

D.4.4.1 JOINT REPORT FROM STUDY TRIPS IN NORWAY AND FINLAND

InnovaMare project

Blue technology - Developing innovative
technologies for sustainability of Adriatic Sea

WP4 - Creation and establishment of innovation
ecosystem model for underwater robotics and
sensors

Project References

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1. OBJECTIVES OF INNOVAMARE STUDY TRIPS

InnovaMare strategic project - Blue technology - Developing innovative technologies for sustainability of Adriatic Sea, coordinated by the Croatian Chamber of Economy (CCE), is co-financed by the European Union, ERDF (European Regional Development Fund), through Interreg VA Italy-Croatia Programme (2014-2020). Its aim is to enhance framework conditions at cross-border level by reinforcing capacities, both at strategical and operational level, to develop an innovation ecosystem promoting breakthrough technologies for the environmental sustainability of the Adriatic Sea, with a focus on underwater robotics and sensors. Expected outputs will contribute to the achievement of the objectives of the EU Strategy for the Adriatic and Ionian Region (EUSAIR), with particular reference to Pillar 1 “Blue Growth”, Topic 1 “Blue Technologies”.

In the framework of Work Package 4, task 4.4, it was planned for project partners and chosen companies to take part to two study trips, the first one to Norway and the second one to Finland. Such activities have been aimed at providing participants with useful insights on how innovation ecosystems work in practice (internal relations, foreseen services, benefits for stakeholders, transfer of technology, innovation management, intellectual property, internationalization). In addition, study trips have also been meant to get to know entrepreneurial case studies from the underwater robotics and sensors world.

- The first study trip organized by PP1, UCV has been hosted in Trondheim (Norway) by the Norwegian University of Science and Technology (NTNU) from 15th until 17th November 2021.
- The second study trip organized by the LP, CCE has been hosted in Helsinki and Espoo (Finland) from 29th until 31st March 2022.

This report summarizes the key findings and lessons learned thanks to the participation of partners, and selected Italian and Croatian SMEs, to the study trips.

2. STUDY TRIP TO NORWAY: 15-17/11/2021

2.1 Introduction

The first InnovaMare study trip has been organized by the Regional Union of Chambers of Commerce of Veneto Region (UCV, PP1), with the support and collaboration of the Norwegian University of Science and Technology (NTNU), based in Trondheim, Norway.

NTNU has been chosen as the ideal partner for this project activity, since it represents a reference model for the creation of a successful ecosystem promoting the generation of innovative ideas, boosting entrepreneurship and supporting effective technology transfer from academia to the private sector and the market. Furthermore, it hosts advanced laboratories and facilities, as well as innovative spin-offs in the field of underwater robotics and sensors and maritime technologies. Therefore, project partners and Italian and Croatian SMEs could greatly benefit from a transfer of knowledge and best practices from this organization.

Furthermore, Dr Martin Ludvigsen of NTNU has also been involved in the online InnovaMare Roundtable held on 18-19/02/2021, realizing a presentation on the local innovation ecosystem that the partnership decided to discover more in depth.

2.2 Agenda and participants

The agenda of the study trip comprised 3 working days (15-16-17/11/2021), with the following contents (the Programme is enclosed as Annex to this report):

15/11/2021

09.00 – 11.30

Welcome to NTNU - Norwegian University of Science and Technology, Trondheim

Presentation of the Department of marine technology Professor Sverre Steen, Head of Department

Guided visit to the laboratories at the Marine Technology Centre

Research activities - underwater robotics and sensor, Professor Martin Ludvigsen

Innovation as the third mission at Department of marine technology, Kjell Olav Skjølsvik, Innovation Manger

12.00 – 13.00

Visit to NTNU pro-rector of Innovation Torill Hernes

Location: The Mine, Gløshaugen

Presentation of the NTNU Ecosystem for innovation

14.00 – 16.00

Visit at the NTNU Applied Underwater Robotics Laboratory by Dr Martin Ludvigsen

Location: Trondheim Biological Station

16/11/2021 (Ocean Autonomy Cluster, Trondheim Maritime Center)

09.00 – 10.00

Welcome and introduction to the Ocean Autonomy Cluster

Introduction and agenda for the day

Visit to the cluster and member companies guided by Frode Halvorsen

09.30 – 15.00

Presentation of SMEs related to innovative blue technologies:

NORBIT

Maritime Robotics AS

Eelume

Ocean Tech (presentation and visit)

Water Linked

Blueye Robotics (presentation and visit)

17/11/2021 (Meeting room at Hotel Britannia, Trondheim)

09.00 – 10.00

NTNU Technology Transfer Office

Knowledge transfer and the NTNU innovation ecosystem.

Anders Aune, NTNU Technology Transfer

10.00 – 11.00

Presentation of the Innovation support systems in Norway

Support system for research-based innovations in Norway,

Stein Ivar Strøm, Innovation Norway Trøndelag

The participants to the study trip were the representatives of the project partners and of Italian and Croatian SMES, as listed below:

N.	Partner institution / name of the company	Name and surname
1	Croatian Chamber of Economy CCE	Domagoj Šarić
2	Croatian Chamber of Economy CCE	Jasna Pletikosić
3	Croatian Chamber of Economy CCE	Željka Rajković
4	GEOLUX (external company invited by CCE)	Iva Sinožić
5	Reg. Union of Chambers of Commerce of Veneto Region UCV	Roberta Lazzari
6	UNIPD (external expert of UCV)	Eleonora Di Maria
7	MERAKI (external expert of UCV)	Valentina Colleselli
8	MERAKI (external expert of UCV)	Ilaria Marcolin
9	T2i (external expert of UCV)	Roberto Santolamazza
10	WIRELESS AND MORE (external company invited by UCV)	Roberto Francescon
11	RICCARDO LONGATO SRLS (external company invited by UCV)	Riccardo Longato
12	University of Trieste UNITS	Grazia Garlatti Costa
13	University of Trieste UNITS	Guido Bortoluzzi
14	ARTI Puglia	Valeria Patruno
15	ARTI Puglia	Nicolo Carnimeo
16	ARTI Puglia	Francesca Tondi
17	THESI SRL (external company invited by ARTI Puglia)	Paolo Quaranta

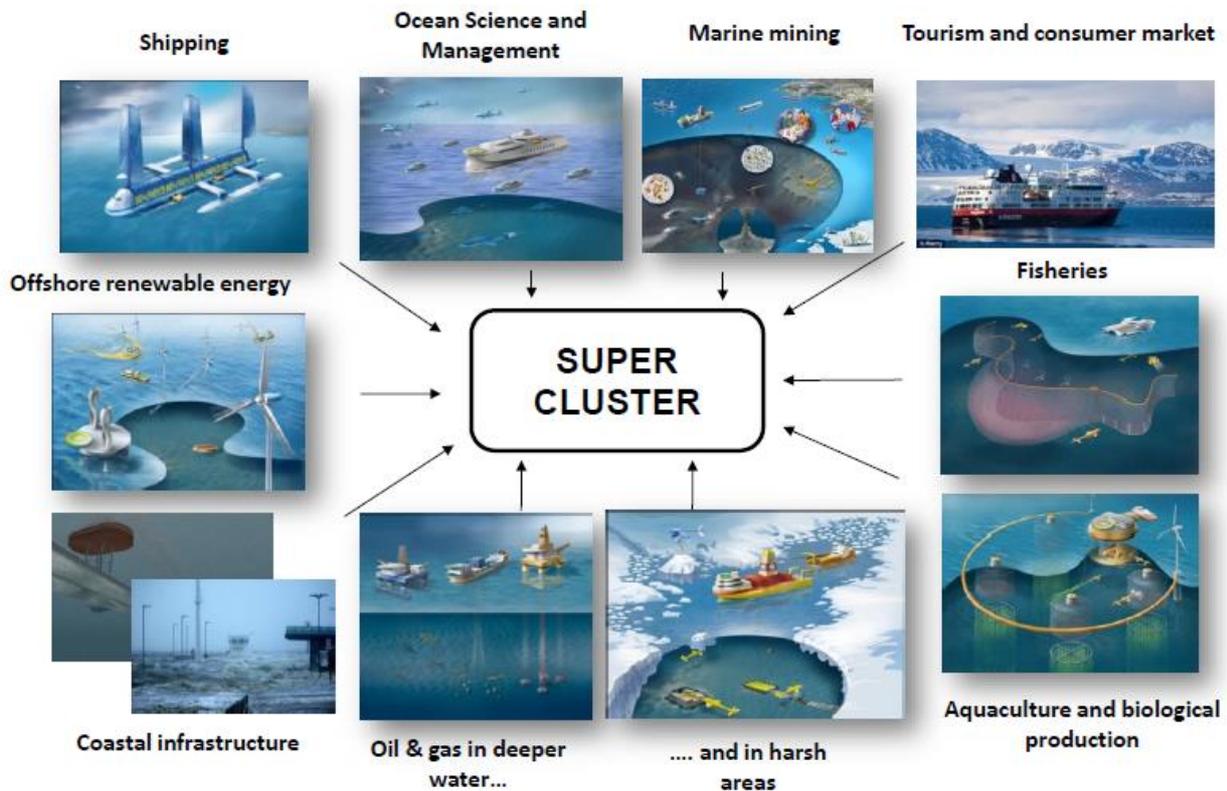
18	CNR ISMAR	Francesca De Pascalis
19	CNR ISMAR	Simone Marini
20	IRB Ruđer Bošković Institute	Neven Cukrov
21	IRB Ruđer Bošković Institute	Nuša Cukrov
22	IRB Ruđer Bošković Institute	Marin Lovrić
23	FER University of Zagreb, Faculty of Electrical Engineering and Computing	Fausto Ferreira
24	FER University of Zagreb, Faculty of Electrical Engineering and Computing	Ivan Loncar
25	University of Nicosia (Cyprus) – external expert invited by FER	Ioannis Kyriakides
26	UNIRI University of Rijeka	Petra Karanikić
27	UNIRI University of Rijeka Pomorski Fakultet	Edvard Tijan
28	AluTech (ŠIBENIK KNIN COUNTY)	Zoran Belak
29	MARE FVG (Maritime Technology Cluster of FVG Region)	Carlo Kraskovic
30	INNOVO (external company invited by MAREFVG)	Andrea Tiberio
31	CPI ENG (external company invited by MAREFVG)	Francesco Cescutti
32	MICAD (external company invited by MAREFVG)	Michele De Petris

2.3 The Norwegian ecosystem supporting innovation in blue technologies

In the framework of InnovaMare study visit at NTNU, it has been possible to have an insight into the local operating innovation ecosystem, with a threefold dimension:

- the **first level**, directly supporting innovation, entrepreneurship and added value in the strategic sector of maritime technologies and operations (NTNU Department of Marine Technology, AUR-Lab (Applied Underwater Robotics Laboratory), AMOS – (Centre for Autonomous Marine Operations and Systems) and NTNU collaboration with SINTEF (independent Research Centre);
- the **second level** related to the holistic innovation ecosystem (Pro-Rectorate for Innovation, NTNU Technology Transfer AS and the membership in the Ocean Autonomy Cluster)
- the **third level**, concerning how Innovation Norway (a state-owned company providing business development services) stimulates and funds innovative business development throughout Norway.

Concerning the first level, it has to be stressed that innovation in the field of marine robotics and blue technologies is paramount for NTNU and also for Norway, since activities related to maritime systems and technologies make a significant contribution to the overall export and economic performance of the country. Blue Economy, in fact, is considered as a super cluster, comprising:



Graphic taken from the presentation shared by NTNU Department of Marine Technology

The strategic importance of the Blue Economy is reflected in the creation of a successful and interconnected innovation ecosystem favouring basic research, applied research, innovation and market deployment (with the creation of spin-offs, contractual research, IPR agreements) of breakthrough technologies and complex systems.

