DIMECC

FINAL REPORT 2/2017

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SERIES NO.14

2014 – 2017

REBUS – Towards Relational Business Practices

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Wide and deep industrial commitment strengthens DIMECC's forerunning role in EU

During the last three REBUS years, we have witnessed an extraordinary period in the Finnish R&D&I landscape. The development has been like a double-edged sword: On one hand, the European Commission and our cooperation partners all over the world have identified Finland as the European forerunner in the implementation of the public private partnership (PPP) model for digitalizing industry. On the other hand, challenges in the Finnish public economy have led us to a situation in which Finland is one of the few countries in the EU without an openly stated industry-led and publicly supported digitalization strategy.

Our innovation platform, which is a form of networking, has enlarged, widened, and increased the impact and efficiency of collaboration between companies, universities, and research institutions. Since 2008, we have led industrial renewal and the dedicated PPP platform in Finland. The results are significant: Companies participating in our platform totally outperform outsiders. Global breakthrough concepts and innovations are reported in our programs on a continuous basis. "Uber of the Seas," one of the most well-known and digital REBUS outcomes, won the DIMECC Prize in 2015.

Many highlights from the REBUS results are introduced in this final report. I would like to thank all the REBUS actors for many years of strong cooperation and the dedicated use of everybody's time to create the PPP model that we know today. In addition, many new co-creation services have been started, based on the visionary needs identified because of the implementation of REBUS. As an example, I would like to mention the establishment of the Autonomous Ships Alliance. The objective of the Alliance is to create the world's first autonomous marine transport system in the Baltic Sea. Ships will be fully autonomous by 2025. The first pilots and applications in the months to come are cargo ships and freight. Finland has world-class marine technologies and ICT competencies. This DIMECC-led Alliance is a natural continuum in our long-term and determined R&D&I facilitation, in which we boost cross-industrial innovation and lead the industry's digital transformation.

The DIMECC co-creation platform makes a significant innovation-based investment wave happen. This has been seen, for example, in Turku, where our shareholder Meyer now invests in physical equipment,

while the necessary intangible investments were made in our programs during 2009–2014. This has been seen, for example, in Southern Ostrobothnia, where Prima Power is entering, after participating in our programs, a totally new value adding service business. We create competitiveness, jobs, and well-being through innovations. Technology Industries of Finland announced, on September 1st 2016, that DIMECC is the platform to create 100 000 new jobs in Finland.

Our role in the European innovation landscape and PPP pioneering has not only been recognized by our customers, but also by labor unions, by economists from many perspectives, and at the highest possible level: the EU Commission. Industry and academia have taken their responsibility for the structural renewal needed now in Finland. We created DIMECC Ltd. by merging Digile Ltd. into Fimecc Ltd. We have all the digital competencies, and the industrial digitalization agenda is ready to be executed.

Since the start of our company, networks have been, at the same time, a research object, a research method, and the basis for a totally new philosophy in getting multidisciplinary and cross-industrial things to happen. REBUS represents all this. I hope readers enjoy this versatile collection of results on one of the most important issues to be managed in co-creation: networking.

Dr. **Harri Kulmala**
CEO
DIMECC Ltd

Let's play together!

Partnerships. Alliances. Networks. Ecosystems. The phenomenon is not new, and there is a broad variety of concepts describing its different forms. In short, it means collaboration, working together, for shared purposes, and to generate benefits for all participants. On the DIMECC REBUS program, we have approached the "relational business practices" through system thinking and aiming to challenge the forerunner firms to take major leaps in developing their business, as well as fundamentally to change their underlying mindsets of managerial behavior.

The REBUS consortium itself has several collaboration levels; it was both a network of organizations and a network of individuals. Altogether, more than 300 people – both business professionals from 22 companies and academics from 7 research partners – have participated directly in the DIMECC REBUS program. In addition, the program had a strong focus on global networks and research collaboration, with a total of 16 international research partners.

As such, the collaboration within the consortium requires different levels of coordination, and the main task of the program manager has been to ensure effective and innovative collaboration between the different parties. This kind of network management is often compared to orchestration, which is a metaphor describing a conductor leading an orchestra playing a common melody. I would compare the tasks of the program manager more to the work of a roadie. In other words, the role of the program manager is to make sure that everything is ready for the orchestra, so that the instrumentalists can focus on playing. On the other hand, it is also the job of a promoter, making sure that the tour is on schedule. During the program period, we were challenged with budget and time cuts, and therefore definitely needed special attention to that.

The results of the DIMECC REBUS program show that we have all succeeded in playing together in many ways, and this publication presents our novel compositions through 20 practical business case examples. Following system thinking, we have organized the cases in this publication from macro to micro level. In other words, we start from cases describing the change process in the business ecosystems (Part I), continue with network structures (Parts II – III), and turn to relationship management (Part IV). Finally, we explore the network capabilities of case

companies and explore state-of-art contracting as a network practice (Part V).

Besides the practical outcomes, the academic results, with more than 120 international journal and conference publications, are engrossing. Ambitious scientific goals included a new theoretical approach: the systems approach to networking and a jointly written book published by Palgrave Macmillan and entitled "Practices for Network Management," with 36 REBUS authors involved, is a starting point for the broader academic discussion. On the other hand, it also shows the strength of the collaboration, as at the beginning of the program work, the decision was that all the research institutes would together implement the future-oriented research task.

I have enjoyed working with the DIMECC REBUS consortium and have also learnt novel approaches, found new tools, and met excellent players – both researchers and practitioners – within the area of collaborative and networked business. I wish to thank all the members of the REBUS consortium, as well as the DIMECC crew; you have made this an amazing tour. I believe that we will also find new opportunities to play together again, sooner or later.

Dr. **Katri Valkokari**
DIMECC REBUS Program Manager
VTT Technical Research Center of Finland Ltd

Energy, excellence and excitement make things happen

Wärtsilä Energy Solutions' vision and strategic goal is that:

- Customers recognize us as the best energy solution provider worldwide.
- We are fast, innovative, reliable and offer a broad range of environmentally sound solutions.
- We are the most attractive brand to work with, for our customers and our people.

Wärtsilä's flexible and efficient energy solutions enable the transition to a more sustainable and modern energy infrastructure, including solar and wind power.

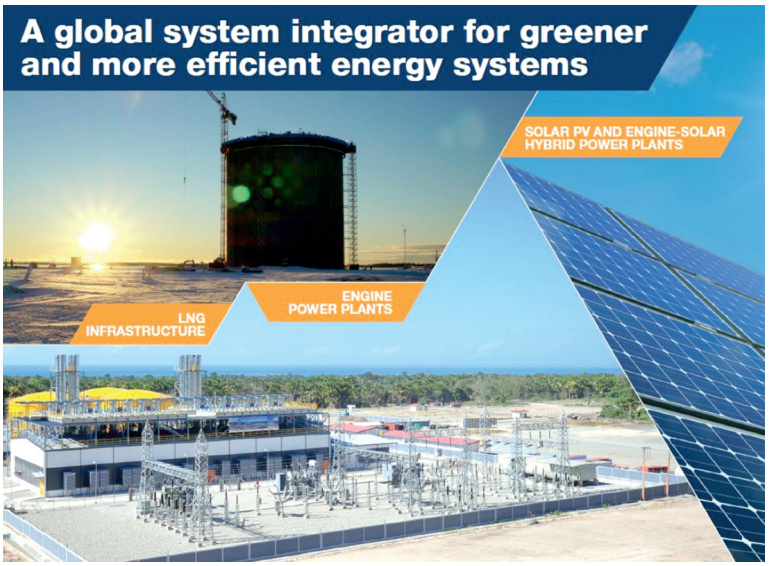

Figure 1. Wärtsilä Energy Solutions offering

Rapid changes in the business environment mean that more and more large, complex projects need a different organization, governance, and attitude to stay flexible, efficient, and effective. The project boundaries are changing, and more demanding contract structures with complex stakeholder set-ups need to be managed.

Wärtsilä joined the DIMECC REBUS program with the ambition that the project would develop a new flexible way of working with agility, to respond quickly to changing market needs for sales and project execution in complex projects.

The objective was to achieve a substantial change in the business mind-set and practices, so that boundary-spanning business model designs are implemented to enable successful and delivery-efficient operations in the business landscape.

The REBUS project catalyzed the developments, and we created and implemented new practices, tools, processes, and structures, enabling operations according to the boundary-spanning business model.

To mention just a few:

A collaboration tool for project management, connecting and sharing information across the whole project stakeholder spectrum, including a tablet extension for digitalizing site work.

We productized our project services, which are the backbone of project work, into clear value packages for our customers.

The REBUS consortium provided a network and platform for different business and academic dialogs and benchmarks.

We can proudly say that Wärtsilä Energy Solutions has now developed even stronger world-class capabilities to quickly ramp up leadership of complex projects with multiple stakeholders within growing business boundaries, and to provide value to all stakeholders.

Antti Kämi

Vice President, Engine Power Plants
Energy Solutions
Wärtsilä Corporation

Where scientific breakthroughs meet managerial practices

Like all the participatory development programs in DIMECC's portfolio, REBUS was built on the assumption that academic and practical knowledge can be integrated in a joint program structure in order to achieve both theoretically and practically relevant results. However, the ideal of academia/business cooperation is not easy to implement due to the different expectations of the parties involved. Firms typically think highly of concrete improvements in their practices; DIMECC and TEKES as coordinators and funders expect transferrable results in order to ensure wide impact; and research institutes seek interesting research results to contribute to theory-building. These varying goals necessitate different processes for implementation and different time frames for results to be realized. These issues were explicitly considered when we planned the REBUS program in 2013, as the figure below indicates. This comprises a slide by which we tried to communicate the very nature of the program to all the stakeholders involved.

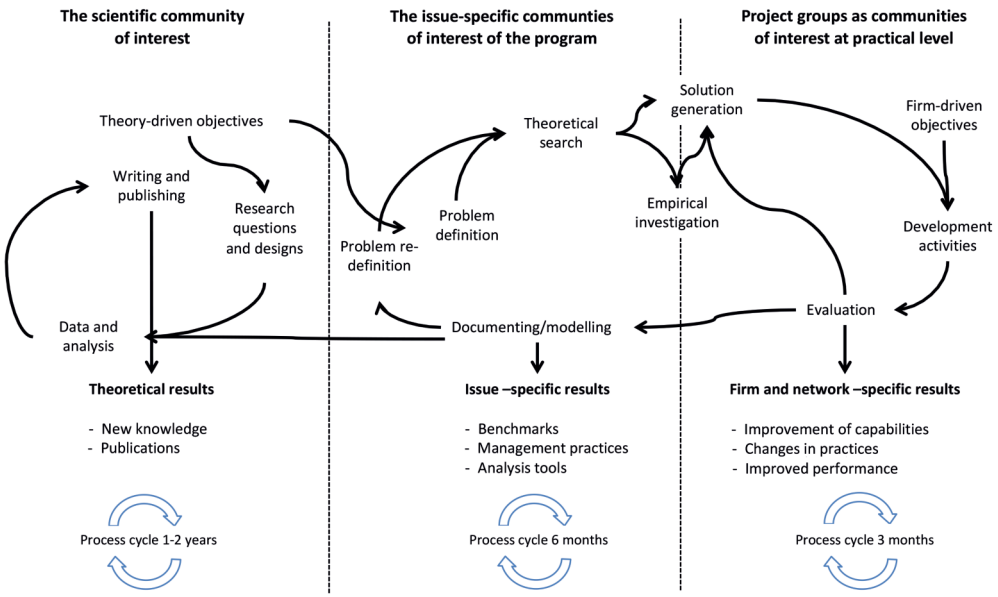

Figure 1. The program as problem solving processes across boundaries

The DIMECC REBUS program has definitively fulfilled the goals set. This book offers a review of the firm- and network-specific results achieved during the development program. As can be seen, a lot of interesting and practical work has been done during the three and a half years. Another book by us (*Practices for network management – In search of collaborative advantage*), published by Palgrave Macmillan, offers a collection of network management tools to be used in an inter-organizational context. The nature of this book is in between theory and practice, and it is our ambition, through this, to achieve both a theoretical contribution and practical relevance. In addition to these two collections of the results of the program, REBUS researchers have published a great number of scientific articles in international journals.

On behalf of the team of academics and practitioners that originally built the program, I thank all the academic and practical contributors of the program. You implemented what was planned and even more. In addition, a lot of the results of the program are still to come!

Prof. **Jukka Vesalainen**
University of Vaasa (Networked Value Systems)

Program Key Characteristics

Company partners (23):

Algol Technics, Bore, Chiller, Finn Power, JTK Power, Kemppi, Kone, Kuusakoski, Leinolat Group, Lännen Tractors, MacGregor, Meriaura, Mervento, Napa, Nordkalk, Rauma Marine Construction, Rolls-Royce, Scanfil, SOP Metal, Technip Offshore Finland, Tieto Finland, Wärtsilä Finland, Yara Suomi.

Research institution partners (7):

Aalto University, Tampere University of Technology (Pori), University of Tampere, University of Turku, University of Vaasa, VTT Technical Research Center of Finland Ltd, Åbo Akademi University.

Volumes:

Duration:	1.1.2014 – 30.6.2017
Budget:	22.8 M€
Company budget:	11.9 M€
Research institute budget:	10.9 M€
People involved:	297 persons: 209 industrial experts and 88 researchers

Results:

Number of publications:	155
Number of doctoral theses:	8
Number of other theses:	14
Patents and invention disclosures:	0
Research exchange months:	55

For theses, see page 148

Introduction – the journey forward after REBUS

Background

The DIMECC REBUS program (2014 – 2017) has been an essential phase in continuing the research work that was started in DIMECC's Innovation and Network (I&N) program (2009 – 2014). In these two programs, the overarching theme has been to develop more sustainable ways of planning, executing, and operating industrial and infrastructure investments. Initially, the focus was especially on networks around companies delivering systems of technology and integrated solutions. The learning was that a fundamental understanding of the overall business ecosystem is needed when developing or disrupting mature industries based on new technology and ICT solutions. In DIMECC REBUS, the main aim has been to seek ways of moving from transactional short-term interactions to short and long-term relational interactions in delivering large business ecosystem transformation projects across their life-cycles.

Studies of alternative governance structures and collaboration schemes have given us an increased understanding of how different actors can be engaged in a way that creates more attractive and effective investments. One essential insight that has come out of the research into these investments and the contexts in which they are placed is that providing enhanced benefits to all relevant actors is a prerequisite for long-term, successful outcomes. This has guided the research toward identifying new governance and organization structures for enabling effective collaboration using contingently selected coordination mechanisms, and the use of new incentives to align interests of all stakeholders. An essential part of the research has included various methods of mapping, visualizing, and modeling the overall business ecosystems, into which any specific investment will be integrated. Thus, the research stream on business ecosystems is one of the central outcomes from the DIMECC REBUS program, and one that also needs further attention.

Still, on the journey forward, it will not be sufficient to focus only on business ecosystems as a phenomenon. We have to continue to try to grasp various, perhaps even more fundamental, issues, such as: How do actors interact within these systems of systems? What are the new forms of interaction and coordination enabled by new data sensing, IT, and AI technologies? How do we start to manage ecosystem changes? First of all, we have to make the knowledge actionable, while still connected to the related ecosystem. The newly published DIMECC outcome, REBUS book 'Practices for Network Management – In Search of Collaborative

Advantage' (by Palgrave Macmillan)[1] on network management practices, is certainly a step in this direction. Analytical building blocks to achieve this ambition are concepts, methods, and tools to simulate the functioning of the overall market and its actors, including the various business models, and the risk, gain, and responsibility allocation mechanisms, as well as the resulting materials, energy, financial, and information flows. **Change management and strategic processes in which we simultaneously consider several organizations' strategies become vital.** Even more important still will be the methodologies for how we are able to calculate how capital is employed and re-employed, as business ecosystems are value creation structures. We also need methodologies to simulate material and information flows, enabling us to visualize and optimize the ecosystem continuously based on evolving experience. The required behavioral and re-education changes for actors and organizations in the changing business ecosystem is another critical area that must be addressed as part of the broader area of governance and collaboration mechanisms.

Below, we describe essential changes in the context in which these novel industrial and infrastructure investments will be conducted in the coming years. After that, we discuss some of the central themes to consider in the way value is created in future investments, and finally how the changes in overall context and value creation are likely to impact how we govern and organize these investments in the future. We end with a forward-looking synthesis that guides the future priorities in the research area.

Changes in context

Mature industries are facing a remarkable disruption. This disruption implies significant changes to multiple actors within many business ecosystems. An enhanced understanding of both the means and the methods for managing business ecosystem disruption are essential to ensure their ultimate success. Therefore, modeling of markets and market dynamics, and also modeling processes of material, capital, and information flows, will be essential in grasping and enabling the extensive changes that will be needed to get to 21st-century "Industry 4.0" business ecosystems. The DIMECC REBUS program has focused especially on sea-related logistics and energy systems, including renewables (and various supply chains within them). Globally, these two segments are likely to be the largest investment sectors during the next few decades. Successful performance – economic, environmental, and social – of these investments will have a large beneficial impact on our society. The initial

1 Vesalainen, J., Valkokari, K. & Hellström, M. (eds.) 2017. Practices for network management – In search of collaborative advantage. UK: Palgrave Macmillan.

DIMECC REBUS findings have revealed that enhancing the performance of these two segments beyond their current, mature, fragmented, and inefficient form offers huge potential in contributing to the welfare of our societies.

The context will change with increasing emphasis on sustainability and key enabling technologies, such as digitalization, data sensing, analytics, and renewable and more efficient energy production, distribution, and consumption. The context will become even more connected and adaptive through artificial intelligence, IoT, online sensor technology, and self-learning algorithms that improve themselves. Structured data is already available, enabling new types of analytics that deepen our knowledge of behavioral issues in a specific context. With real-time sensors, our capabilities to adapt and evolve within the context will improve significantly. This also makes knowledge more actionable for implementation. Our capability to identify and register phenomena and patterns of importance improves. Our biggest challenge will be the interwoven interaction between building a better society and defeating a series of environmental threats. Thereby, we need to become better at utilizing data for that purpose. Different contexts can be analyzed and visualized through the ecosystem concept. This forms a typology of different ecosystems with significant similarities but also with unique, specific characteristics. In creating a typology of ecosystems, more coherent research about various systems and systems of systems can be achieved. Among these ecosystems, questions such as what the particular value creation processes are, which business models exist, and how these should be coordinated. What are the different technologies enabling or restricting digital disruption. How do various stakeholders relate to a specific ecosystem?

Changes in mature industries are even more complicated, due the existing policies, rules, regulations, and laws that have evolved over time to enforce and institutionalize certain ways of acting and organizing. These lock-ins and the resulting inertia need more attention, and new policies are needed to induce change. Work done by researchers such as Professor Mazzucato ("Entrepreneurial State")[2] become especially relevant as they unlock and demystify insights about how the public and the private sectors can collaborate more effectively in creating new rules of the game, and thereby foster a new logic in these two key business ecosystems and others.

How will value be created in the future?

The changes in the context and the enabling means afford new opportunities for the way in which value will be created in the future. "Uberization"

2 Mazzucato, M. 2015, The Entrepreneurial State (US Edition), Public Affairs. ISBN 9781610396134.

– the sharing economy, Industry 4.0 ecologies, and functionality are prominent examples of this. Decomposition of processes based on new, modular products and process architectures becomes essential in composing the new type of collaboration between different actors within the ecosystem. Research efforts to explore the new types of coordination between actors that emerge should be given priority. As we emphasize above, new technologies and digitalization will impact future ways of working and how value is created. As the results from the DIMECC REBUS program show, paying attention to the behavioral models and understanding the counterparty relationships and the formation of trustful long-term collaboration is one of the key challenges. **When grasping the benefit from a specific investment in one part of the business ecosystem, it is not enough to show the returns just for that particular investment; the system benefits also need to be identified.** Building a bridge or automating a port give both direct benefits and benefits far beyond the immediate counterparties in the implementation of such solutions. In the feasibility phase of a specific investment, the system benefits need to be understood and considered.

Traditionally, large investments in industry transformation have been initiated and primarily funded by governments. Today, the situation has changed, and new financing mechanisms and actors are an essential part of planning and executing large business ecosystem investments. From the private sector side, contractors, system suppliers, and institutional investors are expected to take responsibility for financing new infrastructure assets. This impacts the ways in which risk, incentives, and responsibilities are allocated, and creates a need for new types of regulations and policies.

Changes in how we will govern and organize in the future

The changes in value creation also have impacts on how we organize and govern the individual business models and overall business ecosystems. What are the new incentives and earning logics emerging, what type of capabilities are needed and how can the interactions be organized and governed in the most trustworthy and efficient way?

One of the spearhead results is the new short-sea logistics concept that has been developed, labeled as the "Uber of the Seas". The new concept includes and transforms the overall end-to-end sea cargo ecosystem, including the cargo owners, land transportation system, ports, ship owners, and end customers. The renewal of this ecosystem is based on four main innovations: an open digital marketplace, containerization of bulk products for transportation, alliance-based governance forms for shipbuilding and ship operation, and new sources and methods of financing and employing capital. This freight logistics business ecosystem is

a prime example of how a mature industry can be renewed in a controlled manner. It originates with the customer's logistical needs, utilizing technology, data, and decomposition and reformulation of the interaction processes. **Mature industries tend to lean asymptotically toward "Nash Equilibrium" lock-ins in their processes, due to legislation, tradition, and general protection of each individual actor's benefits.** Mature industries also have extensive assets – often heavily leveraged with debt – that cannot be renewed overnight. This needs to be carefully considered in building roadmaps for the way in which disruption takes place and how it can evolve into a new, more optimal and more sustainable, ecosystem. The balance between exploration and exploitation therefore becomes essential in this renewal. The exploitation of existing assets to enable exploration and development of new assets is often a sustainable path. In short-sea shipping, the minimum viable product for initiating the renewal and increasing digitalization is by introducing an open digital marketplace as a match-maker for finding and committing to purchase available cargo space. The benefit from this is the flow of data and analytics, which can then be utilized in further development of the marketplace and then, gradually, also in financing new investments in cargo-handling equipment, automation, and robotics, in turn leading to more automated ports and unmanned, autonomous ships along with new coordination schemes between the actors within the ecosystem.

We generally agree about the potential of new ICT technology to enhance system productivity and efficiency, but one challenge is that participants do not have sufficiently robust models to utilize and implement the ICT technology with confidence. Old governance structures do not allow for making investment decisions that include uncertainty brought on by new technology. Therefore, it is important to identify renewal paths that gradually expose the potential and provide participants with confidence that the technology is reliable. Thereby, the market risk decreases, enabling the flow of larger investments. It also enlarges our focus from merely a single organization's success to the overall system's success.

Areas of relevance in future research

A general note is that many investments that include new technology and digitalization are hampered by uncertainty caused by both the technology risk and market risk. The Paris climate agreement and its roadmap is already now lagging badly behind its CO2 reduction goals. As we have described above, much of the challenge is in our lack of knowledge to transform overall industries. Means and methods are needed to enable these changes in the most favorable, controlled, and rapid way. Therefore, continuing the research path brings us to the fundamental question of how ecosystem change can be fostered and accel-

erated. We argue that this is a relevant theoretical question and also has urgency for, for example, public sector and various suppliers of new technologies. We have identified three areas of priority for the way forward:

1. "Physics" of the ecosystem
2. "Chemistry" of the ecosystem
3. "Biology" of the ecosystem

Research with agent-based behavioral models can enable us to envision and evaluate the new way of acting and can help us to visualize how the "physics" of the ecosystem can work in the future. These models are based on simulating "information exchanges" – meaning the required information flow, subject to the limited capacity ("bounded rationality"[3]) of actors to interact and coordinate, and the "economic exchanges" – that is, how capital is employed in the system and the flow of goods, services, and funds. These models can provide a basis for modeling and evaluating alternative forms of human capital allocation and risk sharing, ecosystem governance structure, incentives, and contractual agreements. One reason for the inertia in changing a business ecosystem to improve value creation is because of the existing human capital deployed in current employees with their existing skills, knowledge, and relationships; in the physical assets (power plants, ships, trucks, etc.); and in intangible assets (organization structures, networks of supply and distribution contracts, patents). In addition to requiring the employment of new capital, changing the ecosystem means changing the capital flows, and potentially endangering the earning capacity of existing deployed capital of all three kinds. Complex ecosystems, such as energy and transport, involve significant amounts of capital that are already deployed and involve many different private and public actors that are interconnected in different capital flows in the forms of corporate earnings and tax revenues.

The "chemistry" of the ecosystems is the domain of research in various forms of interaction and relational issues, such as trust, confidence, willingness to participate, understanding various personalities, different sets of cross-national institutions, meeting challenges, and so on, that also impact on contracts and the rules of the game. This is more difficult to model in agent-based systems, although some early tests have been made in this regard (Levitt, 2012[4]). Aligning goals will require us to develop models of multi-organizational strategic interests and processes as a basis for joint governance structures. Considerable work has been done in this research space that can serve as points of departure for research in this area.

