

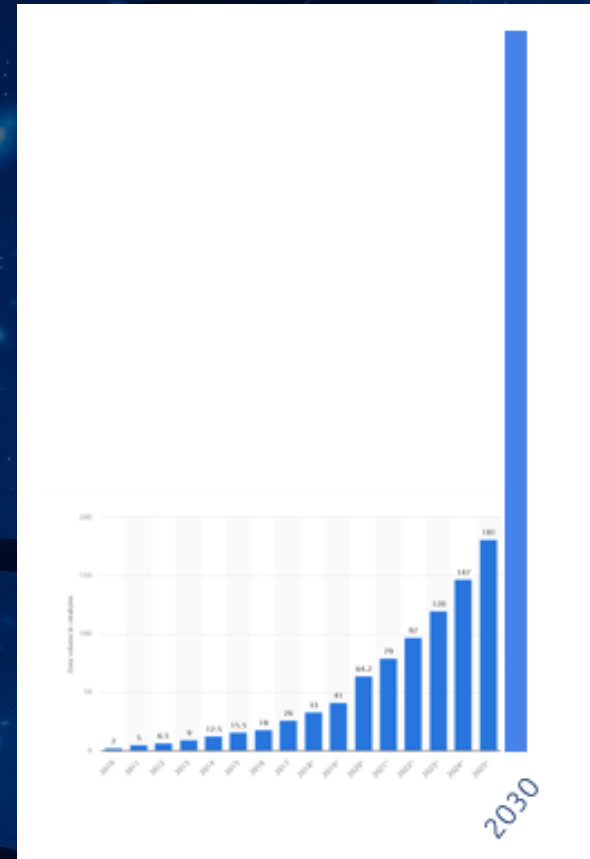
5G Technology to Drive Productivity and Sustainability

Jarkko Pellikka
Director, Nokia Veturi Programs

11 Oct 2022, Industry 4.0 Webinar

Massive Data Increase by 2030

X 10



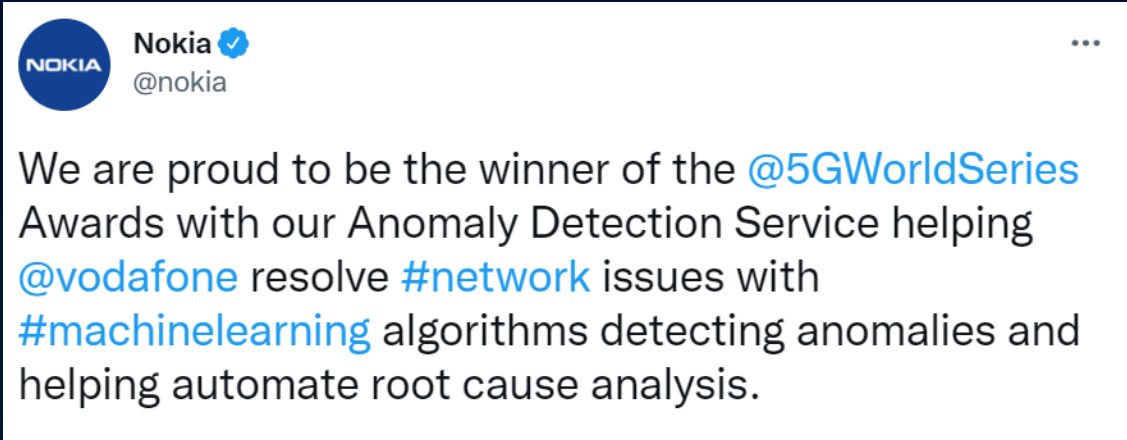
5G




Nokia partners with AWS, Microsoft, Google for 5G and cloud

By Linda Hardesty • Mar 15, 2021 12:06pm

AI in Use to help the world act together



Nokia 
@nokia

We are proud to be the winner of the [@5GWorldSeries](#) Awards with our Anomaly Detection Service helping [@vodafone](#) resolve [#network](#) issues with [#machinelearning](#) algorithms detecting anomalies and helping automate root cause analysis.