The **NTNU Department of Marine Technology**, currently led by Prof. Sverre Steen, is nourished with high level professionals and well equipped with facilities, labs, machinery and equipment (of different scale) allowing for experimenting and testing new solutions and systems. The most promising emerging fields seem to be Renewable energy, Deep-sea mining, Ocean mapping and monitoring, Coastal infrastructure and Tourism and consumer market.

The department is engaged in promoting **transfer of knowledge and technology** to a wide range of application areas, with a focus on know-how and skills on marine hydrodynamics, marine structures, marine cybernetics (including subsea), marine engineering and combustion, marine design and logistics, marine and maritime operations, risk reliability and maintenance technology, arctic technology, marine geotechnics and oil&gas exploration, fish processing and water treatment, marine acoustics optics communication and remote measurement, marine biology and chemistry, marine archaeology, marine biotech, social sciences and humanities.

Oceans, represents one of the 4 main Strategic Research Areas identified by NTNU for the period 2014-2023. NTNU Oceans is particularly devoted to the following **research topics**:

- Maritime transport;
- Environment and society;
- Arctic;

- Marine resources;
- Marine minerals and energy;
- Deep water.

The current Marine Technology Centre (current headquarter of the NTNU) will be upgraded in the near future with the project related to the set-up of the **Ocean Space Centre**, whose construction works will start in 2022, with their completion foreseen by 2025-2028.

The new Ocean Space Centre will comprise:

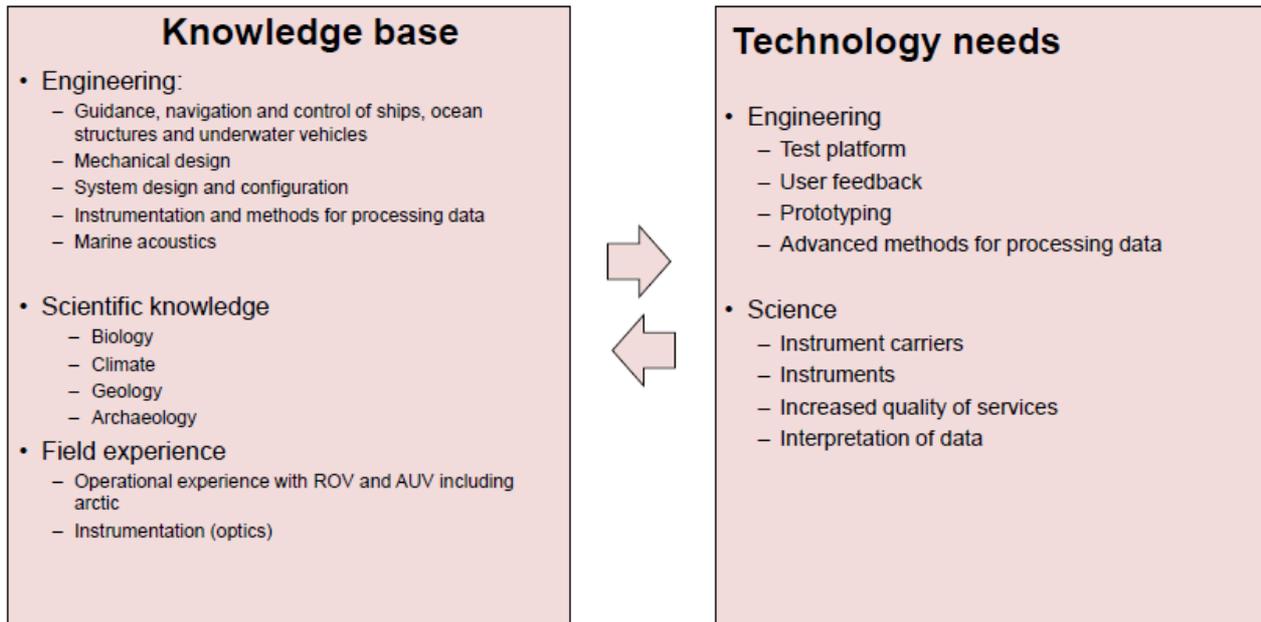
- Offices for NTNU and SINTEF;
- Teaching areas for the Department of Marine Technology;
- Student labs;
- Ocean basin (beam of 50m, length of 60m, depth of 17m, modelling the ocean environment with multi-directional waves, current profile and wind);
- Seakeeping basin;
- Structure labs;
- Machinery and energy labs;
- Fjord labs.

The research activity of **NTNU AMOS (Centre for Autonomous Marine Operations and Systems)** is focused on autonomous systems, that are key innovative technologies enabling a green and blue transition of our Oceans. Target research topics include for instance:

- Autonomous ocean sampling;
- Unsupervised seabed classification;
- Underwater hyperspectral imaging;
- Marine minerals;
- Under ice navigation systems.

Autonomy motivates an interdisciplinary approach bringing together Control engineering, Sensing, Computer science, Modelling, Mathematics, Science & end user requirements, Human behaviour, Risks management, Ethics, etc.

AUR-lab (Applied Underwater Robotics Laboratory), part of the NTNU Department of Marine Technology, is currently leaded by Dr. Martin Ludvigsen. The vision of the lab is based on taking advantage of NTNU's multidisciplinary profile to make a particular impact in challenging environments such as deep waters and polar regions. AUR-lab develops interdisciplinary work and promotes common understanding across the different fields of science and technology, being recognized as a leading structure both nationally and internationally. The close relationship between Science and Engineering at AUR-lab can be described by the following graph:



Graphic taken from the presentation shared by NTNU AUR-lab, Dr. Martin Ludvigsen

Ocean Lab infrastructure is used to transfer basic skills and technology between different research applications and industries. In Trondheimsfjorden a **test area for autonomous ships** has been established since 2016, and has been included in Ocean Lab in 2018. It facilitates full-scale testing and verification of technology and concepts for autonomous ships and operations.

This testing infrastructure allows for good field experiments to be carried out (also varying sites to analyze different degrees of exposure, currents, depths, water parameters, weight classes of fish).

The **Marine Observatory** is a unique platform providing locations for in-situ lab experiments, sensor technology innovation platforms (plug-and-play sensor integration), mobile sensors available for projects, data for fundamental research & model development. The observatory node will also support communication gateways to underwater vehicles & autonomous ships, education and science communication, data supporting local environmental policy-making.

OceanLab e-Infrastructure connects data streams from all the Hubs and can also cooperate with selected external data platforms.

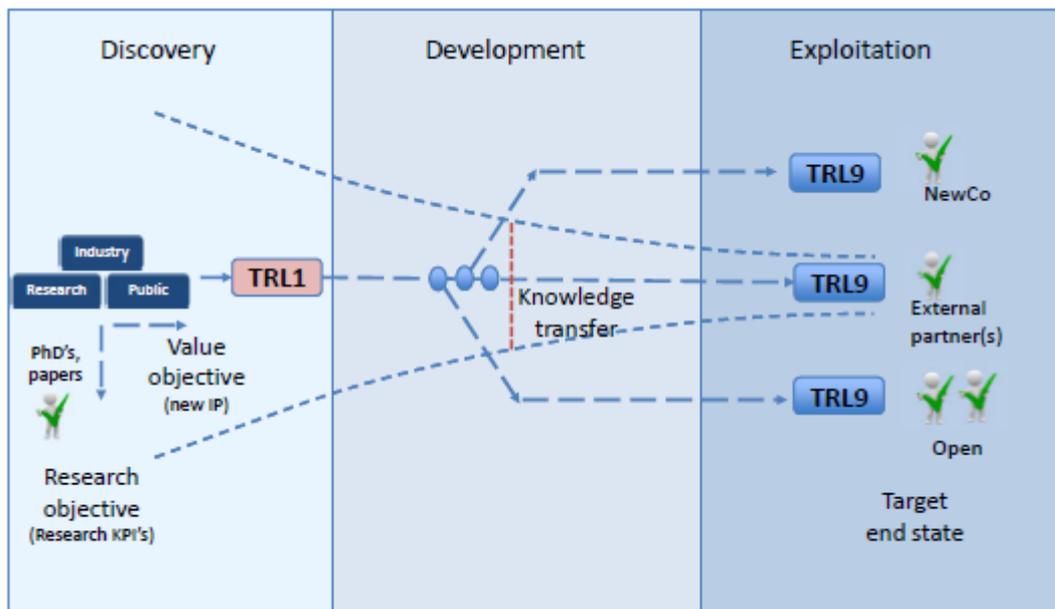
Innovation is considered **as the third mission** at NTNU Department of Marine Technology, as pointed out by the Innovation Manager Kjell Olav Skjølvsvik. In the last years there is an increased focus on missions and societal challenges to be addressed by Science and technology. The same concept of Innovation is evolving **from patents & technology to impact** (and this has also been recognized by Norwegian law changes since 2003, particularly in the field of ownership). Innovation has been included in education, teaching students entrepreneurship and technology management, favouring the creation of spin-offs and Open innovation with a quadruple-helix approach. Such new paradigms also take into due account the top skills of the future, matching academia profiles with the skills required by the top market.

Top 10 skills of 2025



Sources: Future of Jobs Report 2025, World Economic Forum

The Innovation management process, whose objective is to support the successful market deployment of innovative market-creating ideas, can be summarized as follows:



Graphic taken from the presentation shared by NTNU Innovation Manager Kjell Olav Skjølvsvik

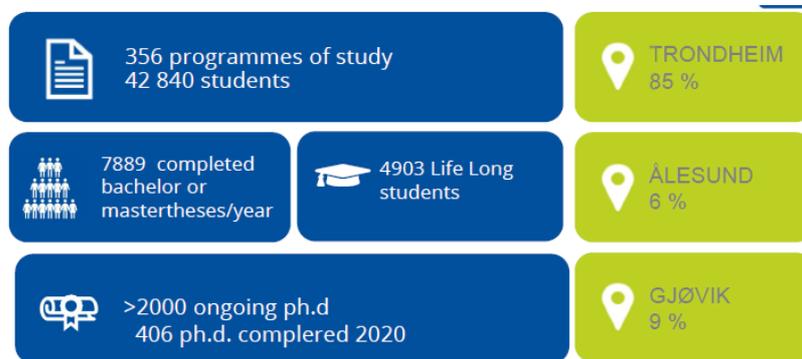
The aim is to identify the most promising market-creating ideas, support applied research and technological development, and promote scale-up and exploitation, with an appropriate IPR strategy, reaching TRL 9 and

successful market introduction. Here the **second level** comes into play, with the NTNU overall vision, strategy and innovation ecosystem.

NTNU vision, as stressed by the Pro-Rector for Innovation Toril Nagelhus Hernes, is based on the following assumptions:

- Set the standard for developing cutting-edge knowledge;
- Use the university’s technical and scientific main profile, its academic breadth and interdisciplinary expertise to address the challenges facing Norway and the world;
- Create economic, cultural and social value.

