviewees who still mainly performed traditional tasks with traditional technology. Two categories served as exceptions: "Digitalization full of uncertainty and images" (the interviewees in which had not yet faced digitalization in their work) and "Digitalization revolutionary" (the interviewees in which had all begun to use new technology and to work with new job descriptions). As the categories of description were neither related to the gender, age group or work unit of the interviewee, or significantly to the level of experience in using new technology or performing work according to new job descriptions, it can be presumed that the way in which digitalization is experienced is individual and/or dependent on some factors other than the ones mentioned above. Of course, every interviewee ultimately experienced digitalization in his/her unique way. The phenomenographic classification of the ways in which digitalization was experienced is a simplified model, according to which the experiences related to digitalization can be described and illustrated.

6 DISCUSSION

This study has examined the quality of working life during technological change and job-redesign. Part I of the thesis presented findings relating to the connection between technological change and the quality of working life, Part II focused on stressors experienced in job redesign and Part III examined technological change with job redesign in terms of the quality of working life. The specific findings of this study are discussed in each chapter after presenting empirical results. In this section, the main findings of the study are summarized, the scientific and practical contributions are explicated and the implications for future research clarified.

6.1 Main Findings of the Study

6.1.1 Technological Change and the Quality of Working Life

Initially, the study set out to describe and understand the following research question:

How are technological changes experienced in terms of the quality of working life?

The qualitative content analysis of experiences related to the quality of working life during technological change resulted in four main categories. Firstly, the technological change was connected with experiences related to (1) technological implementations. The interviewees approached the technological change with positive attitudes but also with fears of extensive changes at work, which were connected especially with the social changes at work, that is, the changes in job descriptions that accompanied the technological change. According to the interviewees, the implementation schedule of the technological change had taken into account the needs and wishes of the employees, which supported well-being, but it was also their experience that the implementation had concentrated excessively on technology rather than on work and personnel, the communication had not been sufficient and, therefore, the future was experienced as ambiguous. As the Finnish Broadcasting Company was one of the first companies in Finland to introduce digital production technology, it was natural that experiences related to the timing of the technological change emerged. On one hand, the early digitalization of program production technology was viewed as a learning opportunity, but on the other it raised doubts

about the future of work and of the survival of the company, as well as causing frustration and lowered work motivation as there were only a few viewers. Also, the usability of the technology was experienced as poor and this was seen to be in connection with the timing of the implementation.

Secondly, the technological change was connected to experiences related to (2) changes in job descriptions. As new editing, recording and broadcasting technologies were introduced, the equivalent recording, editing and broadcasting tasks were transferred over from editors to journalists. The enriched journalistic job descriptions were experienced as positive as they increased the autonomy, flexibility and variability of work, but also as negative as work became fragmented and more demanding in terms of concentration and responsibility. The narrowed editorial job descriptions were connected with fears of job descriptions becoming less meaningful as well as fears of job loss. The interviewees experienced that cooperation had decreased. Some interviewees believed that the number of social contacts increased but the contacts were more superficial that before. Also, new informal forms of cooperation and knowledge-sharing emerged, due especially to the unreliability of the new technology and the lack of skills in using it.

Also, (3) new skill requirements emerged and influenced the quality of working life. Learning was seen as a motivator, but also as laborious, especially for employees who were very experienced in performing job tasks with previous analog production technology. Changes in skill requirements were also connected with fears of not being able to learn, feelings of incompetence and fears of being left alone to cope with the new tools, which all induced stress. Training was seen as accessible, individual and successful by some interviewees, but also as insufficient. In one work unit, peer training was used as a training method. Peer training was experienced as an individual and concrete way of learning but it had also negative aspects as it was prone to interruptions and even the trainer was sometimes insecure about his/her skills. Training and rehearsing were experienced as difficult due to intensive work pace. The interviewees experienced learning as continuous, which was in turn experienced as motivating if the demands for learning remained moderate, and it was experienced as gradual, but also stressful if the capacity to learn became overloaded. New skill requirements had social consequences: knowledge and skills were shared informally, which increased well-being, but changes in skill requirements and personnel resulted in stress and induced a negative atmosphere in some work units.

Finally, the technological change was connected to experiences related to (4) using new technology. The technological changes improved the conditions of work: editing, especially, became more effortless, precise, flexible, ergonomic, various and creative. Stress was experienced due to the unreliability of work tools, specifically due to

breakdowns and malfunctions of the tools and due to the inability to determine and repair technical problems. The nature of the work was connected to experiences of stress due to demands for information processing and concentration increasing as the work became more abstract and the pace of work more intense.

Looking at the results in the Job Characteristics model of Hackman and Oldham (1980), the journalistic work increased in skill variety, task identity, significance and autonomy, and decreased in feedback. According to the Job Characteristics model, these changes, apart from feedback, are beneficial in terms of the quality of working life, especially in terms of internal work motivation and job satisfaction. The journalistic job descriptions were also linked with reskilling (as the technological change brought about new learning opportunities), the post-bureaucratic model of work (as the workers began to independently self-manage their tasks), knowledge work (as the introduced technology was used in complex ways) and technostress (as feedback from colleagues decreased and responsibilities increased due to the increased autonomy and task identity of the job description). However, the journalists expressed feelings of stress related to enriched job descriptions. These experiences of stress were not captured by the Job Characteristics Model. The editorial work decreased in all of the above-mentioned aspects (with the exception of the skill variety in which technological skill requirements increased but task-related skill requirements decreased), which causes lack of work motivation and job dissatisfaction according to the Job Characteristics Model. Furthermore, editorial work was linked with reskilling and deskilling (as complex tasks were transferred to journalists), the bureaucratic model of work (as the workers had limited tasks and limited authority over them), information work (as the introduction of technology threatened to make the editorial jobs more monotonous and simple) and technostress (as feedback from colleagues decreased).

Viewing the results in the light of the Job Demand-Control model of Karasek (1979), editorial job descriptions can be assigned two categories depending on the way in which these job descriptions develop. According to the interviews, editorial job descriptions can become limited and *monotonous,* in which case they resemble "passive" jobs with low job demands and low decision latitude. If editorial job descriptions are developed to become *specialized*, they become "high strain" jobs with high job demands and low decision latitude. Journalistic job descriptions became "active" jobs with high demands and high decision latitude. However, Karasek (1979) links "active" jobs only with high work motivation, involvement, learning and personal growth, whereas the interviewees of this study also experienced stress due to the working with the enriched job descriptions.

6.1.2   Job Redesign and Stress

As the models of Hackman and Oldham (1980) and Karasek (1979) did not capture the negative experiences related to the enriched job descriptions of journalists, a second research question was posed:

What stressors are experienced in job redesign?

By conducting a situational qualitative content analysis, stressful work situations were identified and examined. Stressors were categorized by reference to the Balance Model of Smith and Carayon-Sainfort (1989). The model states that the work system consists of five elements – task, technology, organization, environment and person – which can induce a stress load on the individual. Enriched job descriptions were connected with stressors related to all of the work system elements. (1) Task-related stressors included the extensiveness, fragmentation and independence of the job description, continuous changes to the job description, its rare tasks and numerous roles, the extensiveness of the skill requirements, conflict between these, and the increased sense of responsibility. (2) Technology-related stressors were numerous technologies, the complexity of technology, automation of tasks and continuous changes in technology. (3) Organizational stressors were the lack of opportunities for training and rehearsing, the lack of resources and the scheduling of work. (4) Individual conditions that induced or increased stress included interpreting enriched job descriptions as unfavorable, having a low self-efficacy, being disinterested in new tasks, being disinterested in new technologies, wanting to concentrate on only a few tasks and having skills which became obsolete. Only one (5) environmental stressor was identified, namely social interruptions due to a need for guidance. Narrowed job descriptions were connected with only two organizational stress factors: the fear of job loss and the fear of work becoming less meaningful.

The stressors were also categorized in terms of their stress-inducing elements. The elements related to tasks, technology and environment were excessive breadth, excessive depth, contradiction, changes and social problems. The element related to organization was the lack of organizational support. Finally, the elements related to individual conditions were the lack of individual work motivation and the lack of ability.

6.1.3 A Typology of Experiencing Technological Change with Job Redesign in terms of The Quality of Working Life

The experiences related to the quality of working life during technological change and job redesign were examined separately in Part I and Part II of the study. Therefore it was seen as justified and even necessary to form a third research question, which would focus on the experiences of both the technological change and job redesign:

In which ways is the technological change with job redesign experienced in terms of the quality of working life?

To answer this question, a phenomenographic analysis was performed. The interviews were analyzed according to the way in which the interviewees described digitalization as technological change and job redesign. Similar ways of experiencing this were grouped together. The iterative process of grouping and regrouping the interviews resulted in six ways of experiencing the changes. These categories were organized hierarchically in terms of the degree to which the experience was positive/negative.

There were two positive ways of experiencing digitalization, "Digitalization revolutionary" and "Digitalization interesting". There were also two categories in which the experience was neutral, namely "Digitalization hardly a change at all" and "Digitalization full of uncertainties and images". One way of experiencing digitalization – "Digitalization interesting but stressful" – had both strongly positive and strongly negative aspects. Finally, some interviewees experienced digitalization in a negative way; and this category was named "Digitalization difficult". Compared to the categorization by Huuhtanen (1985), the categories Emotionally intense – Positive and Emotionally dull – Neutral were found also in this study. The categories Emotionally intense – Neutral or Emotionally dull – Positive did not emerge in this study. In this study, a new category Emotionally intense – Negative was found.

