COMPUTER ENGINEERING SERIES

Internet of Augmented Me, I.AM

Empowering Innovation for a New Sustainable Future

Patrick Duvaut, Xavier Dalloz
David Menga, François Koehl
Vidal Chriqui and Joerg Brill

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Forewords

Gary Shapiro, President and CEO, Consumer Technology Association (CTA), USA

Thanks to the rise of tech-friendly leaders and initiatives such as La French Tech, French innovation is making its mark on the world. Each year at CES® - the world's largest, most influential technology event - I'm blown away by the creativity and sheer style of the innovations that French companies exhibit. And I'm increasingly impressed by the steps France has taken to promote a strong tech ecosystem - whether it's permitting companies to test self-driving vehicles on the nation's roads and highways or creating a work visa designed to attract top tech talent from around the globe.

This book exemplifies the growth of French innovation we've seen in recent years. At the center lies what the authors call "the Internet of Augmented Me" - a phrase that summarizes the complex relationship between human choice, digital solutions and environmental factors that will drive our future. I'm excited to see what will happen in the world of French innovation over the course of this decade.

As sister democracies, committed to personal liberty and self-determination, the United States and France share a long and proud history. We must remember this history as the pace of technological and political change continues to increase. Isolationism is not rational in a world where people can share ideas, information and stories with a few swipes, taps and tweets. By recommitting ourselves to our nations' ideals, we can create a global tech ecosystem where everyone - regardless of where they come from or how they identify - can grow and thrive.

The authors bring together a remarkable array of ideas and examples - giving you an image of what the future can and should be. This book is a great way to kick off the 2020s - a decade that, as these pages show, is full of possibilities and opportunities to make our world a safer, stronger and more sustainable place.

André Joffre, President, FNBP (National Federation of Banques Populaires) and Michel Roux, General Director, FNBP, FRANCE

It is a great honor that the authors wanted Banques Populaire to preface this book. Banques Populaire is the fruit of a humanist movement that pushed, at the end of the 19th Century, small artisans and traders to pool their savings to come to the aid of those of them who could not have access to credit, then reserved by traditional banks only for large industry.

The French spirit likes to question established orders and Banques Populaire has been nourished by this audacity of transgression, of a form of protest cooperation, which pushes to innovate and to undertake. It also made the choice of cooperative status to exercise its activity because it highlights relational, geographic proximity and long-term vision. Thus, year after year, it reserves more than 85% of its results, thus creating a new form of mutualization through three means of solidarity: intergenerational, intersectoral and inter-territorial.

We find this same spirit in the Internet of Augmented Me (I.AM). It places the human at the heart and it consecrates the advent of the convergence of digital, ecological, environmental, societal, educational, ethical, economic, industrial transitions and health.

I.AM lays the foundation for new industrial, societal and economic models from the Covid-19 era.

The authors also outline the ways for a new era for France, which must be fully aware of its very great capacity:

– to foster new creations of values that increase and protect humans;

– to build the elements of trust essential to the creation of transversalities and allowing joint work;

– to reinvent a lot of our daily lives for a better world.

Creativity and innovation are part of the solutions and France is sitting on a heap of gold.

Thanks go to I.AM for reminding us!

Pascal Faure, Director, INPI (National Institute of Intellectual Property), FRANCE

The world has never changed so fast! Across the planet, the 20th Century saw the birth of a very new way of life, in a context of extraordinary and increasingly globalized innovation in every sector.

France, which was ranked second-most innovative European country in 2019 by the European Patent Office and Europe in general, has substantially contributed to the change, driven by two factors. First, a strong industry in many important fields such as transport, space, energy, telecommunications and chemistry. Second, a tremendous display of skill and success in the new technology sector, especially digital and biotech, proudly vindicated by France today with the massive mobilization of people and resources around what has become the so-called “Start-up Nation” and, more generally speaking, “French Tech”.

Such rapid progress on an unprecedented scale has raised new issues of unparalleled complexity. We are at the dawn of a century that holds great promise but also carries enormous risks if we are not able to contain the technological race within a humanist perspective.