Nokia and Mobile Industrial Robots showcase real-time robot fleet management using private 5G wireless

Source: roboticsandautomationnews.com



NOKIA |  **vodafone**

Nokia and Vodafone:
Anomaly Detection Service

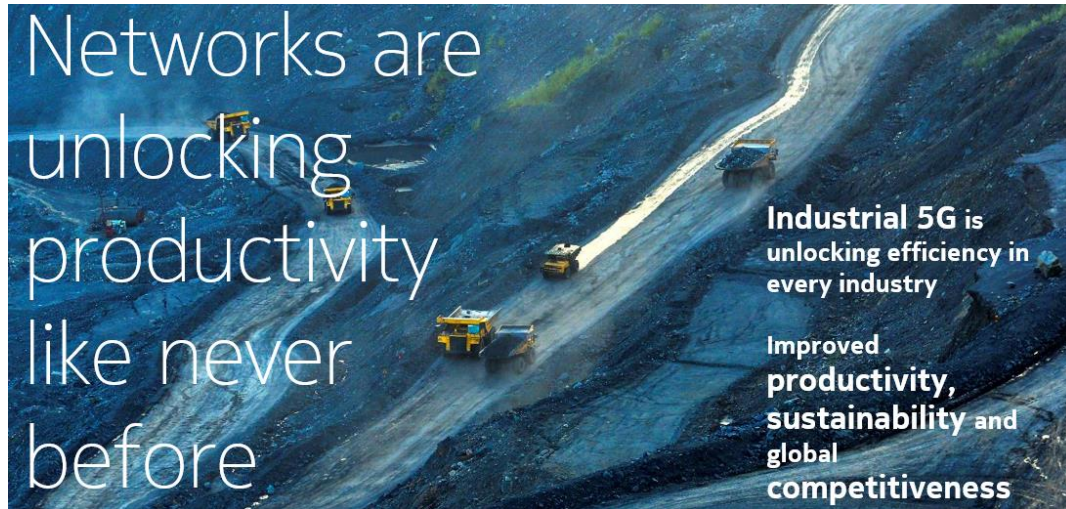
Most Innovative AI or ML Technology
for the Network

 **5G World AWARDS**



Nokia Veturi Program - Unlocking Industrial 5G

2020 (P7) – 2023 (P6)



- System of a Chip (SOC)
- Network Management for Private Networks
- RF/Antenna research
- Key verticals: Mining, Energy and Water Man.

Nokia Veturi Program – COMPETITIVE EDGE

2022 (P1) – 2024 (P12)



- Edge Platform and Architecture
- Edge automation and orchestration
- Edge Applications
- Ecosystems: Selected Edge domains

Nokia Veturi Programs

‘Unlocking Industrial 5G’ and ‘COMPETITIVE EDGE’

30+

New ecosystem projects

200

Ecosystem partners

50%

Nokia's target to cut emissions across Nokia's business by 2030 compared to 2019

1.5 BEUR

Nokia Veturi-related total cumulative R&D increase in the Finnish Ecosystem by 2030

Other awarded Veturi companies (2020-2022)

NESTE

 **fortum**

 **Metsä**

SANDVIK

KONE

ABB


WÄRTSILÄ

 **tietoEVRY**

Valmet 

 **BOREALIS**
Keep Discovering


MEYER TURKU
SHIPYARD 1737

New sustainable and secure networks critically needed to match the future data capacity growth

Data and capacity limits

Exponential (IoT) data generation is pushing network capacity to its limits and at increasing cost.

