# Information and Communication Technology (ICT) and Digitalization in Finland

Finnpartnership

# Contents

# 1 INTRODUCTION

Finland's domestic mobile technology cluster with the related software industry succeeded transformation to globalization of business and innovation in the 90's. Since then, the country has completed a transformation process from a typical telecommunication business made of a lot of hardware and embedded software to a digital services internet economy composed of cloud, internet of things and big data. Innovation-driven and economically successful Finland has given the world the mobile text message (SMS), the Heart Rate Monitor and the Linux operating system, just to name a few. Finland is the biggest contributor to global innovation in the world (ITIF 2016).

Finland's education system played a major role in the transformation. It is one of the most recognized education systems in the world with its deep links with the corporate world, hiring private sector experts as teachers and teachers moving from universities to companies very often, enhancing creative learning and teaching open innovation. 350.000 highly trained professionals work in the Finnish ICT and mobile industry, with 15.000 science and technology students graduating annually from local universities. Finland has the best availability of scientists and engineers (World Economic Forum - The Global Competitiveness Report 2015-2016). The Finnish innovation ecosystem seeks to link start-ups with big companies, universities and public bodies. The number of software firms in Finland has risen by 40 % in six years. Funds are typically mixed (private and public). The R&D expenditure in Finland was 2.9 % of GDB in 2015.

Today, Finland is one of the start-up hot spots in Europe. One benefactor of this trend is Slush, the world's biggest event for connecting start-ups and venture capital. Also, a number of large international companies (such as Intel, Qualcomm, NVidia and Samsung) have established their R&D units in Finland.

This report is structured as follows: first, we offer an overview of the Finnish innovation system; second, we discuss some of the global needs with the ICT and digitalization sectors' potential role in solving them; third, we take a look of the ICT and digitalization sector of Finland; and fourth we look into the internationalization potential of the Finnish ICT and digitalization companies into the emerging markets. In this discussion we focus on the Finnish ICT and digitalization companies; what kind of customers and partners they are searching for and how they are pricing their offerings, what kind of instruments they are to accelerate co-operation between Finnish companies and actors in developing countries. Finally, we give possible options for future scenarios. In addition, in the appendixes, we have first listed Finnish companies appearing in this report and where to find the others, and then listed some useful websites.

# 2 OVERVIEW OF THE FINNISH INNOVATION SYSTEM

Finnish innovation policy aims to create an environment that encourages enterprises to bold innovation, renewal and international growth. Education and skills are the foundation for innovation. The aim of innovation policy is that new information generated by human inventiveness is used and deployed in all areas of society. Finland's innovation policy draws its strength from a wide field of sectors. Development of traditional technologies and a broad range of non-technological skills are used as instruments for economic growth and wellbeing. Digitalisation and the growing importance of services in the economy highlight the role of intangible value creation and offer new ways of creating value.

## 2.1 Innovations require different types of expertise

Solutions that make use of new approaches are created when experts from different fields cooperate and question old practices through networks and ecosystems. Collaboration of enterprises, universities and research institutes refine science, knowledge and skills into innovations and wellbeing. In addition to maintaining domestic networks, enterprises must also actively seek new expertise and knowledge through international cooperation. Incorporating the views of end-users and involving them in the innovation process are examples of new ways of creating innovation.

## 2.2 Public sector supports innovation

Innovation always involves an economic risk. It can take years of research and development to produce an innovation. Sometimes development efforts yield no result, or a product fails on the market. Innovation policy spurs enterprises to invest in innovation in ways that are in society's best interests overall. The means include research and innovation funding, innovation-friendly legislation and environment, and the development of cooperation networks and platforms.

The aim of the public sector is to produce higher-quality public services in a more cost-effective manner. One way of doing this is to purchase more innovative services through public procurement.

## 2.3 Key actors in the Finnish innovation system

The Ministry of Economic Affairs and Employment is responsible for preparing and implementing Finland's innovation policy. The Research and Innovation Council, chaired by the Prime Minister, coordinates the development of Finland's innovation system. The EU is a significant innovation policy player, especially through its research and innovation programme Horizon 2020, which is the biggest of its kind in the world.

The key player and an interface between the public and the private sector, Business Finland, acts as an accelerator of global growth. Business Finland seeks to create new growth by supporting companies to go global, as well as by funding innovations by Finnish companies. Business Finland provides companies with experts to speed up the identification of opportunities around the world and helps to transform them into business. The organization offers services throughout different stages of internationalization.

Finnpartnership's main services, Business Partnership Support[1] and Matchmaking, help developing country businesses to find Finnish partners and build such partnerships with them that allow the partnership to benefit from the Finnish innovation system. The Matchmaking services are briefly introduced in chapter 5.4 of this report.

