

The multi-dimensional space of the futures of work

Futures of
Work

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Abstract

Purpose – The authors present nine dimensions to provide structure for the many Futures of Work (FoW). This is done to advance a more sociotechnical and nuanced approach to the FoW, which is too-often articulated as singular and unidimensional. Futurists emphasize they do not predict the future, but rather, build a number of possible futures – in plural – often in the form of scenarios constructed based on key dimensions. Such scenarios help decision-makers consider alternative actions by providing structured frames for careful analyses. It is useful that the dimensions be dichotomous. Here, the authors focus specifically on the futures of knowledge work.

Design/methodology/approach – Building from a sustained review of the FoW literature, from a variety of disciplines, this study derives the nine dimensions.

Findings – The nine FoW dimensions are: Locus of Place, Locus of Decision-making, Structure of Work, Technologies' Roles, Work–Life, Worker Expectations, Leadership Model, Firm's Value Creation and Labor Market Structure. Use of the dimensions is illustrated by constructing sample scenarios.

Originality/value – While FoW is multi-dimensional, most FoW writing has focused on one or two dimensions, often highlighting positive or negative possibilities. Empirical papers, by their nature, are focused on just one dimension that is supported by data. However, future-oriented policy reports tend to be more often multi-faceted analyses and serve here as the model for what we present.

Keywords Knowledge workers, Case study, Exploratory framework, Societal, Theoretical perspective, Marketplace

Paper type Research paper

Introduction

The great British science fiction writer and Futurist Aldous Huxley was asked in 1950 to look forward 50 years to the year 2000:

[. . .] More and more factories and offices will be relocated in small country communities, where life is cheaper, pleasanter and more genuinely human than in those breeding-grounds of mass neurosis, the great metropolitan centers of today. Decentralization may help to check that March toward the asylum, which is a threat to our civilization hardly less grave than that of erosion and A-bomb. (Redbook, 1950).

Getting it right about the Future of Work was never accurate, even for an insightful Futurist. Therefore, in this article, we present nine dimensions to be used in framing scenarios on the many possible Futures of Work (FoW). Since Huxley opined in 1950, writing about the FoW has grown dramatically: more than eight times the number of papers on FoW published between 2014 and 2019 compared to the period of 1959–1999 (Granter, 2008; Santana and Cobo, 2020).

However, and despite its popularity – or perhaps because of this attention – much of the writing on FoW is often rhetorically expansive and vague [1]. We further note that, despite this lack of conceptual precision, scholars in Information Systems (IS) have authored a steady stream

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of thoughtful contributions to the discourse regarding possible FoW. This scholarship has, however, tended to frame these futures along a particular technological arc such as information, knowledge work, networked systems or artificial intelligence (AI), or the importance of design (e.g. Zuboff, 1988; Burstein and Linger, 2003; Malone, 2004; Coombs, 2020; Pee *et al.*, 2021) [2].

Here we go beyond viewing the FoW along any single technological arc. Our interest is to consider possible FoW that account for differences in how this work might be structured, variations in the roles digital technologies might play, and to consider the different contexts in which this work might be pursued. To do this, we build from the methodological assumptions and structured approaches that form the scholarly basis of “Futures Studies” (e.g. Bell, 1997; Swanson, 2019; Chermack *et al.*, 2001; Schmidt, 2017; Glenn and Gordon, 2009).

Knowing there will be multiple futures, and that any one scenario about the future is unlikely, Futurists pursue an analytic approach of developing multiple possible future scenarios based on dimensions expected to shape these futures (e.g. Bell, 1997; Chermack *et al.*, 2001). Advancing a set of justified dimensions and using these to develop plausible scenarios about multiple futures provides a more useful way of exploring our futures than does the more common, rhetorically positioned, issue advocacy that leads to, for example, statements about robots taking away jobs or that virtual work will lead to the end of cities (Mishel and Bivens, 2017; Batty, 2018).

Building on the Futurist’s perspective and drawing on Futurist approaches, we advance the multi-dimensional space to connect IS scholars in making fruitful connections between the empirically based and single-issue theorizing of IS (e.g. Pee *et al.*, 2021; Wang *et al.*, 2020) and the conceptually driven and scenario-based framing of Futurists and their approaches (e.g. Cottey, 2019; Digital Futures Society, 2019).

In advancing a structured framing to the FoW, we make no predictions. However, we can explicitly build from emerging trends, and the work of others, to provide structured insight to consider multiple and plausible FoW, such as that done by the World Economic Forum (2018, 2020). Our approach contributes to IS scholarship in two ways. First, we advance a futurist’s perspective, using techniques honed in over 50 years of scholarship in this area (Glenn and Gordon, 2009; Bell, 1997). Futurists look differently at a domain, highlighting dimensions and trajectories that serve to frame possible futures (Swanson, 2019). As explained below, in doing so, futurists make different sorts of assumptions than do IS scholars. Importantly, futurists explicitly consider multiple future scenarios to challenge biases toward a desired future or against considering possible undesired futures (e.g. Schmidt, 2017).

The second contribution is an explicit effort to broaden from the current technologically centered focus to a more comprehensive set of dimensions. These dimensions include not only technological drivers but also the changing nature of organizing for work and the changing arrangements of the larger working context. This more explicit, broader and structured approach differs from the IS scholarship that builds on careful empirical and conceptual effort to advocate for a particular conceptual or technological insight (e.g. Baird and Maruping, 2021; Fügener *et al.*, 2019; Zammuto *et al.*, 2007). These works, and that of others, typically advance a single-themed future, such as primarily utopian perspectives of AI. This technological myopia is not new to IS, as Kling (1994) noted (see also Kling *et al.*, 2005; Orlikowski and Iacono, 2001).

The multi-dimensional FoW space considered in this article is limited to *knowledge work*, which demands cognitive engagement, expertise and the mastery of a body of knowledge (Drucker, 1992; Kleinman and Vallas, 2001). Knowledge work relies on abstractions, is often deeply enmeshed in digital systems and computer-mediated interactions and is typically done collaboratively. For emphasis, the boundaries of FoW in this article do not include, for example, truck drivers, farmers, soldiers and supermarket cashiers.