Key facts and figures for NTNU in 2020 are the following:



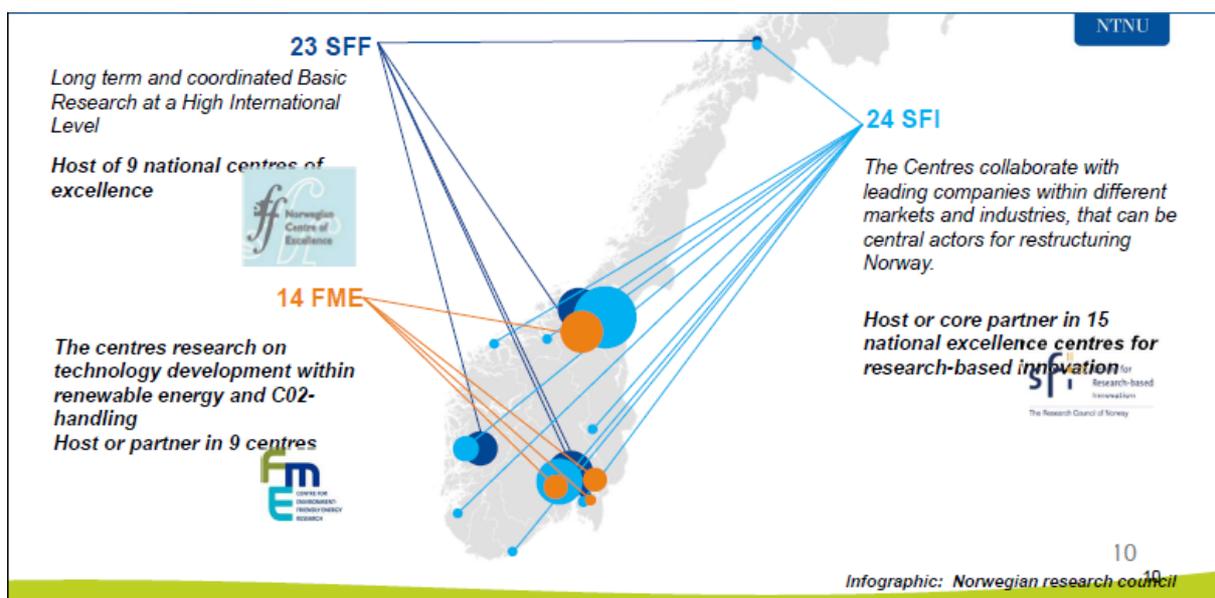
Graphic taken from the presentation shared by NTNU Pro-rector for Innovation, Toril Nagelhus Hernes

The **three pillars of NTNU Innovation Strategy** are the following:

- collaborating with established business;
- collaborating with the public sector;
- helping to create new business (supporting researchers and students).

It is important for NTNU to understand what business and working life needs, so they have signed a Cooperation agreement with the **Confederation of Norwegian Enterprise – NHO**.

The **Research Council of Norway** represents the centre of the innovation system:



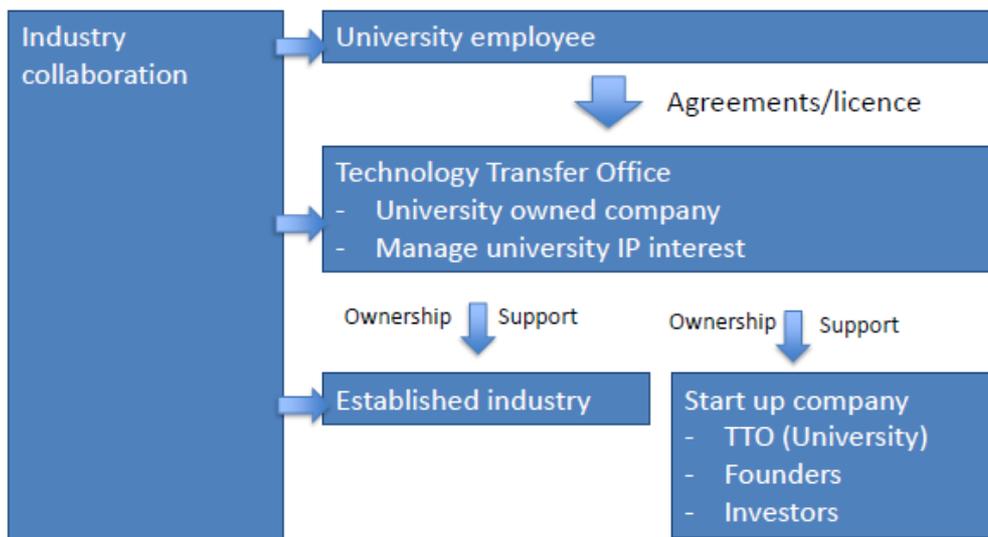
Graphic taken from the presentation shared by NTNU Pro-rector for Innovation, Toril Nagelhus Hernes

In Norway there are several **Innovation Clusters**, funded by Innovation Norway and NTNU participates to 17 of them.

The construction of a new campus is foreseen, with an investment of around 9 billion NOK. The potential implementation time is over 10 years, with a total estimated surface of 278 000 squared meters.

NTNU Technology Transfer AS, represented by Anders Aune (Head of Marketing and Industry Relations), has a long-term strategy supporting the **transition from research to impact and a better and more relevant research and education framework**.

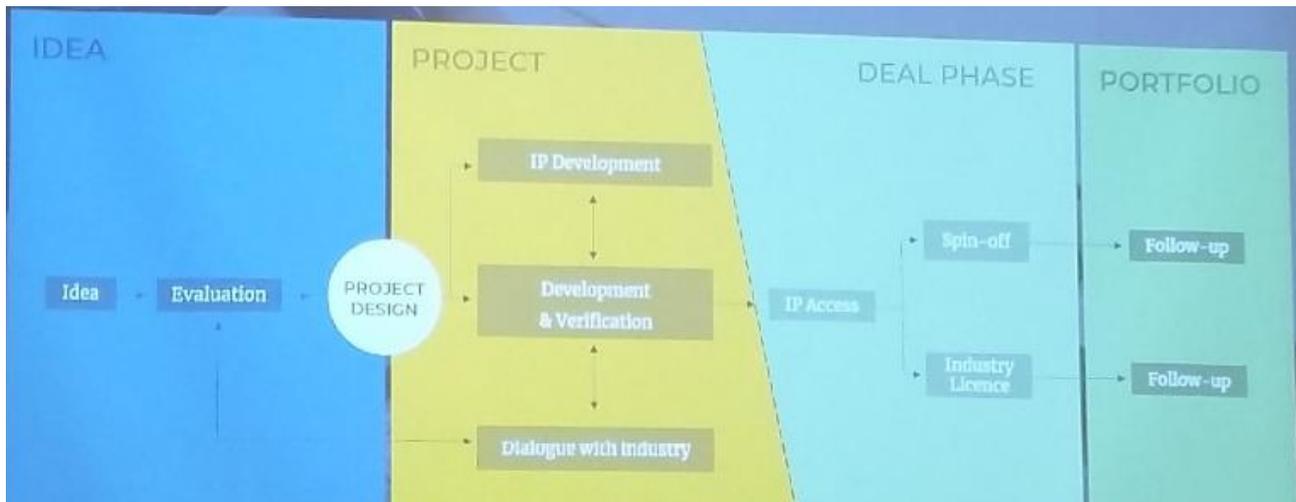
NTNU has currently more than 4.000 industry contracts, mostly with large Norwegian and international companies. The majority of Norwegian companies has identified NTNU and SINTEF as their preferred R&D partners. SINTEF is one of Europe's largest independent research organisations, and the consolidated **collaboration among NTNU and SINTEF** has been ranked as number 1 in the world. The interaction model is based on extensive collaboration with business and public sector through joint projects and research centres, with the following scheme:



Graphic taken from the presentation shared by Dr. Martin Ludvigsen

At the time of the visit NTNU counts on 1902 disclosures, 73 spin-offs, 273 patents filed and 171 license agreements signed.

The tech trans process is represented as follows:



Graphic taken from the presentation shared by Anders Aune, NTNU Technology Transfer AS

The process starts with the collection of ideas and their evaluation, to identify the most promising and market-creating ones (also with a dialogue with industry). Then the project design phase starts, with the definition of objectives, activities and resources to be committed. During the project step, IP is developed, technological development and verification is performed (with validation of the technology/system), and dialogue with industry continues. The next phase is crucial, since an appropriate strategy for IP access and exploitation needs to be envisaged (NTNU Technology Transfer support the selection and definition of the most suitable IPR strategy). This might lead mostly to the creation of a spin-off, or to a license agreement with industry (it is the subject of the Deal phase). Finally, there is the follow-up action.

The **third** and last **level** of innovation support discovered by InnovaMare partnership is represented by how business development is promoted and funded throughout the country by **Innovation Norway**. At this stage, a TRL 9 has been reached and support is given to the successful market deployment of innovative technologies and systems.

Innovation Norway is a State-owned company acting as national development bank, creating value by stimulating profitable business development. Their programmes and services are intended to create more successful entrepreneurs, more enterprises with capacity for growth, more innovative business clusters. Their approach consists in identifying the right customer, clarifying needs, offering the most suitable service and competences, creating increased value. The portfolio of offered services is the following:



Graphic taken from the presentation shared by Stein Ivar Strøm, Innovation Norway

Norwegian enterprises have access to a broad business support system as well as financial means. Innovation Norway provides competence, advisory services, promotional services and network services. The marketing of Norway as a tourist destination is also considered one of the organizations important tasks.

By combining local industry knowledge and international networks with the business ideas and the motivation of entrepreneurs, the foundation for new successful businesses is created.

Innovation Norway is the Norwegian government's official trade representative abroad. They aim to assist Norwegian businesses grow and find new markets. Local presence is therefore of crucial concern to us. They are represented in more than 30 countries worldwide and in all Norwegian counties.

A more detailed overview of the services provided by Innovation Norway is provided hereafter.

Advisory on innovation and development

This service is for companies with ambitions for further development and growth. They are a sparring partner to discuss new business opportunities. They offer individual advice on innovation processes, business opportunities, market clarification and sustainable development.

Financing innovation and development

For the development of new solutions, they provide grants and loans. Grants are used for projects where the socio-economic benefit of the project is considerable and technical risk is high. The most common grant schemes are linked to environmental technology, innovation in collaboration and more environmentally friendly use of bio-resources. In addition, there are EU schemes for radical innovation. Innovation loans may be used for the commercialization of new solutions, strengthening working capital, growth and internationalization.

Grants are reserved for Norwegian companies that have ambitions to create value through innovation. The schemes apply to businesses throughout the country and within all industries. The companies must meet the minimum requirements for good business practice.

They prioritize innovation projects that have great utility, high degree of innovation and likelihood of success. They cannot support projects that lead to unfortunate distortions of competition toward other players in the industry. Therefore, the project's degree of innovation will be emphasized. Why is the solution under development better compared to today's solutions? They want to see how the project contributes to strengthening the company's competitiveness, as well as covering a need in society / the market.

Courses and competences development

They provide several courses and programmes for companies with a capacity for growth.

Innovation Workshops are for companies working with innovation projects and provide them with tools for innovation and business development.

They also offer a digitization programme for companies that need increased expertise in digitization and advanced production.

They offer several global accelerator programmes that will help start-ups and growth companies to compete and grow in an international market. The accelerator programme introduces customers to people, insights and methods that prepare them for what it really means to compete in a global market.

Global Growth are export programmes for groups of companies that target the same market. They help established businesses reduce risk, we open doors, and speed up export. Every year they arrange about 25 Global Growth Programs. Each programme is tailor-made for companies in the same sector or market. The programme consists of courses, advisory and meetings in Norway and in relevant export markets. They follow the companies all the way into the market, create arenas for competence and network building and connect with relevant international and Norwegian partners.

Clusters and networks

Innovation Norway seeks to strengthen collaboration between enterprises and knowledge communities through cluster and network programmes.

Norwegian Innovation Clusters shall trigger and strengthen collaboration in regional business clusters, make the clusters more dynamic and attractive, and make the enterprises more innovative and competitive. The Norwegian Innovation Clusters programme with the levels Arena, NCE and GCE is a collaboration between Innovation Norway (State-owned company promoting industrial development), The Industrial Development Corporation of Norway (SIVA) and The Research Council of Norway.