**Box 1. World leading countries in fostering gender equality**

Finland has always been one of the world's leading countries in fostering gender equality. Finland was the first country in the world to extend the right to vote and stand for elections to all women and men in 1906. Finland is also known as a country where women usually work full-time and enjoy equal access to education and healthcare. Finland has been propelling a worldwide commitment to gender equality, which also reflects to different parts of the society. If we think Finnish development aid, gender equality is a long-standing priority for Finnish development policy. What comes to entrepreneurship and ICT, Finnish women are fearlessly entering the field breaking up glass ceilings. In case you want to know more about this, you can contact Women in Tech-association (https://womenintech.fi/). In addition, the global movement "Rail Girls" was cofounded by a Finnish lady, Linda Liukas.

Rail Girls and Linda Liukas – coding skills for kids and women
Rail Girl aims to give tools and a community for women to understand technology and to build their ideas. They are doing this by providing a great experience on building things and by making technology more approachable. Rail Girls was born in Finland in 2010 but rapidly expanded and now has local chapters all around the world. Local chapters are hosting coding workshops for women. These workshops are free-of-charge, participants don't need any previous knowledge about programming and there are no age-limitations.

More information: http://railsgirls.com/ and http://lindaliukas.com/

[1] Finnish organisations can apply for financial Business Partnership Support for a profitable business venture that has a positive development impact in developing countries. Support may be granted for starting business activities, including identifying a local partner.

# 3 GLOBAL NEEDS AND ICT AND DIGITALIZATION SOLUTIONS

The world cannot solve its problems without ICT and digitalization immersed innovation. In other words, the cutting-edge ICT and digitalization companies that can be found for example in Finland, have a great role to play in partnerships seeking to meet the Sustainable Development Goals (SDGs). SDGs are the blueprint to achieve a better and more sustainable future for all. They address the global challenges, including those related to poverty, inequality, climate, environmental degradation, prosperity, and peace and justice.

Commercially viable partnerships between various types of players, often evolving around innovation impinged upon ICT and digitalization, are looked upon as major actors in delivering solutions in issues pertaining to food and nutrition, health and well-being, education, equality, water and sanitation, energy, employment, industry and innovation and infrastructure, sustainable cities and communities, responsible consumption and production, climate, life below water and on the land, peace and justice and democracy and strong institutions. Business is fully recognized as a solution provider and a partner.


**Until Lab Helsinki**
UNTIL labs create a platform for problem-solving between the UN, private sector, academia and civil society, with the help of startups. Labs are located in different parts of the world, for instance in Malaysia and Cairo. The Finnish government with other local stakeholders is hosting one of the United Nations Technology Innovation Labs. The lab opened only recently in Espoo as part of the Aalto University campus and its AGrid. The lab's focuses on circular economy, education, peace and security, and health.

More information: https://agrid.fi/

**Pexraytech** is a Finnish high-tech company developing portable X-ray imaging solutions and security systems. Pexraytech's security systems combine user centric design and cutting-edge technology to offer high quality solutions affordably. Pexraytech mission is to help governments to increase the level of security for protecting their citizens. Pexraytech does this by offering affordable security solutions to the global market.

More information: https://pexraytech.com/


**Participatory democracy**

Electorate aims at making knowledge management easier. Cities and municipalities cooperate with Electorate to get the publics opinion even to the preparatory phase of creating agendas.

Electorate civic-engagement application offers the citizens a gamified and equal tool to express opinion on different matters and to follow decision making. Electorate's mission is to improve knowledge management and transparent information.

More information: https://www.electorate.eu/?lang=en

# 4 ICT AND DIGITALIZATION INDUSTRY IN FINLAND

Finland is home to world leading companies in a number of ICT and digitalization sub-sectors, some of which are ready, with the right partners, to address some of the burning global issues too. Communication technology, versatile mobile gaming companies, such as Supercell (Clash of Clans), Rovio (Angry Birds) and Fingersoft, are showing the way. Finnish wearable technologies cover everything from fitness trackers, augmented reality glasses and smart contact lenses to smart jewellery, smart clothes and smart fabrics. A world-class cluster of machinery companies, such as Kone, Metso, Valmet, and Wärtsilä, combined with a high concentration of ICT professionals, has enabled Finland to become a pioneer of the Industrial Internet[2].

## 4.1 Communications Technology

The 5G Test Network Finland (5GTNF) is the most advanced in the world, bringing together leading global connectivity companies and operators. It covers the entire telecommunications value chain from research, development and manufacturing to network operators, service providers and public authorities. Over 40 partner organisations are involved, including the "big three" — Nokia, Ericsson and Huawei.

Finland is a leading innovation hub for international companies working on ultra-reliable and low latency mobile services. Aurora, the first Arctic testing ecosystem in the world, which focuses on Automated Driving, Digital Transport Infrastructure, Intelligent Infrastructure Asset Management and Mobility-as-a-Service is shaping the future of mobility.