This article is developed in five sections. In the next, we advance our approach for how to consider the future, drawing on methods developed by Futurists and scholars involved in the broad intellectual space of Future Studies. In the third section, we identify themes from relevant

FoW literature. In the article's fourth section, the core contribution of this article, we present the nine dichotomous dimensions. The last section illustrates and validates these dimensions.

Structured thinking about the future

Future Studies developed in the decades following Second World War during the “cold war” in response to changes in the world (Bell, 1997). At least three efforts helped propel the interest in Future Studies beginning in the 1950s. First, there was a need to understand the geopolitical terrain in a world in which global powers can target each other from afar. In the US, much of this Futures Study came out of the Rand Corporation, a government-focused think tank. The second reason for the rise in Future Studies were efforts by large corporations, with 1960s Shell Oil at the forefront, to prepare themselves for the future (see Shell, 2013). Finally, the rise of powerful computer systems allowed thinkers to develop numerical forecasts and simulations that were previously impossible. A computer forecast by the Club of Rome, gained considerable public attention in its seminal first report, “The Limits to Growth” (Meadows *et al.*, 1972).

It became clear to both organizational and political leaders that these changes demanded a new set of analytic approaches. In response, Future Studies [3] and Futurist approaches were premised on the value of developing structured means to consider possible futures, extending from present arrangements to consider alternative paths to different future arrangements. Futurist methods are a mix of qualitative and quantitative approaches (Schwartz, 1991). For example, reliance on trends can be both quantitative, by building a predictive regression model, or qualitative, by interpreting multiple trend lines creatively into the future. Future Studies are also characterized by attention to the synthesis of multiple forces, with the goal of articulating plausible or possible future arrangements across a range of factors or dimensions. This means that Futurist approaches combine the empiricist's knowledge of the present, the analyst's discipline of building from what is known, and, the innovator's willingness to build from circumstantial evidence (e.g. Alexander, 2019).

Within Futurist approaches the scenarios method is one of the most common (World Economic Forum, 2020; Powers, 2019; Chermack *et al.*, 2001). Alexander (2019) writes that a scenario is a work of creative fiction: it is a story of facts. “Generally, we create scenarios by starting with some part of the present, such as a geographical area or organizational type, then imagine how it would change under the impact of one or several trends They are narratives, clearly more art than science.” (Alexander, 2019, p. 20). Why use scenarios? “(B)ecause humans are narrative creatures, stories can be powerful.” That is, scenarios give us a window into possibilities. At their best, scenarios allow adversaries to interact creatively in a safe space, such as with the 1991 Mont Fleur Scenarios, which helped South Africa move past apartheid (Galer, 2004).

Rhisiart *et al.* (2017 p. 204) see scenario generation as a policy support tool, noting:

Conceptions of the future structure the decision-making processes of the present. The way in which we use the future has a major influence on the possibilities and options that are revealed to us, both inside and outside government.

Seen this way, scenario building is a reaction to the weaknesses inherent in “static” models, particularly where organizations have a “pre-commitment” to a course of action. Johnston (2012) articulates three goals of why scenarios are useful: informing – providing inputs – both conceptual and empirical to inform decision-making; enabling – developing the capacity to deal with uncertainty; and influencing – shaping policy and other outputs.

The goal of developing future scenarios is to create plausible – but not necessarily probable – futures that allow for planning and analysis (Wilkinson and Kupers, 2013). And, the dimensions used to structure these scenarios serve as the framing for the planning and analysis. As we detail below, scenarios about possible futures are useful to the extent they build from useful structuring dimensions. These scenarios are developed to guide additional theorizing and to orient scholars, designers and policymakers to consider possibilities.

As such, these scenarios are more evocative than specific and detailed, used to generate discussion and to provide a structured framework from which to consider consequences, effects and implications of plausible futures.

Futures scenarios should build from a structure of current “knowns,” drawing on characteristics to be used to shape possibilities: creating dimensions for consideration. For example, many current FoW discussions emphasize powerful changes in digital technologies such as AI and automation of tasks (e.g. [World Economic Forum, 2018](#)).

One mechanism the Futurist employs is to frame complexity relative to a smaller number of dimensions, then using these dimensions to emphasize differences. This is done by attending to the ends of a continuum or maximizing the differences in a dyadic relation. This simplification serves both to articulate and magnify the ways in which possible futures might be characterized. For example, using Dimension #1 introduced further below, the end points of place are either compressed/co-located or virtual/far apart.

[Wilkinson \(1995\)](#) calls these dimensions “uncertainties” and writes that when examining an issue (an issue in our case being the FoW), “. . . at first, all uncertainties seem unique. But by stepping back, we can reduce bundles of uncertainties that have some commonality to a single spectrum, *an axis of uncertainty*. If we can simplify our entire list of related uncertainties into two orthogonal axes” then, use those two axes and build a 2×2 matrix with four very different, but plausible, quadrants of uncertainty. Then, [Wilkinson \(1995\)](#) notes “Each of these far corners is, in essence, a logical future that we can explore.”

Some Futurists, especially those who examine societal issues, develop at least one scenario that is the “desirable” future or the “preferred” future ([Milojević and Inayatullah, 2015](#)). The desired future often comes out of creative steps in the futuring process that combine foresight techniques, such as scenarios, with user-centered design techniques. In this article, we use a bit of these inventive flourishes in constructing the scenario narrative examples further below.

The target time-horizon of Futurists’ FoW exercise is typically 10 to 20 years from the present ([Swanson, 2019](#)). Ten years is far enough in the future that quantitative predictive methods are less helpful (with some important exceptions, such as population and, separately, climate change), while events beyond 20 years increase the range of uncertainty.

Finally, we note that Futurists typically write for a specific policymaking audience or in response to specific guidance from a funder or client (e.g. [World Economic Forum, 2018](#)). In contrast, this approach is guided by a desire to advance FoW scholarship. To do this we draw on Futures methods to guide our theorizing on multiple FoW (e.g. [Bell, 1997](#); [Chermack et al., 2001](#); [Alexander, 2019](#); [Rhisiart et al., 2017](#); [Glenn and Gordon, 2009](#)).