Network sustainability

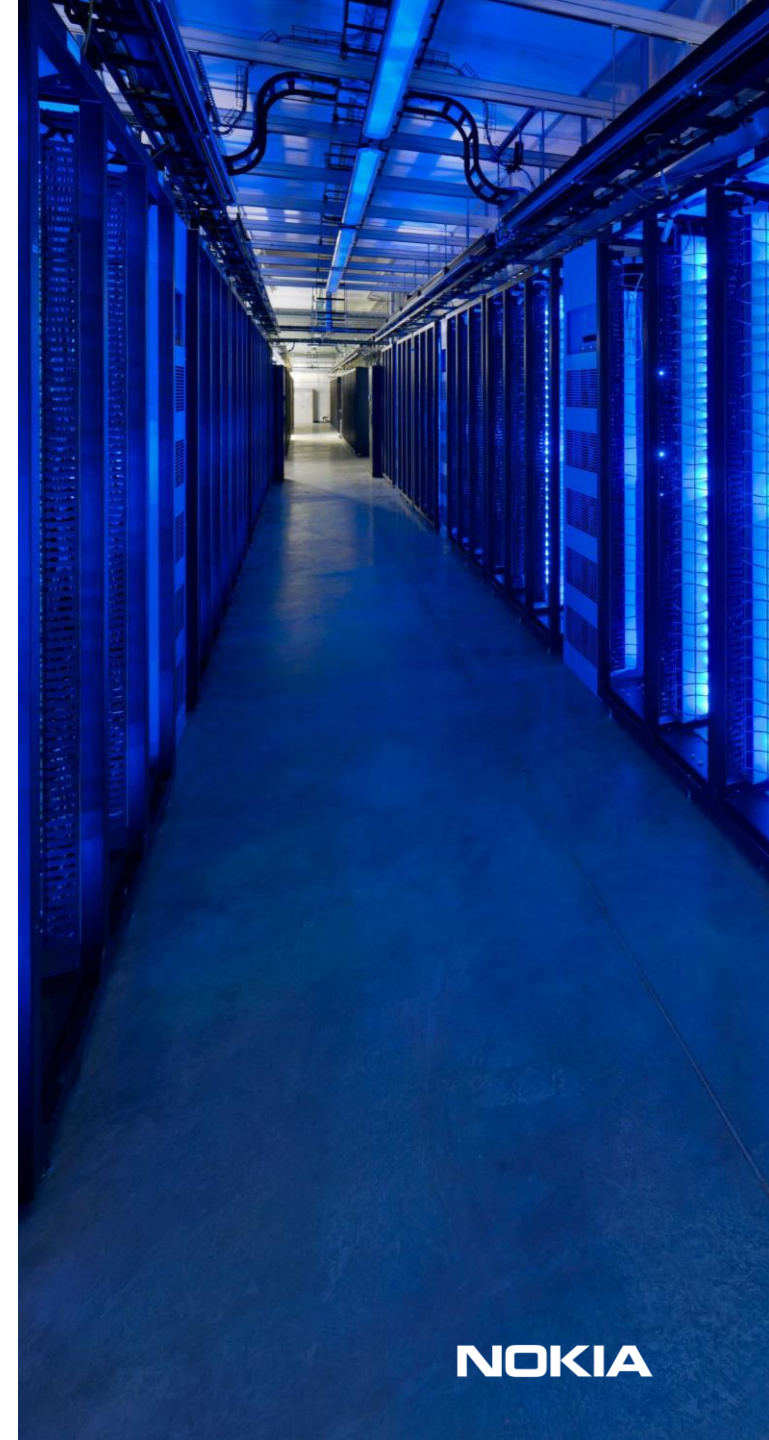
To dramatically slow down the exponential growth of capacity need, energy consumption, and related costs.

Secure data flow

To enable secure and seamless data flow from device to cloud and back.

By 2025, **80% of all generated data are expected to be processed at the edge**

It is estimated that new edge capabilities on 5G can help **reduce carbon emissions and energy efficiency up to 60%** over the next 10 years. Globally, this reduces massively the need for new energy production capacity.



Nokia is committed to cut emissions across Nokia's business by 50 percent by 2030 compared to 2019

Real-time processing of data is driving the transformation from centralised cloud-based infrastructure models towards edge.

New solutions enable:

- Energy savings from data transport can reach up to 60% in targeted use cases
- It is estimated that together 5G and edge computing can help reduce carbon emissions from mobile networks by 50 % over the next 10 years

Case example - Impact on sustainability

Telefonica's O2 in the UK, reported that edge capabilities on 5G could save 269 megatons of CO₂ by 2035 across sectors such as manufacturing, transport, and healthcare. Almost equivalent to England's total emissions in 2018.

Zero Emission Mobile Networks

Reducing CO2 emissions and cost of energy

How to improve base station energy efficiency?

About 80% of a mobile network's energy is consumed by base station sites. Mobile operators report an overall increase of 10-30% annually in mobile network energy use. Managing energy efficiency is necessary to control the costs while maintaining the service level that end users are expecting. In fact, **Nokia Intelligent RAN** energy efficiency management reduces radio network energy consumption by up to 15%.

At Mobile World Congress 2022, Nokia launched commercially the first in the world liquid-cooled AirScale Base station portfolio, which can reduce the cooling system power consumption by 90%. It also includes an innovative waste heat capture mechanism. The waste heat is captured into the liquid and there is an option to circulate the heat for other purposes such as building heating, or to sell it to other parties. This reduces base station CO2 emissions by 80%.