Finland has earned a formidable reputation in the cyber security field, with core expertise in encryption, data privacy, threat prevention and identity management solutions. Some of the strongest encryption protocols, like SSH, were invented in Finland. The Finnish cyber security sector comprises close to one hundred companies, from global players to innovative start-ups.

## 4.2 Data Centers

There are over 50 investment-ready locations available and the co-location and wholesale operators are highly competitive. It is proven that in Finland, it is possible to save up to 50% on energy costs compared to another European location (source: Invest in Finland). Due to cool climate, free cooling is available up to 365 days a year. It is also possible to reuse the center's waste heat by selling it back to the energy company. Strong technical know-how of Finns, ideal

[2] The Industrial Internet is the integration and linking of big data, analytical tools and wireless networks with physical and industrial equipment, or otherwise applying meta-level networking functions, to distributed systems. The term was coined by General Electric (GE).

location between Europe and Asia and stable societal and natural conditions make Finland one of the best locations in the world to deliver cloud services. Also, due to Finland's granite bedrock and no major natural hazards, the Data Center Risk Index 2016 rates Finland as the safest data center location in the EU and fourth safest in the world. Companies such as Google, Yandex, Equinix and Microsoft have chosen Finland as their data center location.

## 4.3 Gaming

The Finnish gaming industry has grown faster than the global gaming market with a compound average growth rate of 45% during 2004–2015. Industry revenues have been the world's highest in relation to population. Globally, mobile games generated turnover of around € 35 billion in 2016. The share of Finnish mobile game development was roughly 7% of the revenue generated. (Source: Invest in Finland).

In 2016, the Finnish gaming industry set a record-high turnover of € 2.5 billion. The annual turnover growth rate was 4% from 2015 to 2016. The number of people employed in the gaming industry has been growing steadily and companies have positive expectations. About 20% of people employed in the gaming industry in Finland are foreigners. (Source: Invest in Finland).

Key factors behind the growth in Finland include a vibrant and robust gaming community, a globally connected hub of game developers that has arisen in the country, and the technologically creative brains behind it. New gaming technologies and platforms increase the rate of growth. Over 20 universities offer gaming educational programs attracting students from countries like Germany, Japan, and Russia.

Game industry specialists have ranked Finland among the very best countries for game production among European countries (see Game Developers Conference (GDC) Europe annual State of the Industry report). Finland is home to such industry big hitters as Supercell and Rovio. In addition, Helsinki continues to attract foreign game studios that have increasingly decided to join the gaming cluster. A few recent examples include Wargaming, Zynga, and JetDogs, who all have expanded their operations to Finland with the aim of expanding into the larger European market.

## 4.4 Wearables

Finland has deep roots in wearable technology. The constantly expanding wearables ecosystem has tens of specialized companies designing and producing wearable devices; developers benefit from top-notch technology providers and contract manufacturers and cutting-edge research supports the development and commercialization of wearable technologies.

The focus on research in heart rate measurements in Finland has produced innovations that are now used by leading global consumer brands. Firstbeat's heart rate measurement technology today powers wearable devices made by Samsung and Garmin that track the achievements of professional sports teams, Olympic athletes and active people around the world. Finnish sports and wellness-focused companies such as Polar and Suunto have taken wearables to the next level with built-in GPS capabilities. Most Finnish sports wearables offer online data storage and data sharing solutions, including Polarpersonalcoach.com, Sportstracker (recently acquired by Suunto) and Motivade.

Active eHealth start-ups have given rise to new innovations in Finland. Navigil offers white-label location services that help elderly people to stay home longer. Spektikor has developed a small disposable ECG-detector for emergency responders and the military. As for applying sensor technologies to the clothing industry, Myontec analyses muscle activity with its sports clothes. Recently, USA based Jabil Circuits bought Clothing+, a developer and manufacturer of comfortable, wearable sensor solutions.

## 4.5 Other Trending Opportunities

Other growth sectors within ICT and digitalization include e-commerce and e-trade, as well as business digitalization, including services such as education, healthcare, financial sector and online mapping.

KARTTAKESKUS

**The pioneer of spatial data in Finland**

With many years' experience of different kinds of spatial data projects, geographic information systems and maps, Karttakeskus is a seasoned spatial data professional. They are Finland's biggest company focused on spatial data services and a technologically independent provider of spatial data solutions.

Karttakeskus' comprehensive range of services and appreciation of changing business environments and digitalization goes from extensive IT solutions and services to analytics, consulting, materials and outsourcing services. From road maps and nautical charts to a wide range of other useful products related to spatial data, in both digital channels and traditional equipment. They enable Karttakeskus' customers to manage all of their spatial data-related affairs through a single partner.

Karttakeskus was established in 1919 as a department of the then National Land Survey Agency. The roots of digital spatial data operations lie in the advancement of digital production technology in the late 1970s and, among other things, the FINGIS software developed by the National Land Survey Agency and Karttakeskus in the 1980s. MapInfo software was included in the Karttakeskus product range in 1989. Following a number of developments over the years, Karttakeskus ended up in the ownership of Affecto. It is currently a subsidiary of the Finnish Affecto Group.