Writings on the futures of work

Given the changes to work, writings about FoW have been increasing across the last 50 years (e.g. [Balliester and Elsheimi, 2018](#); [Santana and Cobo, 2020](#); [Boyd and Huettinger, 2019](#)). Some of the most visible changes to work include automation, more open and global labor markets, demographic shifts in workforce participation and urbanization (e.g. [World Economic Forum, 2018](#); [McKinsey Institute, 2018, 2020](#)). Many of these forces were mentioned in the much-cited study by [Frey and Osborne \(2017\)](#) in their analysis of what jobs were likely to disappear (the first version of which was published in 2013 and has become something of a core reading for scholars of work and labor).

More broadly, academic writing on the FoW can be reasonably sorted into three streams of scholarship, outlined below, that we label here as (1) highlighting reshaped working arrangements, (2) making technological change arguments and (3) advancing plausible future scenarios. We further note these streams intersect. For example, [Rhisiart et al. \(2017\)](#) develop multiple scenarios (stream 3) to highlight different forms of working arrangements (stream 1). We draw on literature from all three streams, explicitly foregrounding the structured futurizing as that is the approach we are taking.

The stream of scholarship focuses on reshaped working arrangements and can be further split between dystopian and market-advocacy perspectives. The dystopian perspective can be found in labor studies and sociology (e.g. [Cottey, 2019](#); [Crowley et al., 2010](#)). This sub-stream focuses attention to the many ways in which work is being restructured at the expense of worker's security and dignity (e.g. [Gershon, 2011](#); [Meda, 2019](#); [Kalleberg, 2008](#); [Gratton, 2010](#)). Several IS scholars have also drawn from and contributed to this stream of scholarship (e.g. [Schultze et al., 2018](#); [Lee et al., 2020](#)).

The market-advocacy perspective focuses on the importance of workforce flexibility. This perspective combines an advocacy for open labor markets with enthusiasm for allowing workers full responsibility for their training and career development (e.g. [McKinsey Global Institute, 2020](#)). Other work from this perspective highlights innovations that are seen as redefining work (e.g. [Digital Future Society, 2019](#)). There are a number of IS scholars who have contributed insights to this stream (e.g. [Rockart et al., 1982](#); [Malone, 2004](#); [Adler, 1992](#); [Coombs, 2020](#)).

The second FoW scholarship stream is that which advances technology-driven change (e.g. [Christensen, 2015](#); [Bower and Christensen, 1995](#)). The IS literature contributes to this stream. Indeed, the arc of IS scholarship is one of careful attention to the possibilities of emerging technological opportunities (and the issues these present). The current attention to the possibilities of AI is the latest example of careful efforts to theorize from a particular contemporary technology to a broader conceptual understanding (e.g. [Baird and Maruping, 2021](#)). As such, the scholarship in this stream tends to emphasize the attributes of a particular technology relative to one imagined (or preferred) future (e.g. [Pee et al., 2021](#)).

The third FoW scholarship stream focuses on developing structured views of the future that rely on scenarios (see [Boyd and Huettinger, 2019](#); [Rhisiart et al., 2017](#)). This work tends to appear in Future Studies venues and in policy-oriented writings [e.g. for consultancies and think tanks (e.g. [Bolles, 2020](#); [McKinsey, 2018](#); [World Economic Forum, 2018](#))].

This scholarship often relies explicitly on Futurist methods and specific scenario development to help guide policymakers and business leaders, building from extensive syntheses of available data and published work (e.g. [Meadows et al., 1972](#); [Schwarz, 1991](#)). The scholarship in this stream is routinely reviewed and synthesized in summary works, as doing so provided important insight on the efficacy and value of the existing future scenarios and the conceptual premises on which they are based (e.g. [Balliester and Elsheikhi, 2018](#)). For example, the [World Economic Forum \(2018\)](#), reporting on the "Eight Futures of Work," takes an approach that is similar to that which we use in this article: to choose the most meaningful dimensions, which they termed the "most impactful and most uncertain variables." In a very real way, these routine and careful analytic summaries of scenario-building serve as the basis for generating new scenarios – which is what we do, below. The scholarship that explicitly relies on Futurist perspectives has the least overlap with IS scholars (with the work of IS scholar [Hovav \(2014\)](#), [Gray and Hovav \(2007\)](#) a notable exception as they draw explicitly on the structured scenario developments to explore possible future arrangements).

Developing the FoW dimensions

In developing the nine dimensions to structure FoW scenarios, we committed to a broad review of existing literature. Our focus in doing so was to the futures of knowledge work, as noted above. This meant that interesting economic themes such as income distribution and locus of (oligopolistic) market power were not included (see [Balliester and Elsheikhi, 2018](#)). Other dimensions such as sustainability were not included because they are not directly about work, even as they are important dimensions of our futures (see [Santana and Cono, 2020](#)).

Writing on the FoW can be found in the literature of multiple scholarly and professional communities. For this article, we began by drawing on the existing studies on FoW

scholarship, looking at both the management and futures literature. Then, we explored IS scholarship (and computing, more broadly) and labor studies. We also looked at the writings of consultancies, think-tanks and non-governmental organizations like the International Labor Organization, the OECD and others, as detailed below.

Two comprehensive literature reviews undergird this article. The first is the International Labor Organization's FoW study (Balliester and Elsheikhi, 2018) of 255 articles. The second is a study by Santana and Cobo (2020) that included 2,286 articles about work futures [4]. The two complement each other in that the ILO compilation looks at FoW from a labor economics perspective, while the Santana and Cobo study leans heavily on management scholarship in its exhaustive review.

In parallel, we drew from the Future Studies literature (see list in Appendix), specifically focusing on 16 papers that explored FoW. From these 16 FoW-oriented papers, we identified a set of themes or possible dimensions. Many of the themes overlapped with the literature reviews mentioned above and this strengthened the choices made. Finally, we added one FoW dimension building from our own work. We do this because we saw, as Futurists focused on creating the scaffolding for scenarios, that there is a gap in our collective thinking about FoW.