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3 March, J.G. & Simon, H. 1958. Organisations. John Wiley & Sons, 2nd edition, Blackwell, 1993.

4 Levitt, R.E. 2012. The virtual design team (VDT): Designing project organizations as engineers design bridges. Journal of Organizational Design, 1(2), 14–41.

The "biology" of an ecosystem is the ability of the system to reproduce itself and adapt over time to changes in its environment. Techniques like modular design enable individual components of the ecosystem to adapt within a fixed system architecture; more radical innovation that affects the product and process interfaces between multiple subsystems is much more difficult to do and typically requires legally or virtually reintegrating the supply chain in the ecosystem in order to allow for shared learning during the process of systemic innovation. The most demanding part of transforming ecosystems is to identify where to begin and how to time and sequence specific changes within the overall system: the biology of the ecosystem. A solid threshold is still to fully understand the customers' needs, and especially, their growing desire for their needs to direct the priorities of change within the ecosystem. Another initial priority is to start to collect data from the ecosystem systematically, to learn by measuring impacts from the actions taken. Points of weakness in the system are enablers to initiate change, as well as new technologies. In complex, mature ecosystems, like transport and energy, there are business models that are out of date but still dominant. Moreover, they are highly resistant to change, because of the large amounts of locked-in human, physical, and relational capital in the current ecosystem. At the same time, these are the weak points of the existing ecosystem. When triggered, these weak points can lead to a sequence of events that eventually tips the value creation logic in favor of the new ecosystem. Through concepts like "Industry 4.0," we have certain characteristics and goals that can direct us toward the new state of ecosystems. Examples are increased connectivity both vertically and horizontally to create cyber-physical systems, digitalized cross-cutting business models such as open marketplaces, ubiquitous low-cost sensing technologies, increasingly powerful data analytics, ever-more precise location detection technologies, digital trust through openness, and data security.

Visualization of the ecosystem, including the present state of information flows, involved business models and organizations, types of coordination, and how capital is employed, provide the basis to create a simulation model that can be used to envision future modes of the ecosystem. A simulation model can also be utilized in grasping the impact of specific investments, to evaluate the benefits they bring, not only in a specific part of the system but rather the value they create for the overall ecosystem. As the change proceeds, there are impacts on individuals and organizations inside and surrounding the business ecosystem – both favorable and unfavorable – so understanding the behavioral aspects becomes essential. To support these changes, we increasingly need to research how to plan and foresee these changes through, for example, agent-based modeling, connecting various coordination forms, and their impact on governance structures, risk, and incentives.

These simulation models can be built by utilizing various types of categories. For example, a vertical hierarchy could be described as an ecosystem consisting of various business models that have different types of coordination modes that dictate the governance structures. Simulations can be used to model and simulate virtual worlds, thereby exploring various alternatives to create categories around ecosystems, and also, as mentioned above, to identify typologies of ecosystem that would be helpful in understanding, planning, and conducting changes in a given ecosystem. Some of the central questions that need to be addressed in the process of changing ecosystems are:

- How do we identify which innovations could potentially transform the ecosystem, and the sequence in which they should be introduced in order to change the ecosystem most successfully?
- How do we calculate the amounts and sources of investment capital – human, physical, and relational – needed to bring about the desired change in the business ecosystem, and how much incremental value could these kinds of capital investments generate for the ecosystem, as well as for its participants? Any revealed "broken agency," – misalignments between investments and returns for one or more participants – can be addressed through various kinds of financial arbitrage by informed third parties.
- How do we identify the amount, type, and structure of capital opposing ecosystem change, and how could it oppose?
- What are the central interaction and coordination mechanisms fostering or hindering the changes in the ecosystem?

To enable new investments, we need methods and processes to align several organizations' strategies and incentivize their willingness to participate in the disruption and evolution of the ecosystem. Change is carried out by a group of organizations that are allied on a strategic level by a supra-organizational strategy to which they commit. The strategic conflict between the old and the new ecosystem can be seen as a conflict of narratives waged by means of the forms of capital we have described above. The existing ecosystem is likely to resist change, since any change is a challenge to the existing employed capital, which could become "stranded capital," and hence a threat to future earnings. Therefore, it is important to understand the structure of forces for and against the ecosystem change. An example of this is the work done by MIT researchers Wen Feng and Don Lessard on stakeholder power, based on direct and indirect social and economic exchanges in an ecosystem.[5]

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5 Feng, W., Lessard, D. R. , Cameron, B. G. 2013. Stakeholders, issues, and the shaping of large engineering projects. Engineering Project Organization Conference (EPOC). January 9–11, 2013. Winter Park. 1–44.

New organizational forms emerge – initially new legally or virtually integrated firms emerge, while the system architecture of the ecosystem is still in flux. Once it settles down to a new set of standards, the supply chain once again fragments and the ecosystem can become stable, with separate firms competing for each note in the ecosystem against the common system architecture standards (Sheffer et al., 2013[6]). Research and development within the new governance and organizations is essential in the coming years.

Large manufacturers can often raise capital at a much lower cost than individual infrastructure operators or owners. Thus, delivering new forms of infrastructure to citizens under long-term service concessions from governments through public-private partnerships (PPP), rather than procuring infrastructure as one-off assets, is a trend that has spread to many kinds of infrastructure: civil infrastructure such as toll roads and bridges; social infrastructure such as schools and hospitals; and fast-changing technical infrastructure such as imaging machines in hospitals. Even jet engines for commercial airliners such as Rolls-Royce's "Power by the Hour" service model, are proliferating and reduce the need for the infrastructure owners or operators to raise the finances themselves. Still, there is a lack of knowledge and competence in these new financing schemes.

Finally, we want to emphasize that a small country like Finland must carefully pick its priorities for industrial research to ensure its future economic success. Two prime examples of autonomous robot-systems where Finland has unique needs, a leading edge advantage, and an especially important role are autonomous ships and ports. These are now being systematically studied and developed through DIMECC's Autonomous Ship Ecosystem, which is run by the biggest REBUS companies. Further development of these technologies, the related business models, and especially their impact on the future related ecosystems, could be priorities on a national level.

Prof. **Kim Wikström**
Åbo Akademi University

Prof. **Raymond Levitt**
Global Projects Center, Stanford University

6 Sheffer, D. A., Katila, R., Levitt, R. E. & Taylor, J. E. 2013. Innovation of unique, complex products. Academy of Management. Lake Buena Vista (Orlando), FL., August 2013.

RE-CONFIGURING ECOSYSTEMS

Magnus Hellström/Åbo Akademi University
Sari Mäenpää/Tampere University of Technology

Introduction

Competition is more and more moving from the company or network level to the level of ecosystems, where companies from different industrial fields are increasingly seen to collaborate and cooperate for enhanced capabilities around novel innovations and increased value creation. Thus, the performance and competitiveness of a company is no longer solely dependent on its own capabilities and activities, but on the capabilities it can access through its business ecosystem, and how well it is able to align the interests and the activities in the ecosystem toward a common goal.

Despite its frequent use, the meaning of the concept 'ecosystem' has remained somewhat obscure. What is the difference between a business network and a business ecosystem, actually? The difference is rather vague, and perhaps more a question of different disciplines and schools of thought. Typically, an ecosystem is understood as a broader entity, connecting a larger variety of actors and crossing industrial boundaries. Adding to the confusion, there are also a number of different types of ecosystems, such as: business, manufacturing, innovation, and knowledge ecosystems (for an overview, see Valkokari, 2014) that all exhibit different aspects of ecosystems. We will not pursue this discussion here to any greater extent. From a practical point of view, there are still some useful notions in the ecosystem metaphor.

1. First is the notion of **system leverage** in terms of increased value creation and efficiency, or innovation (Autio, 2015). Basically, by organizing and doing things differently, a system can create more value based on the same input.
2. Leveraging the efficiency and effectiveness of a system often entails **increased interaction** and **interdependence** between the actors in it. That is, in one way or another, firms are and will become ever more dependent on each other to be successful. This

means that firms ought to be viewed as a system of interacting parts rather than as individual entities, often spanning conventional industrial boundaries. Hence, ecosystems provide a cross-sectoral view to value creation rather than the narrower sectoral view that dominates the economic debate today.

3. Like in its biological role model, an ecosystem is dynamic and undergoes constant **evolution and change**. The notion that competition is moving from the firm level to the ecosystem level builds on this insight. In short, by acting or organizing differently, for example by establishing new connections or by deepening the collaboration between certain parts of the ecosystem, things can be done better than in other competing ecosystems.
4. The existence of a **unifying platform** (and even the absence of a clear focal company) in a rather broad sense is a common yet unnecessary condition for ecosystems, but like its biological metaphor, it is often the case. An often used example is Volkswagen's car platform, which connects a multitude of suppliers and service providers.

In sum, to unleash the value potential in an ecosystem, firms often first have to intensify interaction and deepen their collaboration, which inevitably means a change in the way they are organized as an industry.

In the DIMECC REBUS program, business and innovation ecosystems have been studied from a number of different perspectives, which all illuminate important facets of operating in business ecosystems. These studies are gathered in this section. Common to all of them is the importance of **sharing knowledge** and how to integrate knowledge from different sources (and organizations) in an effective and efficient way.

- First, we have dealt with the strategizing aspect of re-organizing an existing ecosystem. The case of the Baltic Sea logistics system highlights the need for data transparency in ecosystems, so as to induce a change that radically ***leverages the ecosystem's efficiency.*** The case is also an example of how an electronic marketplace may constitute a unifying platform around which the ecosystem may organize to increase the system's efficiency (by reducing transaction costs).
- Second, in the case of the Seaside Industry Park in Rauma, the need for an external party supported systematic approach toward ***open innovation and knowledge integration through increased interaction*** is pinpointed. The industry park constitutes another kind of ***unifying platform*** around which firms gather to share knowledge in order to boost innovation.

- In our third case, the speed of information sharing at the operational level of global projects is brought to the fore. A state-of-the-art ***information sharing platform*** developed by Wärtsilä is showcased in an industry (engineering & construction) characterized by vertical fragmentation and vulnerable information logistics.
- The fourth case shows the same kind of strategizing aspect, but from one single company's point of view. In this case, Tieto examines different roles and positions of a ***data integrator (IT-company) in a changing ecosystem.***

Practical outcomes of these business and innovation ecosystem studies are to be seen in improved practices within case companies, in cost savings, in new business opportunities, and in novel technological solutions.

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RE-CONFIGURING ECOSYSTEMS

Magnus Gustafsson, Anastasia Tsvetkova, Víctor Sifontes Herrera, Anu Keltaniemi
Åbo Akademi University

Improving the Baltic Sea logistics ecosystem

Summary of motivation and achievements

Shipping in the Baltic Sea forms an essential part of Finnish industry. At present, the utilization rate of bulk and general cargo ships serving Finland is under 40%, and the old-fashioned routines in ports lead to ships sailing at non-optimal speeds and thereby to unnecessary fuel consumption. Lack of transparency and coordination between the large numbers of actors in logistical chains is the key reason for inefficiencies in sea transportation, operations in ports, and land transportation. Finland, similar to an island nation, continues to be dependent on the sea and on shipping. Thus, shipping will continue to play a key role in the future, as the majority of the changing cargo flows will continue to rely on shipping. The tightening regulations on gas and particle emissions, water management in shipping, and energy efficiency of vessels make it apparent that shipping cannot rely on a low-cost transactional industry logic. Instead, it has to transform into a highly efficient function, which supports and enables Finnish industry as such. This can be achieved through a more profound shift in the way the industry is organized, and the way value is created and distributed among the actors: actors in the shipping industry, including the export industry as the user of logistics services, need to see themselves as interconnected parts of the same business ecosystem, where their actions and performance largely depend on and impact the business of the other.

Key results and impacts

The focus of our activities lies in the development of the short sea logistics system, with a special interest in the Baltic Sea. For years, we have researched the inefficiencies in and developed a system for short sea shipping: the starting point was to modernize not only technical systems in complete logistical chains, but also organize and lead them in conjunction with managing the corresponding information flows. The result of the development work is a new industrial ecosystem with enhanced productivity and profitability, as a result of Finnish technical, organizational, and financial innovations.

A change in the business models and ways of working in shipping would allow for a lowering of cargo transportation costs by 25–35% and emissions by 30–35% in the dry bulk and general cargo logistics in the Baltic Sea area. This is achieved by carrying out the following measures:

- Establishing transparency in the short sea freight market by introducing an electronic freight marketplace that would enable industrial cargo owners to transact directly with ship operators, bring visibility to the freight market, and enable both parties to adapt their operations to the supply and demand in the market.
- Establishing real-time integrated production and logistic planning to ensure optimized just-in-time freight throughout the logistic chain.
- Employing a performance-driven shipbuilding and operation business model that ensures a highly competitive ship by keeping world-leading technology providers engaged throughout the lifecycle of vessels.
- Implementing new financing models that integrate institutional investors with a long-term investment perspective in order to reduce the cost of capital and put the focus on competitiveness.

These innovations would tackle the inefficiencies of the ecosystem (Figure 1) and improve the systemic efficiency and commercial effectiveness of short sea shipping. This, in turn, is based on increasing the amount, quality, transparency, and speed of information transmission in the system. The underlying rationale here is to improve the operation of the market process so that self-interested system actors can utilize the value-generating potential of the system to the fullest.

This transition calls for a marketplace where, on the one hand, a transparent exchange of information on cargo shipment needs, and, on the other hand, available capacity for shipping, can take place. This can be done with a web-based freight marketplace, deemed to be the key enabling technology in the renewal of short sea shipping. Such a marketplace serves as the market-clearing platform, and with the enhanced information availability, the self-optimization of the sea logistics system as the pricing mechanism is improved and can more efficiently guide actors' decision-making. For example, industrial customers – the cargo owners – can better incorporate sea logistics into their operation planning when the system status can be transparently and comprehensively studied (e.g. historical freight rates, and currently vacant capacities) and predicted (e.g. vessels' planned future routing). Moreover, the system-wide bidding and contracting mechanism can match supply and demand directly on a systemic scale without intermediaries, instead of within the current clientele of a given cargo broker.

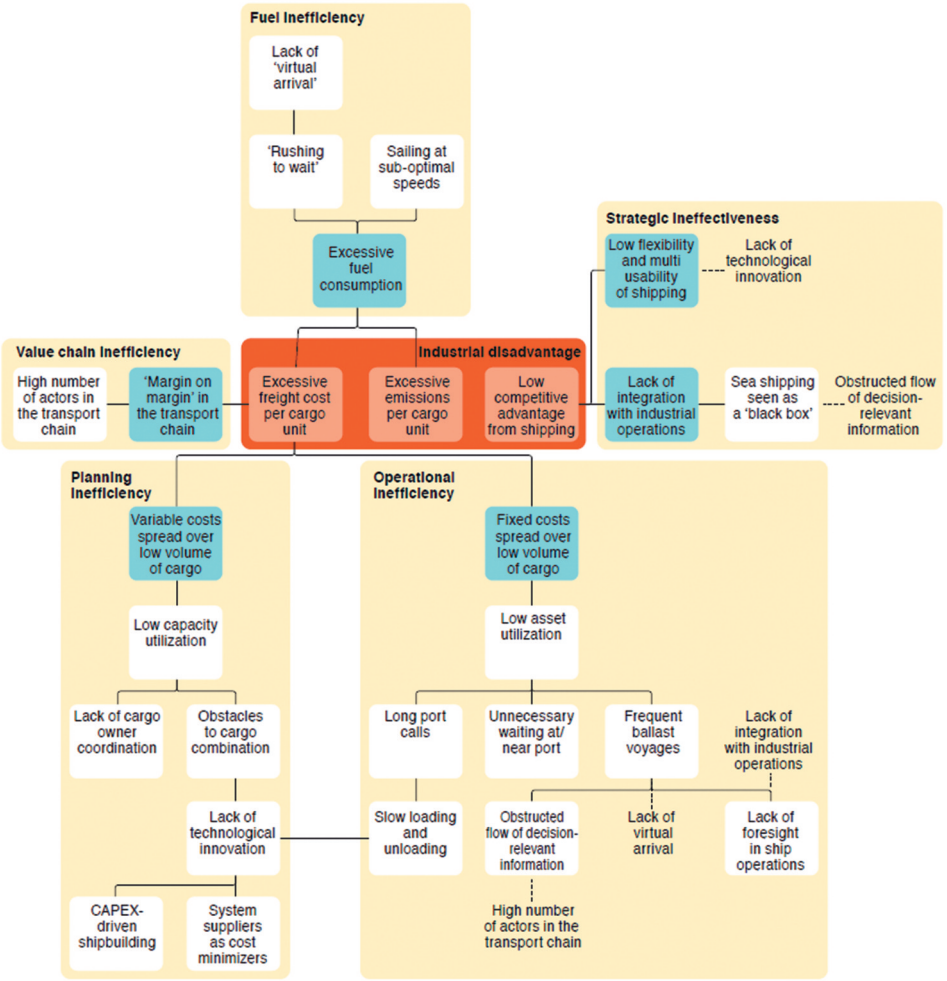

Figure 1. Inefficiencies in short sea shipping and their effect on industry

However, in order to facilitate the market process, such a marketplace needs to offer, as a distinguishing feature, advanced optimization and simulation capabilities for the users. In other words, with such capabilities, the users would be able to simulate different scenarios (e.g. which combination of available shipping options would yield the best operational and economic result for an industrial customer, or which ship routing would maximize the ship's revenues). In essence, the marketplace is a communicating, optimizing, and shipping slot-trading platform, with four specific purposes:

1. Make freight transportation supply and demand transparently visible to system actors in order to facilitate mindful integration of logistic decisions into corporate strategizing, in both the short and long term.
2. Serve as a market-clearing mechanism so that supply and demand conditions (e.g., crowding or temporal underutilization) become priced

correctly, thereby allowing the market mechanism to optimize system utilization.

3. Serve as an easy-to-use centralized communicating, booking, and contracting platform so that the system status is always up-to-date and visible in real time to system actors.
4. Enable all system actors to optimize their own operations and simulate different scenarios (e.g. how alternative ship routing would affect the ship operator's overall profitability) to facilitate the actors' decision-making.

In conclusion, the current short sea shipping system suffers from inefficiencies that lead to excessively high freight prices for the industry. At the same time, other key system actors, such as ship operators, earn unsatisfactory profits. This is because of significant systemic waste, especially in ballast voyages and time spent in ports, meaning low asset utilization. The approach presented here will significantly reduce such systemic waste, thereby enabling, at the same time, lower freight prices for the industry and increased profitability for other key system actors. This is because higher asset utilization leads to increased value creation throughout the system.

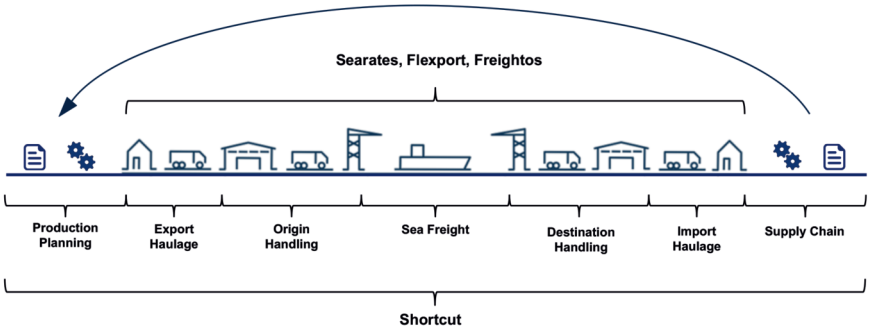

Figure 2. Schematic perception of the scope of the marketplace in comparison to existing ones

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RE-CONFIGURING ECOSYSTEMS

Matti Seppälä/Rolls-Royce Oy Ab
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Rolls-Royce strives for a collaborative industrial ecosystem

Summary of the project's motivation and achievements

The maritime industry is a cyclic business by nature. In the past there have been both ups and downs, just in a few years. In offshore business, a high oil price boosts this segment very rapidly and likewise, when the oil price is going down, investments are put on hold. To handle this kind of cyclic business and the necessary broad knowledge in large projects, it is natural that a networked way of working is commonly in use.

To be competitive in this business it is essential for a company to have an ecosystem that supports both flexibility and knowledge-sharing in supply and the R&D network. In this DIMECC REBUS program, Rolls-Royce Oy Ab had an opportunity to boost its operational model and wrap up its investment plan. During the DIMECC REBUS program, Rolls-Royce both prepared and started to implement a large investment in one of its major propulsion sites in Marine at Rauma. At the same time, the public actors were implementing a fresh industrial hotel concept at Rauma Seaside Industry Park (SIPRA), where the Rolls-Royce site is located.

How to develop your ecosystem configuration if the current setup is delivering excellent results

One answer could be to look at how things are done in the state-of-the-art companies in other industries. Of course you should ask for your customers' and network partners' viewpoints at the same time. It is said that in strategic leadership, the main point is to see the change drivers and the timing of the change. Usually changes in this context are generated from market dynamics or from a new spreading technology. In DIMECC REBUS, Rolls-Royce and KONE benchmarked their operational practices in a network context to review their own operational selections and to learn from each other's practices.

Digitalization is now getting to full speed in the maritime industry, and autonomous ships will be a reality in a few years' time. This change gives us motivation to develop an operational roadmap and select some pilots for the Rolls-Royce Rauma site in the DIMECC REBUS program. Open innovation practice is a good tool to involve your ecosystem companies, universities, public institutes, and other actors together. In our DIMECC REBUS case, the focus was to find a practical approach to working with R&D ideas in reality, by taking advantage of the open innovation concept and inter-organizational knowledge-sharing.

In wide networks, there are plenty of stakeholders that should move into the right direction when the company ecosystem is re-configured. There are boundaries between companies and public actors, but also inside companies. Open communication, piloting cases, and sharing knowledge are excellent practices to increase common understanding about the direction. The DIMECC REBUS program boosted us to implement a local ecosystem within the Seaside Industry Park at Rauma, and gave us tools and ideas when implementing a major investment and operating model change called Rauma Transformation.

Matti Seppälä,
Manufacturing Director,
Rolls-Royce Oy Ab

Rolls-Royce's journey in re-configuring an ecosystem

Rolls-Royce's business is cyclic in nature and concentrates on large projects with an extensive need for knowledge. Therefore, an ecosystem supporting both flexibility and knowledge-sharing is needed. Rolls-Royce's journey towards boosting a collaborative industrial ecosystem started from considering the present situation and the formation of the operating ecosystem, SIPRA (see Figure 1). Then, to review the company's operational selections and to learn how things are done at companies in other industries, a systematized, third-party supported benchmarking process was implemented. Next, to involve ecosystem stakeholders in ecosystem development, open innovation in the form of systematic knowledge integration for digitalized production was utilized. All these piloted cases boosted the implementation of an operating model change called Rauma Transformation – which is now taking place.

Next, the developed and tested methods are introduced in light of the practical cases, to lighten the role of knowledge-sharing, collaboration, piloting, and the systematic approach when business/industrial ecosystems are developed and re-configured.

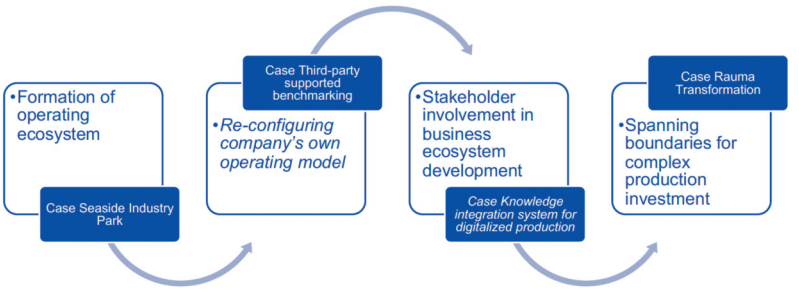

Figure 1. Rolls-Royce's four interconnected cases towards a collaborative industrial ecosystem

Formation of the operating ecosystem: the evolution of SIPRA

Figure 2. Seaside Industry Park Rauma

"Plans must be ready before change begins; otherwise it is too late."

Matti Seppälä, *Manufacturing Director, Rolls-Royce Oy Ab*

Originally, the formation of the industry park in Rauma was a company-oriented idea. Previously the current industry park area housed a Korean-owned shipyard subsidiary (STX) together with a few major companies, including Rolls-Royce Oy Ab (Rauma). The people in those companies were visionaries who saw the networked operation model as a way to build ships cost-effectively in Finland. The companies expressed their

vision of more networked operations both in their business and also in the area. In that vision, the shipyard would operate as the focal company. The networked operation model entailed a net of capable subcontractors in the area and close proximity, providing production activities and services, such as design, engineering, logistics, and finishing, for several main suppliers.