More information: http://www.karttakeskus.fi/about-us/?lang=en

SYMETRI
ADDNODE GROUP

Symetri offers a wide range of services including: 3D Scanning & Model Creation; Business Process Analysis; FM Services; IIoT Project Services; Methodology Development; PLM Services; Project Services Simulation, Sizing and calculation services; Software Development Services; Support; Training; and Training Needs Analysis. Services offered come with yet a wider range of products and solutions applicable to a variety of industries.

More information: https://www.symetri.com/products-and-solutions/gis-and-mapping/

### 4.5.1 E-commerce, e-trade

Most Finnish e-commerce companies rely on cutting-edge tech and skew heavily towards B2B. For example, the super-fast-growth company Nosto operates in E-commerce marketing.

nosto

**Nosto's AI-powered Ecommerce Intelligence Engine has been developed and refined over the past 7 years by a team of engineers, data scientists and PhDs.**

*Personalizing the World of Commerce*
Nosto analyzes your customers' omni-channel behaviors and transactions. Using world leading AI for digital commerce, Nosto is able to deliver real time, automated 1:1 recommendations and personalized content across all customer touch points. Nosto's patented technology and Ecommerce Intelligence Engine has been developed and refined over the past 7 years by a team of top machine learning engineers, data scientists and PHDs.

*Onsite Product Recommendations*
Nosto analyzes the unique browsing and buying behavior of every visitor to your store, building individual customer profiles and crowd-logic for first-time shoppers. Displaying the most relevant products across your site in real-time, Nosto aims at making the shopping journey more personal and more inspiring. Leveraging innovative and advanced machine learning, Nosto builds a unique understanding of your customers. This enables powerful predictive capabilities in real time delivering increased customer engagement.

More information: https://www.nosto.com/

Fiare

Fiare enables media companies to unlock the value of their content and audience by providing the sophisticated FiareAds platform - a whitelabel solution for running online marketplaces and eCommerce sites. FiareAds provides an online classifieds and shopping platform that can be set up and deployed rapidly. The FiareAds whitelabel solution combines comprehensive functionality with ease of use and a fully responsive design that ensures the best user experience in all channels. FiareAds also represents a cost-effective and efficient approach for site renewals using proven technology.

The platform can be customised with client-unique branding and numerous bespoke functionalities. It has been applied in various sectors such as motors, properties, and other specialist areas. Supporting multiple business models from 'freemium' to subscriptions, the platform allows publishers to build new revenue streams - monetising their content effectively.

More information: https://fiare.com/

### 4.5.2 Business digitalization

With digitalisation, companies gain access to new technologies, big data, and new business models based on these assets. Software products and data sets form an increasingly essential business resource, particularly in the platform economy, in which companies can generate billions in revenue with quite modest physical resources. Digitalisation underlines the significance of services and networked business practices, both in commercial and industrial operations.

According to the Ministry of Economic Affairs and Employment of Finland, the current relevant digitalization technologies that support the development and increase of business in the country include: work phase automation, robotisation, machine learning, artificial intelligence, big data analysis, virtual and enhanced reality, and blockchain technologies.


**Derigo** offers state-of-the-art easy to use tools for project organizations to improve their core business by performing more efficiently and improving communication and collaboration. Their Pro3 product family offers tools for management to improve steering and help facilitate change management.

By using Derigo's tools many project organizations have successfully implemented common ways of working and processes to improve their quality and grow their business. By working closely with their customers Derigo can develop solutions quickly to match their specific needs. Derigo's own experience from project-based businesses helps them understand the customer's needs and find the correct solutions.

More information: http://www.derigo.fi/index.php/en

# 5 INTERNATIONALIZATION OF THE FINNISH ICT SECTOR TO THE EMERGING MARKETS

Finland is a small country with only around 5million habitants. For growth-companies this means that they need to internationalize fast and search for possible other markets. Yet, internationalization of Finnish ICT and digitalization companies to the emerging markets has been limited. For those who try, key reasons that they are stating for the challenges faced in our survey and interviews, include difficulties in finding and identifying right kind of suppliers and partners (notably for Programming/coding services ja Business development outsourcing); difficulties in finding and identifying local sales agents; and issues pertaining to pricing.

## 5.1 Potential clients

Potential clients of Finnish ICT and digitalization companies include emerging market public sectors, international organizations and civil society organizations, private sector companies from local start-ups to large national and international companies, and individual consumers at large.

### 5.1.1 Public sector, international organizations and civil society organizations

Developing country needs in sectors such as health, education, water and sanitation, energy, employment (organization of labour markets and actual employment of the young populations), industry and innovation and infrastructure, sustainable cities and communities, responsible consumption and production, climate, and strong institutions are tremendous. If financing is arranged, many developing country governments are ready to procure entire national digitalized systems to cover, for instance, health or education systems.

