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Résumé – Grâce aux technologies numériques, le lieu et le temps sont devenus moins importants pour exercer un travail. Les employés sont des nomades numériques, qui seraient de plus en plus flexibles. Des entretiens avec des travailleurs des services à Genève permettent de comprendre ce changement. On constate un décalage entre les perceptions des employés et les intérêts de la recherche académique, décalage qui pourrait entraîner une augmentation des risques d'entreprise d'origine humaine.

Mots-clés – Numérisation, risques humains, design organisationnel, impact de la numérisation

Dubosson (Magali), Fragnière (Emmanuel), Rochat (Denis), « Perceived risks regarding the impact of digitalization on the future of work. Towards a gap between the concerns of academics and workers' attitudes? »

Abstract – Thanks to digital technologies, place and time have become less important than ever before. Employees have become digital nomads, benefiting from this alleged increase in flexibility. However, little effort has been put forth to understand how they feel about this change. We led semi-directive interviews of people active in the economy of services in Geneva. The results highlight a gap between employees' fears and feelings, and research interests that may lead to increased human-related risks.

Keywords – Digitalization, human risks, organizational design, impact of digitalization

PERCEIVED RISKS REGARDING THE IMPACT OF DIGITALIZATION ON THE FUTURE OF WORK

Towards a gap between the concerns of academics and workers' attitudes?

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INTRODUCTION

It has become a widespread belief that the future of work will necessarily involve digitalization. We often only present the good aspects of digitalization, namely innovation and added value. Service design, design thinking and living lab techniques are all based on the notion of co-production of new products and services, but co-production means that every employee should be involved in the innovation process of the company. However, little effort has been made so far to listen to people on the front line. Do they have an opinion on the issue? Do they perceive any risk in relation to these frantic developments in work

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automatization? We wanted to give them a voice in this exploratory inquiry without restraining them. Thus, we sought to collect opinions and comments on the risks perceived by white collar workers without judging or verifying whether these risks were relevant or whether they had any chance of materializing.

Thanks to 88 semi-directed interviews conducted in 2017, we were able to take the digital pulse of the Geneva region, which is dominated by a service economy. We wanted to question the classic excuse of project leaders in the field of digital transformation, who too easily tend to point the finger at employees and their resistance to change as an excuse for project failure. Since innovation in the service industry is said to be more non-technological than technological, the perceptions of employees who resist change cannot be overlooked. The human factor must be taken into account to accompany the rather disruptive changes brought on by digitalization. It is also important to consider the notions of co-production that are at the core of the improvements and benefits that companies and their customers expect from digitalization. Through this survey, we aim to contribute to the field by understanding what employees think of and fear about digitalization at different levels, i.e. the individual, organizational and societal levels.

This paper is organized as follows. In Section 1, we present a literature review on the topic of digitalization innovations and their impact on the workplace and consequently on individuals, organizations and society. Section 2 briefly explains the methodology used to conduct our field study. Section 3 presents a summary of the key findings from our qualitative survey. We also propose a new conceptual framework that shows how digital innovations modify job offer attributes and consequently impact individuals, organizations and society. We then compare the theoretical model drawn from the literature review with a model that summarizes the perceptions of employees. Finally, we conclude and propose suggestions for further research.

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1. LITERATURE REVIEW

The impact of digitalization – particularly on the number of jobs and skills needed to cope with the digital age – has been studied in the literature. However, the literature has neglected the impact on the individual (Wang and Haggerty, 2011). In particular, researchers have not been interested in understanding employee-user perceptions; they study the impact of digitalization on jobs, but only at the macro level. In this literature review, we explore the scientific papers of sub-domains such as digital innovations, impact on job offers, new features of the work environment and digitalization's impact on individuals, on organizations and on society. These categories correspond to the main dimensions of the conceptual framework that will be proposed in the discussion section later on.

1.1 DIGITAL INNOVATIONS

Digitalization can be defined as the integration of multiple digital technologies into all aspects of daily life that can be digitized by the conversion of analog information to a digital format so that the information can be processed, stored and transmitted through digital circuits, equipment and networks (BusinessDictionary.com; Gray and Rumpe, 2015). Referring to the concept of "digitalization" rather than "digital" implies a conversion process that is emerging, ongoing and developing rather than a completed and fully defined concept (Hagberg *et al.*, 2016). As defined by Moisander and Eriksson (2006, p. 258), digitalization is "not merely something that is imposed on people and organizations but something that people and organizations 'do' and produce themselves through everyday practice and social interaction." From a business perspective, digitalization is "the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business" (Gartner, 2018). To summarize via metaphor, digitalization turns atoms into bits (McDonald, 2013). We live in a digital era where digital technologies are used today in almost every aspect of life (Eshet-Alkalai, 2009), playing a prominent role in shaping and regulating societies, communities, organizations and individuals (Liyanage, 2012).