We are faced with new expectations - technological, environmental, societal and ethical - and new constraints, which cannot be dealt with separately but must be addressed in an overall approach.

In the forthcoming decades, humanity must take up challenges that are immense and perhaps even existential. Only the structured acquisition and convergence of knowledge will enable humanity to control its future.

Our thanks go to the authors who have shared their reflections on these essential topics. They rightly stress the need to trust in new pathways to adopt the decentralization and collaborative approaches required for our increasingly complex economies. Ultimately, they remind us of an obvious but often hidden truth: intangible assets have become the necessary basis of our evolving world.

Wai Keung Eric Leung, Vice President, Innopark Shenzhen, Founder and COO, Shenzhen XY Interactive Technology, CHINA

The masterpiece I.AM tackles the challenges of redefining growth in the era of innovation and showcasing of the realization of digital value.

The insight gained as a result of the I.AM has underlined the genuine digital value by emphasizing the importance of decentralization, the major role of Blockchain technology, as a whole.

This includes the augmentation of the digital entanglement (the visible inside of the invisible), with I.AM representing the digital “a la carte” guide and the architecture of the future mirror world. Government and industrial leaders, etc. shall act together in an artistic manner with the great predictive intelligence.

Prof. N.K. Goyal, President, CMAI Association of INDIA, Chairman Emeritus, TEMA, INDIA

I am very happy to see this book!

Compliments to the six co-authors, this is a most wonderful, enlightening and updated book on the subject. The digital world has changed the way we live and work. Everything is going towards Digital. Increasingly, it looks like humans will become irrelevant and technology will take over everything in human life. This has brought in related issues of data privacy and security and cyber diplomacy. There is technology greed over human aspirations, relations and respectability.

I am sure that this book will be a revelation for stakeholders and will help in framing appropriate policies for Digital economy in the world.

Introduction

We are at the dawn of a new era, the “Internet of Augmented Me”, I.AM.

I.AM catalyzes the “convergence for good” of three worlds - the biological, the physical and the digital, helping us to better tackle the toughest challenges of the 2020s: climate change, resource depletion, an aging population, social inclusion, the empowerment of people and World health crises, such as COVID-19.

People expect to be ethically augmented and cured in a trustworthy manner, while having the final say, giving a genuine sense to their life on a sustainable planet.

As Bill Gates puts it, “Technology is unlocking the innate compassion we have for our fellow human beings.”

This is exactly what I.AM deals with. Gary Shapiro, President and CEO of the Consumer Technology Association (CTA) inspired I.AM. The six co-authors are from very diverse backgrounds - industry (Airbus, EDF), start-ups (BTU), consulting (Tasmane), academia (IMT France) and non-profit organizations (Mission CES France) - and they present, in a sharp and comprehensive manner, every angle of I.AM: humans, society, ethics, trust, economics, opportunities, technology, industry and so on.

This book dives into disruptive concepts of I.AM, such as: Trust as a Service, Business as a Game, ATAWAD (AnyTime, AnyWhere, Any Device), Productivity of Collaborative Exchange (PCE), Unimedia, Shazamization of everything, decentralization of everything, BOTization and Build to Order for Me, Blockchain and Empowerment of Me, edge computing, augmented industry, augmentation value chain and Empowering Innovation, etc.

The fluid, easy-to-read style of this book targets the broadest scope of readers, from purpose-driven and business-oriented individuals, to students, researchers, experts, innovators, consultants, managers and politicians, all eager to empower people to work towards a more sustainable future.

Enjoy reading it!
June 2020

About the Authors

Patrick Duvaut *(Book's initiator and coordinator, Chapter 6)*

Patrick has more than 20 years of international experience (USA, Japan, India, China, and France) as Head of Innovation for large companies, public organizations and start-ups worldwide with core business in telecommunications and digital. Patrick has written four books and more than 200 papers. He owns 70 USPTO patents and three international standards. He is currently involved in frugal, scalable and sustainable blockchain and AI to tackle 21st Century challenges (world health crises such as Covid-19, aging population, social inclusion, people empowerment, resource depletion and climate change). Patrick graduated from École Normale Supérieure, France (MS in Physics and PhD in Statistics) and MIT-USA (Post-Doc in Statistics). He is currently Head of Innovation at IMT France.

