DIMECC

ANNUAL
REPORT

2019

CONTENT

DIMECC

■ NTRODUCTION

This annual report summarizes 2019, the 12th operational year of DIMECC Ltd. The mission of DIMECC is to be the leading co-creation platform for digital transformation. In summary, 2019 was a year of many new openings within our company. Our Board of Directors decided, as part of the annual strategy process, upon a new purpose definition for DIMECC. The purpose was phrased as follows: "DIMECC co-creation services accelerate the exploration of new business ecosystems and efficient development of new capabilities in technology companies." The change in our purpose and focus reflects long-term transformation from the original, R&D-oriented mission, which was crafted in 2008: "search for radical breakthrough technologies towards supporting the formation of new business ecosystems, and facilitating for the growth and efficiency of businesses".

As a short summary of some of the new openings: Intelligent Industry ecosystem took a serious step forward by confirming 2 new industrial partners and securing public funding from Business Finland for its second term. One of the concrete outcomes of this ecosystem is that we started a new industrial data sharing program DIMECC InDEx (Industrial Data Excellence). This is a 10 M€ systemic R&I program including 10 partner companies, 7 research institutions and about 30 SMEs. We also created a multi-purpose coaching concept, DIMECC Academy, for delivering tailored coaching and competence development services for companies. The first coaching (Machine Learning Academy) was piloted already in 2018-2019 in the field of Artificial Intelligence and Machine Learning. The next topic, to be piloted in 2020, will be about digital business models (Business Model Academy). New AI-heräämö concept was launched in May to "wake-up" small companies and introduce them to opportunities related to Artificial Intelligence. The 7th MPD event was held in June with all-time-record of 70 partners!

DIMECC – Digital, Internet, Materials and Engineering Co-Creation – Ltd. is a non-profit company, and the form of our annual report primarily supports the documentation of our most important impact, outcomes, and activities. Economic analysis is not in focus because the objectives of DIMECC Ltd. are in the long-term change and transformation driven primarily by company-university cooperation, knowledge creation and sharing, as well as leading-edge innovation activities.

For more information about DIMECC, see www.dimecc.com.

DIMECC IN NUMBERS 2019

- Founded 2008
- 67 Shareholders (44 companies, 23 research institutes)
- 12 employees
- 1 affiliated company (Demola Global Ltd.)
- 3 offices in Finland (Helsinki, Tampere, Turku) and 16 Demola sites globally
- 2 business ecosystems (Intelligent Industry, One Sea)
- 4 EU trademarks (™, MPD, PoDoCo, DemoBooster, One Sea)
- ca. 300 customers
- ca 2 000 persons involved in DIMECC activities
- ca. 800 M€ of facilitated programs since 2008

DIMECC

HOW TO SUMMARISE 12 YEARS OF PROFESSIONAL INNOVATION FACILITATION?

2019 was the 12th operative year of DIMECC as a company. In this phase, it is relevant to evaluate and assess, what has been achieved during the years. In 2008, when we started as a co-creation facilitation company, the times were totally different. The global financial crisis decreased and dropped some of Finnish-origin companies' businesses and private investments were under serious consideration all over the world. However, Finnish innovation system was still on the top of all rankings according to almost all performance indicators. In twelve years, the global economic outlook has taken many positive steps and many companies perform now extremely well in their businesses. Many of our customers have learned, both in our programs and in all other co-creation set-ups, how to use external players (e.g. universities, start-ups, suppliers etc.) in the ecosystem for R&I purposes. This is great!

Last couple of years I have received many requests and invitations to different regions and countries all around the world to give a speech. All the events have had a specific topic, but the request to me has been primarily either to present some of our well-known services or to summarise, what is it to facilitate co-creation. Most of these events have taken place in Europe, one or two per month, but some of them have taken place in South-East Asia and North Americas. Since the request has been more to DIMECC than to me as a person, I have focused on the lessons learned by our team during the last 12 years. BUT: How to summarise 12 years in 7 or 30 minutes? What a task!

As an engineer, I normally put the facts first on the table. Since the beginning of 2008: 12 years, 800M€ of co-creation program volume, 200+ projects, 22 final reports, 300+ customers annually, thousands of participating persons, 4 EU trademarks, one merger, one acquisition, match-making event at least once a week. What

can you say with these? Not too much. These are facts, which do not tell anything without the context. They are like average without standard deviation.

Our context has always been co-creation between different sizes and kinds of companies, research & educational institutes, and public sector. Professional facilitation of cross-organisational research, product & production development, and innovation work calls for in-depth understanding related to the business and technology challenges of companies, to competence, knowledge, and skills creation mechanisms in every kind of organisations, and to the regulatory framework at hand. Professional facilitation is, like any other private sector job or task, measurable and competitive.

The objectives of professional facilitation can be classified in three:

1. By utilising professional facilitation, a customer receives more impact, better results, faster process, or more cost-efficient performance than by trying to solve all the challenges at hand alone. This is the classical part where a customer must decide whether to use an external consultant, or whatever such a help is called, or not.

2. By utilising professional facilitation, a customer would like to look at something that cannot be formulated as a challenge or project yet. This is the classical part where a customer can go almost everywhere outside his/her own organisation and something may be won by meeting interesting thinkers. Sometimes this is called opening minds or business endeavoring. As in the previous case, consultants and many other kinds of organisations can help here.

3. By utilising professional facilitation, a customer ends up with a group of other organisations, which can form an ecosystem to seek for something new or to execute something that is not possible to any of the ecosystem partners alone. This is the non-classical part of professional facilitation. This calls both for contextual and processual competence, that normally is not present in any organisation that is not half-in and half-out in relation to customers' businesses. What could be such a half-in and half-out organisation?

Connecting points 1 & 2 is in most of the cases very challenging. Why? Consultants normally base their excellent performance on standard procedures, which do not favour exploration of things that may destroy their current procedures. Hence, it may be, that consultants lock out the most innovative avenues. On the other hand, the ones having excellent capabilities in visioning and opening new avenues, e.g. research institutions, universities and think tanks, very seldom can perform tasks efficiently because their incentive system is from the public sector and not execution oriented. In contrast, they may use a lot of public funding and taxpayers' money, which may get their services look almost "free" for companies, but hitting companies with slow, non-structured, and over-resourced service ending up to an increased demand to pay taxes.

If the co-existence of points 1 & 2 is challenging, having both and point 3 at the same time is almost impossible. This three-point co-existence does not happen by coincidence or as a pop-up thing, it must be designed and built into the professional facilitation solution with a long-term and strategic perspective. This integration is the responsibility of those who want to gain something with the professional facilitation.

Public Private Partnership model (PPP) seems to be the best available solution for this integration. It was originally created in early 1990's in Australian infrastructure and construction projects, but it was soon modified

"DIMECC focused a great deal towards European collaboration in R&I activities, and we feel that our shareholders are now one step closer to the more proactive approach towards European R&I participation."

and applied to other fields of activities. Finland was one of the first countries in the mid-2000's to take the PPP-model in large-scale as the framework of national R&D&I policy. The model as such is not important per se, but the benefit of the PPP-model is that we can use private sector incentives and work methods, and public sector competencies and funding at the same time. We can all the time carry out sanity-check for relevance and efficiency with the private investment needed while still maintaining the opportunity to put private money to serve the public benefit through integrating the work to public structures and institutions. By investing public money on top of the private money, we play out the opportunity of non-impactful and inefficient operations. With PPP, professional innovation facilitation helps both the ones using it for their individual needs, and the ones living around the lead innovators. This makes points 1-3 possible at the same time, because we can have the private and public interests served with same efforts. In small, limited, and non-perfect markets this is especially important.

This is my summary of the 12 years. In 2019, we led about 2M€ value of co-creation activities and supported our ca. 300 customers with 12 professional co-creation facilitators. AI-heräämö was the new concept introduction in May to "wake-up" very small companies regarding the

opportunities of artificial intelligence. DIMECC Academy model for targeted coaching was created. 7th MPD was held in June with all-time-record 70 partners! We launched DIMECC InDEx program in September to take industrial data sharing leadership forward in Europe. DIMECC focused a great deal towards European collaboration in R&I activities, and we feel that our shareholders are now one step closer to the more proactive approach towards European R&I participation.

I would like to thank DIMECC's customers, program participants, investors, shareholders, stakeholders, service suppliers, and our personnel for the new openings' year 2019!

Harri Kulmala, CEO

IMECC OPERATIONAL MODEL

During the 2019 strategy round DIMECC's Board of Directors formulated a new purpose statement for the company:

DIMECC co-creation services accelerate exploration of new business ecosystems and efficient development of new capabilities in technology companies.

In other words, DIMECC's role in the technology innovation landscape is to help companies resolve challenges related to high-risk research activities, disruptive business transformation, and capability development needs by offering to them focused, mission-driven co-creation services. In order to fulfill this promise, DIMECC provides its customers with tools, services and networks that make their innovation better – faster, more comprehensive, and with reduced overall risk.

Programs and Projects accelerate companies' R&D&I activities by setting up a shared effort between companies, universities and research institutions both for program preparation and execution. DIMECC programs follow the principles of open innovation and agile development, and their management process is effective and cost-efficient.

Co-creation Services allow companies to share experiences, ideas and viewpoints, and learn from others in an environment of trust. These services shorten time-to-money and speed up sales. This category also includes commissioned projects which DIMECC executes for third parties, as their results support the whole customer base and even wider audiences.

Networks boost companies' innovation capacity by making it easier to identify and capture critical external innovation and enabling more effective and impactful use of partners in strategic R&D&I activities. These connections form the foundation for building solid business ecosystems and leveraging insights and capabilities of start-up companies.

All these activities drive towards commercialization of their results, enabling the long-term competitiveness of the targeted industries.

DIMECC's personnel constantly scans and follows relevant **industry trends** and global **forces of change** that are shaping the future of selected industries – metals, manufacturing, maritime, and ICT – and their common areas of interest. Views and insights from the shareholders define the focus areas, and often these activities are also carried in close collaboration with DIMECC shareholders. DIMECC-led ecosystems have an important role in collecting, producing and sharing foresight to their respective industry domains. When needed, DIMECC's R&D board is used to analyze the foresight data and to convert key findings into **meaningful and actionable business insights**.

Business insights sometimes lead into various types of collaborative activities, such as joint training and competence development programs, lobbying for critical standards, policies and/or regulation, common platform development, or even shared commercialization activities, that help companies prepare themselves for future changes in their marketplace.

