Real-Time Management: When AI goes Fast & Flow

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Abstract: Real-time management of Artificial Intelligence (AI) becomes a central enabling function for coping with the rapid market changes and increasing demands of stakeholders. But diverse sensing of real time makes it tricky for enterprises to adjust business processes towards a real-time-based era and build the temporal conditions needed for deploying AI in a humanistic manner. This chapter therefore introduces the concept of Fast & Flow in an AI engagement context. Fast & Flow encompasses two ideas: one considers time as a monetary asset that helps to increase value; the second does not seek to control time and does not define it on the clock scale, rather, it describes the sense of presence. By introducing the components of Fast & Flow interaction we provide a cognitive psychology dimension to management of AI and explore the balancing of Fast & Flow in three possible AI scenarios. The first scenario is 'business as usual', but faster and more complex; the second scenario is more focused on consumers, and is based on an ideal combination of AI and Fast & Flow management; in the third scenario, there is an overflow of technology – AI is too fast and people are unable to control it. Finally, we are asking what Fast & Flow management can do for a humanistic deployment of AI in enterprises and societies.

1. Introduction

In a dynamic digitally intensive business environment, response time is critical (Gessner and Volonino, 2005). Enterprises have seen significant change with the introduction of Artificial Intelligence (AI) processing huge data loads and they are now facing the fourth industrial

revolution. AI can be defined as "*a system's ability to interpret external data correctly, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation*" (Kaplan and Haenlein, 2019, p. 17). An AI application usually consists of three related components, namely *digital artifacts* of a product or service (application, components, or content) such as Google Maps that provides value to the end-user (Kallinikos, Aaltonen, & Marton, 2013), *digital platform* providing complementary offerings or artifacts, such as time tables for public transportation in Google Maps, and *digital infrastructure* (communication, collaboration and/or computing tools such as cloud computing, data analytics, online communities, social media, etc.).

Schwab (2016), Founder and Executive Chairman of the World Economic Forum, describes this revolution as a large range of new digital technologies that are fusing the physical, digital, and biological worlds. More than ever, managers use real-time information to improve, production, and service processes (Bogner and Barr 2000), like algorithmic trading (Pigni, Piccoli, and Watson, 2016). This disruption is impacting most businesses, industries and economies, leading us towards the total integration through real-time driven platform eco-systems. Real time is thus a core phenomenon of enterprises deploying digital technologies such as AI.

Such real-time technologies are supplying markets with whole new types of services and experiences (Rodd, Verbruggen, & Krijgsman, 1992; Bobrow, 1993), which affects the tasks, the timing, continuity, and rhythms of the organization. Real-time data flows enable managers to quickly understand markets while shortening the decision-making time, for example detect who is playing what role in providing value to the customer and what is the way business will be done tomorrow (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013). AI performance in today's rapidly changing markets is in many cases all about answering the question, "How fast can we go?" But it is not a viable representation of AI performance, because it neglects the critical component of AI as a technology that is pushing enterprises towards faster cycles and shorter reaction times. Consequently, the human and organizational conditions and capabilities get under immense pressure (Reid & Ramarajan, 2016), while customers are demanding faster and better services and appreciating their

personal time highly. Obviously, such a development will be counter-productive in the long run causing people to suffer from stress and reduce their well-being.

Enterprises who are deploying AI with the sole purpose of performing faster ignores the fact that managers' perception of real-time impacts how they consider the pace and purpose of AI processes in operation and customer experience. Some managers describe the AI scenario as "business as usual", meaning that AI may bring more complexity, but doing the same things just faster. Others expect that AI will disrupt their industries and business practices, leading to a version of extreme customization and increasing focus on customer experience. A third scenario is the AI will distort intentions as well as practices and lead to an extreme form of dysfunctionality or arrythmia.

In the meanwhile, humans are being constantly confronted with more information than their sensory systems can effectively process (Morillon & Barbot, 2013), which leads to stress situations and poorer decision-making. In general, we risk with an unreflected application of AI that it will become increasingly harder for people to follow the complex and often arrhythmical paces of the fourth industrial revolution as humans do not change as fast as business practices. With this in mind, people remain skeptical regarding maintaining control and ensuring a human-centered quality of AI, so we therefore discuss in this chapter whether the Fast & Flow approach can reduce fear of control loss with AI of digital dystopia and whether Fast & Flow can be an approach that can help managers pose the right questions about AI-human engagement in time? Based on this discussion, we suggest key competencies for real-time management heading for AI deployment.

