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UNCERTAINTY

In a new age of automation

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IMAGINE you're a designer assigned to a new project for a healthcare client in Boston. You're really excited because you will be facilitating design thinking workshops to help the team focus on their users. The hospitals currently use an IT vendor to handle their emergency call center volume. You're being asked to help them think through how Watson can help manage the calls. As you kick off the morning empathy mapping with the team, a client scratches their head. They exclaim: "WHY DO WE EVEN NEED PEOPLE AT THE CALL CENTERS? THEY DON'T NEED TO BE INVOLVED IF WE AUTOMATE EVERYTHING. IT'S THE MOST COST-EFFECTIVE OPTION FOR OUR HOSPITALS."

NOW YOU'RE SCRATCHING YOUR HEAD. You've just told them how important it is to be human-centered, but the solution being proposed makes sense. Yet it removes people from the scenario! What do you do? Do you re-frame the problem to focus on what agents will do when they're no longer taking the calls? Do you focus on how to best optimize how many calls can be taken through automation, to help more people with emergencies and cut costs?

They didn't make a framework for this. As a designer, if you follow a Hippocratic oath to do no harm, how do you facilitate a solution which lays off hundreds of employees? What if you aren't being asked to solve the dilemma of what will happen to the user once they no longer staff the phone lines? After the workshop ends, you think about what a new model would look like if you went into the session knowing the problem could be solved by taking people out of the equation.

AUTOMATION RAISES A FASCINATING ETHICAL DILEMMA: DOES YOUR RESPONSIBILITY LIE WITH THE BUSINESS OR WITH ITS PEOPLE? WHAT RESPONSIBILITY DO BUSINESSES HAVE?

What trade-offs would you discuss? How would you have brought up the ethical dilemma? Is automation going to take everyone's job? Your anxiety takes you down the rabbit hole. Maybe, at this point, you consult the Internet.

A HISTORY OF AUTOMATION

150 years ago, over half of the U.S. population was employed in agriculture. Today, just 2percent of the workforce farm American soil.[1] How does one of the most populated countries in the world create enough food with so few growers and ranchers? The answer is automation: using technology to optimize and control the production of products and services. Automation transforms industries, and creates new ones, every day. Over the last decade, Apple has spurred an entirely new $100-billion app economy.[2] With these apps, and services like them, came on-demand gratification: transportation, food, and music in your pocket—conveniences which have caused traditional stores and services to shut down. (*RIP, Blockbuster*). When people watched their neighborhood shops close, they believed that the jobs had also disappeared, all thanks to automation. While locally thsee jobs do go away, nationally, the job decline isn't actually happening. The fascinating truth is, even with more machines at work than ever before, the proportion of adults in the U.S. with a job has consistently increased over the past 125 years.[3]

1. Autor, D. (2015, June). Why Are There Still So Many Jobs? The History and Past of Workplace Automation. *https://www.researchgate.net/publication/282320407_Why_Are_There_Still_So_Many_Jobs_The_History_and_Future_of_Workplace_Automation.*

2. *Same source as above* 3. *Same source as above*

AUTOMATION THEORIES

HOW could more jobs exist than ever before? In a 2016 TED talk, M.I.T. researcher David Autor describes two ideas giving rise to the labor market: the O-ring, and the "never-get-enough" principle.

In the 1986 Space Shuttle Challenger Mission, a small rubber O-ring froze the night before the launch and failed the following morning. The resulting explosion horrified the nation, and led to the loss of seven astronauts. Since every other test passed, there could be no weak link in the production line. In a system which must be designed with perfect accuracy, one step depends critically on the next.

Applying this principle to automation means humans are the O-rings in our work, and technology is a means to magnify our expertise and creativity. The tools alone are just one link in a chain; when enhanced, they can improve the capability of all the other links, including us.

The "never-get-enough" principle means that people, when given extra time, will create innovative solutions and new markets, which in turn drive new jobs and industries. A few decades ago, nobody could predict the post-internet online gaming or the cyber security industries. Academics like Joel Mokyr, an economic historian at Northwestern University, claim we won't know how automation will change the job market until it happens.[4] When automation changes the nature of people's work—for example, from counting cash to selling home insurance— it creates more wealth, in less time. It frees people up to invent new products and effect change in the world. With over a century of evidence to back these principles, will they still always be true?

WE'VE REINVENTED OUR CULTURE TOWARDS PROGRESS BEFORE, BUT CAN WE ALWAYS KEEP AHEAD OF THE CURVE? IF WE PLACE A BET ON HUMAN INGENUITY, WILL WE CONTINUE TO COME OUT ON TOP?

