

# Innovating in the digital age – Successfully combining intelligence, foresight and interaction

## *How digital technology will supercharge innovation, and how companies are responding*

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Accepted wisdom is that everything that can be digitalized, will be. While this may be an oversimplification, there are few limits to the march of digital technology. So what does all this mean for innovation management practices?



To answer this, Arthur D. Little conducted an extensive study, looking at which digital technologies would have the greatest impact on how innovation would get done, now and in the future. The principle finding is that change is happening now and winners anticipate enormous benefits, with a predicted doubling of innovation success. Secondly, laggards need get their act together soon. If recent history has

taught us one thing about digital technology, it is that it does not forgive those who are slow to act. This article not only explores the research, but also provides strategic advice for successful digitally enabled innovation.

Digital technologies are poised to have fundamental impact on innovation management. Drawing on a unique global study carried out by Arthur D. Little, this article explains the three areas where digitalization will impact innovation management, the state of adoption, perceived benefits, and the risks to organizations that are left behind.

### **Arthur D. Little's digital innovation study**

In 2017 Arthur D. Little launched a unique, global survey to understand which technologies would have the greatest impact on how innovation would get done, now and in the future. Over 150 senior executives in innovation, R&D and technology shared their views, while the study also analyzed over 300 tools and investigated hundreds of real-world application cases of digitally enabled innovation.

## Innovating in the digital age

### *What is digitally enabled innovation?*

Until recently, businesses have focused their digitalization efforts around disrupting business models and streamlining processes. But what does it mean for internal innovation activities? We can start with a definition. We see digitally enabled innovation as the use of digital technology to improve innovation (management) practices, for example, by changing how development teams collaborate, or widening the data available to them.

Our research found that while most companies were early in the process, the vast majority anticipated a rapid and dramatic increase in the degree of digitization in both their innovation engines and product offerings in the next three years. This is especially noteworthy, given that a fully fledged overhaul of a company's innovation engine may take longer than a single three-year planning cycle. Best practice is already emerging, including focused experimentation with digital solutions to increase both the efficiency and effectiveness of innovation management. This pace of change means those that are not investigating opportunities to digitize are likely to be left behind.

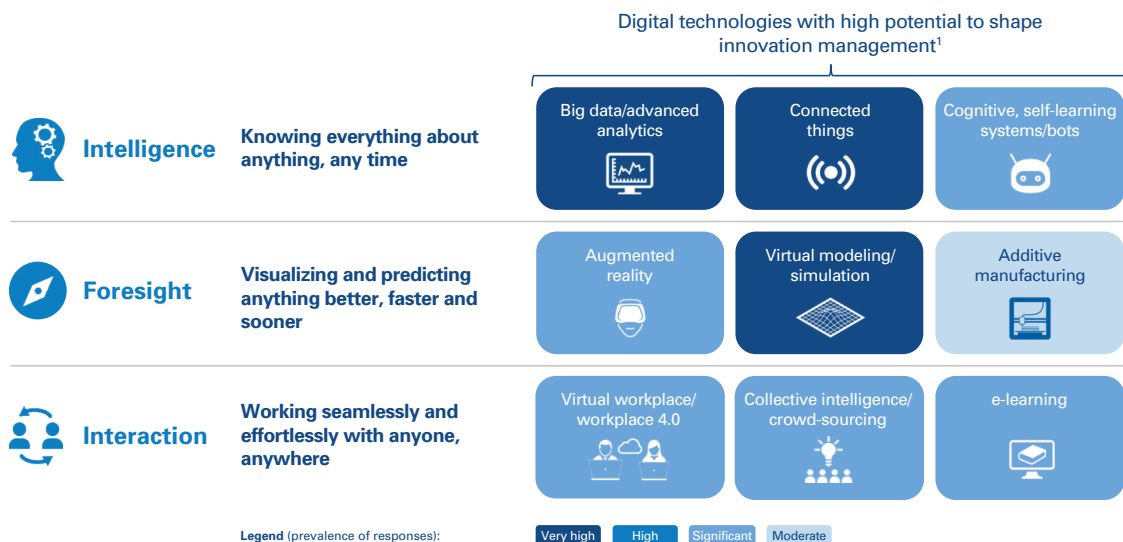
### *The nine building blocks of digital innovation*

Through our research and experience, we have identified nine digital buildings blocks that are shaping digitally enabled innovation. (See Figure 1.) These can be segmented into three groups, according to the solution promise that they deliver:

- Intelligence: Knowing everything about anything, any time
- Foresight: Visualizing and predicting anything better, faster and sooner
- Interaction: Working seamlessly and effortlessly with anyone, anywhere.