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1.2 IMPACT ON JOB OFFERS

The impact of technology on job offers can be classified into four broad categories: (1) the creation of new jobs linked to digital technology either directly or indirectly through its effects on the ecosystem, (2) jobs that are highly transformed by digitalization, (3) the outsourcing of jobs (4) and jobs that will be suppressed and lost (OECD/IDB, 2016). Technology has always raised concerns about jobs. Today, some people fear that it may lead to the "End of the Work" (Arntz *et al.*, 2016; Mokyr *et al.*, 2015; Rifkin, 1995). As early as 1933, Keynes (quoted by Frey and Osborne, 2017) predicted widespread technological unemployment "due to our discovery of means of economizing the use of labor outrunning the pace at which we can find new uses for labor" (p. 3). Reality has shown that such fears were ill-founded, but technologies like artificial intelligence and robotics are now penetrating sectors that were previously confined to human skills (e.g. analyzing, deciding, sensing). Sectors such as healthcare, transportation, fraud detection and law can be automated to compile data, thus contributing to diagnosis or documentation research. In the US legal sector, for instance, 31,000 jobs such as legal secretary positions have been suppressed as a result of technology, and 39% more jobs are threatened over the next 20 years as they will become redundant due to machines (Croft, 2016). Thus, millions of jobs in the knowledge-based sectors could disappear (140 million worldwide according to McKinsey Global Institute, 2013) on top of the expected profound transformation of business process outsourcing or offshoring strategies and of manufacturing operations (Goerlich, 2016). Therefore, computers challenge the skills of humans in many areas that were previously protected from automation (Brynjolfsson and McAfee, 2011). Low-skilled employees in particular should feel threatened as "technological progress is going to leave behind some people, perhaps a lot of people as it races ahead. […]. There's never been a worse time to be a worker with only 'ordinary' skills and abilities to offer, because computers, robots, and other digital technologies are acquiring these skills and abilities at an extraordinary rate" (Brynjolfsson and McAfee, 2011, p. 11).

In order to measure the impact of technologies on job offers, Autor and Dorn (2013) proposed classifying jobs according to a two-dimensional

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matrix: routine versus non-routine and manual versus cognitive tasks. Frey and Osborne (2017) rejected this model because they believe that computerization can be extended to non-routine tasks if the computer can recognize patterns. Indeed, machine learning can discover unexpected similarities between two sets of data, and it is no longer necessary to only use pre-established queries. According to Frey and Osborne (2017), the occupations least likely to be affected by digitalization are those tasks that require creative intelligence, social skills or the ability to perceive and manipulate. After an analysis of 702 jobs, they estimated that 47% of all jobs in the US carry a high risk of being automated within the next decade or two. First, jobs in transportation and logistics, administrative support and production are in jeopardy. Frey and Osborne (2017) also believe that wage levels and educational attainment are negatively correlated with the probability of computerization, defined as job automation by means of computer-controlled equipment. However, they warn that the prediction of technological progress is extremely difficult. It depends on the future level of wages, capital prices, possible labor shortages, regulation and political activism. Still, their analysis clearly shows that they anticipate that many jobs will be lost.

Another study was conducted that proposed an alternative method. Instead of looking at a job as a whole, the authors chose a task-focused approach because even in a single job, some tasks can be automated while others cannot. Technology thus acts as a complement, support or substitute for people. They estimated that 9% of jobs are likely be automated. Low-skilled employees will have to undergo new training if the proportion of job loss remains low (Arntz *et al.*, 2016).

The reality is that estimates of the impact of digitalization show substantial variation. In addition to Frey and Osborne (2017)'s estimation of about 47% of US employment being at risk in the next 10 to 20 years, other studies estimate that 35% of jobs are at risk in the UK (Frey and Osborne, 2017) and 33% in Finland (Pajarinen and Rouvinen, 2014). Whereas the share of jobs at high risk due to automatization is estimated to be substantially higher in developing countries (69% in India, 77% in China and 85% in Ethiopia, for instance), applying the same methodology, the average for OECD countries is about 57% (Frey and Osborne, 2017). The differences between countries can be explained by the extent to which jobs depend on face-to-face interaction (Arntz *et al.*, 2016).

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To face the challenges of digitalization, workers will have to undergo a fundamental qualitative transformation of their skills. It has been estimated that workers will have to change jobs every 5–10 years (Czarniewski, 2014).

1.3 NEW FEATURES OF THE WORK ENVIRONMENT

Thanks to digital technologies, location and time have become less important. It is now possible to work remotely from nearly any location as long as we are connected by communication technologies. It is no longer necessary to respect strict working hours or to be physically present at the workplace, which, to a certain extent, frees up personal time as long as work constraints are respected. Employees, especially knowledge workers, have become digital nomads (Makimoto and Manners, 1997 as cited in Murawski and Bick, 2017).

Not only does digital technology free itself from time and place, but it also tries to break away from the traditional contractual relationship between employers and employees. Some experts believe that we are moving towards the end of waged work, of social models and of a protection framework for employees (for example, work time regulation) (Degryse, 2016). We are referring to the "uberization" of the economy with the emergence of new business models that deviate from traditional regulatory frameworks. As Richard Waters (Financial Times, 2015) said: "Businesses now fear being 'Uber-ed'. From taxi drivers to television networks, from filmmakers to restaurants and banks, the ways in which individuals and companies do business is metamorphosing so quickly that many companies find it hard to keep pace. [...] The success of online lift-sharing company Uber has become an example for entrepreneurs out to attack industries once thought immune to digital upheaval" (Waters, 2015). The uberization of labor relations has given rise to new forms of employment facilitated by talent exchange platforms. The number of people operating as freelancers has been estimated at 15.8% of the labor force in the US economy in late 2015 (Katz and Krueger, 2016), or approximately 54 million workers, according to another source (Horowitz, 2015).