2. What do we know about real-time management?

As real time is in increasing demand from both the enterprise side and the customer side, it becomes pertinent for managers to know where to start with real-time management. As mentioned above, real time technologies, such as AI, are considered drivers of the fourth revolution. Increased digital platform ecosystem connectivity is leading to increased real-time interactions and transactions in multiple industries and creating a push and pull towards real-time structures in enterprises. The deployment of these disruptive technologies is leading to new business practices that enable managers to listen to the here-

and-now market rhythms and gain momentum of real-time insights. But an earlier study we did on real time reveals that managers do not all perceive real-time – or respond to it - in the same way. Rather, they employ different methods of learning, revising, and acquiring real-time based knowledge and skillsets (Rydén & El Sawy, 2019a).

That time or real time is not a uniquely defined concept was in fact confirmed, quantified and explained in 1905, by Albert Einstein, in his special theory of relativity. With elasticity of time, he showed that time is not a constant background tick. It is malleable, passing differently in different places, depending on how those places are moving with respect to one another. In a business context, managers' perceptions of real-time are influenced by product versus customer focus as well as push and pull demands. Customer focus is defined as *identifying customer needs and satisfying them in meeting the organization goals* (Kotler and Levy, 1969). A customer focus is broadly understood as the opposite of a product focus. Where product focus is an inside-out perspective, customer focus is an outside-in perspective. From the work assumption, we synthesize insights from both the product and customer orientation (see also Larivière et al., 2013) to posit that real-time management, besides efficient product and process operations also requires that companies respond appropriately to the customer pull for real-time products and services as *experienced and defined by the customer*. This means a perception of time differentiating from the production focus where time may be relative, and a cognitive phenomenon measured by the unique experience. In the cases when time is more than money (quality of life), real-time management becomes practice of conversation, context, and alignment of expectations.

Real-time management depends on the managers' interpretation of clock time
In 2015-16, we surveyed 1000+ managers in the US and interviewed managers in US and Denmark. The managers were asked about how they perceive real time. The results were published in California Management Review (Rydén & El Sawy, 2019a). We focused on how managers in the US and Europe cognitively relate to real-time in a business context to understand how managers make sense of real time and how the different real time understandings are anchored in their strategic orientation (product versus customer) of the functional areas, as well as their corporate culture and daily practices. We also wanted to

understand how managerial orientations influence the development of certain enterprise capabilities and value propositions of real-time technologies such as AI. From the findings we develop a theoretical framework of real time to guide companies in the process of how to wisely transition to Fast & Flow management.

This chapter thus rests on the conviction of time as a subjectively (i.e., an individual or social construct), meaning that there is a variety of understandings and behaviors regarding time. Real time is described as a concretization of present time[1], however, with the definition of 'present' as being more or less fixed. We began with in-depth interviews of managers, which gave us insights into individual managerial reasoning about time and real time across different contexts. From these insights, we could define relevant questions for the quantitative survey to explore, at a larger scale, the nuances of real-time management for theorizing, at the more general level, about real time perceptions. The study found a broad spectrum of definitions and perceptions among managers, ranging from those who considered it too fast to be measured, to others who quantified it as 'up to a day'. Managers who perceive time as fast are those who generate most profits. In other words, the faster, the better: enterprises are more profitable when they identify real time as under an hour, meaning that they leave scope for taking flexible actions.
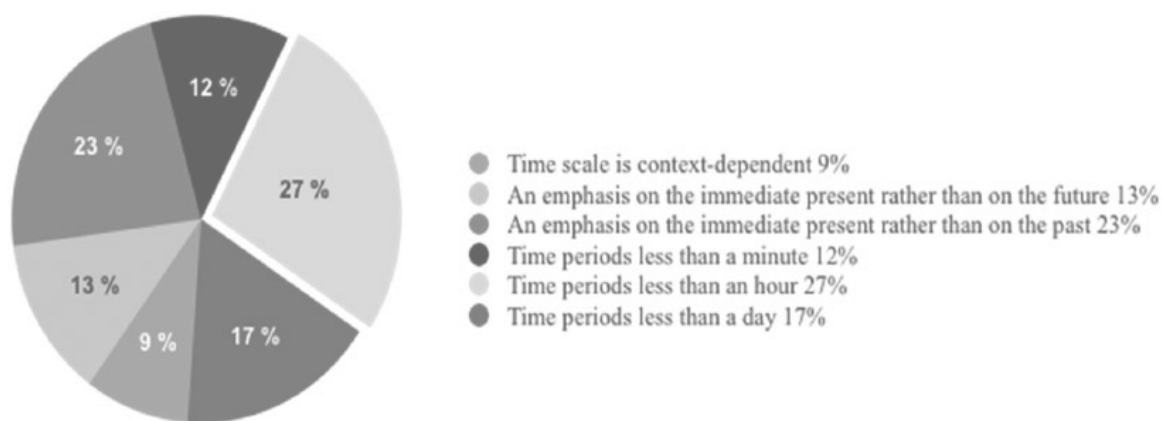

Figure 1: Managerial perceptions of real time (Rydén & El Sawy, 2019a)

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[1] Real-Time describes the actual time during which a process takes place, or an event occurs (dictionary.com).