International organizations (including United Nations agencies, International Financial Institutions and others) and international, regional and national Civil Society Organizations (CSOs) run major programmes and projects aiming at enhancing peoples' lives in the developing world and they can be major buyers of ICT and digital solutions by Finnish companies and particularly by partnerships of Finnish and developing country companies. International organizations and CSO's procure advanced technologies and know-how but they, rightly so, prioritize delivery facilitated by local partners who know how to adjust the products, services and systems to meet the local requirements, make transfer of technology possible and build capacities.

Many developing country governments, particularly in Africa, are also keen to facilitate structural transformation of their economies. This means building up ICT infrastructure and services (incl. data centers), telecom sectors, trade logistics and trade facilitation systems, etc. as well as focusing on the soft-side of providing education in ICT at all levels of the education system.

**Sibesonke's mobile service to help millions of farmers in East Africa**

Finnish mobile-service company Sibesonke Ltd was established in 2009 in Espoo and has from early on been directing its actions towards the developing markets. Sibesonke has successfully piloted a mobile farming service in Tanzania and has now entered into the commercial phase of the project.

Sibesonke announced in March 2013 a National Technology and Content Cooperation with the Tanzanian Ministry of Agriculture, Food Security and Cooperatives, and the Ministry of Livestock and Fisheries Development. The announced cooperation allows both Ministries to better reach the 33 million Tanzanian farmers with relevant up-to-date farming content on mobile phones. The target of the project is to expand the service portfolio of life-relevant services and to make it accessible for mass-market of low-income people across Tanzania. Sibesonke provides both the cross-network technology platform and the business model. Overall target is to substantially increase farming productivity and food security in the region in a financially sustainable way.

More information: http://www.sibesonke.com/ and https://finnpartnership.fi/en/stories/sibesonkes-mobile-service-to-help-millions-of-farmers-in-east-africa/

### 5.1.2 Private companies

Developing country companies from start-ups to conglomerates are seeking to seize the opportunities provided by ICT and digitalization. There are tech companies with interesting apps; e-commerce and e-trade are taking off, digitalization of value chains and industry happens, and in many countries services, notably tourism, are leading the way in digitalization. This means demand for big data analysis, blockchain technologies, artificial intelligence, work phase automation, robotisation, machine learning, etc.

**Automating workflow**

Tridify was established in Finland in 2012 with HQ in Helsinki and Sales teams based in Singapore, Dubai, London and Sydney.

To test the market and technology to both customers and stakeholders, Tridify developed their own application called TridifyRT for AEC professionals. This software takes existing 3D assets

and smart objects and creates immersive, interactive virtual environments that allow users to manipulate dynamic objects online real-time.

**Bridging the gap between BIM and game engines**
At first the automation conversion technology was developed as an internal tool to help deliver TridifyRT easily to architects, developers, interior designers and facility managers. Realising the positive impact it was having just by removing the hassle of manual modelling and reducing errors, with proven demand Tridify launched Tridify Convert to the Unity developer global community as a partner of Unity.

More information: https://www.tridify.com/corporate/

### 5.1.3 Individual consumers

There are ICT and digitalized consumer products in sectors listed above as interest to public or private sector entities that would find a market in the developing world – at least with the right kind of local partner or sales agent. In addition, Finnish stronghold subsectors mentioned in this report, i.e. gaming companies, wearable technologies, and virtual and enhanced reality firms, would have products that could be an easy sell – with right kind of sales' outlets - particularly for the growing middle and upper classes of many developing countries.

DAVID

**David Health Solutions Ltd**.
David Health Solution Ltd. is the world leader in rehabilitation solutions for musculoskeletal problems. Health care professionals in more than 30 countries are using DAVID Active Therapy Solution and have been able to help millions of patients with chronic and recurrent pain.

Specially designed devices with joint specific isolation and loading curves guarantee safe and pain free training experience while a cloud based, state-of-the-art IT system guides and motivates the patient and collects all relevant data automatically for easy reporting.

The DAVID Solution is easily replicated anywhere in the world with guaranteed, high level results due to automated protocol planning, feedback-based adaptive loading progression and pain monitoring throughout the program. Automation, bio-feedback controlled self-training and web-based quality control system increase patient throughput and significantly lower running costs for rehabilitation centers.

More information: https://www.davidhealth.com

## 5.2 Examples of existing co-operation models

There is a range of alternatives of how to partner with Finnish ICT companies. Most common is that Finnish companies are interested in entering the market and finding payable clients. Based on our survey and interviews, several companies mentioned that they are interested in finding local sales agents to boost the marketing and selling effort. In the following we are presenting other possibilities on how to partner and collaborate.

