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# DIGITAL FINLAND FRAMEWORK

FRAMEWORK FOR TURNING DIGITAL  
TRANSFORMATION TO SOLUTIONS TO  
GRAND CHALLENGES




Digital transformation of industries and society is a key element for growth, entrepreneurship, job creation and welfare. Digital transformation enables speeding up the development of innovative responses not only to local economic and societal challenges, but for reaching the Sustainable Development Goals. Finland has been ranked as one of the leading countries in several digital transformation related assessments. For example, in Digital Economy and Society Index<sup>1</sup> 2017, Finland ranks 2<sup>nd</sup> with particular strengths in digital skills and digital public services. According to the Global Competitiveness Report<sup>2</sup>, Finland has the best availability of scientists and engineers in the world combined with one of the most digitally oriented population. The Finnish education system is one of the best globally and ICT specialists' share of the workforce (6.7%) is one the highest as well. The innovation system is based on intensive collaboration between universities and industry (ranked 2<sup>nd</sup> in the world). The Finnish industry is outward looking. It is highly export oriented, international and dominated by high tech solutions and related digital service offerings often based on extensive use of open data and next generation business models

Digital Finland Framework supports effective coordination of sustainable digital transformation in Finland. The Framework combines key perspectives together:

- 1) The digital innovations exploiting the benefits of **platform economy** and the transformation of the **spearhead industry sectors**
- 2) Seamless support for **sustainable digital transformation**
- 3) Responses to **global megatrends** and **sustainable development goals**

All these perspectives rely on the availability of skilled employees, relevant technology resources/key enabling technologies and smart regulation for smart technologies supported innovation funding that speeds up the emergence of new ecosystems.

The Digital Finland Framework aims to ensure world's best innovation and business environment for companies seeking to develop innovative products, services and solutions to challenges ranging from those in everyday life to meeting the Sustainable Development Goals.



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# Platform economy – The model of digital industries

Digitalization changes the boundaries of industry domains. This makes understanding of value creation mechanisms in various industries critical as new digital business models depend more and more on platform solutions. Platforms enable effective scale-up of business and change the value chains of industries towards networked business ecosystems. Managing the change towards platform economy is one of the key success factors in digital transformation.

The platforms are not purely digital ones, but also cyber-physical or tightly linked into f. ex. more efficient use or circulation of materials and raw materials. Every industry is transforming towards Platform economy. The framework below shows the key layers, from regulative environment to platform economy execution, needed. The industry domains in platform economy develop into industry ecosystems, i.e. business constellations or networks where independent or individual actors operate together.

In Finland and in each industrial domain, competitiveness and growth is heavily dependent on networks of larger and smaller companies, interacting closely with the research sector, i.e., universities and research institutes. To take most out of the ecosystems requires advanced, effective, and widely used digital platforms. Platforms enable every piece of data, software and service belonging to a larger ensemble benefiting from global markets.

Digital platforms are an outstanding means to deploy and further develop new enabling technologies and applications, including those based on artificial intelligence IoT, 5G and cyber security.

Platforms should primarily be developed industry-lead, but there are many domains and purposes where public sector driven or mixed public-private mode is most appropriate. As businesses today are international or global by default, platforms must extend and be adopted globally.