It's not only about the creation of new jobs; it's also about how we respond to the disruption of the job market. In the 19th century, mass unemployment hit the crop fields, due to the mechanization of harvesting. As a result, we signed into law a requirement for children to attend school up to the age of 16. This education transformed the country from a society built on manual labor to a society driven by critical and creative thinkers.

FEAR & LOATHING

EVEN WITH PROOF THE JOB MARKET IS GROWING, each era of automation ushers in new fears. The next wave of automation, described as the "fourth industrial revolution",[5] departs from the past revolutions because of new computing capabilities. Professor Klaus Schwab, Executive Chairman of the World Economic Forum, claims that smarter machines today possess the potential to replace human labor at an unprecedented scale and rate. Automation, specifically in information and tech industries, tends to reduce the amount of jobs necessary for the same amount of productivity— without creating new products that provide jobs to existing workers.[6] He argues the combined capacities of robotics, the Internet of Things, and artificial intelligence can drive automation into fields which traditionally required human critical and creative thinking. We've reinvented our culture towards progress before, but can we always keep ahead of the curve? If we place a bet on human ingenuity, will we continue to come out on top?

4. Morgenstein, Michael. (2016, June 25). Automation and Anxiety: Will Smarter Machines Cause Massive Unemployment? *https://www.economist.com/news/special-report/21700758-will-smarter-machines-cause-mass-unemployment-automation-and-anxiety*

5. Schwab, Klaus. (2016). The Fourth Industrial Revolution. *https://www.amazon.com/dp/B01JEMROIU/*

6. *Same source as above*

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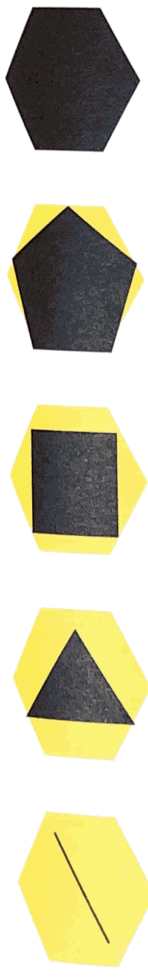
ONE IBMER WEIGHING IN ON THE IMPLICATIONS OF automation is Raphael Arar, a designer who works at IBM Research, Almaden Lab. Raphael works on everything from web and mobile design to Tangible User Interfaces—that is, physical objects with digital interfaces. He currently leads a long-term project titled Cognitive UX, which aims to create a context-sensitive user experience that changes based on the user's needs. Raphael's experience working with AI has lead him to form his own conclusions:



> *"On the continuum of narrow AI to a more general AI, critical and creative thinking fall closer to the realm of consciousness, which is still a difficult problem for AI research. The current state-of-the-art shows us still years away from this kind of realization.*
>
> *While a fully realized AI has the potential to transform many, if not all jobs, a drastic and sudden shift seems unlikely in the short-term. In my opinion, the prevalence of tools to facilitate creative and critical thinking seems more likely in the short-term, which would enable professionals to have more options to do their jobs better. We're seeing many applications of this already—from simple color palette suggestions for designers to more complex machine learning systems that help suggest topics for writers.*

One example from the Washington Post is Heliograf, a news bot created to help journalists write more accurate and compelling stories. The company Automated Insights took the news bot idea a step further, and created a program called WordSmith, which generates simple but complete news stories based on financial updates, sporting events, and weather changes.[7] For fun, journalists at NPR hold contests with the bots to compare their stories' quality and speed—but will the entertainment factor wear off?

It's not just jobs requiring cognitive capabilities that are predicted to disappear, but physical labor as well. According to a White House report released in Dec. 2016, the self-driving car industry will replace between 80 and 100 percent of all truck drivers, eliminating an average of 1.5 million jobs.[8] "Truck drivers cannot afford to go back to school. It's reasonable to assume that 90% of those jobs will disappear within a generation," says Ryan Gariepy, co-founder of OTTO Motors and a specialist in automated driving. [9] With automation anxiety on the rise, worries of greater unemployment, more free time, and the need for re-education exist.

So far, the government has yet to determine laws in anticipation of the next wave of automation, like the case of the self driving-car. Raphael from IBM describes the role of legislation as a critical influencer:

> "Accountability—with automation—is paramount. Laws need to be structured in ways that provide clarity for who is liable in case of an accident. Accidents will be inevitable, and with autonomous systems, determining who is at fault will become challenging. If an autonomous vehicle crashes into a pedestrian, who is legally liable—the car manufacturer or the passenger? Questions such as these need to be addressed prior to the realization of fully autonomous technologies."