## Digital technologies – key enablers for innovation management

Study results 



<sup>1</sup> Color indicates the relative potential of each technology Source: Arthur D. Little Innovating in the Digital Age survey; executive interviews

**Arthur D Little**

**Figure 1: Nine digital building blocks shaping innovation management, and their relative prevalence**

An in-depth review of real-world use cases reveals that the most widely used digital building blocks are those that fall under intelligence and foresight – the third area, interaction, is less prevalent. This is because concepts such as big data, connected things and simulation are well known and provide proven competitive advantage. Interaction technologies are generally at an earlier stage of development, which means their potential impact is less clear. This is not surprising, as human interaction is inherently complex and the adoption of technologies to foster interaction requires behavioral change, as described in our recent article on driving adoption in digital transformation (Issue 1, 2018). Nevertheless, based on our survey results, we expect digital technologies for interaction to be the cutting edge of digitally enabled innovation in the next five years.

*Box 1 - Digital technologies for intelligence*

*Application case: Open innovation driven by AI*

Artificial intelligence (AI) is changing the way open innovation takes place. AI enables more accurate evaluation of problem root causes and identification of key areas to focus innovation efforts, which helps companies to narrow down their focus area for innovation. Moreover, AI can support the search for potential solutions to solve the identified causes by collecting available information from scientific publications or checking existing solutions in patent databases. Machine learning enables potential solutions to be tailored to the capabilities and preferences of the organization. This will help companies to shift from crowd-suggested/crowd-scanned open innovation strategies to ones that are more targeted and tailored, ultimately boosting the efficiency of outside-in ideation while keeping the advantages of open innovation. This has a significant positive impact on the R&D costs for innovation.

*Digital technologies for foresight*

*Application case: Digital twins for innovation testing*

A digital twin is a virtual representation of a physical system. Digital twins enable companies to engage in product-centric, model-based innovation processes. Thanks to the usage of IoT sensors, digital twins can receive real-time data, process it and accurately simulate the results of physical interventions. While the concept of a digital twin is not new, progress in high-performance cloud computing allows far more realistic modeling, and AI enables twins to learn autonomously and recommend interventions. Furthermore, the models can be experienced within virtual reality, which enables developers, designers and even early-stage customers to get sneak-peaks at to-be innovations purely created within digital twins. This adds a second layer to the simulated results of physical interventions and extends the digital-twin application to product design.

### *Digital technologies for interaction*

#### *Application case: Decentralized collaboration platform for ecosystem innovation*

The combination of a decentralized collaboration platform and the use of blockchain technology can enable companies to cooperate and evaluate potential ecosystem partnerships in the innovation process. Blockchain technology can create trust among partners that do not have trust-based business relationships yet, but rely on exchanges of data to validate potential use cases or new business models. By using a blockchain-powered platform, sensible data can be processed in use cases without the need to give access to confidential data. Even after a collaboration decision has been made, the partners do not have to give up their data ownership, but can also connect and share data via a safe and trusted decentralized platform. This solution therefore helps companies to fulfill their need to cooperate for innovation, while still protecting their intellectual property.

## **Where are we today?**

### *What does digitally enabled innovation bring, and what is holding us back?*

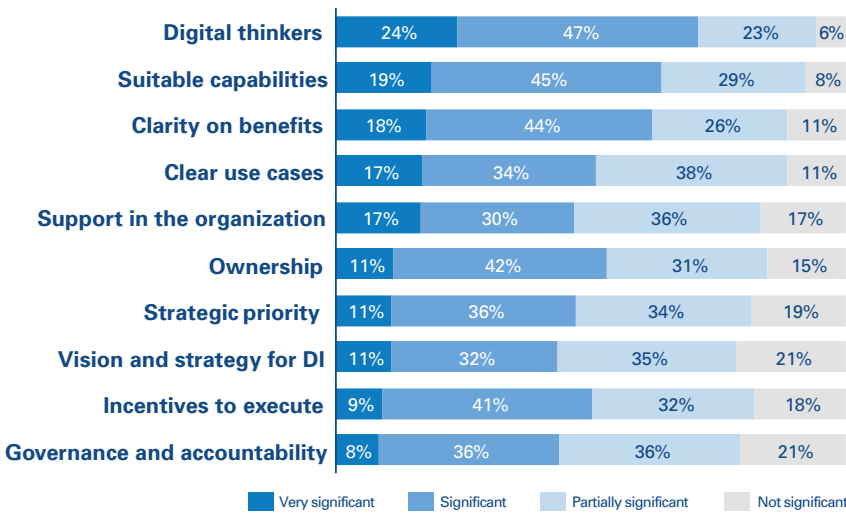
The potential of digitally enabled innovation is transformative. Under current conditions, respondents believe it will directly contribute to doubling of overall innovation success, including the same growth in breakthrough innovation efforts. What is more, interviews revealed that these anticipated increases in innovation success would not be due to better data (intelligence) or faster feedback (foresight). Instead, they indicated that company-wide alignment and learning, supported by digital tools (interaction), would be the key to transforming innovation performance.