Xavier Dalloz *(Chapter 1)*

Xavier has headed the consulting firm Xavier Dalloz Consulting (XDC) since 1993. For more than 30 years, Xavier has performed strategic consulting activities on the use of new technologies in businesses for competitive advantages. Xavier works for some of the largest French companies such as Renault, Air France, Louis Vuitton, L'Oréal, Allianz, La Poste, EDF, ENGIE, BNP Paribas, etc. Since April 1995, Xavier has written a report (40 pages) every month on the same analysis grid. In this report, Xavier analyzes the main issues of "digital" innovations.

David Menga *(Chapter 2)*

David is a research engineer at EDF Lab Paris-Saclay. He is interested in the design of services for smart homes and smart buildings. He is an expert in embedded systems, AI and blockchain. He has been participating in the CES for 16 years and is familiar with the world of high tech. David organizes seminars at the École Polytechnique on the impact of technologies in everyday life. With Professor Nobuo Saito of Keio University, he has co-edited a book entitled *Ecological Design of Smart Home Networks: Technologies, Social Impact and Sustainability.*

François Koehl *(Chapter 3)*

After several years in IT services, François created and developed a strategy and management consulting firm over 17 years before integrating it into one of the large French audit firms, Mazars. After the end of the integration phase, François joined Tasmane in 2019 to focus on “strategies in a digital world”. He gives advice to CEOs and CIOs of middle size companies and large groups on their challenges regarding transformation, digitalization, innovations and change of business models.

Vidal Chriqui *(Chapter 4)*

Passionate about Bitcoin since 2011, Vidal is the inventor of BTU Protocol, the first peer-to-peer booking and transaction protocol. BTU Protocol empowers businesses to engage directly with consumers, thus allowing them to take back control of their physical and digital distribution. Vidal is sharing his passion for decentralization and tokenomics as a regular speaker but also as an academic teacher and startup advisor.

Joerg Brill *(Chapter 5)*

Within his role as Head of Plants and AIT Spacecraft at Airbus Defence and Space, Joerg Brill is responsible for the Pre-FALs, aero- and space structures production and MAIT

(Manufacturing, Assembly, Integration, and Test) of space systems. In addition, he is in charge of performance and improvement for the overall production for Airbus Defence and Space, spread over 13 sites in five countries. Joerg holds a Master’s Degree in Aeronautical Engineering from the Technical University of Munich.

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1
With the Internet of Augmented Me, a New Wave of Innovation is Coming, Which Will Change Everything

> “We always overestimate the change that will occur in the next two years and underestimate the change that will occur in the next ten.
> Don’t let yourself be lulled into inaction.”
> Bill Gates

1.1. The Internet of Augmented Me: new technologies, new jobs, new business

The IoT (Internet of Things) universe is exploding. Just look around and see the smart gadgets, clothing, cameras and virtual assistants that populate homes and are carried by people on their travels. The number of IoT devices connected to broadband networks is already significant, but it is far from having reached its maximum.

According to the main forecasts, 22 billion devices will be connected to the Internet by 2025, which is three times their number today.

For companies, the goal is to get a competitive advantage using these objects with the network effect: increasing the number of people or participants who are exposed to the objects or service can increase the value of the company, goods or services.

The explosion of this market has a very positive side as it will provide consumers with new services and commodities. However, it will also bring new business models, as well as a new complexity and security risks, which could prove to be devastating for millions of people who will, increasingly, rely on digital services and networks in their daily lives.