ReefShark 10 - 15% better efficiency	Machine learning 15% savings by cell optimized timing for sleep	Sleep mode 5% - 10% energy savings with ReefShark deeper sleep mode
BBU Hotel 80% lower power consumption and 80% less HW units	Liquid cooling 90% lower cooling system energy consumption	Waste heat capture 80% lower baseband CO ₂ emissions
Nokia is introducing over 20 innovative solutions to reduce both emissions and energy consumption	Fan unit muting 33% savings with M558 fan unit muting	Networking interface module All-in-one module with 37% lower power consumption
Remote SW upgrades and site acceptance Less site visits	Enhanced field performance validations Less drive testing	Circular products and services Sustainable end of life hardware take back service
Virtual Power Plant Monetization of existing batteries	Peak shaving 10% energy cost saving	Frequency containment Battery power reserve revenues can cover energy bill

Nokia is introducing over 20 innovative solutions and services to reduce carbon emissions and energy consumption

450+ private wireless customers

Uncontested market leader in private wireless*



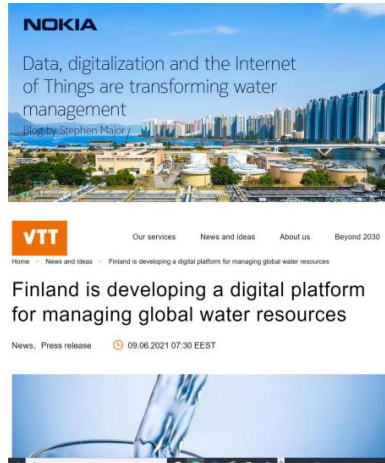
<p>WINNER: MOST INNOVATIVE PRIVATE WIRELESS NETWORKS STRATEGY</p>	<p>"Nokia is a pioneer in the adoption of private networking. It has demonstrated a clear vision of the future of the market."</p>	<p>"According to our latest Omdia LTE and 5G Private Network Tracker, Nokia has received the highest number of private network deployments in 2023."</p>	<p>"Nokia is a clear leader in private wireless, with over 220 4G LTE and 5G customers."</p>	<p>"Nokia is the #1 leader in software and services for private wireless deployments."</p>	<p>"Nokia has a leadership position in 4G and 5G private networks."</p>
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Public references

Recent new logos



Combining Digitalization and Industry-Specific Expertise – Mining & Smart Water Management



Mining Ecosystem – Next Generation Mining



VTT, Nokia, Sandvik on board with 5G-powered underground mining research project

Posted by Daniel Gleason on 16th August 2021



VTT, Nokia ja Sandvik tutkivat yhdessä 5G-tekniikan mahdollisuuksia maanalaisissa kaivosteknologioissa

Uutiset, Lehdistötiedote 16.08.2021 08:30



VTT, Nokia and Sandvik developing 5G underground project

Finnish research body VTT is working with telecommunications company Nokia and Swedish mining equipment maker Sandvik on an industrial 5G project targeted at underground mining.

SoC Hub Ecosystem and A-CORE



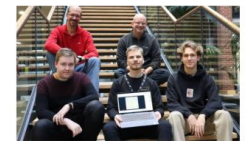
First System-on-Chip developed in a pioneering project between Tampere University and companies

21.12.2021 | NEWS |

Students coded an open-source microprocessor that companies can use as they wish

Published: 2.11.2021

The new processor is suitable, for example, for 6G transceivers and encryption technology. The project encourages young people to study microelectronics; skills that are in high demand in Finland.



RF SAMPO project to strengthen Finland's competitiveness in radio technologies

A consortium of major industrial and academic stakeholders led by Nokia and coordinated by the University of Oulu will start a massive project aiming to speed up the development of RF and antenna technologies from 5G towards 6G. Through technological development, the project contributes to the creation of new jobs and new business opportunities.

RF Sampo is the lead project in the Business Finland Venture program of Nokia for the theme Optimized Antenna Technology. This industrial co-creation project is complemented by key research partners, including ten companies and three research organizations: Nokia, VTT, Ilmarinen, QTEC, Avanceo Technologies, SAAR, SeSTI, Obitics, Mediatek, Exatel, University of Oulu, Aalto University and VTT.