The nine dimensions are summarized in Table 1 and described below. The dimensions are organized into three groupings that we label "technologically driven," "organizing work" and "working context" (see also Rhisiart *et al.*, 2017). In constructing the nine dimensions, we deliberately forced dichotomies in order to facilitate the creation of scenarios. As noted, scenarios are often deliberately created as dyads. Furthermore, within the pairings, we deliberately position the more "desirable" variable first, in the primary spot, within each pair, for ease of comprehension.

The nine dimensions to frame the futures of work

The nine dimensions summarized in Table 1 and discussed below serve to frame the possible future of knowledge work. As such, they serve as axes of uncertainty, a means of organizing concepts when future impacts are unclear (McGrath *et al.*, 1982). The dimensions' descriptions include pointers to relevant sources, a discussion of the dichotomies, and some discussion of the dimensions' second-order consequences. Second-order consequences are an important futurist analysis tool, sometimes labeled as "future wheel." If this happens, what happens next (Glenn and Gordon, 2009). The second order (and third order) consequences often interact with one another.

Dimension #1: locus of place: virtuality versus compressed

This dimension focuses on the nature of working arrangements, contrasting the traditional face-to-face work with its informal engagement, versus distanced work (Rhisiart *et al.*, 2017; Boyd and Huettinger, 2019; Lee and Sawyer, 2010). Santana and Cobo (2020) cluster this theme under the label "telework." Writing from before the Internet's emergence, futurist Toffler (1980) ruminated about the *electronic cottage*. Morelli (1999) writes from early in the Internet era that "The utopian view about the diffusion of telework presupposes a shift from the traditional organization of work, based on concentration of infrastructure and hierarchical organization, to a condition of work based on individual home-based businesses."

This dimension is critical to the future because knowledge work can be disconnected from specific physical spaces but remains collaborative. So, colocation is more about exchange than access to scarce resources or heavy machinery. This is one of the reasons for the second-order consequence reflected in the rise of open offices, cubicle farms and coworking spaces (DeMarco and Lister, 1977; Pratt, 2016; Morisson, 2019).

			Futures of Work
	Dimension	Sources	
Technologically driven	1. <i>Locus of place</i> : Virtuality versus Compressed	Santana and Cobo (2020) Balliester and Elsheikhi (2018) Futurist literature (as noted)	
	2. <i>Locus of decision-making</i> : Human-centered versus algorithmic	Santana and Cobo (2020) Balliester and Elsheikhi (2018) Futurist literature (as noted)	
	3. <i>Structure of work</i> : Holistic versus atomistic	Santana and Cobo (2020) Balliester and Elsheikhi (2018) Futurist literature (as noted)	
	4. <i>Technologies' role</i> : Enhancing versus substituting	Santana and Cobo (2020) Balliester and Elsheikhi (2018) Futurist literature (as noted)	
Organizing work	5. <i>Work–Life</i> : Balance versus rat race	Santana and Cobo (2020) Balliester and Elsheikhi (2018) Futurist literature (as noted)	
	6. <i>Worker expectations</i> : Übermensch versus nihilists	Authors' contribution Santana and Cobo (2020)	
	7. <i>Leadership model</i> : Democratic versus autocratic	Futurist literature (as noted)	
Working context	8. <i>Firm's value creation</i> : Stakeholders versus shareholders	Santana and Cobo (2020) Balliester and Elsheikhi (2018)	
	9. <i>Labor market structure</i> : Social safety net versus free market	Santana and Cobo (2020) Balliester and Elsheikhi (2018) Futurist literature (as noted)	

Table 1.
The nine dimensions to frame the FoW

Another second-order consequence is the impact on cities and the contradictory mega-trend of population migration into dense super-cities and concerns with commuting and crowding (World Bank, 2018; Batty, 2018; Miele *et al.*, 2017). Even as remote technology improves, interdependence among knowledge workers encourages constant informal interaction. Worker flexibility and worker mobility are second-order effects mentioned by both Santana and Cobo (2020) and Balliester and Elsheikhi (2018), who note that those who work from home value this possibility even as they tend to work longer hours.

A third consequence tied to this dimension is the locus of production. That is, the future must consider the implication of long, and often global, supply chains relative to local production efforts (which often imply smaller firms) closer to home (e.g. Williams, 2008; Inayatullah, 2006). These Futurists note that when supply chains are shorter, work is often more holistic. Going into the future, will the renewed emphasis on local engagement continue, or will the push toward global engagement drive attention away from the local?

Dimension #2: locus of decision-making: human-centered versus algorithmic

This dimension emphasizes the locus of decision-making or control, drawing forth current discourses on AI and algorithmic management (see [Boyd and Huettinger, 2019](#); [Cottey, 2019](#); [Jarrahi, 2018](#)). Workers and managers and leaders can combine experience and intuition to guide their decision-making. Human-centered decision-making may lead to not only mistakes but also leaps of greatness. Yet it seems a small step of ifs and thens to see experience as data, intuition as some sort of advanced pattern-matching heuristic, and that a tuned algorithm, driven by machine learning that draws on even more data, could be even more powerful, perhaps more rational and maybe more efficient.

Both [Santana and Cobo \(2020\)](#) and [Balliester and Elsheikhi \(2018\)](#) mention AI in their comprehensive summaries of FoW dimensions. Given the rapidly advancing technological capacities of machine-learning and AI, we position the locus of decision-making as a core dimension of the FoW. There is evidence that contemporary society is growing comfortable with guidance based on AI: we lean on systems for driving directions, music playlists and decisions about which food to eat. Algorithmic decision-making is embedded in fraud detection, loan-making and increasingly in hiring decisions.

The second-order consequences become quite interesting. These include broad-scale and often valid worries of dehumanization (reducing people to fungible entities), issues with surveillance and the lack of “algorithmic transparency:” the ability to understand what data are being used and the ways in which these data shape a decision or output (e.g. [Murphy, 2017](#); [Rader et al., 2018](#)).