DIMECC's programs focus on company-driven development activities that turn business insights into strategic business opportunities that ensure the competitiveness of the Finnish

DIMECC programs and projects are built and implemented openly together with companies, universities and research institutions. They follow the principles of open innovation, co-creation and agile development.

Towards breakthroughs – even faster – DIMECC

DIMECC Co-creation services create competitiveness for the future, and boost new business creation and new market entries. No matteri, if your challenge is small or big, DIMECC co-creation services guarantee you faster time-to-market and increased number of ideas compared to working alone.

More brains – more innovation – more business – DIMECC

Through DIMECC networks customers can boost their innovation capacity and business growth. Boosting innovation capacity means both increased number and variety of high-quality partners. Business growth comes through wider geographical area of business and new partnerships in the R&D phase.

Networking – co-creating – marketing – selling – DIMECC

Figure 1: DIMECC services.

industry. Programs enable large companies and SMEs to co-operate with the leading national and international universities and research teams. The work conducted in DIMECC´s programs and projects is often transversal with respect to the chosen areas. For individual companies, key motives for joining DIMECC's programs are opportunities for learning, development, transformation, and growth. However, DIMECC's long-term purpose is to drive systemic digital change which goes above and beyond the successes of individual companies.

Overall, DIMECC aims to build ecosystems and consortia through which individual companies can develop their business and capabilities in a collaborative manner. The systemic R&D&I programs and projects focus mainly on precompetitive research, while many co-creation services are closer to specific market needs and requirements. Since all DIMECC's R&D&I programs and projects are industry-driven, their results are strategically important for the participating companies with built-in go-to-market interest.

DIMECC key operation responsibilities

DIMECC's operational model is based on lean operations through which network-based co-creation activities are effectively steered and managed. This operational model requires strong commitment from customers, partners and other stakeholders, which is ensured on a strategic level through typical limited company processes, i.e. steering and governance from Board of Directors. The core content is steered by shareholder experts in the R&D council and by committed customers in the Management Boards of DIMECC's ecosystems and programs. Both the BoD and R&D council are used also as communication channels towards DIMECC's stakeholders.

The operating infrastructure of DIMECC (employees, IT infrastructure, offices, etc.) is paid through various types of service fees.

DIMECC Programs and Projects

This chapter introduces shortly the program and activity portfolio and volumes of DIMECC's research activities in 2019. In 2019, DIMECC had two on-going ecosystems (One Sea and Intelligent Industry) and two on-going research programs (LIFEX and InDEx). InDEx program (Industrial Data Excellence) was launched in 2019 as part of the Intelligent Industry ecosystem's portfolio. Research programs welcome new participants, provided that the existing consortium members accept the new applicant and the new applicant accepts the existing consortium agreement.

Following figures illustrate how companies' (Figure 3) and research institutes' (Figure 4) participated in DIMECC's ecosystems and research programs in 2019. The budgetary division of DIMECC's program portfolio in 2019 is presented in Figure 5.
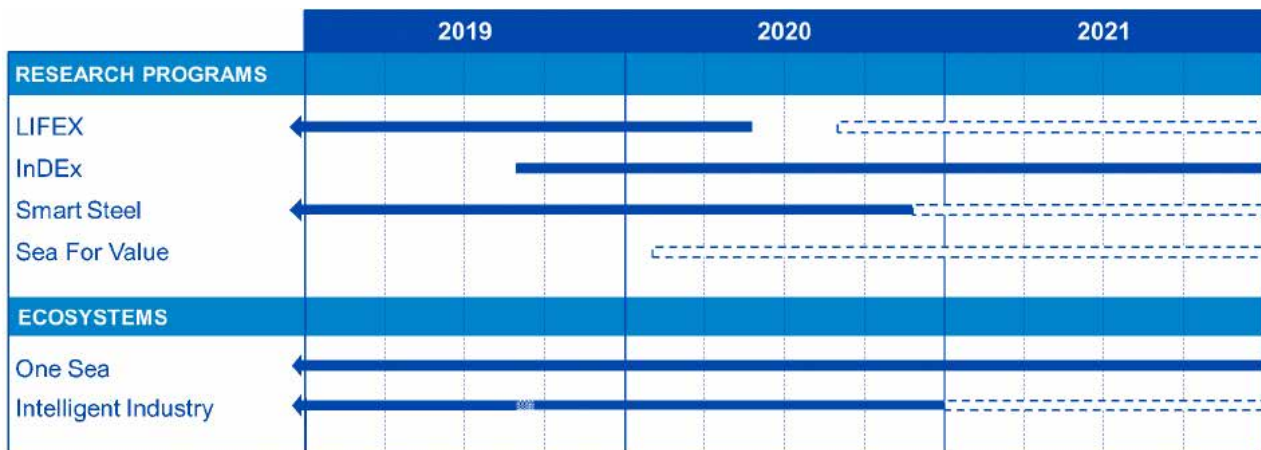

Figure 2: DIMECC's Public-Private-Partnership based co-creation programs and ecosystems.
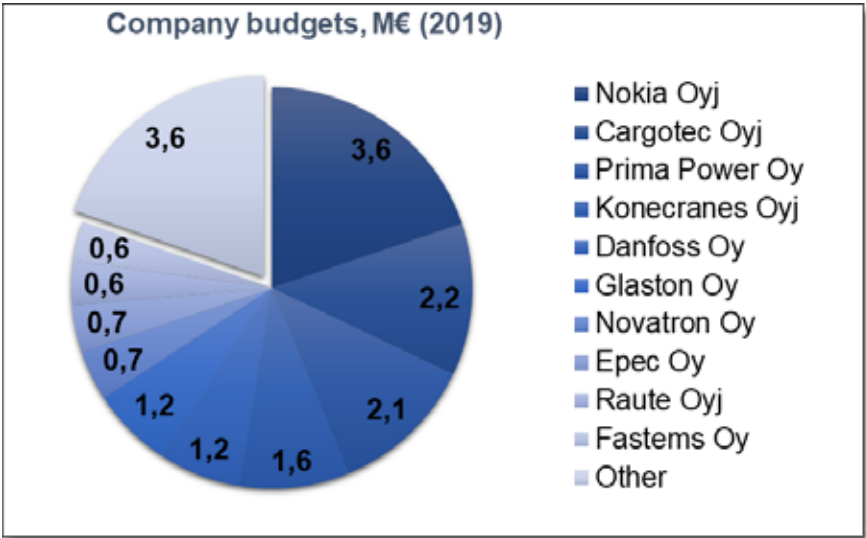
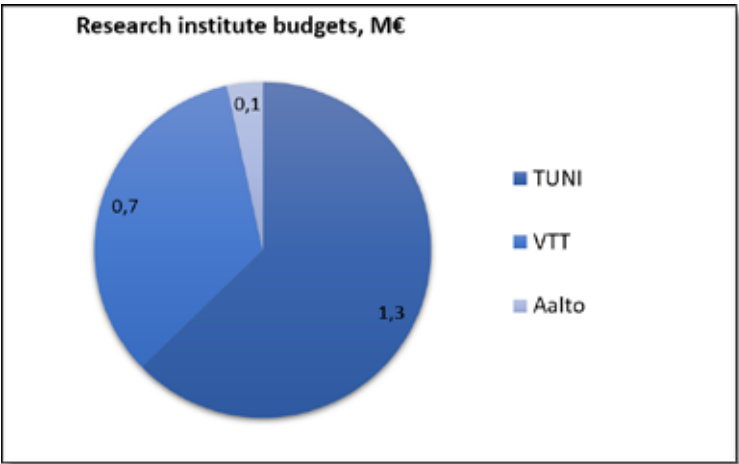*Figure 3: Companies' total investment in DIMECC portfolio in 2019 (in M€).*

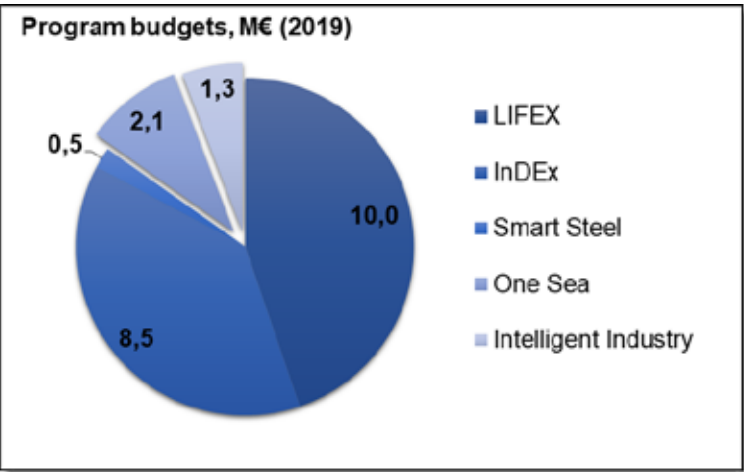*Figure 4: Research institutes' total program budgets in DIMECC portfolio in 2019 (in M€).*

Figure 5: Total budget division of on-going DIMECC portfolio (M€) in 2019

DIMECC Programs and projects

INTELLIGENT INDUSTRY
Turning digital into practical

The Intelligent Industry ecosystem is shaping the future of Finnish manufacturing industry.

Intelligent Industry is an innovative ecosystem connecting leading Finnish industrial companies and providers of digital solutions to drive and realise the immense opportunities of the emerging new era of intelligent industry. The ecosystem is leading the way towards a new era of networked, information driven and autonomous value systems that adapt flexibly to changing operating environments and user needs. The vision of the Intelligent Industry ecosystem is to make Finland a global leader in intelligent industrial systems and related business ecosystems by 2028.

The strategic core partners of the Intelligent Industry Ecosystem are Konecranes, Fastems, HT Laser, Elekmerk, Nokia, Prima Power, Raute, Melkki, Innofactor and TietoEVRY, all leading companies in their own fields. The ecosystem is funded by the participating companies and Business Finland.

Intelligent Industry ecosystem is driving collaborative activities in four focus areas: Data and advanced analytics, Autonomous systems, Value co-creation in ecosystems and Human-Machine collaboration. Core activities include R&D&I programs and projects, pilots and PoCs, participating in standards and regulation discussions and competence development. The ecosystem builds for example holistic operating models and standards for data sharing in industrial value networks. The first ecosystem program Industrial Data Excellence (InDEx) was launched in September 2019. The purpose of this two-year program is to build an industrial data community and common data space to Finland focusing on data sharing. Artificial Intelligence and Machine Learning competences are fostered by the DIMECC Machine Learning Academy, which provides tailored training for manufacturing company personnel.