However, in September 2013, the struggling Korean shipyard giant announced the closure of their shipyard in Rauma. The shutdown directly caused 650 job losses in a city of 40,000 inhabitants.

The region and its inhabitants rely on the tradition of shipbuilding know-how. Therefore, the shutdown of the shipyard with more than 600 redundancies was seen as a collective problem concerning both individuals and the community. At the same time, the economic situation of the city of Rauma was remarkably good, due to earlier profitable years and fiscal discipline. Furthermore, both public officials and politicians showed exceptional entrepreneurial spirit and industry-favorable thinking toward the idea of developing the industry park idea. Furthermore, the competence gained from the CSM (Competitive Sustainable Manufacturing) industrial hotel concept (a previous TEKES project) ensured a good basis for the city to make decisions.

When faced with discouraging news of the termination of activities in the shipyard, the city was not paralyzed. The public sector, meaning the city authorities, took an initiator's role and kicked off the idea of an industrial park. The city made unusual, innovative, and fast forward-looking efforts, such as the bold movement of acquiring the shipyard real estate. As one of the first actions, the city established a real-estate company (RMTK) owned 100% by the city. Furthermore, the industrial park has a planning group in which the majority of the participants are from the companies situated in the industry park.

Key results and impacts

Today, the evolved industry park forms a local ecosystem around Rolls-Royce's site at Rauma. As the outcomes of this collaborative innovation process, there are:

- Collaborative operation models: a Seaside steering group for governance, a Seaside safety group for safety and security, and an event group for marketing and communication
- Innovations for economic sustainability: the city buying the industry park real estate, avoiding unemployment, forming a real-estate company to orchestrate the industry park activities
- Innovations for environmental sustainability: a joint environmental permit for the industry park, the first of its kind in Finland
- Innovations for social sustainability: a virtual campus connecting education and research with industry park companies

The formation of an operating local ecosystem provides Rolls-Royce with (R&D) partners that

- are deeply integrated in the Rolls-Royce internal supply chain, such as Transval (an internal logistics company)
- do close collaboration and incremental innovation, such as Ermail (a surface treatment company).

Some services in the industry park are provided by the public sector, like the infrastructure, environmental permits, and real-estate maintenance services, along with education and training.

There are also other stakeholders within the industry park, even potential customers, such as RMC (Rauma Marine Constructions).

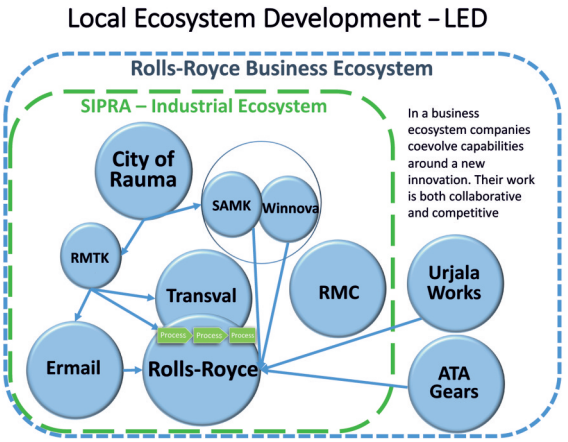

Figure 3. Seaside Industry Park as part of Rolls-Royce business ecosystem

Additionally, there are other stakeholders, like subcontractors, that are not located in the immediate vicinity. Combined, they comprise a Rolls-Royce Business Ecosystem. In a business ecosystem, companies coevolve capabilities around business cases. Their work is both collaborative and competitive.

Re-configuring the company's own operating model: Third-party supported benchmarking

Rolls-Royce chose benchmarking as a development tool to develop novel methods and solutions to support innovation management in its local and global R&D networks. The main objective was to find solutions for quite a broad set of company specific development needs in R&D across organizational boundaries. The concrete aim was to detect and utilize good existing practices instead of developing everything from scratch. Benchmarking was also found to be a useful tool to support a collaborative culture among the participating companies.

The immediate objective for benchmarking was to compare the differences between the operations, and to discuss and share experiences. Another aim was to get acquainted with working practices to help in solving the bottlenecks and problems of Rolls-Royce. The long-term target was to develop the quality and profitability of the participants, as well as to support the formation of a collaborative culture and ongoing development in the network. In this case, benchmarking was implemented in a more structured way and supported by an outside actor, namely a research unit.

The preparation team at Rolls-Royce conducted a self-assessment and formed a list of bottlenecks and problems to be resolved. Based on the identified bottlenecks and problems, a list of more detailed questions was delivered to the target company before the actual benchmarking visit. The list was developed based on the focal company's internal, tacit, knowledge and information needs. Articulating these needs in an explicit manner ensured that the most important, "right", questions were asked.

The target company (KONE) was selected as a comparison partner on following grounds:

- It is a global company known for its good working practices.
- Information-sharing was supposed to be easier than with direct competitors.
- Both companies were participating in the same research program and project (DIMECC REBUS).
- Both companies shared an interest in R&D collaboration.
- Both companies were interested in managing supplier networks and supplier partners.

Figure 4. **Participants in the benchmarking visit at the Rauma site**

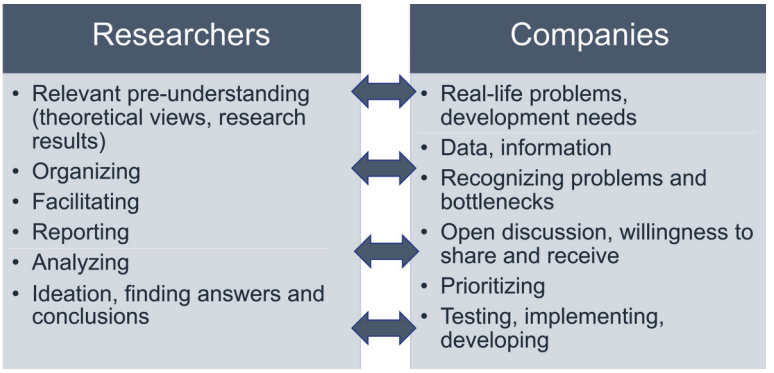

Figure 5. Complementary activities of researchers and companies

The members of the preparation team and the experts on each benchmarking topic attended the benchmarking visit. The collected information was processed in workshops, and it was used as a benchmark when evaluating the workability of current operations, as well as in planning improvements for current procedures.

Key results and impacts

Based on analysis, the solutions to be piloted at Rolls-Royce were chosen, and an action plan for improving the practices was made. The detected solutions were piloted in practice and, when successful, the solutions were to be put into use. The solutions based on benchmarking visits, as well as the piloting experiences, were shared with other companies in the DIMECC REBUS program.

The Rolls-Royce representatives found the benchmarking process quite successful, along with the benefits identified in the process. In relation to the identified benefits, people from Rolls-Royce commented that the BM process

"increased internal discussion"

"made us look in the mirror"

"helped to identify the stimulants"

"reinforced the assumptions"

"increased the development of operations on the whole instead of sub-optimizing".

"Third-party attendance and support is essential and adds sparring, systematization, logicality, and administration to doing. Public projects, such as DIMECC REBUS, enable this."

Ari Vehanen, *Manager, Programmes and Systems, Rolls-Royce Oy Ab*

Benefitting from stakeholder involvement in business ecosystem development: Piloting a knowledge integration system

The search for more extensive utilization of a business network's knowledge and improved development projects has directed the maritime industry, among others, more towards open innovation and increased stakeholder involvement in R&D operations. Rolls-Royce Oy Ab (Rauma) has been showing initiative by applying a collective knowledge integration approach that involves engaging in collaboration with different stakeholders at the early stage of a new product concept and in manufacturing process development. The piloted Knowledge Integration System (KIS) has been developed and practically justified to find a concept for automated robot welding in the focal company (RR), as well as a working framework for co-operation to run a combined R&D and manufacturing process.

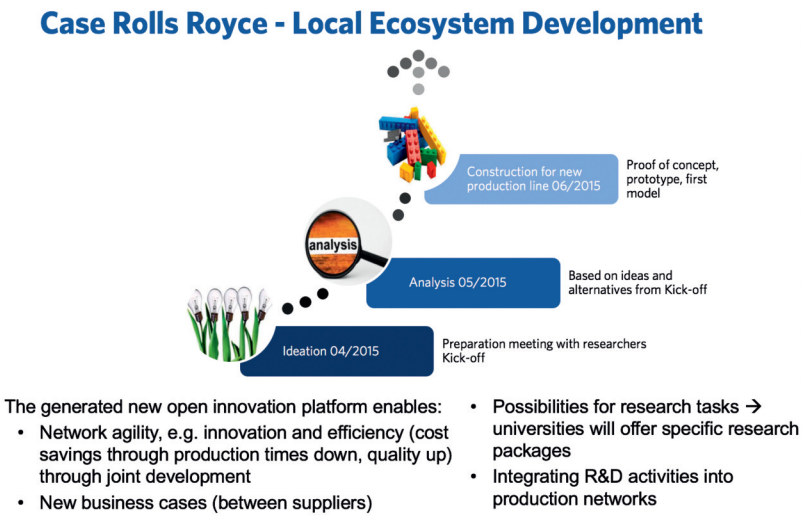

Figure 6. Focal context of local ecosystem development at Rolls-Royce

In the Rolls-Royce case, stakeholder involvement meant integrating external knowledge and different stakeholders, meaning the focal company's different operations, customers, suppliers, and research institutes. The results of the pilot show that certain preconditions need to exist for the knowledge integration process to succeed:

- Participants must be able to co-operate (i.e. communicate, share knowledge, and trust each other).
- Participants must be willing to open up both on a company level and on a value chain level.

- Participants must be prepared for both internal and external re-organization.
- Participants must be ready for R&D strategy change, a novel knowledge-sharing model, new business cases, and novel collaboration.
- All the right actors must be involved, including decision-makers (focal company), specialists (research units), and producers (suppliers).

Figure 7. Pictures of knowledge integration workshops at the Rauma site

The developed Knowledge Integration System (KIS) describes the main principles of linking the knowledge integration process to business ecosystem thinking and development.

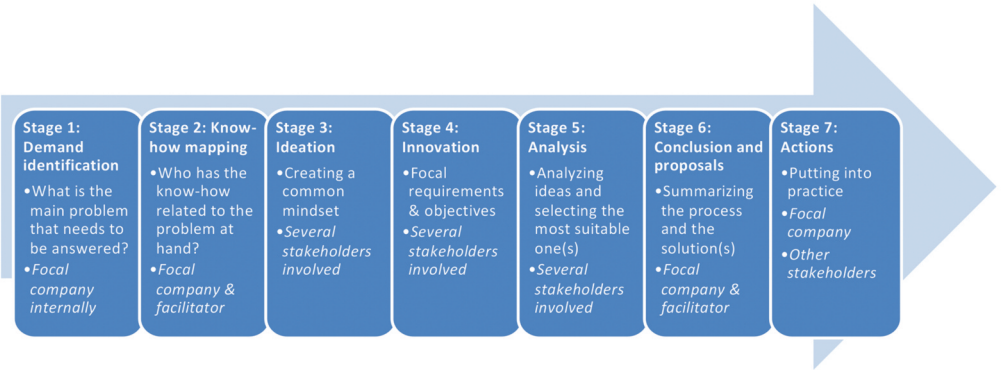

Figure 8. Stages of the knowledge integration process

In the Rolls-Royce pilot case, seven different stages were recognized: 1) demand identification, 2) know-how mapping, 3) ideation, 4) innovation, 5) analysis, 6) conclusions and proposals, and 7) actions. In different phases, different ecosystem stakeholders were present.

Key results and impacts

The piloted knowledge integration process produced beneficial outcomes in different ecosystem areas. First, Rolls-Royce reported having gained 50% cost savings in the time and quality of a new product concept. Second, new research tasks between universities and industry were developed, and third, new business cases between industry stakeholders arose. Thus, KIS shows the manifestation of the knowledge integration process in the form of new relations and new business opportunities, as well as new technical solutions and operating models.

In some cases, losing control of information might be seen as a threat and downside of knowledge integration and sharing. However, in the Rolls-Royce case, knowledge integration in the project network worked and generated the desired results for both Rolls-Royce and different stakeholders. This can encourage other knowledge- and innovation-requiring companies to open up processes to other stakeholders, such as suppliers, customers, universities, and research institutes, while still keeping control over the company's confidential and core capabilities.

"Traditional development of fostering and focusing on just one company's business ability is not as efficient as collaborative development of many key players: common benefits for all instead of sub-optimization. This calls for mutual trust, common understanding, and knowledge-sharing."

Matti Seppälä, *Manufacturing Director, Rolls-Royce Oy Ab*

Spanning boundaries for complex production investment: Collaboration across functions in Rauma Transformation

DIMECC REBUS has reinforced opinions and previously made choices (e.g. SIPRA) and boosted Rolls-Royce to utilize the local ecosystem within SIPRA. It has also provided tools and ideas for implementing an investment of €57 million, called Rauma Transformation. This investment includes a new logistics center, a welding workshop, and renovation of the assembly hall and offices, as well as investments in production devices. Within the DIMECC REBUS project, the success factors of this complex production investment will be clarified – especially the integration of dispersed expert knowledge to increase common understanding across boundaries.

DIMECC REBUS collaboration has also brought up future focus themes and interest areas, such as digitalization in the manufacturing industry. Furthermore, it has brought together active and forward-looking parties to collaborate in the future.

"Motion is what matters! Instead of lengthy planning, the focus needs to be on rapid testing. This means dividing large entities into smaller and reasonable parts, trying and re-trying."

Ari Vehanen, *Manager, Programmes and Systems, Rolls-Royce Oy Ab*

"It is all about business process re-engineering – at times with large leaps like DIMECC REBUS."

Matti Seppälä, *Manufacturing Director, Rolls-Royce Oy Ab*

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RE-CONFIGURING ECOSYSTEMS

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Wärtsilä implementing new ways of working in complex, multi-stakeholder projects

Summary of the project's motivation and achievements

The successful development and delivery of an engineering and construction project is typically a multi-party arrangement that require seamless collaboration between customers, financiers, designers, suppliers, and construction companies, as well as authorities and other third-party stakeholders. Hence, delivering projects more effectively and making them more successful requires continuous improvements and changes to this entire ecosystem of actors. The overall ambition for Wärtsilä Energy Solutions (henceforth Wärtsilä) has been to establish a new and flexible way of working in the business of complex, multi-stakeholder projects.

In DIMECC REBUS, a series of new practices, approaches, and tools has been developed and introduced, enabling a stepwise digitalization of construction projects, a sector otherwise often associated with craft work, old fashions, and slowly changing practices. These developments serve as a platform, not only for Wärtsilä, but for the larger energy project ecosystem, to be in the lead and provide the best customer value.

Key results and impacts

Wärtsilä is traditionally known for its product technology and solutions. Therefore, it may come as a surprise that selling project services (such as project management, engineering, logistics, and site supervision) has been an important part of the company's success for decades. In DIMECC REBUS, Wärtsilä has leveraged these services to develop new approaches and tools for achieving excellence in the project business. These developments hold the potential to change the way companies and people collaborate and interact in complex delivery projects.

Project services and project management are key elements in Wärtsilä Energy Solutions' offerings. To customers, they offer more value: predictability, speed, collaboration (smoother information sharing), and flexible scope. Experienced personnel and project management know-how are essential elements in predictability. Predictable projects reduce

customer risks and even assist customers in obtaining financing. Moreover, competitive delivery times contribute to earlier access to the market. Of course, having open communication with customers is the basis for successful collaboration, and several options for scope compilations ensure the optimal scope of supply for each customer.

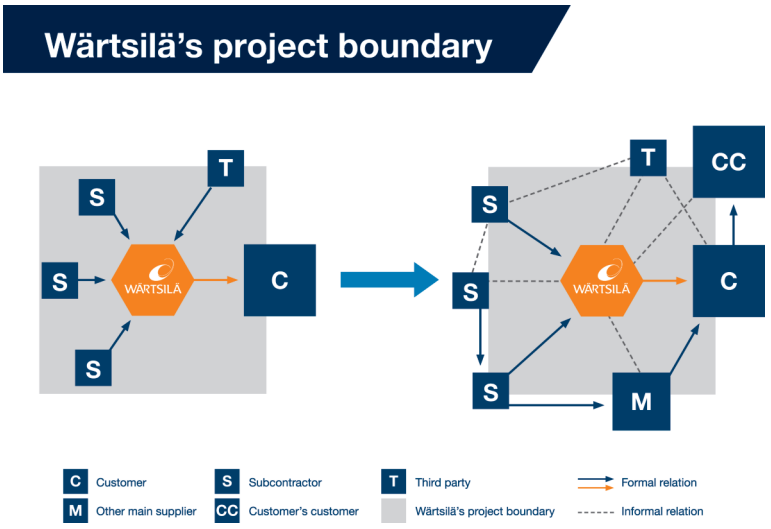

Figure 1. Project complexity changes project boundaries

Requirement management

Every project has its specific needs coming from the customer and third-party authorities. Wärtsilä needs to be able to respond to these requirements quickly in a smooth and efficient way already during the project sales phase, turning these needs into value offerings through open dialog with the customer to identify the best scope for both parties. One important element in this work is the systematic method and tool for agile requirement management, which has been developed and implemented in DIMECC REBUS. The tool enables a smooth transfer from sales to execution after the deal is won. As an example, in a large customer project, there are typically thousands of requirements, some going into the finest details of the product, that have to be identified and dealt with during the project. Wärtsilä is able to seamlessly continue requirement management even on a deeper level during project execution, and translates the requirements into products and solutions. Every requirement is assigned to respective expert disciplines, which might be multiple in a large project.

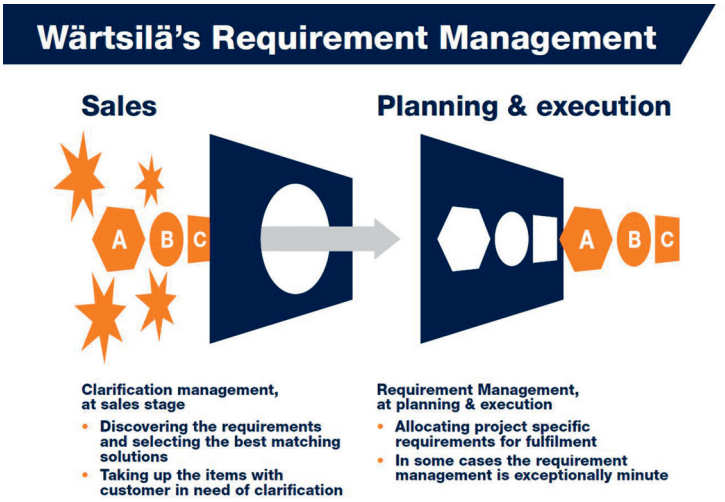

Figure 2. **Requirement management from sales to delivery**

"In successful projects, customer needs are captured, communicated, clarified, fulfilled, and even exceeded when Wärtsilä professionals fulfill the promise."

Simo Ahtola, *Contract Manager, Wärtsilä Finland Oy*

Project planning

Completing projects on time and coordinating the combined efforts of numerous actors constitutes an enormous challenge for all involved parties. Speed and predictability are competitive advantages in the project business. Furthermore, as project complexity increases, managing internal and vendors' work gets excessively difficult without a systematic approach to project planning. In DIMECC REBUS, Wärtsilä developed a framework, including tools, to facilitate systematic and professional project planning in order to manage time effectively. The framework turns generic models into company-specific practices, and also facilitates fast ramp-up and control of project schedules, and progressive decomposition from overview to detail, by automatically translating product scope into work packages and activities. Professional project planning enables up-to-date information about the project situation, facilitating proactive decision-making. Overall, the system helps to redirect the focus from reporting the past to managing the future, and makes operating within an overwhelming mass of interdependent activities manageable. These

developments have significantly improved the organizational maturity toward systematic and proactive planning in complex projects.

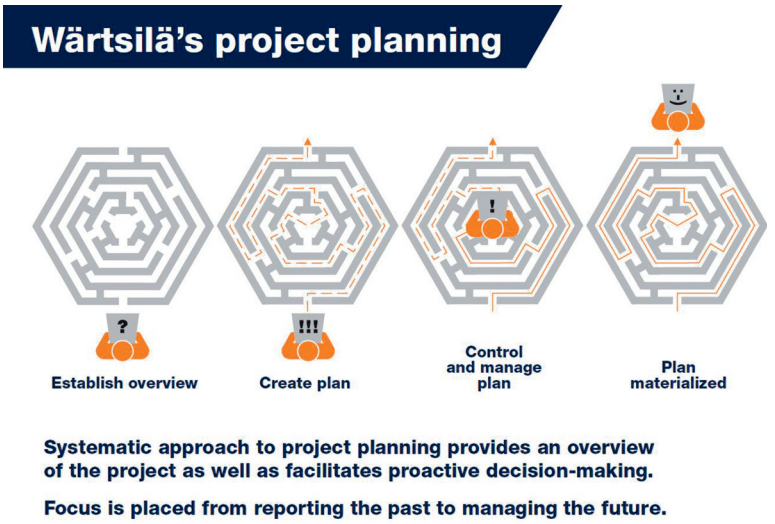

Figure 3. A systematic approach to project planning

Information-sharing

Delivering and constructing large industrial facilities, such as power plants, is a huge affair, and lots of information needs to be shared. A typical project may involve the production of hundreds if not thousands of drawings and documents to be shared between different parties. Common stakeholders are, apart from a multitude of internal ones: the customer, its consultant, the authorities, designers, construction and installation companies, and suppliers. Given the fact that, to start and complete a task, a party is typically dependent upon information from at least one other party, on-time delivery of information is of utmost importance for the success of the project.

To tackle these challenges, Wärtsilä Energy Solutions has developed and successfully deployed a new approach based on a DCM365 collaboration platform. With the help of the cloud-based approach, Wärtsilä can, in seconds, share role-based information with any party, located almost anywhere in the world. For customers, this will create added value by enabling correct information in a fast, efficient, and secure way. With DCM365, customers are invited to be part of Wärtsilä's efficient project management experience.

With the help of the new approach, Wärtsilä can significantly speed up the information-sharing in a project whilst also making it easier for customers and stakeholders to perform their own activities toward the project by offering users complete control of project information, docu-

mentation, communication, plans, and deadlines. DCM365 provides easy but secure access for all stakeholders to data relevant to them. It will also keep them up-to-date by using e-mail notifications of events. DCM365 is fully customizable to fit it for use in any project and any type of project setup.

Earlier, information was typically distributed by shipping a number of folders filled with drawings to remote locations, taking days if not weeks to fill the bookshelves of the collaborating parties. Now the same information is distributed digitally in seconds. The new approach also smooths the technical supervision work on site. No longer need the supervisors walk back and forth between the office and workplace to fetch the correct drawings, but these can be conveniently carried around the site on a tablet in their pockets. For this, Wärtsilä has developed a Site365 tablet application that enables information on the go. The tablet downloads and uploads information to and from DCM365, again in the course of a few seconds. Naturally, this collaboration approach reduces the need for paper documentation and the risk of using outdated information, not to mention the green benefits. DCM365 puts the project communication plan into practice.

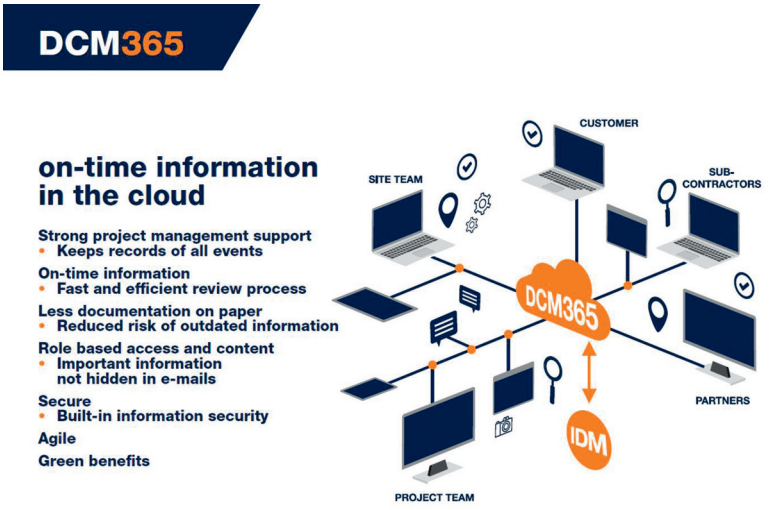

Figure 4. Connecting project stakeholders

"Cloud-based information-sharing brings project collaboration into a new era."

Jarkko Vettenranta, *General Manager, Project Quality and Project Documentation, Wärtsilä Finland Oy*

Conclusions

Taken together, the developments presented above are an important step toward higher customer value, better collaboration, and the digitalization of customer delivery projects and construction sites. Through DIMECC REBUS, Wärtsilä has been able to further strengthen its position as a preferred partner for energy companies worldwide, and to establish systems and practices that make projects more efficient, effective, and transparent for all participating parties.