Some of the managers surveyed took a critical approach and warned of the backsides of moving into a real-time era. Managers who are being too narrowly focused on real time creates a shorter time horizon of outlook for the enterprise and tend to pressure people to be moving at speed. An enterprise with real time focus biased as "fast" combined with speed-increasing technologies like AI, risk create a sense of urgency when it is not always needed, not to mention unnecessary and stress. Some of the managers also expressed a fear that humans have an upper limit on how fast they can deal with information, process information, and things can be done faster than humans can recognize. They expressed a risk of losing touch with our fundamental humanity under some circumstances.

These concerns add yet another dimension to the notion that speed kills in transformation: not only many project fatalities occur; also, humans are at hazard. These considerations are conceptualized in the Fast & Flow framework (Figure 2). It illustrates the real time perceptions (Utility time and Sense time) that are underpinning the Fast and Flow approach to real-time management and lists the underlying assumptions of the two perceptions.

Figure 2: The Fast & Flow Framework (Rydén & El Sawy, 2019a)

Utility time: According to the managers surveyed, real-time management is most directly realized through *faster* decision-making, execution, and problems/opportunities sensing,

improvisation, exploitation of the speed of digital platforms, response culture of the workforce, and human resources reorganization. The left side of the figure reflects this common definition of real time as being as fast as possible. The managers biased by this view, tend to associate real time technologies like AI with something that helps them to speed up business processes. Here, real time performance is associated as operational well-doing. Such managers may be more eager to increase speed to save time (resource) and money, assuming that enterprises can utilize time better and that performance can be measured in terms of time reduction, which also leads to the valuation of real time as fast. Digital platform businesses in particular tend to expect immediacy and control of time and consider minimizing time gaps as important management skills. They define time as a vital aspect for successful AI-driven platforms.

Interestingly, the developments in AI and big data may draw managers further towards a perception of real time as fast and open op for other kinds of temporality. For example, if the AI enables enterprises to anticipate value-creating factors prospectively, then the managers may envision a future-focused predictive approach to real time to drive technologies. For example, "predictive policing" is a concept describing the use of multiple sources of real time data in law enforcement. It allows the police to predict crimes in certain neighborhoods and thus prevent crimes by proactive efforts[2]. This example illustrates the immediacy of process-to-actuate, resulting in superior citizen service and fewer insurance claims because citizens are protected in time (Rydén & El Sawy, 2019b). Similar types of services can be offered by organizations being able to inform their customers at the right time (Pigni, Piccoli, & Watson, 2016).

Sense time: Some managers conceptualize real time as individual moments of private time, where they feel more present than usual. These moments are usually associated with well-being. The flow concept frames real time as a subjective and mindful experience where the person may be in a state of flow (Csikszentmihalyi, 2008). When real time is defined as flow, it can provide an alternative to being fast logic that makes the experience of a present moment more enjoyable. However, this does not mean that people have lost control.

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[2] https://theintercept.com/2018/05/11/predictive-policing-surveillance-los-angeles/

Reality is that all we can control matters here-and-now, not in the past, and not the future. In fact, managers with a perception of real time as flow may experience an even greater sense of control (Csikszentmihalyi, 2008), because positive experiences and pleasant activities enable the possibility of control rather than the actuality of control. For example, if a manager must adhere to goals and deadlines defined by others it may feel like a loss of control but keeping attention on the details of the present increases the manager's ability to assess what is really important at the moment and make better decisions (Rydén & El Sawy, 2019b).

Losing the sense of time and being present is sensed as a positive experience that increases well-being. Sometimes this sensation is enabled by real time-based technologies such as AI, Virtual Reality (VR) and Augmented Reality (AR) that allows professionals as well as customers to have subjective experiences. Through computer-generated scenarios of simulated realistic experiences pilots can learn to fly, patients can regain memories, and gamers can fight each other in parallel universes. Pokémon Go, Facebook, Google, Apple, Amazon, Microsoft, Sony, and Samsung all have dedicated AR and VR groups that work to apply these technologies in their products and services.