CARGOTEC
KALMAR
HIAB
MACGREGOR

elisa
SMART FACTORY

8760 Fastems

HT LASER

INNOFACTOR®

KONECRANES®
Lifting Businesses™

melkki   NOKIA

PONSSE   Prima Power

RAUTE

SSAB   tieto EVRY

> **DIMECC Programs and projects**

DIMECC Program
InDEx – Industrial Data Excellence

The Industrial Data Excellence, DIMECC InDEx – program is the first program initiative under the Intelligent Industry ecosystem. The vision of the InDEx-program is to unlock the value of data as an enabler for the next industrial revolution centered around artificial intelligence in the Finnish manufacturing industry. InDEx was started September 2019.

Unlocking the value of data is much more than one enterprise making better use of their existing data. It requires that the entire industry will operate all through the intelligent use and sharing of data. InDEx-program will take this unique perspective and opportunity focusing on data sharing in manufacturing networks between multiple partners.

Currently only a fraction of the value of data has been captured in manufacturing sector and for this reason InDEx program aims to build a data community and Common Data Space for industry in Finland. This requires effective data sharing, including adequate analytics, between the value network partners. The InDEx-program drives effective data sharing between value network partners with the aim to unlock the value of data in the manufacturing sector.

The Common Data Space defines tested and verified rules and methods as well as practicalities for data sharing in manufacturing networks.

Three strategic targets:

1. DRIVE FINNISH INDUSTRIAL DATA COMMUNITY

Common Data Space drives the establishment of Finnish Industrial Data Community, a network of actors utilizing Common Data Space.

Figure 6: InDEx program started September 2019.

2. NOVEL VALUE CREATION

Common Data Space forms the basis for novel data ecosystems opening new value creation possibilities for all the value chain partners.

3. INTERNATIONAL & SCALABLE

Common Data Space will leverage existing and emerging standards and technologies and drive international standards for data sharing.

PROGRAM PARTICIPANTS

Industrial partners:

Konecranes, Cargotec, Danfoss, Elekmerk, Fastems, HT Laser, Nokia, PrimaPower, Raute, SSAB and TietoEVRY

Research organisations

Aalto University, Tampere University, University of Turku, University of Helsinki, University of Jyväskylä, University of Vaasa and VTT Technical Research Centre of Finland.

Schedule: 2019-2021
Volume: 8,5 M€

DIMECC Programs and projects

ONE SEA
Autonomous maritime ecosystem

One Sea ecosystem is an alliance of leaders in marine as well as information and communications technology companies, who work closely together to promote their common goal of driving for an autonomous maritime system by 2025.

At the end of 2019, One Sea has an increasing number of international members. The list of current members includes ABB, Awake.AI, Cargotec, Ericsson, Finnpilot Pilotage, Inmarsat, Kongsberg Maritime, MTI (Monohakobi Technology Institute – NYK Group's research subsidary), NAPA, TietoEVRY and Wärtsilä. Other partners include Finnish Marine Industries, Finnish Port Association, Finnish Shipowners' Association, Shipbrokers Finland and The Royal Institution of Naval Architects (RINA). One Sea is an open ecosystem that can be joined by anyone who intends to do business in and drive for autonomous shipping. Financing is provided by participating companies and Business Finland.

Ship owners and operators are currently considering when to take advantage of the lower capital and operating expenditure – with the better efficiency, reliability, safety and sustainability – that digitalization has brought into other areas of business and industry. Marine industry suppliers and shipyards are actively looking for opportunities to be the first to offer ship owners the latest competitive edge of digitalization. The companies and organizations collaborating in the project are forerunners in their respective fields and the knowledge they share sets them apart from other likeminded projects. The ecosystem ensures a well-researched, tested and highly capable autonomous shipping network.

The co-creation ecosystem seeks to harmonise the regulations and standards, interfaces and testing regime necessary to deliver a safe and commercially viable highly automated logistics system. A system comprising of both physical infrastructure (ships, ports, freight and communication infrastructure), data infrastructure (cloud services, data interfaces and platforms), as well as services enabling the interoperable travel and transport chains with the targets of minimizing accidents, decreasing the environmental footprint of marine traffic, and advancing possibilities for new commercial ventures.

DIMECC Programs and projects

G GROWTH FROM DIGITAL SECURITY

Growth from digital security – roadmap 2019-2030 was based on an order from three Finnish Ministries (Ministry of Economic Affairs and Employment, Ministry of Education and Culture, and Ministry of Transport and Communications), Business Finland, and Finland's National Emergency Supply Agency. DIMECC planned and facilitated creation of the roadmap for Finland's strategic competence development in digital security and trust. In the work DIMECC leveraged its co-creation methods and the expertise of more than 150 experts from companies, universities, research institutions, and public sector organisations. The work was grouped under four main themes: "digitalisation of business", "competences and continuous learning", "cyber resilience", and "growth and internationalisation".

Main results of the work included:
- Plan for strengthening and accelerating strategic competence and asset development on national level (i.e. the roadmap).
- Identifying key actors and stakeholders, and ensuring their commitment to the roadmap and its execution plan.
- Determining the most relevant execution ecosystem(s) for the roadmap.

Final report provides a comprehensive overview of the digital security and trust landscape in Finland. It also contains a list of key recommendations and the strategic roadmap for 2019-2030, focusing on how Finland can create, attract and accelerate growth in this sector. The report was published in March 2019 by Ministry of Economic Affairs and Employment in its publication series (http://urn.fi/URN:ISBN:978-952-327-405-1).

In addition, DIMECC started the "CyberTRE" project (funded by Business Tampere) in October 2019 in the field of industry and cyber security. The aim of this project is to explore opportunities for co-innovation projects between industrial and cyber companies and strengthen the emerging cyber security community in the Pirkanmaa region.

Figure 7: DIMECC planned and facilitated creation of the roadmap for Finland's strategic competence development in digital security and trust.

DIMECC

DIMECC Programs and projects

LIFEX program focuses on advancing digitalization and Industrial Internet in Finnish industry. The program is positioned in the crossroads of industry needs and emerging technology trends. The joint research projects typically consist of 4-8 core partners, who with subcontractors, form 15-30 partner ecosystems. In recent years LIFEX program has focused on Artificial Intelligence and industry applications of Augmented Reality and Virtual Reality technologies.

Currently the most important LIFEX activity is MIDAS project. MIDAS focuses on artificial intelligence in industry. Participants include among others Epec, Glaston, Novatron, Nokia Technologies and Tampere University. The overall MIDAS ecosystem consists of over thirty partners and it forms an active network advancing usage artificial intelligence.

Schedule: 2016 ->
Volume: 11 M€

DIMECC with its customers and shareholders started the company's very first project in Sweden in November 2018. In Smart Steel, SSAB, Sandvik, and Siemens will create new digital marking, fingerprint and identity for steel and its use cases. These will change the way how customers can analyse and use the information related to steel through data systems and mobile applications. The target is standardization of digitally identified steel. The idea of Smart Steel is brought to publicity by SSAB, the biggest investor of the project. Smart Steel will also lead to new digital business models between the producers and users of steel.

Swedish research institute Swerim will carry out technological research and pilot tests together with the companies. Swedish industry network FindIT will disseminate the results fast to a network of more than 200 manufacturing and IT companies in Dalarna region. DIMECC brings the most efficient and well-proven co-creation mechanisms to the leadership and management of the project, and to the ecosystem's new business creation.

Vinnova, the Swedish governmental RDI funding institution, has granted the 50% public funding for the project. Smart Steel is part of the Swedish strategic innovation program (Strategiska Innovationsprogram SIP) and its center PIIA (Process Industry och Industrial Automation, headed from Luleå Tekniska Högskolan). SIPs were established in Sweden in the mid-2010s after benchmarking the high-impact experiences in Finnish PPPs. DIMECC now continues the Public Private Partnership once started in Finland also in Sweden. After one year of execution it looks that Smart Steel program will be enlarged and continued after 2020.

Schedule: 2018-2020
Volume: 10 MSEK

DIMECC Co-creation services

DIMECC Co-creation services

The co-creation activities consist of reducing the time-to-market, accelerating companies R&D&I, supporting technology transfer and bringing together companies and research organizations into ecosystems facilitating the large-scale systemic transformation of industries.

DIMECC Demobooster

Demobooster is an innovation service for rapid commercialization. It provides a collaboration platform for companies hunting for killer applications through strategic partnerships: an innovation highway from ideas to products.

Demobooster in a nutshell

- The market place where demand and supply of software demos efficiently meet

- Provides immediate feedback on the functionality and applicability of the demo
- Speeds up product development process through "success or fail fast" principle

The mission of Demobooster is to demonstrate new ideas in practice. The outcome is not a "slide show presentation" but a concrete solution!

Demobooster creates a specialists' network for the development and marketing new ideas between Appliers (engineering industry) and Producers (software enterprises and expert organizations). We've had alltogether 12 successful Demodays with 44 different challenges presented by the Applier companies. The Producers have pitched 113 innovative solutions to the problems, 24 of which (with a few additional ones currently under development) resulting in a concrete demo. In total, there have been participants from 56 different companies. Demobooster is a registered trademark of DIMECC.
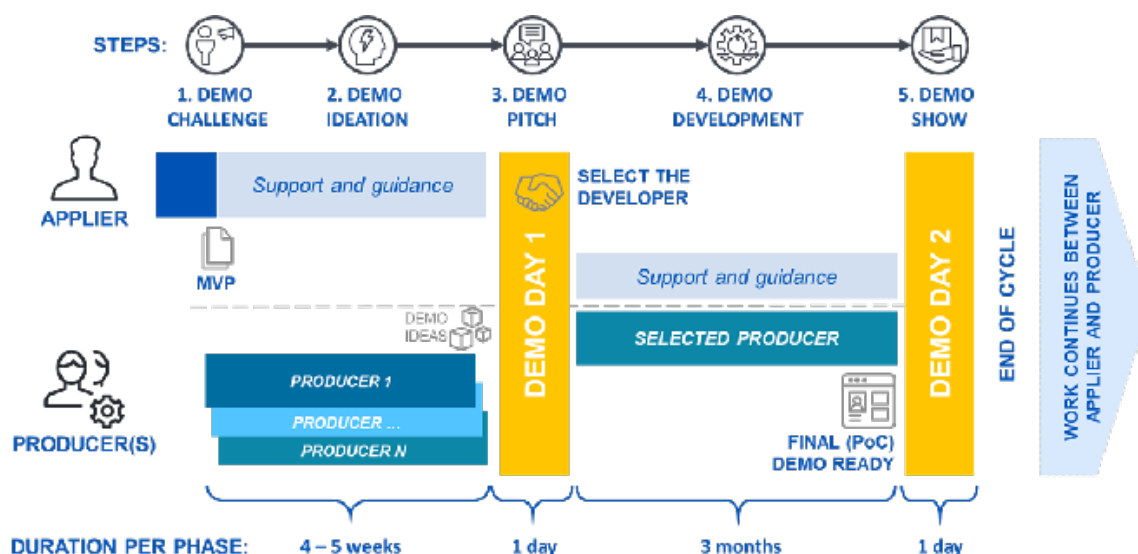
www.demobooster.com

Figure 8: DIMECC Demobooster service cycle.