"The developed tools and systems facilitate a more controlled journey during early project appraisal, initiation, execution, and closure, through better identification and smoother management of requirements, quicker ramp-up, improved predictability, and easier collaboration."

Annika Hanstén, *General Manager, Operational Development, Wärtsilä Finland Oy*

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RE-CONFIGURING ECOSYSTEMS

Joni Lehtonen/Tieto

Defining ecosystem-level value co-creation strategies – viewpoints of IT service supplier Tieto

Research motivation

A company's competitive advantage depends on its ability to create more value than its competitors. In the DIMECC REBUS program, Tieto wanted to understand if the services evolution journey framework that it has created can be justified by a real industrial ecosystem, and to define value co-creation strategies that align ecosystem actors' different viewpoints.

In product-driven value chains, the product supplier is often uncertain of the usage of the product or the ultimate value that the product provides for customers. The customer is the one who experiences the value, but needs to actively participate in the value composition by integrating different products in a complete solution. In this traditional model, the operation of the solution also remains typically part of the customer's own responsibility. However, product-driven value chains have faced dramatic pressure on cost competition due to lowering barriers in global trade. This has led to a new type of thinking in the companies who have traditionally been competing in value creation with their products. The companies have started to compete with services, and thereby a shift from product-driven value chains to service ecosystems has started (Figure 1). Service-driven value chains require a significant intimacy with the customer, and an ability to compile a complete set of products and services into a bundle. This service bundle creates remarkable value for a customer, by reducing the complexity of the solution (integration responsibility moves from the customer to the supplier) or by reducing the costs of production (the supplier might gain better economies of scale by providing a similar type of service for several customers).

Digitalization transforms value chains to ecosystems – customer loyalty as a key success factor

During recent years, we have seen a shift from value chains through service business, toward the competition of ecosystems.[1] In the ecosystems, value creation logic differs from product-driven value chains, while customer loyalty drives profitability (see Figure 1)[2]. In the ecosystems, customer loyalty is driven by customer satisfaction. This creates pressure for a product-driven company to change its position in the eyes of the customer, from price competition and risk of defection toward affection. This shift can happen only if the supplier is able to deliver perceived value for a customer. In order to provide perceived value for the customer, the supplier has to create a degree of customer intimacy and emphasis in order to be capable of delivering such a service that is desired by the customer. **The only way to get this capability is to invest in the customer front, and empower employees to contribute and innovate to the customer's business output, rather than to an input, where the focus is often on product-driven value networks.**

In ecosystem-driven value networks[3], the solution is complemented by the complementors. In these types of value creation networks, the customer puts integration responsibility back on the ultimate solution, but is still very and even more tightly coupled to the *ecosystem driver* (comparable to the *solution supplier* in the service value chain) than to the service operator in the services supply chain.

The difference in ecosystem-driven value co-creation, compared to the solution value chain, is modularity. The customer selects the 'complementors' on an on-demand basis, and they are considered as a disposal value-add for a specific need, which is valid only for a short period of time. This makes the ecosystem quicker and more nimble, hence easier to adapt in a changing environmental, business, or political environment than any of its successors. Due to the nature of disposability, the competing services in the ecosystems are often considered to be digital, due to the relatively short period of time they take to develop, due to the relatively low cost of production and the relatively low (or even no) cost of distribution.

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1 Based on research by MIT (Adapted from a course Platform Strategy: Building and Thriving in a Vibrant Ecosystem at MIT, Boston, Cambridge). One of the most concrete examples of this is the mobile phone industry. It used to be a completion of devices in the past, when rivals like Nokia, Ericsson, BlackBerry, and Motorola were dominating the markets. During that time, the competition was to match the functions and features for each customer segment in the market. Today, the mobile phone industry has shifted from products to an ecosystem. When a consumer today is selecting a phone, they are actually selecting between ecosystems: whether they want to join the IoS, Android, or Windows ecosystem. (Note: Apple, Google, or Microsoft as a brand.)

2 Model adapted from Harvard Business School, Achieving breakthrough service. Based on the research by Harvard Business School, a 5% increase in customer loyalty can drive a company's profitability up by 25% to 85%.

3 Note: IoS, Android, and Windows ecosystems have different set-ups, but all of them are ecosystems.

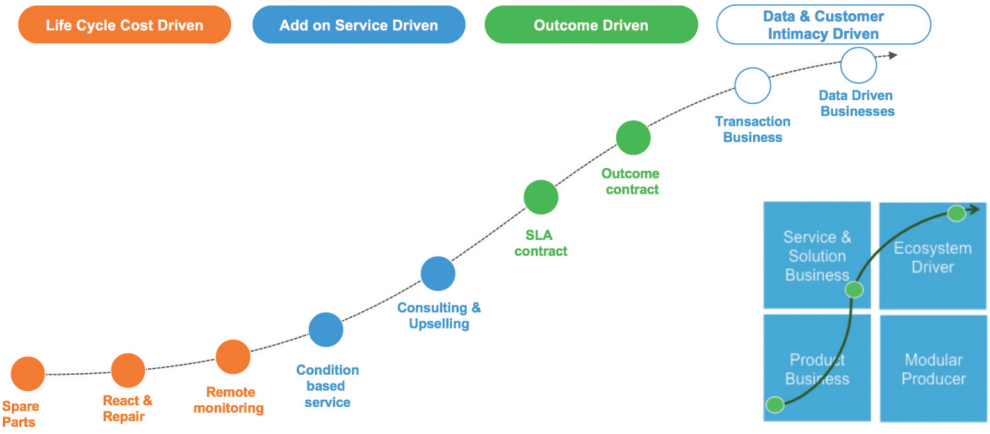

Figure 1. Evolution from products to services and ecosystems

Research outcomes and achievements

In the DIMECC REBUS program, Tieto wanted to explore whether the services evolution journey framework it has created can be justified by a real industrial ecosystem. Furthermore, if the justification can be proven, then what kind of role can Tieto, as an IT services supplier, take in this type of ecosystem and can it establish for itself a position as an *ecosystem driver.* **Due to the unique nature of an ecosystem, in terms of openness, short lifecycle of complementors, and disposability, the actors need different capabilities compared to traditional value chains.** One of the capabilities Tieto was interested in is a digital platform for an ecosystem, meaning what kind of IT platform is needed in order to run an ecosystem, how that platform can be set-up, and who can be in a role of platform owner, that is, who will own, govern, or operate the platform.

"In DIMECC REBUS research, we were identifying and testing three different strategic options for an IT supplier to gain an ecosystem orchestration role:
1) platform provider position, 2) capability, and 3) customer value-based possibilities to gain a role as an ecosystem driver."

Joni Lehtonen, *Global Solution Head for Industrial Internet, Tieto*

Platform provider as an ecosystem driver

The primary aim of Tieto was to investigate whether it could take a role as a information hub and thereby refine and establish an ecosystem around it. The hypothesis for this thinking was based on cost efficiency.

Typically in the ecosystem, many partners want to collect the same data, but use the data differently and analyze different dimensions from the relatively same data set. This was a basis for thinking that Tieto, as a 'neutral operator,' can take the position of an ecosystem driver by acquiring the data from the customers (with permission from the product suppliers) and then delivering the results back to the customers after the analysis by the product supplier.

Figure 2. Tieto as a data hub and platform owner

This model was tested at the beginning of the DIMECC REBUS program. However, the involved product suppliers always wanted to protect their main asset, the customer relationship, and not hand over the relationship to a data operator. The second aspect that the product suppliers wanted to control was the data. They wanted to define what data they would like to share, and what data they would like to protect or have exclusive usage for.

By taking into account these viewpoints, we came to the conclusion that this type of position, 'an ecosystem driver as a data hub,' is very difficult in the industrial ecosystem, where the data is not openly available, and when there is no contractual relationship between the product supplier and the customer. **This type of position might be an option somewhere, with publicly available data and when the data hub operator finds a way to combine the data that is unique to the marketplace.** However, even in this case, when the data is public, the competitive advantage for the data hub operator is relatively weak.

The only way we identified that a data hub operator can take the position of the ecosystem operator is if the platform that they use has some uniqueness, and the platform as such creates competitive value. How-

ever, we did our research from an Internet of Things (IoT) perspective, where the platform market is already a commodity (Amazon, Microsoft, IBM, GE, open source, etc.). Hence, this type of uniqueness was not identified. After these findings during the early phase of this data-driven ecosystem, we decided to turn down this option.

Capabilities for an ecosystem driver

The second option that we started to investigate was the capabilities-based approach for an ecosystem leader. In other words, we compared the capabilities of Tieto original equipment manufacturers (OEMs). Altogether, we identified that Tieto's core business is running the large IT systems and applications. Therefore, Tieto seems to have a lot of different capabilities that OEMs are lacking. These capabilities are software project management, software development skills, data analytics, and data science, and many other software-related skills.

Hence, we started to test what kind of role we could have in the ecosystem if the role is based on the capabilities that we can bring to the ecosystem. However, we ended up in the same dilemma that we already faced during our first initial hypothesis. We were not able to establish the relationship with the end customer, and we were not, as a newcomer in this industry (maritime), able to have such customer intimacy that we could capitalize on the capabilities we had independently. We were always dependent on the other ecosystem partners to advise us how to use the skill set we had. **We concluded that if an ecosystem operator does have capabilities that enable it independently to create customer value, it is only able to get a supporting role in the ecosystem, which could be like a platform operator or a capability supplier** for the one who is driving the ecosystem.

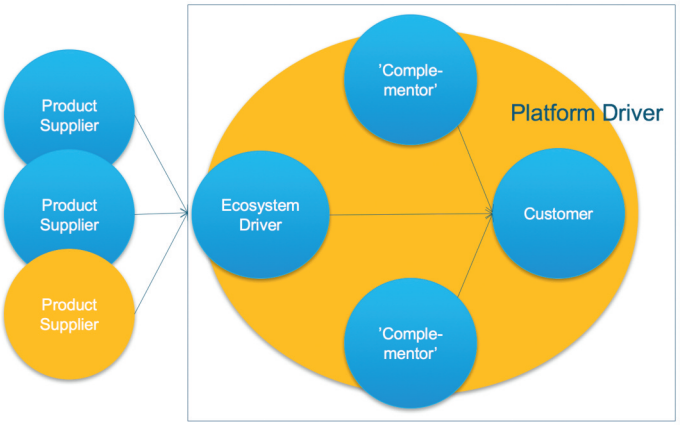

Figure 3. Capabilities for an ecosystem driver

Customer value-based roles

During the research, we started to identify that, in order to exist in the value chain, each of the ecosystem partners has to have some unique customer value. That customer value should be such that it can be sold independently to the customer. Hence, it makes more value at the ecosystem level, if the others who are providing value for the same customer can combine it.

The other observation we made was that the value of each component has to be aligned. This means that if the ecosystem is competing to be the lowest cost of something, then each component must fulfill and respect this characteristic. In the ecosystem that wants to compete with the lowest price, a component supplier who is providing a relatively low (but not the lowest) price and good quality might actually work against the ecosystem objectives and be harmful for this ecosystem, even if they are very valuable for an ecosystem with a quality value proposition.

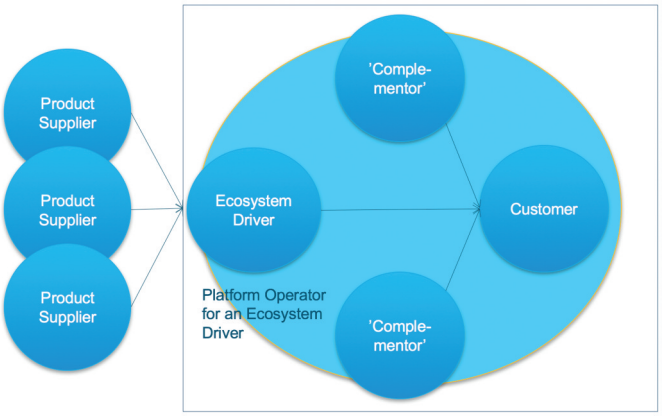

Figure 4. Ecosystem driver as a platform owner

Summary There are some characteristics that differentiate ecosystems from value chains, such as openness, the short lifecycle of complementors, and disposability. Thus, an ecosystem can be formed around physical products, data, knowledge, or a service, but it has to produce value for the end customer.

It is very likely that only one who already has a remarkable position in the industry, and existing customer relationships as a competitive advantage, can be one who takes the position of an ecosystem driver. The other option is that there is someone who has a unique product (or service, or competence), which can be protected, who can take the position. In other words, it is very unlikely that someone just combining something that is available for all can create a unique and long-lasting competitive advantage.

"As a result of DIMECC REBUS research work, we understood how all the partners in the ecosystem must have something unique, which is providing an aligned (with ecosystem objectives) value for the customer by itself – but there is even more value in it if the others complement the offerings. This is the only way to get a trusted position in the ecosystem."

Joni Lehtonen, *Global Solution Head for Industrial Internet, Tieto*

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STRUCTURING NETWORKS IN 'GLOCAL' DISTRIBUTION

II

Taru Hakanen/VTT Technology Research Centre of Finland Ltd
Nina Helander/Tampere University of Technology

Introduction

The way responsibilities are shared between manufacturers and various intermediaries (agents, dealers, distributors etc.) has previously been relatively clear in global distribution: the manufacturer focuses mainly on R&D and production, and intermediaries take responsibility for local sales and marketing, customer relationship management, and service provision (logistics, after-sales services, etc.).

However, ongoing **servitization changes the way responsibilities are shared between manufacturers and intermediaries.** If a manufacturer develops its offering to be complex and service or knowledge intensive, not all of the intermediaries are capable of selling that. Then, manufacturers should either provide sufficient training for the intermediaries or consider selling certain parts of the offering by themselves.

The optimal model for servitizing manufacturers may be a combination of different direct and indirect distribution and marketing channels in global business-to-business distribution. Manufacturers may take on greater responsibility for sales and the provision of certain services, while intermediaries deal with certain services and customer segments. That way, **manufacturers can tackle the so-called 'glocal' distribution**, meaning that they balance between, for example, *global* process efficiency and brand coherency, and customizing the offering and service co-production to *local* customers' preferences.

Understanding of the local context of customers, the creation of a positive customer experience, and adjusting interaction and service co-production to different customer needs and characteristics, is at the heart of service business. However, when a manufacturer reaches its customers via the intermediaries of marketing and distribution channels, they lack direct contact with their customers. Then, a major challenge occurs: how can a manufacturer develop customer-focused offerings and operations when they do not thoroughly know the business customers' perceptions and expectations of value and customer experi-

ence? Is operating via intermediaries then the best way to fulfill customer expectations of value and customer experience in global distribution?

In the DIMECC REBUS program, the practitioners and the researchers have explored these questions together. The framework (Figure 1) summarizes the key aspects.

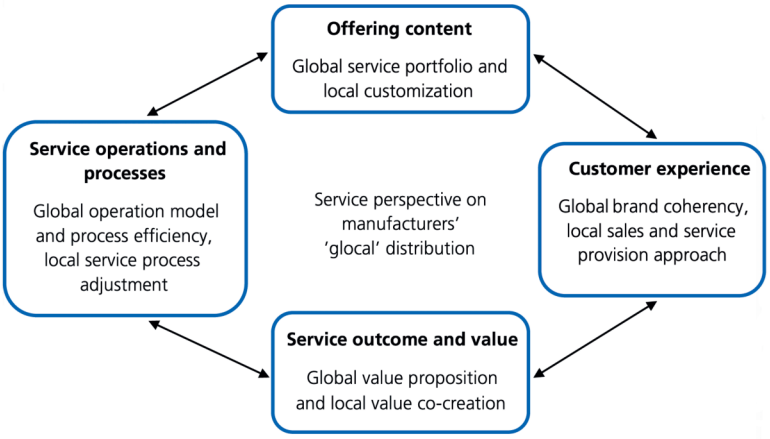

Figure 1. Service perspective on manufacturers' 'glocal' distribution

In spite of the indirect marketing and distribution channels in use, manufacturers may reach their customers directly, for example, via remote services and various digital channels. In an extreme case, intermediaries may end up losing their position in the distribution channel if the manufacturer pursues closer customer relationships for enhanced customer understanding, and starts providing an increasing number of its own services. On the other hand, intermediaries may pursue a competitive advantage through servitization, too. Local services and customer closeness are undoubtedly the intermediaries' central assets and the justification for their role in the distribution channel. Therefore, **intermediaries can take on an even stronger role as local service providers**. Now it is high time for companies to ensure their competitiveness in global distribution, as servitization and digitalization will change it drastically.

This chapter elucidates four company cases and their network stories in structuring their sales and distribution networks in 'glocal' distribution. The case description concerning Kemppi Oy provides insights into selecting new sales and distribution channel strategies as a result of servitization. The Chiller case provides an example of the way a life-cycle cost tool can enhance sales and marketing in international business.

The SOP Metal and Leinolat Group cases open up views on internationalization in critical markets, pointing out the importance of careful planning before entering demanding markets. In Lännen Tractors, a new ambitious strategy was the core of the development activities in the DIMECC REBUS program. Framing the keystones of the offering and identifying the relevant stakeholders using network picturing have been important parts of the strategy process.

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STRUCTURING NETWORKS IN 'GLOCAL' DISTRIBUTION

Mika Kuusela/Kemppi Oy
Hakanen Taru, Kai Häkkinen, Outi Kettunen/
VTT Technical Research Centre of Finland Ltd

Strategic renewal of the global business-to-business sales and distribution network at Kemppi

Kemppi's global business

Kemppi Oy provides welding machines, software, and solutions for several branches of industry, and the related services such as training, repair and maintenance, spare parts, and consultancy. It has operated in international business for several decades. Domestic markets were limited already in the beginning of their history, and business customers that use their products in manufacturing needed to be found abroad. Nowadays Kemppi operates in more than 70 countries around the world. The key to their successful expansion in global markets has been the development of an extensive sales and distribution network with hundreds of companies around the world. This way they were able to ensure efficient sales, services, logistics, and 'customer closeness' in several markets.

However, global distribution has undergone significant changes over the past decades. The logic of action within global distribution is changing. The roles of manufacturers, intermediaries, and business customers are in a constant movement. Companies are seeking new sources of competitiveness and ways to strengthen their positions in the sales and distribution network. In order to ensure competitiveness in the future, Kemppi needed to develop global sales and distribution and the related competencies.

Multi-channel sales and distribution in global markets

Kemppi has selected a strategy of multi-channel sales and distribution in global markets. It utilizes both direct and indirect sales and distribution channels. It has its own subsidiaries in 15 countries and sells extensive and complex solutions directly to business customers. In addition to the direct channel, it sells and distributes products and services around the world via a set of different intermediaries, such as agents, distributors, dealers, and various service providers.

Typically, Kemppi has entered a new market by cooperating with local agents, who have conducted market studies and provided market insights for Kemppi. Agents have also helped in creating the first important customer and partner distributor contacts. Subsequently, Kemppi has expanded its global business by partnering with distributors, which are responsible for the sales and distributor in their respective market area. After reaching sufficient sales volume and future potential in a certain market area, Kemppi has established its own subsidiary there. Although subsidiary establishment in a new country is costly, a major benefit is that Kemppi is locally present close to the business customers. They can acquire customer knowledge that is impossible to receive via indirect channels. They can also provide a wider repertoire of competencies than they could with distributors and dealers. The next list summarizes the benefits of the different entry mode strategies:

Kemppi:

- Strong technological competencies regarding the products
- Solution sales capability concerning complex solutions
- Multi-channel management capabilities

Agents:

- Low-risk support in new market entry
- Gaining market insight

Dealers:

- Wide coverage of the sales and distribution network
- Knowledge of the local business customers and their needs

Distributors:

- Minimizing risks in market entry
- Providing market insight and proof of the business potential

Subsidiaries:

- Local presence close to the customers
- Strong technological competencies regarding the products
- Solution sales capability concerning complex solutions
- Customer knowledge exchange with Kemppi

Sales and distribution "network picture"

As Kemppi developed its global distribution, first they needed to gain a holistic, general view of the sales and distribution network. For this purpose, a "network picture" was created that outlined the actors, resources, and activities in the distribution network. The central resources

of Kemppi consist of the manufacturing machines, the product stocks, and ICT systems. Local market and customer knowledge, customer relationships, and various services represent the central resources of the intermediaries. Thus, the intermediaries that operate at the customer interface combine the Kemppi offering with the business customer. The challenge for Kemppi is to manage dealer relationships so that the intermediaries are competent and motivated to sell their products. The next table outlines the central activities of the companies:

Table 1. The central activities of the companies in the sales and distribution network

COMPANY	CENTRAL TASKS
Kemppi	• Global customer relationship management • Sales of extensive solutions • Management of global marketing • Maintenance of centralized stocks • Building of the sales and distribution network • Management of the dealer relationships • Training, technical support and sales support for the dealers • Handling of customer feedback and reclamations • Warranty issues
Subsidiaries	• Local sales and customer relationship management • Organization and conducting of local sales • Local marketing • Organization of local repair and maintenance services • Stock management
Distributors	• Local sales and customer relationship management • Organization of local repair and maintenance services • Stock management • Participation in training provided by Kemppi • Reporting for Kemppi • Passing on certain (extensive solutions) sales leads for Kemppi
Dealers	• Sales and handling customer relationships • Repair and maintenance (on the part of the dealers) • Technical support for the customers • Participation in training provided by Kemppi • Reporting for Kemppi

In addition to managing dealer relationships, organizing global logistics plays a central role for Kemppi when striving for success in the global markets. The optimal locations of logistic hubs around the world are central for Kemppi in terms of ensuring fast deliveries and customer satisfaction. Therefore, Kemppi has conducted a logistical analysis of two alternative locations for stocks in terms of the related facilities, transport, and labor costs. In addition to logistics costs, it is important to regard other factors in decision-making, such as: political stability and security of the respective country, coordination effort required from Kemppi, the ways to ensure quality, IT system integration, availability of work force, local taxation, labor laws, and cultural issues. Aiming for minimum stock levels is a prevalent trend that also needs to be taken into consideration when negotiating the way responsibilities are shared between the principal and its intermediaries.

Selecting new strategies in global distribution

Kemppi's global distribution is going through a drastic change at the moment. The market is constantly consolidating. Principals, such as Kemppi, seek increased efficiency in their global operations and reduce the number of dealers. They minimize costs in network management by, for example, increasing self-service elements in the order-delivery process for dealers and by decreasing face-to-face trainings. In addition to cost-efficiency requirements, servitization represents a prevalent trend that influences both Kemppi and its intermediaries in global distribution (Hakanen et al., In Press). Both principals and intermediaries then develop and provide services in an increasing quantity and aim to gain 'customer closeness'. Digitalization challenges companies, as a digital channel represents another channel to reach customers in global markets, in addition to the 'traditional' sales and distribution channels. At the same time, business customers' needs become more extensive, requiring customization. In this surge of trends and aims, Kemppi has several strategic options with which it can gain competitive advantage in the future.

Customer closeness and services are regarded as the central assets of the intermediaries of Kemppi. When the Kemppi offering becomes more service and knowledge intensive, this may also result in many challenges and changes in the sales and distribution network (Hakanen et al., forthcoming). The role and task division between the manufacturer and the intermediaries may change, depending on how strong the service emphasis is for both parties in their global operations. When operating via intermediaries, Kemppi may lose 'customer closeness' but, on the other hand, gain in other ways, such as by using digital channels to reach customers and to gain customer understanding.

When analyzing Kemppi against its competitors, customer and service focus, continuous product development, and innovative software so-

lutions and applications are central differentiators for Kemppi. On the other hand, differentiation is hard in terms of marketing. For example, both Kemppi and its competitors utilize social media channels efficiently in their marketing communications. There are no significant differences in terms of the sales and distribution channels between Kemppi and its competitors. Their competitors, too, have an extensive network of dealers in use globally. Extranets are widely used for principal and dealer co-operation. When the digital channels of Kemppi's competitors were analyzed, it was recognized that several Kemppi intermediaries already have their own online shops on the internet, or their products can be purchased at some other online shops. Although many companies have high expectations for e-commerce, a common view is that the sale of basic, "bulk" machines can be done in online shops. More complex machines that require solution sales with higher expertise and customer-specific customization cannot be sold via the internet. However, how much the product sales transfer to the digital channels remains to be seen. Parallel development of the product distribution channels, service networks, and digital channels will be the key to international growth in the future.

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STRUCTURING NETWORKS IN 'GLOCAL' DISTRIBUTION

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Chiller – lifecycle cost tool and customer collaboration

In the DIMECC REBUS program, **a lifecycle cost (LCC) tool** was developed for the purpose of describing and demonstrating the benefits of Chiller's air conditioning systems, meaning the value a customer gets when choosing Chiller's solution, throughout the whole lifecycle of the product. The tool also serves another purpose: it supports the Chiller people selling the products and solutions, especially to customers to which neither the company nor its products are familiar – particularly in international markets. Thus, the LCC tool also has marketing value to Chiller. Moreover, it is a tool for educating users and customers to understand which phases and operations are involved in the lifecycle of a product, and how these affect the cost structure.