To summarize on the Fast & Flow phenomenon, the notion of real time and, hence, fast is relative as the study indicates and just going faster and faster is not always the best for the individual or the enterprise. First step is to discover that using fast—paced technologies such as AI can sometimes have longer-term disadvantages, hidden costs, or no value-add because it is not needed or asked for. Moreover, humans as well as enterprises are equally dependent on well-doing and well-being, and therefore, the Fast & Flow framework can help enterprises with a more humanistic deployment of fast-paced technologies like AI. Humanistic deployment of AI in a Fast & Flow manner requires "digital humanism" capabilities, i.e., the skills, knowledge and understanding which help people to live, learn and work in a real-time era.

2. AI and real time: three scenarios:

AI is increasingly involved in 'capability-building' functions and supporting enterprises in developing their digital and physical infrastructures and this not only improve their practices is changing their corporate cultures. Deployment of AI thus involves "computation" in all of the three domains we are addressing in this chapter, however, with different outcome expectations.

2.1 Business as usual with more complexity and just faster

In this scenario, AI will be a technology that blends with the existing business practices to ease enterprises by augmenting human capabilities, by having machines to work alongside humans (Davenport, 2018). For example, AI can be deployed for automation of structured and repetitive work and engage with customers and employees via chatbots. By 2023, 40% of I&O teams will use AI-augmented automation in large enterprises, resulting in higher IT productivity[3].

There are a number of benefits of using AI. First of all it speeds up digital technology performance, production and service cycles, and knowledge generation through machine learning (ML) as well as a variety of seamless interactions between digital systems (big data, IoT, data mining and business intelligence, and ML), human experience and knowledge, leading to continuous process / service / product improvement.

Automated control of vehicles (e.g., autonomous cars, ships, drones, trains) is one example of AI applications enabling fast self-learning in unpredictable settings. Here, real-time distributed Fast & Flow systems enable the integration of various processes for the car to interact with its complex and dynamic surroundings such as precision in search and planning of routes, obstacle identification, as well as decision-making under uncertainty. Increasing the level of predictability is what may lead to the development of flow experiences.

AI – increasing speed of intelligence should not stand alone

According to Gartner, 50% of agent interactions are influenced by real-time analytics[4]. For example, conversational AI and ML enhance customer experience through deliver of highly

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[3] https://www.gartner.com/smarterwithgartner/gartner-predicts-the-future-of-ai-technologies/
[4] https://www.gartner.com/smarterwithgartner/gartner-predicts-the-future-of-ai-technologies/

personalized, data-driven digital experiences to customers in real-time. AI is delivering faster decision-support for managers (Jabbar, Akhtar, & Dani, 2019) and ensuring rapid business case realization. For example, Siemens AG, a large industrial manufacturing company in Europe, had a 20-30% acceleration of the tendering process by using ML to analyze vendor proposals to support decision making (Ransbotham et al., 2018). AI can also ensure that best-practice knowledge is instantly available to drive to sales in enterprises (Syam & Sharma, 2018) as well as optimize the buyer and supplier relationship through self-service opportunities (Gordini & Veglio, 2017). Gartner (2018) predicted that one-third of all B2B marketers by 2020 will adopt AI-enabled technologies, such as virtual customer assistants (VCA) and chatbots, to drive marketing automation.

Fast & Flow management generates value in the enterprise

Increasing the level of realism with AI is what may lead to the development of flow experiences for users, but to fully understand human-AI engagement requires dual-processing between the AI-human domains and the development of human-centered products and services. To do so, organizations must incorporate the temporal understandings that guide human interaction with this new technology. AI-supported services become vital time-savers, but for humans to succeed as supervisors handling systems as well as reducing the ethical concerns and lack of transparency due to negative implications like fake news, troll-factories, and echo-chambers, there is a need for a Fast & Flow management style of the organization.

Thus, new business opportunities arise, but managers will also need to deal with corresponding challenges. While researchers have focused on the technological understanding of AI (Dwivedi et al., 2019), our knowledge of the humanistic challenges of AI in real-time business contexts is far from conclusive. We will therefore present a more disruptive scenario in the next section.

2.2 Disruption: Extreme customization experience

In this scenario, AI helps enterprises meet customer expectations by continuingly customize their digital products and services. AI means faster computation at high accuracy of personal

customer preferences and anticipatory interaction. Analytic tools are quickly maturing and getting better at making highly personalized predictions and recommendations and transforming customer experiences. Content recommendations algorithms based on AI are personalizing the information on social media, search engines, smart speakers or other applications such as Spotify, Netflix, Amazon, etc. The practical as well as entertaining value of image and video-processing technologies is obvious: face recognition enable you to unlock your smart phone, organize your photos or laugh over what your friends will look like when they get old. Fashion models are now cyber-creations (e.g., H & M use fake models) developing faces that have never existed in reality and so will naturally looking animated movie and video game characters (e.g., Lord of the Rings, Avatar, God of War, Red Dead Redemption) move into a new domain where games develop themselves.