### 5.2.1 Business visits to and from Finland

Particularly in the sector of education, where ICT and digitalization are a big these in the form of edutech (please, see a separate Finnpartnership report on that), numerous delegations of policymakers and education specialists visit Finland every year to learn from its experience first-hand. Many countries are keen to find out what Finland has done to achieve good-quality learning for all. Several companies are currently offering conceptualized tours for foreign visitors. Participating in these kinds of visits is a good start to build partnership between different actors. Visits are also at times organized in sectors such as health, water and sanitation, energy, etc.

In addition, Team Finland - more specifically Ministry of Foreign Affairs and Business Finland - regularly arrange official trade mission trips to different countries. These trips are joint by company delegations. Follow different social media channels of Ministry for Foreign Affairs of Finland and Business Finland to keep on track when and where these are trips are taking place.

**Agroy has created a service for farmers in India, through which they can order affordable fertilizers via their smartphones.**

Agroy Oy has developed an electronic purchasing service that gives farmers access to competitive pricing of fertilizers, seeds and agricultural chemicals. The Finland- and USA-based company is now in the process of expanding to India.

More information: https://www.agroyinc.com/ and https://finnpartnership.fi/en/stories/indian-farmers-can-now-make-purchases-on-their-smartphones/

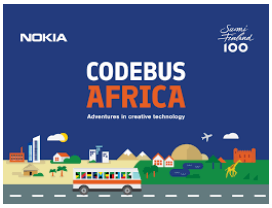
### 5.2.2 Slush; Slush Global Impact Accelerator (GIA), and Start-up hubs

Slush is a not-for-profit startup and tech event. The main purpose of Slush is to facilitate meetings between the founders of start-ups and investors such as venture capitalists, accomplished with events such as "match-making" and pitching competitions. Slush aims to change attitudes towards entrepreneurship by providing a platform for youths and student volunteers to co-organize and build a world-wide startup community. Held annually in Helsinki, Finland, it has grown from a 300-person conference in 2008 into one of the leading global startup event of its kind in 2017. In 2017, Slush gathered 20,000 attendees, with over 2,600 startups, 1,500 investors and 600 journalists coming in from over 130 countries to participate together in this global networking festival.

Since 2015, Slush also run events throughout the world in four major cities under Slush Tokyo, Slush Shanghai, and Slush Singapore.

Slush Global Impact Accelerator (GIA) is a program created in collaboration with the Ministry for Foreign Affairs of Finland and other multiple partners globally. The purpose is to support impact startups and showcase the exciting business opportunities in emerging markets, which are also vital for implementing the Agenda 2030 and solving complex challenges. In addition, the program focuses on strengthening the networks between the impact actors, engaging the Nordic community with the global impact entrepreneurs, and enhancing the mobilization of capital towards impactful business. See more at https://www.slush.org/gia/

Finland has a large number of Start-up hubs; some evolving around the universities, some thematically organized; some acting more as incubators and some as accelerators. Some of the hubs collaborate with hubs in the developing countries; please, contact start-up hubs in your country to find out if they already work together with Finnish hubs.




**CODEBUS AFRICA**

CodeBus Africa: a 100-day adventure into creative technology and youth empowerment.

CodeBus Africa brought together African and Finnish innovators in tech and education to organise creative coding workshops for youth in 10 African countries in February–May 2017. Through the project, the hope was to inspire youth to discover and make use of technology in

their lives. CodeBus Africa targeted especially girls, empowering them to explore technology's possibilities for their future.

In addition to the Finnish partners Aalto University, Aalto Global Impact, Ministry for Foreign Affairs of Finland, mehackit and Nokia, CodeBus Africa collaborated with multiple tech hubs and educational institutes in 10 African countries. Learn more about the local partners here: http://finland100africa.fi/countries/

### 5.2.3 Local sales agents

International sales effort demand lot of resources. Particularly new, small, enterprises sales effort can be the most challenging part. Among the Finnish ICT and digitalization sector, several entrepreneurs would like to hire a local sales agent.

### 5.2.4 Local suppliers

Tailoring solutions to meet the local context is one of the key factors to fulfil the market needs. It can be assumed that in the future, we will also see more Finnish companies, which are hiring local content developers, programmers and coders. Relating specially edutech sector, Finnish Fuzu, which has a branch in Kenya, is heavily utilizing local talents.

**Fuzu mobile learning and career advisory services**

Fuzu's starting point was to develop solutions to problems of high level of unemployment, students' difficulties to 'commercialize' own knowledge and the lack of career planning. Fuzu built an interactive online platform where to find jobs, receive advice for job hunting and conduct some short courses to improve own competences. The service is currently used in few East-African countries and the company has hired local Kenyans to be responsible of producing relevant content.

More information: https://www.fuzu.com/ and https://finnpartnership.fi/en/stories/mobile-service-accelerates-careers-in-kenya/

**IWA IT-consultancy services**

Half of the personnel of the Finnish software company IWA work in Thailand.