6.2 Contributions of the Study

In the introduction, it was stated that this study had both scientific and pragmatic objectives. Firstly, it wished to contribute new theoretical elements to the scientific discussion of the quality of working life during technological change and job redesign. It also examined the appropriateness of the existing theoretical models to describe the results of the study. Secondly, by conceptualizing experiences related to

the quality of working life, the study aimed at assisting managers, trainers, human resource professionals, technological designers among others, as well as workers themselves, to introduce new technologies and job descriptions in ways that take the quality of working life into account. This chapter addresses the scientific and the practical contributions of this study.

6.2.1   Scientific Contributions

This study set out to explore three research questions. Under the first research question, the ways in which technological changes are experienced in terms of the quality of working life were examined. A straightforward answer to this research question was not reached, as the experiences of the interviewees were not only connected to the technological change but also to job redesign. Thus, results on experiencing purely technological changes without any changes in work organization were not produced. Experiences related to technological implementations, learning to use new technology and using new technology were more closely related to technological change, whereas experiences of changes in job descriptions were more closely related to job redesign. On the other hand, past research has found that in many cases technological changes are connected with changes in job design, and it has been suggested that these social and organizational changes should not be excluded when studying technological changes and the quality of working life (Carlson, 1999; Garner & Fidel, 1990; King, 1986; Kraut et al., 1989; Martinsons & Cheung, 2001).

The results of Part I of this study highlight the point that technological change is not only a change in work tools. In terms of the quality of working life, technological change can also be connected to experiences related to the implementation process, changes in job descriptions as well as changes in skill requirements. Thus, a technological change could be more accurately described as a social or organizational change in which new technology has an important role. Interestingly, this study reached findings on experiencing technological changes in terms of the quality of working life that were fairly similar to those of previous studies conducted with quantitative methodology (Chapters 3.1.1, 3.2.1, 3.3.1 and 3.4.1). This is even more surprising when we consider the nature of the technological change: a significant proportion of the previous studies have focused on computerization and on office automation, whereas this study examined the so-called continuous implementation (Korunka et al., 1997) of new technologies. It can be cautiously concluded that the nature of human-computer interaction has not radically changed, even if the technologies introduced to the workplaces have. However, even though the findings

were mainly consistent with previous studies on implementing and using new technologies, it can be assumed that the perspective of this study on the quality of working life would have been more limited and restricted if the study had a quantitative, *a priori* research approach.

In Part I, it was also found that technological change resulted in enriched job descriptions or narrowed job descriptions. The theoretical examination of the results identified connections between enriched job descriptions and the concepts of reskilling, knowledge work and the post-bureaucratic model of work and, also, connections between narrowed job descriptions and reskilling/deskilling, information work, and the bureaucratic model of work. According to the Job Characteristics Model of Hackman and Oldham (1980), enriched job descriptions improved, and the narrowed job descriptions deteriorated, the quality of working life. However, the model did not capture the negative experiences related to enriched job descriptions. Also the Job Demands-Control Model of Karasek (1979) did not acknowledge the negative experiences related to "active" jobs, in which the job is high in job demands and decision latitude. Both of these models have had a significant impact on past research and are still in wide use today. It can be suggested that the characteristics of "good work" have changed. This has also been noticed by Kira (2003) in new media and telecommunication sectors as well as in a hospital and a union setting.

The second research question focused on stressors in job redesign. This research question was successfully answered and various kinds of stressors were revealed. With only a few exceptions, previous research has overlooked the potential stressfulness of job enrichment (Xie & Johns, 1995). In this study, it is noticed that increased autonomy and task identity in work are not automatically experienced as positive in terms of the quality of working life. This might be due to the tendency of past research to study job enrichment (including job enlargement) mainly in manufacturing settings. In this study, the context of job enrichment is knowledge work. It seems that traditional job redesign implementations, which have been noticed to result in increased job satisfaction and work motivation, cannot be directly applied in the new context. The examination of the results gained from the Balance Model of Smith and Carayon-Sainfort (1989) revealed that the model is appropriate for studying the connection between enriched job descriptions and stress. Due to its system-theoretical, open and holistic nature it applies well in studies adopting a qualitative methodological design. Moreover, elements of the stressors were also identified. Instead of merely noticing a quantitative overload, the study emphasized also the importance of vertical (qualitative) elements of stressors, together with elements related to contradiction, changes, social conditions, organizational support and the work motivation and abilities of individual employees. Nevertheless, it must

be remembered that only stressors were studied and the results of Part II do not give a complete picture of enriched job descriptions in terms of the quality of working life.

The third research question emphasized the joint "effects" of the technological change and job redesign and concentrated on the ways in which technological change with job redesign can be experienced in terms of the quality of working life. This research question was also successfully answered, although the reliability and transferability of the results could not be confirmed with multiple previous studies because phenomenographic studies were scarce, except for the study of Huuhtanen (1985). The analysis method is rarely used and similar examinations to this are difficult to find. The results provide general knowledge about the versatile ways of experiencing technological changes with job redesign, and remind us about the complexity of the real-world work contexts in which, ultimately, each individual has his/her unique way of understanding situations.

There are three main findings in this study. Firstly, **technological changes can be accompanied by social and organizational changes that influence the quality of working life of individual workers as well as work units**. For example, changes in skill requirements seem to influence employees' professional self-esteem, thereby exposing employees to feelings of insecurity and helplessness. Change in skill requirements may also result in changes in personnel and the roles of employees within a work unit altering the entire organizational structure of a work unit. These aspects of technological change can be even more relevant in terms of the quality of working life than purely technological changes.

The second main finding that this study brings forward is the fact that **enriched job descriptions are not inevitably experienced as positive in terms of the quality of working life in post-bureaucratic knowledge work** but can also induce an experience of stress. In this study, enriched job descriptions were not only connected to well-being experiences related to, for example, the increased autonomy and variety of work, but also to stress experiences due to, for example, the extensiveness and the fragmentation of the job description. The notion that enriched job descriptions can induce stress should be noted when, for example, designing studies on the basis of the traditional job redesign theories and instruments that hold the presumption of a positive relationship between job scope and the quality of working life.

Thirdly, the initial theory of the study is that the characteristics of technological changes and job redesign that can be experienced as contributing to well-being or inducing stress contain discrepancies that must be balanced in order to ensure a high quality of working life. Four principal discrepancies were identified in this study:

- Increased autonomy contributing to well-being – Increased job scope, increased demands for concentration, increased responsibilities and decreased cooperation inducing stress
- Increased variety of tasks contributing to well-being – Increasingly scattered attention, overloaded concentration and feelings of insecurity inducing stress
- New skill requirements and learning contributing to well-being – Extensive and conflicting skill requirements, fear of not being able to learn, overloaded capacity to learn, insufficient training and rehearsing and feelings of incompetence inducing stress
- The individual and concrete informal learning and knowledge sharing contributing to well-being – The interruptions in work due to knowledge sharing and the feelings of incompetence in training others inducing stress

These discrepancies seemed to create conflicting job conditions as they contributed to well-being but also induced stress. How could these characteristics, which may be general in job descriptions of knowledge workers and experts, be designed to benefit the quality of working life of these employees? Someone might suggest that the level of autonomy, variety and skill requirements should be decreased so that the experiences of stress would also decrease. Certainly this is one option; however, it probably would also result in stress, but due to different reasons, such as limited independency and unchallenging tasks. It can also be questioned if job simplification is at all possible in knowledge work, as complex work processes cannot be split into pieces into a "mental assembly line". Thus, eliminating the stressors from the job description – a technique utilized in job redesign in the past – is no longer a valuable solution. The only option, therefore, seems to be to find a balance in the above-mentioned dimensions that best supports employee quality of working life. An increase in autonomy can lead to an increase in responsibilities, which at moderate levels might actually be experienced as positive rather than as a stressor. These balances are individual and should be determined individually for, with and by each employee.

6.2.1.1 *Methodological Contributions*

As described in the introduction of this report, previous studies on the quality of working life have mainly had a quantitative research approach (Brief & Atieh, 1987; Johnsson & Cassell, 2001). Although producing results, which are theoretically relevant and reliable as well as easily compared and generalized, the quantitative orientation has led to a patchwork of new theoretical innovations and constructs (Barnett & Brennan, 1995). The studies have concentrated mainly on examining connections between limited numbers of pre-defined variables. They have often been

also deductive, relying heavily on earlier findings and using the same measurement instruments, and therefore they have also been prone to achieve results that support the previously constructed theories and models.

This study examined the quality of working life during technological change and job redesign from a qualitative, inductive perspective. The interviewees were given an opportunity to describe their quality of working life openly, in their own words. The methodology enabled the study of processes and complex objects and the identification of emergent issues overlooked in previous research. Also it allowed the interconnectedness of the issues related to the quality of working life, which more relevantly corresponds to the subjective realities of the interviewees than the (quantitative) examination of a limited number of more or less isolated variables.

The methodological contributions of this study are threefold. Firstly, **the use of multiple analysis methods is suggested** on the basis of this study. The data were represented in different but consistent ways in Parts I, II and III of the study. Incorporating the results of the qualitative content analysis, the qualitative situational content analysis and the phenomenographic analysis certainly gave us a more accurate and reliable description of the studied phenomenon, the quality of working life.

Secondly, the content analysis approach produced results that were various (the analysis resulted in multiple qualitatively differing experiences), extensive (the analysis resulted in a large scope of experiences) and interrelated (the analysis resulted in categories of experiences that were partly overlapping and that viewed the same phenomenon from different angles). In the discussion sections of Part I, it could be seen that **the qualitative design produced results that covered themes from many previous studies** and, in some cases, connected them together in a new way. For example, the concepts of reskilling, knowledge work and post-bureaucratic work were connected together in this study, and so were the concepts of reskilling/deskilling, information work, and bureaucratic work.