DIMECC Co-creation services

PoDoCo

PoDoCo is a matchmaking program supporting long term competitiveness and strategic renewal of Finnish companies and employment of young doctors in the private sector.

Grants awarded by PoDoCo foundation pool are intended for academic research investigating new innovative ideas to boost the strategic renewal of Finnish industry. PoDoCo program is funded by PoDoCo foundation pool and companies participating in the program. The duration of PoDoCo project is 1-2 years and it consists of two phases: research period and targeted research period. PoDoCo foundation pool offers research grants of 6-12 months for the research period. After the research period the company hires the Post Doc to deepen the research results and to create company specific insight. The result is a win-win situation where academic research is supporting the long term competitiveness and strategic renewal of Finnish companies and young doctors get industrial experience.

Post Docs in Companies, PoDoCo program, is a joint initiative of Finnish universities, industry and foundations. Ten foundations allocated altogether almost 1M€ to the program yearly, which enables around 35 PoDoCo grants each year. The program's foundations are Finnish Cultural Foundation, Jenny and Antti Wihuri Foundation, Maa- ja Vesitekniikantuki ry, Svenska Kulturfonden, Finnish Foundation for Technology Promotion, Maj and Tor Nessling Foundation, The Foundation for Economic Education, KAUTE Foundation, Paulo Foundation and Helsingin Sanomat Foundation. DIMECC operates the PoDoCo program and facilitates the novel matches and meeting between companies and Post Docs. PoDoCo is a registered trademark of DIMECC.

After 2015 PoDoCo program has funded 134 collaborative projects between companies and Post Docs. Most of the participating doctors have been employed to private sector with the help of PoDoCo program. Based on the experiences PoDoCo program has opened new career opportunities for doctors and improved their career prospects. Additionally, doctors have gained valuable experience in working on R&D in private sector through PoDoCo program. For companies the program has offered new avenues for growth. in addition, companies see that PoDoCo program has increased the collaboration with the universities.

www.podoco.fi

Machine Learning Academy

DIMECC Machine Learning Academy (MLA) helps manufacturing companies build and improve their organizational AI/ML competences. The training is aimed for professionals working in the industry, with its content tailored to the needs of the Finnish mechanical engineering and manufacturing industry.

MLA consists of seven learning modules with diverse topics from machine learning (ML) algorithms to ethics, and from designing and managing artificial intelligence (AI) projects to implementing AI in the company business.

The goal of the training is to increase the participants' understanding of how to utilize AI and ML in their company. After the course, participants understand the fundamentals of AI and ML, and they can recognize and manage development tasks that aim to benefit from use of AI/ML.

The course uses a combination of theory, discussion, practical exercises, as well as examples of existing applications and business cases to emphasize the application of the methods and concepts.

The first course was organized in the fall of 2018 in co-operation with Futurice Ltd. The second course was organized, again with Futurice Ltd., during the spring of 2019 with 19 participants from 12 companies.

DIMECC

DIMECC Co-creation services

MPD 2019 Paved the Way for Ecosystem Economy – the Next Frontier of Industry

MPD is an international top level B2B summit, which is organized every second year in Tampere, Finland. MPD is an executive and visionary event for digital and manufacturing industries, researchers, and technology & service providers worldwide. This highly appreciated event brings together top management of manufacturing and digital business companies, internationally recognised experts in the field of digitalisation, and academia to discuss and represent best industrial practices and operational excellence, novel business concepts, as well as scientific and technological breakthroughs in the field. Company visits, side-events, meetings, and networking nourish potential for R&D&I collaboration over the boarders, and grows opportunities for new business contacts. MPD is a registered trademark of DIMECC.

The MPD 2019 was an executive and visionary industry summit which guided the 800+ participants through digitalization, business leadership and the future of work to the business landscape of Ecosystem Economy. The strategic partners of MPD 2019 were Also, Beckhoff, Business Finland, DIMECC, Fastems, Intelligent Industry ecosystem, McKinsey&Company, Siemens, Technology Industries Finland, Tampere University, VTT, and Wapice. MPIDEA competition was organised for the second time in history. Electric snow scooter by Forest Manor Oy won the competition. MPIDEA focuses on how to create growth and jobs through digital solutions.

More than 40 top class invited speakers from leading industry and academia presented their views and discussed the raised topics. The industry from innovative start-ups to world's leading enterprises representing OEMs, end users and technology, platform and solution developers and providers, had a key position at this leading industry summit.

Each session and the whole seminar programme

Figure 9: Ecosystems were the theme of MPD 2019.

had a story line built on the overall theme 'Harnessing the Ecosystems Economy' and the session topics: 'Towards Business Ecosystems', 'Operation in Ecosystems', ' Fostering Innovation Capabilities', 'Leading the Growth Through Transformation', 'Work Revolution', 'Work in the Age of Disruption and Uncertainty', 'Decoding Leadership', and 'Capitalizing the Ecosystem Economy'.

In addition to the main seminar programme, the MPD 2019 offered pitch presentations of 15 MPD's start-up partners. Altogether 70 MPD partners were presenting and demonstrating their products and services at their stands, and 10 MPD partners presented specific interesting demos at the Future Work demo area.

MPD showed through real business cases, best practices and learnings, how the industry can develop its capabilities to realise the necessary transformation to deal and surpass the challenges and capitalize the opportunities of digitalisation, ecosystems, and the business landscape of Ecosystem Economy.

www.mpdays.com

DIMECC Co-creation services

AI-heräämö

DIMECC implemented during the second half of 2019 and early 2020 a local, Pirkanmaa focused, AI acceleration activity entitled AI-heräämö. This activity aimed at de-mystifying AI and supporting SME companies to take their first steps to develop new products, product features and services based on available data. In 2019 AI-heräämö organized workshops for companies in Kangasala, Sastamala, Valkeakoski and Tampere.

AI-heräämö was partly funded by Council of Tampere Region (Pirkanmaan liitto), which wants to improve the overall competitiveness of local SMEs by increasing their AI-savviness and encourages them to implement concrete AI pilots and solutions.

AI Morning

DIMECC organizes in co-operation with Suomen Yliopistokiinteistöt and Nokia Technologies a series of events entitled AI-Morning (http://www.aiaamu.fi). Since February 2017 over 800 representatives from industry and academia have participated in these half day events with top quality artificial intelligence and machine learning presentations. During year 2019 five events with varying topics like Predictive Maintenance and Ethics in AI were organized. The popularity of the events indicates that the interest in artificial intelligence opportunities and skills is growing steadily. An increased number of private and public sector actors consider artificial intelligence as a key enabler towards next generation intelligent products and services.

Demola – millennials globally as the source of renewal within DIMECC

Demola is the leading global innovation challenge platform that brings together students and industrial brands. With Demola, global and local organizations challenge university students to create better Future. Today, Demola innovation challenges bring together over 50 universities, 750 000 students and leading companies globally almost all over the world. Demola has 16 sites globally to implement companies' endeavoring & scenario work.

In 2018, DIMECC Ltd. bought a minority share of Demola Global Ltd. in order to stimulate industrial renewal. The radical and experimental innovation made possible by university students via Demola projects became part of DIMECC's co-creation service portfolio. Co-operation with DIMECC settles Demola as a successful innovation tool for Finnish industry and boosts Demola's international growth. As an outcome of the acquisition, many shareholders of DIMECC started to utilize Demola sites in their innovation processes in 2019.

In June 2019, the Demola Summit in Nice gathered together Demola's employees, facilitators and stakeholders from alliance universities around the world to direct Demola's activities. This event brought together the many new Demola university alliance members, as Demola expanded both globally and in Finland, where the alliance covers now several DIMECC's university shareholders from Helsinki to Lapland.

www.demola.net

DIMECC

DIMECC Networks

DIMECC supports its shareholders and program participants in increasing their international research and innovation collaboration through international networks and strategic cooperation partners. DIMECC is closely embedded in a larger and mostly European ecosystem. DIMECC is part of EFFRA (European Factories of the Future Research Association), and ensures that there will be topics of interest for digitalizing manufacturing industries in the EFFRA roadmap. DIMECC participates in the public private partnership SPIRE (Sustainable Process Industry through Resource and Energy Efficiency). In 2019, International Data Spaces Association (IDSA) became an important framework for DIMECC to proceed with data sharing issues. In 2019, DIMECC´s CEO served as an international evaluator of Danish and Swedish innovation system activities. DIMECC is also part of the Industry–University Cooperative Research Centers Programme of the US National Science Foundation (NSF). Two of its centers, CVDI (at Tampere University) and S2ERC (at the University of Oulu), were initiated from DIMECC's programs.

DIGINNO

The objective of Digital Innovation Network (DIGINNO) is to advance the digital economy and to speed up the process of moving towards the single digital market in the Baltic Sea Region (BSR). The project aims to increase the capacity of policymakers, industry associations and industrial SMEs to enable faster and more efficient uptake of digital solutions both in public and private sector. The focus specifically is on promoting uptake of ICT in the business sector, developing innovative and interoperable digital public services and facilitating Digital Single Market related policy discussions on the Baltic Sea Region level.

DIMECC, together with the Finnish and Estonian

Figure 10: DIMECC hosted together with the Ministry of Finance in Helsinki a high-level Digital Policy Round Table.

project partners, has raised Real Time Economy (RTE) on the project's agenda. In the year 2019 DIMECC has led development of one of the four DIGINNO show cases, i.e. 'Borderless Real Time Economy (RTE) -Spearhead eReceipt'. The goal of this showcase was to demonstrate the basic idea behind RTE solutions, it is to fully automate data exchange processes and transferring it to a machine-to-machine communication without a human interrupting the process. DIMECC also hosted together with the Ministry of Finance in Helsinki a high-level Digital Policy Round Table on 'The Future of Cross-Border e-Services in the Baltic Sea Region'.

DIGINNO partners: 14 full partners and 10 associated partners from nine BSR countries (incl. Norway). Finnish partners: DIMECC as full partner and Ministry of Finance and Technology Industries of Finland as associated partners. Schedule: 01 October 2017 – 30 September 2020.

