



# Digital Transformation – Be There or Be Square

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**F**or science fiction fans and tech enthusiasts, 2016 was an interesting year in fields such as physics where an Earth-like planet in the life zone of our neighboring sun Proxima Centauri was discovered; telecommunications where three billion people are now connected globally compared to 1.8 billion in 2010; and such as energy which, for the first time, saw renewable energy sources in 30 countries cost less than fossil fuels. And of course, the Star Wars saga goes on!

On the one hand, the future seems bright. Technological developments in different disciplines can help us address major problems like climate change, cancer, and famine. On the other hand, we are experiencing increasing threats due to military conflicts and nationalism,

migration challenges, and dissatisfaction with uneven distribution of globalization gains. Moreover, the digital transformation will fundamentally change the way we live and work in just one generation. 80 percent of today's jobs will no longer exist in the next generation, and 65 percent of the children entering school today will work in jobs that do not yet exist. In other words, while the future might be bright, the transition is challenging.

Obviously, nobody can foresee the future. Yet, it is essential for business leaders, political leaders, and even for each citizen to understand the factors which are likely to shape the future digital transformation.

Four exponential technological developments occurring simultaneously are driving the digital transformation, especially in the ICT and industrial sectors:

### 1. Artificial learning (AI) and machine learning:

Only ten years ago, pattern recognition software could not distinguish between a small child standing on a street corner and a street hydrant, which made autonomous driving impossible. Since then, pattern recognition has improved massively, e.g., there is a lip-reading algorithm which was developed in Oxford last year that can read human lips far better than a human can.

At Deutsche Telekom, we are working together with partners. Today's applications are predictive maintenance algorithms for our network, which help to determine the condition of our network and, therefore, to predict needed maintenance. And the application of machine learning enhances chatbots for our digital customer service (e-care) at T-Mobile Austria.

### 2. 5G as a new dimension of connectivity:

From a physical infrastructure perspective, 5G networks are small cell networks requiring dense fiber-to-the-street backbone networks and new spectrum frequencies. From a logical perspective, the 5G standard facilitates via so-called “network slicing” software the realization of different logical networks with very different capabilities on one logical network – networks with ultra-low “latency” (reaction time), with the ability to securely connect many more machines and sensors than human beings or networks with ultra-high speed can. For example, today's networks have latency times of 50 milliseconds compared to a professional athlete with five milliseconds. Last year, Deutsche Telekom was the world's first operator that built a functioning, end-to-end 5G system with its

global technology partner with a latency of one millisecond, and this year, the guaranteed latency is eight milliseconds. What for? Assuming you want to control an industry robot remotely, you will need guaranteed low latency, for example, to clean up a contaminated area or for rescue activities in burning buildings. If you want to reduce heat, cost, and weight for consumer devices, you would need to put computing power into the edges of the networks with low latency connection to the devices, e.g., for virtual or advanced reality glasses.

Another aspect is the management of connected things. Last year, three billion people were connected globally. In 2020, there will be an estimated 30 billion devices. For that, the Narrowband Internet of Things (NB-IoT) technology can securely connect sensors with a very long battery life cycle that uses little energy, with little cost, and from any remote place (e.g., also in the sewer systems). This year, Deutsche Telekom is rolling out NB-IoT in eight countries. The first commercial applications based on NB-IoT focus on smart parking, smart lighting, smart metering, and predictive maintenance.

**3. Sensor miniaturization and digital production technologies:** like 3D printing or the creation of “digital twins” for products or production factories in order to reduce production time and production costs in the manufacturing sectors.

Sensors are also appearing everywhere, not only in machines and products, but also in our bodies. For example, in 2015, the world's first digital pill received the market go-ahead<sup>1</sup>.

<sup>1</sup> The patient swallows an indigestible mini sensor which measures the concentration of a certain substance in the stomach and transmits the data to a small sensor on the wrist. The data is transmitted via an app to a central data base that provides real-time information to the patient about what patient-specific dosage of medicine needs to be taken)

### 4. Platforms and data security:

With the exponentially growing number of connections, the security thrusts grow exponentially, too. Traditional firewall concepts might no longer be enough. At Deutsche Telekom, we have bundled all security activities in one area and recently started working together with South Korea Telecom to explore quantum cryptography<sup>2</sup>.

<sup>2</sup> Quantum cryptography exploits quantum mechanical properties to perform cryptographic tasks to massively enhance security



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The combination of all four developments creates the essence of this new world. Let's take a simple example of a robot that can clean up a mess of Lego blocks in a child's room. To do so, it needs algorithmic intelligence, computing power, and data updates which are likely to be stored in a network cloud – like an outsourced brain, sensors, and low-latency connectivity to the cloud in order to avoid making an even bigger Lego mess. For Lego blocks, security might be less of an issue, but for autonomous driving it is essential.

Obviously, in the telco sector, we need to understand the use cases in different industries and define the business models in order to justify billions of investments in 5G networks. Needless to say, the digital transformation requires much more of a cultural change than a tech innovation. Enterprises need to be externally-oriented and network-orientated. We need to understand the customer of today and tomorrow and industry pain points. And we need to understand rapidly evolving technologies, how to combine them, and what we create ourselves instead of creating it in networks with start-ups or with established companies. Cross-functional collaboration within the enterprise will become more important than ever before. And, we need ambidextrous leadership which means finding the right balance between the extremely agile, trial-and-error type of working and the traditional risk-mitigating, waterfall-type approaches.

Finally, as leaders we need to live the cultural change we want to see. This might also mean giving up exactly those control mechanisms that made us successful in the past.

As Marie Curie said “Nothing is to be feared, only to be understood”. With that, we can shape a bright future and a peaceful transformation. ■