Arena: The clusters in the Arena programme increase innovation and collaboration between businesses, research and educational environments, and the public sector.

NCE/ Arena Pro: The Norwegian Centres of Expertise (NCE) and Arena PRO help to target, improve and accelerate ongoing development processes in Norwegian clusters. These instruments are targeted to larger scale clusters that are active and are trying to expand internationally.

GCE: The Global Centres of Expertise (GCE) are world-leading clusters with potential for growth in international markets.

Innovation Norway also provides professional guidance and funding for the establishment and development of strategic corporate network projects. Business Networks support small and medium-sized businesses that enter into strategic collaboration with other enterprises.

2.4 The Ocean Autonomy Cluster and its companies

The **Ocean Autonomy Cluster** is one of the Norwegian Innovation Clusters. It is Norway's leading hub for expertise on ocean autonomy. Consisting of both companies and R&D institutions, it combines research and technological development, suppliers of technology, components and systems, as well as forward-leaning investors. Through cooperation, the cluster's participants pursue safer, more efficient and precise operations at sea, contributing to a more sustainable use of the world's oceans.

Today, Norway is the global centre for innovation and development of autonomous ocean technologies and solutions. The Ocean Autonomy Cluster seeks to exploit market development opportunities by combining the experience from Norway's maritime and offshore industry, developers, suppliers and award-winning R&D institutions. The main goal of the organization is to strengthen Norway's global leadership role in the development and commercialization of future autonomous ocean technologies and solutions.

The Ocean Autonomy Cluster combines partners from the entire value chain and supports the establishment of more spin-outs and entrepreneurs through the exchange of ideas and knowhow, and by simplifying and improving the access to test and demo infrastructure.

The Ocean Autonomy Cluster's core centre is the Trøndelag region. As said, in 2016 the Trondheim Fjord (Trondheimsfjorden) became the world's first test site for autonomous ocean vessels.

The current Cluster Manager, Frode Halvorsen, presented to InnovaMare partners and invited SMEs the mission and structure of the Cluster, as well as its members, as it can be seen below.



The mission of Ocean Autonomy Cluster is:

- to create a successful area for collaboration and co-development;
- develop and demonstrate innovative autonomous systems and technologies for the Oceans;
- develop and operate demonstration and testing facilities and infrastructures for autonomous vessels and operations;
- promote the Cluster, the region and the country internationally.

Testation TRD is an initiative that will make test equipment and infrastructure available for entrepreneurs and SMEs through an online portal. The Trondheim fjord holds a lot of testing infrastructure for the development of ocean technologies.

The following members of the Ocean Autonomy Clusters have presented their mission, technologies and application fields to InnovaMare partnership and Italian and Croatian SMEs.

NORBIT

It is a global provider of tailored technology to selected niches, solving challenges through sustainable and innovative solutions, in line with its mission to Explore More. The company is structured in three business segments to address its key markets: Oceans targeting the global maritime markets, Connectivity providing low power wireless solutions for identification, monitoring and tracking of vehicles and other valuable assets, and Product Innovation and Realization (PIR) offering R&D services and contract manufacturing.

NORBIT is headquartered in Trondheim with manufacturing in Norway, has around 400 employees and a worldwide sales and distribution platform.

MARITIME ROBOTICS

Its systems operate unmanned both in the air and on the surface and its technology is developed in close collaboration with civilian, governmental and military partners. The company focuses on delivering high quality products and solutions that are cost-effective, reduce HSE risk exposure and are highly deployable in any conditions. They believe that the future of maritime operations is unmanned and that innovation in automation will drive industry standards and continually broaden operational possibilities.

Its headquarters are situated in Norway's technology capital, Trondheim, staffed by a highly competent team with a global network of clients and partners. Its goal is to make your unmanned endeavors as simple, successful and cost-effective as they can be.

EELUME

Eelume is a technology for subsea inspection, maintenance and repair (IMR). Their vehicles are self-propelled, autonomous robotic arms whose slender and flexible body can transit over long distances and carry out IMR in confined spaces not accessible by conventional underwater vehicles.

The vehicle is well suited to execute inspection and light intervention missions on subsea structures, such as offshore wind farms, fish farms and oil & gas production facilities and pipelines. The vehicle can also be equipped with sensors for executing environmental surveys such as detecting gas leakages, oil in water, salinity, temperature, sound etc. Vehicles are engineered to live permanently under water, where they can be mobilized 24/7 regardless of weather conditions. Cost of subsea operations could be reduced by up to 90% by use of subsea resident, autonomous vehicles.

OCEAN TECH

Their technology is fit for purpose for the Offshore Wind, Aquaculture, Transport and Maritime sectors, as well as the Oil & Gas industry. They have a comprehensive experience in assisting clients with working in the Splash Zone where it is difficult to access for divers and ROVs. Previous projects range from small cleaning tasks to large multidisciplinary modification projects. They have a Subsea Test Center ideally suited for testing of subsea solutions, including a dry dock facility to enable testing of equipment in both dry and wet conditions.

WATER LINKED

It is the world leading underwater sensor technology. The proprietary Wireless Sense™ technology enables to tackle some of the biggest challenges in underwater positioning and aquaculture, so aquaculture can become more sustainable and profitable by measuring more data at a higher frequency with vast expansion possibilities and underwater navigation can become more accurate and agile with Water Linked positioning and communication equipment.

BLUEYE ROBOTICS

They have launched a next-generation ROV - The Blueye X3, with endless possibilities for connecting external equipment such as sonars, manipulators, sensors, cameras and lights. Its applications can be related to aquaculture, shipping, inspection services, research, search and rescue, construction, ports and marinas, offshore, water and energy, cruise.

2.5 Lessons learned

The study trip hosted by NTNU in Trondheim (Norway) has been a great and valuable opportunity for InnovaMare partners, external experts and invited Italian and Croatian SMEs to discover a successful and interconnected innovation ecosystem supporting innovation and business development in the field of blue technologies.

The main lessons learned, that could be very useful for the creation of a cross-border ecosystem supporting innovation in the field of underwater robotics and sensors for the sustainability of the Adriatic Sea, can be summarized as follows:

- there is the need to have a **strong political commitment** (both in Croatia and in Italy) to promote the development of a cross-border innovation ecosystem, **acknowledging the strategic importance and contribution of blue economy for the economic growth and competitiveness** of the two territories;
- **dedicated public funding** should be made available not only for research, but most of all to create the infrastructures and facilities that are necessary to provide testing and demonstration spaces for innovative start up / SMEs;
- all relevant actors must be involved in the process, with a **quadruple-helix approach**, to ensure that all phases of the innovation management process are properly covered and addressed;
- a **medium-long term research agenda** should be defined, taken into consideration EU policies and priorities, macroregional strategies, smart specialization strategies, national innovation agendas, market trends and existing potentials of academia and private sector (with a view at solving strategic societal challenges of our era);
- **education curricula and programmes should match the requests of economic system**, in order to train skilled professionals ready to contribute to the exploitation of innovation and business development in key research and development areas;
- a successful innovation ecosystem must include a set of **very specific skills**, needed to provide companies with targeted needed support in all phases from idea to project development to market deployment;
- **a stable dialogue with industry** is a strategic issue, both for receiving inputs on the challenges faced by the private sector, as well as for assessing and devising strategies for applied research and market exploitation with contractual research and license agreements;
- the **evaluation of innovative ideas** should be thoroughly planned, with the involvement of qualified professionals and dialogue with industry, ensuring that innovations are market-creating, bring an

added value to the company and to the territory, have the potential to develop sustainable business models expanding internationally;

- **access and exploitation of intellectual property (IP)** should be addressed at an early stage, before the implementation phase (project development), so that there is a clear understanding of IP assets, their ownership, their rights of use and exploitation. Therefore, it is very important that the Technology Transfer Unit is equipped with skilled professionals supporting students/researchers/industry to define the most appropriate IPR strategy;
- providing **advanced testing infrastructure and equipment** to researchers and SMEs is paramount for the validation of the technical viability of a new solution/system, allowing to “test before invest”;
- **new companies must be accompanied with targeted advisory services**, most of all in the field of business development, financial management and marketing;
- **grants and loans should be made available to companies with innovative market-creating solutions**. An approach similar to that applied by Innovation Norway could be considered, where grants are assigned in case the idea has an important societal impact and a high technical risk;
- **cooperation environments should be created**, so that companies share spaces, have the opportunity to contact and discuss, and potentially become technological and commercial partners, improving their service/products portfolio;
- **strategic partnerships with R&D and industry partners should be encouraged**, as the example set by NTNU and SINTEF, that brought to a large number of joint R&D projects and business agreements;
- the innovation ecosystem must have the know-how, contacts and outreach to be able to **represent and promote its academia and private actors at national and international level**, contributing to the internationalization of research and business, and to the connection with EU and international platforms and partnerships.

Undoubtedly, the "firepower" expressed by the NTNU innovation ecosystem comes from the ground, that is, the organization of an ecosystem that is born and evolves as a system. The academia, the independent (and private) research centres, the business sector, business networks (in the form of clusters) and last but not least, the institutions, in particular financial institutions, work together from the first moment knowing well that development is a positive-sum game.

ANNEXES

Programme

Signed Participants' List

Photos



DIVE INTO THE DEPTH OF OPPORTUNITIES

**AGENDA OF THE STUDY TRIP TO NTNU
TRONDHEIM (NORWAY) - 15-17/11/2021**



INNOVAMARE PROJECT

InnovaMare strategic project - Blue technology - Developing innovative technologies for sustainability of Adriatic Sea, coordinated by the Croatian Chamber of Economy, is co-financed by the European Union, ERDF (European Regional Development Fund), through Interreg VA Italy-Croatia Programme (2014-2020). Its aim is to enhance framework conditions at cross-border level by reinforcing capacities, both at strategic and operational level, to develop an innovation ecosystem promoting breakthrough technologies for the environmental sustainability of the Adriatic Sea, with a focus on underwater robotics and sensors. Expected outputs will contribute to the achievement of the objectives of the EU Strategy for the Adriatic and Ionian Region (EUSAIR), with particular reference to Pillar 1 "Blue Growth", Topic 1 "Blue Technologies".

STUDY TRIPS

In the framework of Work Package 4, task 4.4, it is planned for project partners and chosen companies to take part to 2 study trips, the first one to Norway and the second one to Finland. Such activities are aimed at providing participants with useful insights on how innovation ecosystems work in practice (internal relations, foreseen services, benefits for stakeholders, transfer of technology, innovation management, intellectual property, internationalization). In addition, study trips are also meant to get to know entrepreneurial best practices from the underwater robotics and sensors world.

The present study trip is organized with the support and collaboration of the Norwegian University of Science and Technology (NTNU) based in Trondheim, Norway. NTNU is a reference model for the creation of a successful ecosystem promoting the generation of innovative ideas, boosting entrepreneurship, supporting technology transfer. Furthermore, it hosts advanced laboratories and facilities, as well as innovative spin-offs in the field of underwater robotics and sensors and maritime technologies.