Chiller is recognized for its high-quality products. Instead of offering the lowest purchase price, the company offers the lowest lifecycle cost. Relatively high purchase prices of Chiller products have, however, caused some challenges for sales, especially when entering new international market areas. Besides this, the Chiller brand is not internationally well known, which also sets barriers for quick entry into new markets and adds extra challenges for dealers to justify the higher price. The LCC tool has proved to be extremely useful in tackling these challenges. Having clear facts and data about how a solution works and how it delivers what has been promised is central in sales. If a customer is not shown facts, they cannot be sure about the solution and the related costs. The customer utilizes the figures that are available, which usually include mainly the purchase price. This is where the LCC tool is needed: it provides the characteristics of Chiller's products in numbers. Services, including digital services, are an essential part of Chiller's business. The LCC tool adds to the versatility of Chiller's digital services in Chiller's portal.

"Without data, you're just another person with an opinion."
– W. Edwards Deming

When entering new international markets, there is a challenge of how to organize product and service provision and delivery, as well as the training required in the new markets. For this, building a capable partner network has a central role. In the DIMECC REBUS program, both the sales and supplier networks were studied in order to analyze the strengths and development needs of the ways of working within Chiller, as well as collaboration practices between Chiller and its partners. We were able to identify components of lean, fluent, efficient, and also delightful relationships. In order to measure these factors in monetary terms, **a transaction cost analysis model** was developed. This gives valuable information for management about the cost-efficiency of the cooperation in the relationship.

Figure 1. Research scientist Katariina Palomäki, VTT, visiting a supplier in Italy

LCC tools as the means for value communication in networks

Today, industrial production systems, buildings, working machines, and so on, are the results of a network in which several companies provide hardware and software for the end product. Each partner in the network increases the value of the end product, but the value created by one partner is not necessarily transparent to other participants. **Thus, there is a need for methods and tools to enhance understanding of the value created by the different actors.**

A demonstration of the value that one company can provide to the end-user is typically required in purchase negotiations, when a sub-system provider is selecting equipment and components for its offering, or the end-user is selecting solutions. Business-to-business negotiations are typically dominated by the purchase price, although the purchase price is often only a fraction of the total lifetime cost of an investment.

To enable consideration of total lifecycle costs already in the purchase decision, VTT and Chiller have together developed a calculation tool that enables the comparison of various types of cooling solutions based on their lifecycle costs.

"The purchase price of cooling solutions may be only a fifth of the costs that arise during the usage of the equipment. Significant savings can be achieved by utilizing the lifecycle cost (LCC) information already in the procurement stage. A more expensive solution can pay for itself quite quickly in the form of smaller energy and maintenance costs."

Ville Vierula, *Training Manager, Chiller Ltd*

The model developed in the DIMECC REBUS program comprehensively takes into account all the main factors affecting the life-cycle, such as technical solutions with an effect on the purchase price and maintenance costs, or customer-specific operating costs and geographical location with a strong effect on energy costs. In addition, the model enables consideration of the cost effects of maintenance services. Similar models, including lifecycle costs to this level of detail, are almost non-existent in Finnish industrial and service companies.

With this new model, it is possible to produce LCC information when selecting a cooling system for various construction projects, such as offices, hospitals, industrial plants, or equipment facilities. That information supports purchase decision-making when the aim of the decision is not to minimize purchase price, but to minimize costs on a longer time horizon.

The LCC tool was also developed into a web-based tool on Chiller's customer portal, in order to enable customers to conduct their own comparisons.

"The calculation method developed during the research project is now implemented in Chiller's customer portal, enabling customers to conduct their own comparisons. Even though the LCC tool was launched just a few weeks ago, it has aroused a lot of interest, and the first customer comments tell us that the tool has already been utilized in some design projects and it has been found useful. One of the customers told us that the tool not only opens the eyes of the final customer, but also helps the architects themselves see what kind of equipment is most suitable in the building."

Ville Vierula, *Training Manager, Chiller Ltd*

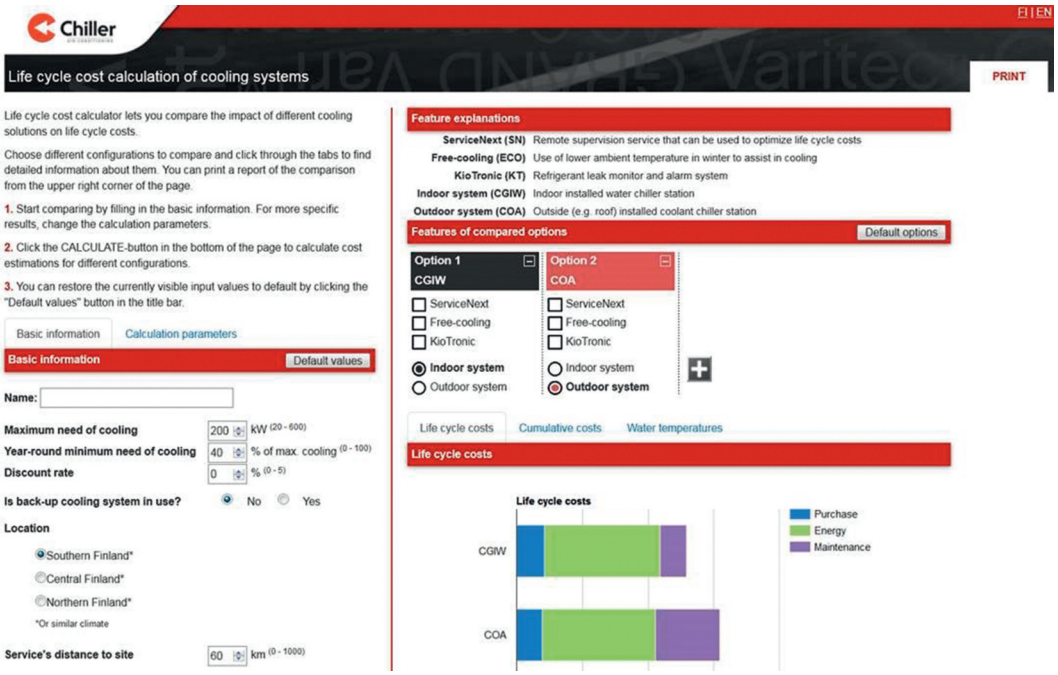

Figure 2. Web-based tool interface for comparison of air-cooling options

The LCC method can be been extensively exploited for lifecycle cost comparison of a wide range of services and technical solutions. Model customization for different kinds of products requires understanding of the business, and understanding and identification of the essential cost categories. This way, a structured costing model can be created, and it is possible to focus on the most important factors of total costs.

Lean collaboration as a target in subcontracting manufacturing cooperation

During recent years, the supplier network has grown and become ever more difficult to coordinate and manage. There are no adequate KPIs for management to use. VTT has, together with Chiller, developed a new kind of cost analysis model for subcontracting manufacturing cooperation. The analysis model (Figure 3) deals with three basic cost categories: 1) transaction costs (SA + CO + PU), 2) warehousing costs (OS + IS), and 3) transportation costs (TR). Transaction costs cover all the purchasing and sales-related costs, as well as communication costs.

The model was tested in the relationship between Chiller and one of its subcontracted manufacturers. The study covered transactions, warehouse events, and transportation operations during a period of one year. The results show that the costs were spread as follows: transaction

costs were 3%, warehousing costs 12%, and transportation costs 1% of the purchase value. The model gives valuable information for management about the cost-efficiency of the cooperation in the relationship. The transaction costs are especially important to recognize and monitor. High transaction costs may mean problems in cooperation. Low transaction costs may mean fluent cooperation and can thus be called "lean collaboration". It is important to notice that transaction costs are always present to some extent. The optimal level of transaction costs is not clear. If there are too few transaction costs, it means that there is too little communication, which may generate problems. The suitable level of transaction costs is very dependent on, for example, the customer company's products and operation models. The transaction costs are also dependent on the respective issues of the supplier.

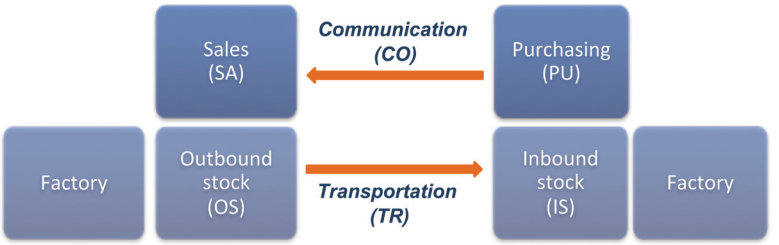

Figure 3. Cost analysis model between supplier and customer

Chiller's suppliers considered the collaboration with Chiller to be stable, systematic, efficient, and fast. When the relationship between a customer and its supplier is professional and reliable, communication can be fluent and uncomplicated – which in turn affects positively the transaction costs discussed above. Being able to trust the other party requires that both the customer and the supplier have the same understanding of the quality and technical standards, and that the information exchanged is reliable, too. Moreover, what makes collaboration efficient is that the persons in contact with each other have a mandate to make the required decisions. Collaboration may get even more informal and efficient as the other party and its way of working becomes more familiar over the years. Certain routines may appear. However, what needs to be noted is that even when the collaboration starts to follow a routine pattern, both the customer and the supplier should remember to review and discuss the collaboration regularly: what the strengths are of this relationship and what needs to be developed; and also to suggest these on their own initiative – for example, what new solutions a party could suggest to the other one, or what new working methods they could utilize.

"A long and good collaboration is a competitive advantage, from the point of view of both the supplier and the customer."

Mika Oinas, *Director, Supply Chain and Information Technology, Chiller Ltd*

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STRUCTURING NETWORKS IN 'GLOCAL' DISTRIBUTION

Nina Helander, Jukka Vesalainen/University of Vaasa

Careful planning needed for entry into critical markets – Leinolat Group heading into oil and gas industry markets in Norway

Summary of motivation and achievements

There has been great interest among Finnish companies to enter the Norwegian oil and gas market, as it has been seen as a market that is full of promise and opportunities. Even though the market situation has been changing in recent years, there is still potential for Finnish metal cluster companies. For this reason, market research for the purposes of Leinolat Group/Uwira was carried out in the DIMECC REBUS program. The research carried out was not a traditional market survey examining the needs of the customers; instead it was built on the understanding of broader value drivers that the potential customer companies in the targeted market have.

Key results and impacts

Defining value drivers

For this purpose, a broad quantitative questionnaire tackling the value drivers, with additional qualitative interviews, was carried out. Based on the research, the market situation has changed dramatically, from a great situation to the present situation with low oil prices, leading to projects put on hold and people being laid off. The value driver analysis revealed that the focus is currently heavily on price, whereas technology was a more dominant factor only two years ago. On the other hand, **innovative new solutions that can help bring costs down are still of great interest to the potential customer companies.** However, for a Finnish SME to enter the Norwegian oil and gas market, an innovative solution with a competitive price still may not be enough, as the target market is highly competitive and constitutes a complete cluster with strong ties between suppliers and customers. This means that the process of becoming a supplier can easily take 1–3 years, and even to start negotiations, good references are a must.

As the industry is driven by oil prices, timing is also important when approaching the market. In order to succeed, price, quality, and timely deliveries are important criteria. It is also important to understand that it is

expected that all new suppliers are familiar with the demands and standards in Norway, and this also further means extensive demands for documentation. This is a learning process, and when making the first offer, it is important to quote production cost and documentation cost separately, clearly indicating price competitiveness.

Planning entry strategies

For the entry strategy into the demanding oil and gas markets in Norway, **it is essential to know that there is a distinction between supplies of standard components versus complex and critical solutions.** It is easier for new suppliers to come into consideration for standard components, and they are often invited to submit a quotation to test the new supplier's offering and also to keep competitive pressure on existing suppliers. Thus, this is the area where it would be wise to start the entry. When it comes to deliveries of complex solutions, experienced suppliers are preferred. Failure to deliver on time and as specified is not an option in the oil and gas industry because of the potentially severe financial consequences. Furthermore, some segments are governed by "contract regimes" in which the end clients (operators) dictate a list of prequalified suppliers that the contractors can use – and no other suppliers can be considered.

Overall, when analyzing the results of the value driver research, two criteria stand out: total cost and production competence. The production competence includes especially on-time delivery – failure to deliver on time may result in severe penalties and costs. In the next figure, these key value drivers and the two different supply strategies form the basis for the entry strategy choice. Based on the market analysis, it is easier to start from the left side of the figure, the standard component delivery, and then move to the right side of the figure, when more experience and reputation have been achieved in the markets. The right side of the figure also means more local presence is needed in order to succeed.

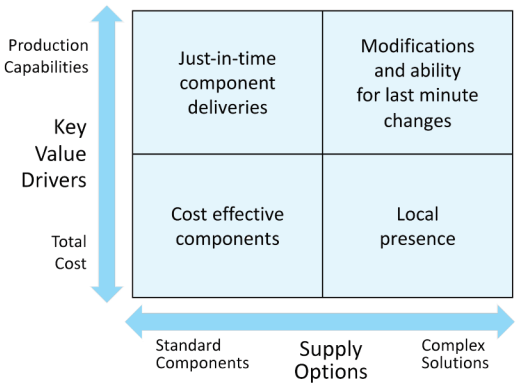

Figure 1. Norwegian oil and gas market typology for entry strategy consideration

The critical success factors for becoming a supplier to the industry is building a visible presence and credibility as a competent, experienced, and competitive supplier. This can only be done on case-by-case deliveries. Proactive actions are expected, and new suppliers need to actively pursue RFQs (request for quotations), follow up on meetings, communicate actively on a regular basis, and show genuine interest in potential clients' business. New suppliers need to allocate sufficient resources to grow the market, and it is also important to scale production for domestic and foreign markets. Furthermore, long-term planning is required, 1 – 3 years ahead.

From the market analysis, we got a much better understanding of the value drivers of the oil and gas markets in Norway, and also some good practical advices on how to approach the market. For example, a local presence and face-to-face interaction are critical when dealing in new markets, and with complex products or solutions with a high degree of customization. For this reason, it would be preferable to start market entry from standard products deliveries, and to build the customer relationship and trust, step by step.

Samuli Kuusisto, *CEO, Uwira / Leinolat Group*

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STRUCTURING NETWORKS IN 'GLOCAL' DISTRIBUTION

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Lännen Tractors utilized a network view in building a novel concept for a global target market

Long-term target in internationalization

Lännen Tractors develops and manufactures machines for demanding applications under the trade name Lännen. The long-term objective has been to become a strong international player. Acquisition of the Swedish company Lundberg Hymas AB in 2008 strengthened the position of Lännen Tractors in multi-purpose machines and expanded its activities in the Nordic countries.

The new ambitious strategy was the core of the development activities in the project. The first version of the strategy was drafted at the end of 2014, and the step-by-step implementation of the strategy is still an ongoing process. Part of the process has been framing the keystones of the company's own offering and identifying the relevant stakeholders using network picturing. The original main target market, Russia, was exchanged for Europe due to commercial and political challenges. The new markets now sought (and already found) include Estonia, France, Norway, and Scotland. The latest commercial deals at the end of 2016 were made in Luxembourg, Germany, and Latvia.

Identifying the core capabilities and key stakeholders in the network

Three global megatrends—climate change, resource efficiency, and urbanization—set the base for the strategy update at Lännen Tractors. These megatrends affect all customer segments, and especially *infrastructure and urban maintenance* were the business segments selected for strategic scrutiny. Climate change poses the challenge of developing means to decrease the environmental burden, such as by moving traffic from road to rail. It has already intensified storms, making secure power distribution and fast removal of snow more critical. Resource efficiency concerns production processes and also sets demands on productivity and high utilization rate during the total lifecycle of machines. Urbanization brings a broad range of needs for infrastructure, both building and

maintenance needs, from power-distribution networks to sewage systems. Strategic choices were made through interactive reflection between the above-mentioned megatrends in the business environment and the current core competencies of the company (see Figure 1).

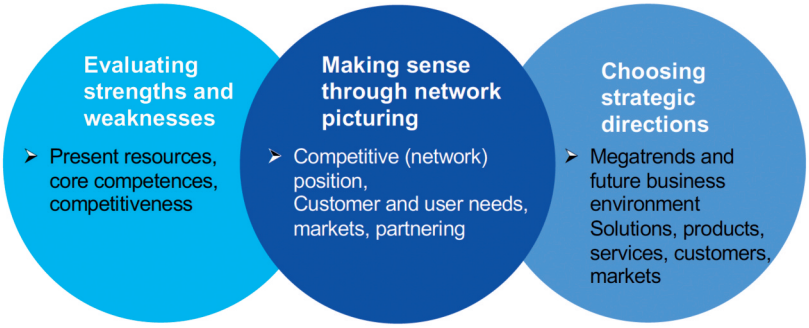

Figure 1. Identifying core capabilities and strategic directions

The global market target and the focus of development work was the infrastructure maintenance segment of electricity and rail network owners and operators. This segment was selected because of the global importance and market potential. Network picturing was used as a tool to illustrate the firm's representatives' perceptions of their surrounding business. The analysis of Lännen Tractors' own position among the networks, as well as different networking directions, offered new ideas on how their business networks currently operate or how they should look in the future. In other words, network pictures were used as a strategic sensemaking tool in shaping change in their business networks.

The network pictures were first drawn from *factory (production) and sales perspectives.* New product development and production are the main functions of the factory, run by the factory director. Technical product support for sales and maintenance networks was also identified as an important function. Continuous development of technological solutions is necessary due to the tightening regulations concerning emissions and safety limits. Competition and varying customer needs are the drivers for the development of new and more customized solutions. The recently modernized factory is specialized in frame building and the company also does contract manufacturing for other OEMs. These direct customers are among the most important network partners. Information concerning the customers of the company's own brand came mainly through the sales organization.

The sales organization is responsible for sales and customer relationships in certain geographical areas. Most of the sales representatives have a long history and experience in the industry, so they know their

traditional customer base, their competitors, and the machines they sell. There are loyal customers in the areas that ideate new solutions and applications for the machinery, to enhance their businesses. The machines are customized and built to order, and dealing with versatile customer requirements and requests is the motivation for the regular communication between sales and product development and production. In addition, tenders and the order-to-delivery process require cooperation. The company has built a maintenance network in the field, but the sales representative is often the first contact concerning repairs or maintenance. The management sets the sales targets and supports this with bigger customer events.

To widen the view of the surrounding networks of Lännen Tractors, two end-customer perspectives were sought in application areas where the machines are used. The first end-customer was a public service provider that operates in the area of one large city. The main collaboration partners are the customers to be served, the public service purchasers. Other integral partners are the other public service providers that are, together, seeking synergy and other means to make public service organizations more effective. The main task of the service provider concerning the machines is to optimize the use of the fleet. Another end-customer perspective is built around a private sector service provider specialized in power network services, such as designing and building electricity transmission and distribution networks and wind farms. Political decision-making, ranging from EU regulations to regional-level decisions, creates a wide array of stakeholders affecting different phases of large projects. The main network partner is still the client that ultimately defines the content and extent of the project, and with whom the contract is signed. The service provider is a service integrator: it has no machinery, but it orchestrates a large network of subcontractors operating on the site. The expertise of the service integrator is project management: it ensures that the right machinery and workers are in the right place when needed.

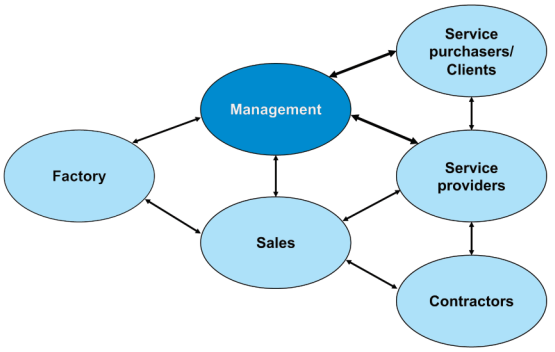

Figure 2. **Network picturing from management perspective**

The other actors' perspectives were visible, and the position of the case company (or lack of it) among them was discussed when the management perspective (Figure 2) was drawn up. Understanding different perceptions inside a company is especially valuable when a strategic change is planned. Network picturing resulted in the identification of new relevant network actors and the need to build connections to them. The strategic aim of Lännen Tractors is to change the industry in the direction they believe is profitable to them, and also to the other relevant network actors (service purchasers, service providers, and contractors). The vision of the management is that "less is more"; that modern, mobile multi-purpose machinery is more productive and environmentally friendly than traditional solutions. Conventional methods and approaches still dominate on work sites, and sub-optimization is common. Network pictures helped in understanding "the big picture" and forming the target of new collaboration: the management network picture involves the service purchasers and providers as important network partners through which it is possible to accomplish the desired change.

"The core of the Lännen Tractors concept is 'less is more' and this is the guideline in all development actions."

Timo Huttunen, *CEO, Lännen Tractors*

The keystones of the offering in the new strategy are multi-purpose, mobility, productivity, and sustainability, and the concept is marketed as the heavy-duty multifunction backhoe loader with all-terrain mobility. The core capabilities are relevant both to a single-machine contractor and to a service provider managing a larger fleet. The reasoning and consequently the sales arguments include:

- The Lännen multifunction machine moves with high-level maneuverability over all types of terrain and can move quickly and independently between work sites without transportation on a trailer. The design of the chassis enables a tight turning radius.
- One multifunction machine can meet all the needs of the work site from beginning to end, replacing multiple single-function machines in the construction of infrastructure, public services, and the construction and maintenance of power and communication networks and railways. Using separate machines multiplies investment and operating and maintenance costs.

- The versatile hydraulic system, fast tool changing, and the detachable backhoe make it possible to use a wide range of work attachments, increasing the productive working hours. The solid structure of the Lännen multifunction machine enables the use of robust and powerful tools, with an extensive working range for both the backhoe and the high-reaching aerial work platform. It is possible to detach the backhoe and equip the machine with another work attachment, according to the demands of the season. In addition, the Lännen multifunction machine meets the highest standards of the best available technology (BAT).

The aim of the concept is to concretize the meaning of "less is more", meaning productivity, and productivity goes hand in hand with environmental sustainability. One multipurpose machine compared to separate machines means less fuel consumption and less staff. Utilizing all the qualities of multi-purpose machinery increases productive working time and lowers the impact on the environment by decreased exhaust emissions, decreased noise levels, less disruption to traffic and residential areas, and lower impact on the landscape. The sales negotiations are supported by fleet utilization rate calculation tools developed in the project.

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STRUCTURING NETWORKS IN 'GLOCAL' DISTRIBUTION

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SOP-Metal learning international R&D collaboration

Summary of motivation and achievements

SOP-Metal participated in the DIMECC REBUS program, aiming to enhance its capability to build new partnerships and to develop existing ones. SOP-Metal has a long tradition in providing ad-hoc services for its customers in the field of R&D, but direct benefits and overall targets for SOP-Metal in R&D collaborations have been blurry. In the DIMECC REBUS program, SOP-Metal investigated its business relationships, created and tested new models for joint R&D processes, and clarified its targets in these joint actions.

Key results and impacts

As a typical mechanical engineering SME in Finland, SOP-Metal's production in Finland has had difficulties in surviving pure price wars. These difficulties have been apparent especially in simpler products that SOP-Metal has been subcontracting. To diversify its revenue streams, SOP-Metal aimed to enhance its ability to operate in foreign markets with a new product line. Partly due to the limited resources available for direct internationalization, SOP-Metal decided to attempt to find partnerships to ease the growth of international operations. SOP-Metal had previously purchased and internally developed a further new product line for traffic noise reduction. This product was perfect to attract potential partners and customers abroad. It was far enough (to prevent claims of competition) from products that SOP-Metal is currently producing for its customers in Finland, but still it represents technology that SOP-Metal is familiar with in terms of manufacturing.

SOP-Metal identified a potential partner for the German markets in late 2013 after contacting Deutsche Bahn. In initial discussions, DB found SOP-Metal's product interesting and encouraged them to start collaboration with a German supplier of safety services and equipment (C). The timing fit perfectly for the DIMECC REBUS program, which had just started when SOP-Metal began the collaboration, aiming to take its NoiseX noise-reduction fence to the German railroads. At that stage, the product was in the prototype phase and it still needed development, especially in terms of attachment technology. SOP-Metal analyzed its experiences

from former relationships and came to the conclusion that product development collaboration had served as a good basis for relationship development. The German safety equipment supplier C's other partner in the Netherlands was willing to participate in further development of the NoiseX system, and these companies, in addition to SOP-Metal's internationalization consultant, formed a network for R&D.