Thirdly, the situational, stressor approach of Part II was seen as fruitful in studying stress. The focus on stressors concentrated also on the specific *why*'s of experiencing stress, not just the *what*'s and *how*'s. This perspective was considered important, as it was important to find out through which procedures the level of stress can be decreased. Also, stress that can be attributed to specific situations (compared to general dissatisfaction) can be more easily decreased by redesigning the situations in which stress is especially experienced. Thus, **the research design produced results through which work conditions can be improved** to better support the quality of working life.

Fourthly, a phenomenographic methodology is usually employed when examining ways of conceptualizing phenomena but, according to this study, it is well suited for studying ways of experiencing phenomena. It also produces more knowledge about the connections between, in this case, technological change with job redesign and the quality of working life. In the light of this study, use of the phenomenographic analysis method is also suggested, as this **retains the individual experiences instead of detaching them from the interviewees who experience them** (which occurs often in quantitative studies, but also in qualitative content analysis).

It is not implied, however, that researchers studying the quality of working life should altogether abandon quantitatively oriented research designs and start using only qualitative methods. The quantitative approach has rightfully acclaimed its position among researchers studying stress at work. The quantitative (and positivistic) research orientation has many advantages, including the following: it is useful in refining and testing existing theories; it is less expensive in studying large samples; it produces precise results that can be numerically presented; the reliability of the results can be explicitly calculated; the results can be generalized; it is less dependent on the researcher who has conducted the study; and it is indispensable in research fields, such as medicine, in which stress is studied as a psycho-physiological phenomenon.

Rather than abandon quantitative research, based on this study **it is suggested that qualitative research is recognized as an alternative, yet complementary, method**, which can be used in studying the quality of working life. Perhaps the best option is to use multiple methods and gain a more comprehensive perspective by employing both qualitative *and* quantitative methodology. Qualitative theory-building methods could be used when studying a phenomenon that is less known to the researchers, and thereafter, when the phenomenon is explored, large-scale studies using quantitative methods could be conducted. In this study, a vast amount of literature was found on the connection between technological change and job redesign and the quality of working life. However, this study examined how so-called continuous implementations were experienced and how the technological change was experienced, especially in the context of knowledge work (rather than, for example, manufacturing work). Also, qualitative methods could be used in answering questions such as '*how*' and '*why*' as they allow the study of processes (Lehto, 1996, 151) and as causal inferences can be verified by the subjects of the study in the interviews rather than by the *a priori* logical reasoning of the researcher. Quantitative methods could be used in examining occurrences, which would require extensive samples and aim at producing results that could be generalized to a larger population.

6.2.2   Practical Contributions

The results of this study suggest that in technological changes and job redesign the changes in job descriptions, tasks and skill requirements should be gradual, allowing the employee to proceed at his/her desired schedule. For example, autonomy should be increased and new tasks could be added progressively so that the employee can better manage new demands and responsibilities. Job redesign should be *moderate*, not reducing the meaningfulness of the work and not extending the job description excessively with new tasks nor enriching it excessively in terms of demands and responsibilities. If job descriptions are narrowed down, the fears of losing the job or some of its meaningfulness should be dealt with by discussing the situation with the employees openly and by offering them opportunities for retraining.

Moreover, according to this study, technological change and job enrichment should be introduced with consideration to *the work motivation and abilities* of individual employees. Sufficient *organizational support* – opportunities for training and rehearsing, personnel resources and appropriate scheduling of work – should be ensured. Enriched job descriptions should remain *moderate* in terms of the breadth and depth of demands. Demands related to tasks and technologies should not be in *contradiction* to each other and should not be *changed* constantly so that employees form a feeling of mastery over the work. The potentially decreased *social interaction* and increased social problems should be compensated in order to ensure that employees receive a sufficient amount of social support and feedback.

Based on this study, managers, trainers and human resource professionals who are introducing new technology or redesigning jobs may be faced with the following challenges:
- To determine with the employee the scope, tasks, demands and responsibilities of the job description ensuring that it remains moderate in terms of breath and depth, ensuring that it does not entail contradicting demands, being prepared for social problems that may rise and ensuring that no new radical changes are made to the job description until it has become well-established.
- To allow a gradual transfer to using new technology and/or working with new job descriptions with regard to the employee's needs and capabilities.
- To provide individual training and time to rehearse in a peaceful surrounding.
- To inform the employee of the changes and discuss them with him/her in order to reduce ambiguities and uncertainty.

Technological designers may be challenged by the following issues:

- Cooperation with the users in order to gain more understanding of the context in which technology is used.
- Increasing usability by designing systems that are easily learned, include only functions that are relevant for the user, are technically reliable and that include guidelines for fixing malfunctions.

Workers whose jobs are affected by technological change and/or job redesign could prepare themselves to face the following challenges:

- To actively and spontaneously reflect their quality of working life in terms of identifying the job characteristics that increase well-being and mental resources and/or induce stress and consume mental resources.
- To define their motivations and goals, as well as needs for training.
- To participate in designing their job description in terms of the discrepancies mentioned in Section 6.2.1 and to determine a schedule that enables them to transfer to using the new technology and/or working with new job descriptions.
- To determine the kind of support they require from the organization, for example, from managers and trainers.
- To develop their learning skills and to maintain and utilize their social networks for support and guidance.

All employees experience technological changes and job redesign in an individual way but, according to this study, these ways can also be grouped into more general collective ways of experiencing the changes. The ways in which employees experience the changes may range from over optimistic to depressive. All of the experiences should be listened to and understood. For the employees whose experience is especially negative in terms of the quality of working life, special attention should be given in order to prevent emotional exhaustion (burnout).

6.3   Suggestions for Future Research

Based on the contributions of this study, suggestions for future research can be made. The connection between job descriptions, job enrichment and the quality of working life has been studied mainly in relatively simple manufacturing work. This study focused on knowledge work and found that previous theoretical models of Hackman and Oldham (1980) as well as Karasek (1979) did not capture the negative aspects of increased autonomy and task identity in terms of the quality of working life. Thus, the

context and type of work should be taken into account when applying these models and their corresponding measurement instruments (for example, the Job Diagnostic Survey based on the Job Characteristics Model). Further research is needed in order to describe and understand how contemporary job descriptions and their changes are experienced in terms of the quality of working life. Also, it can be expected that job descriptions will become more flexible and fluid as organizations become post-bureaucratic. **How is work experienced when job descriptions become undefined?** This question needs to be answered by future research.

Another interesting research topic would be to examine coping mechanisms, which the employees adopt and manifest in technological changes and job redesign situations. **What kinds of coping mechanisms are used in dealing with stress during technological changes and job redesign?** Are they cognitive, emotional or behavioral? How well do they function? Do certain employees have a preference for certain types of coping mechanisms? In this study, coping mechanisms were not specifically asked about in the interviews and only a few of them emerged during the data analysis. However, studying coping mechanisms might be an important source of information in discovering the ways in which employees react to changes in their work. After coping mechanisms have been identified, coping can be supported in order to maintain a high level of quality of working life.

This study examined the connection between job redesign and the quality of working life, especially from the perspective of stress, as examination of this was seen to contribute most usefully to scientific discussion. It must be noticed that enriched job descriptions were also connected with positive well-being experiences; as the autonomy of work increased, work became more varying and learning increased work motivation. **What are the positive aspects of job enrichment in knowledge work?** These aspects should also be studied in more detail to find out the true benefits of job enrichment.

This study was a cross-sectional case study. A longitudinal study would have made it possible to examine the quality of working life as a process. Based on this study, it is not known how many of the employee-experiences can be explained by the early phase of the change process. Were the negative experiences of stress partly due to "growing pains"? **How do the subjective experiences related to the quality of working life evolve as employees become more skilled and more accustomed to the technology and to their new job descriptions?** More longitudinal research is needed on technological changes, job redesign and the quality of working life, especially in the context of knowledge work.

7 EVALUATION OF THE STUDY

The last chapter of this thesis evaluates the reliability and the validity of the study. It also examines the transferability of the results to other contexts and environments. It has been said that validity and reliability, as they are traditionally and quantitatively understood, are not suitable for evaluating the reliability of qualitative research (Eskola & Suoranta, 1998, 212; Marshall & Rossman, 1995, 146). Therefore, the definitions of the types of validity and reliability and the potentials for generalization are derived from the qualitative methodological literature. The concepts of validity and reliability, as well as validity and transferability, are partly overlapping. Nevertheless, they are presented under separate headings in order to achieve a more explicit evaluation of the study.

7.1 Reliability of the Study

According to Mäkelä (1990), the reliability of qualitative studies can be evaluated by using four criteria. Firstly, Mäkelä (1990) and Yin (1994, 147) argue that (1) the significance of the data can and should be evaluated by *positioning the data in the appropriate social and cultural context*. The data of this study were significant in terms of society, as digitalization raised much public discussion in Finland, especially with respect to the visions of the future of digital media and forms of funding digital broadcasting. The data were also significant in cultural terms: the quality of working life undergoing technological change and job redesign was a relevant scientific research subject at the time of the study, and the quality of working life was also a relevant and interesting phenomenon in the studied organization, in which many technological and organizational changes occurred. The themes identified in this study can be identified also in other industries.

