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FUJITSU

Transformation by Design

Planning Design Strategies and Services for the Next Generation Digital Challenges

shaping tomorrow with you

MAGGIOLI EDITORE

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Foreword

In the past decade, digital technology has changed the way we connect, run businesses, and deliver public services. With new uncertainties such as climate change, global pandemics, and social problems such as the imbalance of information or the invasion of privacy, the world is in the midst of chaos. In such times, what is important is to not react recklessly to threats and change, but instead to tackle them swiftly and securely by creating a democratic future where the possibilities of people and society blossom.

Fujitsu is transforming itself from an IT company to a digital transformation company and operating as an organization that generates social value. Fujitsu is moving away from delivering solutions that solve problems that lie before us. Instead, the company is committed to delivering transformations, which will at times overwrite the rules in the market or in society, to dramatically change user experience using digital technologies.

Our experiences since COVID-19 forced us to overwrite many existing norms in our lives and work, and these experiences may have been a factor in prompting this transition. Every day before this calamity, we packed into trains, went to designated offices for designated hours, and went home on another overcrowded train. COVID-19 upended that lifestyle. Every employee is now connected online with internal and external stakeholders and communicates and delivers remotely. Such an autonomous workstyle has become the new normal. Many of us today have welcomed these new ways of working. Ironically, it wasn't existing technological solutions that sparked such transformations and changes in norms and routines. Rather, it was a terrible, unwanted guest disguised in the form of a prehistoric infectious agent—a virus.

Such changes in prerequisites and preconceived notions are the imminent transformations in our society that leave lasting effects. Yet we are capable of bringing about this change without relying on another outbreak. Instead, we can turn to the power of design. Design is the avenue to realizing a sustainable society using the power of technology available to us. Design pushes us to envision a hopeful future from an individual and societal perspective and widens possibilities for actualizations without being limited to how society is today. Fujitsu's Human Centric Experience Design (HXD) has been crystallized from all of our design experience. It intelligibly democratizes the power of design and navigates us to scalable digital transformations for our society. Moving forward, I commit that such a structured design approach along with agile approaches will continue to materialize the scalable software and business sense befitting next generation design.

I must emphasize that the purpose of design is not to superficially make over our products or services, nor is design a tool to produce eccentric ideas. Instead, design is a mindset that every individual should adopt to cultivate innovation and contemporary business literacy.

In the twenty-first century, there is an increasing demand for corporations to clearly define and articulate their purpose and role in society. People are interested in and paying attention to which organizations contribute to creating values for them. Corporate leaders also recognize that for companies to accomplish sustainable and long-lasting growth, it is extremely important for them to explicitly present the *why* of their companies and to fulfill their promises and obligations to people and society. We should no longer be trapped in customer needs of the past or old business concepts and routines. The transformational design mindset requires us to steer away from old constraints. It instead guides us to achieve important goals that people and society aspire to. Every organization should constantly foster and promote this design mindset, since it is the ultimate source of power and drive that shapes a better future.

This book was specially designed and edited to include materials that foster the growth of such a transformative design mindset and offer support and guidance for the process. These materials are based on the research outcomes and the philosophy of Fujitsu's strategic partner, Politecnico di Milano's design department, along with Fujitsu's know-how gained from our own practices. We believe this combination will provide you with tangible knowledge on how design has evolved across industries and various fields. My belief is that to bring about transformation at the required speed and scale, it would be vital for the act of design to become an organizational culture that rejects utter dependence on a handful of experts.

Mr. Takahito Tokita, Fujitsu's CEO and CDXO (Chief Digital Transformation Officer), proclaimed on the July 1 CEO bulletin that design is a crucial corporate management resource and must be applied to Fujitsu's strategies and philosophy in every aspect of the business process. We hope you, the reader of this book, will cultivate a design mindset and become a leader of design-driven transformation today, shoulder to shoulder with other transformation leaders who may not be part of the company, and we hope you share this path in realizing a more fulfilling society. By blending together the digital realm with the power of design, we look forward to creating a yet unfathomable but brilliant world.

Tetsuya UDA
Head of Design Center
Fujitsu Limited

Contents

3

Design and AI in the Age of Digital Transformation

Gianluca Carella (Politecnico di Milano)
& Elena Marengoni

As highlighted in the previous chapter, Fujitsu is committed to Human Centric Experience Design (HXD) to foster digital transformation in response to changes in society. As digitalization took off in the twentieth century, Fujitsu successfully developed technical solutions, greatly contributing to the growth of digital technologies and their industries. Yet today, in the twenty-first century, the company instead leverages technology as a catalyst to drive digital transformation, systemically transforming the lives of individuals rather than industries to generate new social values. This chapter presents the significance of digital transformation in our society today, along with case studies that illustrate the relevance of UX and public infrastructure in driving transformation. This is followed by how artificial intelligence (AI) can not only bring about new business opportunities for companies across industries, but also hasten digital transformation across business processes. The chapter ends with "Fujitsu Group AI Commitment" to promote the use and development of AI aligned with Fujitsu's ethical values and principles.