Schedule: 01 October 2017 – 30 September 2020
Volume: 3,5 MEUR

www.diginnobsr.eu

DIMECC Networks

FIIF

FIIF (Finnish Industrial Internet Forum) was founded by Technology Industries of Finland (TT) in 2014 to speed up new businesses enabled by digitalization. It is a company-driven activity that brings together appliers and providers of digital solutions with research organizations. It also offers an open platform for sharing experiences, identifying new business opportunities and future trends, exploring testing and piloting activities, and formulating collaborative development actions. Ownership of the FIIF concept and responsibility of its operations were transferred to DIMECC from Technology Industries of Finland in 2018.

In March 2019, DIMECC conducted a survey for FIIF partners. Participation rate was much lower than in 2018 (17 responses vs. 69 responses in 2018). Based on the survey results, main reasons for joining the FIIF are still insights about trends and technologies, as well as networking with peers and potential customers.

During 2019, nine open FIIF events were organized. Also, eight issues of FIIF Newsletter and two issues of FIIF Alert were published.

During 2019 FIIF's web pages were viewed 8388

Figure 11: Nine FIIF events were organized in 2019.

times in 3265 sessions. As of December 31, 2019 FIIF had 188 partner organizations and 571 names on its mailing list
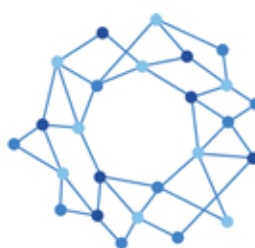
FIIF EVENTS IN 2019		
Month	Topic	Location
January	Smart Buildings & Cities	Tampere
February	Digital Trust & Security	Helsinki
March	Artificial Intelligence/Machine Learning	Tampere
March	Sensing & Data Collection	Helsinki
April	Business Models	Helsinki
June	The new human factor – AI meets employee and customer experience	Tampere
September	Smart Buildings & Cities	Oulu
October	Data Business Models	Helsinki
November	AI/ML – Predictive Maintenance	Tampere

High Level Forum

High Level Forum is an international forum devoted to leading innovation ecosystems. It is managed by the Grenoble Innovation Campus GIANT (Grenoble Innovation for Advanced New Technologies).

The High Level Forum was initiated in 2012. DIMECC is the industry representative among the over 30 internationally recognized leading cities in innovation. Tampere is the Finnish city that was invited to attend the High Level Forum.

The goal of the High Level Forum is to share policies, strategies and experiences about innovation management and promotion between leading campuses, encourage and strengthen collaboration between the world's most powerful innovation ecosystems and to develop common initiatives for maximizing the social and economic benefits of the innovation programs from the participating campuses.

In 2019, the High Level Forum was attended by DIMECC, its shareholders, and Demola. Fastems' R&D director Harri Nieminen highlighted in his presentation the industrial data sharing in DIMECC's InDEx program, and DIMECC's CEO Harri Kulmala served as panelist in the discussion regarding how public private partnership boosts data sharing ecosystems.

GIANT | HIGH LEVEL FORUM
Leading Innovation Ecosystems

MANUFUTURE 2019 Conference on Sustainable Smart Manufacturing

The MANUFUTURE 2019 Conference -Sustainable Smart Manufacturing (MF2019, www. manufuture2019.eu) was organized as part of the Finnish Presidency Event: European Days for Sustainable Circular Economy at Finlandia Hall in Helsinki on September 30 - October 1, 2019. Business Finland was responsible organiser of

the MF2019 conference and DIMECC as a partner had responsibility for the conference programme.

The MF2019 Conference built a bridge between the Horizon 2020 Framework Programme and the new Horizon Europe research and innovation Framework Programme, discussing e.g. the effects of the structural and contentual changes between these frame programmes. Other discussion themes included Artificial Intelligence – Research and Innovation Needs for the Industry; Circular Manufacturing and Sustainability; Manufacturing Europe: Towards an EU-Innovation and Education Systems for Manufacturing and the Society; and Emerging and Disruptive Technologies in Manufacturing.

The MF 2019 Conference continued the MANUFUTURE Conference series started by MANUFUTURE 2003 Conference in Italy and followed by MANUFUTURE Conferences in 2004 (Netherlands), 2005 (UK), 2006 (Finland), 2007 (Portugal), 2008 (France), 2009 (Sweden), 2011 (Poland), 2013 (Lithuania), 2015 (Luxembourg) and 2017 (Estonia), all organised in EU Presidency countries. This year's conference celebrated the 15 years anniversary of the European MANUFUTURE technology platform.

MANU*FUTURE*·EU

NGI

The Next Generation Internet initiative (https://www.ngi.eu/about/) was launched by EU in 2016 to re-imagine and re-engineer the Internet for the third millennium and beyond. NGI aims to shape the future internet as an interoperable platform ecosystem that embodies the values that Europe holds dear: openness, inclusivity, transparency, privacy, cooperation, and protection of personal data.

In the spring of 2017 the Future Internet Forum (FIF) members were asked to nominate NGI Contact Points in their member states and associated countries. From Finland, DIMECC is the nominated contact point.

NGI Contact Points help in reaching out to the right group of stakeholders, getting actors on board and exchanging information with the FIF members and the European Commission regarding ongoing trends and topics. NGI Contact Points also act as links to the future key actors, i.e. high-tech start-ups and SMEs, young researchers and civil society, and raise awareness about the NGI initiative and the related H2020 funding possibilities. In addition, NGI Contact points promote, build and broaden the NGI ecosystem in their member states and feed back information and viewpoints to shape the evolution of the NGI initiative. There are several on-going NGI projects that help to identify specific research topics and to create an ecosystem of relevant stakeholders.

NSF

DIMECC together with partners have created new opportunities of international cooperation for Finnish researchers and companies. US National Science Foundation's (NSF) I/UCRC (Industry/University Cooperative Research Centers Program) provides a unique possibility for co-creation between research and industry. The National Science Foundation (NSF) is an independent federal agency created by the US Congress in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense…". NSF is vital because it supports basic research and people to create knowledge that transforms the future.

Starting from 2015 Finland has participated (as the fifth country outside USA) in the Program in the field of Big Data in the CVDI-center (Center for Visual and Decision Informatics). CVDI conducts research on data science, big data, analytics,

including visual analytics, augmented intelligence, and decision informatics. Finnish Site of CVDI center was created within DIMECC Data to Intelligence program. Currently 11 industry members participate in the work of the center. Tampere University of Technology is working as the Finnish Site for the center and all Finnish Universities may participate in the center through TUT.

The United States of America and Finland have also agreed on a significant cyber security partnership based on DIMECC's Cyber Trust program. In 2017 site of Security and Software Engineering Research Center (S2ERC) was opened at University of Oulu. The center is conducting applied and basic research on software security, system security, and software engineering problems in order to enable technology gains in member organizations. Currently 24 industry partners are involved in the work of the center. Similarly to CVDI center other Finnish universities may participate in the center as well.

EU Activation

In 2019, Technology Industries Finland boosted the participation of Finnish companies in EU projects by ordering an activation campaign from DIMECC. The target of this campaign was to create 1-3 large-scale programs, which are either Finnish-led, significantly participated by Finnish companies, or both. After the campaign, there were four new coordination roles to Finnish companies (Konecranes, Fastems, Outotec, Nokia) and several smaller participations. A significant outcome of the activation was new EU-project and consortium building process designed for Finnish companies. This is to be launched in 2020. This activation is needed also in the Future, because the participation of Finnish companies in EU projects should be increased and widened.

DIMECC Strategic Partnerships

DIMECC supports its shareholders and program participants in increasing their international research collaboration, especially together with strategic cooperation partners:

DIMECC was member in co-operation networks in 2019 as follows:

Artemis Industry Association
Demola Global Ltd.
IIC Industrial Internet Consortium (U.S.)
FIIF Finnish Industrial Internet Forum
ECSEL Joint Undertaking
ManuFuture European Technology Platform
EFFRA (European Factories of the Future Research Association)
A.Spire (Sustainable Process Industry through Resource and Energy efficiency)
The Industry Innovation Center for Future Network, China (IICFNC)

In these networks, DIMECC's goal is to ensure that these networks' research priorities are of interest for DIMECC's shareholders. DIMECC also seeks to be a major node in European Digital Industry Hub landscape. DIMECC organises excursions to various foreign innovation locations and organisations regularly. All DIMECC programs include systematic and continuous researcher exchange.

SHAREHOLDERS 2019

SHAREHOLDER	N. OF SHARES
Aalto-korkeakoulusäätiö	150
ABB Oy	120
Andritz Oy	50
Bittium Technologies Oy	120
Boliden Kokkola Oy	50
Cargotec Oyj	120
Centria Ammattikorkeakoulu Oy	12
CSC-Tieteen tietotekniikan keskus Oy	12
Cybercom Finland Oy	12
Digita Oy	52
Elisa Oyj	120
Oy L M Ericsson Ab	120
EXFO Oy	12
Fastems Oy Ab	50
FIMA Forum for Intelligent Machines ry	50
Finn-Power Oy	50
F-Secure Oyj	12
Haaga-Helia Oy Ab	12
Helsingin yliopiston rahastot	24
Inno-W Oy	12
Itä-Suomen Yliopisto	12
Juridiska Personen Åbo Akademi	40
Jyväskylän ammattikorkeakoulu	12
Jyväskylän yliopisto	52
Kaakkois-Suomen ammattikorkeakoulu	12
KONE Oyj	120
Kongsberg Maritime	50
Konecranes Oyj	120
Kumera Oy	50
Lapin Ammattikorkeakoulu Oy	40
Lapin Yliopisto	24
Lappeenrannan teknillinen yliopisto	64
Laurea Ammattikorkeakoulu Oy	52
Medialiitto	12
Metropolia Ammattikorkeakoulu Oy	52

SHAREHOLDER	N. OF SHARES
Metso Oyj	120
Meyer Turku Oy	120
Murata Electronics Oy	24
Nokia Oyj	120
Nokia Solutions and Networks Oy	84
Oulun yliopisto	64
Outokumpu Oyj	120
Outotec Oyj	50
Prizztech Oy	12
Rautaruukki Oyj	120
Raute Oyj	50
Reaktor Innovations Oy	12
Sanoma Oyj	120
SSH Communications Security Oyj	12
Stiftelsen Arcada	9
Stiftelsen Svenska Handelshögskolan	40
Suunto Oy	12
Tampereen Ammattikorkeakoulu Oy	40
Tampereen korkeakoulusäätiö	76
Technopolis Oyj	60
Teknologian tutkimuskeskus VTT Oy	210
Teleste Oyj	12
Telia Finland Oyj	120
Tieto Finland Oy	120
Tuotekehitys Oy Tamlink	64
Turun Ammattikorkeakoulu	52
Turun yliopisto	64
Vaasan yliopisto	40
Wapice Oy	50
Wärtsilä Finland Oy	120
Åbo Akademi	24
Älykkään liikenteen verkosto – ITS Finland ry	12