IWA, which develops Internet and mobile services, has encountered the same problem in Finland as many other IT growth companies. There is a shortage of qualified software programmers. IWA has solved the problem by establishing a subsidiary in Thailand where nearly 20 local programmers work under Finnish operative management.

More information: https://iwa.fi/ and https://finnpartnership.fi/en/stories/iwa-found-help-in-thailand-for-the-programmer-shortage/

Software company Nomis established a development unit in the Philippines a few years ago. Now the company has set its sights on expanding into the country's software market for the education sector.

Nomis Oy is an information technology company founded in 1993 that specialises in software products for work management. The company also offers a comprehensive range of software development and ICT support services. In 2009, Nomis decided to investigate the possibility of establishing itself in the Philippines. This is a common practice in the IT sector. It is referred to as offshore outsourcing and involves decentralising software development functions to teams in other countries.

More information: https://nomis.fi/?lang=en and https://finnpartnership.fi/en/stories/software-company-nomis-goes-for-it-in-the-philippines/

**BearIT** is a software company that provides its clients with electronic data systems and mobile applications on a turnkey basis, or as part of the client's own projects.

Founded in 2013, the company is now focusing on its own product development. It is currently working on a mobile application for logging working time and a digital health care system. Previously, BearIT's founder Teemu Karhu worked for Logica, a company offering outsourcing services for the IT sector. His team included IT professionals from Pakistan, which gave him the idea of procuring some of BearIT's software work from there.

More information: https://bearit.fi/ and https://finnpartnership.fi/en/stories/finnish-company-pleased-by-pakistani-it-know-how/

### 5.2.5 Licensing model

Licensing is a transfer-related market entry strategy, which is also used in some sub-sectors of the ICT and digitalization export industry. It involves a company (known as the licensor) granting permission to a company in another country to use its intellectual property for a defined time period. The intellectual property can include patented manufacturing processes, trademarked products, copyrights and technical assistance. In return for this permission, the licensor demands a fee from the company it has granted permission to (the licensee) and periodic royalty payments.

### 5.2.6 Partnerships between public, private and civil society players

Non-governmental organisations (NGOs) and Civil Society Organizations (CSOs) at large, have wide networks in different developing countries. They are becoming more and more interested in establishing new kind of partnerships with companies.

In the context of emerging low-income markets, innovative business models are needed. There might be a huge demand for the services, but clients might not be always able to pay for the services. Hence, it might be required to design new types of partnerships.

**Pajat Solutions Ltd**'s, a company developing data collection systems, and development organisation Plan Finland's cooperation led to the creation of Poimapper data collection system. Poimapper is currently used in about ten different projects in developing countries –

for example in India it is used to support the screenings for oral cancer. Mobile solutions make healthcare easily accessible and inexpensive in challenging circumstances.

More information: https://www.poimapper.com/en/ and https://finnpartnership.fi/en/stories/pajat-solutions-ltds-data-collection-system-increases-effectiveness-of-cancer-screening-in-india/

## 5.3 Pricing of products and services

This report set out to cover the wide variety of ICT and digitalization businesses prominent in Finland. As discovered, there is a lot of business-to-business ICT and digitalization offering in the country. Moreover, many of the sub-sectors and companies presented include a tremendous potential for business-to-government sales; even expanding to cover International organizations (including United Nations agencies, International Financial Institutions and others) and international, regional and national Civil Society Organizations (CSOs). Finally, there is also ICT and digitalization sub-sectors and companies focusing on business-to-customer sales.

Also, as we have discovered ICT and digitalization products and services include industrial goods; consumer goods; industrial services, solutions and applications; as well as consumer services, solutions and applications. They also include hybrids of goods and services.

Thus, providing information on pricing of the products and services of the ICT and digitalization sector – when we can be talking about a data center as well as about a health tracker; or automation services (and hardware) for a factory as well as downloading of a mobile game – becomes virtually impossible.

Yet, since the company examples included propose a slight focus of this report and of the ICT and digitalization sector on various different types of software solutions, some of the most common pricing and business models for software are brought up:

***Subscription and licenses*.** Very common way of how different software products are sold is based on a subscription-based pricing. It means that the user/users purchase a monthly or annual license to use the services. Most software we make use of in our computers comes with a monthly or annual license to pay.

***Direct purchasing from online stores*.** Services which are more directed to individual users, can be bought from an online shop. Usually, there is a fixed price for an online game, course, book etc. Online games in particular may allow for more direct purchases within the game world.

***Freemium pricing*.** Some companies might offer certain product for free. Usually these products are limited to a few completely functioning parts of the actual program or then they are offering all the features, but each feature is limited in function. As an example, if you are preparing to purchase a program to enhance your classroom, freemium edutech products can be a great tool

in the process of researching and evaluating the usefulness of the products before purchasing the chargeable features.

***Offered free.*** Partnering with United Nations agencies, International Financial Institutions, Civil Society Organizations or other providers of public good. In some cases partnering with the UN, IFIs, CSOs or others may be possible and they are then delivering the software, and often related services, for free or against a nominal fee.