Employees, meanwhile, think they need to be protected from digitalization. They feel stressed, as if they are overwhelmed with information.

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According to the European Commission (2015), 90% of all data circulating on the Internet was created less than 2 years ago.

1.4 IMPACT ON INDIVIDUALS

The deterioration of employee-employer relations may lead to wage penalties, reduced opportunities for employer-sponsored training and greater risks of a gradual drift into unemployment for people working in the platform service market (OECD, 2016a).

If workers accept more insecurity, volatility or complexity, it is because, in return, they can manage their work schedule as they wish, choose where they work and try to achieve a better work-life balance. This is especially appealing to single parents, students and seniors (OECD, 2016c). Such an arrangement is achieved through longer working hours, higher stress and lack of support from colleagues, among other things (OECD, 2016b).

Social and economic isolation from the rest of society is harmful because it has been observed to correlate with a decrease in life expectancy in white men aged 25 to 54 with a low level of education, resulting in the first generation since the Vietnam War to have a lower life expectancy than the previous generation (Kolata, 2015). This deterioration has been accompanied in this population by symptoms such as mental health problems, chronic pain and inability to work, all signs of increasing distress (Case and Deaton, 2015). This same population has also experienced an increase in unemployment and social inequality (Curran, 2017).

Links between technologies and services generally speaking can be derived based on the following types of relationships: substitution, determination, identity, diffusion and production (see Gallouj F., 2002). In the body of research, where the focus is on relationships between digitalization and services, more could be said regarding the concrete impacts on jobs and organizations. However, as this research is in its early stage, only elements of perception have been gathered.

1.5 IMPACT ON ORGANIZATIONS

With increased digitalization, companies will be able to further centralize operations as logistics costs are reduced to a minimum, with

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marginal costs close to zero for producing and delivering digital products and services. This will enable companies to benefit from increasingly significant economies of scale (Loebbecke and Picot, 2015).

As digitalization favors greater centralization, large companies will benefit, consolidating their position within the market (also through acquisitions to acquire digital skills faster). Markets will tend towards oligopolistic or even monopolistic situations, also referred to as a "winner-takes-all" or superstar economy (Loebbecke and Picot, 2015). Contrary to what had been anticipated, the Internet has not allowed small businesses to compete with the big ones but has instead led to greater disparity in favor of the leaders of the old economy (Albrecht and Gunn, 2000). Large companies are more prone to adopt advanced technology and innovation (Dewan and Riggins, 2005).

Even today, most companies operate according to the traditional model of recruiting and hiring contract employees. Due to the digital economy, companies no longer have to hire people long-term and may instead contract them for a specific task for a limited period of time. In doing so, companies are gradually replacing the production carried out by professionals with production carried you by non-professionals who may be less specialized or may even be amateurs working in their free time (as seen in crowdsourcing platforms) (Shirky, 2008 quoted in Loebbecke and Picot, 2015). Platform economy companies can thus avoid all the obligations and responsibilities inherent in being an employer by treating all workers as self-employed and paying them on a task-by-task basis. This allows considerable savings and an increased profit margin (Byhovskaya, 2017).

The literature does not address many elements related to the changes in work management techniques due to digitalization at the level of the firm. Such a gap is understandable since digitalization of work has been such a quick development. The trend in the research is to focus on the proper orchestration between classical management techniques and the new digitalization processes that will radically change the organizational structures of the future. As such, we believe the notion of transformational management will generally encompass issues related to work management techniques.

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1.6 IMPACT ON SOCIETY

As employees face competition from robots and digital technologies and as digitalization makes offshoring even easier, workers might have to bear the burden of having their standard of living reduced to the lowest common denominator (Fikirkoca, 2007). This is exacerbated by the fact that when working on a freelance basis, workers lose their rights such as paid sick leave, pension-fund participation and company-sponsored training (Byhovskaya, 2017). Because of this, mass proletarianization is considered to be a threat to our developed societies. This phenomenon will allow shareholders to benefit more from their investments as employees see their living standards decline. This will lead to increased inequalities between rich and poor, workers and shareholders (Fikirkoca, 2007; Levy, 2005).

A study (OECD, 2016c) found that the ability to use digital technologies enabled better access to the labor market, higher wages and other social outcomes. Many think that everyone is connected to the Internet, but this is not the case. Currently, Internet adoption is correlated with age, education, income levels, race and employment (OECD, 2016c; Rainie *et al.*, 2003). The availability of Internet access further accentuates the socio-economic gaps with people excluded from the digital world contributing to the digital divide (Gunkel, 2003). A study showed that in England, 13% of the population (6.4 million adults) had never used the Internet, and 32% of them had no interest in ever having the Internet at home (Williams *et al.*, 2016). In most cases, it is not a question of choice but rather a lack of technical, economical or even social and cultural competencies. Elderly people especially face the risk of being left out of the digitalized society with an immediate, detrimental impact on their quality of life (due to challenges faced in accessing health care and banking, for example). In a society where using information technologies has become the norm, not using them is interpreted as abnormal activity, creating a huge technological pressure on those "non-ICT (Information and Communication Technology) users" (see Talsi, 2015 for a focused study on non-users of ICT in Finland).