67 shareholders   **23** research institutes

44 companies

Aalto University · ABB · ANDRITZ · ARCADA · Bittium · NEW BOLIDEN

CARGOTEC KALMAR HIAB MACGREGOR · Centria UNIVERSITY OF APPLIED SCIENCES · CSC · CYBERCOM GROUP · DIGITA · elisa

ERICSSON · EXFO · 8760 Fastems · FIMA Forum for Intelligent Machines · F-Secure · Haaga-Helia · HANKEN

inno-w · ITS Finland · jamk.fi JAMK University of Applied Sciences · KONE · KONECRANES Lifting Businesses · KONGSBERG

KUMERA CORPORATION · LAPIN AMK Lapland University of Applied Sciences · LUT University · LAUREA · medialiitto · Metropolia

metso · MEYER TURKU SHIPYARD 1737 · muRata INNOVATOR IN ELECTRONICS · NOKIA · outokumpu

Outotec · Prima Power · Prizztech · RAUTE · Reaktor · sanoma

SSAB · ssh communications security · SUUNTO · TAMLINK · Tampere University of Applied Sciences

Tampere University · TECHNOPOLIS more than squares · TELESTE · Telia

tieto EVRY · TURKU AMK TURKU UNIVERSITY OF APPLIED SCIENCES · UNIVERSITY OF EASTERN FINLAND · UNIVERSITY OF HELSINKI · UNIVERSITY OF JYVÄSKYLÄ

LAPIN YLIOPISTO UNIVERSITY OF LAPLAND · UNIVERSITY OF OULU · Turun yliopisto University of Turku · Vaasan yliopisto UNIVERSITY OF VAASA

VTT · Wapice · WÄRTSILÄ · Åbo Akademi · XAMK

DIMECC

BOARD OF DIRECTORS

Board of directors was elected in the annual general meeting in April 26th, 2019. The board had ten meetings in 2019.

In 2019, the remuneration paid to board members was 150€/meeting (200€ for the chairman). Due to the challenges with the profitability, the board decided to work without the remuneration. PricewaterhouseCoopers Oy, and Mr. Jouko Malinen as the auditor in charge, continued as the auditor of the company.

Members

Ilari Kallio (chair) Lauri Oksanen (vice chair) Karno Tenovuo Tapani Kiiski Mika Toikka Samu Salmelin

Deputies

Tomas Hedenborg
Kari Knuutila

MANAGEMENT

Dr. Harri Kulmala
Chief Executive Officer

External positions in 2019:
- Finnish Academy of Technical Sciences, member of the board
- Member of The Royal Society of Arts
- Member of high-level group, EU ManuFuture technology platform
- Associate professor (docent), LUT
- Member of innovation and competitiveness council, Finnish Technology Industries
- Demola Global Ltd. member of the board
- Member of the Innovation Fund Denmark evaluation group
- Member of the Vinnova/Produktion2030 evaluation group

Päivi Haikkola (M.Sc. Nav. Arch, M.Sc. Econ.)
Senior Ecosystem Lead

External positions in 2019:
- Member of the Research Committee of Finnish Marine Industries
- Member of The Royal Institute of Naval Architects
- Member of the Board of the Finnish Society of Naval Architects
- Rappoteur for the waterborne part of the STRIA Roadmap on Connected and Automated Transport 2019 by the European Commission

Risto Lehtinen (M.Sc.Eng.)
Head of Co-creation

External positions in 2019:
- Auditor for KOTEL r.y.

PERSONNEL (AS OF DECEMBER 31, 2019)

Kari Aunola (B.Sc.Econ.)
Financial manager

Doris Pryjma (M.Sc. Eng.)
Program Management Expert

Antti Karjaluoto (M.Sc. Econ., M.Sc. Admin.)
Disruptive Renewal Officer

Prof. Seppo Tikkanen
Senior Ecosystem Lead

Jukka Merenluoto (M.Sc. Tech., MBA)
Senior Ecosystem Lead

Prof. Reijo Tuokko
Manager, international relationships (part-time)

Kari Muranen (B.Sc. Eng.)
Senior Ecosystem Lead

Marika Moilanen (BBA)
Manager, marketing and communications (maternity leave)

Dr. Arto Peltomaa
Program Manager

Kaisa Kaukovirta (M.A.)
Manager, marketing and communications (maternity leave substitute for Marika Moilanen)

DIMECC FELLOWS

DIMECC Fellow is a public recognition to a person, who represents the official set of DIMECC values in force at the time of nomination and forwards these with his/her behaviour.

DIMECC values consist of **openness & transparency** for the good of digital, internet, material & engineering technologies and ICT, manufacturing & engineering industries, **efficiency & effectiveness** in implementations and activities, and **expressed cooperation and recognition** towards external competence.

The person to be nominated as "DIMECC Fellow" must fulfil the following criteria:

• Many years of work for and publicly shown support to DIMECC Ltd. (no need to be formally DIMECC employee).

• Experienced by colleagues and others as a strong supporter for openness, transparency, and renewal.

• Effective and efficient work for the generic and overall success of ICT, manufacturing & engineering industries.

• Willingness and capability to combine scientific and practical interests.

• Positive and open mind towards new, radical, and non-traditional ways to organize R&D&I and management of these.

DIMECC FELLOWS	Nomination year
#1 Pentti Karjalainen, Professor, University of Oulu	2013
#2 Ilkka Niemelä, Director, The Federation of Finnish Technology Industries	2013
#3 Matti Sommarberg, CTO, Cargotec Oyj	2013
#4 Arto Ranta-Eskola, R&D director, SSAB	2015
#5 Ismo Vessonen, Senior Research Scientist, VTT	2015
#6 Janne Järvinen, R&D director, F-Secure	2017
#7 Markku Korkiakoski, Director, Sales and Business Development, Bittium	2017
#8 Sauli Eloranta, EVP, Rolls-Royce	2017
#9 Miia Martinsuo, Professor, Tampere University of Technology	2018
#10 Tomas Hedenborg, President & CEO, Fastems	2018
#11 Yrjö Neuvo, Professor, Aalto University	2018

RESULTS AND NEWS OF THE YEAR 2019

This chapter introduces results, outcomes and news from DIMECC activities in 2019.

DIMECC Prize winner: Glaston and Tampere University – Collaboration between an industrial company and the University at its best

Glaston Corp., which develops automated glass tempering furnace, and Tampere University, the resource of research knowledge and industry expertise, won the DIMECC Prize 2019 for their collaboration.

The award-winning collaboration between Glaston and the Tampere University has been achieved in the DIMECC MIDAS project, which focuses on industrial artificial intelligence. Glaston's Digitalization Manager Kai Knuutila received the DIMECC Prize together with Heikki Huttunen, Professor of Signal Processing at the Tampere University, at the DIMECC 2019 Annual Seminar.

The annual award was presented by DIMECC CEO Harri Kulmala at the 12th DIMECC Seminar. The Digital Factory -themed seminar on industrial data development was organized in conjunction with Combient, a Swedish innovation platform akin to DIMECC.

A brave pioneer of artificial intelligence

Glaston's Artificial Intelligence development is based on data collected by over a hundred tempering machines in the cloud, which exceeded a million batches of loading early this year. For this platform, Glaston is developing new technologies, such as deep learning neural networks, to increase the automation of the

Figure 12: Digitalization Manager Kai Knuutila from Glaston Corp. and Professor Heikki Huttunen from Tampere University were awarded the DIMECC Prize 2019. CEO Harri Kulmala presented the prize. Photo: Kari Muranen, DIMECC

quenching process and to provide proactive maintenance functionality. There are so far few examples of the application of artificial intelligence in industry. That is why pioneering industrial company like Glaston in developing digital and IoT-based products not only promotes the company's own competitiveness but also encourages others.

"Glaston has made bold progress in applying artificial intelligence and has achieved significant results. With the products and services now developed, the company is in the forefront of international tempering machines competition", says Arto Peltomaa, Project Manager at MIDAS.

The University acts as a catalyst

Tampere University has over a decade developed strong expertise in signal processing and industrial automation. It has become a strong center of AI know-how, leveraging industry

in the region through education and research projects. Tampere University is a catalyst and partner for industrial companies. Following up on new research techniques and giving industry R&D experts a sneak peek at the forefront of new technologies. The university ensures that industrial companies have capable experts available locally and through international networks. The AI Hub Tampere is a new artificial intelligence research center hosted by Tampere University.

Figure 13: Entrepreneurs Minna and Pasi Kauppinen from Forest Manor Oy in Kannonkoski won the MPIDEA 2019 competition.

Electric snow scooter eLyly won the MPIDEA competition

Electric snow scooter eLyly won the MPIDEA competition. According to the jury, this ecological alternative to motor sled transportation has the potential to become a big hit. The ecological and silent snow scooter has been developed by Pasi and Minna Kauppinen, an entrepreneur couple from Central Finland.

'The decision was difficult for the jury to make. The final's proposals were all very different and the jury considered them all to have considerable potential for becoming successful', described the Chair of the MPIDEA competition Jury, Juho Romakkaniemi, the CEO of Finland Chamber of Commerce. The climax of the competition was followed by around one hundred spectators made up of top industry and innovation leaders taking part in Finland's largest industry event MPD.

The jury based their decision to award eLyly on the snow scooter's potential to create jobs directly in the industrial manufacturing of the scooter as well as the offering's ecological appeal for the winter tourism industry in Finland.

'We considered the ecological potential of the proposal to be very important', stated a member of the MPIDEA jury, Leena Vainiomäki, Country Head of Danske Bank Finland.

The entrepreneur couple Pasi ja Minna Kauppinen from Central Finland came up with the idea through their long personal experience in the winter tourism business and from organizing snow safaris. The idea was carefully developed into an innovation and prototype – now winning the MPIDEA competition offers them the opportunity for global success.

Competing with eLyly in the MPIDEA final were Asensiot Ltd's cloud-based solution for rejecting vibrations in industrial use as well as NWB Finland's environmentally better and resource-saving beverage packaging and their production technology.