Secondly, Mäkelä (1990) states that (2) the sufficiency of the data should be evaluated. The sufficient quantity of data can be determined by continuing the data gathering until *the saturation of data* (Eskola & Suoranta, 1998, 63) *or cases* (Eisenhardt, 1989) is achieved and new interviews or cases do not produce new perspectives or patterns to the studied phenomenon. Yin (1994, 148) also emphasized the sufficiency of data by arguing that the case study must be complete and demonstrate that the investigator expended exhaustive effort in collecting the relevant evidence. The sufficiency of the data contributes to the reliability of the study. In this study, the rough number of interviewees was decided beforehand, but during the

interviewing new names of appropriate interviewees came up and these employees were contacted and invited to participate in the study. In all the case units, the last interviews were consistent with the previous ones and did not produce radically new aspects for the study, which suggests that the saturation of data had been reached. Of course, every interviewee constructed his/her own narrative of the quality of working life during technological change and job redesign. Thus, in that sense, all the interviews were different. The interviews shared, however, some collective experiences and addressed some collective issues related to digitalization. These experiences and issues were clearly manifested in the gathered data and did not acquire new properties after the saturation of the data.

Thirdly, Mäkelä (1990) emphasizes (3) evaluating the scope of the analysis. The *analysis should be conducted carefully* and should not be based on incidental extracts or citations from the data. The consensus between the categorization yielded by the researcher and the viewpoints of the interviewees increases the credibility of the study (Eskola & Suoranta, 1998, 212), which is determined, for instance, by the degree to which the subject of the study is identified and described accurately (Marshall & Rossman, 1995, 143) and the degree to which rival propositions are considered (Yin 1994, 149). Similarly, Kyngäs & Vanhanen (1999) also underline the importance of *forming the correct categories and interpretations* from the data. In order to be reliable, the interpretations have to be logical and cannot include inconsistencies (Eskola & Suoranta, 1998, 214). A code or an index that the analysis produces should be consistent within a code or an index and differ clearly from other codes or indices (Mäkelä, 1990). In this study, the analysis was detailed. The data were read through several times before the analysis. The qualitative content analysis was done iteratively by integrating and disintegrating separate codes and eliciting cross-code differences. In the light of this study, it seems that combining multiple data analysis methods contributes to the depth of the results of qualitative studies.

Also, *triangulation* (Jick, 1979) was utilized. According to Patton (1999), four kinds of triangulation contribute to verification and validation of qualitative analysis: a) checking out the consistency of findings generated by the different data collection methods (methods triangulation), b) examining the consistency of different data sources within the same method (triangulation of sources), c) using multiple analysts to review findings (analyst triangulation), and d) using multiple perspectives or theories to interpret the data (theory/perspective triangulation). This study utilized *multiple data analysis methods*, which produced consistent findings about, for instance, the excessive skill requirements in journalistic job descriptions and the fear of job loss in editorial job descriptions. *Triangulation of sources* was also used. The content analyses in cases YLE24 and YLE Teema began deductively by using the categorization framework obtained from the analysis of case Ylen Ykkönen. The

framework was utilized as the technological changes and experiences related to the quality of working life seemed to be similar in all the three cases. Would the results have been different if the cases had been conducted in a different order? It can be assumed that the results would not have been different because the inductive analyses did not produce new categories, which would have been found across all the cases. Reliability was also increased as two researchers participated in the data gathering of the study. The consistency of interpretations was confirmed by discussing the analysis and the results with a colleague, who had participated in the observation and data gathering sessions. Thus, *analyst triangulation* was used. Finally, *theory triangulation* was also utilized. The results were examined in different theoretical perspectives and frameworks, which portrayed the findings in different ways. For example, looking at the results in the Job Characteristics Model (Hackman & Oldham, 1980), the technological change and job description change seemed to support the quality of working life of journalists, whereas examining stressors of the enriched journalistic job descriptions in the Balance Model (Smith & Carayon-Sainfort 1989) gave a new, less positive, perspective on the relationship between enriched job descriptions and the quality of working life. The triangulation increased the reliability of the study (Eskola & Suoranta, 1998, 70). The scope of the analysis – the ensemble of the sufficiency of the data, the felicity of the analysis and the interpretation, as well as the construction of the research report – is emphasized in qualitative research over the traditional reliability and validity criteria, such as the quantity of the data, the fit between the sample and the population, and the degree to which the results can be generalized (Eskola & Suoranta, 1998, 61).

Fourthly, Mäkelä (1990) views (4) the assessability and replicability of qualitative studies as important evaluation criteria. *Assessability* relates to *the ability of the reader to assess the research results*. The reader should be able to follow the reasoning of the researcher and (s)he should be provided with adequate opportunities to either accept the interpretations of the researcher or to challenge them. The backgrounds, material and methods and results of study are reported in a very detailed way in order to make the research process as transparent as possible. The results are concretized by reporting citations from the interviews, which increases the reliability of the study (Eskola & Suoranta, 1998, 217) as the reader can verify whether the interpretations of the researcher are correct. The transparency of the analysis furthers also the replicability of the study, which refers in qualitative studies to presenting the methods of categorization and interpretation in an unequivocal way, so that another researcher can reach the same conclusions by following the same methods of categorizing data and making interpretations (Mäkelä, 1990).

In addition to the criteria of Mäkelä (1990), the certainty and the confirmability of the study, as well as the researcher's biases, can also be evaluated. The certainty of a

study can be increased by *taking into account the effects of unpredictable conditions* (Eskola & Suoranta, 1998, 213). In this study, **the quality of working life is studied during the change and reorganization period**. This is both a strength (as the experiences are not biased by later events) and a limitation (as change stress might influence experiences related to quality of working life). At the time of the interviews, digitalization had not developed at the expected pace and the technological change had not been fully and extensively implemented. This affected the results of the study as experiences related to the quality of working life contained also imageries and visions. If there had been a follow-up study a year later, for example, then the employees might have experienced less stress as they would have had time to build up their competency. This we do not know, though. This phase of the digitalization has to be taken into account when reading this study and applying its findings. **This study represents only a cross-sectional snapshot of the technological change and job redesign process.** According to Carayon (1997), technological changes and consequent work stressors can have varying strength over time, and from a temporal perspective a distinction should be made between acute stressors such as a technological change and chronic stressors, which include work factors such as lack of job control and high workload. The cross-sectional nature of the data is a limitation of this study as it is impossible to examine and compare short-term and long-term experiences of the quality of working life. Furthermore, **it was sometimes difficult to distinguish the influences of digitalization as a technological change and digitalization as job redesign**, which was also governed by productivity and efficiency goals. A technological change never occurs in a vacuum but in a social setting with different values and norms. Thus, it can be argued that separating purely technological factors from the organizational factors in studying a technological change situation is impossible and disadvantageous. Also, implementing some of the job redesign interventions, especially enriched job descriptions could have been more difficult and challenging without the technological change, which made editing and recording tasks easier for journalists to manage. The interaction between organizational and technological factors is complex in this study just as it is in reality.

Also, the confirmability of the study can be evaluated. The study can be confirmed if *the interpretations of the researcher are supported by other studies* that examine the same phenomenon (Eskola & Suoranta, 1998, 213; Marshall & Rossman, 1995, 145). The results of this study fitted relatively well with the previous findings of research into the quality of working life during technological changes and job redesign, even though the results were examined through different perspectives and theories. Thus, it can be concluded that the confirmability of the study is high. However, the theoretical frameworks of job redesign did not explain the results of this study. In this area lie the greatest contributions of this study. Understandably, a study that contributes greatly to

the existing body of knowledge cannot be entirely conformable with the previous theoretical models.

Finally, reliability is dependent on the influence the researcher has had on the research results. In qualitative research, the researcher is not objective but to some degree influences the research process by, for example, interviewing, analyzing and making interpretations. The starting point of qualitative research is therefore open subjectivity and acknowledging that the researcher is a central tool in his/her research (Eskola & Suoranta, 1998, 211). Reliability is increased by *reporting the research process and methodological choices as accurately as possible*. Also, the role of the researcher should be described. In this study, the role of the two researchers involved in the preliminary observation and data-gathering phases was two-fold. On one hand, some of the representatives of the studied organization viewed the researchers as "young girls", especially in the first case study Ylen Ykkönen, in which the average age of the employees was as high as 52 years. Nevertheless, all the interviewees had a positive attitude towards the two researchers and the study. On the other hand, the researchers were treated as experts in digitalization and issues related to it, even in the case of Ylen Ykkönen. The expertise did not make the researchers distant from the interviewees, as even intimate experiences were discussed in the interviews. Researcher bias, the effect of the researcher on the results, was likely to be smaller as researcher triangulation was used. Two researchers gathered the data, checked the analysis and reported the results in the studied organization.

7.2   Validity of the Study

Internal validity in qualitative research is *concordance between theoretical definitions and conceptual definitions of a study*. The philosophic-theoretical bases, conceptual definitions and the methodological choices have to relate to each other in a harmonious and logical way. (Eskola & Suoranta, 1998, 214.) This study adopted a qualitative approach. The methodology of the study fits together well: the conceptual approach was inductive and therefore open theme interviews were selected as the data-gathering method. The data were then analyzed by inductive and deductive content analysis. This method of analysis was also open: no purely theoretical hypotheses were tested with the data, as even the deductive analysis was based on previous inductive findings of the study. Thus, there is consistency between the philosophic-theoretical base, the conceptual definitions and the methodological choices of the study. There are some critical issues, however, which should be taken into account when evaluating this study.