1. Why Digital Transformation Today?

1.1 What is digital transformation?

Digital technology is now a persistent part of our daily lives. This goes beyond communication and entertainment like social media, video streaming, and online multiplayer games, and extends into everyday contexts like air conditioning, cleaning, laundry, and even cooking. Every aspect of our lives and society seems to be supported in some way by digital technology, be it transit, security, logistics, medicine, or education.

Digital technology therefore has left a significant impact on society as we know it. Given its permeation throughout all aspects of our lives, it can be difficult at times to systematically study the complex history of its evolution. There is growing interest in the creation of different markets and new value in society through the use of digital transformation (DX)—but what exactly does DX refer to, and how does it differ from conventional uses of digital technology?

First of all, *digital* refers to the use of computer technology. The first computer in human history was ENIAC (Electronic Numerical Integrator and Computer), developed by John Mauchly and John Presper Eckert, Jr. at the University of Pennsylvania, and completed in 1946. The purpose of the project was to develop a computer to more rapidly carry out complex calculations, such as those used for artillery firing tables and thermonuclear chain reactions. This project was central to enabling the evolution of military technology in the United States. As this case reflects, the initial concept of digitalization was the replacement of human power or analog technology. At the time, it sufficed for digitalization to achieve large-scale increases in efficiency (in terms of time and resources) over traditional human or analog approaches. What this implies is that the issue to be solved was clear, with the focus being on how to devise a technical solution to the problem. In other words, digitalization at that time revolved around solutions.

Computers were initially large and costly, but gradually became more ubiquitous. They went beyond simply replacing human workers and analog technologies and developed new value as the crux of the new digitalization of society. Essential to digitalization is the use of data. Data is implicated in both the input and output of digital systems, with countless new services emerging that make use of this data, as well as technical solutions like machine learning, which is used to uncover new meaning in large data sets. For example, identifying top-selling products through point-of-sale (POS) data

	Closed	Open
Solution	**1. 1970s–1990s** Enabling task efficiency through replacement of human power and analog technology. Office automation and factory automation have significantly evolved during this period.	**3. 2000s–2010s** Further efficiency has been achieved through enabling tasks in the Solution x Closed phase to be done in an open network. Cloud services have significantly evolved.
Transformation	**2. 1990s–2000s** Utilizing the data obtained through the Solution x Closed phase, new social value has been created. Optimized calculations in the fields of finance and marketing has significantly evolved during this period.	**4. 2010s–** Utilizing the data obtained through the Solution x Closed phase, new social value has been created. This phase corresponds to what is called digital transformation (DX) today.

and using this for merchandising has been central to the growth of convenience stores in the retail sector. This was achieved by first hypothesizing that data sets on daily and weekly sales could be used to uncover more popular products, then employing digital technology as a resource to demonstrate this hypothesis. In other words, the way these problems are structured and identified is in itself a source of underlying value, with the solution being subservient to the problem. Digitalization today is a means of discovering new possibilities—in other words, helping achieve transformations.

If we think about this in terms of its constituent parts, namely, that a solution refers to replacing human or analog approaches with digital technology, and that a transformation refers to using digital technology to create new social value, then we can see two vectors: *closed relationships* in specific domains (such as within companies or communities), and *open relationships* in wider, more ubiquitous domains. We can then think about their respective evolution (See the table on page 60).

Solution x Closed (item 1 on the table): At the dawn of the Information Age, Fujitsu was engaged in the development of computers and developed Japan's first relay-based automatic computer, the FACOM 100, in 1954. Since that time, Fujitsu has pursued digitalization throughout various industries, such as through the use of office automation (OA) and factory automation (FA), contributing to the business infrastructure we use today. In the present day, there is an increasing need for systems architecture (including customization) that caters to growing security and reliability needs.

Transformation x Closed (item 2 on the table):
Fujitsu Laboratories, which Fujitsu established in 1968, was instrumental in research and development into machine learning and AI. In the early 2000s, an anthropological approach to user research began in earnest as a way of asking creative questions to problems. This has supported the growth of business and services operated by companies and organizations throughout Japan and the world. With digitalization's ongoing growth in the business sector, Fujitsu began undertaking steps that would lead to its HXD approach.