***Offered free* via sponsors.** Some of the Finnish companies aim to expand their client base by creating ways how to offer it free for the end-users.

## 5.4 Finnpartnership's Matchmaking Service

Finding local business partners is critical when you are planning to import your products to Finland. With the help of Finnpartnership's Matchmaking Service, companies in developing countries can seek out business partners from Finland. The service is free-of-charge.

Finnpartnership will provide visibility for registered companies and their business proposals in Finland. Once your company has been registered to the service, a public introduction profile is created and added on Finnpartnership's public Matchmaking database. All the registered companies are also included in Finnpartnership's monthly newsletter and your business proposal can be presented at events that are attended by Finnish companies that are interested in finding new business partners. Finnpartnership may also present your company to other import/export organisations, business promotion organisations and to chambers of commerce. Also, a direct one-to-one introduction can be made if a potential partner candidate is found.

# 6 FUTURE SCENARIOS

In this report, we have given an overview of the Finnish innovation system and the ICT and digitalization sector of Finland. We have also looked into the internationalization – and its potential - of the Finnish ICT and digitalization companies into the emerging markets. It should be noted that there are those companies – born global – that have directly targeted global and/or certain emerging countries' markets, as well as those that have first established themselves at the domestic and/or emerged markets and then set out to supply from, partner in and/or sell at the emerging markets. It is likely that both types of trends will continue and more and more such companies, who will start at the emerging markets, will emerge.

The born global and others focusing on emerging markets will require reliable local partners, suppliers and sales outlets. There is a lot of opportunity for emerging markets ICT and digitalization companies to raise their game, make use of services such as the Finnpartnerhip's Matchmaking to identify Finnish partners; and ultimately in such a partnership to make use of the Finnish innovation support services to solve global and local problems and positively impact the world with tailored top-notch ICT and digitalization solutions.

# 7 APPENDIX

## 7.1 List of Finnish ICT and digitalization companies featured in the Report

*The following Finnish ICT and digitalization companies have been mentioned in this Report. For others, please, go to:*

**The Finnish Software and E-business Association:** https://ohjelmistoebusiness.fi/en/

**Business digitalization**

***Derigo:*** http://www.derigo.fi/index.php/en

**Tridify:** https://www.tridify.com/corporate/

**Democracy and strong institutions**

**Electorate:** https://www.electorate.eu/?lang=en

**Gaming**

**Fingersoft:** https://fingersoft.net/company/

**Rovio:** http://www.rovio.com/fi

**Supercell:** https://supercell.com/en/

**Health and well-being**

**Pexraytech:** https://pexraytech.com/

**David:** https://www.davidhealth.com/

**Pajat Solutions:** https://www.poimapper.com/en/

**E-commerce, e-trade**

**Fiare:** https://fiare.com/

**Nosto:** https://www.nosto.com/

**Industrial Internet**

**Kone:** https://www.kone.com/en/

**Metso:** https://www.metso.com/

**Valmet:** https://www.valmet.com/

**Wärtsilä:** https://www.wartsila.com/

**IT consultancy, software**

**IWA:** https://iwa.fi/

**Nomis:** https://nomis.fi/?lang=en

**BearIT:** https://bearit.fi/

**Mobile services**

**Sibesonke:** http://www.sibesonke.com/

**Agroy:** https://www.agroyinc.com/

**Fuzu:** https://www.fuzu.com/

**Online mapping**

**Karttakeskus:** http://www.karttakeskus.fi/about-us/?lang=en

**Symetri:** https://www.symetri.com/products-and-solutions/gis-and-mapping/

**Wearable technologies**

**Firstbeat:** https://www.firstbeat.com/en/

**Myontec:** https://www.myontec.com/en/

**Navigil:** https://www.navigil.com/

**Polar:** https://www.polar.com/us-en/about_polar/who_we_are/polar_origins

**Spektikor:** http://www.spektikor.com/company/

**Suunto:** https://www.suunto.com/

**Other entities**

**Slush:** https://www.slush.org/

**Ministry of Economic Affairs and Employment:** https://tem.fi/en/frontpage

**Research and Innovation Council:** https://valtioneuvosto.fi/en/research-and-innovation-council

**Horizon 2020:** https://ec.europa.eu/programmes/horizon2020/en/

**Business Finland:** https://www.businessfinland.fi/en/for-finnish-customers/home/

**Finnpartnership:** https://finnpartnership.fi/en/frontpage/

**Rail Girls:** http://railsgirls.com/ and http://lindaliukas.com/

**Sustainable Development Goals:** https://sustainabledevelopment.un.org/

**UNTIL Lab Helsinki:** https://agrid.fi/

**5G Test Network Finland:** http://5gtnf.fi/

**Codebus Africa**: http://finland100africa.fi/

**Women in Tech-association:** https://womenintech.fi/

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