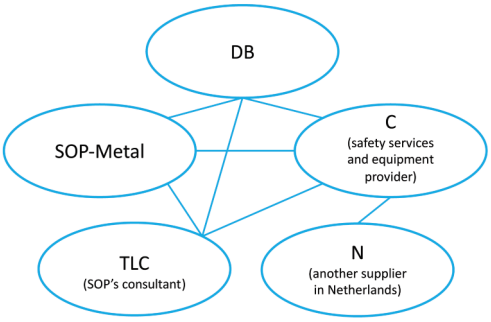

Figure 1. Network of SOP Metal's collaborators in the NoiseX project

Creating a trust-based collaboration network is typically a long-term process and in the NoiseX case it has been done through joint actions over three years. SOP-Metal has learned a lot in international network building. **In general, many of the initial connections are built at trade fairs, but actual collaboration and relationship development require a shared target.** As a part of the DIMECC REBUS project, SOP-Metal investigated its collaborations with current key customers, and research showed that customers appreciate SOP-Metal's proactivity in development efforts and especially the available support in R&D. Analysis of existing relationships has guided SOP-Metal in applying enhancements, but it also assisted SOP-Metal in its effort to build new connections and business relationships. Approaching potential partners with a new product idea has been convenient, as it aims to create additional business and thus benefit both parties. However, handling challenges coping with internationalization at the same time as aiming to build trust based on long-term collaboration can be especially difficult. In its NoiseX project, SOP-Metal decided to purchase assistance for internationalization to ease the creation of new relationships. The advantage has been that a consultant with long experience in the German market has been able to get SOP-Metal quickly to the same level of discussion with its new partners. For every SME such as SOP-Metal, the focus in building a new relationship should be on core collaboration, not on learning how to manage cultural differences. "For SOP-Metal, it has been the right choice to facilitate international relationship building by using an external internationalization specialist. TLC has assisted us to develop our daily communications and to manage inter-

national tasks during the whole three-year process," says Kuntola. The current stage of the project looks promising. SOP-Metal has delivered multiple versions of the NoiseX system, which have been tested in various locations in Germany. After slight modifications, the NoiseX system is expected to gain DB approval in early 2017.

"I think that we have been able to develop remarkably our network capabilities with the DIMECC REBUS program. Our NoiseX project in Germany has been a great learning process, and in the future we are aiming to reach other markets with the same approach."

Sami Kuntola, *CEO, SOP-Metal Oy*

SOP-Metal has been able to clarify its approach to R&D collaboration in the DIMECC REBUS program, but some issues have not been solved. For example, the earnings part of the R&D collaboration business model remains blurry, as customers are not willing to pay directly for participation in the development processes. However, SOP-Metal has great trust that its efforts in development will pay off in the long run in the form of more solid relationships and advantages in terms of capabilities to continuously work closely with the customer.

Figure 2. **NoiseX pilot testing in the Rhine Valley**

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CREATING AND MANAGING BUSINESS NETWORKS

III

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Introduction

Many manufacturing businesses are migrating toward an industrial solution business model. The five following cases address challenges that arise when creating new solution businesses, finding the most suitable network partners, facilitating integration, and managing solution business networks.

The first case deals with solution sales. The case reports the experiences gained during a sales process development process at MacGregor, a cargo-handling manufacturer that introduced a new solution to the market. The case describes the challenges MacGregor encountered when it put together a new value-based sales and functional contracting process, complete with performance-based contracts. The case highlights the organizational changes that are necessary for successful migration to value-based selling. It also sets out the contract-related pitfalls firms are likely to face, and outlines an innovative sales and negotiation process that could help in overcoming the obstacles.

The second case addresses a common leadership challenge that arises often in network governance. In the project with Wärtsilä, researchers developed a software tool to aid project managers in honing their leadership approach to match the specific nature of the employees of their network partners. The tool is built on the Schwartz's socio-psychological theory of human value-orientations. The software tool helps the managers to diagnose the value-orientation of a network partner and to adapt their own behavior to match their counterparts' expectations, proclivities, and anxieties. The tool promises to improve cooperation within the project networks.

The third case, in turn, looks into the early development phase of a solution business model. Researchers and NAPA embarked on a project that sought to develop a new solution business for NAPA. An extensive data analysis project was undertaken to identify a solution need in the shipping sector for NAPA to target. The effort coalesced around the analysis of a huge trove of ship use data. The project identified a number

of inefficiencies that NAPA could tap into to develop an attractive service offering.

The fourth case in this chapter deals with a key facet of networked production arrangements, in which the lead firm depends on external partners to provide discrete end-product components for its production process. In the case, the focus is on how the lead firm can manage the global stock of potential suppliers. The researchers, together with the case company, Rolls-Royce Marine, developed two software tools to identify and evaluate potential suppliers' capabilities, and to aid in supplier selection and sourcing. The idea was, essentially, to formalize and "applify" the tacit knowledge and capabilities that experienced procurement professionals have.

The final case addresses another facet of network governance. Prima Power, together with researchers from the University of Vaasa, introduced a new software-based platform to improve communications between the network lead firm and its supply partners. The platform replaced disorganized and fragmented email correspondence within the network. The communication platform had multiple beneficial impacts. The platform made the lead firm's production process more visible to suppliers, thus increasing their ability to understand the firm's future needs. It also reduced resource slippage and increased trust within the network, enabling the firms to learn from each other. In addition, the firm developed a system to measure network efficiency.

All five cases (MacGregor, Wärtsilä, NAPA, Rolls-Royce, and Prima Power) offer different vistas of the challenges firms encounter in business network context. Together they provide system-level understanding on different network management challanges. The Rolls-Royce, Wärtsilä, Prima Power, and MacGregor cases deal with how networks can be managed. The cases highlight the distinct nature of networked business: the need to proactively and systematically develop new capabilities to both understand and influence the network partners. Whereas the Rolls-Royce and Prima Power cases deal with upstream actors, that is, suppliers, the other two cases are more holistic, introducing new approaches that could be deployed to make sense of all network partners, both upstream and downstream, and even internally within the lead firm. The Rolls-Royce and Prima Power approaches could even be integrated to constitute two ends of a single system. The same kinds of synergies are visible between the Wärtsilä and MacGregor approaches, as well. In the Wärtsilä case, the conceptual framework could offer a platform for further development of the MacGregor sales process. The value-orientation tools could be offered to sales staff to improve their efforts, and even integrated into the sales process itself. This could, ultimately, enable firms to deploy sales processes tailored to match each potential customer's specific behavioral proclivities.

The NAPA case takes a different perspective on collaboration in business networks. It highlights an important aspect of the picture that emerges from the solution business. The case offers a glimpse of the pre-introduction process that all solution business actors must implement to identify a niche for their solution. Simultaneously, the case locks with the MacGregor case, as it further illustrates the data-driven nature of the business model and sales process creation.

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CREATING AND MANAGING BUSINESS NETWORKS

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Anna Hurmerinta, Mika Viljanen/University of Turku

Development of a value-based solution offering and related sales concept at MacGregor

Summary of motivation and achievements

MacGregor has developed a cargo solution offering that consists of two parts. The first part is an upgrade of several products and systems, and the second is a value-based warranty management service for the customer's installed base. MacGregor's solution supports customer asset performance in terms of increased capacity and productivity potential. In other words, the focus is on customer and vessel lifecycle cash flow (see Figure 1). The solution addresses both mechanical performance and usability of an installed base. MacGregor's solution has a significant influence on customer revenues by improving a ship's second-hand value, that is, ensuring the best total investment efficiency and lifetime profitability.

MacGregor's new value-based solution offering required changes in the organization. First, it required the introduction of new selling and contracting approaches: a value-based, modular selling process, and a performance-based, functional contracting process. Second, the values of people working in the organization were measured, to successfully implement and pitch the new strategy. Third, to ensure the management of the new solution offering, seven development actions, or adaptation mechanisms, were identified.

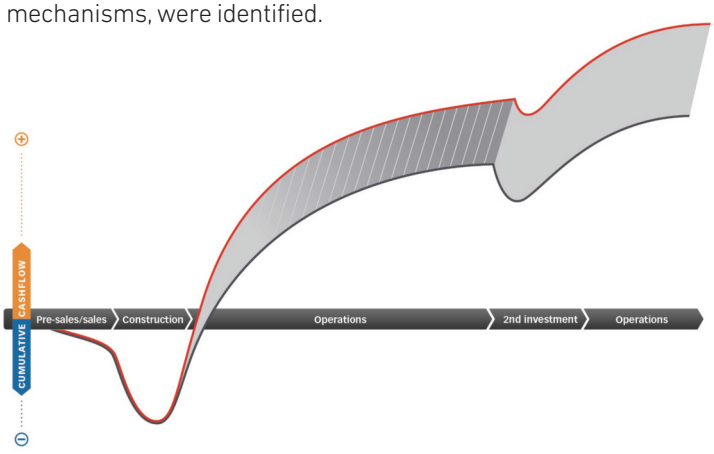

Figure 1. **The impact of MacGregor's solutions on the customer's business**

Key results and impacts

A value-based, modular selling process and a performance-based, functional contracting process: demonstrating the value of MacGregor's solution to the customer's business

MacGregor sought to introduce a performance-based pricing model for its cargo solution sales business. The new solution offering required a new contract model. A key finding was that value-based contracts are complex and disrupt established industry patterns. Therefore, a customized sales process that accounts for the specific challenges that relate to introducing a novel contract was required. To address the challenges, MacGregor and the researchers jointly designed a value-based, modular selling process and a performance-based, functional contracting process. It was soon learned that the value-based selling process facilitated value creation between MacGregor and a broader business ecosystem, and the functional contracting process supported and internally anchored the value-based selling process. Moreover, it aided in legitimizing the disruptive contracts MacGregor was offering to its clients. The value-based selling process is currently applied in several sales cases.

"The developed processes helped us to commit the customers to our new solution offering. Moreover, they enabled us to better understand our customers' business logic and align our business interests."

Tommi Keskilohko, *Director, Customer Solutions, MacGregor*

The process is divided into the following phases (see Figure 2 for details):

- Pre-sales – MacGregor and the customer set the problem formulation and the interface together. The main goal of this phase is to make the customer certain about the fact that the solution provider can impact the customer's cash flow.
- Detail sales – Involves increasing the customer's commitment to the proposed solution by reaching the right promoters and decision-makers within the customer organization. In this phase, MacGregor introduced the customer to pricing models that clearly outline the customer's generated value from the proposed solution.
- Final sales – MacGregor outlined the final scope and specifications of the solution together with the customer, outlining the final contract model, and signing the deal. However, it was soon realized that reaching such certainty highlighted the role of a competent value designer/sales manager. This means that the uncertainty and complexity of the solution are solved, and mutual confidence in the value of the solution is gained.

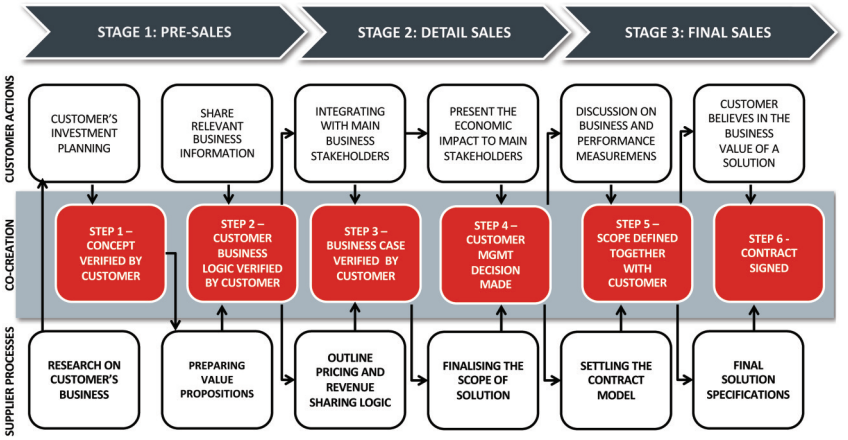

Figure 2. **Value-based, modular sales process**

Required characteristics of solution sales

During the cargo solution concept development, MacGregor realized that introducing the new solutions strategy was challenging. As is usual in the case of introducing change in organizations, people are confronted, amongst other things, with the enthusiasts that are excited now, intrigued by the idea's novelty, and the skeptics pointing out dozens of pitfalls, both real and imagined. Moreover, traditionalists assert that it is not the way things are done in the organization, and egoists wonder what they might gain from the strategy. Similar patterns were identified in the case of MacGregor.

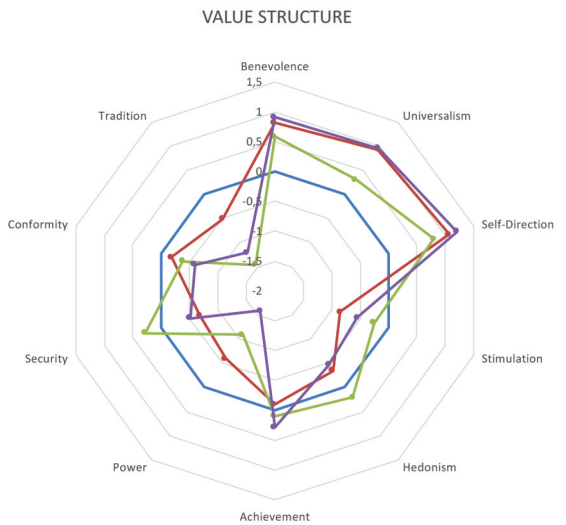

Figure 3. **Example of value structures (fictive)**

The sales manager profile included the most central traits required for the job; examples are found in Figure 3. As MacGregor introduced a totally new cargo solution concept to the industry, it realized that the sales manager must be able to understand cues from the customer and to identify what is of interest for the customer. Moreover, the courage to inquire about the customer's business and embrace new ideas was needed.

As MacGregor was striving to change its strategy from a product supplier to a solution provider, the solution development team pondered how the new strategy should be pitched to the different departments at MacGregor. Eventually, the joint efforts to shape the solution strategy showed considerable variance in values between MacGregor's departments and resources. It showed that some had a stronger tendency to keep the status quo, while others had a stronger tendency to embrace new ideas. Regarding relational behavior, the company showed a natural tendency to care for others' well-being, which was a good basis for the introduction of long-term and inter-organizational collaboration.

Developing a new work logic and development actions to adapt to the solution business

The idea of the seven development actions, meaning the adaptation mechanisms, was to manage the uncertainty that faced MacGregor during the cargo solution strategy change. The mechanisms were considered to be one part of the change management that we found was required during the move toward the solution business.

Seven interdependent action points, with implications for management and organization, were identified:

- *Define the solution:* Clarification of how MacGregor's solution contributes to the customer's business.
- *Allocate resources:* MacGregor's strategy transformation included both the primary operational and supporting resources in the organization, meaning that the roles and responsibilities between functions, units, tasks, and individuals shifted as the delivery scope grew.
- *Operate more effectively:* A solution-oriented delivery approach required that the service part of the solution was equally addressed, and not only in terms of the design and manufacture of components (where the latter was usually the case in the product-oriented delivery models).
- *Develop contract models:* Contracts in solution-oriented business are inherently complex and disruptive to established industry patterns. Designing and anchoring new contract models and negotiation processes required internal and external integration and marketing. Contract-related issues needed to be considered already during the sales process design phase.

- *Communicate:* Communication in the organization became important to clarify the emerging strategy on both conceptual and operational levels. In essence, the communication needed to translate the strategy into contextual parameters.
- *Manage stakeholders:* Solution development required shared interests with key stakeholders. It was realized that the solution provider was an important integrator that managed the collaboration.
- *Focus on the future:* As a solution provider, MacGregor needed to follow the developments of industries and markets. Its competitiveness relied on coevolving and being in the pipeline of innovation and future industry calls.

As shown in Figure 4, the development actions drove the management of complexity and uncertainty in the value chain. Challenges during order fulfillment were caused by a situation in which the two contradicting strategies (established product-oriented vs. intended solution-oriented) collided. By implementing the identified adaptation mechanisms and needed actions, MacGregor's organization could move into solution businesses orientation.

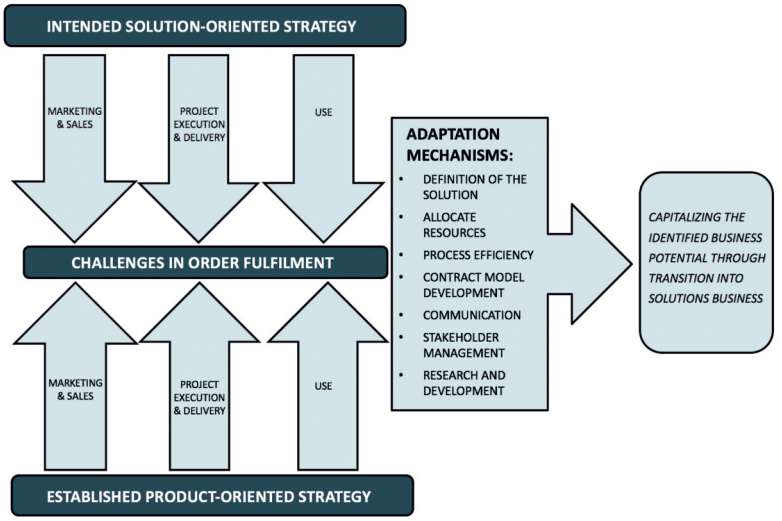

Figure 4. Adaptation mechanisms and needed development actions in the transition from a product-oriented strategy to a solution-oriented strategy

"The researchers taught us the theories and we taught them how to use those in practice. This resulted in 150–200 M€ of new business."

Tommi Keskilohko, *Director, Customer Solutions, MacGregor*

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CREATING AND MANAGING BUSINESS NETWORKS

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Leading industrial projects: method and practice at Wärtsilä

Summary of motivation and achievements

The objective of the project was to increase the leadership abilities across Wärtsilä Energy Solutions project professionals. Most of them have a background in engineering (as is the situation in so many other Finnish project-based companies). Therefore, their strength lies in technical competence, and interpersonal skills (often called "soft skills") are less salient and less systematically addressed. The role of stakeholders has, however, grown, due to both the increased project complexity and the increasingly global markets. As project complexity increases, so does the number of stakeholders and task interdependencies that are not necessarily governed by contracts. In these cases, project managers have to find alternative means to influence their counterparts and collaborators (see Figure 1). In order to meet this need, Wärtsilä Energy Solutions' leadership requirements were explored. The study showed that the leadership method had to be agile enough to fit the ever-changing landscape of Wärtsilä Energy Solutions projects. The research project resulted in a method through which project managers are able to analyze their stakeholders' behaviors. The method offers them support in their choice of leadership style in relation to a specific stakeholder. It was piloted in 11 projects, and interest in the method was high. It has helped project managers put a finger on the causes of behaviors of stakeholders and what leadership styles should be used for different types of stakeholders.

Key results and impacts

Technical know-how is at the heart of project management in industrial projects. Professionals need to understand the solution they deliver, what work packages it requires, and in what sequence these should be executed. All challenges and risks need to be managed or mitigated in a due manner. The traditional triple constraints still persist; projects should meet time, cost, and quality targets.

This is, however, not enough. **Projects are more than mere technical deliveries. A project is a network of people and companies trying to fulfill**

their business goals through the project. Hence, projects are characterized by a variety of interests that stakeholders bring to the table. Many challenges in projects arise from integrating interdependent work packages. The situation becomes particularly challenging when the stakeholders are not governed by direct contracts (see Figure 1). In those cases, project managers are required to find other means to influence the stakeholders. Especially in more complex and demanding projects, it is often a matter of managing stakeholder expectations and finding a common objective for the project team. In theory, these situations can be handled by adapting one's leadership style according to the context created by the project's social and technical environment. This does, however, come more naturally for some than others. Therefore, decreasing leadership differences would create a considerable business advantage, with higher stakeholder satisfaction and even smoother project execution. One of the objectives of the DIMECC REBUS program was, therefore, to find a way to make it natural for project managers to complement their hard, technological skills with "softer", inter-personal skills.

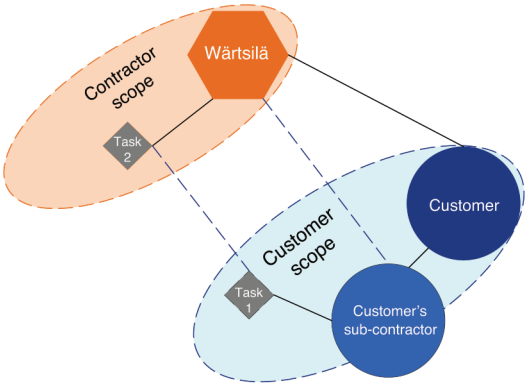

Figure 1. Task interdependencies beyond contractual arrangements

Soft skills become even more important in global projects in which stakeholders with various national, professional, and personal backgrounds meet. Research shows that leadership styles are not universally applicable in projects, and some leadership styles fit some projects better than others. A universal leadership style for projects is therefore unlikely to be found, and a project manager cannot merely rely on past experiences, as project set-ups are rarely similar. Therefore, a project leader must be able to change their leadership style as the project changes.

It all starts from understanding the project context and complexity. In DIMECC REBUS, Wärtsilä Energy Solutions also reviewed the project classification and implemented different new approaches based on

project complexity. For example, in addition to the leadership method, a new requirement management approach for the most complex projects was implemented, developed, and tested. Requirement management, indeed, represents the hard, technical skills. To develop leadership, the idea was to have a method that, by simple inputs, can assist managers in selecting a leadership style.

Because the project context is almost exclusively international, the leadership method had to work regardless of the nationalities and professions involved. Hence, cross-cultural literature was consulted, and a theory of basic values that had strong empirical validity was identified[4]. Values theories are interesting because they are designed to detect personal goals. In contrast, personality theories investigate how people behave in order to achieve their personal goals, but do not shed light on the goals themselves[5]. According to the values theory, people's actions are directed towards ten basic needs, as shown in Figure 2. In short, values are a set of beliefs that serve as the foundation for how individuals evaluate others and situations. Values are based on basic psychological, biological, and social needs, and are often assumed to be the reason for friction between people from different cultures. Therefore, the theory presents a strong starting point for developing a globally applicable leadership method.

Thus, there were three main criteria for the method:

1) It needed to be easily spread within the organization.
2) It had to be globally applicable.
3) It had to be applicable in any given project.

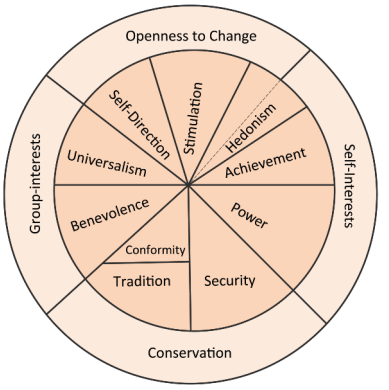

Figure 2. Universal motivational type values (Schwartz ,1992)

4 Schwartz, S.H. 2012. An overview of the Schwartz theory of basic values. Online Readings in Psychology and Culture, 2, 1–20.

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To fulfill the first criterion, software to support the method was designed. This was done due to its autonomous and mobile nature. The software would not require extensive education. The second and third criteria were fulfilled by using widely validated basic human values as a foundation for the method. The software is built so that each value (see Figure 2) is represented by a description of typical behavior in which the values are expressed. This way, the user, in this case Wärtsilä Energy Solutions professionals, has a solid framework through which to analyze their stakeholders. Building on the user's analysis, the software suggests a suitable way of approaching each given stakeholder. This means that the method provides the project manager with unique leadership suggestions for each stakeholder (i.e. a leadership method). It also means that several leadership styles may have to be used within the same project.

The method was tested in 12 projects with 9 project managers. Based on their analysis, the project managers received a profile of their stakeholders, which included suggestions on how to manage each stakeholder. A typical project has 3–5 key stakeholders, depending on the size of the scope and the project. Some examples of situations in which the tool has been successful are described below. The examples describe some of the challenges project managers face in projects, and show how the method copes with the dynamic nature of projects.

Example 1 – Changing stakeholder context

The first scenario that stands out in particular is a case in which the dynamics in the project were changed entirely by unforeseeable events. The project involved a stakeholder that had been particularly difficult, with an emphasis on power, achievement, and tradition value types. He wanted to be in control, appearances were important for him, and he tried to enforce his own ways of working on Wärtsilä. We used the method to create a leadership style that would fit this type of stakeholder, but for reasons unmentioned, the stakeholder left the project. This might have been a relief, but new challenges arose, as the stakeholder that had hired this stakeholder had no experience in the field. This led to a new issue: how do you lead your customer when the hierarchy is upside-down? Again we used our method to create a profile of the stakeholder and a custom leadership style for the new stakeholder. This differed considerably from the difficult stakeholder; the new situation created a different setting that required a different approach, more focused on support than conflict management.