This technological gap also creates an increase in the inequalities between those countries leading digital reform and those countries lagging behind in their digital transformation. This could further

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strengthen US hegemony as 9 of the top 10 software companies worldwide are American (Fikirkoca, 2007). Inequalities also affect the business world by contrasting large and small businesses. Not every country of the world is equal regarding digitalization. According to the IMD World Digital Competitiveness ranking (2018, second edition), there is a significant heterogeneity in the ranking regarding size, region and development pace. According to the ranking, it seems that developing countries are not necessarily left behind as we might imagine. For instance, it has been seen that in some developing countries, digitalization has already directly benefited the society thanks to a significant proportionate increase of households that have access to a bank account. Such a development would not have been possible without the access to the Internet (Asli, 2018). However, to our knowledge, no proof exists that a country's participaton in the "digitalization race" of work processes will provide any substantial and sustainable benefits in the future.

Since digitalization reduces distribution costs to almost zero, some cultural goods are distributed almost free of charge. Without discussing the ethical aspects of the copyright problem, we can observe that this phenomenon might reduce the creation process to hardly viable and thus prevent the appearance of new creations. We are therefore experiencing an impoverishment of cultural diversity (Glenn and Gordon, 2002; Loebbecke and Picot, 2015).

Additionally, an interdisciplinary study conducted among many experts, scientists, business leaders and others concluded that digital technologies represent threats in terms of information warfare, cyberterrorism, financial market vulnerability, fraud and knowledge gaps (Glenn and Gordon, 2002). In short, we are heading towards a very complicated time that could be marked by many crises: fiscal, financial, security, political, environmental and social. The question of the role of the state has not been resolved. Can it continue to be "an ex post bearer of excessive risks and the agent responsible for attempting to clean up private risk crises while respecting the sovereignty of business over its products and processes" (Curran, 2017, p. 14)? Such a stance may no longer be sustainable.

Finally, Figure 1 offers an overview of the impact of digitalization based on our literature review.

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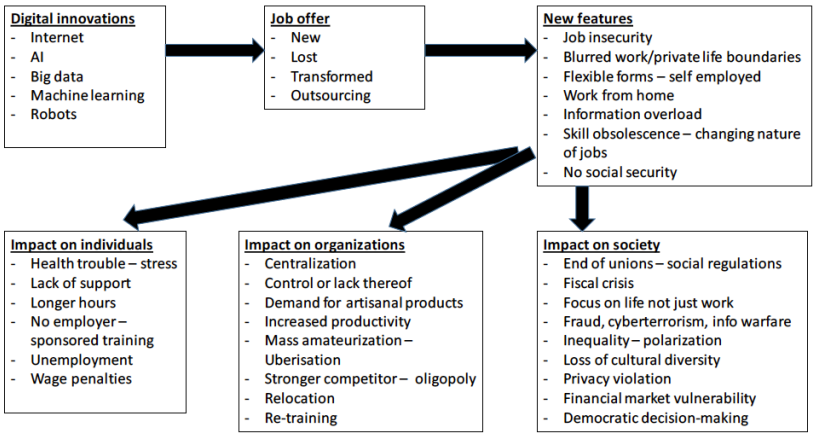

FIG. 1 – Conceptual framework based on scientific literature.

2. METHODOLOGY

In the spring and autumn of 2017, we conducted two waves of semi-directed interviews in the Geneva region. All interview transcripts were analyzed using Nvivo software. Our results led to the generation of research hypotheses to be compared to the scientific literature. Finally, a model was devised following the steps of theory-building using an exploratory approach.

Following the exploratory research that led to the literature review presented in Section 2, we selected specific areas of interest and themes for discussion. In order to lead engaged and in-depth interviews, each of these themes was introduced by the interviewer by means of a specific open question. Unlike the closed questions often found in quantitative surveys, open-ended questions are used to initiate discussion on a theme as they enable the "why" or "how" of a given phenomenon to be investigated.

The questionnaire we designed for the semi-directed interviews is presented below. This structure reflects the selection of items of interest,

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with the overall objective being to understand how companies approach or prepare for the digital shift and if they anticipate human risks:

1. If I mention the digitalization of the economy and especially its impact on the labor market, what does this mean to you?
2. Regarding the labor market, do you think the impact will be positive or negative in terms of the number of jobs? Why?
3. What impact will digitalization have on quality of life?
4. Do you think that the Swiss labor market properly anticipates the training and education needs related to digitalization? Why?
5. Do you think the labor market will become more flexible? If so, how do you view this change?
6. Concerning the legal framework of the labor market, should it be adapted to the needs of the digital economy? How?
7. Is there anything you would like to add that we have not yet addressed? Is there anything you would like to share with us?