A continuous increase of pace leads to process optimization, but its success depends on the organizational ability to avoid disturbances and maintain the flow for the individuals. The more personalized the application experience through AI, the more the flow will be sustained for the users of the application. Eliminating arrhythmic disruptions to flow will help the flow state from being disrupted and keeping the good vibration for the user but will fast-customized processes enhance the humanistic deployment of AI?

Lemonade home insurance App AI going Fast & Flow - example
Lemonade[5] is a platform-based insurance company offering services for house owners reversing the traditional insurance model in several ways. It is a leading-edge example that illustrates the use of AI for extreme customization as well as the principle of Fast & Flow.

Transparent data analysis provides the platform company with insights into the customer's product services preferences and brings the customer a service through meta-data insights. Speed optimization helps process operation, for example, the customer's address is automatically mapped on the screen. Mapping customer reach tells the company how far they can influence the customer experience. Instant calculation of the price and deductible amount reduces the experience of friction for the customer and increases product and

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[5] insurance video: https://www.youtube.com/watch?v=flSLI2JmWVE).

service reliability, while reducing costs for Lemonade. Finally, the customer rating of their service is integrated which ensures immediate (real-time review, which is more reliable as it is related to the actual service provided. They describe their business model like this:

"Forget everything you know about insurance, Lemonade is designed differently. Powered by technology and transparency, you can get homeowners and renters insurance fast and simply, all from the comfort of your phone. Say goodbye to paperwork and agents, file claims instantly, and choose a cause you believe in to giveback money to at the end of the year. Features: - Killer prices → we've cut the overhead so our renters insurance start from $5 a month! - Instant everything → We're powered by technology, so you can get a policy and file a claim in seconds and minutes, all from your phone. - Committed to social impact → Lemonade is a B-Corp, meaning social good is baked into our legal mission. Choose a cause you believe in to give back to at the end of the year."[6]

Note the effect of comparing the making of a lemonade with signing up for insurance: "adding sugar" > "crushing ice" > "your lemonade is ready" > "go party". The use of figurative language engages customers and make them look differently at insurance. Relating to an everyday task, while using a very informal language (e.g., "valuables and stuff") de-complicates being an insurance customer and levels the customer and company, which reflects important elements of Fast & Flow.

Taking a closer look at the presentation of the Lemonade app in the YouTube video we find several examples of utility time and sense time defined as "Fast & Flow" coming into expression: *"Lemonade's app will get you insured **fast**, anytime, anywhere… "this will only take you a minute".* The real-time application eases the customer (rationally, emotionally, physically, and/or virtually) by not wasting the customers time ("**fast**…under a minute"; "Pay in seconds", type credit card details). The ubiquity of "anytime" (when it suits the customer) - "anywhere" relates time to space defining the interface of the virtual and physical reality of the customer. Lemonade follow the principles of simplicity and transparency in the

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[6] Comment stated by Lemonade to their own insurance video:
https://www.youtube.com/watch?v=flSLI2JmWVE).

Real-Time Management: When AI goes Fast & Flow, Rydén, P. & El Sawy, O. In: Bounfour, A. (eds) Platforms and Artificial Intelligence. Progress in IS. Springer, Cham. https://doi.org/10.1007/978-3-030-90192-9_11

design of the customer's real-time experience. By asking few and simple questions where the customer does not have to fill in forms or write text, just swipe a few question buttons, ensures a seamless **flow** by making it easy for the customer:

"Instant Everything. Maya, our charming artificial intelligence bot, will craft the perfect coverage for you. It couldn't be easier, or faster."

AI enables instant data analysis and visualization of data as simple star rating and numbers, i.e., $10,000 or $1000,000, coverage highlight icons, which stimulates moments of real-time experience by use of different types of virtual interactions (text, video, illustrations) involving mobile, cloud, and social media: *"See what's covered and customize your policy easily"* or *"Filing a claim is just as easy* (i.e., the customer is guided through the processes like creating a list of items damaged)*: no forms to fill out. Just speak to the camera* (i.e., describe the incident and send picture of the police report). AI can also help business solving problems with trust such as face recognition revealing if insurance customers are lying and cheating.