Example 2 – Negotiating impatience and insecurity

Another example is a project in which a second project team was introduced to a project. The project team was implementing a wholly new technology and was a bit insecure about their solutions. For a key stakeholder, it was very important that progress was made constantly. Therefore, the project manager had to be able to balance the carefulness of the other team with the occasional impatience of the key stakeholder. It was clear that the project manager needed to convince the team to share all their progress with the key stakeholder, rather than developing solutions and then presenting the finished solutions.

Example 3 – An expert challenging your solution

In our third example, a project manager was befuddled by a situation he had been in during a meeting. It seemed that the structure of the project was not quite as he had expected. In his counterpart's team, the project manager was not calling the shots, but rather one of his engineers, the engineer was not particularly collaborative. The project manager was able to convince him of the solutions, but he did not understand why some suggestions were approved while others were not. As he profiled the stakeholder, he was able to identify that pleasure and security are important, and the stakeholder could be convinced by illustrating the additional effort that would be required from him due to his propositions.

"Since most of us have a technical background, the method increases our maturity in stakeholder management, which is crucial in complex projects."

Timo Mäntysalo, *Director, Africa & Europe Area, Project Management, Wärtsilä Energy Solutions*

Although the method was developed in the context of Wärtsilä Energy Solutions projects, it is designed to be applicable in other stakeholder-rich contexts, as well. It is especially suitable for projects with many stakeholders and task dependencies, where good relationships are crucial for

project success. As a result of the research, a platform for systematic stakeholder analysis and leadership style decision support was created. The method and the software attached to it create an opportunity for project managers to analyze their stakeholders, even when more seasoned project managers are unavailable.

Further information

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CREATING AND MANAGING BUSINESS NETWORKS

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NAPA enabling the step from big data to improved fleet operational performance

Summary of motivation and achievements

The amount of available data and information is growing at an exponential rate. At its most advanced, data is paving the way for the unmanned vessels of the future. Data analytics can already today be applied to address current challenges, delivering enhanced safety, efficiency, and productivity. For example, data collection is widely used for evaluating a ship's technical performance, for analyzing global cargo flows, and everything in between. To fulfill new regulations and progress from the current state, we need better transparency through more open data, combined with continuously developing analytics.

Key results and impacts

There are a number of inefficiencies in short sea shipping in the Baltic Sea that ultimately lead to unnecessary costs and emissions. One specific set of issues is the low utilization of vessels time-wise, meaning unproductive idling in ports and suboptimal sailing schedules. In other words, the impossibility to plan the timeframe for a voyage affects the sailing profile in a negative manner. For example, vessels too often need to *rush to wait* in ports, due to the lack of a sort of quay booking system: if there is congestion at port, vessels are forced to sail faster when approaching the port, just to take an earlier position in the queue (see an example sailing profile in Figure 1). As a result, sailing speed is uneven and at times too high, leading to higher fuel consumption and emissions.

Another set of issues is caused by how operational decisions taken during voyage execution are often based on the crew's personal experience, even when there are already technologies that enable adapting to real-time weather and sea conditions. Such technologies can be installed on vessels and can drastically improve their performance during operation (e.g., sailing could be executed at an appropriate, even speed), which translates into reduced fuel consumption and emissions.

Although optimized voyage execution can be broadened to encompass the coordination of both production and logistical chains (from door to door), our focus here is on the actual sea voyage. Using the concept of optimized voyage execution as a point of departure, the teams at NAPA and Åbo Akademi University hypothesized a scenario that focused on the application and implementation of optimizing tools in order to achieve fuel savings, emission reductions, and overall more congruent and tightly integrated shipping operations. Here, the role of big data became essential for the construction of the scenario: large amounts of historic data provided the foundations for computer simulations. These simulations were carried out with the assistance of software developed by NAPA Ltd, and the data, provided by the European Maritime Safety Agency (EMSA), consisted of AIS and PortPlus messages.

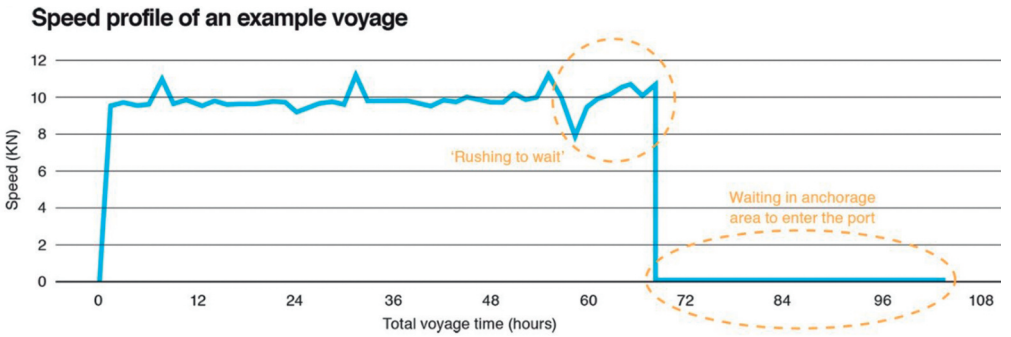

Figure 1. A typical 'rush to wait' sailing speed profile in the Baltic Sea[6]

The historical data was further enriched in order to broaden the scope of the calculations, and it provided a detailed picture of the vessel movements in the studied sample. Details, such as estimated times of arrival and departure, trafficked routes, and the most relevant physical characteristics of the sample vessels, made it possible to recreate the shipping trade scenario for the years 2013 and 2014 in a delimited geographical area (the Baltic Sea). However, the data alone did not provide any direct empirical insights into fuel consumption and emissions, and so, in order to assess the impact of voyage optimization, the role of computational simulations became central for estimating and understanding voyage execution *before* optimization, and for exemplifying the benefits to the

6 The figure is based on historical data obtained from the European Maritime Safety Agency for a voyage between Sillamäe, Estonia and Lübeck, Germany.

case in study *after* retroactive optimization. In other words, our approach consisted of both the analysis of past voyages just as they had been executed and the simulation of more efficient voyage executions, which in the end provided a quantification of fuel consumption and emission reductions. Since the optimization of one single voyage, albeit technically challenging, is deemed to have a marginal effect when trying to understand its impact on a bigger scale, it became crucial to focus on understanding the additive effect, which could only be achieved by a systematic enhancement of the performance of a vessel fleet. For this reason, a holistic method for evaluating operational performance of multiple vessels was developed by NAPA.

In total, the AIS database comprised 1.2 billion entries for a total of 20,000 vessels, and the PortPlus database contained roughly 280,000 entries for 4,760 vessels. From this dataset, a sample fleet consisting of 472 vessels was analyzed. Ship performance models for each vessel were then created by NAPA. The models are based on ship main dimensions (length, breadth, and design draught), ship type, building yard, and building year.

Valuable data can be readily gathered through diverse means, such as sensors on board and authorities' web portals in the case of the maritime sector. While this constitutes an important part of the implementation of big data, more often than not, the challenge lies in finding meaningful uses for the data and in the realization of such uses. In this case, it was possible to collect a vast amount of data from different sources and to subsequently interpret it in order to (1) learn about the current status of the objective fleet, and (2) develop tools that can remedy the inefficiencies that characterize it.

More concretely, the analyzed data provided insight into how sailing with inadequate sailing speed profiles leads to extra fuel consumption and polluting emissions. On the other hand, development and testing of individual ship performance models benefitted greatly from validation by contrast to predicted and historical indicators.

As the methods for producing such models were refined, the analysis of big maritime datasets spurred the faster and more systematic development of individual ship performance models.

"This learning enabled the development of tools that can be readily applied to understanding and correcting ship performance at both individual and fleet level."

Pekka Pakkanen, *Product Manager, NAPA*

Another important factor worth mentioning is that big data, as such, is a continuously expanding set of information that is not limited to providing the quantitative foundations for developing voyage optimizing tools. Performance metrics are continuously collected and, by contrasting them with existing model predictions, a feedback loop can be introduced into the development cycles. This allows for the continuous improvement and renewal of existing models and tools.

In a nutshell, this DIMECC REBUS program provided a closer and more quantitative insight into the actual state of shipping in the Baltic Sea, while simultaneously assisting in the development of better informatics tools. However, as long as good quality data and analytics are available, the opportunities in the maritime sector are wide: optimizing voyages, increasing transparency between stakeholders, simplifying reporting and bureaucracy, enabling smarter and more focused design of vessels, among other things. Thus, work on this front can and should continue in order to transform the shipping industry into an enabler of a sustainable economy.

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CREATING AND MANAGING BUSINESS NETWORKS

Magnus Hellström/Åbo Akademi University
Leo Lagström/Rolls-Royce

Selecting the best – smarter purchasing through software at Rolls-Royce

Summary of motivation and achievements

Global supply markets today offer manufacturing companies a wide variety of options to configure their supply chains in yet more effective ways. At the same time, this variety of options poses a complex decision and selection problem for purchasing managers. First of all, where can promising new suppliers be found, for example when entering a new geographic market that we do not know much about? Second, given that the product itself is complex and that the focal company operates in a project-based industry, how can we be sure to select the most optimal supplier, considering in addition to costs, also the project's deadlines and the specific manufacturing criteria of the products? To cope with these two challenges, two software tools facilitating smarter purchasing were developed at Rolls-Royce.

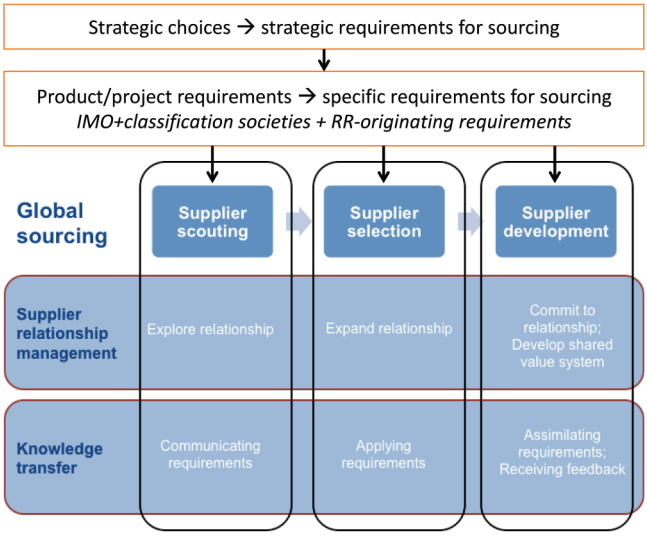


Figure 1. **The global sourcing framework**

Key results and impacts

The sourcing challenge for complex products from a global supply market is illustrated in Figure 1 above, where the sourcing process itself is divided into three stages: scouting, selection, and development, of which the latter two have typically received the most attention in both practice and theory. To succeed in global sourcing, it is also important that the process is grounded not only in the strategic choices made by the buying company, but also in the specific requirements of the complex product and the customer project at hand.

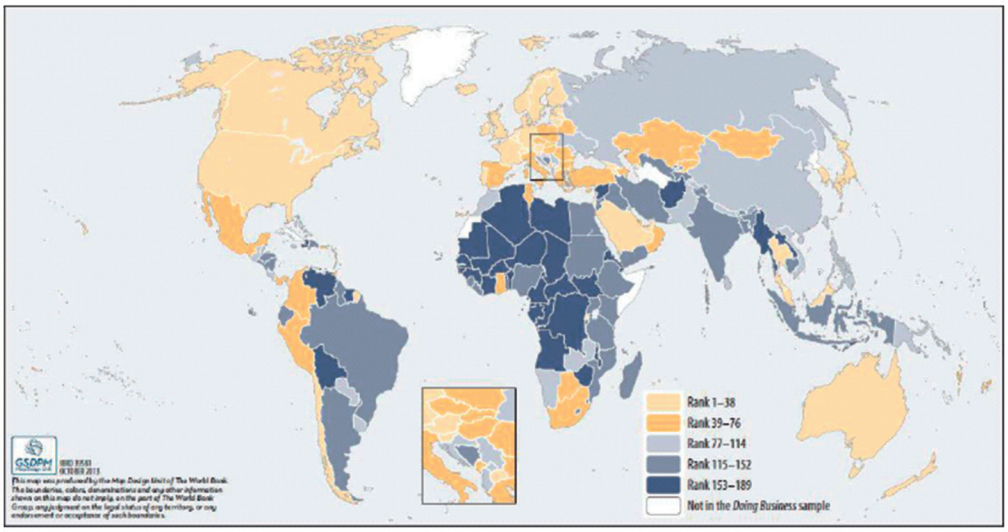
Below, we describe two approaches (or tools) that have been developed during DIMECC REBUS to facilitate successful purchasing and network building in the project business.

Scouting new talent

On a strategic level, the reality for many companies, especially those operating on global markets, is to continuously look for prospective new suppliers closer to their customers' markets. Although costs may have been the main driver for exploring the benefits of global sourcing, buyers have increasingly noticed that manufacturers in many so-called low cost countries, or LCCs, increasingly offer a number of other benefits. For example, most of them offer access to knowledge about local norms and standards, some of them have adopted and invested in modern manufacturing technologies, and some already serve a number of international clients. Hence, on the one hand, some LCC suppliers offer possibilities to reap the benefits of economies of scale, and on the other, they exhibit low risk of bankruptcy or other such trouble because of no dependence on a single buyer. Together with rapid development in both product and manufacturing technologies, a failure in recognizing and exploring these benefits may make the supply chain of a company less effective than that of its competitors. A "supplier scouting" tool has been developed to improve the company's ability to choose the most suitable new suppliers, especially for their strategic components.

With the broadening realm of practical prospective new suppliers, the task of gathering and analyzing the information required for mindfully tapping into such a sea of opportunities is a huge one. The attractiveness of a prospective new supplier depends on, for example:

- Political conditions (e.g., stability and relevant regulation) in the target country/region and their foreseeable development
- Economic conditions and trends (e.g., macroeconomic cycles and cost levels) in the target country/region
- Logistical (i.e. not merely geographical) distances to buyers' important sites
- Trends in end-product demand, both geographically and in general
- Prospective suppliers' own capabilities and their foreseeable development



Source: Doing Business Database

Figure 2. The ease of doing business on the global market

The tool developed for this purpose (i.e. supplier scouting) is intended to help make well-informed choices at the very early stages, when a need for a new supplier arises. The tool directs those involved in the scouting/selection process to evaluate the most essential supplier-related criteria as early as possible in the new supplier selection process, providing access to contextual information (see e.g. Figure 2), and establishing a scoring mechanism for the evaluation of countries and supplier candidates. Furthermore, the tool is embedded in the development of a supplier scouting process, in which its intention is to work as a decision-making aid for a supplier scouting panel. A flowchart of the tool is presented in Figure 3.

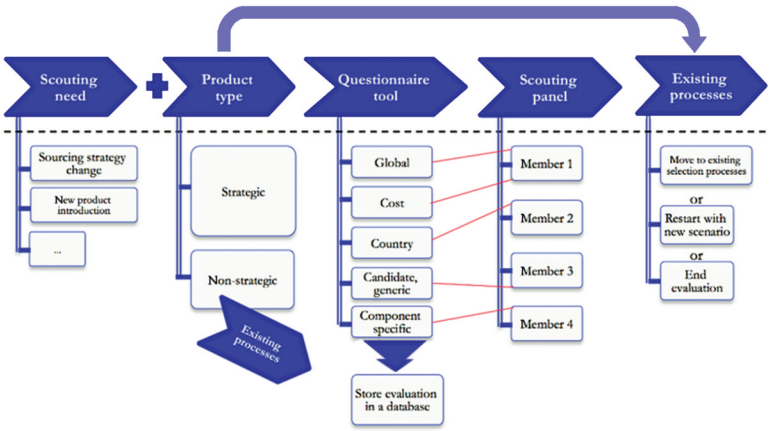


Figure 3. A flowchart of the supplier scouting tool

Potential benefits connected to the use of the scouting system include:

- A scoring mechanism that helps in comparative evaluation, taking into consideration several issues simultaneously.
- Informed and deliberate decisions.
- Enhanced organizational knowledge: information is pooled, shared, and stored.
- Support for day-to-day practices: supplier scouting as a formal process and tool aims to help relevant actors in conducting existing activities successfully and with more ease.
- *Optimal use of the company's supplier selection resources:* by increasing the amount and use of formal resources in the early stages, the intention is that the later stages of supplier selection will filter out unsuitable candidates through the use of methods unsuitable for the early stages (RFQs, sending product designs, etc.), and not by revealing something that could have been found out earlier.

"Moving from selecting to have the best – Do not follow others"

Leo Lagström, *Global Purchasing Executive, Rolls-Royce*

Selecting the best

The purchasing point in the outsourcing process often requires various factors to be taken into consideration besides product price. In complex products and engineer-to-order supply chains, or more commonly project business, the purchasing personnel often have to understand the specific properties of a product and/or know the manufacturing or delivery capabilities of suppliers. Large corporations strive to cope with this issue by introducing formal evaluation criteria and centralized purchasing schemes. Such schemes, however, often focus on relatively high-level supplier characteristics, such as financial health, and product and process certifications. While such characteristics serve as good proxies for general-level capabilities, they may tell very little about the tangible, actual 'low-level' capabilities, such as production equipment maximum capacities or achievable tolerances, which are required to produce the sourced components either at all or with sufficient efficiency.

Experienced purchasers typically possess large amounts of such relevant 'low-level' information, which is required in making informed supplier selection decisions. This information is accumulated over time

through repeated interactions with and visits to suppliers, and most likely as a result of learning from some misinformed erroneous decisions, as well. While such experience-based information undoubtedly is a great asset for the buying organization, it is not readily accessible for other employees because it is tacit (i.e. not codified). To address such challenges, a supplier selection tool has been developed, which is to serve as a decision-making support tool to guide the purchasing personnel to make optimal purchasing decisions for customer orders. Therefore, the tool helps to avoid such purchasing decisions in which problems are bound to arise, which could strain the relationship between the company and its suppliers. Moreover, the tool incorporates extensive information about the suppliers, and thereby increases the company's awareness about the suppliers and their capabilities, as well as the relationship (purchasing) history.

To overcome the above-mentioned problems with matching customer orders and product component requirements with sub-suppliers' actual capabilities, the buyer's procurement personnel must have all the necessary information available to them when making the procurement decision. Thus, there is often a need for a decision support system that codifies and makes the following information readily accessible:

1. Suppliers' relevant capabilities – importantly including the 'low level' ones – and other characteristics that are needed to assess suppliers' suitability for any given purchasing need, such as a customer project
2. Component requirements that are consequential with regard to selecting the most suitable supplier in any given purchasing need
3. The relevant linkages between the above, namely their meaning

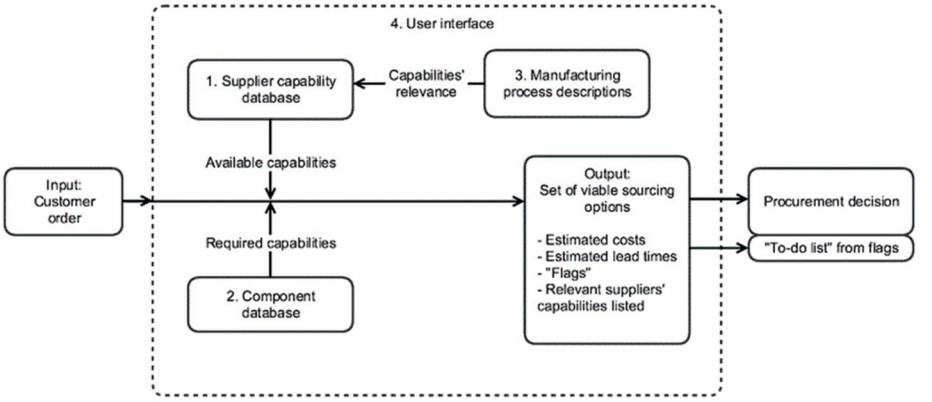


Figure 4. An overview of the supplier selection tool

Consequently, a supplier selection tool that automatically presents and visualizes such factors was developed to support the sourcing personnel in their effort to select the most appropriate supplier(s) for customer orders by taking into consideration all the above factors. The tool takes the form of a web-based decision support system in the corporate sourcing intranet portal. An overview of the elements and the main functions of the tool is provided in Figure 4.

One of the particular aims of the system is to eliminate erroneous or otherwise inappropriate supplier selection decisions due to a lack of decision-relevant information. A simple example of such an inappropriate decision would be to order large components from a supplier that, in principle, is capable of producing them, but whose automated production machines only can manufacture smaller components, which then leads to long lead times and variable quality, due to the large amount of manual labor required. In this case, then, on a high level, the supplier is an appropriate selection for the assignment, but if one takes the 'low level' capabilities into account, the appropriateness is not at all evident.

Potential benefits connected to the use of the selection tool are threefold:

1. Better-informed business decisions
   - The tool enables screening and an accurate choice of suppliers before placing/negotiating the actual order.
2. Contemporary usability
   - The final version is implemented in a browser.
3. Extensibility
   - The data warehouse and tools find an additional use in benchmarking the performance of new actors within an existing supply chain.

The system is easily extendable, for instance, by enabling the suppliers to share their order book status with the company, giving accurate lead-time estimates.

"The type of information processed in this development work has in reality been driving the selection of our propeller suppliers, which is a complex process."

Leo Lagström, *Global Purchasing Executive, Rolls-Royce*

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CREATING AND MANAGING BUSINESS NETWORKS

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Tero-Jussi Teppo, Tommi Mäki/Finn Power Oy

Digitalization of the PrimaPower supplier network to improve operations efficiency

Summary of motivation and achievements

Supply chain (SC) integration through digitalization is a key driver for network-driven efficiency and effectiveness. SC integration has well-known merits when it comes to transparency-related advantages in terms of smooth and accurate information flows, on-the-spot knowledge, and inter-organizational learning. Digitalization offers a great opportunity to improve so-called white-collar productivity, which mainly relates to the creation, transfer, and absorption of information. The main challenge for digitalization actually stems from the varying needs of information management. On the one hand, it deals with the efficient transfer of standardized knowledge (such as product data or orders), and on the other hand, digitalization should enhance the use of individual tacit knowledge in innovation and development processes.

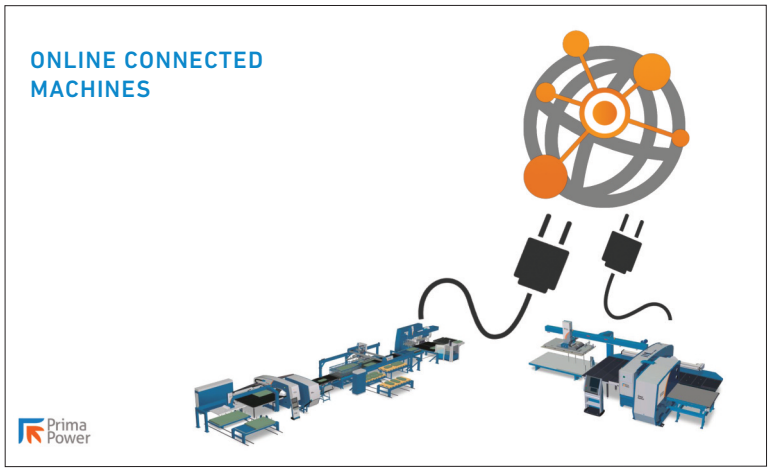

Figure 1. Prima Power is a pioneering firm in product digitalization, as well as in supply chain knowledge management; together with the change in product digitalization, Prima Power has conducted a major shift from stand-alone machines to integrated manufacturing systems with cloud service availability.

Prima Power (http://www.primapower.com/fi/) has acted as a pioneering firm in digitalization when it comes to the integration of supply chains. At the point the DIMECC REBUS program was about to start, Prima Power made a decision to build supply chain management on a digital collaboration platform, which enables a wide range of means to deal with network-related information and knowledge needs. It started to use a collaboration platform, Jakamo (www.jakamo.net), in order to share order-delivery process information with the majority of their suppliers, as well as to use the platform as a means for sharing and developing less standardized pieces of information and knowledge. The development challenge has, thus, two facets: the effective transfer of standardized information and the use of unstandardized tacit knowledge in order to develop and innovate. When deciding to use a general platform instead of developing a firm-specific portal, Prima Power sought network effects through wider connectivity.

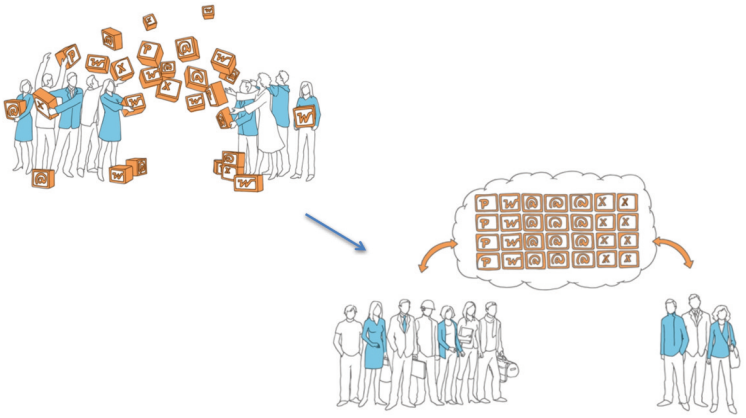

Figure 2. A collaboration platform enables controlled and effective inter-firm information-sharing and knowledge management; for Prima Power, the digitalized new practices of supply network coordination are crucial due to the increasing complexity and variability of its product offering.