It should be noted that the choices about which theoretical models to include in the study also affect the validity of the study. **The conceptual definitions guided the reporting of the results**. For example, in this study, stress was considered rather loosely to also include experiences such as insecurity, helplessness and fear. This must be remembered when evaluating this study. The results were primarily examined in the context of one job characteristics model and two stress models. These models were selected as they fitted well to the research subject and as they covered job-related factors extensively and therefore enabled the examination of qualitative results. It must be realized that the theories represent just some perspectives, which direct the study and certainly influence the way in which results are manifested.

Also the contextual conditions of the data gathering influence the results of the study. It could be that because the thematic interviews covered also themes such as changes in competencies and job-descriptions, these themes were also more emphasized in experiences related to the quality of working life. Thus, **the inductive nature of this study can be somewhat questioned**, even though the interviewees were not guided to express experiences related to the quality of working life on especially these themes.

Finally, even though the study adopted a person-environment fit approach to the quality of working life, well-being and stress, **the connections between personal factors and environmental factors were not examined for each individual separately** but were examined at a more general level. For example, the specific stressors of Part II were not connected to specific moderating factors, such as the lack of work motivation, but were discussed more generally. Thus, some accuracy of the results might have been lost due to not connecting each stressor with its moderating factors.

According to the criteria of Mäkelä (1990) validity issues are connected to the significance of the data, as relevant research questions are also valid. Validity is also related to evaluating the scope of the data. Kvale (1989) argues that to validate is to question. This means that *the researcher should approach both the truthfulness of the reports of the interviewees, as well as the truthfulness of the interpretations (s)he makes from those reports, critically*. In this study, there is no reason to believe that the reports of the interviewees were false. The atmosphere of the interview situation was open and also negative experiences were expressed freely. The validity of the interpretations resembles the third criterion of Mäkelä (1990), evaluating the scope of the analysis. This mode of validity was tested by sending the analysis to some of the interviewees, by discussing the findings with the interviewees as well as other representatives of the company and by discussing the findings with other researchers participating in the project. The consent of the interviewees and other representatives

of the organization with the analysis and the results of the study increased the face validity of the study (Kyngäs & Vanhanen, 1999), the communicative validity of the study as the validity claims were tested in dialog with different audiences (Kvale, 1989) and the construct validity of the study, as the interviewees accepted the operational measures (such as 'experience', 'stress' and 'well-being) for the concepts being studied (e.g., the quality of working life) (Yin, 1994, 33). Moreover, if external validity is understood according to Eskola & Suoranta (1998, 214) as the degree to which the interpretations of the researcher describe the research object accurately, interviewee acceptance of the research results also improved the external validity of the study.

7.3   Transferability of the Results

Qualitative research does not aim at statistical generalizations but to describe a certain situation, to understand a certain activity or to give a theoretically valid interpretation of a certain phenomenon (Eskola & Suoranta, 1998, 61). The results of qualitative studies are generalized theoretically and analytically, not statistically. Theoretical generalization refers to the transferability of empirical observations to different operational environments (Marshall & Rossman, 1995, 143): to other populations, settings and treatment arrangements. This type of transferability is also known as external validity (Marshall & Rossman, 1995, 144). Secondly, qualitative findings, and especially qualitative case studies, also aim at expanding and generalizing theories. The transfer of empirical observations to the theoretical body of knowledge is referred to as analytical generalization. In this mode of transfer, a previously developed theory is used as a template with which the results of the study are compared. (Yin, 1994, 10; 31.) According to Eisenhardt (1989), tying the emergent findings to existing literature enhances the internal validity, generalizability, and theoretical level of theory building from case-study research. As qualitative research settings are not usually statistically representative, *the generalizing of qualitative results should always remain firmly grounded in the empirical details* of the studied context (Coffey & Atkinson, 1996, 163). Thus, the central elements of quantitative generalization, such as the quantity of data and its parameters, are replaced by the robustness and depth of the researcher's interpretations from the data (Eskola & Suoranta, 1998, 68).

In order to create and increase the theoretical transferability of the study, the researcher has to *make sufficiently elaborate descriptions* of the studied phenomenon (Eskola & Suoranta, 1998, 68; 212). The results of this study are transferable in similar organizational, economical, technological and social conditions. The

organizational and economic setting in which the data are gathered is described at the beginning of this thesis. The technological and social setting in which the data gathering has been conducted is described throughout the study. Eskola and Suoranta (1998, 66) argue that the degree to which the results of qualitative research can be transferred to different operational environments *depends on the soundness of data gathering*. A sound sample consists of interviewees who have a relatively similar experiential reality, are knowledgeable about the issues to be studied and are interested in the study. According to these criteria, the sample of this study is sound. The interviewees shared the same reality, as they worked in similar organizational conditions and had experienced similar technological changes and job redesign interventions. The interviewees also had experiences and knowledge about the studied phenomena, even though the quality of working life during technological change and job redesign might not have been previously contemplated in a conscious and reflective way. Moreover, the interviewees were all interested in the study and wanted to contribute to it. Finally, Marshall and Rossman (1995, 143) argue that demonstrating the applicability of research findings to another context is not the responsibility of the original researcher, but other researchers who wish to elaborate or utilize the findings of the study. Therefore, the applicability of the results of this study is not tested here.

Analytical transferability of the results can be created and increased in multiple-case studies by using replication logic: if two or more cases support the same theory, replication may be claimed (Yin, 1994, 31). In this study, the case results were highly consistent in the way in which they supported the theoretical concepts and models. However, this does not automatically increase the analytical transferability of the results, as there might also be other factors modifying the results into being consistent. For example, it must be taken into account that all the cases and interviewees were from the same organization and therefore share a similar contextual environment, which probably affects the results by making them more uniform.

Finally, there are a number of situational factors affecting the transferability of the results. The effects of technological changes depend on the type of technology to be introduced, the type of organization in which the introduction occurs and the type of organizational changes, such as job redesign changes the managers see necessary, to name a few. Still, there are general patterns that can be identified from the data with the help of the previous theoretical findings. This study provides interesting perspectives on the scientific discussion of the quality of working life during technological change and job redesign. Also, there is much to be learned from the results of this study that can be applied to supporting employee quality of working life in organizations.

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APPENDIX 1: ORIGINAL INTERVIEW CITATIONS IN FINNISH

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1 On se jonkin verran muuttunut, mutta se on oikeastaan se työtapa, se työ ei ole muuttunut, mutta se tehdään toisella tavalla. On totta kai, onhan munkin työ muuttunut sinäkin aikana kun olen täällä ollut, koska työkalut on muuttunut, mutta mä en näe sitä sellaisena työn muutoksena, mä näen, että se työ tavallaan kuuluu tähän ammattiin, en näe, että mun työ olisi jotenkin muuttunut, vaan tämä maailma on muuttunut. Onhan moni muukin asia muuttunut, tässä on vaan elettävä mukana.

2 Mä en siellä varsinaisessa toimituksessa ole päivittäin, mutta kyllä mun mielestä siellä on ollut hirveästi napinaa. Semmoista että ei se kivuttomasti ole mennyt ja kyllä ihmiset on, ehkä se oli kaikkein pahin se, kun aluksi oli se slogan, että kaikki tekee kaikkea, mutta siitä on nyt onneksi vähän päästy siihen, että on joitakin jotka tekee pääsääntöisesti vaan teksti tv:n vuoroja, koska ne osaa sen ja on hyviä siinä.

3 Mä panen illalla kädet ristiin ja liitän iltarukoukseen että rakas taivaan isä, anna meidän herrojen olla oikeassa tämän digitalisoinnin suhteen koska jos tämä on virheliike, niin se on isoimpia mokia mitä Yleisradiossa on koskaan sattunut.

4 Tämähän tässä tapahtuu väistämättä, että kun koneet tulee hienommiksi niin ohjelmat on toisarvoisempia ainakin tuntuu, että puheissa meidänkin kanavan tai koko Yleisradion tasolla puhutaan jatkuvasti kehityksestä ja ensimmäinen asia mikä tulee niin on nämä laitteet. Kyllähän se tietysti tuo ihmisille, sehän tuo sen tunteen että ei me olla olennaisia vaan olennaista on nämä vehkeet..

5 Musta nämä on vähän tällaiset aika vaakkuvat, ja tavallaan mua rassaa se, että kun mä olen tyyppinäkin sellainen, että mä haluisin selkeät puitteet, että mä tiedän, minkä välissä mä liu'un. Ja tässä selvästi nyt ei ole sellaisia, ja mua rassaa se vähän ylimäärinkin.

6 Eihän tämä ole sen kummallisempaa kuin missä tahansa muutoksessa, että silloin kun siitä tiedetään liian vähän niin sitä vastustetaan mutta sitten kun rupeaa konkretisoitumaan niin sitten ruvetaan näkemään näitä, että miten meidän mahdollisuudet kuitenkin tehdä jotain uudenlaista.

[7] Silloin kun mä tein c-kasetille, niin silloinhan mä jouduin tekee nauhakarttaa ja silloinhan mä jouduin menee äänistudioon ja työskentelemään tarkkailijan kanssa. Että se muutos mikä on yksinomaan positiivinen muutos on se, että mä saan tehdä sen oman jutun alusta loppuun asti itse. Ja sitten, mutta mulla on myös käytettävissä se tarkkailija siihen työhön, joka vie mun mielestä turhaa ja kohtuuttomasti mun aikaa muusta työstä, kuin tämä viimeistely. Mutta kaikki se, tämä omassa työpisteessä tapahtuva editointi mulle merkitsee plussaa, että mä koen sen positiivisena ehdottomasti.