InDEx Program concentrates on Smart Chain and Smart Factory

Top companies driving the InDEx-Programme (Industrial Data Excellence) started their pragmatic work towards global leadership. Radically more efficient utilization of data with AI is the key, tells Juha Pankakoski, Chairman of the Intelligent Industry Ecosystem and Executive Vice President, Technologies of Konecranes. InDEx will build a Data Community and a common data platform to Finland.

DIMECC

In order to create an intelligent industry, people and machines and appliances must communicate seamlessly with each other. Ambitious results can only be achieved with broad cooperation, and that's exactly what we're aiming at. Intelligent Industry brings together the most significant and innovative actors of our industry. The InDEx Programme launched today is a major endeavour of vital national importance', characterizes Pankakoski.

The program work will be driven by two industry led application domains: smart chain and smart factory. The application domains form the full chain of operations for smart manufacturing, full digitalized industrial practices with connectivity in the entire value chain between smart equipment, facilities, products and processes.

PROGRAM STRUCTURE:

The program work will be driven by two industry led application domains: smart chain and smart factory. The application domains form the full chain of operations for smart manufacturing, full digitalized industrial practices with connectivity in the entire value chain between smart equipment, facilities, products and processes.

Partner Company Driven experiments:

Smart Factory

1. Smart Factory Connectivity

2. Prescriptive Maintenance

3. Manufacturing process excellence with AI

Smart Chain

1. Material information flow in value chain

2. AI-assisted demand-order-delivery process

3. Manufacturing logistics

Research Organisation Work Packages:

1. Novel connectivity solutions & technologies for collecting and delivering data

2. Advanced analytics methods for processing data

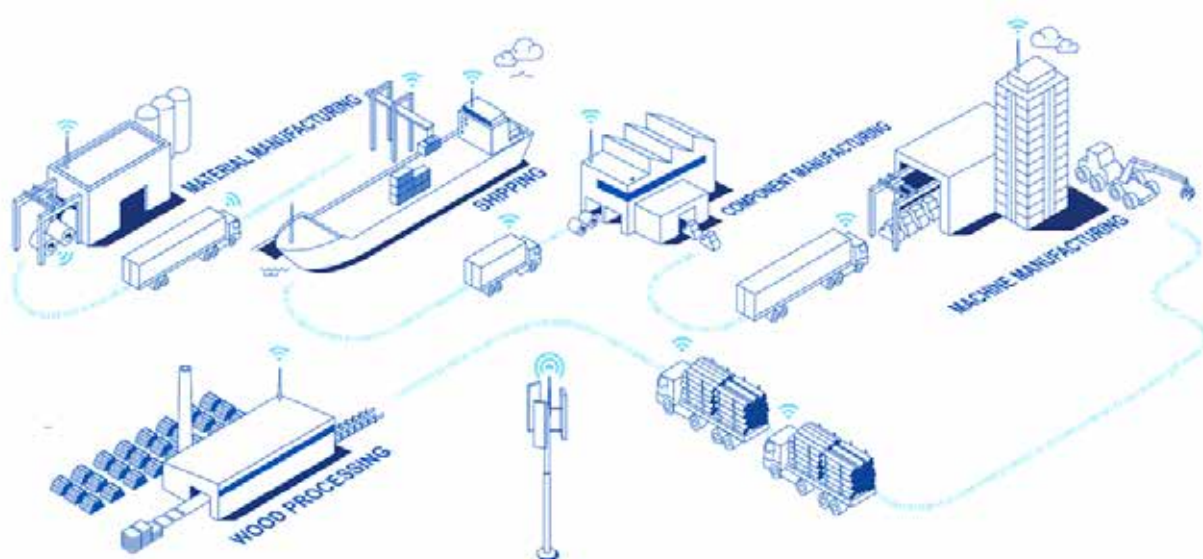3. Ecosystem business models for creating data-intensive solutions in ecosystem

Figure 14: The work will be driven by two industry led application domains: smart chain and smart factory..

134 PoDoCo grants awarded since 2015

A total of 134 grants have been awarded in the PoDoCo program since 2015.

– Especially small and medium-sized enterprises have been active and successful in the PoDoCo program. In the fall 2019 application round, 75% of the collaborative projects funded are focused on research and innovation in small and medium-sized enterprises, says Dr. Seppo Tikkanen, leader of the PoDoCo program.

The funded projects represent a wide range of disciplines and sectors, from medical to material technology and from applications that support children's emotional development to active magnetic bearing.

Here are some 2019 funded projects:

Weather forecasts with block accuracy

In the city, the weather conditions change from block to block. This is caused by different surface shapes. As the climate and environment change, it becomes even more important to understand the local weather conditions.

Vaisala's PoDoCo project is implemented in cooperation with the Finnish Meteorological Institute. Maria Filioglou explores in her research the wind forecasts of Helsinki using Vaisala's new wind lidars for remote sensing of wind.

– The expected results of the project will provide information for the development of Vaisala's Smart City business concept. The results will give a better understanding of how the best accuracy of urban environment weather forecasts could be best achieved on a block scale. Future citizen services, such as air taxis and drone-transport, need more accurate weather information to enable safer and more efficient operations, says Tapio Haarlaa, Head of Aviation, Strategy and Business Development, Vaisala's Weather and Environment business area.

Figure 15: Small and medium-sized enterprises use PoDoCo program actively.

Studied plants for wall and table

Martina Angeleri, currently a Researcher of Plant Molecular Biology at the University of Turku, is studying the effects of light in small greenhouses in her PoDoCo collaboration with Plantui Ltd. The chemical composition and growth of plants grown in Plantui's miniature greenhouses, which combine special light and aquaculture technology, has not been previously studied. The goal of the PoDoCo-project is to study the effects of changes in light conditions on the levels of vitamins and various antioxidant compounds as well sugars.

– In the project I am developing light conditions that affect the growth and taste of the plants. The idea is that everyone can enjoy the food they produce as they wish. I'll start my research with lettuce, kale and tomatoes. The intention is to expand to other plants later. I look forward to the project because food science has always been close to my heart, and now I can integrate it into my research, Angeleri says.

Urban green infrastructure

Long Xie, a doctoral candidate from the University of Helsinki, has been researching microbial growth in vertical plants for six years. His PoDoCo research concentrates on the indoor and outdoor green walls and it is done in cooperation with a Finnish SME, InnoGreen.

According to Xie's earlier investigations, beneficial microbes can have a major impact

DIMECC

on the function of plant walls. In outdoor walls, especially stormwater management capacity is of interest.

– We hope that the results of the study will inspire consumer interest in plant walls and provide evidence of stormwater management in the new outdoor plant wall structure we have under development. The research is vital for InnoGreen in order to develop the best possible product for creating an urban green infrastructure and stormwater management. This lays the foundations for successful internationalization, says Mikko Sonninen, founder member of Innogreen.

LIFEX – Midas

The ongoing MIDAS project develops more intelligent, connected products and new data based services. It increases data-analytics and AI expertise both in the participating companies and research institutes.

The research focus of the project is in modern machine learning techniques applied to a range of different industry sector problems related to working machine safety, robot perception, machine state recognition etc. The goal is to exploit the theoretical advances in order to enhance the level of technology of the participating companies and enable their future international growth. This also encourages companies to create their own platform economy strategies.

The research contribution concentrates on applied artificial intelligence. The key technologies are the following:

1. Deep learning for object detection. Intelligent perception of the environment has long been a key challenge in robot control, work machine safety and many other domains. Deep learning based approaches seem to promise acceptable level of accuracy.

2. Situational Awareness. Object detection alone is not enough for complete perception of the surroundings. To this aim, we will merge the object detection paradigm with the concept of situational awareness.

3. Learning to control from data (learning from demonstration and reinforcement learning). In robot control, learning from data is the holy grail for creating physical machines with human like skills, either through human demonstration or self-exploration (that is, reinforcement learning). Novel learning paradigms are transforming the way machines learn.

All four company participants have different focus areas:

Epec is a control system specialist for mobile machinery. In MIDAS project, Epec focuses on applying new sensor technologies and ML, which Epec considers as key technologies in developing next generation control systems and operator assistance systems for mobile heavy work machines. Project results are applicable for different industry customer segments such as agricultural, construction, forestry, material handling and mining machines.

Glaston delivers machines and services for production of heat-treated glass. Glaston is applying AI and ML both in product and service development. On product side, Glaston needs more adaptive diagnostics methods to monitor operation, performance and condition of glass processing machines. Already there is a fleet of Glaston tempering machines collecting data to Glaston cloud solution, which is constantly developed to tackle future needs. In cloud applications, new data analytics and ML is needed to enable predictive maintenance services and creating more automation and operator assistance in tempering machines.

Novatron is an expert in digitalized earthmoving solutions and delivers control systems for mobile machines in construction industry. Novatron sees that earthmoving business has a strong need

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of improved operator assistance solutions and more autonomous field operations. It considers AI and ML as key technologies to raise machine intelligence to a sufficient level. Novatron thinks that same technologies can be used for scaling the service business to global markets.

Nokia is renewing their business models with significant emphasis in health care research. Intelligent monitoring of well-being of family members is one focus area. Nokia sees that in aging population the demand for intelligent solutions for health care of senior family members will dramatically increase. As visual AI systems evolve for better performance, visual sensing and monitoring will play a crucial role in efficient monitoring and alert generation for caregivers. In MIDAS research Nokia builds a proof of concept monitoring solution including intelligent visual sensors, cloud computing engine and a mobile based application.

LIFEX – Dynavis

DYNAVIS research project concentrated on implementing virtual reality/augmented reality to industrial problems. The project involved Konecranes, KONE, Wärtsilä, 3DStudio Blomberg, Eeedo and two research units University of Tampere and VTT.

In the public research project DYNAVIS, VTT and TAUCHI (Tampere University) together with the participating companies, developed novel dynamic visualization solutions. The aim was to develop, in parallel, new tools and new work practices in actual industry cases. The results of the project include descriptions and illustrations of dynamic visualization concepts together with user evaluation results that reflect user acceptance of the concepts. The most promising concepts were implemented as demonstrators or prototypes for industrial pilots. The demonstrators and prototypes were evaluated with maintenance professionals.