Doubling of success may seem ambitious, but actual results could be even higher. Under optimal conditions, companies indicated that digital innovation could actually nearly triple overall performance in both breakthrough innovation and overall innovation success. (See Figure 2.)

## Roadblocks for digital innovation



What is lacking today, % of responses:



Source: Arthur D. Little Innovating in the digital age survey



Figure 2: Current roadblocks to digital innovation

### Companies follow different routes to digital transformation

Analysis of company responses enables us to identify four distinct approaches and archetypes when it comes to digital innovation:

- Digital natives** are companies in which “digital” is already in the DNA. They typically offer digital as part of their value propositions, providing their customers with digital products and services. They frequently rely on digital technologies to develop innovations. Example industries include IT, telecoms and media.

- **Pioneers** are characterized by general optimism about the benefits of digitally enabled innovation, which drives them to embrace new digital technologies within innovation, albeit selectively. Example industries include the process industry, transport and logistics, and consumer electronics.
- **Traditionalists** recognize digital as having minimal immediate impact, yet are convinced of its potential future benefits. They therefore stick to multi-year plans to usher digitally enabled innovation into their organizations, often piloting technologies extensively prior to implementation. Example industries include utilities and financial services.
- **Aspirants** do not yet have complete visions for digital transformation. They tend to dabble in digitally enabled innovation by selectively piloting new technologies. Example industries include manufacturing, food & beverage and engineering.

Companies within strategic archetypes have different views of the importance of digital innovation. For example, digital innovation is seen as more important than “conventional” innovation by natives and pioneers, but less important by the other two groups. All except for the natives say that they are still exploring its specific potential. When it comes to investments, digital pioneers are the largest spenders, investing 10 times more over the next three years than the lowest spending group, aspirants.



## How companies can get started with digital innovation

*What it may bring – identifying distinct opportunities for your company*

Rather than investing in emerging technologies that provide an unknown competitive impact, many companies wait until best practices materialize and then buy relevant solutions from established vendors. But when it comes to the nine key digital building blocks, the inevitable lag resulting from followership may turn out to be insurmountable.

The recommended starting point is therefore to identify the digital building blocks with the potential to drive step-change transformation, as well as those that can solve the specific issues with which your organization tends to struggle. This will allow you to define a target picture for digital innovation that is holistic enough to remain relevant beyond the first few steps, and specific enough to drive concerted efforts. This target picture is the first step on the path to digitally enabled innovation. (See Figure 3.)