In total, 88 persons were interviewed in the greater Geneva area (in May and September of 2017) by students of the Executive Master of Business Administration program of the Geneva School of Management. All of the persons interviewed were (or had been, in the case of a very few who were retired or temporarily out of work) active in the service economy in the French-speaking region of Switzerland. In terms of sociodemographic characteristics, the sample consisted of 55% men and 45% women, with distribution among age as follows: 18–24 years, 7%; 25–34 years, 32%; 35–49 years, 34%; 50–64 years, 20%; and 65+ years, 7%. Slightly more than 60% of the persons interviewed were active in the private sector (62% private, 38% public), and close to 20% of them had a managerial role. In this first exploratory research phase, we did not concentrate on these comparisons based on sociodemographics. The goal was to generate a hypothetical generic model of forced perspective between workers and academics. Even so, we could not detect in our sample any noticeable differences between sociodemographic groups.

The coding of the interview transcription was conducted using Nvivo. Using a set of labels that were created based on the literature review and on thorough analysis of the collected data (i.e. interview transcripts), we articulated our search through five main categories:

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(1) labor demands, (2) global attitude, (3) impact on individuals, (4) impact on organizations and (5) impact on society as a whole. For each of these five categories, codes were selected to describe the various facets of each category. Some codes emerged from the literature review, and some codes emerged from the interviews.

3. RESULTS AND DISCUSSIONS

In this section, we synthesize the transcripts in order to build on our interpretive analysis using Nvivo.

First of all, it is interesting to note that the vast majority of respondents were hardly able to spontaneously articulate their thoughts about the digitalization of the economy and its alleged impacts. The assistance provided by the semi-directed questioning approach was very useful, in the vast majority of cases leading to animated and engaged discussions.

The respondents were generally divided on the issue of digitalization: they enjoy their benefits but are aware of the associated risks. In particular, the immediacy and abundance of information is leading to new stressors, with an increasingly blurred line between work and private life.

At the individual level, the most common thought was related to unemployment, although the vast majority of respondents did not feel directly concerned. The most common opinion can be summarized as follows: "What to do with long-term unemployed people? No one will be immune to digitalization." When the interviewer followed up with, "No one?" the respondent qualified, "Except me." Even though there is a risk of widespread unemployment, which is scary, another respondent said that "my work is so specialized that it cannot be done by a robot, as artificially intelligent as it may be." These points of view reflect that people active in the service economy do not perceive a direct threat to their jobs, at least at first glance. (A few respondents concluded that "in the end, we all will lose our jobs" but did not point to the digitalization of the labor market as the sole or main reason.)

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At the organizational level, companies must rethink the way they hire and manage freelancers. Corporate culture and corporate values are more diffuse with teleworking and digital mobility.

In everyday life, digitalization is appreciated in the form of smartphones and online shopping. On the other hand, when respondents think of digitalization at work, they think first and foremost of robotization and artificial intelligence. Robots remain worrisome in the popular imagination, especially when they are associated with artificial intelligence. These fears lie in the fact that they could take control and then replace and enslave the human population. The main fear of our respondents is that we are moving towards a depersonalized world where the human dimension will be completely forgotten.

> "It will be a cold and sad world only with robots and where human beings will only be autistic. And if artificial intelligence exceeds human capabilities, the world will collapse." - 34-year-old woman, project manager

Respondents felt that the challenges lie not only in the labor market, but in society as a whole. The risks are high in terms of social unrest, exclusion of the weakest, inadequate education and lack of democracy, and many fear that Switzerland – and Europe in general – is already lagging behind.

> "The Swiss government's support may not be adequate for local companies that face international competition operating within a more flexible framework and have easy access to venture capital. Some sectors of the economy will die or be very weakened." - 57-year-old man, former director

Our skills and jobs will be transformed and threatened if we do not adapt and train. There will no longer be clear career paths. The job search will be done only via internet. The very idea of employer-employee relations is being challenged. Employees will have to become accustomed to managing new contractual relationships and several employers or mandates at once.

At the organizational level, companies must also rethink the way they operate and manage these new employee-agents. Workers will suffer greater stress as the line between work and private life becomes increasingly blurred. Corporate culture and values will become increasingly diffuse and distanced with the rise of telework and employee mobility.

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> "Just because you can work anywhere doesn't mean you have to work all the time." - 31-year-old man, ticket office manager

In summary, respondents' opinions were divided between the day-to-day benefits of new technologies and the risks involved in the labor market and society in general, viewing Switzerland and Europe as very unprepared to face these challenges. Regarding the latter, they expected the Swiss authorities to take more action to organize and regulate the digitalization process of the economy.

Despite this awareness of the risks associated with digitalization, respondents appeared unresponsive to the threats they identifed. Prior to and at the beginning of the interview, they seemed to have no clear-cut opinion on the expected impact of the digitalization of the service economy. Most of them actually built an opinion during the interview itself without being able to predict with confidence a clear expected outcome of digitalization. In the analysis of the transcripts, we did not notice an instinctive need to prepare for or anticipate these changes. This attitude could be the result of a lack of understanding and/or communication about the potential effects of digitalization. It could also be due to the belief that "My job is different – it brings more value," which we will discuss in the next section.

The analysis of the transcripts allowed us to put forward different research hypotheses and develop a conceptual framework dealing with future digital innovations and the dynamics of the labor market. "Impact on the labor market" is defined as jobs that are either newly created, destroyed/lost, transformed or outsourced (OECD/IDB 2016). Jobs redefined by digital technologies will exhibit new features that have an *impact on individuals, organizations* and *society*. On this basis, we have developed two different versions of our conceptual framework, one based on a review of the scientific literature (see Figure 1) and the other based on the findings of our data collection and analysis (see Figure 2). In comparing the two versions, several discrepancies emerge.

First, regarding *new features* of the labor market, our qualitative survey shows that respondents focused more on attributes that directly affect the individual (micro view), such as changes in the blurring boundaries between private and professional lives (33 respondents) or the overwhelming amount of immediate information that people are expected to "digest" and use efficiently (41 respondents). Respondents

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were afraid of the constant intrusion of technologies into their lives and into their homes and of the sense of urgency that comes with it.

> "Concerning the pace, there is a tremendous amount of pressure. Today, when you get an email, you are disgraced if you don't respond right away. They urge you to do so. In the past, we were allowed to take our time to reply." - 43-year-old woman, midwife

As for the scientific literature, it appears to place more emphasis on attributes that concern changes in the organization that surrounds individuals (macro view), such as skill obsolescence. For example, while researchers identify the problem of organizations that have to manage information overload, this issue was barely mentioned by respondents (9 respondents). When they talked about the problem of information, it was more in terms of lack of quality. Also, only six respondents noted that the new digital environment will impact the level of worker protection. Here, they called for a redesign of the social security system in order to protect employees against any demonstration of power abuse.

When comparing *impacts on individuals, organizations* and *society*, the differences between the literature review and the results of the qualitative survey are even more evident. Once again, it could be said that research, which most often focuses on numbers rather than individual characteristics, has a much more macro view of these social phenomena. This discrepancy is reminiscent of the service design concept of "zooming in" and "zooming out," which denotes the process of alternating between an overview of service production and a focus on a given touchpoint in the service blueprint.

The differences between our findings and previous studies mainly center around the three pillars that emerged from the literature review: impacts on individuals, on organizations and on society.

First, regarding the *impact on the individual*, our survey showed that depersonalization (28 respondents) is a critical factor for the individual; however, it has hardly been touched on in the scientific literature because it does not affect the organization in its financial and organizational aspects.

> "I fear that men and women will become apathetic and lazy, that they will carry out less and less activities, that they will become submissive to the machines that will think for them." - 20-year-old man, part-time student and teacher

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Respondents also feared the negative impacts of digitalization on their daily lives, such as unemployment (19 respondents), extended work hours (12 respondents) and health trouble (11 respondents) like stress or burnout.

Conversely, while the literature highlights impacts such as lack of support (1 respondent), lack of employer-sponsored training (1 respondent) and mobility (3 respondents), those items were almost never mentioned by the respondents. Indeed, these impacts are generated and managed by companies. Here we see that the individual is more interested in the notion of self, of his or her role as a human being in society, than in the organizational aspects that, although they do indeed affect each worker, have an impact at the operational rather than the individual level.

Second, the *impact on the organization* is symptomatic of the differences observed between our survey and the literature review. Respondents first highlighted the issues related to a search for increased productivity (38 respondents) by eliminating problems related to human flaws such as absteeism or lack of performance. They thought that companies are pursuing cost reduction strategies and that the best way to implement them is to replace their employees with machines. They also discussed the aspects related to customer satisfaction (16 respondents) and thus to a perception of individuals as customers. Numerous examples have been described to highlight the positive and negative aspects of digitalization.

Respondents did not seem to be very concerned about concepts like mass amateurism (0 respondents), better monitoring (3 respondents) or relocation opportunities (3 respondents), which are probably far too abstract to understand their impacts here and now. There is no doubt that the trends that have been identified and labelled by scientists are noteworthy and will continue to impact our world, but they do not resonate with ordinary people. This seems to highlight an apparent gap in communication that probably explains the respondents lack of spontaneity when asked what the digitalization of the economy and its impact on the labor market meant to them.

Third, the *impact on society* is probably the pillar with the greatest differences. It is perhaps the most contradictory element of this exploratory research. Indeed, workers' perception of the digitalization of work is very strongly linked to societal aspects and differs considerably from the themes addressed in the scientific literature on the subject. When

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repondents raised the same issues as the academics, it was in different terms. While the literature speaks of mass proletarization and increased benefits for shareholders, respondents (28) pointed to growing inequalities in terms of a widening gap between rich and poor, between the low-skilled and high-skilled and between younger and older workers.

> "I wish we could have a more egalitarian society with more positive values. Today a few people are getting wealthier by forgetting social values. We have to stand up and act on this evolution." - 35-year-old woman, bank employee

Privacy violation was also mentioned by 15 respondents, but in a more extreme vision of what the future might be. They fear that machines might take control of humans thanks to all of the collected data.

When workers discussed the impact of digitalization from a societal point of view, they highlighted, among other things, educational aspects (37 respondents), a new legal framework (26 respondents) and a high structural unemployment rate (10 respondents). Research on societal impacts, meanwhile, is more focused on the end of unions, tax crisis, fraud, cyberterrorism, loss of cultural diversity, financial market vulnerability and democratic decision-making. This demonstrates that workers focused on societal issues that have a direct impact on their own situation. Their perspective once again placed the human being and her/his role at the center. This suggests a vision that is perhaps more hedonistic and less mechanical than that advocated by academics.

Based on these findings, we propose a revised model (see Figure 2, with all concepts not identified in the literature review shown in italics) that includes the main risks as perceived by workers based on the interviews' content analysis. In this model, the use of digital innovations in an organizational design approach will have to take into account the self-interested behaviours and feelings of workers to ensure that they will effectively contribute toward achieving the organization's overall objectives.

Our findings lead us to suggest a new model wherein we assume that it is *digital innovation* rather than available *digital technologies* that will modify employment dynamics. Digital innovation will be increasingly marked by human-centered attributes and considerations, and the labor market will reflect these concerns. These effects are already perceptible among the millennial generation as more and more organizations report

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that they need to find ways to motivate and integrate this population by staging the work context and finding alternative work schemes so that they can embrace and contribute to the company's objectives.

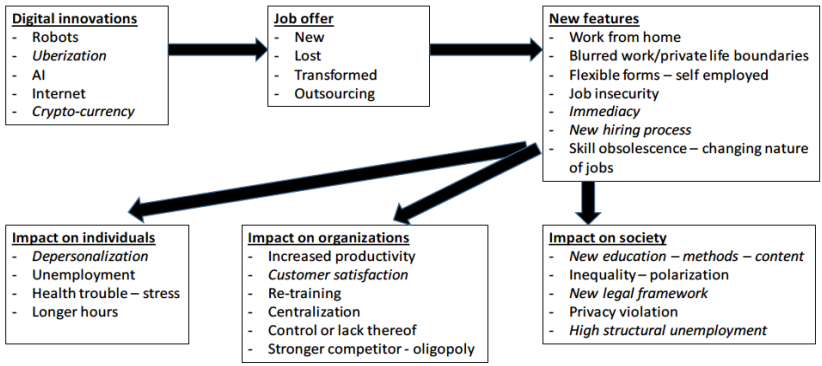

FIG. 2 – Conceptual framework based on interview content analysis.

Even more schematically, the differences between the literature- and interview-based models can also be seen in Figures 3 and 4. These generic models show that the view of academics on work digitalization is biased, as if there was a forced perspective (or trompe-l'oeil) included in their theoretical framework. The concept of forced perspective has been defined in architecture as "the use of objects or images that are larger or smaller than they should be, to suggest that they are nearer or further away than they really are" (source: Collins English Dictionary). This technique allows artists to point the spotlight at the central part of the painting, which is drawn in larger dimensions than the rest of the background. Regarding digitalization, it is as if the real preoccupations of employees have been artificially positioned far from the organization as part of the background while the center of the stage is dedicated to the concerns of the organization. The perspective of employees seems to be in the exact opposite order (see Figure 3). Our survey findings highlight a risk of abusing digitalization and the rejection of the transformations associated with it (see Figure 4) if solely based upon the academics' view. From the academic perspective, the role of workers is to integrate all digital innovations and adapt as quickly and as well as possible. On the contrary, respondents believe that the role of individuals is to use the good aspects of digital innovations

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and to shape the organizations and society in order to prevent the bad aspects from negatively impacting individuals' lives.

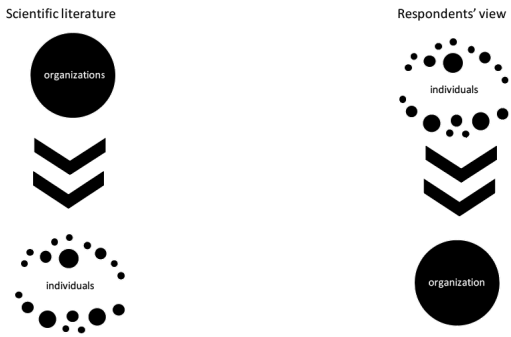

Fig. 3 – The model of the forced perspective in work digitalization: role perspective.

From the perspective of the academics (left), the starting point of the process is the concerns of organizations, which will make their own decisions in their own interests. These decisions will then have an impact on individuals as workers. On the contrary, from the perspective of workers (right), the overall design of organizations and society as a system should be based on the requirements and needs of individuals. In this way, organizations will be human-centered as they will be designed around and according to human concerns.

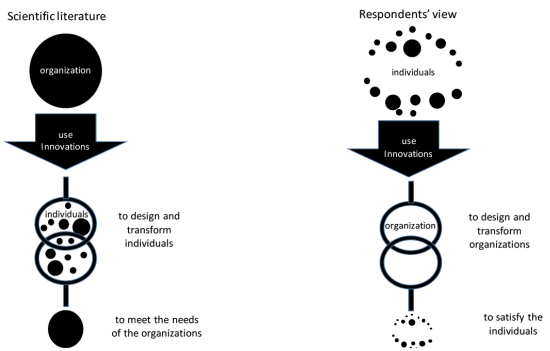

Fig. 4 – The model of the forced perspective in work digitalization: design perspective.