Dimension #3: structure of work: holistic versus atomistic

This dimension focuses attention to the structuring of work, embodying the tensions between defined and task-centered work structures and more open-ended and interdependent approaches ([Santana and Cobo, 2020](#); [Balliester and Elsheikhi, 2018](#); [Digital Future Society, 2019](#); [Vallas and Schor, 2020](#)). This tension is a familiar theme for both Futurists and FoW scholars, beginning with mass production and Taylorism, and more recently elements of this tension have been termed Post-Fordist and Post-Bureaucratic ([Williams, 2008](#)).

Atomization has two components: the structure of the task and the contractual relationship of the worker with the employer. Traditionally, the latter dimension – the contract – has received more attention. These fluid work arrangements are part-time, zero-hour and outcomes-oriented, flexible, temporary, freelance jobs, usually enabled by a technology platform. From Tayloristic factories to today’s gig economy, this structure is not new, it just looks different today. The percentage of workers in atomized contracts has been relatively constant at 10–15% of the economy in both the USA and UK ([Steward, 2020](#)). [Wilkinson \(2016\)](#) takes this concept a step further, anticipating more solo, independent workers that are in a “technologically-enabled era of self-generated work.” That is, these workers are expected to be innovators: they are doing holistic work, not expecting contractual relationships and full clarity.

Increasingly, however, attention is being focused on atomizing tasks, not on the factory assembly line of Taylor factories, but in computer-enabled tasks. For example, software construction tasks can be decomposed and parsed to each individual designer, coder, tester and UI designer. At the extreme are the tasks of several minutes on Amazon’s Mechanical Turk, gracefully detailed by [Gray and Suri \(2019\)](#).

Atomization has contentious second-order consequences of benefits and costs. It benefits workers and employers by making work more adaptable. Some workers benefit from increased flexible lifestyles. Conversely, atomization may degrade humans by making them anonymous cogs in a machine – ghosts that are expandable with any change in the employer’s condition. Another second-order consequence is the inherent contradiction

between specialization and the need for collaboration. That is, work is atomized because of the increased need for expertise, yet collaboration and teamwork are increasingly important because the scale and complexity of work requires multiple experts.

Dimension #4: technologies' role: enhancing versus substituting

The classic framing for the role of technology has been as a labor versus capital decision (Brynjolfsson and McAfee, 2014; Davenport and Kirby, 2015; Willcocks, 2020). Indeed, both Santana and Cobo (2020) and Balliester and Elsheikhi (2018) see this as a major dimension under labels such as job destruction, susceptibility to automation and technology-driven joblessness. The concern that technology/automation will substitute for human work accelerated after 2010 as AI improved substantially (World Economic Forum, 2020). All this implies that there is a trade-off of technology and employment, leaving decision-makers to find the balance between these choices (be they profit or policy outcomes). The debate about job substitution (via robots) continues at this writing (Seamans, 2021).

In contrast to binary framing, much of the investment in new technologies is oriented toward systems and arrangements that augment or collaborate with human workers and thus, potentially, enhance work (Grønsund and Aanestad, 2020). This ranges from the uses of digital technologies to “informate” workers, as noted by Zuboff (1988), to the contemporary rise of AI-enabled smart speakers, chat-bots and other forms of human/machine teaming and collaboration (see Choi *et al.*, 2016; Mishens and Bivens, 2017). Workers interacting with chat-bots are a gentle form of enhancements, showcasing both the possibilities and the complexities of such work (e.g. Ciechanowski *et al.*, 2019).

Dimension #5: work–life: balance versus rat race

This dimension focuses attention to the worker’s mental model of work and personal needs. A future well-balanced between work demands and life stands in contrast to a future where there is a constant scramble to attend work, where deliverables, interactions and responsibilities span the entire day, leaving family and life to fit in and around the small bits of time when one is not working. This “rat race” is a future filled with a time-consuming, unsatisfying job that one is stuck in to pay the expenses of family.

More broadly, in the academic literature, the work–life construct is often coupled with job satisfaction (Santana and Cobo, 2020) or job quality (Balliester and Elsheikhi, 2018) – and is familiar from the popular press through terms such as burnout and work–life balance. Other sub-themes that are linked to these are (Santana and Cobo, 2020): work–life conflicts, stress, overtime work, flexible work hours, overtime, relentless connection to work, family time, improved coordination, interruptions, and feeding knowledge workers’ personal compulsions. While knowledge workers have often been burdened with long workdays at the office (e.g. the Japanese “salaryman” of the 1970s), technologies have been blurring time and availability boundaries between work and non-work, accentuated by the norms that came out of the pandemic.

Santana and Cobo (2020) indicate that this is a relatively young theme in the FoW literature. Indeed, Granter (2008), in a survey of the history of the FoW, argued that “the end of work” that writers have been discussing since well before IT has made the disappearance of work comprehensible. In the 1950s, he writes, there was already concern that too much leisure was not a good thing for society, and that many people saw work – not leisure – as providing for purpose in their lives.

This work–life dichotomy is presented by Khallash and Kruse (2012) who contrast two views. First, that work–life balance is an essential cornerstone in the lives of employees, forming a close tie between employees and employers. And in the opposite scenario, “work-life

balance is not important for the majority of employees struggling to hold on to their jobs and hence is only available to the most privileged workers.”

[Sarker et al. \(2012\)](#) highlight an important second order consequence: “. . . sustained lack of work-life balance or work-life conflict arising from temporal servitude (being on call all the time) can, over time, affect workers’ health, psychological well-being, commitment and productivity.”

Dimension #6: worker expectations: übermensch versus nihilists

We present this dimension, drawing from our own scanning of futures issues. FoW discussions often assume that workers are smart and gifted participants, eager to work hard and draw on their breadth of insight. [Appelbaum \(1992\)](#) examines this assumption about FoW – that we assume in our culture a “work ethic” – that work is a moral duty; that it is imperative to work industriously. Do the imagined futures require workers to aspire to higher goals and values? Are future workers expected to be what Nietzsche articulated as “Übermensch?” That is, are workers of the future expected to be superior persons, able to rise above baseness and craven interests to pursue higher goals and purity?