Solution x Open (item 3 in the table):
In the late 2000s, several technological advances led to the rapid proliferation of cloud computing, which allows for remotely using services at metered, pay-as-you-go rates without the need for on-premises hardware or facilities. During that time, Fujitsu developed software-as-a-service (SaaS) work applications for a wide range of sectors and provided SaaS apps to enterprise clients within and without Japan. During this phase, open networks enabled easier integration between companies and sites, thereby enabling digital services to encompass a wider range.

Transformation x Open (item 4 in the table):
This is the stage at which digital transformation (as discussed in this section) took place. Starting in the late 2000s, the global growth of smartphones and Internet of Things (IoT) solutions enabled the collection of real-time digital data on a variety of people and objects. The conventional techniques and methodologies used in the Transformation x Closed domain were combined with the vast amounts of data obtained through Transformation x Open approaches, leading to the creation of new social value.

1.2
Evolution of digital transformation through cases and practices

In this section, we look at what kind of social value is created through the use of data from two perspectives: UX and public infrastructure.

The role of user experience in designing digital transformation

Since the late 1990s, various services have emerged online as the internet has become more mainstream. These include services like Google, Facebook, and Amazon, which emerged largely in the twenty-first century, as well as platforms like Airbnb and Uber, which seek to digitize real-world experiences for greater convenience.

These platforms come in a variety of shapes and sizes, but what they share is that their core competency revolves around collecting data to create a superior UX. The high level of convenience they offer attracts more users, and service operators in turn use data from these users to further improve the UX to provide services inimitable by other companies. In this way, collecting usage data to continuously improve UX could be a necessary condition to creating social infrastructure for today's era of digital transformation.

Example: Google Maps Google Maps is an app that has now become indispensable to our everyday lives. It analyzes GPS data on users' smartphones to determine in real time the best route to take. It also forecasts how congestion will change over time based on past data. This is used to display the optimal route from among different transit options. Google's business model here involves offering Google Maps to users for free, and then selling map services based on user data to third parties.

In recent years, the Online Merges with Offline (OMO) business model has gained traction. OMO goes beyond preexisting service categories to create new touchpoints with users by bridging online and offline contexts. This model maintains constant touchpoints with users and aggregates behavioral history data to improve the UX.

Example: Ping An Good Doctor One example of the OMO model is Ping An Insurance, a Chinese company providing the Ping An Good Doctor app. This app gives users more opportunities to engage with doctors prior to examinations and reduce their anxiety. This includes free 24/7 online consultations with private clinicians, as well as the ability to review doctors' backgrounds before booking appointments at clinics. Moreover, the company uses the app to identify user needs and uses this data to accommodate insurance filings in a more seamless manner. By going beyond existing service domains and offering services matched closely to users' contexts, it has gained a loyal following of two hundred million users.

Digital transformation of public infrastructure

Initially, the premise of digital transformation was that companies with advanced technology would provide services to individual users. Recently, however, governments have begun actively providing data and information that have significant public interest, making services more accessible to all and creating even greater social value.

Example: India's digital policy India is expanding its services around a digital infrastructure built by the government. In 2009, the government of India launched a project to grant digital identities to all 1.3 billion of its citizens. This project sees them developing IndiaStack, a digital infrastructure that brings together open application programming interfaces (APIs) such as those used for personal authentication, electronic signatures, and payment platforms. This project enables corporations to use IndiaStack to easily gain access to authentication and money transfer solutions. For example, Milaap is a crowdfunding service that aims to solve social problems through emergency assistance to those who cannot pay medical expenses, and DriveU is a vehicles- and drivers-for-hire app that connects people looking for drivers with those offering their services. These and many other unique services are being offered by startups in the country.

Example: Helsinki Region Infoshare (HRI) Since 2010, Finland has been operating the HRI program, an open data project centering on metropolitan Helsinki. The project went formally online in 2013. As of 2020, it offers 644 data sets and 174 APIs, with 262 services available. Companies using the above include intriguing new service providers gaining global ground, such as Blindsquare, a GPS app which offers audio route navigation for blind users, and Whim, the world's first Mobility-as-a- Service (MaaS) app. The latter allows for searching and paying for the optimal transit route by combining options offered on a single app, like buses, taxis, bicycle sharing, and car sharing.

Digital technology has continued to become more important to society since the introduction of computers in the 1950s. Fujitsu, for its part, has been deeply involved in the growth and development of technology since the dawn of computing. Now, in the twenty-first century, technology has gone beyond simply growing the industry, and is attracting great attention as a means to transform not only the lives of individuals but also social systems as a whole. Instrumental in this approach is the use of data in ways like those described in this section. Going forward, we must consider how to use data in a user-centric manner to develop new social value.