The project's main target is to achieve a comprehensive approach to speed business growth in a very complex technological area from 5G to 6G. The ecosystem improves competitiveness and collaboration by the partners in wireless technologies.



Nokia, Sandvik lead Finnish mining project to take industrial 5G deep underground

How to build world-class ecosystems?

Strategic approach

Business priorities, market and asset analysis, partner selection, value chain approach and **portfolio**

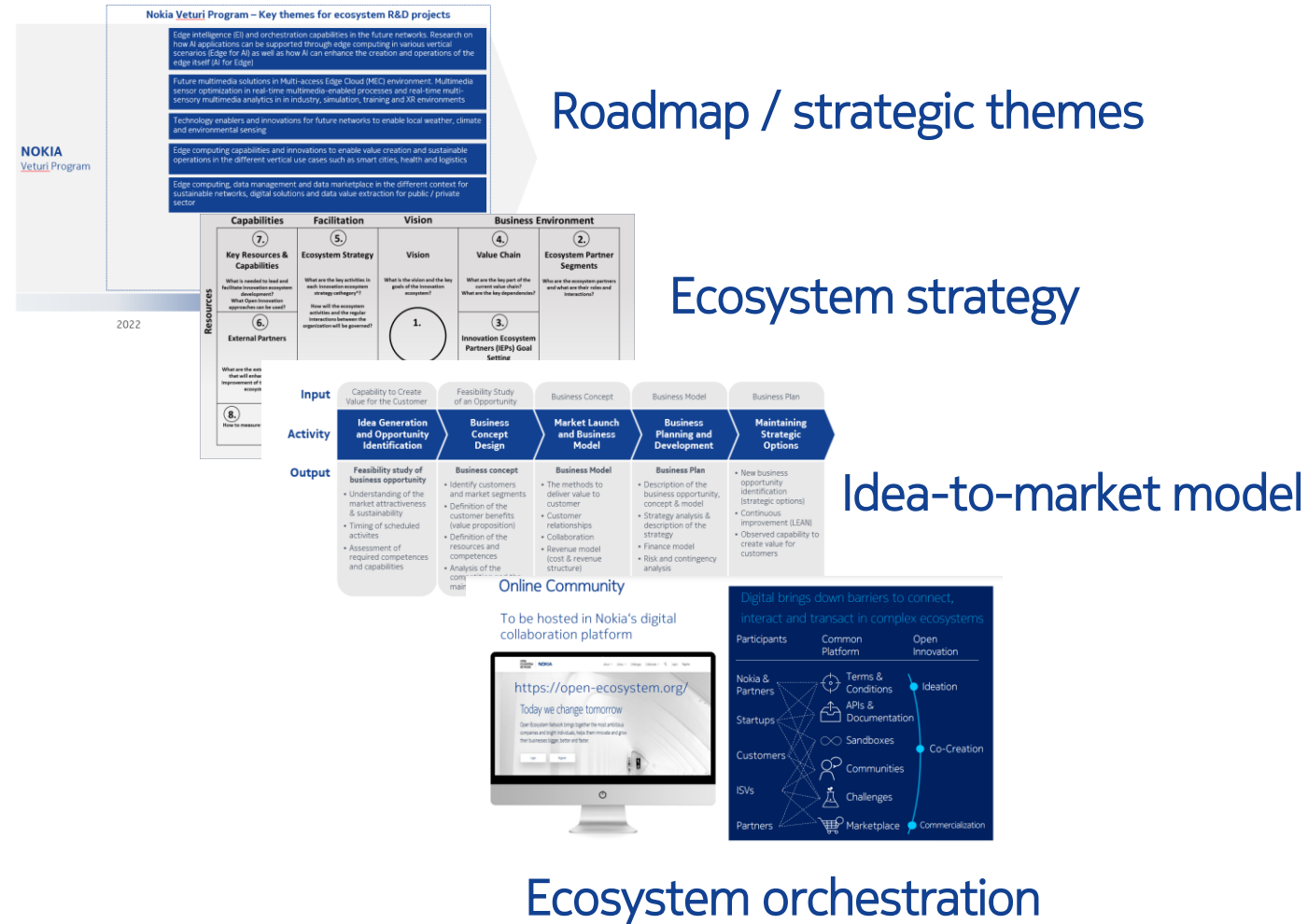
Ecosystem orchestration

‘The set of deliberate and purposeful actions undertaken by the Veturi company to co-capture value’