The quest for meaningfulness in life and in work seems eternal: from Plato’s views on the soul (as discussed in his *Phaedos*, per [Claus, 1981](#)) to death camp survivor [Frankl \(1946\)](#) in his “Man’s Search for Meaning.” Scholars and philosophers aspire that our work be meaningful. Going even further, the French philosopher Simone Weil aspired for us not just work, but hard work, as a moral calling. Work that is at the highest spiritual meaning – a metaphysical experience. [Granter \(2008\)](#) wrote about the 1950s in which rising automation led to concern with too much leisure leading people to have a lack of purpose.

One argument about meaningfulness is that current workers are simply repressed Übermenschers. In a better future, if the nasty boss, odd job roles, or cruel economic system, are removed, then their true colors, their Übermenschian selves, will be able to surface.

It is not clear the evidence bears out these beliefs. The dichotomy of the meaning of work is intertwined with the underlying assumption that work helps define who we are, versus something we need to do in order to have the money to do what we want. To this point, a classic American saying is that no one has ever gone to their deathbed wishing they had spent one more day at work.

In the face of Übermensch’s high-performing aspirations, the management literature is full of approaches to motivate workers (e.g. [Hansen and Keltner, 2012](#)). [Kalleberg \(2008\)](#) calls this the mismatched worker noting that what workers are asked to do often differs from what workers seek to provide. Many gig workers prefer lower compensation for increased flexibility and fewer constraints on their lives (e.g. [Gray and Suri, 2019](#)). Still, many workers aspire to happiness rather than meaning. This is why we point to Nietzsche, for he was also critical of mass culture and of the emerging utilitarian stream that explains individuals’ purpose as attaining happiness. Perhaps nihilism is the better assumption rather than expecting Übermensch to be our future workers.

Dimension #7 leadership model: democratic versus autocratic

This dimension focuses attention to the expectations and actions of organizational leaders. [Santana and Cobo \(2020\)](#) highlight that differences in leadership approaches directly impact work. Indeed, leadership models are fundamental to understanding the way work is organized. And, there exists a large and growing body of literature on leadership styles and leadership models ([Goleman, 2000](#); [Anderson and Sun, 2017](#)). And, contemporary leadership models continue to evolve to reflect different forms of work, different working arrangements and different expectations of workers. Where once the autocratic/visionary leadership model was common, contemporary models, which we label Democratic in this dimension, could also

be other flexible leadership models, such as Servant, or Spiritual, or Coach or others ([Anderson and Sun, 2017](#)). Reducing all the leadership models to one dichotomous dimension cannot capture all the leadership nuances.

The dichotomy here is posited by the well-known Futurist [Inayatullah \(2006, p. 10\)](#). He posits the dichotomy thus:

Will organizations in the future still be run by the classical strong male leader (authoritative, sometimes authoritarian – my way is the only way, I am the hero) versus the facilitated situational leadership feminine (partnership, providing vision and direction, listening, bringing out the hero in others).

Inayatullah's desired future is clearly the latter.

One second-order consequence of the leadership model is the attention to training, human-resource development and worker selection ([Goleman, 2000](#)). This is because autocratic structures favor different kinds of workers than do collaborative models (e.g. [Anderson and Sun, 2017](#)).

Dimension #8 firm's value creation: stakeholder versus shareholder

This dimension is about how the firm sees itself. Does it create value for just its shareholders or for all its stakeholders? A stakeholder view sees the firm's overall responsibility with social and environmental layers: The stakeholders are anyone influenced by the firm's actions, such as workers, customers, suppliers, neighbors and government. In contrast, the shareholder view of the firm's value creation is that the firm should be concerned only with maximizing profit for its shareholders. The modern stakeholder dimension is presented by many researchers in corporate governance ([Freeman and Elms, 2018](#); [Marens and Wicks, 1999](#)). [Santana and Cobo \(2020\)](#) cluster it around the construct of corporate social responsibility, while in [Balliester and Elsheikhi \(2018\)](#), the concern is with a narrower notion of industrial relations. The well-known futurist [Inayatullah \(2006\)](#) does not dwell on this dichotomy, though he makes clear that his desired future is the first of the dichotomy.

While there have been calls for broader corporate responsibility going back decades, with [Drucker \(2001\)](#) noting in the early 1980s that corporations were social actors, who had social responsibilities and needed to address social problems, this thinking fell away, in the US, through decades of attention to shareholders over stakeholders. The evolution of this dimension was illustrated when the US-based Business Roundtable explicitly redefined by stating: "the Purpose of a Corporation is to Promote an Economy That Serves All Americans" ([Business Roundtable, 2019](#)) thus declaring the primacy of the stakeholders over shareholder and shifting the dominant American stance from one side of the dimension to the other.

Dimension #9: labor market structure: social safety net versus free market

This dimension focuses on the economic context of work, contrasting open, unfettered markets with arrangements centered on collective action. Both [Santana and Cobo \(2020\)](#) and [Balliester and Elsheikhi \(2018\)](#) note that many FoW studies emphasize job flexibility, worker protections, working conditions, social protection offered by firms and governments (e.g. healthcare), training and education, and retirement contributions.

The market premise is fundamental to principles of commerce and the structure of contemporary economies ([World Economic Forum, 2018](#)). In the unfettered market of neoliberal capitalism, the individual worker seeks work based on transactional arrangements: gigging for their life and livelihood ([Gershon, 2011](#)). In these markets, the firm seeks workers by posting for work, careful to make no promises beyond current needs. Both the firm and the worker act in their own best interests ([European Commission, 2006](#)). Neoliberal markets are flexible, on-demand, with minimal regulation.

The alternative to open markets is based on a societal system that provides for distributions of risks and costs. Laws, regulations and tax regimes provide for social benefits, unemployment, minimum wage and/or a Universal Basic Income (Piketty, 2014). Employment is seen as a primary right, and this reframes the relationship between worker and firm to be oriented toward security of employment. And, labor protections such as unions and employment laws reify these arrangements. To help employment stability, firms are also provided protection from market fluctuations through active state intervention (akin to the ways in which China supported its large international firms; Hsueh, 2016).

The structuring of labor markets leads to many second-order consequences: here we raise two. The first is the structure of worker/employer engagement and – more broadly – what will be the nature of labor relations? Balliester and Elsheikhi (2018) advance this as “social dialogue.” McKinsey Global Institute (2018, 2020) argues for pro-employee policies as a vehicle to suppress workers’ need for collective action and (or) governmental intervention.

Another second-order consequence will be the structuring of work (how one gets paid). That is, what will be part of the formal labor market or arrangement, and what will be outside. Informal work is pervasive, from (e.g. child-care and lending tools). To this, Williams (1999, 2006, 2008) argues that informal work and non-commodified work are both often devalued in the hierarchy of work. Likewise, Bateman (2019) argues that housework and sex work have not been counted as work, even as this becomes more visible in contemporary labor. What, then, will the FoW be for informal markets and labor arrangements?

Illustrating and validating the dimensions

In this section, we provide two examples of how these dimensions can be used to consider futures. In the first part of this section, we develop sample scenarios to illustrate the value of the dimensions and the resulting scenarios created from them. In the second part, we examine the dimensions’ veracity using the pandemic, answering the question: would the dimensions have surfaced the various – often conflicting – FoW outcomes that have played out in the pandemic?

Using the dimensions to develop sample scenarios

In this section, we take two of the dimensions and create a 2 × 2 matrix, resulting in four scenarios (see Table 2). This is typical for Futurist methods, though the selection of dimensions is most often driven by specific purposes such as attending policy-relevant possibilities or to explore strategic paths for organizations. That is, the Futurist approach is purposeful, and our purpose is to show how scenarios are constructed.

Futurists construct a creative narrative of each of the future scenarios that are framed by the two dimensions in use. One of the key components of that is to create an evocative label, and one that helps to convey the kind of future the scenario represents. In developing these

Table 2.
Future Scenarios;
Examples using
Dimensions #2 and #6

	Algorithmic decision-making	Human decision-making
Übermensch	<i>A world of poets</i> Now that AI/robots do much of the labor and decision making, humans have time to create and read poetry	<i>AI serves humanity</i> AI is carefully regulated and is intermediated by humans
Nihilism	<i>A world of homer simpsons</i> Now that AI/robots do much of the labor and decision making, humans have time to sit on the couch and watch cartoons	<i>Disney world happiness</i> Humans work hard to collect currency to travel to the magic kingdom

futures scenarios, the focus is on plausibility: can we imagine a future like this? Plausible futures allow us to explore and consider the current trends, carried forward in time, to better assess what it might take to encourage or alter such paths. Plausibility also means these futures have roots in sociotechnical processes and arrangements that are present today.

Scenarios are also designed to be generative: to invite those using them to develop these plausible spaces in more detail and consider implications and second-level consequences. Futurists see scenarios as offerings, evocative sketches of possibilities: illuminating arrangements and raising discussion. Seen this way, detailed futures are for science fiction writers (e.g. [Johnson, 2012](#)). Returning to their original function of strategic foresight, Futurists also make the case that any detailed scenario-writing should be specifically situated in specific settings (e.g. [Meadows et al., 1972](#)).

We expand on two of these scenarios below using a common foresight practice: creating pithy, evocative and scenarios to carry the core point (e.g. [Schwartz, 1991](#); [Wilkinson, 1995](#)). The writing of these narratives is disciplined creative work and educated fiction. The scenarios introduce plausible futures that are both empirically and conceptually rooted in the present. We expand these narratives here as a proof-of-concept and not for any other use. In and of themselves these narratives are cartoonish since they are extremes but for policymakers they accelerate thinking.

AI serves Humanity: AI is heavily regulated and is intermediated at important points by human decisions. Robots work alongside humans. The UN “Commission on the Future of the Human Species,” chaired by historian-futurist Noah Harari, proposed a regulatory framework for AI that was, surprisingly, passed with some adjustments, by the EU and the USA. Blackbox decision-making was, from that point forward, approved on a case-by- case basis. This means that so-called “algo work allocation” (AGA), such as Uber-like driver scheduling algorithms, are presented to commissions for consideration ahead of use.

A world of Homer Simpsons: First came years of rolling pandemic waves and stay-at-home orders, leading to massive adoption of AI/robots that do much of the labor and decision making. Thus, now, humans have time to sit on the couch and watch cartoons. The economy is growing, yet unemployment remains at 25%. Universal basic income allows many to skip work partially, or fully – and be entertained. They need less human interaction because of an emerging genre of social AI – a new class of agents and robots called Friendz. Friendz are more advanced forms of software agent Alexa and robot Pepper.

The essence of this scenario responds to the question posed by renowned Futurist Arthur C. Clark [\[5\]](#): Why should not humanity seek “full unemployment”? Or, as rephrased and simplified by [Keiper \(2016\)](#), there are two (extreme) narratives: (1) Techno-optimism. When technology (such as AI) allows us all to achieve self-actualization and (2) Techno-Dummies in which we all become couch potatoes like Homer Simpson. There is widespread assumption that the Homer Simpson future, driven by AI, will play out in a range of increasingly more intelligent machines, ever-more pervasive computing, and the rise of cognitive computing.

Examining the dimensions’ veracity using the pandemic

We write this article as the world flounders through the greatest global disruption of our lifetimes – the coronavirus disease (COVID-19) pandemic that began in 2020. Here, we examine the dimensions’ veracity using the pandemic, answering the question: would the dimensions have surfaced the various, often conflicting, FoW outcomes that have played out in the pandemic? This examination is loosely inspired by futurists’ backcasting method ([Glenn and Gordon, 2009](#)). The examination helps to demonstrate that the dimensions help surface the inherent instability of our collective futures thinking and the vital need to play with multiple futures – with strong dichotomous dimensions. Dimensions 1,5,2,3 are examined here in that order.