Fast & flow designed customization services empower the customer and this form of customer interaction can provide quality moments: *"Payment was successful. You are now covered!"* or *"Zero hassle. Zero paperwork"*. The handling time of refunding is fast (6 sec.) meaning that the customer experiences that claims are instantly approved, allowing pleasant time for the customer: "*Get paid in no time and **go party".***

A further example of how Fast & Flow design engages and empowers customers is charity service where the 'Giveback' function gives back unclaimed money. Here, the customer can select the cause from a limited list of local or nation-wide choices: *"Lemonade gives unclaimed money to **charity** – you choose the cause"*.

More crucial is to know how the customers experience the Lemonade app. By reading some of the comments to the video we see that people are impressed:

Baz: *"If the app does well half of what is shown here, it is already the best app I know. Congrats! This is great."*

Adrien JOLY: *"that's awesome! EVERY administrative task should be as clear and easy as that!"*

Sympathy Devil: *"I don't think very highly of insurance companies, but seems like this company could be a step in the beneficial direction."*

One of the comments releases reviews from existing customers:

Kenna Parker: *"I'm scared to try this, are you able to sponsor people to give honest reviews?"*

@Kenna Parker: Autumn Volume: *"I just got Lemonade for my apartment - it really is as easy and hassle-free as they claim. I haven't had to make a claim, as I've only been with them for about a month now, but I can assure you it's cheap, and it's stupidly simple to set up."*

Bridgy Hairston: *"Yea I just got it too I'm moving into my apartment Tuesday. It's really cheap my monthly payment is 5 dollars."*

The comments reflect the positive impression that Lemonade has on the market from using advanced AI-enabled technology to enhance Fast & Flow customer experiences. The video does not reveal the level of awareness of Fast & Flow management, but the Lemonade example describes how the company successfully manage real-time in a Fast & Flow manner. However, data analysis could be enhanced to also understand the customer's real-time preferences.

2.3 Distortion: Extreme dysfunctionality

The third scenario addresses AI being out of control, i.e., the possibility that general-purpose AI will lead to an intelligence explosion where AI goes too fast for the human race and ultimately eclipses the intellectual capacities of humans. With the 200 Hz per second human processing versus machines processing 2 GHz per second, technology overflow, and, hence, loss of control may come irreversible dystopian effects on human well-being and the

well-doing of societies, which brings the humanistic challenges of deploying AI even further. In his book "Artificial Intelligence and the Problem of Control" Stuart Russell (2019) states that it is not the "boring" yet beneficial "tool AI" that is the control problem, but the "super-intelligent" AI, which brings AI management to a tipping point once it exceeds the general cognitive capabilities of humans. We're not there yet, but when it does happen, we'd better be prepared, he claims.[7]

For the discussion of the intended or unintended misuses of AI, we look at the ethical aspects of AI deployment in combination with invasive data collection as machine learning is a means to derive artificial intelligence by discovering patterns in existing data. We suggest that a Fast & Flow perspective may help managers take actions against an extreme-paced technology overflow to a humanistic Fast & Flow pace.

Ethical biases in programming

AI is not born with an innocent mind of its own; rather, it inherits the individual and cultural biases of its developers, e.g., when Siri described the Indians as "slightly brown people smelling curry because they eat it". Another example of biased, untrustworthy AI is the COMPAS system, used in Florida and other states in the US, based on a regression model to predict whether or not a perpetrator was likely to recidivate. The AI model was optimized for overall accuracy but predicted double the number of false positives for recidivism for African American ethnicities than for Caucasian ethnicities[8].

The biases of tech builders can thus influence AI-driven platform creation, no matter how comfortable our methodology, which may result in bad experiences for end users. This is calling for more humanistic approaches to AI application research, design, and development. For example, Cariskan, Bryson, and Naryanan (2017) demonstrate in their paper that applying machine learning to ordinary human language results in human-like semantic biases and stereotypes. Using the Implicit Association Test--a purely statistical machine-learning model trained on a standard corpus of www text--they replicated a spectrum of known biases to show imprints of historic biases, whether morally neutral as

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[7] https://www.nature.com/articles/d41586-019-02939-0
[8] https://aibusiness.com/three-notable-examples-of-ai-bias/

toward insects or flowers, problematic as toward race or gender, or even simply veridical, reflecting the status quo distribution of gender with respect to careers or first names.

Ethical biases in hiring

AI is increasingly used for hiring, but with its inherent biases, AI discriminates applicants. Apparently, male applicants are at a better position compared to women because word embeddings encode stereotyped biases. One explanation is the distribution of AI programmers. In 2015, women made up only 18% of the computer science majors in the US, which reflects a decline from 37% in 1984. More that 80% of AI professors are men, and only 15% of AI researchers at Facebook and 10% at Google are women[9]. Another explanation given by Nosek and Banaji (2002) is that female names are more associated with family than career words, compared to male names and they raise the possibility that all implicit human biases are reflected in the statistical properties of language. Thus, AI solutions, which is based on language programming, are based on the normative value orientations of developers, which distorts the factual value and validity of using AI.