The most successful transformation programs, whether their focus is organizational or societal, are leveraging a range of digital technologies to help enable their transformational vision. These enabling technologies typically combine connectivity and data in a way that supports human beings to lead better lives. Digitally enabled transformation is likely to depend on a range of technologies rather than a single solution. These can include web-based applications, cloud services, smart devices, and IoT making use of the growth of connectivity. Digital transformation is predicated on the introduction and increasingly extensive use of automation with robotics, machine learning, and AI.

It is this latter technology that has grown enormously with the advent of greater storage and processing power to cope with ever increasing volumes of data and network speeds that allow the data to be gathered from multiple sources. Implementation of AI as a standalone project will not deliver the wider transformation possible when contextualized with a design mindset. In the next section, there will be a focus on AI as a means to explore the respective roles of technology and design.

2. The Rise of AI: Evolution and Future Scenarios

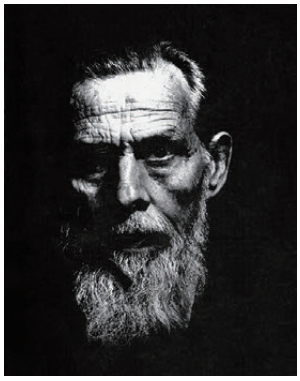
2.1 Introducing Artificial Intelligence

AI has brought about radical technological transformations in our time and is an important avenue of innovation for Fujitsu. Today, AI is generating benefits for users, creating new business opportunities for companies across different industries and countries, and opening up new scenarios for digital transformation. Fujitsu explores how the application and development of AI technology can effectively be used to foster digital transformation and bring about change in the economy, culture, politics, and more.

AI is related to the study of machines that are able to both make decisions and act like human beings. Today, digital entities are able to learn and process information through observation, reading and processing text, and engaging in a dialog with other entities.

The first time the term AI was introduced was in 1956 by John McCarthy, even though the first artificial neuron had already been created in 1943 by Warren Sturgis McCulloch and Walter Pitts.

1



2

3

1. John McCarthy
2. Warren Sturgis McCulloch
3. Walter Pitts

Following a growing interest in this field, in 1950, researchers started to discuss if machines were capable of thinking. Between 1966 and 1979, the first tangible results in the context of AI were achieved, though there were still significant limitations in its ability to interact with the environment.

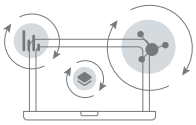
AI entered the industrial world in 1980. Its objective was to simplify and reduce manual labor, save money, and increase productivity. Finally, in 1995 intelligent agents were invented, allowing machines to respond to their environment.

Nowadays, the wide array of AI algorithms can be summarized into eight classes of solutions:

Intelligent data processing used to extract information from the analysis of both structured and unstructured data to initiate actions.

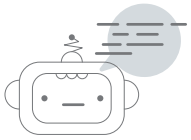
Virtual assistant or chatbot, i.e., software agents able to perform actions and/or provide services to a human interlocutor through commands and/or requests received through interaction in natural language.

Eight possible AI solutions



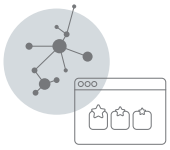
Intelligent data processing

01



Virtual assistant / Chatbot

02



Recommendation engine

03

Image processing

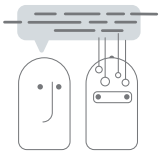
04

Autonomous vehicles

05

Intelligent objects

06



Language processing

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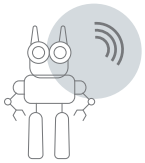


Autonomous robots

08

Recommendation engine that start from the analysis of user information to orient and direct user preferences

Image processing, which extracts information from an image or video to allow users to recognize people, animals, and objects in it

Autonomous vehicles, which concerns self-driving vehicles circulating on roads, seas, lakes, and rivers, and in flight

Intelligent objects, which represent objects capable of performing actions and making decisions without requiring human intervention

Language processing, which concerns language processing solutions based on input data or documents

Autonomous robots that concern robots able to move by themselves, manipulating objects and performing various kinds of actions without human intervention, and being able to adapt to unforeseen or coded events