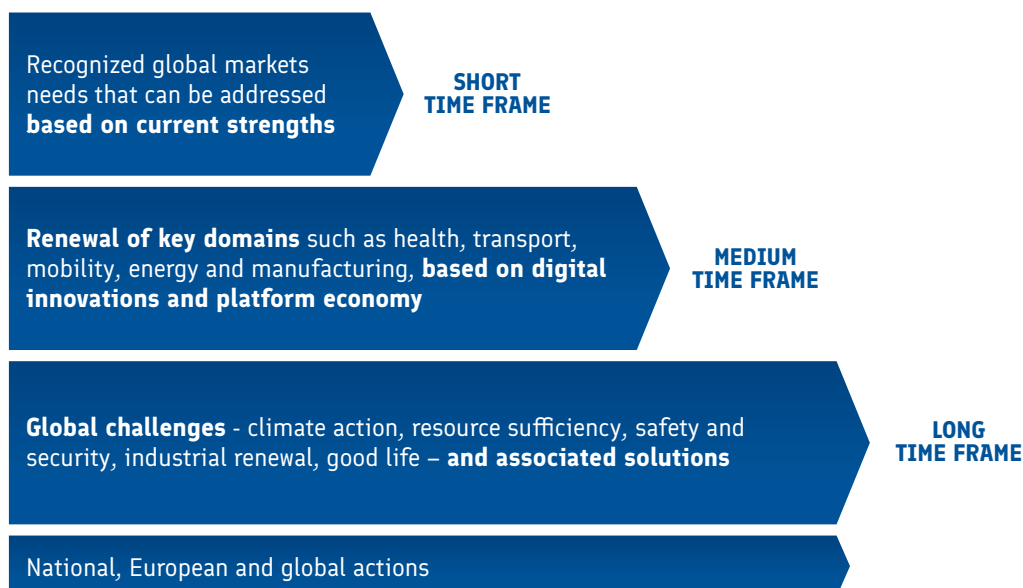


# Seamless support for sustainable digital transformation

The Digital Finland Framework combines the future opportunities based on the global megatrends and the current Finnish strongholds, i.e. the industry sectors with the best digital transformation potential.

The digital transformation path in each industry depends on the current digital maturity and models of the focus markets. The transformation has different time horizons where the operating models and need for support is varying. In all these horizons, international co-operation is crucial, as digitalization and associated platforms are global by the nature.

In short term, companies focus on commercializing their innovations, digitalization of their offerings and international growth based on current market needs. Activities that boost lively business environment with startups, inspire investments and ensure skilled resources availability, are needed. In midterm, the industries seek for novel innovations and business models in partnership with other companies and research organizations. In this horizon, it is important to enable effective co-innovation in business driven ecosystems and ensure innovation funding, testbeds availability, and co-operation of industry and policy makers. In long term, the research aspects have a key importance as these opportunities are outside of companies own R&D&I funnel. This horizon leans on the availability of skilled researchers, high quality research infrastructures and funding that speeds up international co-operation. In general, the innovation system should ensure that there are needed regulations and resources in place in to support the effective innovation process throughout these horizons.



# Global megatrends as a source of global business opportunities

Digital Finland Framework responds to grand challenges that open opportunities for global digital solutions markets. In the following, the grand challenges and associated Finnish strongholds are described.

## Industrial renewal – source of welfare and economic growth

The industrial revolution has been ongoing already, but the pace is increasing. The rapid rise of data based businesses and platform economy, and the introduction of novel production technologies are boosting the globalization. Success in global competition requires agile strategies and superior products with value intensive services. Prosperous business leans on digital operations as tomorrow's smart products and services are created in new industrial ecosystems supported by globally connected platform economy. Opportunities emerge from growing share of services, increased collaboration and customer intimacy and use of data. At the same time, there is an increasing global need for sustainable, resource efficient industry and circular economy solutions that are heavily depended on digital means.

Finnish industry has a strong position in several sectors: Finland exports heavy machines (engines, elevators & escalators, cargo handling equipment, plant components/subsystems, mining machines, ships, harvesters, tractors, etc.) and designs and builds factories worldwide (pulp & paper, energy, chemical). In these rather niche sectors, the Finnish vendors are global market leaders that are already driving digital transformation, so that the value of digital services and aftersales business count up to about to 50% of the revenues. Finland, with high innovation capability and skilled workforce, is ready to be a frontrunner in next generation manufacturing and service business.

## Climate action – clean energy and transport solution for the future

Close to 200 countries have committed to COP21 to limit the global warming below 2°C which calls for radical changes in all the sectors that are emitting greenhouse gases. This opens a global market for solutions and businesses as billions of mechanical and ICT devices, buildings, vehicles and industrial processes need to be replaced or renewed. At the same time, opportunities arise from distributed energy markets, as consumers are becoming producers of energy. These climate neutral solutions or new energy systems heavily rely on digital means and effective, secure use of data.

Finland has already one of the world's most modern energy distribution systems with open energy markets. By capitalizing on the digital capabilities, Finland has a strong position to become a global leader in using and providing intelligent and clean energy for all. In addition, Finland has strong basis in climate neutral industrial processes and the smart mobility services and technologies, which enable climate change mitigation.



## **Good life – new technologies for better life**

Urbanization and digitalization in the built environment will have significant impact for the everyday life and society. Also, growing healthcare costs together with aging population demand for a paradigm shift for prevention of diseases and a new kind of participatory healthcare. The global markets for novel technologies for better life, like AI supported diagnostics, preventive health care solutions or automation and situation awareness in built environments, etc. are rapidly increasing.