ORGANIZERS OF THE STUDY TRIP TO NORWAY

Regional Union of the Chambers of Commerce of Veneto Region (UCV) - Contact person: Roberta Lazzari, Phone: +39 041 099 9411, E-mail: roberta.lazzari@eurosporettoveneto.it, with the support of the **Norwegian University of Science and Technology (NTNU)** - Kjell Olav Skjolsvik, Martin Ludvigsen and Antonio Vasiljevic and **MERAKI Srl** - Ilaria Marcolin and Valentina Colleselli

AGENDA OF THE FIRST DAY (WHOLE DAY)

MONDAY 15/11/2021

- 09.00 – 09.45** Welcome to NTNU - Norwegian University of Science and Technology, Trondheim
Location: Marine Technology Centre, Otto Nielsens veg 10, Tyholt, Trondheim
Welcome and introduction to the agenda
Presentation of the Department of marine technology
Professor Sverre Steen, Head of Department
- 09.45 – 10.00** Guided visit to the laboratories at the Marine Technology Centre
- 10.30 – 11.00** Research activities - underwater robotics and sensors
Professor Martin Ludvigsen
- 11.00 – 11.30** Innovation as the third mission at Department of marine technology
Kjell Olav Skjøglsvik, Innovation Manger
- 12.00 – 13.00** Visit to NTNU pro-rector of Innovation Torill Hernes
Location: The Mine, Gjøshaugen
Presentation of the NTNU Ecosystem for innovation
- 13.00 – 14.00** Lunch
- 14.00 – 16.00** Visit at the NTNU Applied Underwater Robotics Laboratory (AUR-lab)
Location: Trondheim Biological Station
Visit of the Laboratory by Dr Martin Ludvigsen

AGENDA OF THE SECOND DAY (WHOLE DAY)

TUESDAY 16/11/2021

- 09.00 – 10.00** **Ocean Autonomy Cluster**
Meeting point at Trondheim Maritime Center
Location: Skippergata 14, Trondheim
Welcome and introduction to the Ocean Autonomy Cluster
Introduction and agenda for the day
Visit to the cluster and member companies guided by Frode Halvorsen,
Manager of Ocean Autonomy Cluster
- 09.30 – 12.00** **Presentation of SMEs**
NORBIT
Marine Robotics AS
Eelume
- 12.00 – 13.00** Lunch
- 13.00 – 14.00** Presentation and visit – OceanTech
- 14.00 – 15.00** Presentation of Water Linked
Presentation and visit – Blueye Robotics

AGENDA OF THE THIRD DAY (HALF DAY)

WEDNESDAY 17/11/2021

- 09.00 – 10.00** **NTNU Technology Transfer Office**
Location: Meeting room at Britannia Hotel, Trondheim
Knowledge transfer and the NTNU innovation ecosystem.
Anders Aune, NTNU Technology Transfer
- 10.00 – 11.00** **Presentation of the Innovation support systems in Norway**
Location: Meeting room at Britannia Hotel, Trondheim
Support system for research-based innovations in Norway.
Stein Ivar Strøm, Innovation Norway Trøndelag



PROJECT PARTNERS



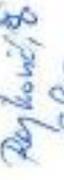
CONTACTS

CROATIAN CHAMBER OF ECONOMY (CROATIA)
 WEB: www.italy-croatia.eu/innovamare
 E-MAIL: innovamare@tgc.hr
 CONTACT PERSON: Matko Ivanec, Project Manager

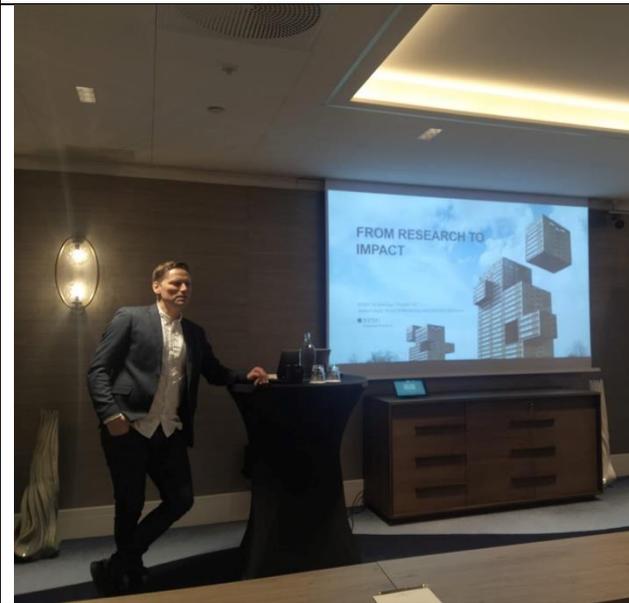
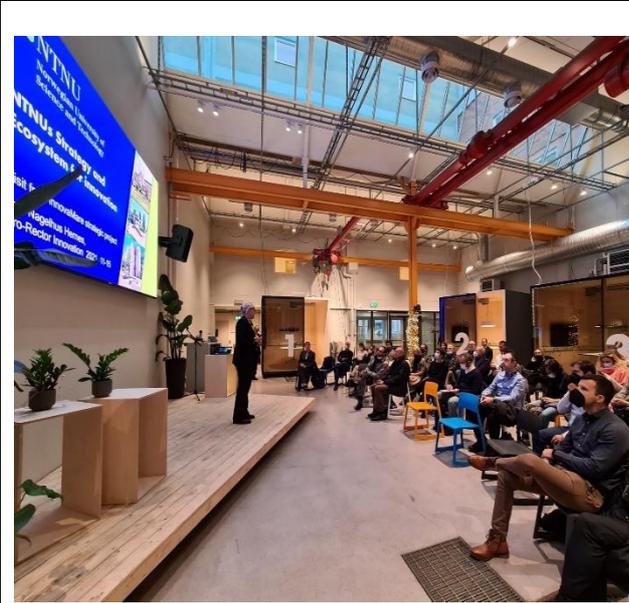
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-  @innovamare
-  Innovamare project
-  twitter.com/innovamare

PARTICIPANTS LIST TO THE STUDY TRIP TO NTNU - NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY, TRONDHEIM (NORWAY) - 15-16-17/11/2021 (WP4, Task 4.4)

nr.	NAME AND SURNAME	ORGANIZATION	SIGNATURE
1	Domagoj Šarić	CCE - CROATIAN CHAMBER OF ECONOMY	
2	Jasna Pletikosić	CCE - CROATIAN CHAMBER OF ECONOMY	
3	Željka Rajković	CCE - CROATIAN CHAMBER OF ECONOMY	
4	Iva Sinožić	GEOLUX (Invited external company)	
5	Roberta Lazari	UCV - UNIONCAMERE DEL VENETO	
6	Eleonora Di Maria	UNIVERSITY OF PADUA (expert for UCV)	
7	Valentina Colteselli	MERAKI SRL (expert for UCV)	
8	Iaria Marcollin	MERAKI SRL (expert for UCV)	
9	Roberto Santolamazza	TZI (expert for UCV)	
10	Roberto Francescon	WIRELESS AND MORE (Invited external company)	
11	Riccardo Longato	RICCARDO LONGATO SRLS (Invited external company)	

12	Grazia Garlatti Costa	UNITS - UNIVERSITY OF TRIESTE	
13	Guido Bortoluzzi	UNITS - UNIVERSITY OF TRIESTE	
14	Valeria Petruno	ARTI PUGLIA	
15	Nicolo Carnimeo	ARTI PUGLIA	
16	Francesca Tondi	ARTI PUGLIA	
17	Pablo Quaranta	THESE SRL (Invited external company)	
18	Francesca De Pascalis	CNR - ISMAR	
19	Simone Marini	CNR - ISMAR	
20	Neven Cukrov	IRB - Institut Ruder Bošković	
21	Nuša Cukrov	IRB - Institut Ruder Bošković	
22	Marin Lovrić	IRB - Institut Ruder Bošković	
23	Fausto Ferreira	FER - UNIVERSITY OF ZAGREB	
24	Ivan Loncar	FER - UNIVERSITY OF ZAGREB	
25	Ioannis Kyriakides	UNIVERSITY OF NICOSIA (Cyprus)	



3. STUDY TRIP TO FINLAND: 29-31/03/2022

3.1 Introduction

From 29th to 31st March 2022 Croatian and Italian partners of the strategic project InnovaMare (Interreg VA Italy-Croatia 2014-2020 Programme), together with SMEs and experts were involved in a study visit to the innovation driver of Finland, city of Espoo, for exchanging experiences and knowing the ecosystem of sustainable growth and innovation.

InnovaMare team started its Finnish study trip in Otaniemi Campus in city of Espoo, with presentation done by Ari Huczkowski from Lumintel Ltd., then made a tour in fantastic A Grid, a start-up building of Aalto University led by Leigh Ewin who shared his experience on how to organize and run this place with 135 start-ups with successful stories of developing great business. Later on, participants learned why Aalto Start up Centre is Top 5 Global University Incubator presented by Natalie Gaudet.

The second day started with inspirational thoughts from Markku Markkula, an expert who gave participants an overview on development of Innovation Ecosystem. Participants learned from first-hand about Helsinki Think Company, where students are supported with an entrepreneurial mindset and finished the day with the overview of services offered by Helsinki Innovation Services of University of Helsinki.

This study visit taught that Skilled individuals and knowledge sharing are key pillars in creating an ecosystem. Together with networking, they are the essential part of modern Innovation ecosystem, as said Professor Erkki Ormala.

The study visit in Finland gave participants clear information and has widen views where to start and how to build successful innovation ecosystem as a team.

The study visit was organized by the Croatian Chamber of Economy, lead partner of the project, with the aim of offering the chance to the partners to enhance their knowledge on the process from starting cooperation in innovation to access to market and on which are the enabling conditions of this process, such as inner relations, services, benefits for stakeholders, transfer of technology, intellectual property, internationalization.

3.2 Agenda and participants

The agenda of the study trip comprised 3 working days (29, 30, 31/03/2022), with the following contents (the file is enclosed as Annex to this report):

Visit Program (the exact structure may vary from what is presented here, but will follow this basic structure)

Mon 28 March	The arrival day	
18:00	Ari Huczkowski comes to meet delegation leaders at the hotel	The hotel
Tue 29 March	The Otaniemi Campus, City of Espoo, Aalto University, VTT	Venue
08:30	Bus picks up from hotel	The hotel
09:00 - 10:00	Welcome to the Otaniemi Campus, overview of the study visit program. Your host, Ari Huczkowski, CEO of Lumintel Ltd.	A-Grid, Otakaari 5, 02150 Espoo
10:00 - 11:00	What is A-Grid? The 40,000 sqm startup building of Aalto University. Leigh Ewin, Community Manager of A-Grid - with walkaround of A-Grid.	A-Grid, Otakaari 5, 02150 Espoo
11:00 - 12:00	Aalto Startup Center ASUC, a Top 5 Global University Incubator. Marika Paakkala, Head of ASUC. Also introducing one ASUC startup.	A-Grid, Otakaari 5, 02150 Espoo
12:00 - 13:00	Networking break	A-Grid, Otakaari 5, 02150 Espoo
13:00 - 14:00	ESA BIC European Space Agency Business Incubation Center in Finland, Kimmo Isbjornssund, Head of ESA BIC Finland Also introducing one ESA BIC startup	A-Grid, Otakaari 5, 02150 Espoo
14:00 - 15:00	The Innovative and Sustainable City of Espoo, Ossi Ritvos, Manager, Innovation, Growth & Invest In at Enter Espoo.	A-Grid, Otakaari 5, 02150 Espoo
15:00 - 16:00	Sustainable and Safe Sodium Batteries - A New Solution to World's Growing Energy Storage Needs from EV's to Grid Storage. Dr David Brown, CEO of Broadbit Batteries.	A-Grid, Otakaari 5, 02150 Espoo
16:00 - 17:00	Q&A of Day One with Ari - you can ask anything!	A-Grid, Otakaari 5, 02150 Espoo
17:00	End of Day One, bus transfer to hotel	