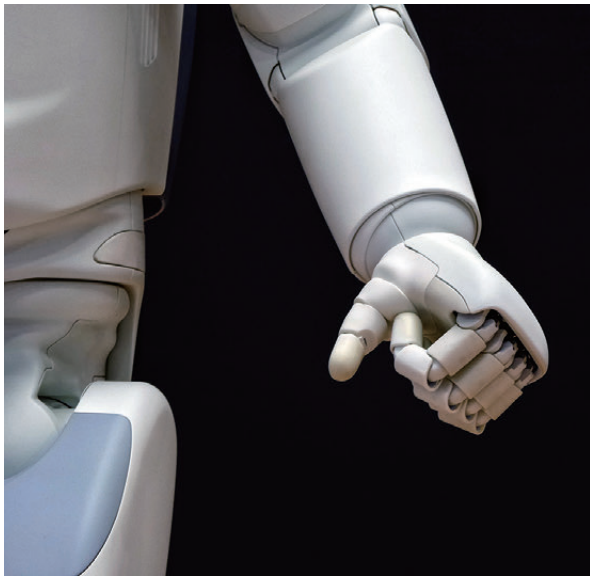
AI represents one of the most radical technological evolutions in our time. The introduction of the different forms of solutions AI enables is also thanks to the acceleration of innovation. The time between technological inventions and their adoption is getting shorter and shorter. Some views advise caution so technology doesn't get out of hand. At the same time, more optimistic views claim that AI could aid humanity in tackling some fundamental challenges and that it could even expand and augment the capacity of human beings.

AI mimics human behavior in different forms:

Narrow AI is the only type of AI that is commonly employed today and it refers to AI trained to perform a specific task (e.g., playing chess, providing travel recommendations, or analyzing symptoms).

General and super AI refer to types of AI that can mimic entirely or even surpass the intellectual skills and self-awareness of human beings. In particular, while super AI is still regarded as a somewhat unrealistic idea, general AI is regarded as a much more concrete possibility.

It is important to look ahead and imagine how technology might affect our lives in the future, so we may be more prepared to use it for the best and handle the transformations that come with it.



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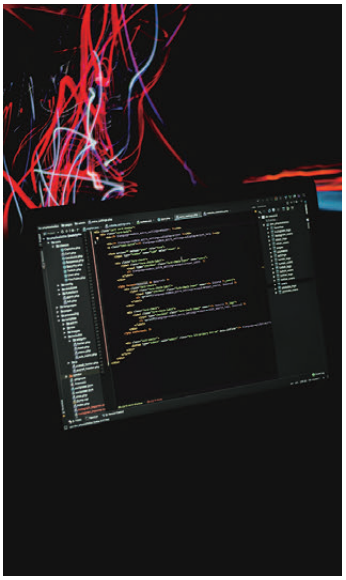


2

1. Artificial intelligence

2. Machine learning

2.2
AI: State of the art

The most important abilities that regulate modern AI systems are machine learning and deep learning.

Machine learning is the ability to analyze large data sets to establish a set of rules that enable the system to perform a certain task correctly over time. A classic example is teaching an AI to identify a certain object (e.g., a dog) by feeding it a huge number of images of that object, rather than trying to program its ability to detect the object correctly.

Deep learning is a subset of machine learning, and it takes the learning abilities of AI one step further. When fed with new data, the system doesn't just learn how to produce the correct output; it learns to improve outcomes by repeating a task and weighing and adjusting variables, and it trains the network to react like a human brain.

While machine learning and deep learning describe how an AI system learns, they don't necessarily define the way in which AI is applied or the purpose it serves. When dealing with certain kinds of data (such as images, text, or voice), it is necessary to employ specific AI capabilities, like the following:

Speech or voice recognition and natural language processing identifies and makes sense of words and voices, along with the ability to produce content in human languages.
Example: Replika chatbot (https://replika.ai/) is described as a personal companion that a user concerned with mental wellness can message and talk to.

Computer vision and image processing identifies, processes, and manipulates visual data.
Example: the Google Translate app is able to recognize a foreign language and augment the image to overlay an accurate translation.

Generative adversarial networks (GAN) are deep learning, generative model frameworks.
Example: painting with the GAN from the MIT-IBM Watson AI Lab (https://gan-paint-demo.mybluemix.net/) is better described as painting with neurons.

2.3
AI: Business opportunities

AI creates an opportunity to further accelerate the growth made possible by the digital revolution of the last few decades. Compared to traditional firms, digital companies have often achieved higher productivity and profitability: even though they employ fewer people, they tend to enjoy higher market capitalization and higher revenues per employee, thus creating more opportunities to invest in innovation. AI is very likely to make this growth exponential and therefore likely to be a key asset for companies to stay competitive.

Today, AI is already being applied in a variety of different contexts and industries. While it improves back-end operations, it is also successfully employed on the front end. What most of these different applications have in common is the possibility to delegate manual or repetitive tasks to AI, freeing people from such chores and allowing them to focus on other, more creative or strategic tasks. While it is impossible to give a complete picture of the (endless) possibilities of AI, some key trends and macro-opportunities can be identified:

Human capital management (HCM): AI can enhance operational decision-making processes to support building stronger teams.