This has implications for AI and machine learning because of the concern that these technologies may perpetuate cultural stereotypes when AI is ignoring the existing cultural contexts. Serious concerns of bias distortion arise as AI is given increasing agency in our society and must be addressed to ensure humanistic deployment and purposes.

Other ethical dilemmas

AI technologies such as voice, text, and facial recognition are bringing other ethical dilemmas to manage. The identity-based applications may ease users' lives, and, ironically, they may increase security for the users while at the same time putting the user at a larger risk of identity theft if getting in the wrong hands. Also, deep-fake generators and information-integration systems are misused by hackers or other criminals or by governments using it for surveillance, control and mass-behavioral manipulation. When

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[9] Source: https://insights.stackoverflow.com/survey/2017#overview

private information can be stolen for prediction project purposes, like preventing tax fraud or insurance fraud, we deal with an extreme power asymmetry that threatens democracy.

But even in our daily living, we are voluntarily surveyed by our smart watch, smart phone, security system, and other nice-to-have gadgets that ease our lives. Just think of Google, who started this "information-quid-pro-quo" trend and today, nine out of ten searches are Google searches. Tech companies has an interest in controlling every aspect of what we do, for profit purposes, which can make digitalization and AI applications into Trojan horses for stealing information. Not only collect data about our behavior, but they also affect and change our behavior. Shoshana Zuboff explains it like this:

"How far and where your morning run takes you, the conditions of your commute, the contents of your text messages, the words you speak in your own home and your actions beneath all-seeing cameras, the contents of your shopping basket, your impulse purchases, your speculative searches and choices of dates and mates – all recorded, rendered as data, processed, analyzed, bought, bundled and resold like sub-prime mortgages….The litany of appropriated experiences is repeated so often and so extensively that we become numb, forgetting that this is not some dystopian imagining of the future, but the present." [10]

AI is used for collecting and coding data, as a B2B data commodity and the "bitter pill" is coated as "service improvements" and consumers have no insights or overview of what is going on in these huge black boxes of AI of companies. The human vulnerability to such technologies calls for a humanistic concern about the right to the mental "private space", where the individual can be alone and feel a sense of security of living in the age of surveillance – a perversion of capitalism as Zuboff[11] calls it.

Governments must take the lead to combat this, but what should the rules of the game be when government interest often coincide with those of the commercial companies – namely to collect data for their own purposes? Dr. Kai-Fu Lee (2018), one of the world's leading AI experts, explain in his book "AI Super-powers: China, Silicon Valley, and the new world order" how the two giants of AI, China and the U.S. have two completely different

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[10] https://www.theguardian.com/books/2019/feb/02/age-of-surveillance-capitalism-shoshana-zuboff-review
[11] https://www.theguardian.com/books/2019/feb/02/age-of-surveillance-capitalism-shoshana-zuboff-review

attitudes toward the market, to research and development. China has a do-anything, copy-anything approach whereas Silicon Valley is driven by disrupt-to-profit, but what will lead to more powerful innovation? China's national support for technology? In the meanwhile, EU is still tipping on its toes eager to play with the big AI super-powers, and none of them is knowing where it eventually will take humanity in the long run or how—if so—it will do us any good.

3. How to manage and embrace real time technologies such as AI

The profound societal changes triggered by technological disruption also influence our relation to time. We noticed how real time becomes increasingly important for the value proposition of enterprises and their ability to develop and innovate technology-driven products and services. At the same time, we see how people and societies are challenged by this acceleration of time demands. The "faster is better" seems to have severe consequences for people and societies in general and apparently sometimes for the worse, not the better. Our real-time management study embraced the product focus as well as the customer focus to address this paradox (expressed by the famous Henry Ford quote) *"If I had asked people what they wanted, they would have said faster horses"* even though the faster horses eventually will kick them off. The quote is meant to highlight that real-time management is about understanding the underlying drivers of accelerating time and be able to navigate managerial practices accordingly.

Thus, most people cannot cope with the accelerating pace of technology and risk suffering from stress and burnout, which eventually slows down business productivity and erodes the purpose of AI. Neither can they stop the combats of the huge tech giants that are disrupting lives and societies towards the real-time era. There is an increasing need now for critically considering how we approach real time technologies like AI and reflect on their true value proposition to humans.