[8] Ja sitten tämä digitaalinen se on siis aivan fantastinen mullistus, tämä digitaalinen leikkaus juuri siinä, että sitä järjestystä voi muuttaa, että se on aivan uskomatonta, mitä me ollaan tehty ja sitä mä oon nauranutkin, että harmittaa kun nykynuoret, jotka pääsee suoraan tekemään näillä digitaalisesti, että ne ei ymmärrä, minkä valtavan työn kanssa me ollaan näitä tehty, että se on ihan fantastinen asia tämä digitaalinen just tässä, että niitä voi niitä paloja siirtää ja laittaa ja viedä ja tuoda. Ja nyt kun mä sain sen itselleni kotiin, niin se on kyllä, se on ihan fantastista, että mä en voi käsittää että kukaan toimittaja voi vastustaa sitä, että haluaisi opetella sen. Se ei silti vie yhtään pois sitä, että sitten on vielä arvonsa

mennä sen materiaalinsa kanssa ammattileikkaajan luo, koska se näkee sitten taas eri asioita, mutta siinä päästään heti syvemmälle, koska mä tunnen siinä vaiheessa materiaalini niin hyvin (…) mutta sitten mun täytyy sanoa kyllä että totta kai jokainen toimittaja on yksilö ja joku voi olla, sille voi olla niin vastenmielistä noihin laitteisiin koskeminen, että kyllä mä luulen, että semmoistakin tapahtuu, että joku menee vielä kasseineen sinne leikkaamoon. Mutta kyllä mä luulen että se on aika vähäistä, että ei aika riitä semmoiseen, että siellä vasta ruvetaan kelailemaan. Että kyllä sen aika paljon sen ajatustyön on täytynyt tehdä jo.

[9] "Ja kyllä siinä oikeastaan siinä pitäisi olla hyvä työryhmä kuitenkin jonka kanssa kommunikoisi. Ett siinä on se vaara tosiaan, mikä mullakin on että hautautuu liikaa sen oman tekemisen alle ja olisi syytä ryhmässä kommunikoida ja välittää niitä ideoita ja käydä dialogia (…) koska ei sillä omalla tekemisellä tulee liian sokeaksi."

"Että se olisi negatiivinen puoli tässä se erakoituminen?"

"Joo ja onhan näitä nörtti-ilmiöitä olemassa se on ihan sama tapahtuuko se tietokonepelien kanssa vai kaiken maailman materiaalien kanssa, minkä tahansa materiaalin kanssa saattaa jäädä sähläämään itsekseen."

[10] Että kyllä mä koen sen vähän sellaisena sääliasiana, että lähetys sujuu nyt hyvin tarkkailijan ja kuuluttajan yhteistoimintana. Että nyt mä kyllä ajattelen sitä, mitä kaikkea siinä menetetään. (…) Jos lähdetään siitä, että joskus vielä kuuluttaja hallitsee yksin lähetystä edes kaksi tuntia, niin silloin se on siellä itsekseen, yksin kyhnöttää eikä siellä ole ketään missään. Ja sitten siinä menetetään sellainen varmistus. Että tavallaan nyt kun kuuluttaja ja tarkkailija kumpikin tekee ohjelmaa, niin aina jompikumpi pitää huolta siitä ja aina jompikumpi kysyy, että miten tämä nyt menee.

[11] "Että on ihan selvä ollut mun mielestä (…) että ihmiset ei halua tehdä, ei halua olla monimoniosaajia, ne haluaa tehdä jotain muutamaa asiaa."

"Osaatko sanoa, että minkä takia?"

"Se on liian rasittavaa. Siis se pelkästään jo se että tekee tekstitelevision ja netin uutisia niin siinä on niin monta erilaista ohjelmaa, joita pitää osata käyttää. Että siinä on koneella auki yli kymmenen eri näkymää, kaikenlaista ohjelmaa ja lähdettä ja työvälinettä ja kuvaohjelmia ja kuva-arkistoja ja kaikkea. Se on liikaa ihmisten, ihan tavallisen keskiverto ihmisen päälle."

[12] No ottaen huomioon että (…) olen 37 vuotta ollut alalla ja olen opetellut nämä viimeiset tekniset asiat hyvin aikuisena niin kyllä minä näen erittäin epätodennäköisenä sen että minä pystyisin kunnolla editoimaan suoraan johonkin eetteriin ja sitä paitsi minun tasoni on niin korkealla että minä en siihen ryhtyisi muuta kuin pakottamalla, totta kai minä siihen pystyisin jos on pakko, mutta kyllä minä nyt viimeiseen asti taistelen sen puolesta että minä saisin työskennellä edes ja äänitarkkailijaa käytän silloin kun on kyseessä muu kuin aivan suora lähetys.

13 Kuvitelmat tällaisista synergiahyödyistä on ylimitoitettuja ja ne tulee pikkuhiljaa tässä paljastumaan että siis televisiotuotannossa on tiettyjä prosesseja joita yhden ihmisen pitää tehdä ja ne ei nopeudu vaan ne päinvastoin hidastuu jos yksi ihminen pistetään ammattitaidottomana tekemään sitä minkä joku toinen osaa tehdä ammattitaitoisesti että tämä on ollut hyvin tällaista prosessiteollisuutta tähän asti että tämä muistuttaa vähän sellaista murrosta että sitten jos tässä uutisliukuhihnalla ihmiset pannaan

tekemään kaikkia työvaiheita, ehkä tavallaan jossakin määrin sitoutuminen siihen työn lopputulokseen paranee ja se voidaan kokea vähän enemmän omaksi tai jotain muuta tällaista jos sä olet tekemässä sitä aivan alusta loppuun kaikkia työvaiheita mutta koska nämä kaikki työvaiheet ovat aika monimutkaisia, vaikeita niin laadullisesti se lopputulos ei tule olemaan sama.

[14] Hyvinvointi moniosaamisessa on tällainen yksilöllinen asia. Että jos tykkää huseerata vähän kaikkea, niin silloinhan tämä moniosaaminen sopii, mutta että jos haluaa keskittyä johonkin tiettyyn asiaan ja tehdä vaan sitä asiaa ja tehdä sitä kenties huolellisemmin niin silloin tämä on varmasti vaikuttanut kielteisesti työssä viihtymiseen ja hyvinvointiin.

[15] "Niin onko tämä [yhteistyö] nyt korvautunut sillä lailla, että ne koneet tai ne ohjelmat laitetaan sinne koneen työasemalle ja sitä kautta siirrellään paikasta toiseen?"

"Joo, siis joku vaan on siellä jossakin, kun ihmiset eivät enää tapaa toisiaan että joku vaan jossakin toisessa huoneessa sitten, 'ai nyt se tuli tänne', sitten soittaa ehkä tai ei soita, että mutta siinä on tullut sitten taas se, korvautuen tuohon edelliseen se että kun on kaikenlaista hässäkkää ja ongelmaa noissa [koneissa], niin se on yhdistänyt ihmisiä taas sillä lailla että jos joku pähkäilee jonkun kanssa, ennen kukaan ei pähkäillyt silleen oli vaan kiireen kanssa pähkäiltiin, nyt on kiire, kaikki toimi mutta nyt tulee joku sellainen, ihan jotakin tapahtuu niin sitten kaikki kerääntyy sinne katsomaan ja mennään kysymään siltä että tietäisikö se mitä tässä pitää nyt tehdä, tai jotakin sellaista. Siellä voi olla kymmenen tarkkailijaa miettimässä jotakin yhtä asiaa, se on korvannut sen edellisen. Mutta ne on tuollaisia just yleensä siis ikäviä juttuja, jotka kasaa ihmiset yhteen. Se on vahvempaa mutta siinä on se erilainen jännitys kuitenkin, että se oli ennen jännittävämpää se työ kuin nyt."

[16] "Sä olet kokenut tämän pelkästään positiivisena tämän muutoksen [digitalisoinnin]?"

"En mä pelkästään positiivisena sitä ole siinä mielessä kokenut, että mun mielestä on sellaista virheellistä käsitystä osittain, että nämä tietokoneet jollakin tavalla korvaisi tarkkailijan ammattitaitoa. Ei todellakaan. Sellaista on aika paljonkin sellaista virheellistä käsitystä. Nyt on mahdollista tehdä toimistohuoneessa leikkaamista. Se on oikeastaan se muutos, mutta se että ei se millään tavalla, tietokoneessa ei ole milliäkään ammattitaitoa, se on vain tyhmä kone, mikä tekee sitä mitä käsketään. Että se on mun mielestä ollut huono suunta, että joissakin paikoissa kuvitellaan, että tämä tietokone korvaisi jotain tarkkailijan ammattitaidosta. Ei se sitä tee mun mielestä, se on ihan väärä käsitys."

17 Tuntuu että se on tietyllä tavalla paljon pirstaleisempaa se työ ja sellaista pientä sälää on hirvittävä määrä että juttua tehdessä saattoi, varsinkin joskus vuosia sitten (…) sä tavallaan pystyt keskittymään siihen että sä teet sen oman juttusi ja mietit siihen haastateltavat ja minkälainen sen pitää olla. Mutta että nyt jo juttua tehdessä musta on ainakin viimeisen vuoden parin aikana että siihenkin liittyi hirveä määrä sellaista ylimääräistä sälää sillä lailla että joutui omasta jutusta esimerkiksi poimimaan kuvat jotka tulee nettijuttuun ja poimimaan erikseen johonkin kuvamuisteihin graafikon kanssa, tai graafikkohan sen tietysti hoiti mutta että mennä graafikon puheille ja ottaa ne ja sitten pitää antaa otsikkotekstit toimitussihteerille ja sitten toimittaa materiaalit jollekin nettitoimittajalle, että joutui olemaan hirveän moneen suuntaan yhteydessä ja aina on sellainen että aah, mä unohdin sen (…). Että uskoisin että joskus vielä enemmän joskus aikaisemmin oli tv-toimittajuus sitä että teki oman juttunsa ja siinä se, että jos nyt sitä mitä teki muiden kanssa niin toimitti juonnon jollekin tai juttua tehdessä

tietenkin joutuu kuvaajan kanssa tekemisiin ja leikkaajan kanssa mutta että sitten sellaiset muut että toimittaa tietoja sinne tänne siitä jutusta tai kuvia tai tekstejä tai käsikirjoituksia. Se on mun mielestä ihan selkeä muutos.