Example: AI can assist in hiring to build and manage a better workforce, either recruiting new talent or supporting decision making by quickly screening and identifying qualified candidates. However, skewed past data may cause ethical problems.

Human labor replacement: Robotic process automation with AI can supplement a human workforce.
Example: Factory automation could mean machines scurry across factory floors to deliver parts and packages.
Example: Banking or financing programs can automate administrative duties like accounting or payroll.

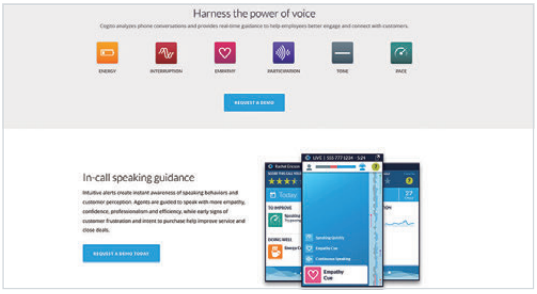
Market intelligence: AI can enhance internal decision-making processes and company operations.
Example: A basic AI-based data collection methodology (that is, surveys) can enable a better understanding of the state of the market. Executives can better keep track of goals and performances to make more informed decisions.

Enhanced customer service and service operations: AI solutions are being employed in customer management as a way to increase capacity, but also to improve the quality of customer care and utilize it as an asset for the company.

Survey

Example: D.FI is an AI engine integrated into service desks, which analyzes and interprets service tickets using the natural language algorithm before routing to service agents with recommended actions.
https://www.i-cio.com/strategy/big-data/item/leveraging-ai-to-automate-the-it-service-desk
Example: Cogito is an AI application for customer service centers. It analyzes voice signals in phone conversations and provides support to agents to increase the quality of each call.
https://www.cogitocorp.com/solutions/customer-service/

More personalized UX and ability to leverage customer insights: An AI allows for hyper-personalization of services.
Example: Spotify and Netflix use algorithms to predict user preferences. It studies the past interactions of users, tagging the typologies of preferences and then offering what can result as similar.



Cogito customer service solution

Recommendations system on Netflix

A new wave of transformation is about to take place, but companies will need to realize that becoming AI based is more than just sprinkling a bit of intelligence on existing products or processes, just like having a website or app does not necessarily make a company truly digital.

Rather, the real transformation lies in the ability of a company to harness the potential of a certain technology to serve a greater vision and strategic purpose, not only to achieve increased productivity or greater efficiency. AI will not only transform the products and services that companies put out into the world, but it will require organizations to transform themselves as well.

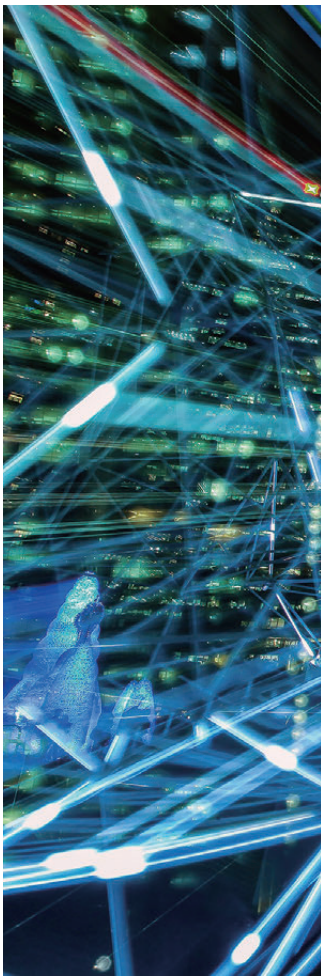
Over the last several years, a debate has raged about certain jobs potentially disappearing as manual tasks are increasingly performed by machines. However, new skills will be needed to design and implement intelligent systems. The challenge will mostly lie in the speed of such a transition, as an abrupt change may exclude a significant number of individuals from the job market.

3. Innovating with AI and the Role of Design

AI is one of the most radical technological evolutions of our time and represents an interesting source of new opportunities in the field of services as well. Service providers who have pursued this opportunity have faced the need to come up with new interaction models and even create new physical touchpoints (e.g., Amazon Echo) to enable this type of exchange, which is based increasingly on conversational models, either verbal or textual.

On one hand, this proliferation of touchpoints provides people with more opportunities to interact with a service in a more personalized way. On the other hand, it increases the complexity of the design activity. The employment of AI poses even more articulated challenges and considerations. These, more specifically, include the following:

Amazon Echo



Users are faced with new and unfamiliar interaction models, and designers need to take into account new usability challenges related to AI but also the psychological perception of this technology.