We have showed that managers, who use "real time" in different ways, articulate different facets of experience and practices, leading to the Fast & Flow framework. Thinking of real time as "Fast & Flow" presents a sensemaking that is better attuned to the organization, the market, and a technology-driven state of flux. Enterprises who are able to build a "Fast &

Flow" responsive enterprise and to transition to real-time management and harness AI in a Fast & Flow manner may stand a better chance of creating lasting value with AI for customers and business.

By thinking Fast AND Flow and letting this be the governing mindset of AI deployment, AI may better benefit humans rather than enterprises, tech giants, and governments. However, Fast & Flow management for the future demands a conscious and collective effort, not just by managers. Policymakers and decision-makers, but also by the individual users. On a minor scale, enterprises can start by closing the gaps in how marketing, sales, IT, and R&D managers prioritize the way AI real-time technologies generates value to the business, its customers, and societies in general – not only in the future, but also here-and-now.

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Appendix 1: CTM Survey

A. Questions about the "WHAT"

A-1: What do you perceive "Real Time" to be in your Enterprise? (Please mark all that apply)

Reduced latency of information in discovering problems or opportunities

Immediate response to customers

Immediate response to enterprise partners

24 x7 continuous streaming of online big data

Automated on-the-fly adaptation for actions

Seamless fusion of data and processes

Rapid-fire decision making

Instant employee-to-employee communication and knowledge sharing

Operating in the Internet world with digital platforms

Just another 'hyped' technology

Other? Please describe:

A-2 Do you associate "Real Time" in the enterprise with any of those time scales or orientations? (Please mark all that apply)

Times that are sub-second

Times under an hour

Times under a day

An emphasis on the immediate present rather than the past

An emphasis on the immediate present rather than the future

Interactive time

Other? Please describe

A-3: What do you perceive "Real Time *Management*" to be in your Enterprise? (Please mark all that apply)

Sense & Respond mode of management

Managing at the edge of Chaos

On-demand delivery of customized services

Immediate response and action to problems

Omni-channel marketing

Ubiquitous online presence

Moving faster than the competition

A critical emphasis on timely action with higher priority on time than on quality or cost

Other? Please describe:

A-4 At what stage do you think your company is at in Real Time Management? (Please pick one only)

Has not thought about Real Time Management

Decided Real Time Management was not a high priority for now

Started experimenting with limited initiatives in Real Time Management

Real Time Management is becoming a key part of our business strategy

Real Time Management is advanced, strategic, and enterprise-wide

We are an exemplar in Real Time Management and other enterprises come to us for advice

Other characterization of stage of Real Time Management? Please describe

B. Questions about the "WHY"

B-1 In which areas of the enterprise is business value most usefully realized through Real Time Management? Please mark all that apply.

Customer service

Marketing

New Product and Service development

Operations or Manufacturing

IT Services

Relationships with partners

Business development

Financial operations

Other? Please identify:

B-2 Through which enterprise capability do you think the value of Real Time Management is most directly realized? Please mark all that apply.

The ability to sense problems and opportunities faster

The ability for quicker decision making

The ability to execute the outcomes of decisions faster

The ability to reconfigure human resources quickly

The ability to be agile in changing business direction

The ability to improvise actions

The ability to communicate transparently across the enterprise

The ability to ingrain real-time management culture into the workforce

The ability to take advantage of digital platforms for real time management

Other? Please describe

B-3 Which if any of these companies do you regard as exemplary in the practice of creating value from Real Time Management. Please mark all that apply.

Fedex

Uber

Google

Amazon

eBay

Apple
Facebook
LinkedIn
Proctor & Gamble
Walmart
AT&T
Verizon
Netflix
Disney
ESPN
Nike
Xiaomi
Cisco
Other? Please identify

C. Questions about the "HOW"

C-1: What organizational mechanisms and culture do you think are important for successful Real Time Management? Please mark all that apply.
Open and transparent communication throughout the enterprise
Flat organizational structure
An organization where digital technology skills are widespread
An organizational culture that allows delegation
An organizational culture that tolerates failure
A organizational culture that encourages experimentation and iteration
An organizational culture where consensus is not necessary
Strong top management support for Real Time management practices
Other? Please identify

C-2: What digital platforms and technologies do you think are important for successful Real Time Management? Please mark all that apply.
Social Media
Mobile technologies
AI Analytics platforms
Cloud Computing
Management Dashboards
Big Data platforms like Hadoop
On-Demand platforms
Interactive What-If Analysis technologies
Other digital platforms or technologies? Please identify:

C-3: How do you best measure the success or failure of Real Time management? Please describe briefly whether generally or in your enterprise: