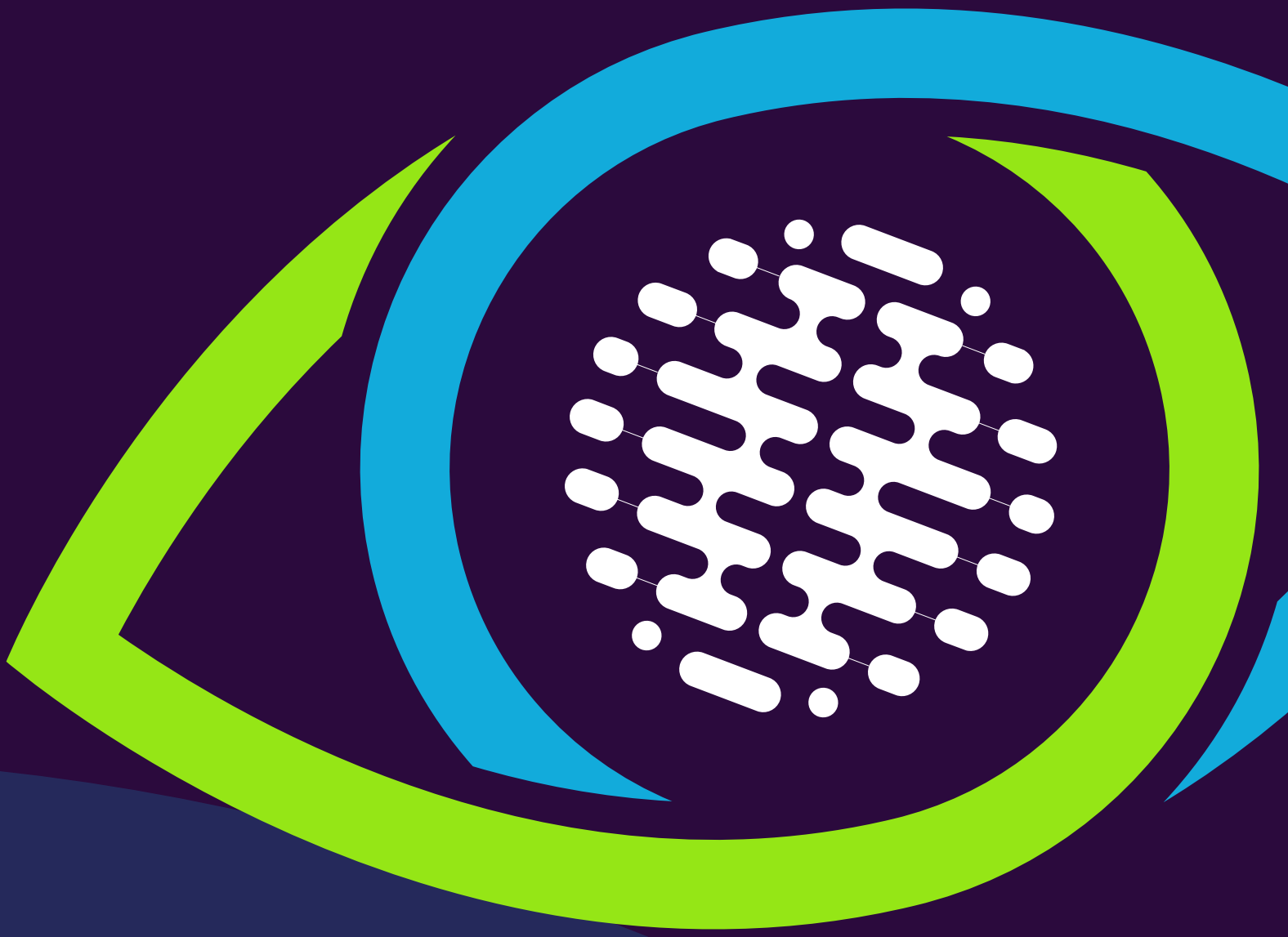
Capgemini



TechnoVision

The Impact of AI

2018

We introduce TechnoVision 2018, now in its eleventh year, with pride in reaching a second decade of providing a proven and relevant source of technology guidance and thought leadership to help enterprises navigate the compelling and yet complex opportunities for business. The longevity of this publication has been achieved through the insight of our colleagues, clients, and partners in applying TechnoVision as a technology guide and coupling that insight with the expert input of our authors and contributors who are highly engaged in monitoring and synthesizing the shift and emergence of technologies and the impact they have on enterprises globally.

In this edition, we continue to build on the framework that TechnoVision has established for several years with updates on last years' content, reflecting new insights, use cases, and technology solutions.

The featured main theme for TechnoVision 2018 is AI, due to breakthroughs burgeoning the democratization, applicability, and pervasiveness of this set of technologies. Indeed, AI is a spectacular example of rapid evolution affecting every other technology, from dynamic management at scale of the cloud, through to first line defense against ever-more sophisticated cyberattacks. It is a game changer in terms of impact, opportunity, and, it must be acknowledged, risks, for business.

To implement successfully in today's complex ecosystems, TechnoVision will increasingly be the focus of systems architects, as there is a growing need for enterprises to deal with the "constant of change" through a strategy for introducing and managing the impact of new technology in years to come. This means deploying the right technology from what can seem a bewildering array of choices, and through an architectural approach that delivers agility, security, and sustainability in line with business plans.

We believe that with TechnoVision 2018, you can further crystalize your plans and bet on the right technology disruptions, to continue to map and traverse a successful digital journey. A journey which is not about a single destination, but rather a single mission to thrive in the digital epoch through agile cycles of transformation delivering business outcomes.

With our best wishes and support for your journey,

Patrick Nicolet
Group Chief Technology Officer, Capgemini

TechnoVision releases have been following each other for 11 years now. This year's release is, on the one hand, a "midterm" update, but on the other hand, it zooms in on a breakthrough technology area with unlimited change potential: Artificial Intelligence.

Last year, we went for a profound rework: fundamentally new Design for Digital principles, many new building blocks, and the notion of "parallel twins" as our red thread, natural and artificial intelligence, reality and virtual reality, digital enterprise, and digital IT.

Our 2018 autumn edition celebrates our entry into the era of pervasive – or even invasive – artificial intelligence, the collection of capabilities and behavior by systems that are perceived by humans as intelligence. Looking at the exuberant interest and enthusiasm for AI around our clients, our professionals, the marketplace and our technology partners, we felt there could be no other guiding topic this year.

As this is a "midterm" release, we have simply updated all design principles and building blocks with fresh examples and new links (it was surprising to see how many links to technology solutions became "dead" within just one year).

But many of these updates relate to AI – or pave the way for AI. Additionally, we offer a perspective on AI and TechnoVision systematically checking all building blocks for the impact of AI. It demonstrates – better than slogans, claims, and propaganda – that AI is already fully applied in many different ways, triggering a new wave of business technology solutions. Trust us, there will be no next "AI Winter" anytime soon. AI already does, and inexorably will, disrupt and reform most aspects of technology, not to mention most aspects of business, and many aspects of our lives.

Next year, AI might even disrupt and reform TechnoVision itself …

If you are a novice to the TechnoVision universe, you may want to have a look first at our Overview of TechnoVision, starting at page 14, in order to have a full appreciation of the AI editorial. If you are a TechnoVision connoisseur though, a deep dive right into the AI editorial on page 5 may be just the right thing for you.

In any case, enjoy this update. May it brighten up your autumn days, deliver some sparks of inspiration for your 2019 digital innovation plans, and simply provide you with some good, compelling stories.

Ron Tolido
Executive Vice President, CTO
Capgemini Insights & Data

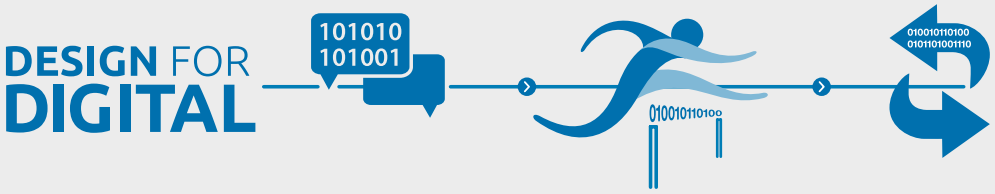
Pierre Hessler
Capgemini Fellow

TECHNOVISION & ARTIFICIAL INTELLIGENCE

When the AI story is told with the help of TechnoVision, it is multi-faceted and rich, and well-worth telling: it is more comprehensive and more nuanced than the ubiquitous AI boilerplate. It shows the value of examining each of the technology components – from the most general design principle, to the most specific building block – to understand, for that component, the meaning and impact of AI.

The results of this analysis are both expected – one knows that AI disrupts broadly – and staggering: out of 37 TechnoVision principles and building blocks, only 7 appear to be to a certain extent "AI-free," while 11 can already be looked at as potentially "human-free." The remaining principles all include AI in various ways of supporting, enabling, operating, and/or managing roles.

Our AI story starts with the Design for Digital cluster, continues with the two "system-close" clusters, Invisible Infostructure and Applications Unleashed, then the two "bridge" clusters, Thriving on Data and Process on the Fly, and finishes with the two "people-close" clusters, You Experience, and We Collaborate.



The seven Design for Digital principles offer guidance for the development of digital architectures, applications, and solutions. At first glance, it is only in two of the seven principles that AI seems predestined to play a significant role: IQ Up, obviously, and Trust P&L, because trust in AI will be as important as trust in humans. That first view is correct but insufficient: all seven principles – save maybe one – are under the "AI spell."

Le Roi Cloud

Each development is a cloud-computing development, drawing solely on cloud resources and capabilities – computing power, memory, intelligence, and paths.

If AI has moved from an exotic place to the mainstream, it is chiefly thanks to the cloud – for data, for communication, for software, for catalogs, for libraries, for exchange, for knowledge. Moreover, the increasing notion of the "edge" – putting AI reasoning power and data flows close to the real action – is required to make AI a standard feature of all applications.

In other words: **no AI outside of the cloud and Edge**

Twin Worlds

Each development enriches the virtual world, progressively building digital twins of people, (thought) processes, objects, and enterprises.

Paving the way for AI, software automation looks much like physical automation: repetition for lower cost, predictability, speed, and precision – superior to human movements and reactions. If the physical world is tough to automate and make intelligent, the virtual world – all data – is the ideal "sandbox" for AI, replicating the whole of physical automation and expanding to the majority of what humans do in the physical world. Physical and virtual worlds reflect each other. In the same way, human and artificial minds will mirror each other, joined at the intellectual hip.

In other words: **where human and artificial minds meet**

Speed Platform

Each development builds on and adds to the digital platform – the agile foundation for speedy solutions with enterprise-grade quality and scale, internal and external.

Speed Platform is an oxymoron: platform as a symbol of stability, continuity, slow evolution; speed as movement, getting ever closer to real time. Adapting the platform in real time requires computer speed; adapting it in real time to the infinite combinations and unpredictable ways of the digital world can only be done with AI power. This is an AI that doesn't simulate or emulate the human mind, but gives the crude build-up of software and hardware components an adaptive intelligence of its ilk.

In other words: **AI makes the foundation agile**

IQ Up

Each development bears upon one or more facets of the enterprise's corporate intelligence quotient (CIQ) and raises it measurably.

Measuring the IQ of a company or institution is difficult. One comparatively easy, partial way is to measure it "as seen by the customer," which means rating: – the IQ of products and services, – the intelligence displayed in interactions, and the intelligence built into any provided information. AI contributes most of the first and much of the second and third. Therefore, AI capabilities will pretty much determine how customers perceive the intelligence of the firm.

AI will play a similar role for most other dimensions of the CIQ. As a result, the best way to raise the CIQ is to apply AI, in priority, to the right places.

In other words: **AI is the most powerful CIQ booster**

Trust P&L

Each development contributes to the enterprise's trust capital through a positive trust bottom line.

Who needs trust? Humans, of course; trust makes our social life bearable. But AI needs it too; otherwise, how could one AI application relate to, and depend on, another? Luckily, humans are notoriously untrustworthy and set a low standard. AI knows no mood, no prejudice, no bias, no fatigue – except those its human creators bestow upon it. Therefore, AI should automatically be more trustworthy than humans – with a big BUT: AI all too often looks like black boxes integrated in mysterious ways. For trust, AI must be trimmed towards transparency, as seen and understood by humans. That way, human trust will be strengthened by AI, in stark contrast to today's views and prejudices.

In other words: **AI for building trust**

Hack My (Business) Model

Each development challenges the established order and embodies new ways of thinking and acting.

Teaching AI to hack would be tricky; fruitful hacking requires more judgment than AI can provide, at least for some time. Hacking should, therefore, remain our privilege. That said, The disruptive power of an "AI-first" perspective in reimagining processes, products, services, business models – even the very reason the company exists – is unmatched. When AI ultimately challenges our own, personal role and capabilities within the organization, we know we're firmly on the hackers' path.

In other words: **AI inspires reimagination**

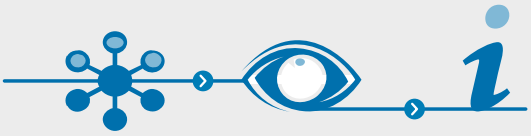
What's Your Story?

Each development tells a compelling story with the declared purpose and result of enriching the narrative of the digital enterprise.

Telling a story is a human privilege, or power reserved, because the story calls for the most unexpected connections, the unbridled power of imagination, the generation of images beyond the obvious, and logic woven into a red thread! Let's continue to enjoy this privilege, but without depriving ourselves of AI support – for access and formatting, for proofing and logic checking, for inspiration and facts, for tirelessly retelling through new channels. AI will help us making our story richer, newer, more compelling, and up to date.

In other words: **Human privilege, AI-supported**

INVISIBLE INFOSTRUCTURE



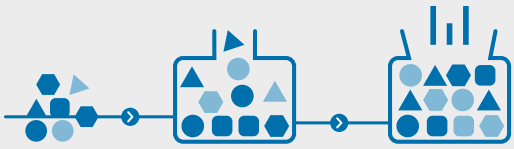
AI is the pinnacle of where we always envisioned a digital infrastructure to eventually be: perfectly invisible – through a maximized level of intelligent automation and autonomous self-optimization – and evolved into a true "infostructure" in which people and things are connected, exchanging data and interacting, often at the very edge of where real life actually happens. This becomes apparent when we zoom in on each of the five building blocks.

Both **Virtual Lego** *(A fully automated, declarative toolbox for an infrastructure that matches the dynamics of Digital business)* and **Orchestrate for Simple** *(AI and automation turn managing hybrid cloud platforms into an easy, self-service commodity for both business and IT)* depend increasingly on AI to rapidly build, deploy, and deliver infrastructures that evolve in real time together with the digital business it supports. Ultimately, an intelligently automated infrastructure will be "self-driving" and autonomous, as already evidenced by some of the biggest cloud data centers in the world – being virtually unmanned. **Let's Get Physical** *(Blending the real and virtual worlds for seamlessly digital parallels)* addresses the notion of building digital twins. The digital twin world provides a crucial playground for human and AI minds to meet and supplies the key data to train AI models. Because many trained and optimized AI models need to be deployed in the nearest proximity to the actual action (for example in a car or a medical device), extending the infrastructure towards the very edges of real life becomes key.

Build, Release, Run, Repeat *(The DevOps way unifies development and operations in a joint, continuous heartbeat with the business)* evolves into "DatOps" as it also becomes the default way to continuously explore, build, deploy, learn, and improve in the context of AI models and solutions. It no longer "just" focuses on developing and operating software, but also takes care of an uninterrupted flow of correct training data and seamless model deployment, if needed at the edge of real life.

Finally, the dream of **Ceci n'est pas une Infrastructure** *(Continuously build and deploy the next generation of software solutions, without ever noticing your infrastructure)* is already coming true. Especially with the demanding needs of AI in terms of "big" storage and specialized (GPU-based) processing power, it makes sense to go low- and even no-server: get the specialized AI infrastructure power whenever you need it, scale it up at will, and release it the moment you no longer need it (all with a click or two).

APPLICATIONS UNLEASHED



Initially, it seems AI is primarily the domain of data professionals, rather than application builders and software engineers. It turns out that this is not the case. At all. Almost any existing or new application can deliver more value by augmenting it with a touch of "smart." AI services in areas such as vision, speech, language, knowledge, and predictive analytics are routinely available as webservices and APIs. So no need for application developers to dive deep into the alien world of machine learning, neural networks, and computer linguistics in order to unleash the AI beast.

In the foundational area of **All in the Catalog** *(Quickly benefiting from next-generation, industry best-practice application services without building them from scratch),* many of the leading application vendors – such as SAP, Oracle, and Salesforce – are equipping next versions of their software with valuable pieces of AI, ready to be configured, trained, and activated. And, with the impending lack of specialized experts, off-the-shelf AI solutions may soon be the preferred way to get busy with AI.

What more to say about the **Bot is the New App** *(Providing compelling, more conversational, more intuitive access to application services while simplifying and reengineering the underlying application landscape)* trend, as it is entirely driven by AI?

Accelerated application development, both through the highly automated, continuous build-and-deploy platform of **Kickstart My App** *(Leverage DevOps, intelligent automation and AI to the fullest extent for lightning-fast delivery and management of applications)* and **App Maker Movement** *(Low-code and no-code platforms make building next-gen business applications a high-productive, DIY matter, bringing digital power to the people)* rely on AI to deliver their promise, the latter particularly in the conversational ability to understand – and even anticipate – the exact intentions and needs of the end-user, making self-service easy, compelling, and effective.

Many AI capabilities will be mainly consumed – and offered – through APIs and webservices, thus making the **API Economy** *(Manage APIs as the core asset that make both the internal organization and the outside world fully benefit from your application services – and vice-versa)* all the more open, active, and key in the era of AI.

THRIVING ON DATA

We have made our point crystal clear: AI affects virtually every technology domain, hence it should not be considered as belonging primarily to the data and analytics context. That said, the good data people sure have a lot on their plate in order to actually make the AI promise work – for example, in terms of storing and accessing the right training data, mastering next-generation technologies and platforms, and then finding, developing, and providing the killer algorithms that it's all about. It may be "artificial" intelligence, but significantly raising the corporate IQ will soon be unthinkable without AI.

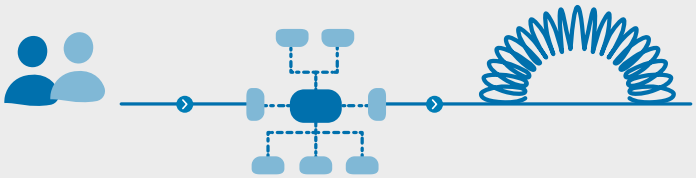
Most AI models need lots of internal and external training data to become effective, so the end of limitations that came with **My Data Is Bigger Than Yours** *(With "Big" now the new normal in data, it's time to create a new wave of liberated, actionable business insights)* is certainly due to the current success of AI. Still, there are already indications that "Small Data," as a way of only incrementally adding corporate data to an already pretrained, industry best-practice model, could make size matter less than before.

Data science is clearly pivotal to the rise of AI, as stipulated by our **You Do The Math** *(Algorithms are the key to creating more business value from data, so everybody needs to become a bit of a data scientist to raise the corporate IQ)* component for some time now. New models and approaches such as neural networks, reinforcement learning, and natural language processing can challenge even the most seasoned data scientists, though. A shortage of relevant capabilities is imminent, so pretrained models and high-productivity "citizen" tooling will be key.

The latter is also the main area of interest in **At Your Service** *(A growing lack of specialized resources, and the need for insights as close as possible to the business, are the fuel to the self-service data revolution)*. Noteworthy is the fact that AI itself is also instrumental – through its conversational, cognitive, and complexity-addressing capabilities – in creating DIY tools that are both easy to use and deliver high-productivity AI results. It is the same power that also drives advances in the federated approach to data management and governance that is propagated by **Data Apart Together** *(Managing and governing data in an unpredictable, highly distributed context requires an agile, federative mindset right from the start, in every decision)*.

Finally, no need to elaborate on **Max Machina** (*"artificial" or not: AI provides the key to raising the corporate IQ, by potentially augmenting and reinventing each and every solution in the digital era)*, as it ostensibly made the key point of AI as a main driver of the digital era. With AI rapidly evolving, the anticipated dialogs around ethics, manageability, and the overall impact of AI on society will certainly be deeper than ever before.

PROCESS ON THE **FLY**



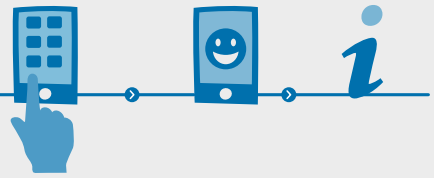
If we agree on the definition of AI as "the collection of capabilities and behavior by systems that are perceived by humans as intelligence," then even the simplest form of process automation would already strike many people as typical AI. And there is much more to come, if we realize the potential of adding powerful cognitive and problem-solving capabilities to an already seemingly magically automated process. *Who knows, an Autonomous Enterprise might sooner or later run and optimize its processes completely by itself, leaving us relaxed and liberated, observing our business ambitions and objectives being delivered on by AI. "Alexa, Run My Business": more than just a dream.*

There are many flavors of process, from fixed for all time all the way up to hyper-agile and opportunistic for the moment, as described in our "Process 101" component **Shades of Process** *(Build, run, manage, and improve processes with every needed level of robustness or agility)* and as illustrated by **Silo Busters** *(Busting corporate silos by adding flexible process layers on top of them, rather than break solid, established structures)*, effectively connecting the petrified parts of the company with a flexible, digital élan.

Much of the current enthusiasm for RPA, as introduced by **Rock Robot, Rock** *(Robotic process automation delivers quick process benefits without elaborate and risky reengineering)* comes from the somehow fascinating idea that an AI-driven robot, albeit a software one, does the human work of interacting with applications, the screen, keyboard, and mouse – challenging the idea that robots are primarily deployed in factories.

The power of AI becomes even more apparent if we add extra intelligence to the automated process, as suggested in **Work That Machine** *(Getting the max out of processes, by augmenting them with cognitive and powerful problem-solving capabilities)*, and in its essence, AI could be used to reimagine a process as self-configuring and self-optimizing, autonomous and eventually **No Process at all** *(A process without a fixed flow, seamlessly adapting to its environment, is that even a process anymore?)*.

YOU EXPERIENCE



Even in the seemingly most "human" of all TechnoVision areas – the only one that addresses the technologies for our direct, personal use – AI turns out to be the key to most of its components. After all, it is where AI is closest to the actual human experience that it can actually show its full potential. Also, human trust in AI – crucial for adoption and thus for eventual success – is mainly built through the user experience, where a continuous dialog adds to understanding, acceptance, and finally the real intelligence embracing the artificial one.

The highly compelling context of **Reality Bytes** *(If a picture says more than a thousand words, an interactive 3D VR/AR environment says more than a thousand pictures)* is an AI fiefdom: it simply would not exist without it. Also, there are few other areas where the augmenting capabilities of AI become so apparent, for example when we use our mobile phone or smart glasses as an intelligent, overlaying lens on the world that we see.

But this is equally the case for both **Chat Me Up** *(You are urgently invited to join the chat platforms and jump into a natural conversation with your customers (because they are already there, waiting))* and **The Bot Effect** (*Always available, emotionally connecting, scalable, computer-generated humans are getting more mainstream)* are building blocks where AI is paramount: their impact would be much reduced, their cost massively higher, without it, if conversational systems would even be thinkable without AI in the first place.

Sure, the platform revolution of **There's a Platform for That** *(In response to the emergence of platforms, traditional product pipeline companies must open-up the silos and expose their capabilities, becoming part of a value-network of ecosystem players)* is based on platforms created by us, humans – who can best design the right platform if not those who are keen to see it serving their own needs and satisfying their whims? But their operation, unceasingly and instantly combining, matching, and recombining a myriad of components, could not be managed without AI anymore.

I'm Happy *(Working with your organization, whether as a customer, employee or partner, should be like a string of seamlessly connected happy moments, creating worthwhile memories that will be shared)* is not only the first of the five building blocks of the You Experience, but more importantly the umbrella one, giving its sense and direction to the other components. We are decidedly not ready to entrust this one to AI, be it only because our happiness depends on so much more than technology, which is at best embedded in this vast and enigmatic complex we call happiness! Still, respectfully using AI to be more understanding, emphatic – and sooner or later amazingly, even magically proactive – in terms of the needs and drivers of individual consumers certainly will leave them happier.

WE COLLABORATE

Like its "teammate" You Experience, the components of We Collaborate aim to create happiness; in this case collective happiness, rather than the individual variant. This raises the probability of a critical role for humans, being pivotal to the very concept of being happy. But also, just like in You Experience, the places where human and artificial intelligence meet – now in order to collaborate – might prove to be the most crucial to the success of AI.

Its first building block, **Happy Together** *(Engage your digital consumer "egosystem" proactively with proper care, timing, and empathy, thriving on trustworthiness)*, is the realm of humans looking to expand their individual happiness to their social environment. AI is a welcome, powerful assistant in understanding and anticipating – if necessary in real time – the evolving needs and sentiments of the crowd. Equally so, its analytical and natural language capabilities are indispensable in harnessing privacy and personal data security – across all social communication channels.

Friend that Thing *(Expand your social network with smart, collaborative "things")* also has a strong human dimension, to the degree that we extend friendship, but we will increasingly appreciate and value these bright, AI-driven things. Conversational AI can give machinery a more accessible face, more easily related to by humans. And, it's at the very edge of real life, where things equipped with AI models interact with us, that AI surfaces the most yet again. Both **You@Work** *(Automation and AI are changing the purpose and ways of people at work for good, addressing challenges across the business)* and **Crowd Surfing Allowed** *(Tapping into the explosive combination of brainstorming and crowdsourcing)* are so human-centered, that only humans can design them. But, they couldn't work without AI as a supporter and operator, for example in finding exactly the right person for the job at the right time, prescribing the best winning team, or distilling the most relevant information out of an ocean of knowledge.

Strikingly, the blockchain as introduced by **New Chain on the Block** (*Using distributed ledger technology to create next-generation business connections)* is very much a human creation, where AI's role is only supportive – a logical consequence of the fact that only a human community will accept sharing a public ledger. Is it because blockchain is all too human, that its progress is so desperately slow, while the need for trust-building mechanisms is so desperately high?

OVERVIEW OF TECHNOVISION 2018

TechnoVision categorizes technology drivers with business change potential in six clusters (the "what"). Two of them cover the foundational building blocks of a typical IT landscape (Invisible Infostructure for infrastructure and Applications Unleashed for the applications landscape). Two of them cover crucial IT capabilities to deal with high-speed, high-impact digital change (Thriving on Data for leveraging data and Process on the Fly to manage processes). The final two cover channels to the outside, connected world (You Experience for creating compelling, individualized user experiences and We Collaborate to tap into the power of social connectivity).

Overview

When read from right to left, we see how the "real" world of people and their things is mirrored in a "virtual" world of systems and digital solutions.

Then, there is an extra cluster of overarching design principles (the "how") that should be kept as a mindset throughout the lifecycle of applying technology to Digital Transformation: Design for Digital.

The 37 building blocks are all described through one-pagers, designed to be crisp and to-the-point on the one hand – after all, this is the era of limited attention span – yet appetizing enough for further study through its links and case stories.

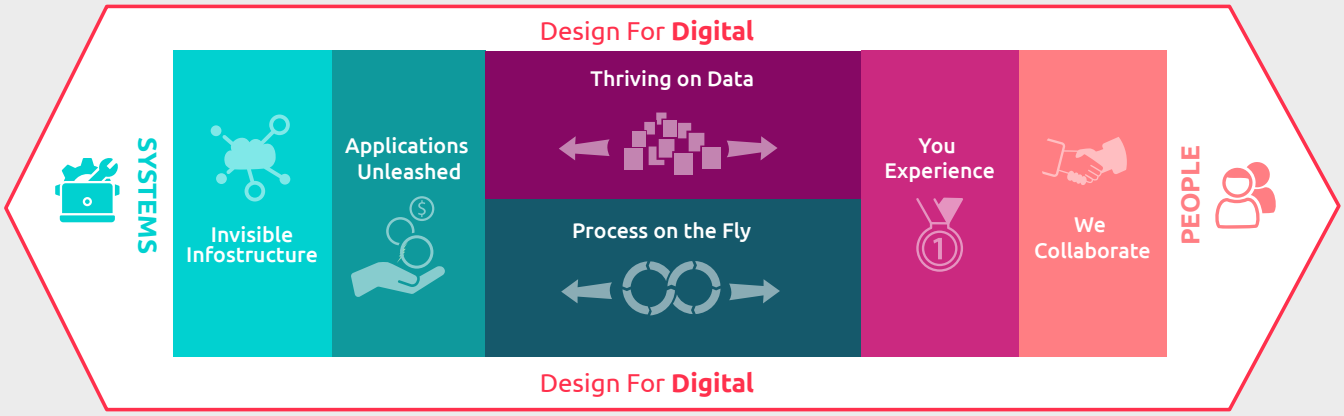
Each building block contains an elevator pitch that briefly describes the trend. Then comes the "what" (a slightly more elaborate description), the "use" (actual use cases), the "impact" (potential business effect of the trend) and "tech" (links to leading technology solutions and other relevant information).

There is a method behind the sequence of the building blocks within a cluster. The first building block is the "101" trend that sets the scene for the entire cluster, covering key technology drivers and their overall effect on business. The second is more or less free format, giving the contributors the chance to highlight a technology driver that is particularly hot. The third block explores the impact of automation on the cluster, which we deem a powerful, overarching theme that influences the entire business technology landscape. The fourth block zooms in on how the notion of platforms relates to the cluster. Finally, the fifth block typically introduces a more disruptive, forward-looking dimension of the technology cluster.

The seven Design for Digital principles are also introduced through an elevator pitch, followed by the "why" (the reasons for principle), the "what" (a slightly more elaborate description), the "how to" (guidelines on how to apply the principle) and the "so what?" (the relevance of the principle).

If you still possess an unabated appetite for more, the TechnoVision microsite contains a growing number of detailed posts and articles that dive deeper into each of the 37 building blocks. Also, if you happen to run into the colorful TechnoVision cardboard boxes, you will find a QR scan code on each block that will bring you directly to the relevant materials.

TechnoVision Framework



Have a look at the TechnoVision 2018 building blocks:

Design for Digital

Overarching design principles to be followed throughout the lifecycle of applying technology to Digital Transformation.

- Le Roi Cloud
- Twin Worlds
- Speed Platform
- IQ Up
- Trust P&L
- Hack My (Business) Model
- What's Your Story?

Invisible Infostructure

Evolving the IT Infrastructure into the pluggable utility it was always supposed to be.

- Virtual Lego
- Let's Get Physical
- Build, Release, Run, Repeat
- Orchestrate for Simple
- Ceci n'est pas une infrastructure

Applications Unleashed

Liberating the legacy application landscape and unleashing the next generation of powerful, agile, cloud-based apps.

- All in the Catalog
- Bot is the New App
- Kickstart my App
- API Economy
- App Maker Movement

Thriving on Data

Leveraging data and algorithms as an asset to increase the "Corporate IQ"

- My Data is Bigger than Yours
- You do the Math
- At Your Service
- Data Apart Together
- Max Machina

Process on the Fly

Building, managing, and running processes that match the dynamics of the digital outside world.

- Shades of Process
- No Process
- Rock Robot, Rock
- Silo Busters
- Work that Machine

You Experience

Creating unique, excellent user experiences that create happiness.

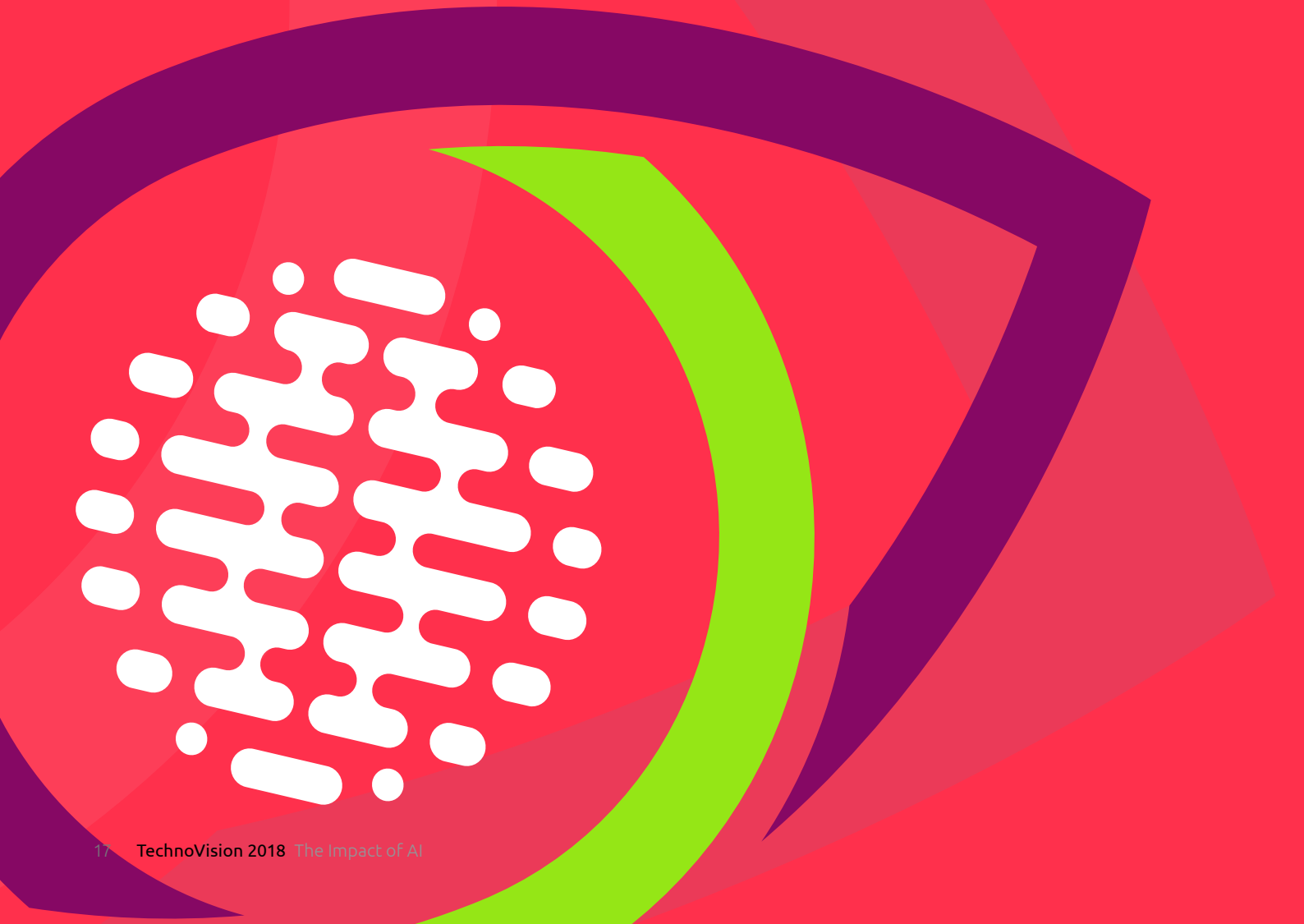
- I'm Happy
- Chat Me Up
- The Bot Effect
- There's a Platform for That
- Reality Bytes

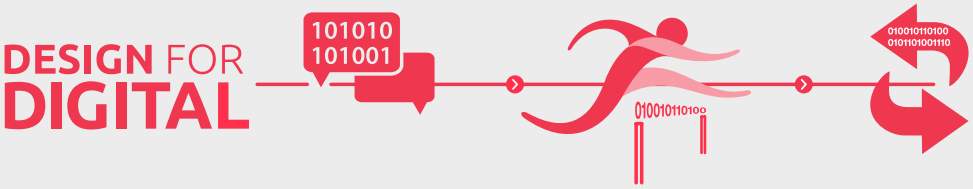
We Collaborate

Tapping into the power of the connected and collaborative "everything."

- Happy Together
- You@Work
- New Chain on the Block
- Crowd Surfing Allowed
- Friend that Thing

DESIGN FOR DIGITAL





***Design for Digital* is different from the rest of TechnoVision. It focuses on the "how" rather than on the "what." It doesn't describe, it prescribes. Through seven design principles, it provides a thorough checklist for any new or ongoing digital initiative. Design for Digital suggests the proper mindset when engaging with technology for business impact.**

Its ambition is to serve as a guideline to design the right solutions for our world – which is digital by default. Each of the principles might look innocuous enough; taken together, they are a tall order. Cloud is king, nobody escapes its jurisdiction; we build in twin worlds, real and virtual, joined at the hip; the enterprise's platforms make it agile and responsive; corporate IQ must go up to remain competitive in the quickly emerging era of AI; trust has become so precious, one has to carefully count it; every business tradition deserves to be hacked; between enterprise and customers, transactions give way to digital stories.

LE ROI CLOUD 360

Each development is a cloud computing development, drawing solely on cloud resources and capabilities – computing power, memory, intelligence, paths

There's a new ruler in town. And just like the Sun King, his reign will be long and prosperous. The cloud started as an achievement of computing as a utility, the plug to computing power. But now, it's an overarching mindset that connotes immediate availability, maximum flexibility, continuous updates, unlimited scaling, and full connectivity. With that, just "moving to the cloud" is not enough: for the next generation of solutions to be digital, no data or catalogue can be ignored, no acceleration missed, no connection omitted, no delay accepted. Exploiting 720° of the cloud potential – in all its dimensions – is the key starting principle for the digital world. The old ways are dead. Vive le Roi!

WHY

- The digital world is a real-time world made of instant reactions, constant innovation, nagging impatience, implosive failures, and hit-and-run successes.
- To cope with this new reality, *immediate computing*, such as computing power spiking and ebbing, updates applied without delay, development carried out both immediately and continuously, and contained data floods are required.
- Only the cloud can provide this level of applied digital agility. For both for IT, and perhaps more importantly, for a business, it opens up an infinite palette of possibilities, stretching both imagination and intelligence alike.

WHAT

- Take the qualities of the cloud as a rule, not an option, for your new endeavors.
- Just *use* cloud-based services – don't invest in infrastructure.
- Work from what's in the cloud catalog, rather than reinventing your own solutions over and over again.
- Evolve AI (and IoT) solutions from the cloud: train and analyze with massive cloud data and specialized computing power, consume and publish with webservices, deploy at the very edges of the cloud infrastructure – close to the action.
- Develop continuously and in perpetuity.
- Create *now, here, and together.*

your expert **Nicolas Gaudilliére**

HOW TO

Going 720° on the cloud unfolds in two ways:

- The *technical* way: move to infrastructure-as-a-code, infrastructure provisioning automation, software "container" units of production, serverless application architectures, micro-services, elastic Graphic-Processor-Unit-based architectures for AI, and Software-as-a-Service.
- The *human* way: go beyond the necessary training, develop "cloud-compatible" mentalities and behaviors, and the matching governance with self-organized, customer-driven, agile teams.

Combine the two and create your *Digital IT* processes and organization at the very heart of the digital enterprise.

SO WHAT

- As with many advances in IT, the cloud has already generated both big hopes and crippling anxieties; they rank from fears for privacy and security breaches to the lock-in power of dominant cloud providers.
- This calls for new rules, new behaviors, and a new level of transparency regarding the use of cloud solutions:
  - Go for a Cloud-First strategy: Cloud-Only (meaning SaaS) for non-differentiating systems, Cloud-Native for new applications, and Cloud-Ready as a modernization path for existing applications.
  - Benefit from key milestones in your IT calendar – application support renewal, end of datacenter ownership, new digital initiatives, post-merger integration – to start your journey.

Each development enriches the virtual world, progressively building digital twins of people, (thought) processes, objects, and enterprises

In the digital world, everything acquires a virtual, or even a *twin life:* an identity, an image, an existence, a way of working, a reputation. While the concept of "digital twins" started with physical objects, it now extends to people, to processes linking real and virtual steps, to thought processes by automation and artificial intelligence, and to enterprises and institutions. The *digital enterprise is the sum of twins*, virtual and real. New developments no longer just improve the mastery of the real world. They build up, step by step, the various facets of the digital twins. What happens in the real world must also happen in the virtual world, and vice-versa.

WHY

- For digital systems to have control of the physical world, they must *represent* it, *control* its representation, and *apply* this control to reality.
- Furthermore, the virtual representation has to be perfectly accurate in order to be useful. This extends to their behavior.
- The digital twin of an aircraft engine is not only statically replicated; it also works like its real counterpart. As a result, all engineering changes, test runs, and maintenance can be *performed* on it before being performed in the real world.
- This is even more relevant in the context of AI, as digital twins provide the ideal playground to test hypotheses, train and evaluate algorithms, test transparency, and generate synthetic data and events – exploring levels of "smart" that initially might even seem inapplicable to the real world.

WHAT

- The notion of "twin objects" can be expanded to digital representations of people, thought and business processes, and even complete enterprises.
- These models not only contain current states and connections, but also observed and projected behavior.
- All thought and decision-making processes use these digital representations, removing the discontinuity that separates virtual and real worlds. In a way, this is an accurate depiction of the impact of AI as well – as the human and artificial minds meet through digital twins.

HOW TO

- Entering Twin Worlds requires a mindset change to understand how digital systems actually reflect and control the real world.
- Accepting errors, inaccuracies, or latency is replaced by the *constant demand* for both accuracy and control. It requires a consistent data landscape where governance, trust, and accessibility are core concerns within the fabric of the Twin Worlds.
- A virtual representation of the real world needs to be built up step by step, incorporating an increasingly better understanding of the key real-world assets and an improved ability to translate them into digital terms.

SO WHAT

- The digital twin of a physical object can be tangible enough, but augmented or virtual reality can make it lifelike even if the complex ones are difficult to recreate.
- The twins of persons, processes, or institutions are less tangible, and are consequently challenging to grasp.
- The key is to constantly take a *virtual world perspective*: how do consumers, corporations, and products behave digitally, and how is this translated into the next-generation digital IT landscape?

SPEED PLATFORM

Each development builds on and adds to the digital platform – the agile foundation for speedy solutions with enterprise-grade quality and scale, internal and external

There's a need for digital speed. Waiting for requirements from business or external partners to arrive is a recipe for disappointment: too little, too late, and irrelevant on arrival. Instead, provide a compelling digital platform with services that your own IT department can use. It will enable the business, its partners, and even its clients and consumers to rapidly build their own solutions while leveraging enterprise-grade data and services. As new developments are built on the platform to launch services with greater speed, they should add new, improved features to it as well. From now on, it's Platform First!

WHY

- The clock pulse of the digital world requires different flavors of speed and agility in order to make solutions available. These include "train-style" dynamics for robust, predictable enterprise solutions and "scooter-style" dynamics for innovative, viable products – notably in the areas of IoT, AI, and mixed reality.
- Although the solutions may differ widely, they need to be connected and based on a corporate common ground to address security, privacy, and integration – certainly in an era in which data breaches can seriously harm the company overnight.
- The future needs of the digital enterprise and its external ecosystem are impossible to predict. A requirements-driven approach is, by its very nature, too slow, and creates a gap between business and IT – even more so in emerging technology areas such as the IoT, AI, and mixed reality.

WHAT

- A digital platform typically features APIs, open datasets, service catalogs, integration, frameworks, playbooks, tools, and development support.
- It supports self-service tools to quickly create solutions nearest to – or by – the business, but also features a high level of automation to ensure productivity and enterprise-level security and integration. Both increasingly depend on AI to make the platform both compelling – through a conversational and proactive user experience – and productive – through complex logic, smart automation, and autonomous, self-optimizing capabilities.
- It provides the "art of the digitally possible" to anybody who needs to develop solutions within the IT department, the business side, or externally.

HOW TO

- Create an overall architectural blueprint for the digital platform, but build it iteratively: a minimum viable product on which the first solutions can be built will create early excitement and commitment, while mitigating development risks.
- Make the platform applied: offer "internships" to internal and external stakeholders to jointly explore the platform services and create the first solutions. Consider setting up a "platform center" to accommodate this.
- Develop processes and incentives – and if necessary, directives – for using and contributing to the platform catalog.
- Handle the platform as a product that needs to be "commercially" marketed and managed.

SO WHAT

- The platform mindset requires a thorough understanding of what drives both the supply and the demand sides of the platform; the number of enthusiastic, committed users ultimately determines its success.
- It is also the last nail in the coffin of central, requirements-driven development, in favor of decentralized enablement.
- To a large degree, the platform determines the speed and agility level of the enterprise. It also is instrumental in raising its corporate IQ and digital trustworthiness concurrently.

IQ UP

Each development bears upon one or more facets of the enterprise's corporate intelligence quotient – CIQ – and raises it measurably

Digital capabilities already enhance the IQ of both the people and the many corporations that need to keep up with the pace and the intelligence of the world. Now, 100 years later, comes the automation of the virtual world – a parallel development to the physical world's automation – and with it, the arrival of artificial intelligence. AI builds the "exoskeleton" for our brain and senses and provides advanced algorithms to predict and even prescribe our future state. Leveraging all of this to raise our Corporate IQ (CIQ), is the next big transformation theme for the digital enterprise. More information, more connections, faster reactions; the only way is up.

WHY

- Corporate IQ is still uncharted territory: it is difficult to define, to measure, and to compare. But digital customers, clients, and partners can gauge it. They now judge companies by their actions and words rather than uniquely through their products and services. Expectations have evolved from a company behaving reasonably to a company behaving intelligently: the more intelligent a digital company looks and feels, the more it will be liked and therefore preferred.
- This is why CIQ must be on the agenda as the ultimate and most difficult to emulate differentiator; now, raising the CIQ becomes an essential objective, which puts new demands on the IT organization.

WHAT

- AI is the most powerful catalyst to raise the Corporate IQ. It should therefore be considered for any digital initiative, both in terms of augmenting solutions by adding touches of "smart," all the way up to reinventing entire business models with an AI-First perspective.
- For IT applications, codifying the knowledge and experience of an enterprise is no longer enough, it does not stop there! They now must measurably and continuously raise one or more aspects of its Corporate IQ.
- When an Amazon virtual agent advises you, guides you, and shares its treasure trove of experiences with you, you see and feel the company as an intelligent enterprise. Take a leaf from their book: develop your own intelligent stories.

HOW TO

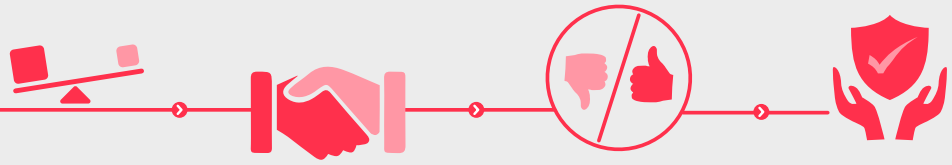
- The first step is to analyze which aspects of Corporate IQ are influenced by alternate solutions. Typically, these aspects would be grouped into areas that interface with users, monitor and steer activities, service work items, analyze data, or manage knowledge.
- The second step is to assess and describe the CIQ increment that the new solution can bring, resulting in a measurable contribution to business outcomes.
- The third step is to maximize this increment within the application itself, through links with other data and solutions, through additional perspectives and assets from clients and partners and certainly through augmentation with AI services and capabilities.

SO WHAT

- To generalize the Corporate IQ dimension, the evaluation of all potential investments will move to measure their expected "ROI," where the "I" now ostensibly moves from "Investment" to "Intelligence."
- While CIQ is difficult to measure, adding "Artificial" to the mix brings further challenges and opportunities: go in small steps and tests to progressively build up a complete CIQ picture.
- In the same way that our character should match our intelligence, Corporate IQ should strengthen various aspects of a company's desired reputation; for this reason, IQ Up and Trust P&L should be considered for all developments.

your expert **Christopher Stancombe**

TRUST P&L



Each development contributes to the enterprise's trust capital through a positive trust bottom line

Trust is the key to a solid digital reputation. It is painstakingly built yet easily destroyed due to a lack of cybersecurity or the careless use of personal data. And with regulation only increasing in intensity, it's obvious that trust needs to be cherished, just like any other key asset on the corporate balance sheet. This calls for a full understanding of the latest in data privacy and security technologies and a Privacy-by-Design mindset. It brings a new responsibility during solution creation: to be the accountant of the enterprise's trust balance not only by protecting it, but also by positively adding to it through each and every new development.

WHY

- The digital world is a world of relations. Relations are built on trust; therefore, trust is a necessary ingredient for success in a digital enterprise.
- Without trust, there is no true connection between enterprise and customers, no distribution of intelligence or roles between B2B partners, no shared data lake, no customer data to learn from.
- Trust is built at human speed and destroyed at internet speed.
- Fraud and hacking are obvious trust killers but barrages of invasive advertising, the constant stabbing of the private sphere, and the rain of invasive offers – not to mention (AI-generated) fake news and data – are effective passion killers, too.

WHAT

- The digital enterprise has to introduce trust accounting, where trust is measured, assessed, and counted. Every digital initiative or investment has to yield a trust increment or at least avoid trust loss.
- With trust accounting comes trust accountability. Designers, developers, and cybersecurity experts need to become the guardians of trust and design thinking is needed to address how to cultivate trust between clients, customers, employees, and partners.
- The new generation of AI solutions (notably in the areas of neural networks and reinforcement learning) are often highly accurate in their analysis, predictions or prescriptions – but as the result of a fully opaque reasoning. It requires an extra effort – against all odds – to explain what's inside the intelligent black box, in order to raise the trust of humans in AI.

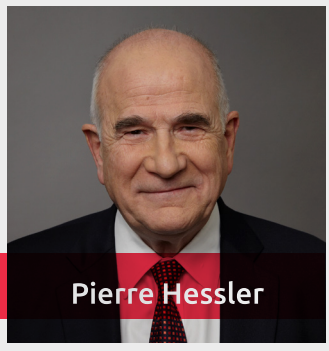
HOW TO

Designing for trust needs to be transparent, bidirectional, offensive, and defensive:

- Transparent: cybersecurity has to be seen or perceived. The private sphere must be unambiguously recognized, sensitivity to data protection must be patent, and the use of personal information circumscribed.
- Bidirectional: trust is a two-way street. Trust others so that they trust you.
- Offensive: seek trust gain by replacing the weak links in the trust chain by a blockchain; and build AI in to autonomously detect and deal with anomalies, potential fraud, and compliance breaches in real time.
- Defensive: avoid trust loss through precautionary measures and cybersecurity.

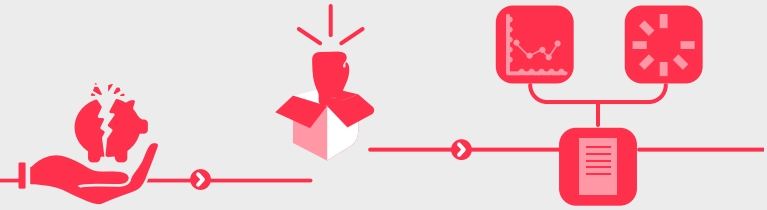
SO WHAT

- The more the digital enterprise becomes relatable, intelligent, and trusted, the more it gains power.
- If trust is the currency of the digital world, power is its rule: it can be gained at network speed and dominates globally but runs the risk of vanishing at the blink of a distrustful eye.
- Using the trust dimension to leverage power intelligently might be the best survival kit in this digital world – or is it a digital jungle after all?
- With AI rapidly becoming the main engine to boost corporate IQ, new factors – also ethical ones – will weigh in the trust balance of the enterprise.



your expert **Pierre Hessler**

HACK MY (BUSINESS) MODEL



Each development challenges the established order and embodies new ways of thinking and acting

Heck yes, it's definitely the age of digital disruption, with new technology as the engine behind radically reinvented business models. Or should we say just "models?" Clearly, disruption has hit the ways supply and demand meet in the open market place. But with a growing grasp of the digital world, we see that the impact of disruption goes way beyond business models. It includes governance, processes, traditions, and behaviors. This is a tall order for solution designers: their creations have to be game changers with a measurable contribution to the permanent digital transformation companies undergo.

WHY

- After automating the existent and reengineering processes, digital solutions become the agents of disruption, affecting enterprises that either seek disruption or are submitted to it. As such, digital solutions are actually digital transformers.
- Disruption started with "hacking" business models, driven by the radically changed and constantly changing expectations of digital consumers to start a dialogue, buy, and receive services in the ways that suit them best.
- But business models are just the beginning: the digital revolution penetrates deep into an enterprise – no domain, no rule, no governance, and no mindset escapes it.
- With the huge, but largely unexplored potential of AI, new opportunities arise to reinvent products, services, and business models. An "AI-First" perspective challenges everything, including what was considered a given only yesterday.

WHAT

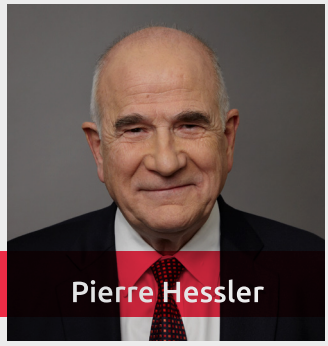
- The decision to invest in digital solutions has to take into account a new parameter: the measurable disruption a new application will cause. Investments that protect, solidify, or embellish the established order are no longer worth it.
- Don't forget that not only business but also IT have to transform – cannibalizing both sides' traditions and institutions, and creating new common ones

HOW TO

- Keep hacking business models. Too many outdated approaches are still intact. After disrupting customer relation business models, think of client relations as business models: write the scenarios and scripts of the new roles in your digital ecosystem.
- Then, hack your other models. Revisit employment to give digital employees and freelancers the workplace they want. Rethink R&D to open it up, attach umbilical cords to your connected products, think twins for service, flex your budgets, report the future.
- Finally, hack behaviors. Use the new solutions to change mentalities and design new partnerships.
- Dare to explore the unthinkable, think AI first – even (or especially) if it might render your own present role redundant.

SO WHAT

- "Hacking" as an activity may sound destructive to some, even if it echoes the vagaries of digital life. Luckily, this design principle does not stand on its own. It will work best in harmony with the others: by all means hack, but make sure your Corporate IQ increases while doing so. Hack, but make sure your Trust balance profits from it. Hack, but make sure your Story sounds constructive to your customers, clients, and partners.



your expert **Pierre Hessler**

WHAT'S YOUR STORY?

Each development tells a compelling story with the declared purpose and result of enriching the narrative of the digital enterprise

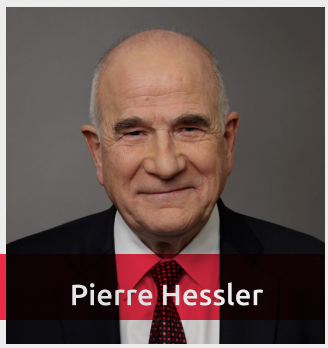
Your digital solutions are fighting for intellectual shelf space to exist and to survive in your enterprise. The way to achieve both is to tell a compelling story. Such a story depicts the digital world and shows the way to El Dorado. It speaks to our intellect, by designing the path, and to our emotions, making us just want to get there. Because we're only human, we prefer compelling stories to dry information, set questions, and formatted answers. The ability to tell a story – and even better, to listen to one – is critical to creating digital experiences that excite and delight. It is both a pedagogical and a design tool, and we have to master it. End of story.

WHY

- Information systems have come a long way, from dispensing predefined information in bits and pieces to entertaining conversational transactions and augmenting intelligence. They have grown into an essential part of the day in the life of customers, partners, and employees alike.
- With so many options to choose from and a plethora of distracting or confusing features, digital users are now also the producers of their own digital journeys.
- The only way to get and keep someone's attention is to make them part of a story, not just as readers, but also as writers or even better, as co-writers and actors; even more so when exploring unchartered, yet unsung areas such as AI, blockchain, and mixed reality.

WHAT

- For each development to tell a digital story, its creator needs to become an artist. The writer must appeal to the creative and esthetic side of the brain while remaining an engineer to give the story the logic, rigor, and metrics of IT.
- This is at the heart of Design Thinking, combining the notions of purpose, human centricity, and iteration.
- The story should not stand alone: through connections with other stories, the digital enterprise creates an anthology of its relations with the world.



your expert **Pierre Hessler**

HOW TO

- From oral tradition, to the written word, and now to digital copy, telling a story is the oldest method for recording, teaching, communicating, and entertaining. You learn the craft by listening to the best ones – and, increasingly, by leveraging the rapidly growing "creative generation" and support skills of AI.
- Think through your solution as a story with a good structure from beginning to end, from issue to resolution, from understanding to adhesion, from neutrality to support.
- When your story pertains to relatively unknown technologies, "Show, Don't Tell" should be your mantra.
- Share your story early by inviting users, listeners, and actors to iteratively participate in its development.
- Synthesize your story to its quintessence – this is the era of limited attention spans. Some of the most compelling stories are tweets.

SO WHAT

- The Design for Digital principles are to be seen and used as a whole: the story hatches in the clouds, it stages the play of twins, draws momentum from the platform, makes listeners and players more intelligent, exudes trust, and gently hacks our customs and traditions.
- Over time, stories become the signature of the digital enterprise, the reflection of its style, and the yardstick of its differentiation. Consider the story unfolding before you in these white little boxes – how does it move you?

INVISIBLE INFOSTRUCTURE

INVISIBLE INFOSTRUCTURE

The infrastructure part of the IT landscape is a crucial foundation for any organization with "post-digital" ambitions. It must deliver the speed, agility, and value for money that both the organization and the outside world have come to expect. It must also be able to capture, hold, manipulate, and provide the data that is needed to continually increase the corporate IQ.

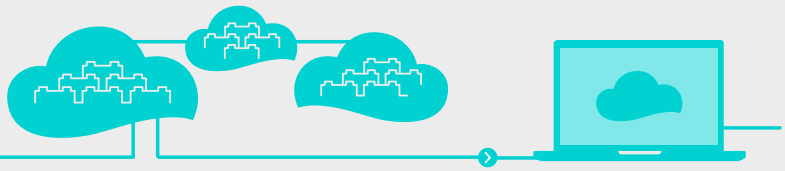
This doesn't mean that we must meticulously design, construct, and implement our own unique and dedicated IT infrastructure. Instead, we can combine the necessary IT services right from the catalogue, as pre defined, easy-to-combine, Lego-style building blocks. As this is an ongoing transition, most organizations – unless they are starting from scratch – will have to mix the existing and the new, the stable and the agile, the customized and the standard, the on premises and the cloud based.

Radical automation is the key driver to success, as it will provide the simplicity, trustworthiness, agility, and speed that are the new norm. It goes hand in hand with the increasing power of AI to deal with complexity, risk, and effectiveness on the way toward a fully autonomous, self-healing, self-optimizing infrastructure.

As the real and virtual world are merging into one, so too will infrastructure evolve into an "infostructure" that is able to build digital twins of whatever relevant and connected physical assets are out there. This makes it the foundation for storing and accessing historical and real-time data – the key to training any corporate AI system.

And as we enter the era of serverless solutions that do not require any infrastructure at all, the "invisible" part of the equation sure gets a whole new meaning.

VIRTUAL LEGO



A fully automated, declarative toolbox for an infrastructure that matches the dynamics of digital business

Here are some bricks you actually want to step on. Virtualization is the key ingredient for rendering the IT infrastructure invisible and benefiting from cloud-based building blocks. It reduces costs and deals with the mounting complexity of divergent technology. What's more, with infrastructure rapidly composed from Lego-style building blocks, businesses can become more agile, more responsive, and scale up faster. A complete, software-defined infrastructure stack can be deployed in minutes. With "micro services" running in independently deployable containers, it's no child's play; it's a powerful enabler to running a business with similar qualities.

WHAT

- With compute, storage, network, and software packaged in autonomous, independent software containers that run microservices, IT infrastructure becomes an ultra-flexible, highly scalable commodity.
- Programmable platforms allow for the target-state infrastructure and environment to be described in the form of code, which can then be executed via API access – hiding implementation and technical details.
- A declarative, "soft-code" style of programming the infrastructure, along with an AI-enabled orchestration engine, drives rapid deployment of infrastructure platforms in a self-healing setup.

USE

- Netflix rapidly deploys services across multiple AWS accounts and regions over 4,000 times a day. It's an evasive, global service that balances service availability, latency, data replication, compute capacity, and efficiency – all with standard building blocks and "auto-magically" monitoring the ever-changing state of the infrastructure.
- Using a declarative infrastructure, a leading US cruise line uses a library of modules, which enables it to quickly script new platforms, reducing build time by up to 90% and significantly decreasing risk by limiting manual elements.

IMPACT

- Reduction of infrastructure costs and complexity, cutting down on technology options and integration issues.
- Infrastructure aligning directly with business, together building a floor-to-ceiling capability; combining compute, network, storage, and software for immediate business outcomes.
- Technology diversity and loose coupling of components, taking an elastic approach towards resiliency and scalability while eliminating configuration drift and mitigating risk.

TECH

- **Industry standards**
  - OpenFlow, Cisco Opflex, OpenStack
- **Container and platform technologies**
  - Docker software containers, AWS Lambda, Mesosphere, Nginx, Confluent
- **Declarative Infrastructure Tools**
  - Ansible Tower, CFEngine, Otter, Puppet, Saltstack, Terraform

LET'S GET PHYSICAL

Blending the real and virtual worlds for seamlessly digital parallels

Time to get horizontal – to integrate the physical and virtual worlds, that is. With potentially every "thing" equipped with sensors, computing power, and network connectivity, you can envision a model – or a "digital twin" – of anything in your system. It will supply the business with a radically different perspective on how to develop, operate, monitor, and service physical assets. And, it has the potential to open up entirely new revenue streams. With a new, true infostructure that enables digital twins to be precise, trustworthy models of their physical equivalents, there is nothing that keeps the real and the IT worlds from getting really intimate.

WHAT

- The internet of things (IoT) brings a rich infrastructure that connects physical assets to IT systems, often in real time. This enables the building of virtual models of these assets that not only reflects their current situation, but can also leverage AI to predict their future state and drive their interactions with other assets.
- These digital twins pop up in all major industries, notably in manufacturing, where the Industry 4.0 initiative envisions the merger of operational technology and information technology.
- Producers of physical assets move to create software and AI platforms to model and develop with digital twins.

USE

- Industry 4.0 describes a digital infrastructure in which machines, factories, supply chains, and products are equipped with a real-time, "smart" IQ that improves autonomy, productivity, and quality.
- GE Aviation built the Configuration Data Exchange: a real-time dissemination and integration of digital-twin configuration data and exchange of essential operations, maintenance, environmental, and event information.
- "Smart" cities are increasing their IQ as well: in Auckland (NZ), sensors in the street lights monitor traffic, and by applying analytics to the collected data, the city is better positioned to manage traffic congestion.
- Fast Digital for Discrete industries, a collaboration with SAP for Industry 4.0 digital acceleration, establishing a fully functional digital twin, or digital thread for the manufacturing supply chain.

IMPACT

- Optimize the management and servicing of physical assets through predictive analytics to, for example, improve business processes and activities that could benefit from a real-time connection to physical assets, for route optimization, or for customer experience.
- Add value to physical products, by providing usage analytics to customers.
- Create new business models through the monetization of the IoT.
- Immersive experience through a blend of augmented and virtual reality.

TECH

- **IoT and digital twin platforms**
  - GE Predix for the Industrial Internet, IBM Watson IoT, Microsoft Azure IoT Suite, C3 IoT Platform, AWS IoT Core, SAP Cloud Platform for the IoT, Thingworkx
- **Open standards**
  - Open Connectivity Foundation, The Open Group IoT Work Group
- **IoT marketplaces and communities**
  - IoT Consortium, IoT Talent Consortium

your expert **Nick Callanan**

BUILD, RELEASE, RUN, REPEAT

The DevOps way unifies development and operations in a joint, continuous heartbeat with the business

Enterprises are raving about DevOps; the agile and perfect fusion between IT development and IT operations, supercharging deployments with near-perfect quality. On a unified platform with a highly automated toolchain, DevOps teams develop applications, test, integrate, and package for deployment. They promote a continuous, uninterrupted flow, releasing many times a day without fail. This requires a thorough understanding of the components of a state-of-the-art DevOps platform and a disruptive change of culture within the organization. Build, release, run, repeat in the digital world. All before lunch. What if business could do that too?

WHAT

- DevOps is a portmanteau of "Development" and "Operations." It's a concept that connects these two traditional IT silos throughout the development lifecycle, operating as a continuously delivering factory that is able to release new application versions many times a day.
- DevOps requires a highly industrialized, AI-enabled toolchain to automate the activities of the entire software solutions lifecycle – a platform challenge for all involved.
- Above all, DevOps is a seamless team effort that brings together all necessary IT disciplines in a high- productivity, multidisciplinary team.

USE

- A European bank transformed its IT department into dozens of autonomous DevOps teams, aiming to both improve business agility and significantly decrease production errors in its digital applications.
- Netflix sets a shining example when it comes to next-generation solutions development. Their approach to DevOps leans on well-architected, platform-based tooling, but also on the rigorous testing of their backend services, notably the database systems.
- Digital leaders such as Spotify and Etsy, rely on a top-down, business-driven vision on DevOps, making sure the company fully embraces this new culture.

IMPACT

- Increased speed to market, enabling the quick, initial release of high-quality, minimum viable products (MVPs), and the ability to continually improve and expand it.
- Higher productivity and fewer errors and unexpected bottlenecks due to a high degree of automation and an integrated, multidisciplinary team.
- Perfect approach to exploring the new, digital world of cloud, mobile, AI, and IoT solutions.
- Helps the enterprise toward agile value delivery.

TECH

- **Collaboration tools**
  - Slack, Jira
- **Configuration management tools**
  - Puppet, Chef, SaltStack
- **Deployment and lifecycle management tools**
  - Jenkins, Appdynamics, Splunk for application lifecycle analytics
- **Integrated DevOps platforms**
  - IBM DevOps, Microsoft Azure DevOps, AWS DevOps

your expert **Gunnar Menzel**

ORCHESTRATE FOR SIMPLE

AI and automation turn managing hybrid cloud platforms into an easy, self-service commodity for both business and IT

The journey toward a cloud-based infrastructure nowadays seems like a walk in the park. But it's still far from standard. Different perspectives on privacy, security, scalability, costs, and manageability – to name just a few – can lead to wildly varying scenarios. They can involve multiple suppliers, multiple technologies, and a mix of public, private, and on-premises deployment. It's a hybrid world out there, and it can bring more complexity than desired. This is where "Service Orchestration" becomes crucial, providing the power of the cloud through a unified platform of simple, easy-to-consume services, no matter what route is chosen.

WHAT

- Organizations have fluctuating needs centered around attributes such as security, privacy, integration, flexibility, costs, and standards. The near future of cloud delivery models will thus involve a combination of public (agile and cost-effective) and private (secure and self-managed) deployment, likely to be delivered by multiple providers. This hybrid cloud reality brings complexity.
- A cloud orchestration platform allows transparency and access to all cloud services through a single and central portal. With such an automated – and increasingly AI-enabled – platform, the IT department can offer, manage, and charge back current and future cloud services in the most efficient way.

USE

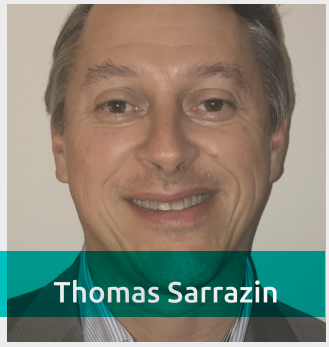
- A leading global supplier in logistic services deployed a hybrid cloud solution underpinned by a professional cloud management platform (CMP), with a focus on value through the orchestration and automation functions. The result was an integrated digital factory solution for cloud-native application development, enabled by a robust DevOps delivery approach.
- A Dutch distribution organization migrated its entire application landscape from an on-premises infrastructure to an off-premises, cloud-based IaaS and SaaS, all made possible by an industrialized migration factory. It delivered significant cost savings and increased agility.

IMPACT

- Taking the full benefits of a cloud-based infrastructure (including agility, security, innovation, and cost reduction) without having to manage the unavoidable complexity of hybrid scenarios.
- Transparency of which cloud services are actually being used by which business unit and for what purposes.
- AI-enabled and cognitive self-service capabilities for the business side, improving speed to market and the alignment between business and IT.

TECH

- **Hybrid cloud orchestration platforms**
  - MicroFocus Cloud Management Platform, Microsoft Azure Cloud Management, IBM Cloud Automation Manager
- **DevOps tooling**
  - The typical components that underpin DevOps – such as Chef, Jenkins and Docker – are key for cloud benefits
- **Open Source**
  - OpenStack is an open cloud platform that diminishes dependency on specific cloud service providers



your expert **Thomas Sarrazin**

CECI N'EST PAS UNE INFRASTRUCTURE

Continuously build and deploy the next generation of software solutions, without ever noticing your infrastructure

Sounds like a pipedream. But the ultimately invisible infrastructure (the "no" infrastructure) is certainly within reach. Many startups would agree with this idea, as they prefer asset-free business models for their next disruptive solutions anyway. Software-defined "everything," radical automation, software containers, microservices, orchestration, and the cloud are paving the way toward a retail-style, catalog-based infrastructure. Perhaps there is no catalog at all, just software. With software being continuously developed and deployed on an infrastructure that automatically adjusts, IT infrastructure can finally become the powerful utility it was destined to be; always available, just not noticeable. C'est tout.

WHAT

- A new breed of providers focus on providing measurable business outcomes for their clients' consumers with turnkey infrastructures that are transparent and measurable in terms of value delivery.
- The mix of virtualization, software-defined networking and data centers, cloud, APIs, and software containers makes IT infrastructure a commodity that can be easily orchestrated and procured from a catalog of services.
- This can even evolve into "NoOps" and "serverless" computing, in which applications – or microservices – are instantly deployed on a cloud-based infrastructure that remains fully hidden from the developers.

USE

- Startups often rely on an event-based, architectural combination of IoT, image processing, AI-driven analytics, and social media functions; for that, the default design mix now would consist of third-party APIs and "serverless" computing.
- Cloud-based development – even in full DevOps mode – typically involves building software, checking it into a source code management system, and deploying it to an application server, scaling up and down when needed. With serverless computing platforms such as Azure Functions or OpenWhisk, it's only a matter of uploading the code and watching it run within seconds.

IMPACT

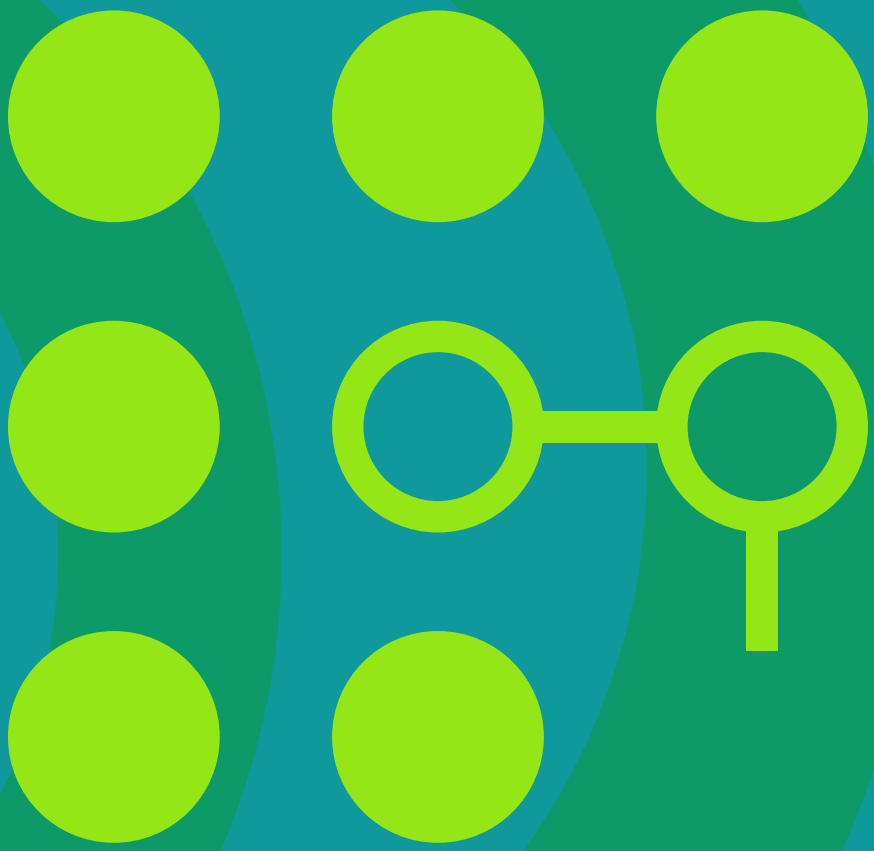
- Speed to digital value: no waiting for infrastructure procurement and installation, just on-demand usage.
- Elastic scalability, varying with business volumes.
- Full business focus on software-based solutions, rather than on the underlying infrastructure challenges.
- Easy-to-start new initiatives, based on minimum viable products (MVPs), no limits to scaling out, and small costs for failures.
- Modest to no upfront IT infrastructure investments.

TECH

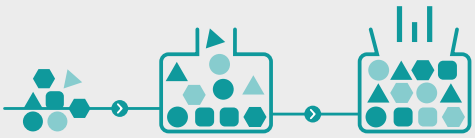
- **Managed data center services**
  - Mesosphere, Nutanix, Qubole
- **IT service marketplaces**
  - AWS marketplace, Microsoft Azure marketplace
- **Platform-as-a-Service**
  - Google App Engine, Salesforce Platform
- **Serverless computing**
  - AWS Lambda, Google Cloud Functions, Microsoft Azure Functions, IBM Cloud Functions (based on Apache OpenWhisk)

your expert **Gunnar Menzel**

APPLICATIONS UNLEASHED



APPLICATIONS UNLEASHED



Show me your application services landscape and I'll tell you about your company. In a world of parallel, digital realities this is more ture than ever.

New solutions need to be delivered more rapidly and in various incarnations, as the very notion of "user interfaces" is rapidly melting away (Alexa, terminate my GUI). And although minimum viable products are the norm – thanks to the start-up community – the quality of applications need to be enterprise-level, as the trust balance of the organization is at more risk than ever.

The new application landscape can be unleashed in three different ways:

Existing applications need to be rationalized, simplified, consolidated, and decommissioned. What may have once been differentiating solutions for organizational growth, are now all too often petrified, budget-devouring nuisances. Standard, industry-best-practice solutions from the cloud are a quick – though possibly disruptive – way to break the inertia. Loosely coupled layers on top of silo applications – through bots, APIs, robotic process automation – another. Existing applications can be augmented by adding a touch of "smart" to them. AI services in areas such as vision, speech, language, knowledge, and predictive analytics are routinely available as webservices, so no need for application developers to dive deep into the alien world of deep learning, neural networks, and computer linguistics.

New applications are rapidly built and released in DevOps-style: in quick iterations between business and IT, leveraging micro-services, APIs, software containers, serverless computing and radically automated, high-productivity tools. Again, built-in analytics, cognitive/AI and smart contracts further add to both the corporate IQ and the trust balance of the enterprise.

Time to unleash the power. Applications Are Go!

ALL IN THE CATALOG

Quickly benefiting from next-generation, industry best-practice application services without building them from scratch

Look no further, it's already in the catalog. The cloud has brought a brand-new generation of Software-as-a-Service (SaaS), mobile, and task-oriented applications. And they are not just off-the-shelf versions of software you used to build yourself. They typically contain industry best practices and new functions from which your impatient business can immediately benefit. All of this with a top-of-the-bill user experience, flexible APIs, and mobile-first apps. Even your legacy applications can be turned into easy-to-access catalog items. A growing catalog of next-generation applications is waiting to kick-start your digital journey. Open it up today and start exploring!

WHAT

- SaaS applications: born-in-the-cloud applications that deliver innovative, next-generation business functionality in areas such ERP, CRM, SRM, and HRM; also covering task-oriented areas such as team collaboration and project management.
- AI applications: turnkey AI functionality without the need to get into the data science or platform engineering, often even without the need for supplying lots of training data due to pretrained, industry-strength models ("small data").
- App Store-style navigation and availability of business applications and application services.
- APIs and web services provide an easy way to create business access to application functions, not only for next-generation cloud applications, but also for catalog-based access to existing, legacy applications.

USE

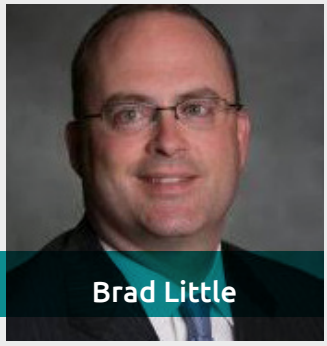
- While re-implementing an ERP system, a large manufacturer decided not to go for the standard "one ERP" approach, but split the functionality in cataloged services to provide more speed and agility for the business.
- A European high-tech company changed its formerly requirements-driven approach to defining value cases and impact assessment to working with catalog-based cloud applications, speeding up both selection and implementation.
- A large US company created a so called "logo-based architecture": an architecture in which the business functions are covered by SaaS applications only, supported by a single orchestration platform.

IMPACT

- Quick access to next-generation business functionality and even advanced AI without large, upfront investments and having to build new skills.
- Standardization while still providing agility and autonomy for the business through APIs.
- Mixing core enterprise applications with agile and catalog-based solutions.
- Speed up application selection and implementation by applying a catalog perspective instead of requirements specification.

TECH

- **SaaS solutions**
  - CRM: Salesforce
  - HRM: Workday, SAP Succesfactors
  - ERP: Oracle Netsuite, Kenandy Cloud ERP
  - Task-oriented: Concur, Asana, Trello, Microsoft Yammer, Slack
- **AI solutions**
  - IBM Watson Health, iManage RAVN for legal and contract management, Commerce.ai for marketing, Area for supply chain
- **App stores**
  - Salesforce AppExchange, SAP App Center, Microsoft Azure Marketplace



your expert **Brad Little**

BOT IS THE NEW APP

Providing compelling, more conversational, more intuitive access to application services while simplifying and reengineering the underlying application landscape

Say what? Every day, new and exciting applications pop up that don't look like traditional applications. Actually, sometimes you can't even see them at all. Building on powerful artificial intelligence (AI), it's just a matter of asking a question in a natural language and an application service will respond. Application bots may involve spoken dialogue or messages and emoticons. Its technological capabilities can seriously diminish the number of applications on a desktop or a mobile device and reduce the number of applications you need to manage. Close your Windows – the bots are here.

WHAT

- Virtual assistants apply artificial intelligence to recognize and produce natural language and act as a front end to application services. They can be used from the desktop, the smart phone, the car, or through a dedicated device, such as Amazon's Alexa.
- Messaging apps apply similar technology to recognize and produce text and even emoticons; they can be integrated with existing chat platforms or built as stand-alone applications.
- These assistants provide the means to automate workflows much more naturally. Google Duplex can make appointments, Siri already suggests to create workflows based on phone usage. Enterprise software providers will soon follow with similar functionality.
- The application services needed for all of this typically stay "under the hood," requiring back-office applications to be redesigned as microservices and APIs.

USE

- With Odigo's Voice App, customers can browse, coordinate, and perform services. By using speech analytics, the emotional state of a caller can also be identified and acted upon.
- Several banks now allow their clients to use the virtual assistant of their phone to conduct financial transactions.
- Using the Chinese WeChat messenger interface, 200 million customers already can pay a bill on the spot, transfer money, book a restaurant table, order a taxi, or collaborate with colleagues.
- Automated workflows based on AI-driven analysis of past behavior and dialogs, make the individual consumer a power user.

IMPACT

- Opportunities for better, timelier, and more efficient customer service as well as employee productivity.
- Obtaining better understanding of customer needs and sentiments.
- Turning business users into better-enabled power users.
- Better leverage and use of back-office (legacy) applications.
- Opportunities to simplify and rationalize the existing application landscape.

TECH

- **Customer Service interaction**
  - Capgemini Odigo, IPSoft Amelia
- **Voice assistant platforms**
  - Microsoft Cortana, Apple Siri, Amazon Alexa, Google Duplex and Assistant
- **Voice assistant devices**
  - Amazon Echo, Google Home, Apple HomePod
- **Text assistant platforms**
  - WeChat Open Platform, Microsoft Bot Framework, Facebook Messenger Platform

your expert **Frank Wammes**

KICK START MY APP

Leverage DevOps, intelligent automation, and AI to the fullest extent for lightning-fast delivery and management of applications

Blessed with a motley crew of brilliant ideas for killer apps? First of all, you'll need the power to deliver new disruptive ideas to the market blazingly fast and with the right quality. Classic software delivery based on manual work and more mythical man months will only get you so far. To leapfrog, you must automate. Radically. Next to industrializing infrastructure delivery, it's a matter of fully automated, vanguard software development, deployment, and management pipelines. These cover the full applications lifecycle, even monitoring the actual business performance of applications and automatically taking corrective actions. Put your app engines on and get ready to rock!

WHAT

- DevOps-style continuous delivery is based on multi-disciplinary teams that seamlessly work together; it also builds on highly automated "tool trains" often based on open source technology that cover the entire applications lifecycle in the blink of an eye.
- Systems that are purposely architected on the principles of speed, safety, and scalability are stable and yet can accommodate rapid, iterative change.
- Automation can be extended to monitoring the actual business performance and business usage of the application, applying artificial intelligence to detect and correct inefficiency and anomalies without human intervention.

USE

- An industrial manufacturer increased its IT process efficiency by over 30% by implementing end-to-end process automation, also covering data integration and the verification process.
- A European bank drastically moved to DevOps-style, highly automated software delivery, changing its image from error-plagued laggard to innovation leader.
- A large stock exchange replaced its incoherent set of application management tools with an end-to-end, automated suite; it enabled them to fluently migrate their application landscape to the public cloud without the danger of failing performance and low-quality results.

IMPACT

- Rapid delivery of potentially disruptive solutions to the market, starting from minimum viable products that can quickly and iteratively be extended and improved.
- Lower cost of software development and maintenance, combined with higher software quality.
- Optimization of application performance and opportunities to proactively monitor and improve the business impact of software.

TECH

- **Delivery and release automation and DevOps**
  - Xebialabs, Spinnaker, Pivotal Concourse, LambdaCD, IBM DevOps, Chef, Puppet
- **Process automation**
  - Cortex, CA Automic One, IPsoft
- **Applications Monitoring and Management:**
  - Appdynamics, Splunk, New Relic

your expert **Frank Wammes**

API ECONOMY

Manage APIs as the core asset that makes both the internal organization and the outside world fully benefit from your application services – and vice versa

May the best API win. Unleash the power of your applications portfolio through easy-to-use, standardized interfaces to application services. This will allow both the business and IT sides to quickly build flexible solutions that feel like their own even if they are not. And by exposing your carefully managed API catalog to the outside world, it doesn't only open up your business in new ways to customers and partners. It might also give way to a platform for innovative ideas and solutions that you never envisioned yourself. Come to think of it, you may want to intimately know and use the APIs of others as well. Your digital breakthrough may be just one API away.

WHAT

- An application programming interface (API) provides standardized, open access to an application service or data set; it is decoupled from the actual user interface of the application.
- A set of definitions, protocols, and tools for building application software, APIs provide the building blocks for developers to compose and enrich their application, leveraging data from multiple sources. With more and more companies opening their data sources by means of APIs, we no longer have to build all our services.
- APIs can be managed as a product through API management platforms; they take care of versioning, scalability, quality, and monitoring of actual use.
- APIs can be built on top of existing applications in order to provide more flexible access; new applications typically come by default with a set of accompanying APIs.
- APIs can be exchanged with the outside world.

USE

- Of Salesforce's daily use of core application services, more than 70% is based on API-usage rather than through the browser user interface.
- The New Zealand Post provides a special developer resource center that enables its customers and partners to implement digital solutions by integrating their applications with the New Zealand Post's APIs.
- A European tax agency rebuilt its entire core system as a set of micro services and APIs, enabling any flexible solution to be developed on top of it.
- A financial institution used their API strategy to turn the PSD2 banking regulations into an opportunity to generate new revenue sources.
- IBM's Watson's AI capabilities are mostly available through APIs.
- Google and IBM provide access to their quantum computing capabilities through APIs, in order to explore the new possibilities.

IMPACT

- Simplification of the application portfolio, as well as better and more flexible access to existing and new application services by both business and IT sides.
- Monetizing and enriching application services through the publication of APIs to customers, partners, and external developers.
- Leveraging external API catalogs for ready-to-use application functionality, AI capabilities, and very specific IT services.

TECH

- **Dedicated API management platforms**
  - WSO2, Kong (open source), Tyk (open source), Apigee, Mulesoft, Microsoft Azure API Management, IBM API Connect, Dell Boomi API management, CA API management, AWS API Gateway
- **API management open standards**
  - The Open API Initiative
- **API marketplaces**
  - ProgrammableWeb, AWS Marketplace

your expert **Joakim Lindbom**

APP MAKER MOVEMENT

Low-code and no-code platforms make building next-gen business applications a high-productive, DIY matter, bringing digital power to the people

Bring Your Own Device? So last year. How about bringing your own applications? Just like the Maker Movement has inspired individuals to create their own 3D objects and robots, it is now easier than ever to construct your own applications – and not necessarily by learning how to code. It is done by using powerful, visual DIY tools that leverage API catalogs and prebuilt template galleries to the fullest extent. It gets even better when you collaborate with peers. Sometimes, it's really just a matter of gluing together a few web services. And AI support is on its way to making things even simpler, more effective, and automated. The time is ripe for app democracy. Make your move.

WHAT

- Powerful low-code and no-code platforms are available for DIY, "citizen" application development, although IT people may be equally enthusiastic about their productivity and ease-of-use.
- These platforms depend on the availability of robust, enterprise-scale API and web service catalogs (both internal and external), open data sets, and tested and proven template galleries.
- Sharing of best practices and collaboratively building on each other's solutions is a crucial success driver, as also evidenced by the "Maker Culture."
- AI will quickly assist in creating even more powerful DIY applications without any need for coding.

USE

- An online optical products retailer chose to custom-build its entire stack of core applications rapidly with its senior managers on the low-code Mendix platform, rather than implementing a more expensive, less flexible ERP system.
- The Dutch city of Zaanstad used the Betty Blocks no-code platform to build a prototype in days that rapidly convinced 13 surrounding municipalities of an innovative concept around youth care services, enabling them to use the same platform to easily adapt to their own, local needs.
- Individuals from all over the world routinely create and exchange "applets" on IFTTT.com, based on thousands of web services that give access to the world's most popular applications and data collections.

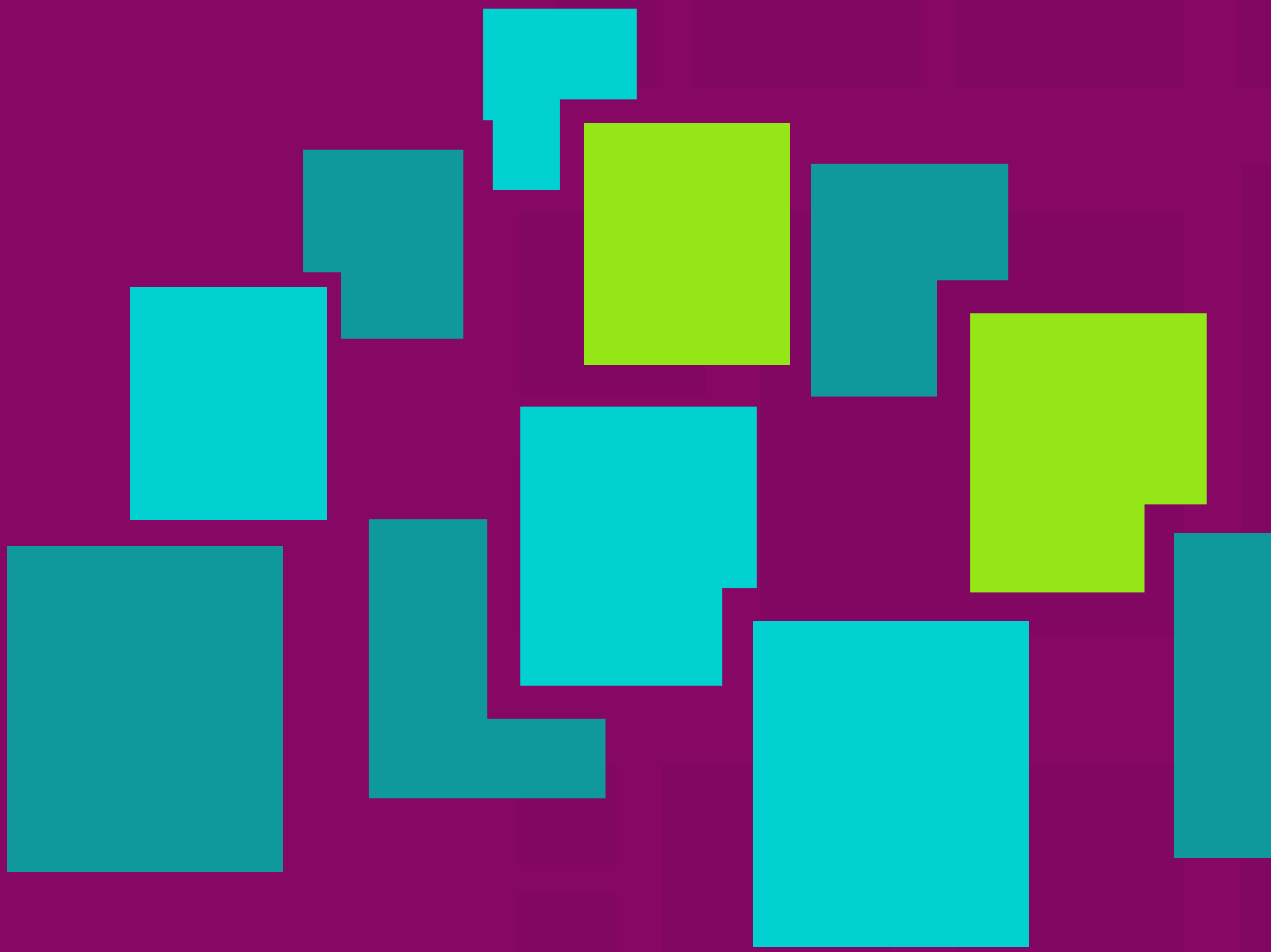
IMPACT

- Increased application development productivity, on both the business and IT sides.
- A much better alignment between the IT and business sides through personally involved and committed "citizen" application developers, and the open, digital platforms that IT supplies to help these citizens along.
- More innovative and higher-quality business-facing applications.
- Enterprise robustness combined with agile solutions.

TECH

- High productivity development tools – Google App Maker, Mendix, OutSystems, Microsoft PowerApps, Salesforce Lightning Platform, Betty Blocks, Wordpress website builder
- Visual web service and API composers – If This Then That, Appian, Microsoft Flow
- Maker Movement – The Maker Movement

THRIVING ON DATA



THRIVING ON DATA

The corporate IQ depends on data. Data from many different sources – outside and inside the enterprise, people, things – in all sort of structures or "un-structures," in hardly conceivable volumes, coming in at yet unseen speeds.

Technology innovations from the open-source community have created what the entire world has come to know as big data. As major providers have integrated these new capabilities as a commodity in their platforms – getting rid of the limitations of previous data estates – it's fair to say that all data is now "Big," hence no reason anymore to emphasize. So it's official: bye-bye, big data.

Combine all of it in a platform with cloud delivery, powerful self-service tools, advanced visualization, fully automated data pipelines, plus cognitive support, and Business Intelligence and Analytics get an entirely new, cool life. It will provide more real value, closer to the business than ever before.

And more than ever, it's about data science and next-generation algorithms, too. An eclectic catalog of high-performance analytics is destined to be the most valuable enterprise asset, whether it's built in house or mindfully acquired from elsewhere.

Then, of course, there is the augmentation of the corporate IQ with artificial intelligence, leaning on various ways of machine learning, neural networks, and natural language processing. There are very few products, services, processes, capabilities, solutions, or applications that wouldn't benefit from an AI injection of "smart." And the opportunities for reinventing the entire business model from scratch with an AI-First perspective are quickly popping up as well.

With all this enthusiasm, data engineering and data science skills are scarce. Rigid automation, high-productivity self-service tools and off-the-shelf analytics and pre-trained AI solutions provide the means to deal with this increasingly pivotal issue. Also, personal data – as insightful as it potentially is – has all it takes to devastate the enterprise trust balance. Creating data-driven solutions through privacy by design should be at the foundation of the corporate Maslow pyramid.

MY **DATA IS** **BIGGER** THAN YOURS

With "Big" now the new normal in data, it's time to create a new wave of liberated, actionable business insights

Yes, data is bigger than ever – and it's not just because technology supports you in storing and analyzing data in unparalleled volumes, in any structure, from any source, and at any given time, although that certainly helps. The real breakthrough of the new data landscape is the ability to insert actionable insights into literally any business activity along every step of the way, with the very best next move. It's more than a business on steroids; it's a business on insights. Envision it from before the very first contacts with potential customers, to way beyond the finest details of the final, operational delivery. Insights are the key to boosting corporate IQ – and that's huge indeed.

WHAT

- The new data landscape combines low-cost, huge-volume data storage and access with cloud-driven flexibility and scalability alongside raw, real-time analytical and visualization power.
- Many innovations came from open-source projects and startups, but industry leaders have quickly caught up, now successfully merging big data platform technologies with their proprietary platforms.
- Data can be made available as actionable insights, not just as a separate report or analysis, but right in the middle of a process flow, a mobile application, an API or a webservice; it can also provide the crucial training assets needed for almost any serious AI solution.
- With "Big Data" now the new normal (hence, consider this the last mention of it in a TechnoVision edition) the focus should shift to creating a next wave of business insights, liberated from the restrictions of the earlier data landscape.

USE

- A large European tax agency migrated its entire legacy data warehouse to an open source-based, next-generation data platform, saving considerable costs while increasing delivery speed and gaining access to innovative big data capabilities.
- A Japanese insurance company made an insight-driven, cloud-based sales portal available to its more than 100,000 independent agents, supporting their commercial activities with targeted next-best actions.
- A Nordic post agency augmented its existing data warehouse with real-time sensor data, delivered through a big data platform in the cloud

IMPACT

- Leverage next-gen technologies to simplify and rationalize the existing data landscape, saving costs while increasing agility, speed, and business buy-in.
- Infuse processes, activities, and applications with real-time actionable insights, in turn improving decision- making, efficiency, client intimacy, and ultimately business performance – all with a higher corporate IQ.
- Create additional value on top of existing BI and analytics solutions, by augmenting them with big data-driven insights.
- Explore new revenue streams and breakthrough business models, leveraging data as the key asset.

TECH

- **Industry leaders' next-generation data platforms**
  - IBM Big Data Analytics, SAS Viya, Microsoft Big Data solutions, SAP BW/4HANA, Cloudera Enterprise Data Hub, Hortonworks Data Platform, Snowflake Cloud Data Warehouse
- **Integrated insights**
  - Salesforce Einstein, Oracle Adaptive Intelligent Applications, Pegasystems Customer Decision Hub, SAP Leonardo
- **Open Source and standards ecosystem**
  - Open Data Platform Initiative

your expert **Anne-Laure Thieullent**

YOU DO THE MATH

Algorithms are the key to creating more business value from data, so everybody needs to become a bit of a data scientist to raise the corporate IQ

We know, we know. Data science isn't only about math. However, the future of your business lies in algorithms. It will rely on leveraging internal and external data to make better informed decisions, predict the future, and prescribe what should be done to achieve objectives. An eclectic catalog of algorithms can be the most differentiating business asset, whether pertaining to the customer experience, internal operations, human resources, risk, fraud, or "things." And there is a quickly growing market of sector and domain algorithms as well, algorithms that are ready to use right out of the box. So you don't need to science your way out of this all on your own.

WHAT

- An innovative push from the open source world has accelerated the development of advanced analytics, algorithms, and AI, shifting from insights that describe or (at best) diagnose, to predictive and even prescriptive insights.
- With more – diverse – data available from internal and especially external sources, findings are corroborated, rather than depend on guesswork becoming much more accurate.
- A catalog of algorithms and AI-based insights, made available to the business, can make a decisive difference in business performance and competitiveness.
- Off-the-shelf and AI-enabled, do-it-yourself analytics are a quick, viable alternative to building algorithms from scratch "by hand;" this is crucial in a time of scarce resources and the need for quick results.

USE

- A life science company uses weather and social data to refine forecasts, streamlining their supply chain.
- Unilever actively analyzes social media to refine campaigns, decide on marketing strategies and protect brands.
- A global insurance company develops analytical models to analyze external media for events that could affect customers, and hence their exposures.
- Daimler China analyzes internal and external data to accurately predict arrival of a car at the dealer, right from its arrival at the port.

your expert **Marc Chemin**

IMPACT

- Getting more new value from data from various – often external – sources, beyond the traditional business intelligence benefits.
- A better understanding of future customer behavior, optimizing the supply chain, shortening delivery routes, saving energy, identifying the right personnel for the job, predicting health issues, tax fraud, and machine defects.
- Modeling, simulating, and deciding around alternative business scenarios and key outcomes to decide the next best action.
- Augmenting existing products and services with (built-in) insights and AI, adding value to the customer and potentially increasing revenue, potentially even through new business models based on monetizing insights and algorithms.

TECH

- **Open Source ecosystem**
  - Hadoop, Spark, R project, Cloudera, Hortonworks
- **Advanced Analytics platforms**
  - SAS Viya, Microsoft Big Data and Analytics, IBM Analytics, Knime, RiverLogic prescriptive analytics, GE Predix platform, C3 Digital Enterprise platform for AI and IoT, Dataiku Collaborative Data Science platform, H2O automated machine learning platform, DataRobot automated machine learning, Alteryx data science and analytics platform
- **Analytics solutions, marketplaces, and communities**
  - Kaggle data science crowdsourcing, Microsoft Team Data Science Process, Alteryx analytics marketplace, Data Ventures, BlueYonder

AT YOUR SERVICE

A growing lack of specialized resources, and the need for insights as close as possible to the business, are the fuel to the self-service data revolution

"Can I help you?" Every businessperson nowadays should be a bit of a data expert, perhaps even a "citizen" data scientist. The best insights are created in close proximity to the business and to do that that, data must be discovered, prepared, analyzed, and visualized by business people themselves. It requires a highly automated data pipeline that gives agile access to the right data, while ensuring security, privacy, and quality. It also requires easy-to-use, self-service tools that power a business to take data matters into its own hands. Introducing the Data Concierge: an intelligent, one-stop shop for data. You're welcome!

WHAT

- The days of a six-month turnaround for a new data warehouse requirement are gone. Today's insights need to adapt to the latest challenges and information, and this means achieving "DatOps" delivery, which allows updates and new insights to be delivered quickly and continuously.
- This is driven by an automated, increasingly AI-assisted factory-style process to ingest, select, transform, and prepare data – making the right data available as easy as asking a concierge.
- As Excel remains the preferred business data tool, its quality of individual insight at speed needs to be trumped by nex t– generation "do it yourself" BI, analytics – and even AI – tools that identify and effortlessly connect to the data pipeline.
- AI-driven support – both in understanding data and using natural language to express needs – makes self-service tools increasingly powerful and easy to use.

USE

- A consumer products company created "data science on demand" that enables the business to work with data experts on specific challenges and rapidly have the first proof of solutions – then production versions – to reap early business benefits.
- A financial institution turned its data ingestion into a highly industrialized, automated, managed service where new data and insights are made available from months down to just days.
- A US airline supplied business users with intuitive self-service data tools, creating much more data exploration, innovation, and a true "self-service movement."

IMPACT

- Cost effective production of BI and analytics results, reducing manual effort and increasing quality.
- Speedier availability of new insights for the business.
- Better access from the business to more relevant data from various internal and external sources.
- Increasing cultural and practical awareness on the business side of the potential for turning data into insights, algorithms and AI.
- A true fusion of the business and IT sides – crucial for digital change – with the automated data platform and the data concierge concept pivotal to the success.

TECH

- **Continuous, agile delivery**
  - Jenkins, Bamboo, Git, Subversion, Puppet
- **Data pipeline technologies**
  - Alteryx data science and analytics platform, Informatica Intelligent Big Data, Talend, AWS Data Pipe Line, Microsoft Data Factory, Hortonworks Hybrid Data Platforms, Cloudera Enterprise Data Hub, Trifacta Data Wrangling, Talend Data Prep
- **Self service BI, analytics and AI tools**
  - Tableau, IBM Watson Analytics, Microsoft Power BI, QlikView, SAS Visual Analytics, Dataiku Collaborative Data Science platform, H2O automated machine learning platform, DataRobot automated machine learning, Google Cloud AutoML, BigML

your expert **Goutham Belliappa**

DATA APART TOGETHER

Managing and governing data in an unpredictable, highly distributed context requires an, agile, federative mindset right from the start, in every decision

The single source of truth in corporate data is like the Holy Grail: great to pursue yet destined not to be found. Therefore, organizations must adapt to a federated business reality. As a result, many different sources, uses, and perspectives of data exist both inside and outside the corporate perimeter. Enter meta-data management, master data management, and federated analytics. They deliver integrated yet powerful access to data spread across multiple data stores. Governance is thus more agile and closer to the business than ever before. It complements the crucial quest for trustworthiness and unobstructed collaboration on data. The best of both worlds, really.

WHAT

- The increasing need to execute not just on internal data, but also with external partners, means that more data needs to be connected and collaborated on in a highly federative way.
- Master data management and the cross-reference it supplies between systems is crucial to ensure that connections between data can be both navigated and managed.
- A realistic, light-weight approach to this does not require an undisputed "golden record" though, just the minimum to enable people and systems to connect the dots: quality can sometimes wait, but collaboration cannot.
- Next to MDM, meta-data management, business process management, increasingly powerful self-service exploration, data virtualization and AI all significantly help to thrive on federation.

USE

- A leader in healthcare and life science wanted to open up distributed data for self-service analytics. It created a data catalog that automatically inventoried every field of data from several data lakes so that business analysts could maximize their time to value.
- With product information residing in multiple systems with different standards definitions across various regions, a global beauty products company spent way too much time finding and aligning data. Through the implementation of federated MDM, it reestablished its grip on mastering complexity while freeing up time to actually work on insights-driven product management and marketing.

IMPACT

- Business advantage is built on insights from data: wherever it is kept, by whomever, in whatever way.
- Getting the right information means knowing what can be obtained: for example what customer information lives in which lakes and other data stores and what product information is related to it.
- Enabling owners and users of internal and external data lakes to collaborate, so to provide better business outcomes for all parties involved.
- Creating quick results without lengthy, often unrealistic unification and standardization efforts.

TECH

- **Master Data Management**
  - IBM InfoSphere Big Match for Hadoop, Informatica Intelligent Master Data Management, Talend Master Data Management, SAP Master Data Governance
- **Data Exploration**
  - Informatica Enterprise Data Lake, Cloudera Navigator, Apache Atlas, Waterline Data Catalog, Microsoft Data Catalog
- **Data Virtualization**
  - Datometry Hyper-Q, Tibco data virtualization, Informatica data virtualization, Denodo data virtualization

your expert **Steve Jones**

MAX MACHINA

"Artificial" or not: AI provides the key to raising the corporate IQ, by potentially augmenting and reinventing each and every solution in the digital era

No need to race against the machine. Breakthroughs in deep learning and raw computing power are fueling the renaissance of AI and machine intelligence, resulting in spectacular progress in the areas of audio, video, image, and text processing. These are human-like, cognitive capabilities, but AI can also absorb and reason around complex data in unearthly ways, surpassing what the human brain can deal with. As such, the mission of AI is to augment your personal and business world. Add AI to an app, a process, a product, a service, or even a thing, and it will quite likely grow both smarter and better. You decide how fast and to what extent AI will do this. After all, these are still "machines" and they'll do what you told them.

WHAT

- Artificial (or machine) intelligence is progressing rapidly due to increased computing power and superior software, notably in the area of neural networks-based deep learning and natural language processing.
- AI is best illustrated by its cognitive capabilities coupled with human-like capabilities such as image and video recognition, language understanding, speech generation, complex text analysis, and conversational capabilities.
- However, AI can also surpass existing (statistics- and algorithms-based) analytics, benefiting from large amounts of training data or even generated, "synthetic" data and "reinforcement learning."
- Powerful AI capabilities are often only an API call or web service away, increasingly becoming available to the non-data science community, such as application developers and business analysts.
- AI works best by collaborating with humans rather than replacing them; in either case, ethical dilemmas will surface, and non-profit communities such as the Partnership on AI start to address these.

USE

- Capgemini brings more IQ to its own (BPO) business services by combining an automation of process steps with AI-enabled analysis and resolution of service requests. It also uses cognitive capabilities to facilitate complex contract management, optimize people matching for assignments, and drastically speed up testing.
- A large financial clearing house uses cognitive natural language capabilities to turn piles of unstructured financial brochures into 80 well-defined data points; an international bank uses similar capabilities to distill trends and risks from corporate annual reports.
- AI-powered drones combine image recognition and supervised learning to automatically count and control stocks in large warehouses.
- An oil & gas infrastructure manufacturing company combines image classification and sensor data to detect pipeline defects at the earliest stage.

IMPACT

- Cost effectiveness, improved productivity, and higher quality through "smart" automation of human tasks.
- Capturing and leveraging collective knowledge as well as decreasing the dependency on undocumented, individual expertise, and experience.
- Adding "IQ" to products, services, and devices, or even "things," making them more conversational, accurate and autonomous.
- Modernizing existing IT solutions by adding cognitive capabilities to it, increasing the value delivery to the business.
- Ultimately reimagining entire business models, products and services by taking an "AI-First" perspective.

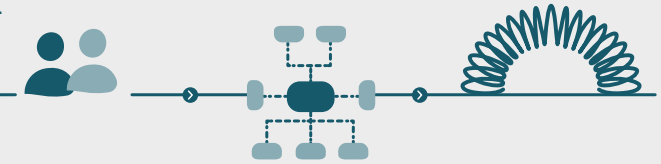
TECH

- **AI and machine intelligence platforms**
  - AWS AI Services, IBM Watson AI, Microsoft AI Services, Google AI, Loop AI Labs, Salesforce Einstein, Oracle Adaptive Intelligent Applications, SAP Leonardo, Dataiku Collaborative Data Science platform, H2O automated machine learning platform, DataRobot automated machine learning, SAS AI Solutions
- **AI solutions**
  - iManage RAVN, Mindbreeze Intelligent Search, Celaton, IBM Watson Knowledge Studio, Narrative Science natural language, IBM Watson Health
- **AI (open-source) platforms and communities**
  - Facebook AI Research, Google AI Research, OpenAI non-profit research, Partnership on AI

your expert **Ron Tolido**

PROCESS ON THE **FLY**

PROCESS ON THE FLY



As we all know, a high IQ is not always a recipe for crushing success. In the end, it's all about execution. Corporate speed depends on the ability to turn insights into action, to quickly respond to events, to overcome business silos, to rapidly change our ways if circumstances so dictate.

This is where process management technologies deliver. Having consistently caught less of the shine than its complementing concept of Thriving on Data (ever heard of "Big Process" ?), breakthroughs with intelligent automation and a taste of autonomous decision making have firmly planted Process on the Fly center stage underpinning the latest digital experiences.

As there are many different flavors of process that can be supported and enabled by technology, organizations can apply a range of options to support stable, predictable workflows, automated sequences of user interactions with systems, ad-hoc configurable responses to spontaneous events, and even no processes at all. Delivered as a crucial component of a next-generation business IT platform, process technologies bring a new pulse to literally any process in the organization.

As a certified silo buster, it bridges gaps between corporate – or inter-corporate – systems without intruding upon them.

As a next-generation solution builder, it's the glue that binds together microservices and APIs into something that we might have called "applications" in the past.

Combined with AI and cognitive systems, it is making business processes more and more intelligent, help drive decision making to boost corporate performance and creating better places to work.

Not exactly a May fly.

SHADES OF PROCESS

Build, run, manage, and improve processes with every needed level of robustness or agility

State-of-the-art business process platforms make it possible to support, define, run, and manage processes in many ways. Forget about carving process definitions in stone. Nowadays, at least 50 different flavors of agility can be added to your processes. This ranges from classic, predefined, workflow-styled process integration via document-based interaction, to robotic automation, dynamic rules, and policy-based process choreography. When guided by dynamic decision-making and AI support, these processes become smarter too, providing the power to act and react in real time. Quite the seductive perspective.

WHAT

- The portfolios of leading process management suppliers support processes with many degrees of agility and manageability.
- Such platforms support process modelling, then run through an orchestration engine, and monitor, manage, and improve them based on collected process metrics.
- They often rely on access to applications and data through web services and APIs, although non-intrusive ("robotic") access is a good possibility as well.
- By bringing in embedded analytics and AI or cognitive capabilities, process platforms can learn from both the human and automated experience and continue to improve.
- They support the more recent growth in varied interaction methods such as chat and voice bots.

USE

- Building on Dataiku, a leading freight broker improved their core product's accuracy and efficiency while establishing a data-driven spirit within the entire company. This move has resulted in several competitive advantages, such as increased customer loyalty and a much-improved speed limit correction process.
- A European bank required robust platforms, security, audit trails, strong authentication services, and many other features that Convertigo easily provided.
- A German Telco utilized the Pega platform to create a 360-degree customer view across all digital channels while drastically simplifying its daily operations.