In this context, all connected objects must have their own digital representations, i.e. *digital twins*, with the following properties:

– *unicity of identification of each object:*

- the possibility of identifying each object is a fundamental notion of the IoT. Each object should own and know its identity in order to evolve in the network,

- each object should be a *legal actor* in its own right,

- the assignment of identifiers should be programmable;

– *suitability for its environment and its context of use*:

- an object must be able to report its status and communicate data collected about its environment: temperature, humidity, vibration level, noise or geolocation;

– this new infrastructure should be *proactive, seamless and "scalable"*:

- objects must be permanently connected to the Internet, if possible, or at least when a connection is available,

- TaaS (*Trust as a Servic*e) is at the heart of this infrastructure. *The Internet will be a trusted third party*;

– the digital twin of an object must combine its real and virtual aspects (be "phygital"). The aim is to have the best aspects from each space to create a much more complete and satisfying customer experience:

- a twin is constructed so that it can receive input from sensors, gathering data from a real world counterpart. This

allows the twin to simulate the physical object in real time, and, in the process, to offer insights into performance and potential problems,

- a twin embodies the possibility for a program to act on behalf of a physical object to which it is attached and of which it is perfectly aware,

- a twin should evolve with each transaction,

- twins will be integrated in a *"smart wallet*", i.e., a software application that serves as an electronic version of a physical wallet;

– *autonomy based on a decentralization* of everything:

- objects will behave like robots,

- objects are treated individually from an isolated point and are operated independently of a remote control,

- *there must be no central intelligence* controlling the totality of individual objects in a totalitarian way. On the contrary, each object is in some way autonomous and independent, with the ability to be interrogated and to interact with other network objects when necessary. In short, objects in the IoT should be *independent and communicating agents* (in the sense of AI and operating systems).

The Internet of Augmented Me (I.AM) is necessary for the business model of the IoT. The characteristics are perfectly described with the following Chinese proverb:

– *Tell me and I'll forget*. This is at the heart of *mass marketing*.

– *Show me and I'll remember*. This is at the heart of *segmented marketing*.

– *Involve me and I'll understand*. This is at the heart of the *business model of the IoT.* Every customer is a market. The

dialogue between the companies and their clients becomes real, and ethics are at the heart of the winning business models. The companies cannot lie anymore.

With the Internet of Augmented Me, the complexity of devices plays a secondary role because users work with their own digital assistants for all their daily tasks, which cover both the physical and digital worlds.

So hyper-personalization and citizen/consumer involvement are at the heart of the Internet of Augmented Me business model. The answer to the hidden expectations of the consumer citizen is at the center of value creation (contextual marketing). In this context, there will be a massive decentralization of collaboration between citizens/consumers, the AI environment (enhanced intelligence) and secure transactions with the blockchain to facilitate this involvement and training just in time.

A new wave occurs in the digital world every 10 years, with new innovations, breakthroughs, applications and new issues that concern a wider audience each time:

– 1944: the first computer;

– 1954: the first mainframe;

– 1964: the first mini-computer;

– 1974: the first microcomputer;

– 1984: the Macintosh;

– 1994: the first navigator with Mosaic;

– 2004: social networks;

– 2014: the Internet of Augmented Me;

– 2024: the brain to X (interaction of the brain with its environment).

The main features of the Internet of Augmented Me are as follows:

– goal:

- hyper-personalization and *citizen/consumer involvement* are at the heart of the Internet of Augmented Me business model;

– how:

- anticipation: answering to the latent expectations of the consumer citizen is at the center of value creation (*contextual marketing*);

– method:

- (1) key role of the *massive decentralization* of collaboration between citizens/consumers, (2) *AI environment* (enhanced intelligence) and (3) securing transactions with the *blockchain* to facilitate this involvement and training just in time;

– competitive advantage lies in collaboration and data sharing:

- *collaboration* is everywhere. It is at the intersection of humans and machines, between machines, and between humans. Humans and machines must work better together: P2P, M2M, M2P, B2M, etc.,

- *citizen/consumer access to all the services* they need, when they want, wherever they are and with the available equipment. This equipment can be a computer, a TV, a phone, a tablet, a watch, a game console or a multimedia device;

– valuable creation:

- key role of *brands*, whose valorization is the result of collaboration, which can only make sense if the parties involved are interdependent in one way or another. Their

effectiveness depends on a compromise between the actors concerned to produce solutions that none of them could obtain if working independently. In this way, the actors all depend on each other to find mutually beneficial solutions. The goal is to improve the productivity of these exchanges. The PCE (*Productivity of Collaborative Exchange*) will be a very strategic indicator of the quality of this collaboration;

– business model:

- it resides in the capacity to create intangible capital and to have an apparent financial surface more important than it is, with regard to the results;

- *key role of* data and algorithms:

- the algorithms go to the data and not the other way around.