[18] Mä oon ehkä joskus miettinyt sitä että ehkä oli väärin alkaa itseäni kouluttaa moniosaajaksi, koska nyt tuntuu että revitään joka suuntaan, mutta toisaalta se on tuonut semmoista tietynlaista vaihtelua että jaksaa olla töissä, että ahaa tänään teen tätä, huomenna teen toista, toisaalta se on ihan hyvä, varsinkin tuossa työssä. Ja niistä nettimediavuoroista mä tykkään sen takia, että mä saan olla siinä toimituksessa niiden toimittajien kanssa läheisemmissä väleissä.

[19] Kun oli pakko oppia, niin opinhan tuon. Ja sen jälkeen en pystyisi enää luopumaan tietokoneesta. Ja tämä on vain esimerkki siitä, että tulee uusia asioita. Opitaanhan me ajamaan vasemmalla puolella autollakin eikä pitkään kestä. Muitakin tämmöisiä, meille tulee uusia laitteita ja opimme, miksi emme työssä oppisi. Kun nämä on ihmisen tekemiä ihmisille, niin tottahan – tai en tiedä, onko insinöörit ihmisiä. Mutta nämä on hirveän paljon kätevämpiä kuin vanhat. Se on kanssa työssä mielenkiintoista, että ei tarvita aina tehdä sitä samaa, samaa mutteria vääntää.

[20] Se kynnys on suurempi, mitenkähän sen kuvaisi, minä en ole varma pystyttekö te sitä käsittämään sitä kun siirtyy aivan erilaisesta työmetodista toiseen niin se vaatii sen tietokoneen idean hahmottaminen niin se vaatii melkoisesti, kun se ennen oli se ääninauha niin se oli konkreettinen sen näki tai tiesi kun sen oli äänittänyt että se on nyt tuossa ääninauhalla, mutta sitten kun se ääni menikin sinne tietokoneen sisään niin se tuli sellainen pelottava tunne monta kertaa, että mihin minä nyt sen äänen siellä panen ja mihin minä taltioisin siellä ja löydänkö minä sen sieltä ja tässähän se juuri onkin, kuten varmaan tiedätte sitten kun huono tuuri käy niin sitä ääntä ei löydykään sitten sieltä tietokoneelta ja nämä on ne hankalimmat vaiheet..

[21] Että meiltä vaaditaan, tavallaan ruvetaan vaatimaan jo sellaisiakin kompetensseja, joita meiltä ei koskaan työhön ottaessa ole odotettukaan. Ja sellaisia kompetensseja, jotka ei meihin ihmistyyppinä edes välttämättä liity. Tämä on hyvin sanottu. Että meihin, kuuluttajiin valikoituu taas yhdenlaisia ihmisiä eikä varsinkaan teknisiä välttämättä. Ja sitten jos meiltä ruvetaankin odottamaan jotain, niin tästä tulee jonkinlainen tälläinen ristiriita. Ja juuri tuollaista laitteiden käyttöä ja muuta, niin kyllähän sen tietysti oppii ehkä, mutta ei välttämättä kaikki sitäkään opi. Ja onko meissä sellaisia, jotka ei sitä opi? Mitä niille sitten tehdään?

22 Mutta sitten se pelkotila tavallaan mikä mulla on ja mulla on se vieläkin tuolla takaraivossa, niin se että mä en osaa vielä kunnolla että yrittää tsekata että onko mun lähellä varmasti joku jolta mä voin sitten kysyä, koska sitä on aika yksin sen koneen kanssa sitten siinä, että se ei ollut mikään hirveän mukava, että silloin kun mä aloitin näitä niin mulla oli melkein maha kipeä puoli viikkoa aikaisemmin kun mä tiesin että mun pitää mennä sinne ja se johtui juuri siitä puutteellisesta koulutuksesta, että jos mä olisin saanut rauhassa ja kunnolla harjoitella niin totta kai ihminen silloin ei jännitä niin paljon.

[23] On kyllä musta on sitäkin, että jos on halukas niin onhan meillä kouluttaja, joka kouluttaa noita tarkkailijoita tai niitten esimiehiä niin se kyllä tulee, se on sellainen ihminen, joka tulee sieltä lennosta. Että apua saa siinä mielessä kyllä. Ja se tekee sellaisia monisteita, missä on lyhennetty, käyttöohjeet lyhennetyssä muodossa. Että kyllähän tällaista tukea on..

[24] Nytkin aloitettiin opetus niin, että niitä ei oltu kaikkia edes kunnolla vielä kytketty, ei ohjelmoitu, ei ollut kaikkia laitteita paikalla. Sillä toisella viikolla, siellä oli ryhmä opetettu edellisellä viikolla, niin ei toiminut vielä tälläkään viikolla. Koko ajan häsläsi siinä opetustilanteessa tällaisia teknikoita ja insinöörejä siinä, että nyt pitäisi laittaa tämmöistä, nyt teidän pitäisi vaihtaa paikka, milloin voitaisiin tulla. Koko ajan oli tällaista näin, että asiat keskeytettiin. Opettajat keskusteli siitä, mitä puuttuu vielä, missä on vielä vikaa. Että olisi ollut rauha käydä asioita läpi.

[25] "Se on niin leikkauspäädyssä kuin lähetysautomaatiossa, ne [laitteet] on ihan mun mielestä raakileita. Että eletään jo jossain semmoisessa maailmassa, jota todellisuudessa ei ole olemassa vielä. Että hirveästi tämä [digitalisointi] on ollut tekniikkapainotteinen sen sisällön kustannuksella."

"Entä sitten miten tähän on ollut esimerkiksi koulutusta?"

"Vaihtelevasti, että se vähän tuntuu, että varmaan kaikki on joutunut kylmiltään hyppäämään ja se on tietysti luonut sitä epävarmuutta."

[26] "Se just että missä vaiheessa koulutetaan, se koulutus pitää tulla niin että sä pystyt sen jälkeen käyttämään, harjoittelemaan sitä (…) on kyllä vähän turhauttavaa."

"Eli tämä työrytmi ei anna siihen mahdollisuutta?"

"Ei, että tämä toimenkuva on sellainen ettei siinä pysty joustamaan."

[27] Mä en vaan, sitä hirveätä tiedon määrää jaksa enää edes ottaa vastaan. Että mä en halua oppia joka ikistä nippeli nappelia, että mä en vaan enää jaksa sitä. Että kun siihen koko ajan tulee jotain muutoksia ja uutta, niin se on tosi rankkaa mulle ainakin.

28 Siellä on jatkuvasti ihmisiä, jotka ei osaa jotakin, ne saa opetella sitä, mutta samalla ne muut, jotka ehkä jo jotenkuten osaa asian, niin ne yrittää selvitä sekä siitä jotenkuten osaamisestaan että kiskoo niitä jotka ei vielä osaa ollenkaan niin perässään. Mä luulen, että se on yksi syy, miksi ihmiset ovat niin väsyneitä.

[29] Tässä [digitaalisessa teknologiassa] se on hyvin helppoa, nopeampaa, jälkikäteenkin tasoittaa niitä ääniä. Siinä [analogisessa teknologiassa] sä jouduit aina kopioimaan sen uudelleen, sä et muuten pystynyt sitä äänen tasoa muuttamaan, vaan aina joutui tekemään sen kohdan, kopioimaan sen, nauhoittamaan uudelleen sen kohdan toiselle koneelle ja sitten klikkaamaan se paikalleen. Se vei hyvin paljon aikaa. Tässä se on hyvin helppoa. Samoin se muuten, jos tekee miksauksia, tekee tällaisia erilaisia ääniä, joita miksaa keskenänsä, niin jos ei ole tyytyväinen siihen tulokseen, se on nopea muuttaa. Siinä analogisessa [tuotannossa]koko kone ladataan uusiksi ja äänität sen koko homman uusiksi.

[30] "Miltä tämä muutos sieltä analogiselta puolelta digitaaliseen on tuntunut?"

"No se on tuonut epävarmuutta enemmän."

"Johtuuko se just näistä että laitteet ei toimi?"

"Laitteista joo. Mutta muuten se on mun mielestä ihan ok että niin kun siirtyy digiaikaan että ei siinä, ehkä jotkut asiat on tullut yksinkertaisemmaksi ja ehkä helpommallakin tavallaan pääsee, niin kun just avidin leikkaamisellakin niin siinä nyt on paljon sellaisia kikkoja mitä sä analogisella [teknologialla] olisit tehnyt tuntikausia. Että jotkut asiat on tuntunut paljon helpommilta, jotkut taas vaikeammalta. Ne

on aika ristiriitaisia mutta ihan positiivisella mielellä katsoo eteenpäin. Toisaalta epävarmuutta se on tuonut enemmän että ei voi olla enää mistään niin varma."

[31] Mä luulen että se on pahin nyt niille jotka siellä on [digitalisoinnin] alusta asti olleet, jotka osaavatkin sen, niin kuitenkin siellä taustalla on se pelko aina kun sä menet siihen lähetykseen, että toivottavasti nämä [laitteet] toimivat. Pakkohan sen on vaikuttaa, ihan sama jos sä lähdet rämällä autolla niin kyllähän sä koko ajan toivot, että toivottavasti mä pääsen perille tällä autolla, ettei tässä hajoa mikään. Kyllä mä luulen, että se on heilläkin siellä taustalla koko ajan, se pelko, että ei käy mitään ja toivottavasti käy sellaista että mä osaan tehdä sille asialle jotain. Että kyllähän nämä vanhemmat lähettävät toimittajat, en mä usko että heillä muunlaisia osaamisen pelkoja enää on, se on vaan se stressi siinä.

[32] Nyt on paljon sellaisia tilanteita, että ei kukaan tiedä mistä joku asia johtuu. Tavallaan vastuuta ei, on jotenkin sellainen olo että no niin, se on sitä paitsi aika ikävä puoli kyllä suoraan sanottuna, nyt mä vasta sen tajusinkin. Aikaisemmin kun on jotakin tapahtunut, että on jotakin mennyt rikki niin se on pystytty korjaamaan ja on pystytty sanomaan että nyt tässä on tämä vika, ja joku on ollut vastuussa siitä, että nyt se pitää saada tai jotain. Nyt on jotain sellaisia että jotain hajoaa niin että, tai menee tilttiin jotenkin sillä lailla, että ei sitä kukaan voi sanoa, mitä siellä on tapahtui. Sitten se on jotenkin sen koneen vika tai en mä tiedä kenen vika, ennen pystyttiin sanomaan, mikä oli kenenkin vika helpommin, mikä mun mielestä on tärkeätä ollut kuitenkin aina (…) mutta jos jotakin tapahtuu siinä laitteessa niin ei sitä voi sitten kukaan, tavallaan se on vaan sattuman kauppaa, että kuka sattuu olemaan siinä töissä, että jotenkin se vastuu on ulottumattomissa jotenkin, ihan selvästi. Kaikki vaan pyörittelee silmiään, että en minä tiedä missä on vika, tai jotain sen tapaista.

[33] Mä luulen että se suurin murros tapahtui, on tapahtunut oikeastaan jo ja se tapahtui, sen jatkoa on se että nämä ihmiset jotka jää eläkkeelle ja on vaikeampi ollut omaksua tätä asiaa niin ne siirtyy pois ja tilalle tulee ihmiset jotka osaa sen. Jolloin kun se koko työssä oleva ryhmä on sitä joka hallitsee tämän asian, niin silloin voidaan jotenkin lähtee luomaan sellaisia tekniikoita, sellaista teknologiaa, kun tietysti vaatimuksethan kovenee kun kaikki hallitsee sen asian, niin vaatimukset näiden laitetoimittajien, insinööreille ja niille firmoille kovenee joten pitää ruveta räätälöimään sellaisia ohjelmia, jotka on sitä varten, sitä toimintaa varten, jota suoritetaan. Jolloin kaikki turha jää pois. Ja tämähän olisi hirveän, meillähän on laitteissa kaamea määrä ominaisuuksia, joilla ei tee yhtään mitään, mä käytän varmaan vaan kymmentä prosenttia allekin sen vehkeen ominaisuuksista, en edes varmaan sitäkään. Ja sehän on ihan naurettavaa, että siellä on niin kun turhaa valikkoa ja vipstaakia ja muuta joka vaan häiritsee ja hajottaa huomiota.

34 Kaikki ihmiset tällä alalla on sillä lailla journalistisesti kunnianhimoisia että eivät haluaisi laskea keskeneräistä työtä käsistä ja tämä deadlinejen lisääntyminen johtaa siihen että työtä ei ole mahdollista niin huolellisesti kuin sen haluaisi tehdä ja kuin sen voisi tehdä. Se automaattisesti näkyy työstressin lisääntymisenä ja siinä että yritetään saada itsestä ja muista enemmän irti kuin on kohtuullista ja mahdollista ja tämä tapahtuu usein, siis tämä tapahtuu jatkuvasti, niitä deadlineja on koko ajan.

35 Kun sopeudutaan vähän niihin työvälineisiin, niin sitten se varmuus lisääntyy ja myöskin se sitten vähenee tässä ajan mittaan ettei syytetä sitä tekniikkaa niistä virheistä ja hyväksytään se että ollaan itse

tehty niitä virheitä. Se kuitenkin antaa semmoisen turvan siihen, että tulee tavallaan itse semmoiseksi vastuulliseksi tai hallitsevaksi siihen touhuun, kun alkuvaiheessa se on sitä että tekniikka vie mukanaan.

[36] Digitalisoimisessa jotain haittoja? Lyhyesti: ei yhtään mitään (naurahtaa).

[37] Niin mulla on positiivisen tunnelmat, kun on itse teknisesti suuntautunut, että pitää uudesta digitekniikasta sinänsä, on kiva, oikeastaan tällaista laitemäärää ja vaihtuvuutta ei ole ennen ollutkaan kuin mitä tällä hetkellä on, tulee uutta softaa ja uusia laitteita ja tietenkin niihin kouluttautuminen on kiinnostavaa.

[38] Mä olen ollut kauhean innoissani, koska sellaiselle joka on niin kun kuunnellut musiikkia monona kokoikänsä, yhtäkkiä saa stereot eteensä niin onhan se 'vau', upea juttu. Että sehän se vaikutus aluksi on ja sitten huomaa rämpivänsä samojen asioiden parissa.

[39] Kyllä se nyt kuuluu tehdä työt niillä välineillä mitä työnantaja on antanut näinhän se on.

[40] Tämä työ pitää, siis nämä työvaiheet ja tällä tavalla se täytyy tehdä tulevaisuudessakin, että mun mielestä se on digitaalisuus sinänsä niin se on ykkösiä ja nollia.

[41] Tekniikka on aina tavallaan sitä tekniikkaa (…) sä opit sen ja sä et enää kiinnitä siihen sillä tavalla huomiota.

[42] Että mun mielestä, niin mä en ole vielä kohdannut digitaalisuutta (…) mutta että tavallaan toivoisi, että olisi jotenkin paremmin näkemyksiä, joku messias jossain, joka sanoisi, että mitä tapahtuu.

[43] Nythän se on vähän semmoista teorian makuista, paperilla luetaan kaikenlaista (…) kaikkihan on tapahtunut huomattavasti hitaammin kuin silloin kuviteltiin.

[44] Kyllä se periaatteessa on ollut mielenkiintoinen, mutta raskas ja vähän musta on lähdetty soitellen sotaan. Että puhutaan hirveästi kaiken näköistä, että sitten kun on se ja se laite niin sitten ongelmat ratkeaa ja kuitenkin laitevalmistajien tuotekehittely ei ole siinä vaiheessa, missä ne mainoslehdissään sanoo. Ja kyllä siinä mielessä mun mielestä tässä on lähdetty väärästä päästä että tässä on näitten laitteitten merkitys on kauheasti korostunut sen sisällön kustannuksella.

[45] Minä sanoisin että ei mikään pahalta tunnu, minä olen siis aina tykännyt tehdä äänitarkkailijan työtä ja tykkään edelleenkin, en minä ole sillä lailla leipääntynyt siihen, että minä kokisin sen stressaavana tai vastenmielisenä, ei siis, tämä on ihan työ muiden joukossa jota minä teen mielelläni, mutta nyt kun tullaan tähän murrokseen ja digitalisoitumiseen niin totta kai se on selvää että tämä siirtyminen digitaalitekniikkaan tämän ikäisellä ihmisellä aiheuttaa sellaisen, on aiheuttanut sellaisen tietyn kuitenkin jossain määrin välillä sellaisen stressin, mutta en minä ole sillä lailla sitä kokenut ylivoimaiseksi.

[46] Mutta sitten se pelkotila tavallaan mikä mulla on ja mulla on se vieläkin tuolla takaraivossa, niin se että mä en osaa vielä kunnolla että yrittää tsekata että onko mun lähellä varmasti joku jolta mä voin sitten kysyä, koska sitä on aika yksin sen koneen kanssa sitten siinä, että se ei ollut mikään hirveän mukava, että silloin kun mä aloitin näitä niin mulla oli melkein maha kipeä puoli viikkoa aikaisemmin kun mä tiesin että mun pitää mennä sinne ja se johtui juuri siitä puutteellisesta koulutuksesta, että jos mä olisin saanut rauhassa ja kunnolla harjoitella niin totta kai ihminen silloin ei jännitä niin paljon (…) se ei musta ole kivaa, että kun joka kerta sä menet töihin niin kädet tärisee heti aamusta, että se ei ole

kovin mukava tunne mutta mä nyt alan pikkuhiljaa päästä siitäkin enkä mä ole mikään sellainen, ainakaan ulospäin, superjännittäjän oloinen.

[47] Ainoa, mitä on pystytty, niin yritetty tukea toinen toisiamme, mutta aika huono tuki on se, jos sokea toista sokeata tukee tai, mutta se, että se on ollut pakko vaan kestää. Sitten tällaiset ihmiset, joilla on kotona jonkinlainen tuki. On lapsia tai aviomiehellä on kone ja hallitsee perusasiat, niin sieltä saa jonkinlaista tukea. Niin kuin tyhjän päällä istuisi tai olisi istunut.