‘Ecosystem value offering’

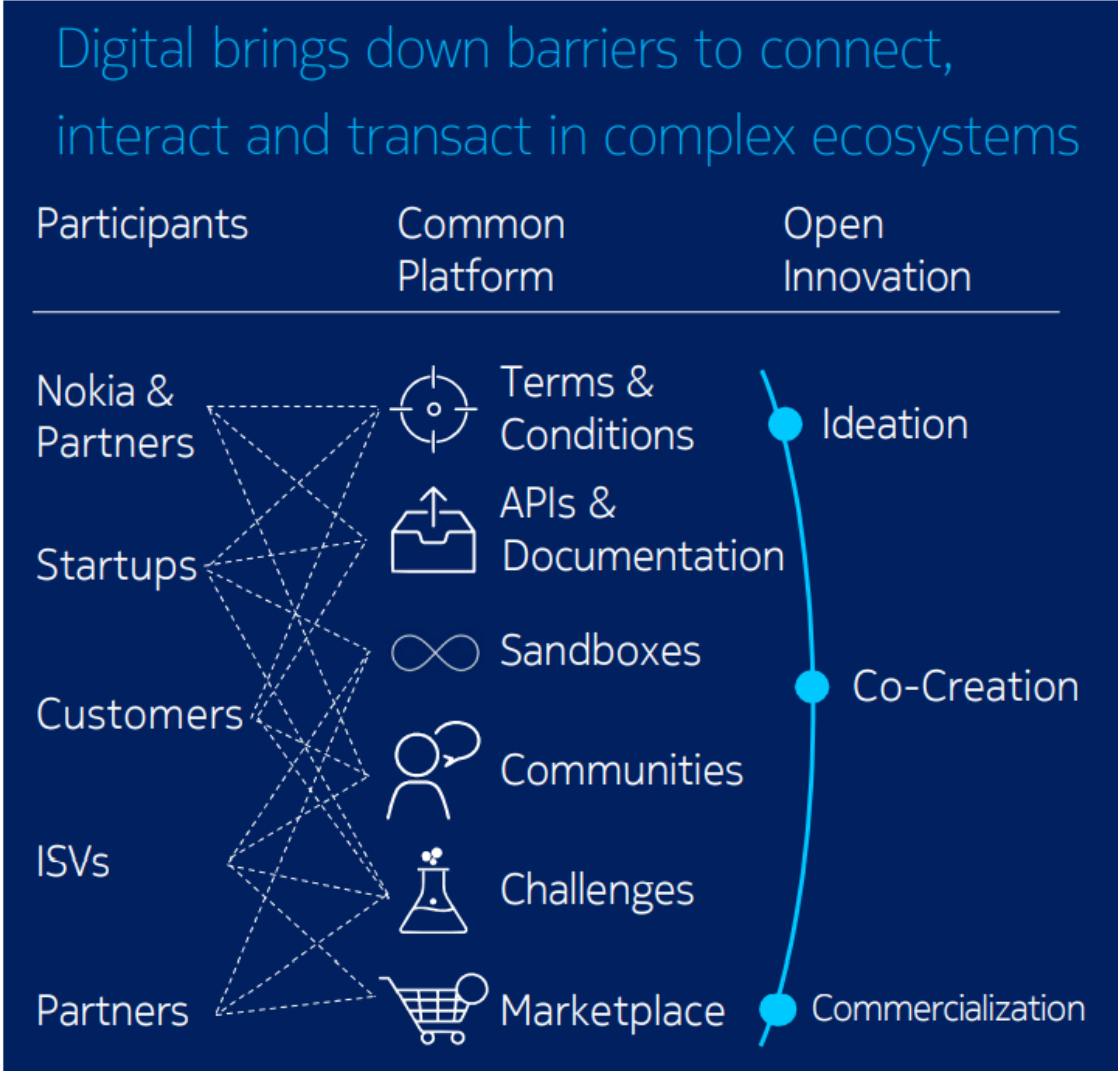
Continuous learning

Shared resources, communication and digital tools



Online Community

To be hosted in Nokia's digital collaboration platform



In Collaboration with Savonia, UEF and many more

1

Strong technological know-how and an associated ecosystem

2

Advanced infrastructure

3

A tradition of trust and cooperation

NOKIA