Wed 30 March	Uusimaa Region, TUTLI and University of Helsinki	Venue
08:30	Bus picks up from hotel	The hotel
09:00 - 10:00	Developing the Innovation Ecosystem, City and Region Point of View. Markku Markkula, President of Helsinki-Uusimaa Regional Council. former President of EU Committee of Regions (Brussels), former Chairman of City Council Board of Espoo, former MP.	A-Grid, Otakaari 5, 02150 Espoo
10:00 - 11:00	Meilahti Campus of University of Helsinki and the Health Related Programs. Dr Chiara Faccioto, Project Manager at University of Helsinki & Coordinator at HiLIFE Helsinki Institute of Life Sciences	A-Grid, Otakaari 5, 02150 Espoo
11:00 - 12:00	The TUTLI Program - From Research to Business. Panu Kuosmanen, Technology Transfer Manager, Aalto University Center for Entrepreneurship.	A-Grid, Otakaari 5, 02150 Espoo
12:00 - 13:30	Networking break	A-Grid, Otakaari 5, 02150 Espoo
13:30 - 14:00	Bus transfer to Helsinki City Center	
14:00 - 15:00	Helsinki Think Company - Helping Create Entrepreneurial Spirit at the Campuses of University of Helsinki. CEO Rosa Salmivuori	THINK Corner, Yliopistonkatu 4, 00100 Helsinki
15:00 - 16:00	Helsinki Innovation Services HIS - A Top Tier Tech Transfer and Deep Tech Spinout Operation of University of Helsinki. CEO Jari Strandman.	University of Helsinki, Kaisa Hall 7th floor, Fabianink. 30, 00100 Helsinki
16:00 - 17:00	Q&A of Day Two with Ari. You can ask anything.	University of Helsinki, Kaisa Hall 7th floor, Fabianink. 30, 00100 Helsinki
17:00	End of Day Two, because already downtown, easy to walk to hotel:-)	

N.	Partner institution / name of the company	Name and surname
1	Croatian Chamber of Economy CCE	Mateo Ivanac
2	Croatian Chamber of Economy CCE	Jasna Pletikosić
3	Croatian Chamber of Economy CCE	Željka Rajković
4	Platform 22 (external company invited by CCE)	Matia Bumbak
5	Reg. Union of Chambers of Commerce of Veneto Region UCV	Roberta Lazzari
6	Reg. Union of Chambers of Commerce of Veneto Region UCV	Arianna Pittarello
7	University of Trieste UNITS	Grazia Garlatti Costa
8	University of Trieste UNITS	Guido Bortoluzzi

9	ARTI Puglia	Valeria Patruno
10	CNR ISMAR	Francesca De Pascalis
11	CNR ISMAR	Simone Marini
12	IIA CNR	Barbara Angelini
13	IRB Ruđer Bošković Institute	Neven Cukrov
14	IRB Ruđer Bošković Institute	Tomislav Bulat
15	FER University of Zagreb, Faculty of Electrical Engineering and Computing	Vladimir Slošić
16	FER University of Zagreb, Faculty of Electrical Engineering and Computing	Luka Mandić
17	UNIRI University of Rijeka	Petra Karanikić
18	UNIRI University of Rijeka Pomorski Fakultet	Edvard Tijan
19	UNIRI University of Rijeka	Ana Milosevic
20	ŠIBENIK KNIN COUNTY	Damir Slamić
21	MARE FVG (Maritime Technology Cluster of FVG Region)	Carlo Kraskovic
22	INNOVO TECH (external company invited by MAREFVG)	Ali Wahoud

3.3 The Finnish ecosystem supporting innovation



The presentation of the innovation ecosystem of the Aalto University started from an event space (see photo above), that of the agora of the **A-GRID** which reflects the characteristics of the ecosystem: open, informal, engaging, practical and without barriers.

A-GRID is a start-up hub, home to 150 startups, accelerators, as well as the European Space Agency, Aalto Start-up Center, and established companies, like City of Espoo's business services.

ESA is well known but within the A-GRID structure it uniquely becomes a perfect example of the contamination of knowledge and experience and the possibility of growing talents and new projects. ESA Finland is one of the 18 European branches of the European Space Agency linked to a Business Incubator Center: the **ESA BIC Finland**. ESA Business Incubation Centres (BICs) are the largest network of space incubators in Europe. The main objective of ESA BICs is to support entrepreneurs with a space based business idea, thereby creating and growing clusters of space related start-ups across Europe.

Among the most interesting “inventions” ESA’s Sun-watching Sunstorm CubeSat has produced its first solar X-ray spectrum. CubeSats are miniaturised satellites based on standardised 10 cm boxes. Sunstorm is a ‘2-unit’ CubeSat, hosting an innovative solar X-ray spectrometer called the X-ray Flux Monitor for CubeSats (XFM-CS).

A Finnish team led by the ISAWARE company developed the miniaturised XFM-CS instrument.

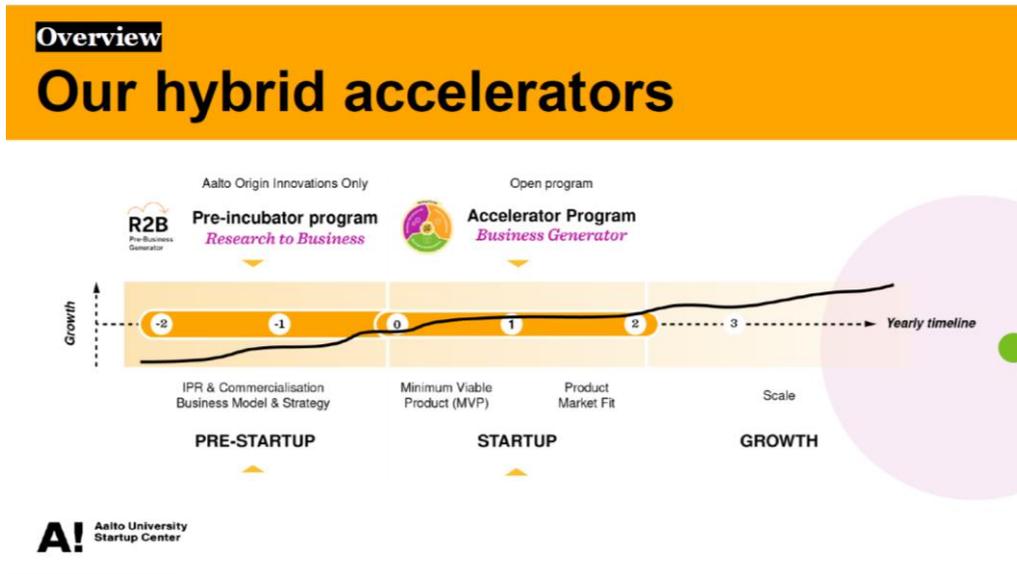


A-GRID facilities offer a significant research infrastructure open for everyone. It includes world-class research facilities for micro- and nanotechnology, neuroimaging, and bioeconomy. There are also excellent resources for computational research, radio astronomy and space research. In addition, Aalto Studios facilitate film and TV, games and animation, VR/AR, product- and user experience testing, sensor data-analysis and fast prototyping.

Aalto Startup Center is defined as a hybrid accelerator that offers both incubator and accelerator services for start-ups (innovative is rhetorical in the Finnish context).

Aalto Startup Center offers programs to:

1. Aalto University origin innovations and inventions based on research, entering the “Research-to-Business (R2B)” program
2. Finnish registered startups, entering our “Business Generator” program
3. External partners and corporations, creating a service for their particular needs



The Pre-Incubator Program or Research-to-Business (R2B) is open all year round (there are no deadlines to start the course) to Aalto University origin innovations and inventions based on research. It is a pre-start-up program to make a smooth transition from academia to industry by:

- helping research projects to reach higher targets in their innovation readiness levels
- helping research projects on business-related matters
- with the help of business advisors, assisting projects with the commercialization, funding, market analysis and research, as well as understanding the customer potential
- working together with the Aalto Innovation Services which leads Research to Business IPR and commercialization support processes
- helping research projects to recruit Business Developers to join the teams.

The Business Generator Program focuses on sustainable research-based and innovative deep-tech startups. The program is open all year-round to Finnish registered deep tech startups which are less than three years old. The program takes place over a minimum period of 12 months (up to 3 years) and helps deep-tech startups to scale-up and grow your business, solution, and assets.

There are three coaching areas of the Business Generator program:

1. Asset Development focusses on building the startup's capabilities, providing assistance on how to seek funding, create a network and connect with mentors and partners, IPR and branding.
2. Business Development looks after the startup's actions and plans on how to build a healthy, sustainable and growing business. But also on commercialization, go-to-market and Internationalization.
3. Solution Development is focussing on the startup's core product and/or service, providing assistance on how to make a proof-of-concept as well as piloting and validating it.

Aalto University campus is the home of its innovative community. The campus is based in Otaniemi a lively neighbourhood of the **City of Espoo**, an environment that supports interaction for research, innovations, learning and the arts. The goal of campus development is a mixture of valuable history and new kind of planning.



Espoo is a city - integrated in the macro metropolitan area of Helsinki (together with Vantaa) that holds some records:

- the highest density of international talent and the second highest education level of all Finnish cities
- 56,3% of residents between 25-64 years old hold a higher education degree.
- the city is home for over 150 nationalities
- English has an official status as a public service language

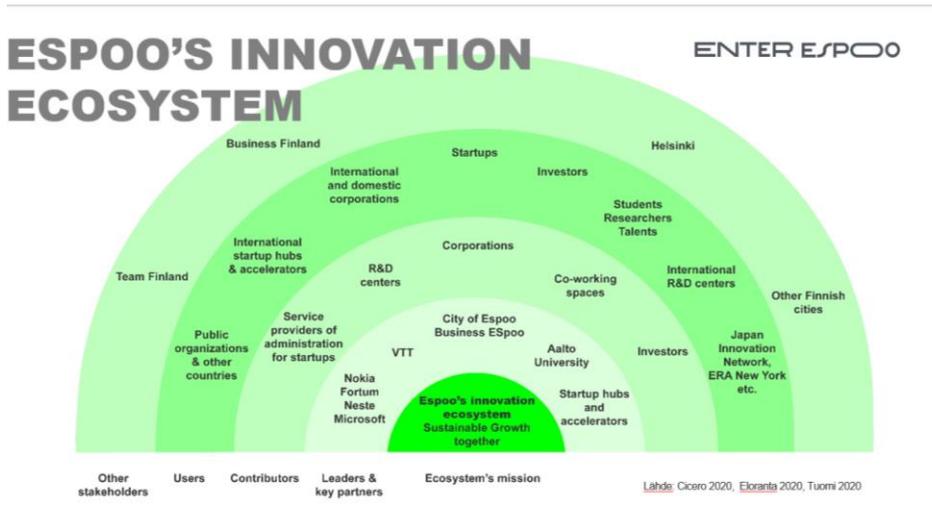
Furthermore, in the panorama of the Espoo innovation ecosystem, in the city of Espoo is based the VTT - Technical Research Centre of Finland, one of Europe's leading research institutions, owned by the Finnish state. VTT is the largest applied research institution in the Nordics and it is the main source of Finnish deep technology.

Key figures*

- **2,093** number of employees (2020: 2,129)
 - **32%** doctorate or licentiate degree (2020: 33%)
 - **51** different nationalities (2020: 48)
- **1,160** customers (2020: 1,410)
 - of which **1,005** are domestic and international private sector customers (2020: 1,230)
- **254 M€** total revenue (2020: 244 M€)
 - Net turnover **154.2 M€** (2020: 149 M€)
 - Government grant **85.1 M€** (2020: 87 M€)
 - Other operating income **14.4 M€** (2020: 8 M€)
- **14 M€** operating result (2020: 11 M€)
- **7.3 M€** comparable operating result (2020: 8.6 M€)
- **12.1 M€** result of the financial year (2020: 9.6 M€)
- **69.5%** equity ratio (2020: 69.5%)
- **45%** of our turnover comes from abroad (2020: 45%)
- **430** patent families (2020: 440)
- **1942** year of VTT's establishment
- Owned by **the Finnish state**

*VTT Group 2021.