Five dynamic visualization concepts were introduced: 1) Contextual guidance based on
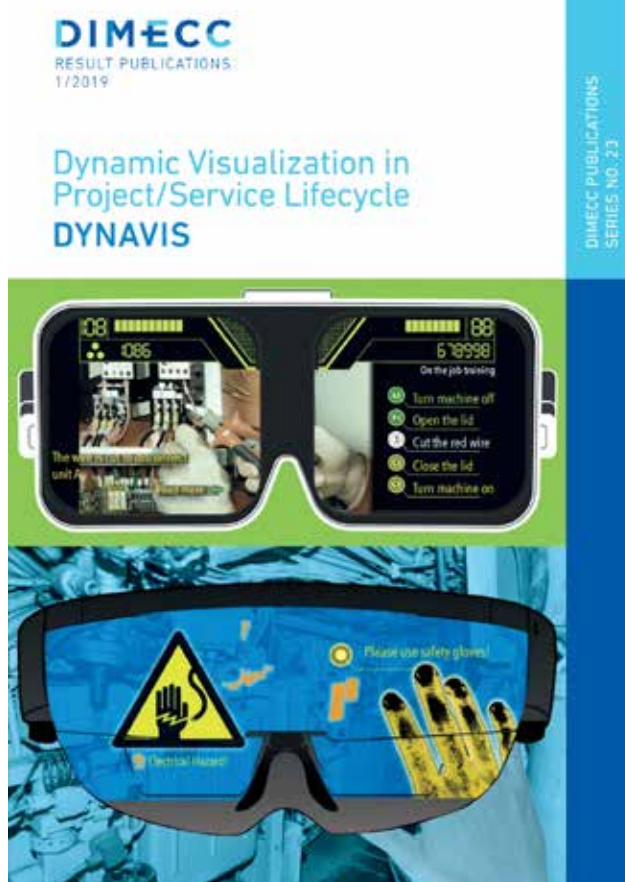

Figure 16: DYNAVIS project results are presented in DIMECC Result Publications 1/2019.

augmented reality (AR), 2) Captivating learning experience based on virtual reality (VR) and gamification, 3) Access to visual lifecycle data with digital twins, 4) Safety support with AR, and 5) Contextual knowledge sharing tools that support making tacit knowledge visible. In user evaluations of the concepts with industrial experts, the general impressions were mostly positive. The dynamic visualization approach and the concepts were found useful.

The implemented demonstrators and prototypes include: 1) AR-based workflow support together with a AR content authoring tool, 2) Contextual knowledge sharing with augmented reality, 3) Digital twin browser for easy access to maintenance data, 4) Speech interface for easy reporting, and 5) Mixed reality solution to support safety and learning experiences. User experience of the AR-based workflow support was positive

and the system was found useful, especially for training purposes. There were, however, some concerns related to the robustness of the system in actual field use. The users thought that the quality of maintenance work would improve with these kinds of tools as the tools would give access to up-to-date instructions and the tools would support everyone adopting the same work procedures.

Contextual knowledge sharing integrates virtual notes and communication platform with maintenance systems and activities. The solution supports creating and sharing maintenance target specific visual information. Overall attitude of the test users was very positive towards the solution, and they expected that the solution will improve, ease, and speed up field reporting. Challenges were seen in content moderation and possible information overflow.

The implementation of the Digital twin browser has given understanding of the possibilities of such browsers. Digital twin browser has been utilized in communicating the design of Ruukki's near zero energy building tothe visitors but further usage possibilities are seen in maintenance.

Speech interaction will support hands-free operation. Test users thought that the solution would improve the quality of maintenance reports and the reports can be submitted sooner. At the same time, the solution will simplify the maintenance technician's reporting task. As the attitudes towards speech-based reporting are positive and both workers and organizations are ready to utilize it, there seems to be great potential.

Augmented and virtual reality systems in maintenance work can support safety as illustrated with the implemented mixed reality solution. AR can support technicians in their tasks, increase safety, and help avoiding unnecessary risks. The combination of AR and VR provides an appealing and practical learning environment.

LIFEX – IVM

LIFEX program's IVM project focuses on new innovative vibration management solutions. Based on earlier successful marine applications a novel damping and design concept is applied to several new industry applications.

Vibrol Oy's product ReKi™ Resonance Killer was developed further in IVM. The companies involved in using the breakthrough technology in this program were Wärtsilä, Meyer Turku, Sampo Rosenlew, BRP-Finland and SimulOne. The research organizations are Aalto University and VTT. The goal was to improve mathematical simulation model of the ReKi™ to be available in structural design and do feasibility studies in new applications.

In ships the reduction of vibration levels will give and advantage in passenger comfort. There's a possibility to reduce ship mass and bring reliability and maintenance advantages.

Smart Steel

In Smart Steel, the first year resulted in several activities and lines of research. In addition, some preliminary results were identified.

A successful pre-study was conducted by Luleå Tekniska Universitet on the use of speckles for fingerprinting on both flat steels and tubes. More robust Steel Marking possibilities were investigated by SWERIM in close cooperation with some start-ups, technology companies and service providers.

Dissemination activities were carried out through conferences, events and meetings in Sweden, Finland and Europe in general.

Learnings on possible new data business models and complex interaction between suppliers, customers and partners were developed and shared in two workshops.

Automated maritime traffic breaking the mold

Digitalization and environmental technologies have been the big trends in maritime traffic for the past decade at least. Environmental technologies have been driven by legislative efforts whereas digitalization has its origin in the technological development in various other fields. Both trends have resulted in numerous innovations being introduced and taken into use in the maritime domain. One of the most visible areas of technologies in the digital domain, has been autonomy and related technologies. By related technologies, I refer to all advances in automated operations, such as remote operation and increasingly sophisticated decision support systems.

A few years back autonomous and remote-controlled ships received a lot of hype in the industry. The publicity hype was met with both enthusiasm and skepticism in the field of maritime traffic (to be honest, mostly skepticism). To me it feels as if we had passed the stage of publicity hype and entered the stage of developing business as usual. I have realized that as we have entered this new stage, some people assume that not as much is happening as the big headlines are not as many and YouTube videos are not popping up as frequently as before.

But what are we to expect then? The suppliers have shown that the technologies are ready, new products have entered the market and even the regulations are being reviewed. Are we going to see the bright new autonomous future with mostly autonomous maritime traffic in a few years? Anyone familiar with maritime traffic can tell you that it will take more than that. The exchange rate of current fleet is rather low and it will for sure take decades before we even have a moderate autonomous fleet in operation.

Another issue is the allusiveness of the business case for the new technologies. I have been cited the lack of business case as the biggest obstacle to the deployment of these technologies at many events. The problem is not easy to solve, as ships in general are designed to a specific transportation need on a specific route. We need to look at the feasibility on a general level, but also on specific business case level. This is made all the more difficult by the fact that in the new digital world transportation chains are linked. In order to evaluate the feasibility of a particular technology for a ship, we also need to consider the entire infrastructure from satellite links to harbor facilities.

There are also other obstacles in the way of the new technologies. In order to transfer these new ships with autonomous technology between countries, international regulation is needed. The International Maritime Organization (IMO) has started the work, but it is slow going. There are also many fears among the general public and the practitioners regarding the new technologies and the dangers they could bring. Some of the fears are unfounded, others are important factors that need to be addressed both technologically and through open communication with the stakeholders.

Ships and equipment onboard are often operated in isolation. The new digital technologies require interconnectivity. So how is one to go about to change the way an entire industry has been working for hundreds of years? The answer lies in cooperation. It is not a coincidence that several cooperation platforms have sprung up around the world to develop these technologies. Now we need true international cooperation to solve the practical problems slowing down the adaptation of these technologies. DIMECC has a long experience in enabling cooperation towards digitalization. The DIMECC-led ecosystem One Sea is well on the way to become the means of this international cooperation.

Päivi Haikkola
Senior Ecosystem Lead at DIMECC

STAKEHOLDER RELATIONSHIPS

Support and assistance from following non-shareholder organisations supported in DIMECC strategy and operations:

Beijing Academy of Science and Technology
CECIMO
Chinese Academy of Sciences – Qingdao Academy of Intelligent Industries (CAS-QAII)
Clic Innovation Ltd.
Confederation of Finnish Industries EK
DFHK Finnish German chamber of Commerce
EFFRA
Finnish Marine Industries
Finnish Ministry of Employment and the Economy
Flanders Make
It'sOWL Clustermanagement GmbH
Linz Centre for Competence in Mechatronics (LCM)
Metallinjalostajat ry
Ohjelmistoyrittäjät ry
Orgalime
PiiA, Sweden
Politecnico di Milano
Production2030, Sweden
RWTH Aachen
Upper Austrian Research GmbH
SPIRE
SYMME, France
Business Finland
Finnish Technology Industries
ZPark

Following suppliers were used for services:

Datalink - PoDoCo™
Fondia Oy - Legal services
Futurice - Machine Learning Academy
Gaia Consulting Oy - Demobooster™
Hopiasepat Oy - Impact analysis & communications
Inno-W Oy - Web pages & research portal
Koodiviidakko Oy - Communication platforms
Meom Oy - Web pages
Triuvare Oy - IT infrastructure
Talenom Oy - Accounting

Management Events Studio - Manufacturing Performance Days™

COMMUNICATIONS

The primary communications between DIMECC and public media were through website www.dimecc.com. Several DIMECC personnel interviews, articles and technology policy comments were published in Finland and internationally.

DIMECC was active through following communications:

- DIMECC In-Brief information package was updated
- Five DIMECC Newsletters and 8 FIIF newsletters were published in digital form
- Co-creation service leaflets were branded and printed
- MPD2019 attracted wide audience in Tampere and through media
- One new DIMECC publication series report was published on print and one on-line.
- DIMECC was active in social media channels in Twitter and LinkedIn.
- DIMECC Annual Seminar 2019 – Digital Factory was organised with Combient

Figure 17. DIMECC's Annual Seminar 2019 – Digital Factory was held in Helsinki with Combient.

KEY FINANCIAL INFORMATION

The financial year 2019 of DIMECC ended December 31st. Due to the special role of DIMECC as a non-profit company, the key financial information is presented in short form and without traditional business performance measures.

Income	
Net sales	1 122 813,03
DIMECC program management fees	203 304,58
Other income	639 186,99
Total income	**1 965 304,60**
Expenses	
Materials and services	-412 403,34
Staff costs	-1 114 315,26
External program management cost	-40 000,00
Other expenses from operations	-569 780,35
Total expenses	**-2 136 498,95**
Operating loss	**-171 194,35**
Financial income	36 803,98
Loss for the year	**-134 390,37**

Assets	
Stocks, shares, and fixed assets	826 761,80
Long-term investments	10 593,00
Short-term receivables	269 080,95
Cash and bank balances	2 044 765,55
Total assets	**3 151 201,30**
Liabilities and shareholders' equity	
Restricted equity	1 146 500,00
Non-restricted equity	2 302 113,91
Net losses from previous years	-424 508,08
Net loss for the year	-134 390,37
Liabilities	**261 485,84**
Total liabilities and shareholders' equity	**3 151 201,30**

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