IMPACT

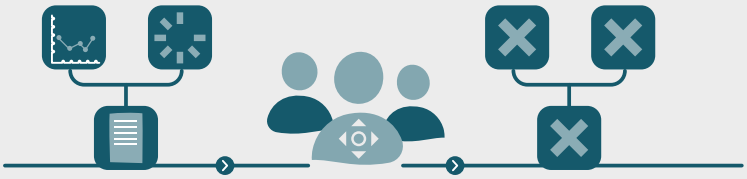
- Increased process productivity and effectiveness by automating human tasks and decision-making.
- "LEAN"-style continuous process and quality improvement.
- Augmented process agility and flexibility that leads to quickly creating new processes that might support a new product, service, merger, or external partnership.
- The power and foresight to quickly respond to customer-related events and needs, crossing process boundaries both inside and outside the organization.

TECH

- **Business process management platforms**
  - Pega platform, IBM Business Automation Workflow, SAP Process Management and Integration, JBPM open source, Activiti open source; Appian
- **Do-it-yourself business process tools**
  - Salesforce Process Builder, Microsoft Flow
- **Customer experience platforms**
  - Sitecore omni-channel suite, Bitrix social collaboration suite

your expert **Miroslaw Bartecki**

NO PROCESS



A process without a fixed flow, seamlessly adapting to its environment, is that even a process anymore?

The best process? Consider no process at all. As the need for radical business agility continues to accelerate, established business process management tools will only bring you so far in terms of their ability to respond to complex customer events in real time. Driven by context-sensitive, analytical insights and AI, fixed and inflexible processes can be replaced by powerful reasoning systems. These systems fluidly adjust to whatever situation occurs by using rules and algorithms to decide the next-best action and employing the precise resources available to swarm the case at hand. It provides you with an enterprise heartbeat locked on digital speed.

WHAT

- Automate case building with AI figuring out the intent of a request and interrogating core systems to build a case file for the case worker
- Dynamic case management systems capture and process business events across process silos, providing end-to-end intelligence and optimized outcomes on a case-by-case basis.
- Business Rules Management System (BRMS) solutions externalize decision logic from applications, allowing both IT and business experts to define and manage decision logic. This logic is then executed by Business Rule Engine (BRE) systems.
- Complex Event Processing tools analyze the context stream – or "event cloud" – around an event that occurs in order to identify the most optimal response and action.

USE

- A transport company used AI-based case management to streamline and automate the management of customer correspondence leading to an 85% reduction in manual case preparation and handling effort.
- A European tax agency used a business rules management system to extract the logic around computing benefits from its core applications in order to adapt more quickly to changing regulations.
- A government organization used a case management system both to optimize the allocation of its scarce personnel resources to new unemployment cases and to track progress and outcomes.
- A global bank utilized a complex business event processing platform to ensure a consistent, real-time customer experience across multiple digital channels with quickly evolving products in various regions.

IMPACT

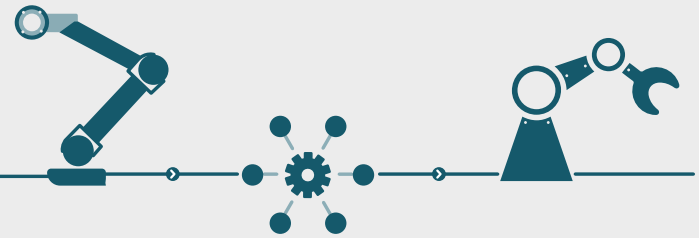
- Customer-centric decision-making with a radical impact on agent productivity when dealing with customer cases.
- Identifying hyper-personalized next best actions in real time.
- Split-second responses to high-volume data streams and events in real time, in particular around the Internet of Things and digital customer channels.
- Optimizing scarce enterprise resources to deliver the best outcome for every case.
- Highly flexible business logic that can be defined and adapted on the fly, in or very near to the business.

TECH

- **Case Management**
  - Appian case management, Pega case management, IBM Case Manager, Celaton InStream
- **Business Rules and Decision Management**
  - Prowler.io, Drools open source, Oracle Policy Automation, Pega Customer Decision Hub
- **Complex Event processing**
  - Amazon Kinesis, SAP Complex Event Processing, Tibco BusinessEvents, Apache Flink, EsperTech Esper

your expert **Fernand Khousakoun**

ROCK ROBOT, ROCK



Robotic process automation (RPA) delivers quick process benefits without elaborate and risky re-engineering

The robots are among us … though they sure don't look like robots. Rather, they emerge as powerful software solutions that target the mechanistic and repetitive processes of the human workforce, typically interacting with screens and systems. Robotic process automation looks at this interaction and aims to automate it as much as possible. The mission of RPA is not to fix underlying technical problems or flawed application logic. It is simply to maximize the efficiency of process execution, in spite of inherent shortfalls. So, while they may not be the shiny robots that walk around, carry your stuff, and do your household chores, they sure will speed up your routine business activities, 24/7/365. Robots rock.

WHAT

- RPA utilizes a software system to replicate the actions of a human worker interacting with the user interface of a computer system.
- This "software robot" can be trained to use the user interface in exactly the same way as a human would, virtually initiating input actions (such as mouse clicks and keyboard input), interpreting display output, and taking automated actions according to predefined rules.
- Additional RPA management software manages resource allocation, systems usage, and compliance.
- RPA solutions typically carry out their actions much faster (and more reliably) than their human counterparts.

USE

- From business processes in finance, HR, and supply chains through to technical and service management processes in IT, Capgemini's Business Services (BPO) global practice deployed RPA technology in order to generate new operational efficiencies for their clients while increasing price-competitiveness.
- A large services organization automated its order management process with RPA, covering the work of 800 FTEs by 50 software robots. The average handle time was reduced from 30 minutes to ten and an 80% cost reduction led to a return on investment within six months.
- A government department is using RPA extensively to automate clerical tasks leading to 40% improvement in average handle time for customer contacts and an 80% reduction in processing costs for processing applications.

IMPACT

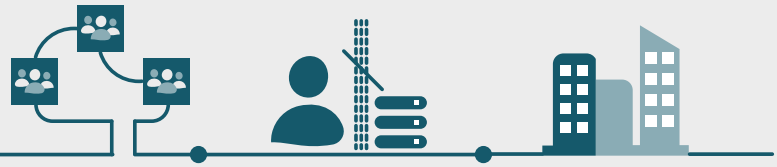
- A faster and more reliable execution of routine human tasks carried out across a multitude of different applications, saving money, time, and resources.
- Repaired application integration and cross-silo organization issues that are typically too small or too costly to address within the core application systems.
- Due to its non-invasive nature – no applications need to be changed – benefits are delivered quickly, effectively, and without additional risk.

TECH

- **RPA platforms:**
  - http://www.uipath.com/, Automation Anywhere cognitive robotic process automation, Blue Prism robotic process automation, Jacada Integration and Automation, Kofax smart process applications, Nice robotic process automation, Pega robotic automation and workforce intelligence suite, UiPath robotic process automation, WorkFusion intelligent automation

your expert **Lee Beardmore**

SILO BUSTERS



Busting corporate silos by adding flexible process layers on top of them, rather than break solid, established structures

Your aging silo applications support disconnected silo processes. The souls of frustrated business users haunt you day and night in the IT neighborhood. Who you gonna call? The need to maximize value from existing assets has never been greater. Rebuilding core applications containing years of investment is complex, disruptive, risky, and massively expensive. But still, opening up access to applications, departments, and even the outside world is within reach. Business process technologies allow you to bridge the gap between systems without intruding upon them. Create a silo-busting platform for flexible and agile process layers on top of disconnected applications and create early, compelling benefits. Nothing to be scared of after all.

WHAT

- Robotic process automation (RPA) platforms enable the automated integration of multiple siloed applications from the perspective of a human worker without changing any of the affected systems.
- Business process management tools offer the capability to invoke various application services offered by different applications as part of a modeled and managed process flow.
- APIs and web services can be created on top of disconnected applications to expose crucial application functions to process modeling and system development tools.

USE

- A large private hire company, transporting more than 10 million passengers each year, needed to be able to improve reaction times to changing customer behavior and preferences. To achieve this, it leveraged MuleSoft to securely redefine their data and application services to support global expansion, enabling partners to embed private hire services into their own processes and services.
- An insurance company used RPA to quickly and safely integrate the core systems and processes of an acquired company, creating end-to-end processes that connected both companies.

IMPACT

- Sustaining the lifespan of aging or dysfunctional applications without costly and risky applications management activities.
- Connecting siloed applications inside and outside the organization to create new, outside-in, end-to-end processes to serve customers' and companies' digital needs.
- Providing a high level of process flexibility and agility without intruding on the affected application systems.

TECH

- **API and web services management**
  - Mulesoft API management platform, Google Apigee, IBM Connective & Integration
- **Robotic Process Automation**
  - Automation Anywhere, Blue Prism, UiPath, Pega Robotic automation and workforce intelligence suite , NICE Robotic Process Automation
- **Business Process Management**
  - Oracle BPM, IBM Intelligent BPM, Pega BPM & Case Management, Appian

WORK THAT MACHINE

Getting the max out of processes, by augmenting them with cognitive and powerful problem-solving capabilities

"Taking the robot out of the human" is a powerful first step in applying automation to work processes. But what if we bring machine intelligence into the equation? Cognitive systems can mimic human behavior and, perhaps better still, augment human intelligence; this is visible in their mastery of natural language and their understanding of audio, video, and images. Deep learning enables these systems to observe processes and their broader context, detecting complex patterns that humans might not be able to see or absorb. They are starting to watch how users interact with applications, so they can automatically generate robots to deliver the work items. They continuously learn from applying these patterns to daily practice, improving their models, augmenting the workplace with ever-increasing, automated intelligence. Such a symbiotic relationship between man and machine changes the way we work, get ourselves organized, and do business.

WHAT

- Cognitive systems can master the typical human ways of communicating and analyzing through, for example: natural language processing where interpretation and understanding of textural content takes place, natural language generation where narratives are created to represent and describe raw data and the ability to recognize images or analyze video footage. These capabilities enhance existing processes, either by augmenting human work, by replacing parts of it, or more frequently both.
- AI has utilized (unsupervised) deep learning to win games – such as Go or Dota 2 – just by observing how it is played and won, without even knowing the rules. The same technology can be applied to processes by learning from the way humans do their work and then providing them with automated, highly intelligent support.

USE

- A European mobile communications retailer leveraged cognitive technology to radically improve back office processes, leading to a 70% reduction in operating costs and up to 80% improvement in operational efficiency.
- A trade finance organization digitized and categorized unstructured documentation and extracted relevant data with thousands of complex daily transactions managed by cognitive software and bots.
- Capgemini Business Services works with Celaton, leveraging its inSTREAM AI software to automatically handle incoming structured and unstructured correspondence through a variety of digital channels improving efficiency by over 50%.

IMPACT

- Boosting work productivity and effectiveness through automated decision-making and the availability of real-time, predictive insights.
- Improved customer experience by adding human-like, cognitive capabilities to end-to-end processes.
- Mitigating the risks of an attrition, an aging workforce and dependencies on specialized or scarce knowledge.
- Enabling new, previously unthinkable processes to very complex, data- and event-intensive contexts, gradually approaching the era of autonomous processes and even the autonomous enterprise.

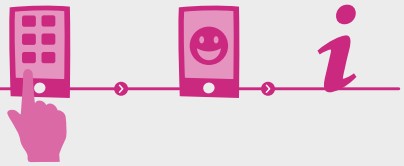
TECH

- **Cognitive and AI solutions and platforms**
  - Prowler.io Autonomous Decision Making, DataRobot, Celaton intelligent services automation, iManage documents learning system, WorkFusion intelligent automation, Loop AI Labs cognitive computing, IBM Watson, IPSoft Amelia, Pega Customer Adaptive Learning

your expert **Lee Beardmore**

YOU EXPERIENCE

YOU EXPERIENCE



Arguably, no IT area is changing so rapidly as that of the user experience. As spoiled, easily bored consumers of the latest technology platforms, we expect nothing less than compelling IT experiences offered by the organizations we do business with – or work for. Interaction should be a seamlessly connected string of "happy" moments of delight.

To make customers and employees truly happy through their use of your technology, there should be no modesty in your next-generation IT strategy.

Creating an excellent customer experience first of all requires a Design Thinking mindset: envisioning the customer journey from an outside-in perspective, putting equal amounts of compassion, empathy, and factual analytics into the equation – finding the crucial micro-moments in which key decisions are made and happy memories created. With technology becoming ultra-interactive, understanding the nature of the real-time conversation with the customer or employee paves the road to success. Then it's no longer a matter of creating the next killer mobile app. It is now the quest for finding – or building – the platform where supply and demand will naturally come together, sustaining a long-lived relationship. Often a "platform of platforms" is required, integrating what's available through the cloud with what can be exposed as services to the outside world, participating in growing ecosystems that together address every need of the customer.

It's also simply a matter of keeping up with the rapid pace of change in user experience technologies. Classic user interfaces on desktop and laptop computers are being replaced by chatbots and voice agents that understand and speak natural language. These AI-driven systems can pop up on your phone, in your car, on your watch or through a speaker in your living room. Smart glasses and 3D virtual reality headsets create a fascinating mix of the virtual and real worlds.

Indeed, many interesting animals out there to keep a close eye on.

I'M HAPPY

Working with your organization, whether as a customer, employee, or partner, should be like a string of seamlessly connected happy moments, creating worthwhile memories that will be shared

Nothing can bring down the sky-high expectations of digital era customers. Individualized, context-based, laser-focused on the task, gorgeously designed, quickly delivered across any channel. It's the quest for customer happiness that will determine business relevancy and competitive success. It begins with understanding the decisive micro-moments of the customer's day by using service design and customer journey mapping. Then, it's about creating the "now" and "wow" by obsessing over meeting the customer's needs in an immediate, helpful, and personal manner. An exceptional digital customer experience; clap along if you feel like happiness is the truth.

WHAT

- Every time a customer takes out her smartphone, a micro-moment occurs. This happens on average 200 times a day. Wearables, connected and "enchanted" things, smart bots and robotics will drive even more opportunities for delight.
- At each of these moments, a customer may "want to know," "want to go," "want to do," or "want to buy." It is everyone's job to make these moments happy ones.
- Digital winners apply a range of AI, technologies and integrations, which often require new collaborative platforms across organizations, to understand the individual behaviors and desires within these micro-moments, fulfilling and increasingly anticipating future customer needs.
- Digital happiness assumes digital beauty, and it can be "wowed" by a human connection, such as friendship.

USE

- Electronic retailer Boulanger launched a series of smart "urban stores" that feature interactive kiosks, big video walls, and employee tablets all working together with back-office systems, seamlessly exchanging information to provide a next-generation retail experience to customers in the city.
- A leading quick service restaurant chain mapped the digital journey of its younger clients and developed targeted online content, social media channels, and a dedicated app to cater to the evolving needs of millennials and "iGen" individuals.

IMPACT

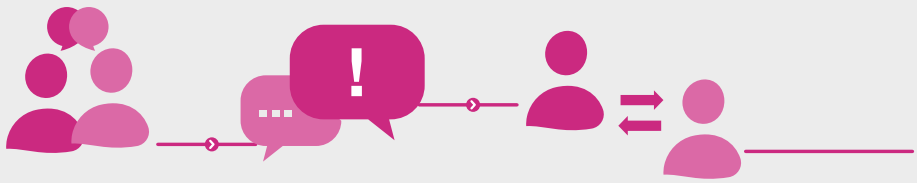
- Staying relevant to digital era customers by meeting and extending their individual digital capabilities and expectations.
- More effective and less costly customer service.
- New market opportunities and revenue streams through the better understanding of target groups and their evolving needs.
- Better cross-sell opportunities due to a higher level of customer intimacy and understanding.

TECH

- **Customer Interactions Management**
  - Prosodie customer interaction hub, Adobe marketing cloud, Salesforce Marketing Cloud and Service Cloud
- **Digital Commerce**
  - Oracle Commerce Platform, SAP Customer Experience, Salesforce Commerce Cloud
- **Customer Process Management**
  - Microsoft Dynamics 365, Salesforce CRM, IBM Watson Customer Engagement, Microsoft Cortana Intelligence Suite, Relay42 AI-driven customer journey platform

your expert **Andreas Sjöström**

CHAT ME UP



You are urgently invited to join the chat platforms and jump into a natural conversation with your customers (because they are already there, waiting)

It started up, and now it may never stop. Consumers are adding messaging platforms to mobile apps and websites as their preferred medium to interact with people, brands, organizations, and services. They utilize plain text, emoticons, and other natural language interfaces – including voice – to engage in "Conversational Commerce" transactions. It's all enabled by artificial intelligence, bringing actual facts and additional intelligence to the conversation. Once again, it's a matter of understanding the conversations with your client, embracing the right messenger platforms, and speaking the new language of chat.

WHAT

- With 1.5 billion users on WhatsApp, 1.3 billion on Facebook Messenger, 1 billion on WeChat, and 600 million on Line, popular messaging or chat platforms dwarf apps and websites. Messaging is becoming the new digital connective tissue: easy to use, simple to understand, ultra-fast, and directly impactful.
- Companies can use selected messaging platforms to connect to their customers in "Conversational Commerce," designed to both adopt and use typical messenger language, shortcuts, and habits to connect, discuss, and transact.
- AI and cognitive technologies make chat conversations more fluent, through adapting to the mood of the customers and providing contextual insights.

USE

- KLM has implemented a multi-chat-platform strategy. WeChat, WhatsApp, and Facebook Messenger can be used to converse, order, and "print" tickets – "Chat Me Up to the Sky" any way and to any destination you want.
- A visit to a doctor can be planned in China via WeChat through a specialized, automated sequence that guides the patient through dialogue to select a hospital, the department, the doctor, and the date and time.
- Insurance start-up Lemonade ("forget everything you know about insurance") has been the talk of the town in chat land, with their record-breaking chat app to submit and process insurance claims. Their AI-supported process delivers money to your account in three seconds after submitting a claim.

IMPACT

- Creating the Wow: the ability to bond on an emotional level by using dialogues instead of digital dichotomies.
- Creating the Now: conversing with customers during their crucial "micro moments," whether at home, traveling, working, or enjoying their free time.
- Staying relevant to consumers expecting high availability, ease of use, and speedy delivery.
- Unique opportunities to better understand the needs of customers and anticipate future market developments.

TECH

- **Messenger apps**
  - WeChat, Facebook Messenger, WhatsApp, LINE, Slack
- **Conversational assistants**
  - Microsoft Cortana, Apple Siri, Amazon Alexa, Google Assistant, IBM Watson Assistant
- **Voice assistant devices**
  - Amazon Echo, Google Home, Apple HomePod, Orange Djingo, Tencent Tintting (for WeChat)
- **Messenger development platforms**
  - WeChat Open Platform, Microsoft Bot Framework, Facebook Messenger Platform, IBM Watson Assistant SDK, Amazon Alexa Skills For Business kit

your expert **Menno van Doorn**

THE BOT EFFECT

Always available, emotionally connecting, scalable computer-generated humans are becoming more mainstream

"My bot understands me." Artificial intelligence and end-to-end automation are creating a future full of digital, algorithmic agents. They are always available – on the phone, in the car, on the table, within smart glasses – to serve one's needs courteously and efficiently. These specialized bots are aware of personal preferences and behaviors and communicate in a way that fits the specific purpose, learning and improving over time. For this, personal data needs to be aggregated, analyzed, and cautiously managed. Here's the move from customization and personalization towards a truly individual, always-on "You" experience: the bot effect benefits business, big time.

WHAT

- Digital bots have already been working on a person's behalf, starting with "Sync Me," a way of sharing copies of digital assets and keeping them in sync across all media.
- They can also "See Me:" they know where a person is and has been, both on the internet and in the real world and also "Know Me."
- Soon, bots will get authorized to "Be Me," acting on a person's behalf based on observed behavior or explicit personal rules and policies.
- Newly created bots are entering the influencer marketing space, including fake (digital) individuals, looking real on social media.
- AI and cognitive technologies drive this evolution together with high-productivity bot development tools

USE

- Trim and Digit are financial services bots that act on your behalf. They look into your expenses and suggest actions; following your approval, they take care of the transaction.
- FaceMe is an AI-enabled digital human creator, focused on creating emotional engagement. The Chief Investment Officer of UBS for instance, has been cloned. His virtual twin now advises clients. Shudu Gram and Lil Miquela are computer-generated influencers, used in marketing through Instagram accounts with daily stories and product placement.
- A Capgemini Loyalty Chatbot uses natural language processing to address retail-related issues. In FB Messenger, it draws from the user profile to auto-fill forms for loyalty scheme sign-ups. It also handles first-level customer service.

IMPACT

- A well-designed bot can express a brand's desired identity towards customers.
- Digital influencer bots can be controlled better than human influencers and be more directed towards a designed goal.
- Bots present an entirely new, alternative channel to reach out to customers and be available to them for knowledge and transactions 24/7, without human intervention.
- A bot that is trusted by consumers can collect crucial personal and behavioral information, leading to better product development, marketing, cross-selling, and customer service.

TECH

- **Bot development platforms**
  - WeChat Open Platform, Microsoft Bot Framework, Facebook Messenger Platform, Pandorabots Platform, Rebot.me Platform, Kore.ai Platform, Watson Assistant SDK
- **Customer conversation platforms**
  - Capgemini Odigo customer interaction hub, Imperson for sales and marketing
- **AI and cognitive technologies**
  - IBM Watson AI, Microsoft AI, Google AI, Facebook AI for developers

your expert **Menno van Doorn**

THERE'S A PLATFORM FOR THAT

In response to the emergence of platforms, traditional product pipeline companies must open up the silos and expose their capabilities, becoming part of a value network of ecosystem players

There was an app for that. You used to seduce your customers with gorgeous, compelling mobile apps. Now, they are looking for platforms instead: they want attractive markets, directly between producers and consumers of goods and services. Because of the network effect, these platforms can drive uninhibited growth, particularly when participants join in on all sides. If platforms are the place to be, it is key to understand where you – and your customers – fit in. Should you create your own platform? How do you incite participation? Or, should you partner with existing ones? This time around, it's platforms that will make, break, or entirely reverse your connection with customers.