Finland has unique health care data sources, which is a superb source for digital innovation. Finland has high trust level in society with a number of growth oriented companies in the field. Finnish health care system is under significant renewal offering a unique place for develop and pilot new technology, service concepts and business models for the benefit of the people in the digital society.

## **Resource sufficiency – prosperity from resource wisdom**

Social changes, urbanization, increasing wealth and consumerism lead to rapid exploitation of natural resources exceeding Earth's capacity. Closing the loops of materials flows, using secondary and unconventional raw materials, such as CO<sub>2</sub>, adopting renewable materials and revolutionizing food production are a must – and huge global opportunities. Renewable materials, such as cellulose, and production of non-renewables from secondary sources will become the mainstream.

Finland recognizes the need for sustainable, resource efficient solutions and circular economy. The Finnish industries benefit from renewables and unconventional raw materials. We have premier know-how and technology to extract metals and minerals from mineral waste. Combining the material and process strongholds to digital capabilities (AI, platform economy, digital design) is an asset for sustainable Finnish industries and emerging new ecosystems.

## **Safety and security**

In the turbulent and increasingly automated world, unexpected complex and cascading failures can lead to catastrophic effects. Ensuring safety and security of people, government, companies and infrastructures in all conditions has strong implications to technology development, business continuity and resilience models, and opens new business opportunities. For example, cyber security solutions have a global market that is expected to grow very rapidly and is already a multi-billion dollar industry.

Finland is in the front line to develop autonomous systems for ships and cars. We invest in developing monitoring, controlling and countering technologies and algorithms as well as safety policies and procedures. We have globally operating companies in the area of cyber security.

## Strategic approach – to make it happen

Concrete policy actions are defined by two spearhead programs of the Finnish Government: 1) platform economy focused “Finland in platform economy” and 2) an AI focused “Finland a leader in the application of artificial intelligence”. The categories are as follows:

### Facilitating new digital industrial platforms and ecosystems

The forming of industry-driven innovation ecosystems with digital disruption focus are supported. The national innovation funding organization’s (Business Finland) has a dedicated funding instrument for business driven ecosystem creation and facilitation. The ecosystem activities are supported by national and international innovation funding (See funding for details). In addition, a specific funding program for AI and platform economy has been created.

### Ensure novel technologies, like AI, can be adopted more quickly and easily by industry

Strengthen and build knowledge and innovation testbeds or hubs to speed up technology and solution development processes up to commercialization and global market penetration or disruption. The existing R&D&I actors are linked into strong competence centers that are capable for effective international co-operation (refer to Digital Innovation Hub or DIH network of Finland). Relationships and actual cooperation with similar European and global nodes or clusters benefit from complementary resources of the network. The competence centers as a part of ecosystem formation, the creation of world-class testbeds and pilot sites is supported and investments are attracted. The ways to accelerate novel technologies adaptation is enhanced by creating specific accelerator mechanisms, like AI accelerators. In addition, increasing the mobility, usability and quality of growing data resources are catalyzed by flexible regulation.

### Ensuring future-oriented digital skills

The digital skill creation is accelerated from basic education to company employees. The share of mathematics and science in all education levels, from elementary school to universities is increased. The digital professional and university education is boosted not only in technical sectors but also in application professions. Use of Mass Open Online Courses (MOOC) is encouraged. The train-the-trainee approach for digital skills is applied in education but also in companies. The Finnish close research-company co-operation is further strengthened and innovation funding emphasizes knowledge transformation from research to business.



## **Ensure availability of public funding and investments for digital transformation**

The Finnish Research and Innovation Council, chaired by the Prime Minister, is committed to a vision where Finland is the most attractive and competent environment for experiment and innovation in 2030. In this roadmap, the target for public and private sectors' investments in research and innovation is set to four per cent of the GDP. In national perspective, the key importance is in Business Finland's (national innovation funding organization) co-innovation funding and focused innovation programs such as Smart Energy, Smart Mobility, Smart Healthcare, and AI and Platform Economy. The fundamental research is funded through Academy of Finland basic funding and flagship programs. In addition, Innovation vouchers are offered especially for SMEs.

## **Ensure international collaboration in all aspects of digital innovations**

Global cross-sectoral and cross-border mobility is actively encouraged. The university curricula must include international exchange as well as pre and post-doctoral studies. The innovation funding should support international co-operation, e.g., EU innovation participation. The activities and conditions for attracting and recruiting international talents into Finland is highly supported. Finnish activities and visibility in global networks is strengthened. Business Finland promotes growth from innovations to global markets and attracts investing in Finland.



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