Together with the VTT, there are a few other centres of excellence in Espoo and the Meilahti Campus is one of those. The **Health Innovation ecosystem** is an essential part of the overall Aalto University ecosystem.

Meilahti Campus is one of the best medical campuses in Europe, brings top research, teaching and medical care together. The core of the campus work is the close cooperation among the University of Helsinki's Faculty of Medicine, the Helsinki Institute of Life Science (HiLIFE) and the Hospital District of Helsinki and Uusimaa (HUS).

INNOVATION AND ENTREPRENEURSHIP SUPPORT IN MEILAHTI

UH INNOVATION ECOSYSTEM SERVICES	UH INCUBATOR SERVICES	HELSINKI THINK COMPANY	HIS HELSINKI INNOVATION SERVICES
 BIODESIGN FINLAND	 TERKKO HEALTH HUB	 SPARK FINLAND	 HEALTH CAPITAL HELSINKI
 Helsinki Brain & Mind Neurocenter Finland	 Health Incubator HELSINKI		

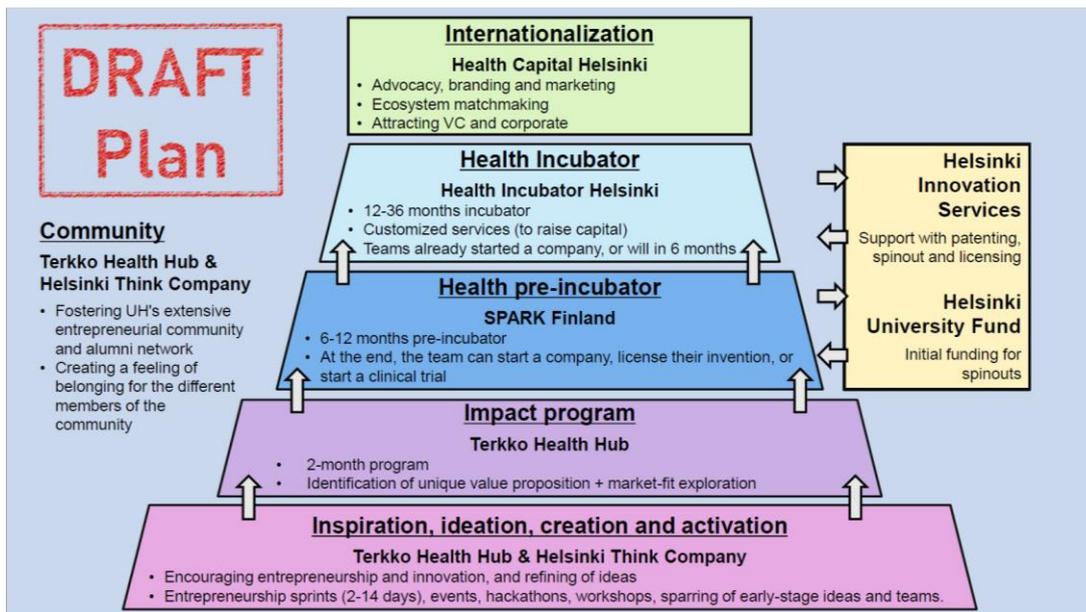
HiLIFE
HELSINKI INSTITUTE OF LIFE SCIENCE

www.helsinki.fi/hilife

In particular HiLife – the Helsinki Institute of Life Science is considered a new tool - outside the box In fact supported by the Faculty of Medicine, Life Science (LS) area joint effort established in 2017 aimed at:

- support top LS researchers at all Helsinki University campuses,
- coordinate LS research infrastructures,
- promote innovation, and brand Helsinki University internationally.

The mission of HiLIFE is to position the University of Helsinki at the top level of international competitiveness in life sciences.



In the medical field (health is considered an area of the "key industries"), support for innovation and therefore for start-ups is developed with a path that is part of the exploration, evaluation and enhancement of ideas. This also happens thanks to structures such as **Terkko Health Hub e Helsinki Think Company**.

Terkko Health Hub is the biggest health hub in Finland. It houses startups, researchers, corporates, entrepreneurship society of the University of Helsinki, an early-stage idea accelerator Terkko Health X and a unique three-year incubator program, Health Incubator Helsinki by The City of Helsinki.

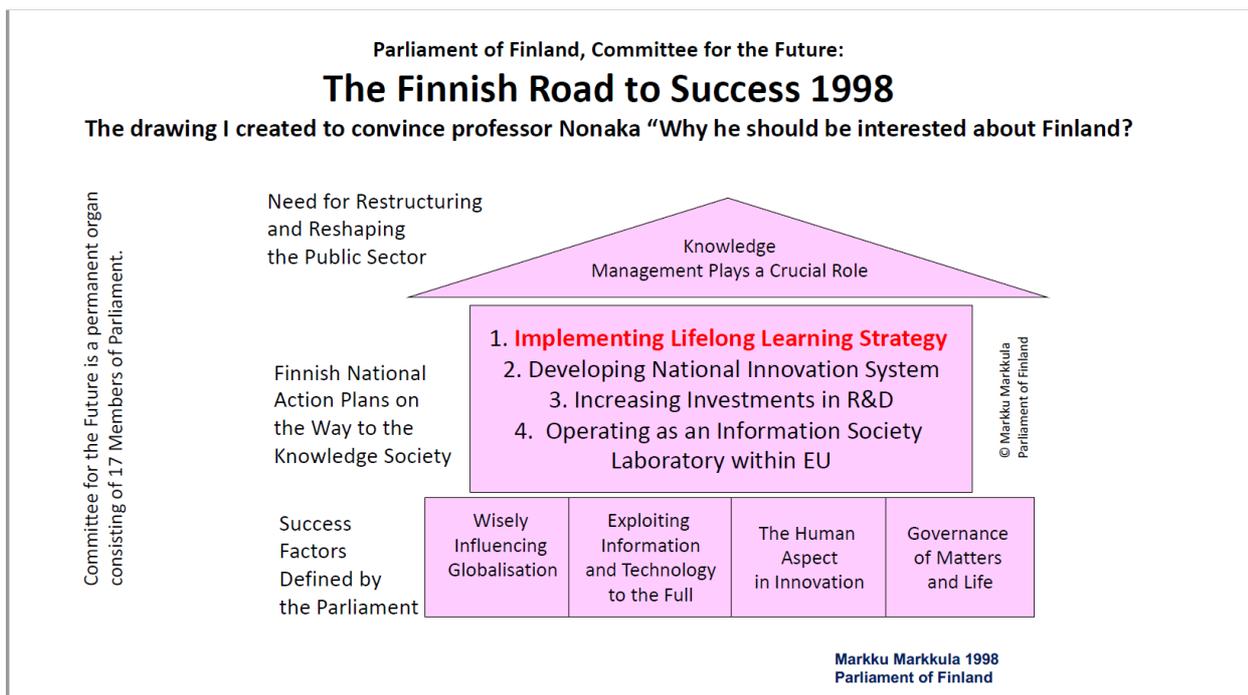
The development of the Helsinki Think Company is closely linked to the development of the entire innovation ecosystem in Helsinki and begins with a study visit of students enrolled at the Helsinki School of Business in the United States. It was the year 2012 and at the time, the paths of academia and entrepreneurs rarely crossed, and entrepreneurial skills among students and faculty were not seen as a priority. "We will change this", was the mindset of the founders of Think Company. In 2013, the first coworking space opened at the city center campus of the University of Helsinki. Meeting people, and people who wanted to create something out of the community were able to form into one. This was soon followed by the establishment of Helsinki Think Company association, to spread the message of entrepreneurship at the grassroots level of the wider academic community.

3.4 Focus on innovative start-ups and applied research

3.4.1 The Finnish “path” to innovation

For a clearer description of how deep tech start-ups and innovative companies have found "fertile ground" in Finland, it is useful to get an overview of the political decision-making process and crucial choices that have led the country to be one of the most innovative in the world as well as the paradigms followed to achieve this result.

To talk about innovative start-ups and applied research in Helsinki and more generally in Finland, it is necessary to first focus on the political path of innovation. For many European countries, including Italy and Croatia, talking about public policies in support of innovation has become common but what is the systemic approach to the Regional (and then to the City-Espoo) Innovation Ecosystem in Finland is peculiar. Within the Finnish Parliament in the 90s, was carried out a serious research and were created structures to study and deepen "The Way from Information Society to Knowledge Society" considering Nonaka's theories of organizational learning and in 1993 was established the Committee for the Future.



The EU Joint Research Centre JRC made in 2017 an analytical study¹ of Espoo Innovation Garden to be a forerunner model for the other cities.

¹ RISSOLA Gabriel Julio; HERVAS SORIANO Fernando; SLAVCHEVA Milena; JONKERS Koen, (2017) *Place-Based Innovation Ecosystems: Espoo Innovation Garden and Aalto University (Finland)*: <https://publications.jrc.ec.europa.eu/repository/handle/111111111/45669>

Finnish Way to Knowledge Society:

Markkula & others
In early 1990's

Regional Level = The Learning City



- Smart sustainable city is a physical and virtual place where technologies and humans co-evolve.
- Innovation ecosystem is a partnership of complimentary players who share the same vision and are willing to contribute to joint actions in order to achieve the individual and joint goals.
- Smart sustainable city is by-default resilient. It predicts, identifies and responses to opportunities and risks.
- The new role of cities is to empower communities, collaboration and citizens to pursue ideas, to innovate and to take action.

3.4.2 Success stories and greater innovations

Considering the statements of geneticist Leif Andersson saying that we cannot stop to admire leaves and flowers but we need to observe what happens in the soil at the root of the plant, we never stop being "seekers" while observing innovation processes.

The words of the CEO of the Bayer for Nordic Region to represent what the Finnish "ground" represents for companies are enlightening:

” FINLAND IS A HIDDEN GEM. ”

“For a company like ours, from both a local and a global perspective, **Finland is the ideal base to do research**. For example, we have a global R&D function here in Finland; it is the fifth largest within the Bayer Group.

What we really utilize is the **availability of the health data**. We have the health register here, we have the biobanks, we have the openness of the whole society – a **very open environment for doing research and development**. We use that to conduct clinical research. Combined with the mass of data that is available dating back to the 1960s, this gives us great opportunities for research.”



Miriam Holstein
CEO Nordic region, Bayer AG

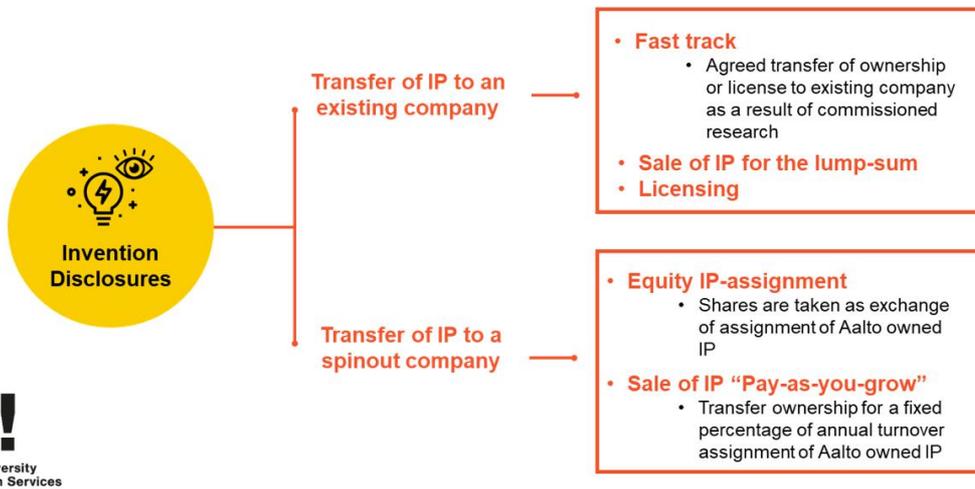
Aalto Innovation Service

Among the reasons for the success of the Finnish innovation ecosystem is the creation of a structure that is both agile and highly coordinated at the University of Aalto, which makes it possible to promote research, especially applied research, enhance research results and facilitate they enter the market by seeking and attracting investments and working on marketing and communication to create a client portfolio on a global scale.