It's important for designers to consider the trade-offs of automation's impact in the job economy and out in the world. One recent project from MIT allows you to explore at your own pace. Researchers created a scenario-based question and answer platform called Moral Machine, which invites the public to judge different machine learning moral dilemmas such as self-driving cars, and their "acceptable" outcomes. You can also design scenarios and see how your responses compare to others who take the survey.

(Curious? You can find it at moralmachine.mit.edu)

7. Keohane, Joe. (February, 2017.) What News-Writing Bots Mean for the Future of Journalism. *https://www.wired.com/2017/02/robots-wrote-this-story/*

8. Semuels, Alana. (February, 2017.) When Robots Take Bad Jobs. *https://www.theatlantic.com/business/archive/2017/02/when-robots-take-bad-jobs/517953/*

9. Darrow, Barb. (2017, May). "Automation, Robots, and Job Losses Could Make Universal Income a Reality." *http://fortune.com/2017/05/24/automation-job-loss-universal-income/*

A DESIGNER'S ONUS

ANOTHER WAY TO STAY ENGAGED? EXPLORE THE WORK of other thought leaders who are heightening awareness of automation and its ethical implications. According to Raphael, "Tristan Harris has some interesting thoughts around the matter regarding the attention economy and the ethical implications of the technologies we are creating." Much of his work is still in the process to be revealed in his non-profit Time Well Spent. Additionally, Nick Bostrom has raised some poignant questions around the implications of an AI maximizing its goals with disregard to any malevolent effects. Much of his work is largely philosophical though and serves as a series of thought experiments. Max Tegmark, a professor at MIT, recently wrote a book called "Life 3.0: Being Human in the Age of Artificial Intelligence," and his colleague Kate Darling at MIT is doing some interesting work in Robot Ethics."

Designers play a critical role in the creation of new products and systems, which will influence the direction automation takes. Long before the legal system gets involved, designers can determine the roles that machines play in our lives—so how might designers hold themselves accountable as they make products that might automate jobs or displace larger ecosystems? As a designer and researcher, Raphael believes that:

"Automation has and will impact every aspect of the design profession, from the tools we use to the types of products and services we design for. The ethical implications of the technologies we design for should be the foundation of a human-centered process. The word 'human' should be assessed from all perspectives."

He goes on, "While the solution we design may solve an immediate need, the time-based implications of the solution should be assessed on all fronts. In industrial design, we have seen an increased importance on green products—when products are abandoned or thrown out, how do they impact the environment? With digital products or intangible services, the implications are less obvious and the time-based nature of experiences is something to carefully consider. Designers should be considering not only the immediate impact of the solution but also the long-term implications."

There are still many gaps in the global discussion of automation that designers could use to frame future angles. Economists have discussed establishing a universal income, or offering new job training as two possible solutions for replacing jobs lost to automation. But what will be the cultural and emotional impact on individuals who change job roles mid-career? Does it change their sense of identity? What will they do with the down time of unemployment while re-training for a new job? These are potentially fruitful considerations for designers who will continue to focus on human user needs in the future with automation. Raphael says that automation impacts humanity on such a macro scale that it's quite difficult to assess from all angles:

> "A universal basic income may be a good start but still has many aspects that need more scrupulous consideration. Education needs a massive revolution—the prolonged time-line of many 4-year university programs and their curricula seem much too slow to keep up with the pace of changing professions even today. Some articles have said coding is the next blue-collar profession. If so, then vocational schools need to increase in their prevalence to help mitigate issues around job displacement. In my opinion, education needs to be a continuous process, much like certain professions require certification and ongoing renewal.

If one thing is clear, automation changes how we spend our time—both when it benefits society, and when it comes at the cost of certain livelihoods. It poses ethical dilemmas, yet frees us up to invent the future. It creates new jobs, but it creates new fears too—and it leaves people with a skills gap at risk of falling further behind.

"I think we have to be very cognizant of the unintended consequences, but also acknowledge them and design them out," says Tony Fadell, one of the minds behind the iPod and the iPhone.[10]

10. Schwab, Katharine. (July, 2017.) "Nest Founder: "I Wake Up In Cold Sweats Thinking, What Did We Bring To The World?" *https://www.fastcodesign.com/90132364/nest-founder-i-wake-up-in-cold-sweats-thinking-what-did-we-bring-to-the-world*

DESIGN is ripe for the opportunity to study automation with regards to human behavior. Designers must be vigilant of the long-term trade offs they are making with the creation of products and systems where automation takes place. Automation offers extra hours of creative leisure, but we must address the people it effects negatively, too. If we cast our thinking into the future, we can reduce unintended consequences.