We begin with Dimension #1, Locus Of Place, and Dimension #5, Work–Life. We do so as these dimensions reflect a set of assumptions from before the pandemic that virtuality would see a gradual, linear increase. It is now clear that the massive global investment in high-speed networks and collaboration tools (e.g. Zoom) set the groundwork for accelerated move toward virtuality. Early in the pandemic, some, like [Kretchmer \(2020\)](#) argued that office design will lurch away from crowded open space for some years to come. Knowledge workers will not want to work in dense open-work settings due to fear of disease. Likewise, office kitchen spaces, once viewed as desirable “collision” places, are no longer desirable. More people will eat at their desk, fewer together. Traditional closed-door offices will be popular again, and partitions for cubicles will become much higher. Knowledge workers will likely work from home more often.

The pandemic fast-tracked the “Work From Home” thinking that rattled perceptions of Work–Life boundaries and stretched the dichotomy in interesting ways. On one hand “Work From Home” rid millions of knowledge workers of the dreaded commute and brought them closer to family. On the other hand, workers reported working more hours and feeling stressed because of lack of time boundaries. Firms and knowledge workers began to move out of crowded central business districts. However, just as soon as this first wave of thinking began to solidify about the future, a counter wave of “Back to the Office” began.

Not as abruptly as the above items, collective outlooks on Dimension #2 and #3 have also changed and oscillated as a result of the pandemic. Regarding Dimension #2, Locus Of Decision-Making: the pandemic restrictions accelerated technologies to replace humans. At the same time, there emerged a need for more humans to be involved in logistics as supply chains were damaged, requiring coordination and problem-solving in adapting to the new ways of working and to new and often unexpected issues (e.g. who knew toilet paper shortages would be a defining issue of contemporary supply chains?).

Dimension #3, the Structure of Work, was also accelerated by the pandemic. The directions of this change remain unclear – which is why, once again, it is important to have dichotomous dimensions. That is, the future could be one where knowledge work is primarily pursued through virtual means, allowing people to work and live at a distance. Or, the knowledge work of the future could be pursued through the tight-knit social worlds of constant informal interaction that blurs work and non-work time, highlighting urbanization and spatial compression. Or, it may be that this is a false dichotomy and the hybrid model will strengthen. Surveys such as [Gartner \(2020\)](#) found that quite quickly, workers desire to work remotely, at least part of the time after the pandemic.

More broadly, scholars will be investigating on the realities of the many changes coming to working contexts, working arrangements and technological opportunities. And, we intend to combine our futurist work with retrospective summaries of what is being reported. Huxley’s insights from the above make clear that such efforts deserve more of our attention.

Conclusions

We have advanced two contributions, the first being the nine dimensions framing the many FoW. Whether it be for future planning of a labor non-for-profit in Czechia, a consulting company in Japan, the Jobs and Small Business ministry in Canberra, or a FoW researcher in Chicago, we posit that the nine FoW dimensions, as detailed in [Table 1](#), are a useful starting point and a useful foundation for disciplined thinking about the FoW (see also [Rhisiart et al., 2017](#); [McKinsey Global Institute, 2018](#); [Cottey, 2019](#); [Boyd and Huettinger, 2019](#)). More pointedly, the FoW that we will be experiencing will reflect a reality bounded in large part by the nine dimensions advanced here.

Our second contribution is to advance the Futurist’s approach to disciplined thinking about the future, with the goal of advancing this discourse for IS scholars. And, the

scenarios in Table 2 can help us to envision plausible futures that reflect the trends we can see emerging but cannot yet fully understand. Futurists traffic in helping do this, as they emphasize that the future is a blending of the present with the new. For example, we use powerful new mobile devices, but many of us live in homes built before 1960, often with one power outlet per room. More broadly, the seeds of our future days are being sown: our work here serves to provide both a set of dimensions and a structured and analytic means to consider future days.

Notes

1. To this point, none of many scholarly writers that we cite in this article define the concept. In contrast, practice-based FoW research offer definitions: Gartner (2021) advances “how work will get done over the next decade, influenced by technological, generational and social shifts.” Deloitte (2021) articulates the FoW as “. . . AI in the workplace, and the expansion of the workforce to include both on- and off-balance-sheet talent.”
2. Indeed, this Journal was a leading venue for rethinking office arrangements as desktop technologies swept through 1980s offices (e.g. Gregory and Nussbaum, 1982; Coates, 1988).
3. This is also known as the discipline of Foresight, see <https://wfsf.org/about-us/futures-studies>. Some scholars call this foresight studies. And, the Future Studies methods are sometimes (too) broadly labeled as forecasting.
4. Looking at the 24 themes identified by Santana and Cobo (2020), some were blended into higher-level constructs, and some were excluded for our focus on knowledge work. Ultimately, selecting dimensions requires “judgement calls for style” (per McGrath *et al.*, 1982).
5. From an interview of Arthur C. Clarke conducted by Gene Youngblood on April 25, 1969, Los Angeles Free Press, Free Press Interview: A. C. Clarke author of “2001”, Start Page 42, Quote Page 43, Column 4 and 5, Los Angeles, California. Retrieved from Digital Independent Voices Collection at revealdigital.com on May 18, 2020.

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Appendix

Futures literature

Futures Studies is a multidisciplinary intellectual space whose boundaries overlap with other scholarly spaces like technology forecasting and policy studies. Here is a list of the core Futures scholarly journals:

- (1) Futures (publisher: Elsevier).
- (2) Technological Forecasting and Social Change (publisher: Elsevier).
- (3) Foresight (publisher: Emerald).
- (4) European Journal of Futures Research (publisher: Springer).
- (5) World Futures Studies Federation (publisher: World Futures Studies Federation).
- (6) World Futures Review (publisher: Sage).
- (7) Journal of Future Studies (publisher: TamKang Univ., Institute of Future Studies).
- (8) Journal of Futures and Foresight Science (publisher: Wiley).

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