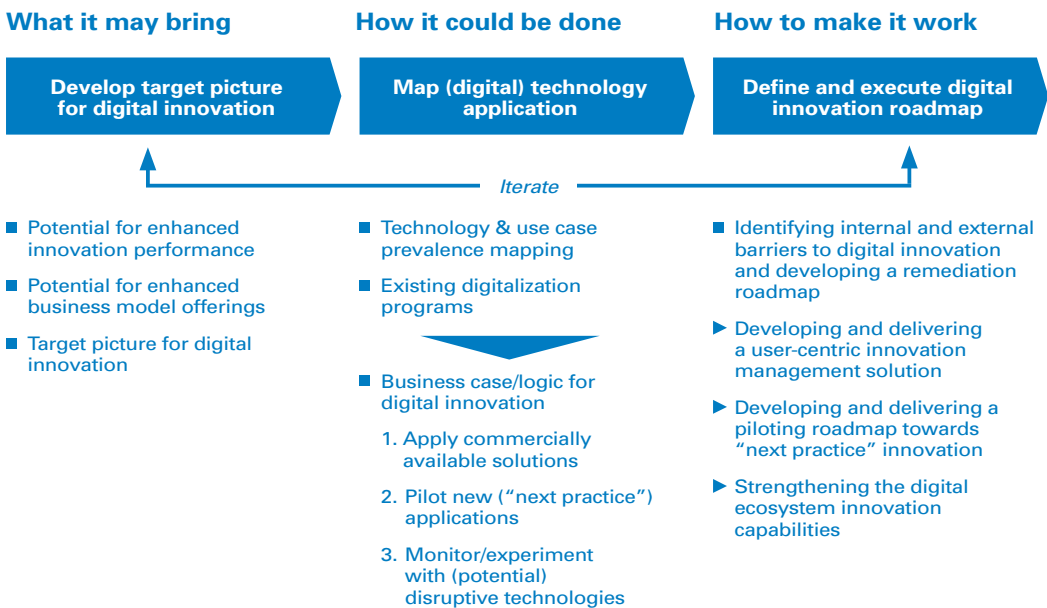


Figure 3: **A guide to jump-starting digital innovation**

### *Making it work – moving from concept to real benefits*

The key to practically moving to concrete benefits is not to start with technology, but to start with business needs. A thorough innovation diagnostic will reveal today's main bottlenecks and the value creation potential of innovation in your company, with needs-based segmentation of your customers revealing their true unmet needs. For example, working with a specialty chemicals company, Arthur D. Little revealed that its "must-win battles" in innovation were to predict technical and functional product performance better and sooner, before starting expensive piloting experiments. The company also learned that its main customers were looking for functional solutions rather than the bare product, and "functionality" would come from in-depth understanding of the chemical processes involved. Together with the client, we then identified a set of "transversal" (i.e., across segments) innovation programs to realize these benefits through digital technology – some of which were already known, and others were to be explored.

### **Looking to the future**

While over 90 percent of survey participants told us that digital technology would partly or fully transform their industries, more than half said they were still discovering its full potential. Evidently, there is widespread realization that "we ain't seen nothing yet". Companies are therefore hesitating to limit themselves to implementing the digital solutions that are available today. But how can they implement solutions that do not yet exist, at least not in their companies? The answer essentially boils down to "innovating your innovation engine", and is founded on three principles:

- Stay away from the solution; start with the potential. Identify the areas where you see major opportunities through new solutions, and evaluate their business potential and the risk that (new) competitors will find them before you do.

- Learn from today's "art of the possible" digital solutions, but continue to think in terms of the big picture: unlimited intelligence, foresight and interaction. While there are limitations with existing solutions, they may not be as great as you think. Create a list of the types of digital solutions that could be applied to these new areas of innovation performance, incorporate them into your vision, and think of likely or preferred partners and major milestones.
- And thirdly, start experimenting – not by following a fixed implementation plan, but rather by launching a limited set of pilot projects. In the best case these will lead to replicable results, but even when unsuccessful they will increase your knowledge and understanding of the must-win battles in digital innovation. Pilot after pilot, your initial vision will improve in quality, robustness and specificity.

### *Box 2 - Experimenting with digital technologies*

This approach of piloting and experimenting worked especially well for an Arthur D. Little client that embarked on its digital journey through multiple projects that evaluated the potential of digital technologies to transform core business processes. The company set up a "digital pilot factory" where it tested the impact of digital technologies to support maintenance activities (e.g., data glasses to assist in maintenance, exoskeletons to reduce the physical impact on employees, and cameras to assist with checking vehicles and infrastructure for potential damage). After several successful proofs of concept, the company rolled out the technologies to all maintenance facilities. Additionally, it piloted an internal app development platform, selecting several pilot apps developed by employees to validate the concept. In this way, the company was able to identify central modules that could speed up the development process and make the apps fulfill corporate requirements, such as around security. This enabled the company to learn, improve and achieve early buy-in from key stakeholders.

## Insight for the executive

If only half of the ambitions shared in our survey come true, digitally enabled innovation will be key to all industries. At the same time, current technology building blocks for digitally enabled innovation differ significantly in terms of maturity. Yet, as with any family of new technologies, if you do not start today, you will have a hard time catching up. Realizing the full potential of digitally enabled innovation therefore requires:

- **Needs-based digital thinking:** Innovation in the digital age will demand a new approach to managing innovation that understands and anticipates the needs of your customers, and of your internal and external innovation communities. At the end of the day, digital technology is still just technology, and will be useless if it is not being used by the right people.
- **Development of a target picture for digital innovation:** Inclusion of a digital innovation target picture alongside technology strategy and product innovation strategy will set the course for your digital transformation and ensure that activities target the right opportunities.
- **Willingness to invest and experiment:** You can't wait for digital innovation to become established and offer replicable best practices – you'll simply be too late, at least regarding the factors that are critical for your company and customers. You need a much faster, more agile way to manage and execute digital innovation, as well as willingness to invest in the development of digital technologies that address the greatest opportunities and risks to your organization's innovation engine.



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