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In summary (see Figure 4), in terms of design, academics believe that organizations should use digital innovations to become more efficient and more productive. To do so, they will have to transform and "redesign" the skills, needs and expectations of people so that people as workers and as customers contribute to the achievement of organizations' objectives. On the contrary, respondents seemed to believe that innovations have to be carefully selected and implemented to design and transform organizations so that they better meet individuals' expectations and needs as customers, workers and citizens.

As previously mentioned, many studies have anticipated substantial job losses leading to widespread technological unemployment. No sector can claim to be immune from automation or to new technologies superseding human skills. The occupations that appear most secure are those that use perception, manipulation, creativity and social skills (Frey and Osborne, 2017). Indeed, robots still have difficulty replicating the depth and breadth of human perception and demonstrating precise dexterity, especially in cramped places. Additionally, creativity is the ability to provide new ideas in line with our values so that they are welcomed and adopted (Frey and Osborne, 2017). As our values evolve over time and among cultures, they cannot be encoded in a stable and permanent way. Finally, while robots can reproduce certain aspects of human interaction, they still have great difficulty understanding and responding to emotions in real time. Empathy is a huge discriminating factor between humans and robots.

However, even jobs that match these characteristics have aspects that can be automated. Sometimes computers can even be superior in cognitive tasks because they display no bias (e.g. see the study on judges in Israel by Danziger *et al.*, 2011). Therefore, every worker, regardless of his or her level of education and salary, should be attentive, informed and involved in technological change as much as possible.

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CONCLUSION

Like a tidal wave, digitalization is radically changing our relationship with work. Of course, it does provide some advantages. The creation of more interesting, less strenuous and more rewarding professions is often cited. However, as with any new disruptive change, it has also negative effects. Many of these positive and negative elements will not be known for several years.

However, with the purpose of better integrating these technologies into our everyday life, it seems important to understand workers' perceptions of these important changes occurring in the digitalization of service processes. According to our knowledge and opinions, we believe that their voices still have not been sufficiently included in the context of academic research. This was therefore the main aim of this study. Over the past decade, empirical studies have addressed the general notion of human risk as organizational risk. It seemed interesting and relevant to focus on the theme of human risks from the more specific angle of the perceived risks of workers in the frame of the digitalization of service processes.

On the basis of a large number (88) of semi-directive interviews, we surveyed a population of workers active in the service economy in the French-speaking region of Switzerland regarding their perceptions of this digitalization phenomenon. We were also able to observe a wide variety of points of view and not necessarily a clear positioning of each one concerning the risks and opportunities generated by digitalization. Notably, however, respondents did not seem to feel directly threatened by the risks they identified: the risk was only perceived for others. Is this a way of masking one's own fears or a way of coping with these fears? Is it perhaps due to a lack of appropriate communication? Can it also be linked to the fact that services are inviolable, meaning that the first person concerned does not directly see the changes to his or her workplace.

It is a quite common belief that the digitalization of the economy has been a great boon to the corporate, financial and administrative sectors by exponentially widening the number of services being offered to society, with the most common examples being in the healthcare sector and in the educational sector for the less privileged (Bhutani and

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Paliwal, 2015). One of the promises of the digital economy is providing an almost one-to-one connection between consumers and their brands. Hence, digital transformation is commonly seen as a means of radically lowering the social entry cost for accessing and generating knowledge, creating a real opportunity for the personal and collective development of people as stated in the Manifesto for Innovation in Europe (2018) (manifestoforinnovationineurope.org/manifesto-for-innovation-in-europe).

Based on the results of this study, we strongly believe that any process of digital transformation must include the perceived impact of individuals. We believe that a more individual-centered approach is crucial to promoting lowered social entry costs, generating knowledge and prosperity and preventing social exclusion through massive failure in digital transformation programs. The risk of social exclusion would not only affect those classes of people excluded due to their (technical, economic, social and/or cultural) inability to adapt to the technological change but also to all those people who did not properly anticipate the impact of this transformation and therefore did not adapt accordingly due to a lack of appropriate corporate and institutional communication.

Digitalization will definitely offer new kinds of jobs that will replace older jobs. However, these new categories of work will probably be very polarized into high-end jobs (e.g. data analysts, data miners, data architects, etc.) and low-end jobs in the digital field (encoders, computer platforms, etc.). At the same time, different forms of collaborative economies will also transform organizational structures themselves. Thus, the digitalization of service processes will certainly not lead to negative outcomes alone. Nonetheless, we believe that too much of the literature has focused on the bright side of digitalization.

We intend to develop this research by pursuing the following axes. First, it is important to continue collecting data on this topic regularly in order to conduct a longitudinal analysis. In this regard, a new series of interviews (approximately 80) were conducted in spring 2018, one year after the first data collection in the spring of 2017. Second, further research should be conducted in order to measure the emotional reaction to human risk within a company employing digitalization tools. Third, research results should be disseminated in order to encourage new types of managerial controls to prevent and correct damage related to human risk by introducing early control mechanisms.

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