With the Internet of Augmented Me, the *asymmetry of information* has been equalized in the sense that it becomes favorable to the citizen/consumer who gains bargaining power. Tools such as blogs, forums and recommendation sites give viewers access to more information, especially the buying experience of citizens/consumers.

With the Internet of Augmented Me:

– a company sells a product, but a citizen/consumer buys a service and beyond that a UX. An object is no longer bought for its primary function but for the services it renders;

– there is a main difference with traditional business models: customers get involved and ask to be rewarded for their work;

– robot coaches and assistants of all kinds will become widespread;

– enterprises are increasingly redesigned to transform businesses in *platform companies*;

– *predictive intelligence* will be at the heart of the competitive advantages of the companies.

The success of the Internet of Augmented Me is also the result of multiple interaction opportunities between companies and their customers, which will create *new challenges for companies*:

– companies must synchronize their communication across all channels and deliver the most relevant content for each of their citizens/consumers at the best time and through the most effective channel;

– they must reinvent the customer relationship and put the consumer at the center of their strategy;

– they must transform unique transactional relationships into a long-term, permanent interaction with more frequent interactions;

– they must get a recurring revenue stream, while customers exchange a single capital expense for a tailor-made solution that can be increased or reduced as needed, while gaining support and quality service;

– they must reason in terms of flows, exchanges, interactions, collaboration and not stocks, which means, in particular, that a company does not own its employees, suppliers and customers.

The IoT facilitates this transition by adding sensors to its products as well as accurate, cost-monitoring devices. This provision of historical and real-time data enables the creation not only of automated alerts and preventive maintenance, but also of predictive maintenance and predictive well-being.

We will move from the traditional product-based approach to a marketplace approach. The goal is to deliver optimal value to consumers via multiple ecosystems that will interact with each other. The goal is to interact with the consumers so that the producers will understand hidden expectations and create value after the sale of the product.

In this context, the value of an object is getting closer to 1 euro. The creation of value is the result of the implication of the citizens/consumers.

In this context, the subscription-based business model makes obsolete the loyalty programs of retailers based solely on prices. It is a way to enter the daily lives of consumers. Subscription can therefore be the gateway to services that encourage the purchase and use of new products. A good example is that of Nestlé, which offers a Nespresso machine against a subscription that will soon be a piece of the puzzle, alongside other channels such as personal assistants.

In data wars, subscription is a way to collect valuable information so that companies can better target customer expectations. Faced with the power of GAFA, it offers a competitive advantage to brands and retailers.

This new way of making business implies that more and more data must be collected from each transaction or process in real time. Any device equipped with processors can be connected to a network and can start broadcasting large amounts of information.

The major challenge for companies is therefore to understand how these interactions with citizens/consumers will create a competitive advantage for pioneers by focusing on network effects, and therefore on the Internet of Augmented Me.

1.2. Characteristics of the Internet of Augmented Me

It is important to understand the growing significance of seven concepts that are inextricably linked to the Internet of Augmented Me, in order to fully comprehend I.AM. technologies:

1) new way of building trust, Trust as a Service;

2) (digital) twin of everything (TWE);

3) interaction with objects, ATAWAD (AnyTime, AnyWhere, Any Device);

4) massive decentralization of everything and autonomy of objects;

5) unification of all the media (Unimedia) so that users will only have one interface and service continuity;

6) anonymous personalization;

7) robot coaches and predictive/emotional intelligence.

1.2.1. *Building trust and autonomy*

With the Internet of Augmented Me, an organization can be represented as a set of interactions that flow between internal actors and between the organization and its external stakeholders.

An organization can only live sustainably if it is perceived as creating sufficient value not only by the capital but also by current and potential customers, staff, suppliers and the society in which it operates. Otherwise, the conditions for sustainable viability are not met.

In this perspective, there is more value than that perceived by the “client”; it is at the heart of the Internet of Augmented Me. The true value of an object is not its cost