WHAT

- Platforms bring producers and consumers of goods and services in direct contact with one another, often cutting out the middle man. This involves a careful alignment of supply and demand, a comparison of features and prices, individual suggestions, and social networking.
- They are typically enabled by a technology architecture that features data security and privacy, mobile applications, the IoT, open APIs for demand and supply sides, embedded analytics, AI, and social technology.
- Successful platform players create, stimulate, and guard positive network effects; they know what it takes to enchant demand, supply, and ecosystem partners.

USE

- Ready-to-use platforms are already a fact of life for many consumers: Airbnb, HotelTonight and Booking for lodging, Uber and Lyft for transport, Instacart for groceries, Kickstarter for funding, PayPal for payments, Etsy for design items, Netflix or Spotify for entertainment, Alibaba and Amazon for retail, and eBay for the quintessential personal marketplace.
- In automotive, the Mov'Inblue platform, built for connected vehicles and fleet management, is illustrative of offering "asset-light" mobility to individuals through the on-demand allocation of cars and "virtual car keys," combined with advanced car usage analytics.
- Platforms are a key enabler for the digital transformation of the industrial sector, often referred to as "Industry4.0."

IMPACT

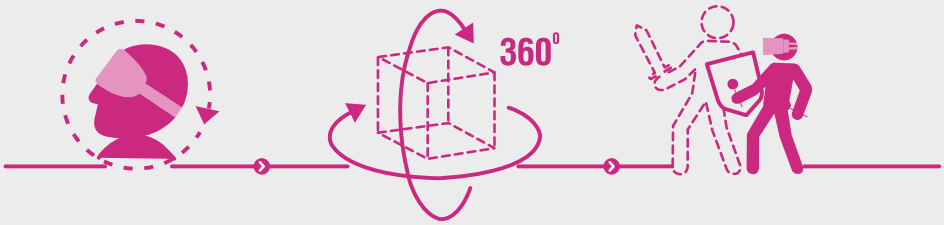
- More direct connections to customers thanks to a better understanding of their needs and preferences in compliance with the GDPR.
- Efficiency improvement based on a global agile organization, and the move towards a demand-driven supply chain.
- New smart products designed and enriched natively with digital services.
- New revenue opportunities as a result of newly-discovered, unexplored markets and unaddressed consumers.
- Entirely new business models that allow for disruptive consumer and partner interactions.

TECH

- **App development platforms**
  - IBM Cloud, Microsoft Azure development tools, Mendix rapid development, Salesforce Platform
- **API management and micro-services**
  - Mulesoft, Google Apigee, AWS API gateway
- **Analytics and AI**
  - IBM Watson, SAS Viya, Microsoft Azure AI, SAP Cloud Platform
- **IoT**
  - Microsoft Azure IoT Hub, SAP Leonardo, Capgemini XIoT, PTC Thingworx

your expert **Jacques Mezhrahid**

REALITY BYTES



If a picture says more than a thousand words, an interactive 3D VR/AR environment says more than a thousand pictures

Is this the real life? Well, look up to the skies and see. These days, almost any pocket-sized device can create a completely 3D virtual (VR) or augmented (AR) reality, dramatically improving the way technology is delivered. It's all thanks to the gaming industry, which has delivered tons of tech innovations to the masses. It makes you want to rethink the IT user experience from the ground up, mashing up the real-world perspective of the consumer or worker with unique, digital "realities." This blend of reality and fantasy has radical disruptive potential in areas such as healthcare, training, maintenance, defense, R&D, and collaboration. Buckle up: bits are about to get real.

WHAT

- Once confined to high-end computing work in research and the military, advanced 3D, 360-degree, and simulated realities are now mainstream. This is thanks to high-res, head-mounted VR displays such as the Oculus Rift and notably Go, but also through low-cost "cardboard" VR headsets, any of which can be combined with motion-sensing and 3D scanning technologies.
- Augmented reality (AR) technologies are also quickly evolving, adding digital layers to the world we perceive. This can be as easy as pointing a smartphone camera at a subject to seek out more information, or through the use of dedicated goggles, headsets, car screens, projection systems, remote cameras, and even contact lenses or holograms of the future

USE

- Using a simple cardboard VR headset, potential buyers of a new car can fully configure and experience their future car from all angles.
- A cloud-hosted "smart glass" solution was paired with voice control and integrated with SAP to support field staff in even the most complex maintenance activities.
- Within the concept of Industry 4.0, in search of operational efficiencies, using immersive technologies is clearly a differentiator. Combined with the use of 3D CAD data, technologies provided by for example Diota (AR) and Open Cascade (3D management and visualization) allow end-to-end solutions for the "augmented worker" in the factory or in the field.

IMPACT

- Being able to integrate tightly with the perceived reality of consumers and workers, creating unique and intimate user experiences.
- Advanced visualization of data, making insights more contextual, clear, and actionable.
- Breaking the barriers of time and location to facilitate previously unthinkable and safer ways of experiencing, designing, modelling, and collaborating.
- Improving the benefits for field workers in production, maintenance, training and collaboration: reduced time to search and locate information, faster education and training process due to reduced face-to-face time, reduced error and waste rates in production and maintenance activities, increased accuracy and traceability of operations.

TECH

- **Virtual reality devices and toolkits**
  - Oculus Rift and Go, Samsung Gear VR, HTC VIVE, Sony PlayStation VR, Google Cardboard, Leap Motion, Amazon Sumerian, Unity for VR
- **Augmented reality devices and toolkits**
  - Layar for smartphones, Microsoft HoloLens, Magic Leap, Vuzix Smart Glasses, Epson Smart Glasses, DIOTA, Google ARCore, Apple ARKit, PTC Vuforia, Wikitude, Unity for AR
- **Motion and image sensing, 3D scanning**
  - Microsoft Kinect, Structure 3D scanning, Bridge mixed reality and sensor system

your expert **Philippe Sottocasa**

WE COLLABORATE

WE COLLABORATE

Humans, organizations and nowadays also "things" find their meaning and value in being connected to others. With the outside world getting better and better connected – through superior, ever more ubiquitous technology and an abundance of social platforms – the enterprise needs to mirror this level of connectivity and use it as a key enabler to its strategy.

Being able to navigate any ecosystem, with its characteristics, dynamics, key players, standards, preferences and unwritten rules, is a prerequisite for social mastery. It gives access to possibly otherwise scarce resources, unexplored markets and channels and agile, possibly asset-free business models. It also taps into a crowd IQ that goes way beyond what even the brightest enterprise could develop on its own.

It also requires particularly flexible technology options, as connections may come and go in an instant. The IT platform needs to provide services to leverage a new breed of connections at top speed. The blockchain is an example of a technology framework that substantiates the notion of smart, collaborative contracts; these are distributed, open, transparent, and rock-solid safe.

The latter capability cannot be emphasized enough; being successfully connected depends on mutual trust. And trust is based on an equally divided mix of clarity about what's to be expected at both sides and the measures that have been taken – both in terms of technology and governance – to ensure the right outcome.

5G is another example of a technology that will change the way we collaborate. The new, amazing network bandwidth it brings will further boost virtual and augmented reality usage, soon maybe even augmented with holograms. But the very low latency will also enable us to connect to billions of sensors and interact essentially with the entire planet. Being connected everywhere, with less need of travelling, decreasing our carbon footprint: it's a whole new collaboration experience.

You, Me, Us, We, It, our Planet. All together now.

HAPPY TOGETHER

Engage your digital consumer "egosystem" proactively with proper care, timing, and empathy, thriving on trustworthiness

No matter how they toss the dice, your ability to navigate the social networks around you and your customers sets you up for success. Social networks point the way to understanding what makes your customer happy though connections, preferences, opinions, activities, needs, and likes. But customers now see better than ever what their social profiles are actually worth. They will want to understand in what way their personal data is monetized. Privacy and personal data security have taken a front-row seat. Handle this digital "egosystem" proactively with proper care, timing, and empathy, and you'll thrive on trustworthiness together with your customers.

WHAT

- Mastering the social network of customers – with all its digital platforms, tools, technologies, and communities – presents crucial yet disruptive growth capital for organizations.
- Personal profile data that reflects this social network provides powerful input to activities such as innovation, product management, marketing, sales, and customer service.
- Advanced analytics and AI take the front-row seat in understanding and anticipating – if necessary in real time or even preemptively – the evolving needs and sentiments of the crowd.
- The privacy and security of this data are, however, quickly becoming a key element to master, if only to comply with stricter rules and regulations (such as the GDPR in Europe), and also to avoid public exposure and image erosion – sometimes occurring overnight.
- A trustworthy brand with the customer's perspective radically central is the best way to establish extraordinary connections that deliver extraordinary results.

USE

- A major consumer goods company created a focused "People Data Center" that captures and analyzes social media data across various social networks. They then made it available to all business units for use in product management, marketing, campaigns, and customer support.
- A utility company positioned itself as the "Most Social Utility in Canada," connecting with customers and trading partners through multiple social channels and progressively using innovative technologies and media.
- The Consumer Goods Forum defined seven clear principles for consumer engagement to which organizations should commit in order to build trust and engage with connected customers.

IMPACT

- Become – and stay – more relevant to customers through a proactive, connected dialogue.
- Anticipate trends, opportunities, and threats, leveraging advanced analytics, natural language processing, and other applications of AI.
- Skip activities that dilute the richness of social content and context.
- Build better, more meaningful, and more sustainable relationships with customers from a trustworthy brand.
- Enrich products and services with additional social layers and capabilities, and build new revenue streams.
- Monetize social profile data in and outside the company.

TECH

- **Social Technology Platforms**
  - Salesforce marketing platform, Brandwatch, Crimson Hexagon, Twitter enterprise platform, Google Analytics, Sysomos, IBM Watson Marketing, Lithium
- **Revenue Management Platforms**
  - Marketo, Act-On, Adobe, Oracle Eloqua, Salesforce Pardot
- **Specialized social technologies**
  - Evocalize, BuzzSumo content analytics, Circloscope community management

your expert **Kees Jacobs**

YOU@ WORK

Automation and AI are changing the purpose and ways of people at work for good, addressing challenges across the business

Automation and AI are changing the purpose of people at work. As technology performs increasingly complex tasks, the role of a worker transforms from "just" being a part of a business function to addressing challenges across the business. Peer-to-peer platforms increase transparency, dexterity, and connectivity across any role or organization. AI supports the dynamic matching of people's skills and interests with the job to be done. Freelance at scale is the new employment model in the Gig Economy. The new focus is on the individual and her network, creating freedom and personal purpose.

WHAT

- Domain expertise becomes less dependent on individuals as AI gradually does a more effective job. • Highly automated (robotic systems) take over many routine human tasks.
- The next generation of social and collaboration tools will help to rapidly locate the internal and external people needed to resolve the challenge at hand.
- The skills people need will shift to information and personnel network management. It's not about what they know, but how they think and the types of problems they can solve.
- Technology facilitates the connection of purpose and productivity, selecting work based on a desired impact.
- Office of the future: new technologies enable people to work from everywhere, office, hotel or home. Co-location is also a more realistic option.
- New contract: the Digital wave brought a new worker class: the "slashers:" they work on different jobs, for different clients, in varying contexts.

USE

- A global media and entertainment company changed the way that work shifts were allocated from fixed allocations to auctions and bids, based on personal preferences.
- A global fashion brand transformed the way connections were made and information shared between the employees of their stores and back office.
- An internationally operating temporary employment agency used advanced analytics and cognitive natural language analysis to automatically and optimally match demand and supply around their pool of temporary workers; Capgemini is now using the same software for its own, internal purposes.

IMPACT

- Enabling the speed of innovation and creativity needed today to stay in touch with the digitally-savvy consumer and employee, becoming more competitive as a result.
- New levels of productivity and engagement.
- Higher levels of compensation and personal job satisfaction for employees through the freedom of selection.
- Reduced cost of operations because larger businesses can operate using a smaller core operating model with a wider, more flexible network of experts on which to draw.
- Reduced carbon footprint brought by virtual work, virtual and augmented reality resulting in less travel.

TECH

- Freelance Talent hubs: – UpWork, Talao, Freelancer, Fiverr, Outsourcery, Workhoppers, Gigster AI-enabled IT development services
- Collaborative work platforms – Hubstaff, Facebook Workplace, Microsoft Yammer, Slack team communication, LinkedIn
- Dynamic resource matching – Capgemini People Analytics, IBM Talent Management, Workday HCM, SAP SuccessFactors

NEW CHAIN ON THE BLOCK

Using distributed ledger technology to create next-generation business connections

Excellent connections create excellent results. What if getting connected and carrying out transactions in an ultra-safe, transparent, and effortless way comes to you as a fully automated platform capability? Well, there's a new kid in town, and it seems she's here to stay. The blockchain is the most striking example of a next-generation platform that acts as a public ledger for open, collaborative transactions and "smart" contracts. It provides generic connection capabilities that speed up transactions, cut out the middleman, and provide full transparency while ensuring data integrity, privacy, and security. It seems we're in the middle of a chain reaction!

WHAT

- Blockchain was introduced as part of the underlying technology for bitcoin; it acts as a public ledger for transactions while keeping the users anonymous. It uses distributed computing to maintain data integrity.
- It is named "blockchain" as every block of transaction is signed using the previous block of transactions. If you want to alter a transaction, you have to change not only its block, but also all next blocks faster. This makes changing past data nearly impossible.
- There are two types of blockchain – permission-less and permissioned. Bitcoin is a well-known example of a permission-less, public blockchain network in which anyone can participate. Permissioned solutions are governed by a consortium that defines the rules to get in.
- The smart contracts reside on top of the ledger. They are a digital translation of a contract. AXA Fizzy is a perfect illustration; if your plane is more than two hours late, the smart contract will automatically compensate you.
- Still an emerging technology, it has high potential for use in business areas such as payments, recording transactions, and strengthening trust – which quickly places it in a league beyond the pioneering areas of "FinTech" and digital commerce.

USE

- The first use is obviously creating and managing cryptocurrencies. https://coinmarketcap.com/ is a perfect illustration of the current market.
- A second frequent use is to ensure traceability and immutability of content and documents ranging from land registries, copyrights, patents, car lifecycles, to egg-laying dates.
- It is also one of the underlying technologies behind B2B platforms making it possible to deliver transactions in a safe and guaranteed way via a combination of shared ledgers and the use of smart contracts. The Marco Polo platform, governed by technology companies and financial institutions, is a good example of a permissioned platform.
- The use of blockchain in supply chain management is seen as a killer usage. Creating a well-governed ecosystem is not easy and requires time. Many initiatives are running, owned by a corporate wishing to simplify its relationship with its suppliers up to sector platforms.
- Blockchain has been evoked in many other use cases, from cybersecurity to customer onboarding (KYC for know your customer) and as blockchain matures, many initiatives will move to production.

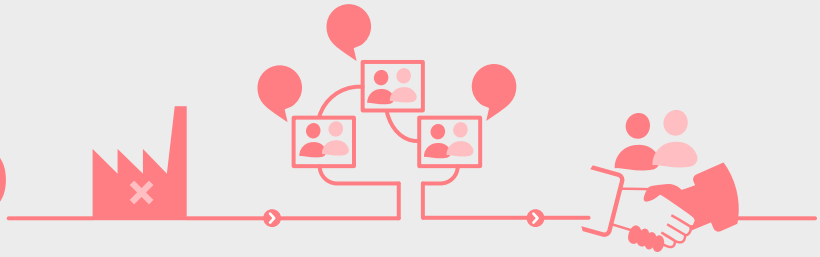
IMPACT

- Improved value chain efficiency, by cutting out the middleman for trust and building on an open, secure platform for collaborative transactions.
- Increased data security, privacy, and auditability – all crucial with data protection regulations (such as the GDPR) becoming tighter every day in our increasingly digital world.
- Disrupting the way businesses exchange value and assets, enforce contracts, and share data across industries, potentially opening up entirely new business models.

TECH

- **Collaboration innovation consortia**
  - HyperLedger, Ethereum Foundation, R3
- **Blockchain platforms**
  - AWS Blockchain Solutions, Microsoft Azure Blockchain, IBM Blockchain Platform, R3 Corda Network

CROWD SURFING ALLOWED



Tapping into the explosive combination of brainstorming and crowdsourcing

Imagine the crowd out there, full of innovative ideas, brilliant opinions, alternative perspectives, and scarce expertise, just waiting to collaborate with you. Wouldn't you love to jump right into it? However, the best talent in today's market quite likely doesn't work for you. So how can you tap into the world's brain trust to accelerate your digital agenda while electrifying your existing workforce? How do you reach beyond your own organizational boundaries to expand to the global IP economy? Enter crowdstorming: combining brainstorming and the power of the crowd on a large social scale. Enter crowdstorming, the explosive blend of brainstorming and crowdsourcing on a large social scale. It's one powerful digital mosh pit you'll want to dive into.

WHAT

- "Crowdstorming" is the process of enabling business through an ecosystem of potentially thousands of people to ideate, innovate, test, learn, execute, support, and sustain your business. It is driven by social technologies.
- It incorporates outside perspectives, opinions, IP, ideas, thoughts, and experiences into the evolution and even the revolution of products and services. The objective focuses on the maximum level of collaboration in order to optimize all results and desired outcomes.
- Crowdstorming can target potential future customers and business partners, but also specialized communities of expertise, such as data scientists and R&D.
- AI is adding a new, "machine" component to this already potent mix: advanced analytics, natural language processing and deep learning all can bring augmented power to the crowd.

USE

- Lego has created a community around its Cuuso building blocks, using social filtering and voting to select the best new product ideas.
- Quirky is a community-led invention platform that lets people submit their ideas to a global community of inventors, makers, designers, and tinkerers to help to refine these ideas in exchange for influence.
- Local Motors leverages crowdstorming to solve the world's most challenging problems in engineering.
- Established global companies launch their gamified Big Data challenges on Kaggle, reaching out to thousands of data scientists in search of the "killer algorithm."

IMPACT

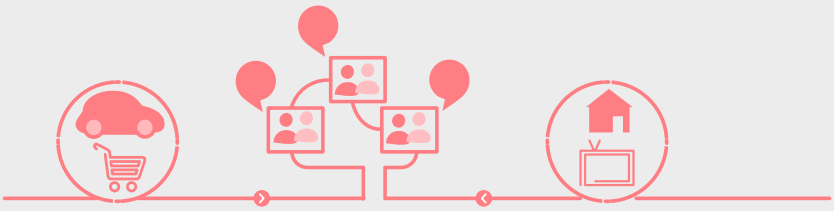
- Achieving a more intimate engagement with future consumers and suppliers while keeping up with digital expectations.
- Redesigning how an organization makes investments, places bets, innovates, and steers clear of business disasters through pre-emptive social testing.
- Gaining access to scarce resources, capabilities, experiences, and intellectual property.
- Revitalizing the workforce by connecting with fresh perspectives and ideas from the outside world.

TECH

- **Crowdsourced resources**
  - Jumpstartfund for ideas, from conception to funding,
  - Kickstarter for start-up curation and funding,
  - Kaggle for data science,
  - Amazon Mechnical Turk for micro work
- **Crowdstorming Platforms**
  - Jovoto, Local Motors Motors engineering crowdstorming platform, Communifire crowdsourcing software, InnoCentive open innovation, Hypermind prediction market, IdeaConnection, Ideaken

your expert **Patrice Duboé**

FRIEND THAT THING



Expand your social network with smart, collaborative "things"

Operational technology and IT are fusing into a new cyber-physical reality as the Internet of Things becomes part of everybody's social context. With IT getting physical, we're more and more connected not only to people, but also to omnipresent devices and increasingly intelligent things. Disruptive opportunities lie in these connected products, with the promise of a direct route into the hearts and minds of consumers, service engineers, and business partners. It brings a whole new dimension to social networks, for future lists of social "friends" may soon contain some unexpected guests. Chip me baby, one more time.

WHAT

- "Things" are more intelligent and better connected than ever before. Mixed with AI, they learn, adapt to their environment, and share their experiences.
- Cars, road sensors, engines, fridges, health equipment, and even vending machines are becoming serious participants in both social and value networks.
- With wearables and the IoT elements around us on a daily basis, some of them may "know" more about consumers and their context than the consumers do themselves.
- IoT development platforms allow for the creation of "digital twins," leveraging the vast intake of data for predictive analytics, cognitive augmentation, and experimenting with AI. It then sends the results to both the affected humans and things. The concept of "I3oT" thus evolves: the Intelligent Industrial Internet of Things.
- AI deployed at the very "edge" – where information technology and real life meet – through trained models, working often autonomously on embedded AI and analytics runtime technology.

USE

- A US-based grocery chain deployed smart shelves in its stores, using sensors and dashboards to measure inventory life and send shoppers product information on their mobile phones. Out-of-stock replenishment time was reduced by two-thirds and its out-of-stock SKUs by 50% on any given day.
- Toyota Friend enables people to interact with their cars, dealerships, and Toyota itself. In addition to prompting recharges whenever the battery is running low, it enables the car to "tweet" service information to social channels.
- Michelin uses IoT technology to collect various sensor data from tires in use. Engineers in its "road usage laboratory" analyze the data in direct connection to selected driver groups with different levels of experience.

IMPACT

- Better understanding of the actual use of products by consumers in their context, improved product management, innovation, marketing, and customer service.
- Using the IoT as an alternative, direct channel to communicate and engage with customers.
- Improved matching of human resources and assets in an operational context, like when using predictive analytics for maintenance, logistics, and manufacturing.
- AI-based, conversational front ends can put a more "human" face to devices and machinery, making them easier and more compelling to interact with.
- Monetization of IoT data through new services and products.
- Anticipate the impact of new telecommunications networks (LPWAN Sigfox, Lora,– and 5G) associated with the "edge" cloud, that will allow to connect billions of objects and human in real time.