The aim of Aalto University is to promote the protection and exploitation of inventions in a manner that is purposeful from the viewpoints of the inventor, the university and society.

Innovation Services manage and implement technology transfer in according to the commercialization policy of Aalto University.

Aalto Technology Transfer models



Innovation Services (IS) serves widely researchers and Aalto community in developing inventions and in implementing commercialisation activities. IS manages intellectual property (IP) protection in collaboration with the researchers and executes technology transfers with versatile industrial companies – from startups to international corporations. Technology transfer is crucial to allow the scale up of start-ups and above all their positioning on the market considering that the marketing of research ideas begins with the decision to acquire the rights but at the same time must define the commercialization path, assuring sustainable commercializing model.

Selected success stories



The case of BROADBIT

The story of David Brown, CEO of BroadBit Batteries Oy, is as fascinating as the journey of his business. A talented American researcher who leaves the USA for Finland and discovers a country in which to fulfil himself personally and professionally. Batteries have a long history starting in 1748 when Benjamin Franklin Charged glass plates called “batteries”. The incredible rise in the use of batteries is due to their use to power car engines. Today, batteries represent the future of "sustainable" transport and the achievement of zero CO2 emissions and at the same time also the higher cost that markets and the environment have to bear, because the cost (of extraction and disposal) of lithium and cobalt, needed to produce the best performing batteries is very high.

BroadBit is a technology company developing revolutionary new batteries using novel sodium-based chemistries to power the future green economy.

BroadBit made high performance lab samples and are now commercializing the technology for next generation electric vehicles, portable electronics, starters and grid energy storage. Our batteries enable:

- increased range/use time
- longer lifetime
- reduced cost
- improved environmental friendliness
- scalable to any production volume.

The batteries are based on metallic sodium and other widely available and plentiful compounds. Our active materials include sodium chloride (NaCl), which is also known as table salt.

BroadBit is also developing a high power and low-cost battery capable of fully recharging in 5 mins.

BroadBit's core battery innovations

Better Battery Chemistry

Evolutionary (Li-Ion):
Electrolyte: Wide-temp/Hi-Volt
Cathode: Co & Ni Free
 (TRL-9 2021)



Revolutionary (Na-Salt):
Anode, Cathode, Electrolyte:
 Rare Earth Metal Free
 (TRL-5, TRL-9 2022)

Lower Cost, Higher Performance, Greener, Safer, More Scalable

Evolutionary:
Water-based: Non-Toxic
 (TRL-7, TRL-9 2022)

Revolutionary:
Dry: Liquid Free
 (TRL-6, TRL-9 2022)

Better Battery Manufacturing

Confidential and proprietary

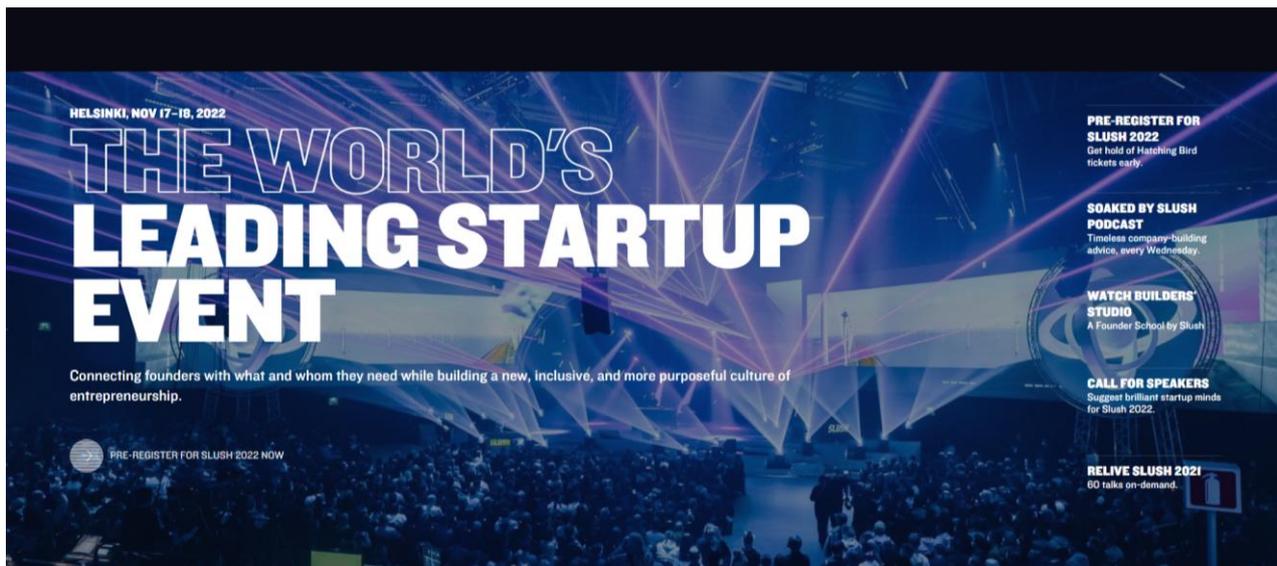




Startup Foundation mission is to support international growth entrepreneurship. The Foundation is the non-profit owner of Slush, Junction, The Shortcut and a co-owner of the Maria 01 startup hub. The Foundation was established in 2012 in a situation where the financial crisis and its aftermath had plagued Finland for years. Thanks to the willingness to invest of 57 people the Foundation and its projects gained a guarantee of continuity for the support to local startup ecosystem. The number of investments into local startups has reached 244 million euros in the first half of 2020 according to the Finnish Venture Capital Association (FVCA).

The key role of Startup foundation is to help attracting new talent to the Helsinki (Aalto) innovation ecosystem. Therefore to be open to people from all walks of life to build their own startup, to work in tech, and to invest in it. The vision for 2030, is to see Helsinki as an international startup hub that attracts entrepreneurs and investors from abroad – and in this, diversity and inclusion will serve as a powerful tool.

A good example of the how to connect the unicorns around the world: the **SLUSH** event. Slush was born as a student-led not-for-profit movement on a mission to help world-changing founders globally in 2008.





SLUSH
CONFIDENTIAL

31/3/22 — 5

SLUSH 2021

DECEMBER 1-2

After a year's hiatus, Slush 2021 is going ahead physically in Helsinki on December 1st and 2nd.

This year's Slush 2021 will be an intimate, application-only gathering of the most brilliant founders, investors, partners, policymakers and researchers with around 8,000 attendees.

In true Slush spirit, the event will be put together by some 1,000 volunteers – many of whom are European university students getting their feet wet in the ecosystem for the first time.

8,000
ATTENDEES

INCLUDING

3,000
FOUNDERS & OPERATORS

1,500
INVESTORS

While we're preparing for the main event, we are following the evolution of the pandemic closely. In case of cancellation, we are planning for an online event on the same dates that would, to the extent possible, make use of the same event concepts, speakers, and partners.

3.5 Lessons learned

At the conclusion of the Study trip to Finland, we can share some considerations, free from reporting and perhaps in divergent way: this trip was enlightening precisely because it diverged. The hope is that we will be able to deepen and experiment, applying them, some practices also in our emerging innovation ecosystems and in particular the Blue Economy ones.

The founder of the Tesla car company, Elon Musk, in his speech recalled that: «There's a silly notion that failure's not an option at NASA. Failure is an option here. If things are not failing, you are not innovating enough».

Innovating requires passion, commitment, courage. Innovation is a practice that does not combine with the fear of failure and which, on the contrary, is strengthened with every failure when the latter is faced and managed as an opportunity for learning, discovery, and testing.

This is the first and most important reflection shared in the study visit to Finland of the Italian and Croatian delegation of the InnovaMare project organized by A-GRID, the start-up community of Aalto University.

More relevant is that A-GRID is part of the innovative Aalto ecosystem, ranked by MIT in the top five globally. It is really an ecosystem: well-integrated, connected, responsive and very rich in ideas that circulate and let individuals and the society to evolve.

The ecosystem is primarily made up of entrepreneurial activities led by students and academics (PhD students, associate professors, etc.) as well as all different partners, researchers, and established companies locally. In addition, a solid network to support the growth of start-ups, including Design Factory, Aalto Start-up Centre, Aalto Entrepreneurship Society, Kiuas and Slush.

The exciting and winning history of the Aalto University begins thanks to an "enlightened" reform of the Finnish university system supported by the former dean of the University of Art and Design, Yrjö Sotamaa, considered the "father" of the Aalto University project, which is born (just) in 2010. It is the merger of three universities (University of Technology, Helsinki School of Economics and University of Art and Design) which gave birth to one of the most innovative University in the world. The winning intuition of focusing on innovation was supported by public policies, which despite the succession of governments led by different parties (or coalition governments), have maintained a firm and constant commitment to allocate up to 4% of GDP to R&D (from the 90' to 2015!) From 2015 to 2021 the share dropped back to around 2 - 2.5%, but a plan has just been voted on return to 4% by 2030.

Business Finland is the concrete example of this political path: a government agency that finances and promotes innovative processes, start-ups, business partnerships and business development plans on a national scale.

Lastly, the ecosystem, beyond political-institutional, academic and research participation, makes use of a network of companies that learned from failure: the deep tech revolution that hit Nokia was also the great opportunity for the company and its related industries to reposition itself on the global market of great innovators.

That in the Finnish innovation ecosystem is a journey of discovery and learning.



ANNEXES

Programme

Signed Participants' List

Photos

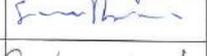
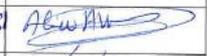
Attendance list – Study trip to Espoo, Finland, March 28 - April 1, 2022

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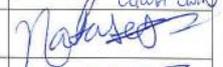
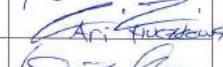
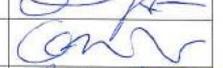
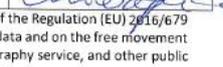
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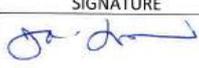
European Regional Development Fund

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By signing this Attendance list, you agree that you have been informed that your personal data will be gathered in accordance with Article 13 of the Regulation (EU) 2016/679 of the European Parliament and of the Council of 28 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (GDPR - General Data Protection Regulation). That includes video and web-streaming, photography service, and other public activities which ensures project visibility.

European Regional Development Fund

Attendance list – Study trip to Espoo, Finland, March 28 - April 1, 2022

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European Regional Development Fund





4. FINAL CONCLUSIONS

The experience of the study visits was an important opportunity to gather knowledge, to learn from new practices and to exchange information and contacts that will be put to good use in the future by the partners of the InnovaMare project. The journey of the InnovaMare project is continuing with great appreciation, despite many difficulties due to the ongoing pandemic situation and all the uncertainties that Europe is facing due to the conflicts on our borders.

As it was reiterated during the study visits, “we must not consider the weaknesses but focus on the strengths”, expand the network because if quality is important it is equally true that by increasing the quantity it is more likely to “meet” quality.

Cooperation is the tool through which we can not only better develop new technologies but also acquire those that are ready to be used in different contexts (perhaps with some revisions) or integrated with others in order to increase the value and expand the field of application.

For the new technologies of underwater robotics and sensors, the exploration of the “blue ocean” is an unmissable opportunity.