Other service actors (employees involved in the delivery of the service) may find themselves working side by side with AI and may face similar challenges to those encountered by users.

Designers need to build a basic understanding of the capabilities and logic of AI and work hand in hand with developers to create meaningful experiences around this technology.

New design skills are needed for the creation of voice- or text-based conversational interfaces, and designers need to receive dedicated training.

All practitioners involved in the creation of AI-enabled solutions need to work within a shared ethical framework that helps them to map out the implications of their design decisions and act accordingly.

Artificial intelligence

4. The Ethical Challenges of AI

The topic of the ethical implications connected to the use of AI is huge and controversial. Different perspectives and actions are adopted in different parts of the world. Ethical challenges related to AI should rely on a clear definition of it and are connected both to the application of this technology and to the ownership and management of data on which AI relies.

People are frightened of adopting AI solutions because of the uncertainty they feel about the management of their data. There are many instances where people refuse to adopt virtual assistants at home like Alexa and Google Home due to the fear of being constantly listened to. In the same way, a lot of people were perplexed and frightened at first by Google and other platforms' collection and storage of data.

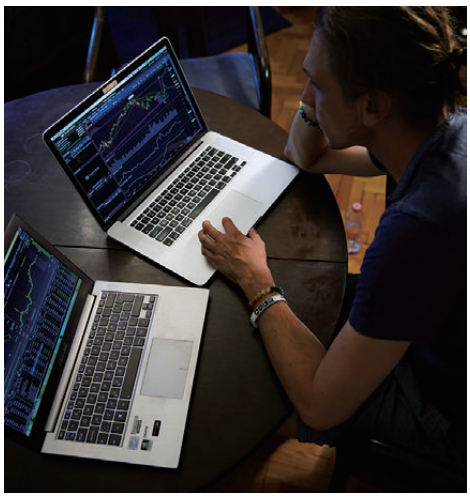
While discussing AI applications that require human interaction, it is important to keep in mind the principles of the Belmont Report, which include three key requirements:

The personal autonomy of people is not violated.

Benefits coming from the interaction with the technology outweigh the possible risks associated to the interaction.

There is no discrimination in the distribution of benefits and risks among people.

Use of data



From this perspective, one of the actual ethical challenges of AI is making it transparent. Transparency is linked to the possibility to unpack the processes of the AI and make them visible. It is also related to disclosure of ethical principles, hard evidence, source code, and other information that establish the credibility of the developer of the AI solution and the solution itself.

It is important to avoid creating *black boxes*: exposing the complexity behind AI systems is in many cases the only way to verify whether guidelines have been followed and whether the team who designed the system has taken into account certain ethical principles and turned them into decisions.

Beyond transparency, some of the most common AI-related guidelines are as follows:

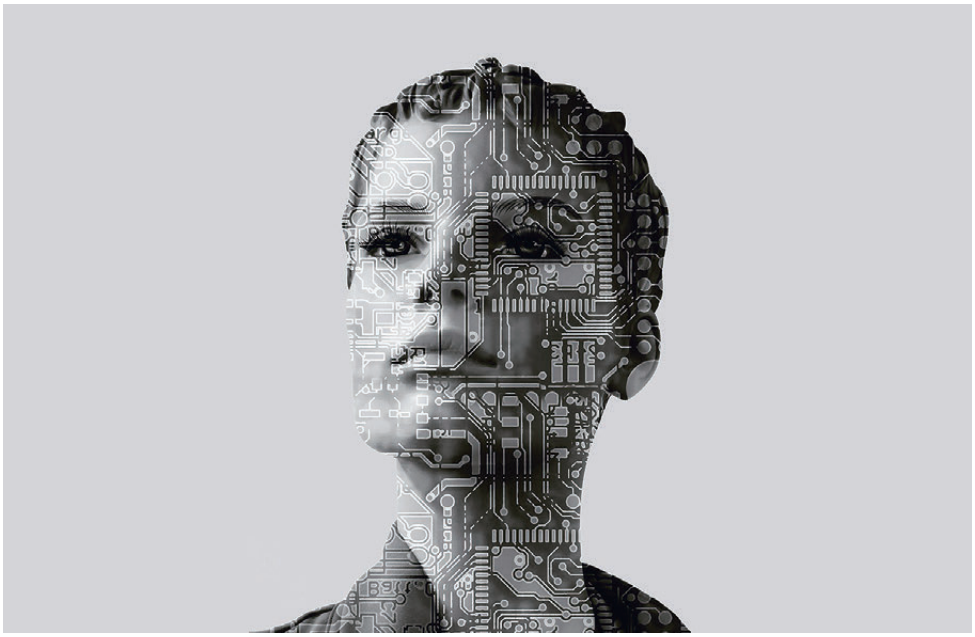
Reliability and non-maleficence: It is possible to trust the judgment of the AI, the inherent effectiveness of the system, and its algorithms and potential to prevent mistakes. The concept of reliability and non-maleficence also refers to the purpose for which the AI is used and its never being employed in situations where it can cause harm to others. Moreover, some guidelines stress the importance of using AI for the common good.