TECH

- **Industrial internet, IoT, digital manufacturing**
  - GE Predix Industrial IoT platform, AWS IoT and Greengrass for edge, C3 digital platform for IoT and AI, Google Cloud platform for intelligent IoT services, Microsoft Windows 10 IoT platform, Salesforce IoT Cloud, IBM Watson IoT, ThingSpeak open IoT and analytics platform, PTC Thingworx industrial IoT platform
- **Open source and open standards**
  - Project Flogo open source IoT integration, Open Connectivity Foundation, Open Group IoT work group, Eclipse IoT standards
- **Research**
  - Unlocking the business value of IoT in operations – Capgemini Research

your expert **Patrice Duboé**

APPLYING TECHNOVISION

There are many ways to apply TechnoVision, like brainstorming entirely new ideas, systematically crosschecking a design on how up to date it is, and finding a breakthrough to tackle a tough challenge.

But above all, TechnoVision is a tool to tell a digital story, a story that shapes an opportunity, answers a question, gives direction, resolves an issue, or simply delights an audience. It is always a story to be told between people, from both the business and IT sides of an organization. Choosing the right building blocks – studying them, interpreting them, discussing them with others – is already part of the storytelling. Then, the blocks are woven together with other views, considerations, and scenarios to create a unique digital story that addresses a specific need, challenge, or opportunity.

Selecting a business technology frame from our white paper or getting a rough cut of relevant technologies through a trend radar or S-curve "hype cycle" are other complementary approaches that may prove useful. In short, anything that triggers the need for a compelling digital story will do – as long as it's a simple story.

In more than a decade of shaping yearly editions of TechnoVision, we've spent a considerable amount of time getting rid of complexity in the approach. We introduced icons, visual metaphors, storytelling, and (hopefully) intriguing trend names to compel the reader. We cut down on the content volume, forcing ourselves to focus on the essentials within a minimal, structured format. We are living in an era of limited attention span, and if we urge users of TechnoVision to be crisp and to the point, we'll have to apply it to our own ways as well.

The TechnoVision boxes certainly helped with that as well: 37 trends turned into colorful, real-life cardboard boxes, each box containing a short elevator pitch of a trend and with a QR code for more detailed content.

These boxes can be picked up, carried away for study outside in the sun, discussed with others, and stacked as digital "totem poles." Together, they can tell a technology-enabled customer story, a day in the life of an employee, a breakthrough in a process, or a new, disruptive product.

Our digital "building boxes" turned out to be an easy, attractive language spoken by both IT and business people. We have put them in our Applied Innovation Exchange labs, our agile development zones, and our office lobbies. Rumor has it that a certain TechnoVision author even glued a full mini-set to his wall at home – talk about dedication! We have also made the graphic designs publicly available for free, so that the boxes can be printed out on plain cardboard (or processed in any other way; we welcome creative best practices and will be happy to share them with the outside world).

The boxes feature in several of the examples we gathered about applying TechnoVision. The full list is as follows:

- TechnoVision Theater (with boxes)
- Business Model Canvassing (with boxes)
- Repositioning
- Digital Picture
- Storytelling
- Grab a Box (with boxes)

There's already a VR version of the TechnoVision theater, enabling teams to work together in a session from different locations.

Again, we welcome hearing about other best practices and are most happy to share any additional format you have pioneered yourself around applying TechnoVision.

TechnoVision Theater

What to Achieve

Create digital stories that address business challenges, opportunities, potential innovations, digital strategies, or architecture with TechnoVision Theater. Used as an introduction to general technology trends or as a teambuilding and alignment tool for business and technology delegates, it helps familiarize a team with Technovisions capabilities. You can even apply it as a hands-on "ice breaker" during transformation workshops.

For Whom?

TechnoVision Theater lends itself well to business and technology representatives with no specific requirements in terms of knowledge, expertise, or experience. This session can be completed with one team of three to five people, but is more effective with multiple teams reporting out to each other and building on each other's stories. Sessions of up to 50 attendees (spanning seven teams) have been successfully conducted.

Preparation

Preferably, participants already have some basic knowledge of TechnoVision, although it has proven to be difficult to gather a team consisting of equally informed members.

Before starting the session, make sure you have built up the TechnoVision "wall" with boxes, positioning the cluster areas and boxes in the right sequence. The cluster "header" should be on top of its pile and the five trends – if possible – sorted according to their sequence in the TechnoVision document. This facilitates the process, as the wall can be used to explain the TechnoVision framework.

Documenting the sessions is a must. This can be done through video recording or supported by a "live cartoonist."

The session also needs a credible problem-owner that

- a) can express the challenge crisply and convincingly,
- b) the teams report out to,
- c) supplies feedback to the team and provide an overall summary at the end.

Beginning of the workshop

The workshop opens with a short (five to ten minutes) introduction of the TechnoVision framework with its structure of six technology clusters (the "what") and the design principles (the "how"). Do this on a high level and provide some examples to which the participants can relate. Rely on the attendees to study the content of the blocks themselves after selecting them and provide just enough information to help them make the right choices for the building blocks. Then, describe the process of forming teams, building a digital story, and reporting out.

The problem-owner describes the challenge at hand; it can be a strategic question, a conundrum, a quest for ideas, a process redesign, service, or product.

Working

Form the teams. Team size will depend on the time available (more report-outs take more time) and the number of people attending.

The teams select a few building blocks that they deem particularly interesting for the challenge at hand. A digital story should typically consist of a minimum of three building blocks and a maximum of seven (five seems a good average). The "header" building blocks should not be selected (although quite a few teams have been known to break the rule with positive results).

The blocks are selected on a first-come, first-served basis. However, if while building a digital story a team decides a block is not as useful as anticipated, another box may be selected. Of course, the rejected block needs to be put back into the pile for potential use by other teams.

Next, the teams start to study the building blocks, reading the elevator pitches on top of the boxes and maybe scanning the unique QR codes with their smart phones for more information. The team members can explain the boxes to each other, provided each box is individually examined.

By building on each other's ideas, the digital story gradually comes together through the combination of building blocks from several colored clusters. It is worth mentioning that

focusing on one cluster per team has been a successful, early format as well. Teams can choose to combine technology building blocks from the six clusters along with the "mindset" building blocks of the Design for Digital cluster; a good story often involves both the "what" and the "how."

Take 15 to 30 minutes to build a digital story, depending on how much time is available.

Reporting out

Each team reports out to the problem owner in its own way. The blocks are typically stacked while telling the story to illustrate the enabling role of each building block within the storyline. Some teams prefer to simply create a pile, but we have also seen more creative constructions like "totem poles" or arcs. The report-out should not take longer than five minutes per team, to keep the story crisp and to the point. A cartoonist may capture the story or each story can be recorded. Teams should photograph the final box construction for later use. The other teams provide initial feedback to the story, followed by the problem owner. A feedback round should be time-boxed to five to ten minutes each, depending on the time available.

The problem owner gives a final summary and assessment after the last report-out, possibly selecting stories or story elements and suggesting potential future steps.

Business Model Canvassing

What to Achieve

Create insight into how technology can change the business models of organizations with two novel approaches: the Business Model Canvas method and the TechnoVision building boxes. At the end of a session, participants will garner a working knowledge of these approaches and create a list of potential business model improvements or changes. We suggest taking a picture of each idea and having a separate meeting (after about two weeks) to validate the feasibility of the idea within the organization and to identify some potential next steps.

For Whom

Participants are business and technology representatives, with no specific requirements in terms of knowledge, expertise, or experience.

Preparation

Preferably, participants have already familiarized themselves with both TechnoVision and the Business Model Canvas approach, as many instruction videos are available on YouTube, including a, b, and c. Before starting the session, make sure you have built up the TechnoVision "wall" with boxes, positioning the cluster areas and boxes in the right sequence. This facilitates the launch process as the wall can be used to explain the TechnoVision framework. Then, draw a large BMC model on the ground using painter tape.

Beginning of the workshop

The workshop starts with a short introduction on both models. For TechnoVision, introduce the framework (the seven building blocks), the structure of the five elements within the building blocks, and the seven design principles. Do this on a high level and provide some examples. No need to dive into the details yet. For Business Model Canvas, explain the origin (how Ostenwalder used the model to write his book) and the different elements of the Business Model Canvas.

Working

After the explanation, take one example of a company that:

- Most people will be familiar with
- Is bankrupt or highly successful

Then, take some boxes and explain which elements the successful company put in place so they stand out from their competition or move boxes into the BMC model to illustrate what the bankrupt company could have done differently.

Next, ask the participants to consider their own organization or a specific part of their business (organizational unit or product). Let them generate ideas about how the technology building blocks can be used to improve business performance or even entirely change the organization. Let them physically place the boxes in the model on the ground. Encourage discussion, play for about ten minutes, and ask for a report-out.

If you have a large group, you can split it up into groups of four or five and have them report out to each other. Depending on the time, you can have multiple rounds. You will see that the stories improve with each round.

Make a picture of each model and write a one-sentence description. If possible, print it out. At the end of the workshop, these prints can put on a two by two matrix, labeling the axes as "impact of the idea" and "ease of realization." The big impact ideas that are easy to realize are the ones the participants should take with them to elaborate on later.

Let the participants give a short statement on the insights they gained. Then, let them all take one box that they found particularly interesting and take a group picture with the boxes.

Repositioning

What to Achieve

Examine existing development projects, and operational applications, to boost their digital orientation and role, by first checking if and how they make use of digital technologies, and second: tuning, amending, enhancing, or repositioning these applications to take better advantage of new technologies.

As a result, existing and past investments are not wasted on the path to the digital enterprise. They are updated, pruned, and rejuvenated for faster progress.

For example, an on-going Customer Relationship Management project will be re-oriented towards a series of smartphone applications with a different distribution of roles between customers and employees.

Who

Project teams, together with two kinds of challengers: one or two with knowledge of the application field, and one or two with knowledge of the new technologies.

When

- Timing of initial positioning:
  - For developments: soon enough to make changes with minimum effort
  - For operational applications: after six or 12 months of run, depending on estimated rate of change of functionality and technology
- Repeat after 6 months for developments, 12 months for operational applications.

Preparation

1. A good, sufficiently detailed description of the application – functionally and technically, including the various APIs used and provided.
2. A state-of-the-art view of the application area.
3. A checklist of technologies based on TechnoVision 2017.

The Format

Depending on complexity, repositioning takes between two hours and two days.

The repositioning steps are as follows:

1. Walk-through the application in development or as is.
2. Comparison of the application with state-of-the-art thinking.
3. List potential adjustments with a rough estimate of corresponding efforts; list potential simplifications or eliminations with rough estimate of corresponding savings.
4. Go through the TechnoVision-based checklist and create three categories:
   - Used already
   - Not used and relevant
   - Not used and irrelevant.
5. Combine functional changes and "not used and relevant" technologies to create a list of potential repositioning actions.
6. Decide on actions based on impact and effort required.
7. Plan actions in relation with the original schedule.

The Digital Picture

What to Achieve

The Digital Picture is a Capgemini methodology used to produce an accurate image of an enterprise's digital position. It is produced by combining the points of view – expectations compared with reality and experience – of various stakeholders, from top management to customers of the enterprise.

The Digital Picture can be usefully completed and detailed with a TechnoVision-based image of the enterprise's position in digital technologies.

Who

All people with a thorough knowledge of the technical position of the IT department and of other holders of information technology in the enterprise, as well as one or two connoisseurs of TechnoVision 2018.

Preparation

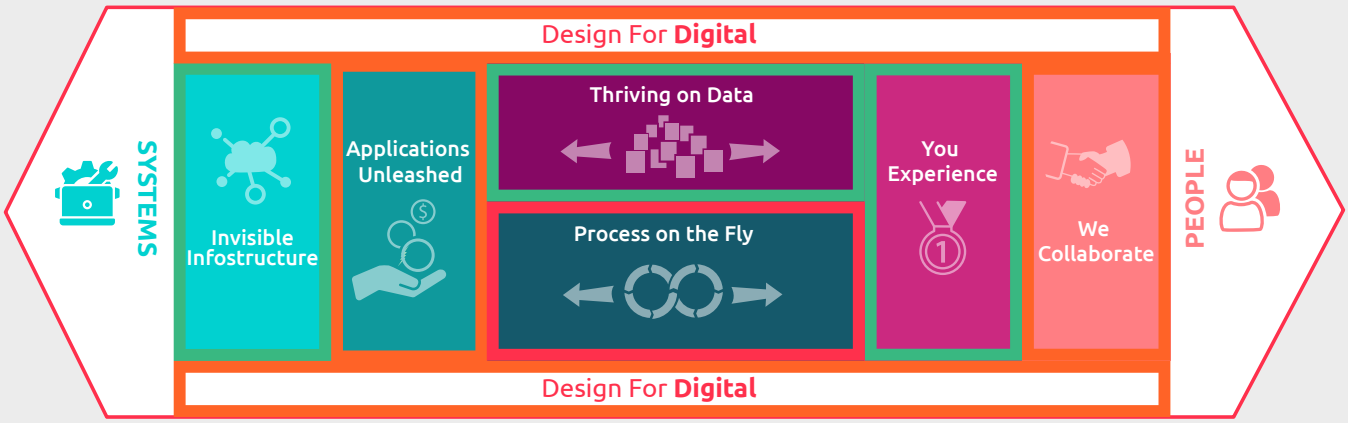
None, except having available the pictures or forms needed to capture status.

The Format

The work takes the form of a dialogue between:

- the connoisseurs of TV, who give a description of a cluster's content, starting with the Design for Digital principles, and continuing from left to right with the content clusters
- after the description of each cluster, people knowing the technical position of the enterprise describe it for this cluster's principles or technologies
- collectively, the positioning is completed with the color-coded attributes:
  - green: adequate knowledge and capabilities, solid actual and planned uses
  - orange: significant gaps between technology's potential and actual mastery and use
  - red: technology's potential ignored and therefore not used or envisaged.

Here is an example below: This can, of course, be done at a lower granularity level, by principle and trend individually.



Storytelling

What to Achieve

Use TechnoVision 2018 to tell a digital story. Of course TechnoVision is just one of the ingredients of your story, but it adds structure and content. For example, to discuss the accelerations the digital world requires and enables, you can start with the cluster You Experience, to understand the speed expectations of digital people; move to You Collaborate if you want to explain the speed components of social networks; Process on the Fly will help show how external speed gets translated internally, making use of real time data availability – mastering the velocity of big data flows, with the help of Thriving on Data.

You can find inspiration in the design for digital principle What's Your Story, which prescribes that each application should tell an attractive story.

Who

Anybody with the will to tell a digital story. A working knowledge of TechnoVision is needed, and can be acquired by practicing the development of stories.

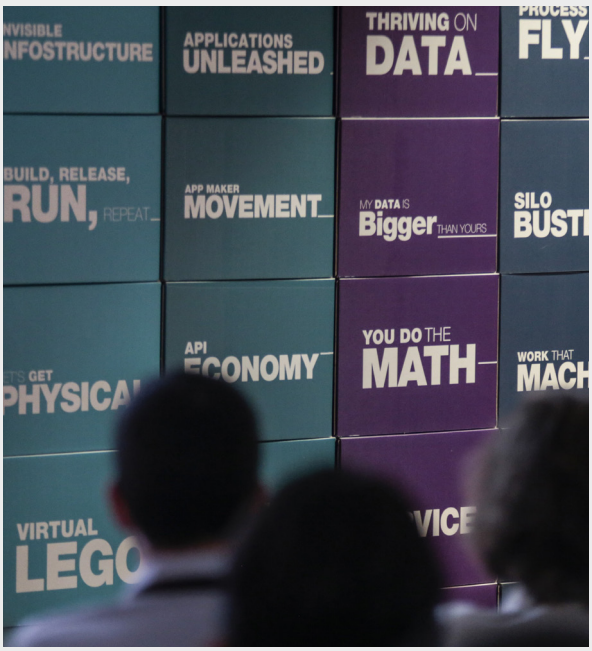
Preparation

A thorough scripting is needed to give the story structure and avoiding getting bogged down into anecdotal details.

The Format

Monologue is feasible, but all forms of dialog and conversation help with the actual understanding through participation.

Using the TechnoVision boxes is a proven way to make the content more alluring and tangible.



Grab a Box

What to Achieve

Get an ultra-fast benefit from TechnoVision in just a few minutes. Create a long-lasting memory (if nothing else) through a picture. Acquire your first taste of working with TechnoVision. Have a quick icebreaker between workshop sessions.

For Whom

For anyone, including people that happen to be visiting an innovation center or office space that feature the boxes.

Preparation

Make sure you have the "wall" of TechnoVision building boxes set up.

The Format

Don't explain TechnoVision. Just ask all participants to have a brief look at the "wall" of TechnoVision building blocks and choose a box that – on its title alone – intuitively matches their interests or ambitions. Ask every participant to give an elevator pitch on why they selected this particular box and, if applicable, what personal next step they assign to it. Take a picture of every individual showing "their" box. Finally, take a group picture. Distribute to all participants for later reference.

In Conclusion

Using TechnoVision as our story-telling guide, we learned quite a bit about the impact of Artificial Intelligence on the world of business technology – we've come to see and appreciate it the *apex of Digital*.

Looking at AI through the TechnoVision glasses demonstrates AI's ubiquitous character as a technology: facts and evidence have definitely replaced our intuitive feeling. Always a good thing.

Because AI augments – or even replaces – our intelligence, its use will become ubiquitous in all walks of life and work.

As a result, AI will be – or is it already? – a pillar of every digital strategy. Moreover, its deployment will require – or does it require it already? – an approach transcending the usual ones. While converting enterprises and organizations to an ERP base was a single massive, monolithic, therefore focused project, the move to AI calls for a "polylithic" method where each facet and component of the enterprise embraces AI and prioritizes – within the general strategy – its own deployment.

For the IT organization, maybe the best path forward is to look at AI as if it were a new, standard, universal (programming) language which will transform – or does it already? – everything IT does and how it does it.

Moreover, for business and for IT, AI – as the culmination of digital - calls for new behaviors – to make sure the results of espousing AI match expectations rather than destroy them.

Looking at TechnoVision through the AI glasses paves the way for TechnoVision's future. For the last decade or so, every year, we have questioned the validity of TechnoVision's cluster structure; always to conclude that the present structure, created way back in 2007, was still valid – maybe because we couldn't find a better one…

AI demands a new, re-invented TechnoVision structure though, because it revolutionizes IT, and because it is – to us – so close and so distant at the same time. No better illustration of the truly disruptive impact of AI, it seems. It is part of our promise for next year's edition, next to exploring quickly emerging areas such as the Autonomous Enterprise, the further rise of Self-service Digital and Edge IT, the Renaissance of Ethics and the need for a Chain of Trust. Watch this space, we'll be back!

The TechnoVision 2018 Team

Authors: **Ron Tolido with Pierre Hessler**
Executive Sponsor: **Patrick Nicolet**
Editor: **Monica Kwiecinski**
Design and Graphics: **Kristin Morris**
Project & Marketing Manager: **Pratibha Sharma**

TechnoVision 2018 benefits from a wide variety of perspectives from many of Capgemini's leading technology experts:

Miroslaw Bartecki
Director, Chief Architect

Lee Beardmore
CTO, Business Services

Goutham Belliappa
VP, North America Insights & Data

Marc Chemin
Global Head of Data Science & Analytics

Nick Callanan
Enterprise Architect, Director

Fernand Khousakoun
VP, DCX & Operational Efficiency Lead, Application Services Europe

Manuel Sevilla
Chief Digital Officer, Capgemini Business Services

Menno van Doorn
Director, Sogeti VINT

Nicolas Gaudillière
VP Future of Technology, Capgemini Invent

Philippe Sottocasa
VP Head of Portfolio & Business Development, Engineering Services Europe

Patrice Duboé
Innovation EVP, CTO Engineering Services

Kees Jacobs
Insights & Data Leader, Consumer Products & Retail

Steve Jones
VP, AI Engineering Insights & Data

Joakim Lindbom
Director, Chief Architect

Gunnar Menzel
VP & Chief Architect – Cloud Infrastructure Services

Jacques Mezhrahid
VP – Technical Director, Sogeti High Tech

Ajith NC
Senior Director, Cloud & Edge CIS Project & Consulting

Thomas Sarrazin
Head of CIS Architects community

Andreas Sjöström
CTO, Sogeti Sweden

Christopher Stancombe
EVP, Capgemini UK

Anne-Laure Thieullent
VP, Global AI lead

Brad Little
EVP, DSS

Frank Wammes
Chief Innovation Officer, Capgemini Europe

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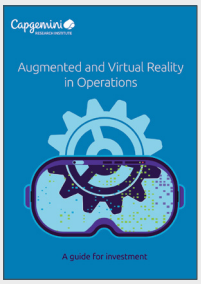
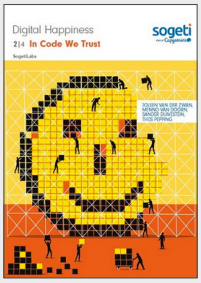
Read related research and points of view to help you on your digital journey

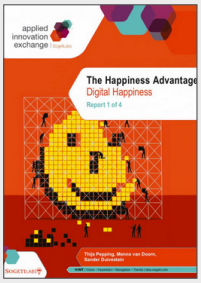


Augmented and Virtual Reality in Operations: A guide for investment

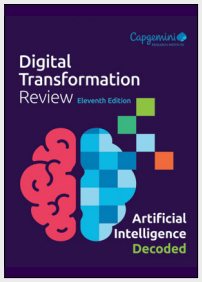
Reshaping the future: Unlocking automation's untapped value



Digital Happiness: In Code we Trust



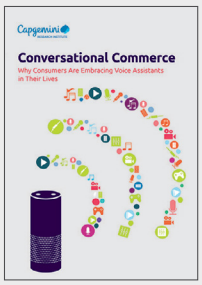
Digital Happiness: The Happiness Advantage



Digital Transformation Review 11: Artificial Intelligence Decoded

World Quality Report 2018-19

The Secret to Winning Customers' Hearts With Artificial Intelligence: Add Human Intelligence



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www.capgemini.com

For more details contact:

Ron Tolido
ron.tolido@capgemini.com

Pierre Hessler
pierre.hessler@capgemini.com

Gunnar Menzel
gunnar.menzel@capgemini.com

Frank Wammes
frank.wammes@capgemini.com

Lee Beardmore
lee.beardmore@capgemini.com

Patrice Duboé
patrice.duboe@capgemini.com

Michiel Boreel
michiel.boreel@sogeti.com

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