Fairness: The AI is able to avoid bias and discrimination of any kind. This aspect is also largely dependent on the data sets the system is being fed, which may be very effective for application on certain sociodemographic groups but not others (Case in point, health-related applications of AI mostly rely on data from the Western world).

Privacy: The AI system respects personal information and the fair and transparent use of this data.

Protection of autonomy and human self-determination: The AI is prevented from posing a risk of creating unwanted influence on human behavior to the point that the final decision is no longer in human hands. This potentially relates to important social or political matters as well.

Among the different organizations in Europe that regulate the adoption of AI, the European Commission



Artificial intelligence

released a report, *Building Trust in Human-Centric Artificial Intelligence* (2019), that sets the ground for a human-centric employment of AI. The report lists seven key requirements that should be respected:

- Human agency and oversight
- Technical robustness and safety
- Privacy and data governance
- Transparency
- Diversity, non-discrimination and fairness
- Societal and environmental well-being
- Accountability

Despite different principles and regulation norms, the main challenge lies in how data is interpreted and applied, which is influenced by sociocultural differences as well.

Distributed agency comes with distributed responsibility: as stated earlier in the chapter, all practitioners involved in the creation of AI-enabled solutions need to work within a shared ethical framework that helps them to map out the implications of their design decisions and act accordingly. This poses an unprecedented challenge, since classic ethical frameworks mostly focus on individual actions, while there is now a need to define the concept of shared responsibility.

Some key aspects a sound ethical framework should address include delegation (how tasks are allocated between humans and machines) and responsibility (who is responsible for which outcome).

Delegation can have, in fact, negative consequences, especially when there isn't an opportunity for humans to intervene and potentially correct the behavior of the AI before its outcome is effective.

Building on their human-centric focus, Fujitsu has recognized the importance of anticipating and eliminating the unwanted side effects of AI and has established the "Fujitsu Group AI Commitment," a document outlining Fujitsu's core AI-related principles:

- Provide value to customers and society with AI.
- Strive for Human-Centric AI.
- Strive for a sustainable society with AI.
- Strive for AI that respects and supports people's decision making.
- As corporate responsibility, emphasize transparency and accountability for AI.

Key Takeaways

1. Why Digital Transformation Today?

In the twentieth century, **digitalization revolved around developing technologies to address *solutions***—whether it is to ease human labor or improve analog technologies. This solution-based approach may be identified in closed relationships in specific domains (such as within companies or communities).

Today in the twenty-first century, **digital technology is a means to foster transformation** to not only improve the lives of individuals but to also consider larger systems in society and generate new social values. This transformation-based approach presents **open relationships** that take into account wider domains and their evolution.

Digital transformation may generate social value through two main approaches that rely on the effective use of data collected by digital technologies. The first approach is to **continuously update and improve UX based on the data collected,** and the second approach is to **employ such data when developing public infrastructure** that better serves citizen needs.

2. The Rise of AI: Evolution and Future Scenarios

AI is related to the study of machines that are **able to both make decisions and act like human beings.** Digital entities should be able to learn through observations, reading and processing text, and discussion with others.

AI is fully **employed in market intelligence,** enhancing internal decision-making processes and company operations.

AI solutions are increasingly being employed in **enhancing customer service and service operations,** improving the quality of relationships and filtering customer issues.

AI allows for the possibility to process a lot of customer data, delivering a personalized UX while creating new scenarios of hyper-personalization.

There are many concerns about the increase in unemployment caused by the reduction of jobs for humans, who are replaced by machines. But **new roles and jobs related to AI will emerge** and be in high demand.

3. Innovating with AI and the Role of Design

Users are faced with new and unfamiliar interaction models. Designers need to take into account **new usability challenges related to AI** but also **the psychological perception of this technology.** It is necessary to **design conversations among humans and machines.**

Designers will progressively need to learn how to design for **open-ended and, at times, not fully predictable interactions.**

Designers need to build a basic understanding of the capabilities and logic of AI and work hand in hand with developers to create meaningful experiences around this technology.

4. The Ethical Challenges of AI

Ethical challenges related to AI are connected both to the **application of this technology and to the ownership and management of data** on which AI relies.

"Fujitsu Group AI Commitment" emphasizes **transparency and accountability** of AI.