The main need for change concerning standardized information stems from the daily practices of supply management. Earlier, the supplier network was coordinated mostly by e-mail, but this practice appeared to be very ineffective (about 50 to 100 emails for a supply manager per day, lost messages, difficulties to cope with changes in product data, etc.).

In terms of the use of unstandardized information and knowledge, Prima Power wanted to increase the level of supplier involvement in innovation and development activities. It also wanted to intensify the interaction with suppliers in customer–supplier relationships, in order to improve relationship-specific and network-level competitiveness. One specific target was to make visible the focal supply chain's performance level and to take coordinated efforts toward improvement.

Key results and impacts

Prima Power integrated its ERP and PDM systems with Jakamo, and today a majority of order-delivery process-related information flows automatically from Prima's systems to Jakamo, from where the suppliers can get it. There is no need for continuous cross-emailing of delivery information, but the data is in one virtual location available to all who need it.

Today, after two years' experience in the use of the new ways of action, based on the digital collaboration platform, the people at Prima Power, as well as at the suppliers, list the gains achieved as follows:

- *Shared view of the current situation*. Due to the fact that all orders, documents, forecasts, and related discussions are collected and stored in a common work space, all participants within a business relationship stay continuously well-informed about the current situation.
- *Unproductive work has reduced*, because the amount of ineffective e-mail has decreased and changed into more transparent practices within business relationships.
- *Speed of action and the agility of the supplier network have improved* due to transparent information on open tasks concerning the order-delivery process, which deals with, for example, differing understandings of delivery times.
- *Quality of network operations has improved*. Processes, activities, and ways of working have been developed along with the implementation of the information platform. These include clarified actor roles, improved measurability of performance, and accurate product data availability for the suppliers.

Along with the improvement of operative information flows, Prima Power has developed inter-organizational learning, supplier involvement, and network performance management within its supplier network, in cooperation with the NeVS research group at the University of Vaasa (www.uva.fi/fi/research/groups/nevs/). A network-level performance measurement method, including both financial and operative measures of performance, as well as measures for inter-organizational activity, was developed and piloted. Besides network-level performance measurement, the method gives important relationship-specific information to be used in supplier-customer relationships, to further develop interaction. Using the information generated by the method, it is possible to address more strategic and future-oriented issues in discussion with the suppliers. Such strategic issues that are measured and thus made open for discussion are, for example:

- strategic integration in terms of relationship-specific investments
- information transparency
- customer value profile

- relational capital (trust, commitment, and shared views)
- customer and supplier involvement in the partner's development processes (continuous improvement and new product development)
- relationship integration in terms of structures, processes, and systems

The usage of the performance measurement method in a network, and particularly in business relationships, facilitates shared understanding about the prerequisites of effective networks. The practice of supplier–customer relationships tends to be very operative and future-oriented developmental issues become easily shelved if not addressed explicitly. To improve the strategic interaction between Prima Power and its suppliers, a yearly agenda was developed for relationship-specific discussions. This new mode of interaction was piloted in selected supplier relationships, by addressing the importance and development of information transparency. Jakamo was used as a knowledge-sharing platform to facilitate these discussions.

There is still a lot of potential unused in terms of digitalization in Prima Power's network. The next steps are twofold. First, the integration of data exchange should be enlarged to cover the supplier-end, too; that is, to integrate supplier ERP to Jakamo in order to develop a network-wide IT infrastructure. Second, there is an obvious need for and a great opportunity to develop relationship-specific and network-wide continuous improvement practices, in order to utilize all the knowledge that firms in the network have. If these goals can be reached, one can say that Prima Power, with its supplier network, has succeeded in implementing network-wide knowledge management practices ranging from automatic data transfer to practices for creating new knowledge. The REBUS team of NeVS continues to facilitate Prima Power and the supplier network to reach the last goal in particular.

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MANAGING IN BUSINESS RELATIONSHIPS IV

Rainer Breite/Tampere University of Technology
Magnus Hellström/Åbo Akademi University

Introduction

Rapid technological and business model evolution together drive the development of business relationships and continually change companies' business environments. As a result of this evolution, companies have to create new ways of managing their networks. They also have to increase their understanding of how to accelerate partnership processes, and what kinds of boundaries exist between companies. This, in turn, reforms a company's need for a network co-operation and making sure suitability for the long-term partnership with its suppliers and customers. Furthermore, a new need for a broader and faster method, or tools for network-wide knowledge-sharing and utilization, is arising. Therefore, the understanding of the network connection between suppliers is more and more important.

In this section, we highlight the development of the business relationships with the help of four cases implemented in the DIMECC REBUS program. Each of these presents the business relationship from a different managerial point of view. In the case of TOF, the business relationships are improved by relational factors, especially in a case where the supply network is illustrated by the triad constellations. Correspondingly, in the case of NAPA, the focus is on efficient and effective data-sharing enabled by a triad constellation and network thinking. The case of JTK Power focuses on the development of partnerships, and especially how to create a deeper partnership during relatively short-term business relationships, and why the supplier's activity in this process is important. The fourth case, about KONE, highlights the different relationship between the firm and supplier in a situation in which the rapidly changing customer needs and technological evolution process entail a need for supplier integration into KONE's R&D processes.

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MANAGING IN BUSINESS RELATIONSHIPS

Mikko Jaskari, Seppo Virta/Technip Offshore Finland (TOF)
Anu Suominen, Sari Mäenpää, Rainer Breite/Tampere University of Technology

Governance in triads – Case Technip Offshore Finland

New way for project business – from functional project management to visualized network management

TOF is producing massive subsea constructions with extreme quality requirements. One of TOF's main products is the "SPAR" platform for oil production. The TOF production process depends on an effective supplier network. It consists of some twenty key suppliers and tens of minor suppliers. Contracts are mainly based on competitive bidding. However, the length of relationships with TOF and its subcontractors has been as long as 20 years. Long-term contracts have been issued for some key service areas. The organizations have a long-term view on collaboration and the effects of relational factors on cooperation. The business focuses on the complex oil and gas business. With a high risk level and varying capacity requirements, project control is a major issue for both TOF and its suppliers. Thus, the number of potential suppliers is limited.

Figure 1. **Technip's products and their operation environment**

With the support of the DIMECC REBUS program, TOF has developed a roadmap that helps to simplify network management. The roadmap includes the following four main phases and steps:

Phase 1 *"Motivation for cooperation development"* consists of three steps:

In step 1, define activities and purposes. In this phase, TOF and TTY have defined the common activities and purposes with suppliers. After that, the context was decided. In our case, the context includes the main work tasks in the SPAR project. The context has been formed according to key and support activities, which are strongly related to the chosen key activities.

In step 2, define the "network constellation". The relationship constellation was carried out in the following way. First, the network was roughly described and the key suppliers and their relative positions and orientations with respect to each other were defined, and the common service subcontractor (SS) discovered (see Figure 1). Next, the triad constellation was described for the relationships between our company (TOF), key subcontractors (S1, S2, S3, S4, S5), and the key subcontractor of support activities (SS) (see Figure 2). The aim of this step was to define the framework in which the possibilities for control shift, and further collaboration with suppliers can be examined.

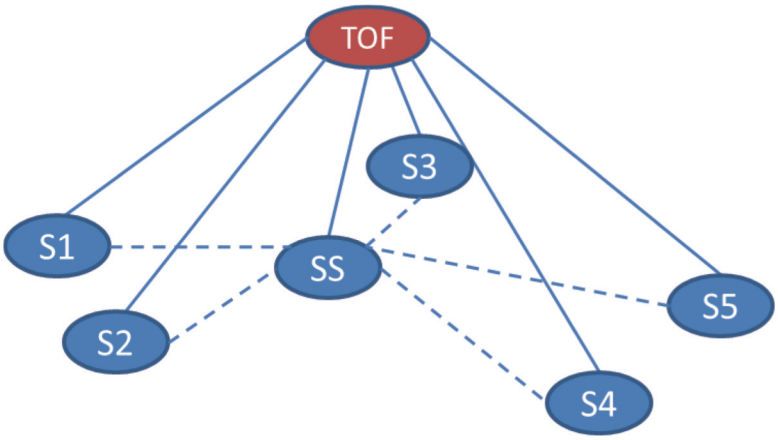

Figure 2. Part of the TOF supply network

In step 3, select participants. This step is a process in which key subcontractors are selected. One subcontractor represented support activity and other subcontractors represented the chosen key activities. Every subcontractor has a long-term relationship with TOF, and they were estimated to have the potential for a long-term strategic partnership with TOF in the future.

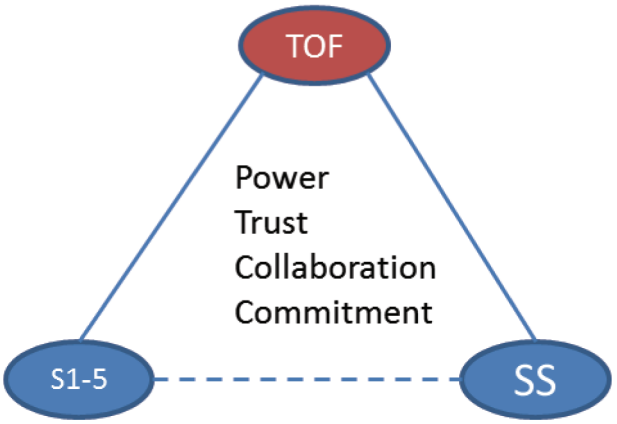

Figure 3. The context of the relationship definitions

The second phase: *"Evaluation of relational factor levels".* The relational factors are decided, to evaluate and map the triad framework. According to this evaluation and mapping, a query with questions and discussion themes was carried out with different evaluation questions.

The third phase: *"Selection of the right cooperation strategy".* TOF's purpose is, according to the results from phase 2, to figure out subcontractors' readiness to collaborate, and whether the suppliers are at a level at which they can be allowed to take more responsibility for project control.

The fourth phase: *"Reduction of control activities step by step".* This phase has not been actually done yet. In the future, TOF and its suppliers will plan how some control activities can be transferred from TOF to the suppliers. This, in turn, is reflected in TOF project management, and it will be taken into account that the need for network-based control activities will decrease.

Benefits for TOF

Although the use of the roadmap brings new requirements for network and project management, several benefits can clearly be indicated. The main benefits for TOF are threefold: 1) network management is more visual, which in turn simplifies network management itself; 2) the need for the control of project activities may decrease in the future, which in turn simplifies the company's project management; 3) cost savings are expected. The expectations are based on the conception that project management is more efficient, cooperation between subcontractors is improved, and the area of subcontractor responsibilities is more explicit.

"The DIMECC REBUS program and the support from Tampere University of Technology gave TOF the frame and tools to have the subcontracting strategy updated to meet TOF's new mode of operation. TOF's subcontracting strategy is based on visualized network management internally and externally. The TRIAD model will be tested in a real work environment in TOF, and later on further developed. TOF's own qualified resources will, in the future, carry out a major oil rig project supported by the partner and subcontracting network."

Mikko Jaskari, *Procurement Manager and* ***Seppo Virta,*** *Procurement Director, Technip Offshore Finland (TOF)*

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MANAGING IN BUSINESS RELATIONSHIPS

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Improving operational efficiency in shipping through multi-party contracts for data utilization – Case NAPA

Summary of motivation and achievements

All kinds of efficiency can be improved through integrating data from different sources. Unfortunately, existing company boundaries often stand in the way of the required data transparency. In shipping, data transparency can at best save tons of fuel and large amounts of money. A point in case is cleaning the ship's hull. In operation, all kinds of organic sea matter attaches to a ship's hull, as can be seen in Figure 1.

Figure 1. **Biofouling of a ship's hull**

The result is a gradual increase in friction and a decrease in hydrodynamic efficiency, and hence an increase in fuel consumption. The typical measure is to repaint the hull during regular dry dockings at intervals of a few years. If needed, the hull can also be cleaned by divers in ports or wet docks. The tricky thing is to know when the hull is to be cleaned, as it, of course, costs money and takes time. To detect a decrease in the hydrodynamic efficiency, one has to take into account a number of variables.

Another problem is the fact that if the vessel is chartered on a time or voyage basis, the one who pays for the fuel (charterer) is often not the same as the one who monitors the ship's performance and pays for the ship's maintenance (ship owner).

The objective of the analysis presented here was to find a way to show how performance monitoring, data utilization, and transparency can be used to improve operational efficiency in shipping.

Key results and impacts

The case was about performance monitoring of a vessel operating in Asia. A time-based charter party contract was made between the ship owner and ship operator in 2014. NAPA's system was installed onboard the ship, and as part of the arrangement, NAPA's indicators and tools were to be used in order to monitor the performance of the vessel. Key factors such as speed, route, and fuel consumption were reported continuously, showing the vessel's performance for the last 24 hours. According to the agreement, the reports were distributed to both the ship owner and the charterer. Once a week, a report was also submitted in order to verify and follow up on the condition of the hull. Such a report is done in order to investigate when and why performance degradation happens. In the report, NAPA's algorithms were used to normalize fuel consumption, taking into account factors such as loading conditions, wind, swell, speed, and rpm of the ship engine.

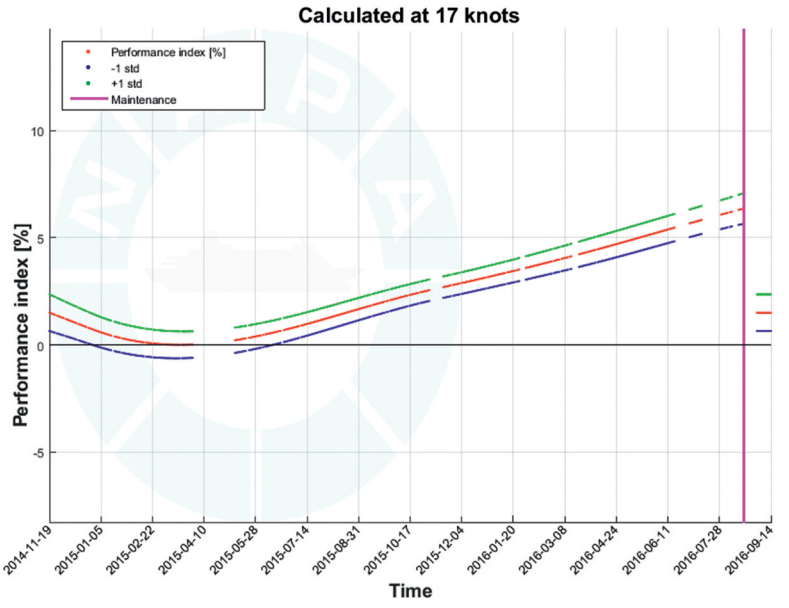

Figure 2. Normalized fuel consumption over time as a result of fouling

The first dry docking was scheduled for November 2017, according to the normal docking and maintenance rhythm for the ship owner's fleet. Following up on the periodic performance reports, an increase in fuel consumption was, however, soon detected. A more thorough analysis was undertaken toward the end of 2015, and at the beginning of 2016 it was found that fuel consumption was approximately 4% above the average rate, due to fouling. Communication took place between the parties, and it was concluded that the hull needed to be cleaned. Cleaning of the hull took place in the middle of the second year of the contract, when a suitable slot in the ship's time schedule had been found. At the time, fuel consumption was approximately 7% over the average consumption, as can be seen in Figure 2.

As a result, fuel consumption was reduced to levels close to that at the beginning of the contract period. The cost of cleaning the hull was a fraction of the accrued savings. In monetary terms, € 84,000 can be saved on a return voyage by means of a two-day maintenance stop.

Without NAPA's system and data sharing between the owner and charter (as well as the willingness of the owner to clean the ship without its own direct benefits), this would never have been detected (and realized), as illustrated in Figure 3.

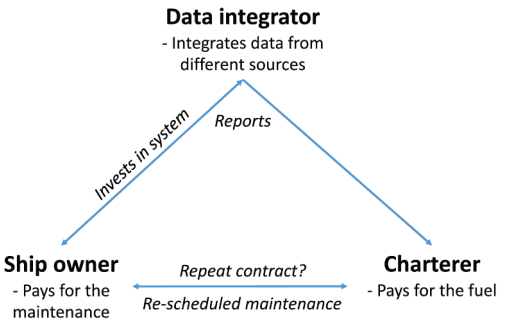

Figure 3. The three-party set-up between NAPA, the ship owner, and the charterer

Legal aspect

Contractual issues may hinder the quest for data transparency. In general, ship owners try to avoid dry-docking, as they must bear the cost of vessel maintenance under most standardized charter parties. Since fuel consumption is often a contractual warranty, granting the charterer damages if not fulfilled, the owners may also object to any monitoring system that can demonstrate that, due to fouling, the vessel consumes more fuel than agreed. However, these obstacles can be overcome by a contract technique. The parties may agree under a rider clause to share profits generated by NAPA's system, or to modify the performance clause so that monitoring of vessel performance does not lead to adverse consequences for the ship owner.

Jutta Seppänen, *Doctoral candidate, University of Turku*

"Through the DIMECC REBUS program, NAPA has been able to develop its capabilities in data analysis and its business model for analytics services. Moreover, the program has promoted data transparency in shipping or, more generally, called for open data in logistics."

Pekka Pakkanen, *Product Manager, NAPA*

Further information

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MANAGING IN BUSINESS RELATIONSHIPS

Jouni Hartikainen/JTK Power Oy
Juho Ylimäki/University of Vaasa

JTK Power enhancing supplier-driven R&D collaboration

Summary of motivation and achievements

In some cases, determining the type of relationship between a supplier and a customer is challenging. If the supplier sees its role as that of a subcontractor, it tends to focus on issues relating to production, and especially making production more efficient. When the supplier then succeeds in that, the customer is often willing to give more responsibility to the supplier, and increases the portfolio purchased from this supplier. An increased product portfolio means more interaction between the supplier and the customer, and more focus is typically placed on a smooth information flow and integration of systems. JTK Power has gone through this process and, in their case, the customer relationship has continuously developed toward being a partnership-type relationship. The initial framework of the DIMECC REBUS program matched JTK Power's vision well. Our target has been to strengthen the co-operation and overall partnership with JTK Power's main customer. The goal in the DIMECC REBUS program was also to distinguish the key factors in their co-operation, and to build a new process to be used in future collaboration.

Relationship development

JTK Power has a long history with their main customer. From JTK Power's point of view, the relationship has been a partnership for years, but they wanted to strengthen it more and ensure relational thinking within it. The relationships between organizations are often too complex to describe using simple relationship classifications. Instead, they typically include characteristics from multiple relationship types. As long-term relationships often include plenty of ties across companies, multiple products in varying phases, and various interests, defining relationships and their current status is sometimes challenging even for managers operating in these relationships. The DIMECC REBUS program provided an interesting opportunity for JTK Power to analyze its relationships. In JTK's thinking, the key factors for partnership creation are quick

trust from the beginning and technical expertise in the relationship. As the relationship grows into a partnership, the technical side of the relationship is seen as a key factor. The focus might move away from the current product and its commercial terms, to information flow, and meanwhile the social aspect of the relationship continues to rise. In the DIMECC REBUS program, JTK decided to emphasize technical expertise in the relationships. The main idea was to describe the current way of collaborating with a process model, analyze it, and develop it further. To pursue partnership development and to ensure objectivity and validity in the development process, JTK decided to build a Master's thesis topic around this idea. The University of Vaasa has also been involved, and conducted dyadic interviews involving both sides of the relationship.

"To enhance our business relationships, we needed deep and broad knowledge from our ongoing partnerships. DIMECC REBUS provided us with an opportunity to accurately define the status and characteristics of our relationships with key customers and suppliers."

Jouni Hartikainen, *Development Manager, JTK Power Oy*

Key results and impacts

The results of this project evolved from the analysis of JTK Power's current partnerships. The co-operation with the customer, and also with JTK's suppliers, has been systematically investigated. JTK has learned what the actual key practices and processes are that they have with their main customers and suppliers. These findings served as a basis when JTK has been designing an approach to be used with other potential customers and suppliers. New customer acquisition is seen as important in the future, and to assist JTK in this, R&D collaboration and its advantages with the current main customer have been studied. Established R&D collaboration with the main customer has been remarkable, but instead of having a planned process, it has been an ad-hoc type of collaboration occurring each time the customer has felt that it needs mutual development work. The research that JTK Power has conducted in this area has already given beneficial practical results in terms of collaboration processes and the business model. To ensure JTK's development in R&D collaboration themes, the organization decided to hire a person dedicated to it during the DIMECC REBUS project. This has enhanced JTK's ability to collaborate, and customers have seen this as a positive signal to further develop the partnerships.

"One of the main points in the research findings has been the importance of early customer involvement."

Jouni Hartikainen, *Development Manager, JTK Power Oy*

"In our field of business, our customer has the best access to the feedback from end-users and, together with them, we can efficiently address it. In the case of new product development and upgrading an existing product, the voice of the customer is vital. This steers the design onto the right track already in the early stages, saving time and resources", development manager Jouni Hartikainen explains. Other key impacts in the project have been to point out what JTK has been doing right. "Analyzing our competitive advantages has helped us to increase our level of service, and it has helped us to recognize and to use our potential better", states Hartikainen. He also feels that JTK's processes are now more systematic than at the beginning of the DIMECC REBUS project.

JTK has been using capable suppliers, but it has not used their full potential in terms of product development projects. As a result of the DIMECC REBUS program, JTK has now added an important factor to the criteria for its supplier selection: the capability to collaborate in product development projects. JTK has also paid attention to determining the type of technical co-operation. This is, in many cases, a key factor and needs to be taken into account when making technical relationship plans. JTK has used the three-way classification of design to customer, design with customer, and design by customer. The type of collaboration can vary depending on the product. Furthermore, one company can actually consist of multiple business units that handle information flows separately. Thus, their ways of working with suppliers might vary significantly. These variations increase the complexity of the supplier-customer relationships, and therefore several approaches need to be implemented in relation to one single customer company.

"Understanding all of these factors together has helped us to improve our core business. We hope that these factors have been noticed at the customers' end, and that these factors have increased our attractiveness in the eyes of the customers. We feel that the supplier needs to be proactive and to understand the reasons behind system integration and seeing further. A new work phase regarding information flow may be a side branch of deeper system integration that is needed in future business."

Jouni Hartikainen, *Development Manager, JTK Power Oy*

Case

After the analysis of the partnership, technical cooperation in new product development was seen as an important area for improvement. The companies had previously been discussing how their information-sharing is vital for successful joint design projects. The companies agreed that they should be able to use knowledge residing (a) in the manufacturer organization, (b) in the customer organization, and (c) in some cases in the manufacturer's suppliers' organizations. What is usually not clear is when and how all the information should be used. A newly launched design project was chosen as a learning case. In that project, numerous approaches to new product design were investigated. After the analysis, the widely used Stage-Gate approach was chosen to serve as a basis for JTK's new process. JTK modified the basic Stage-Gate model to better fit a multi-company setting, and implemented it in the relationship. As the customer has the best knowledge of the end-user's comments and needs, early customer involvement is particularly important. In JTK's case, all the gates include a review of the depth of customer and supplier involvement in the next stage. When collaboration is discussed at several points during the project, involvement can be easily adjusted for each stage, to match the actual need.

In the JTK's test case, the customer was involved in the development process from the beginning. In addition, one supplier participated in the process already in the first stage. Customer needs, including end-users' wishes, were transferred to material requirements rapidly using both parties' expertise, and proposed designs for a prototype were made efficiently, mainly by JTK. As the decision of a relational approach in development was made at the beginning of the process, it was not necessary to discuss those issues later. The new systematic process for joint development was already seen as beneficial for the collaboration, and the customer has indicated its appreciation of JTK's efforts in building a new collaborative product development process. JTK is looking forward to using same kind of approach with new potential customers, and hopes that it will help them to pursue new business opportunities.

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MANAGING IN BUSINESS RELATIONSHIPS

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Mikko Mattila/KONE

Boosting people flow via external resources and an enhanced R&D process at KONE

Global drivers of supplier involvement

In enhancing the flow of urban life, the systems of elevators, escalators, and automatic doors are at the heart of 'smart cities'. Owing to the increased complexity of people flow solutions, the outsourcing of subsystems and the underlying manufacturing processes has been accelerating since the 1990s. In this process, original equipment manufacturers (OEMs)[7] like KONE have become more like *systems operators* that know more than they are able to produce. They coordinate loosely coupled networks of suppliers, their equipment, components, and specialized knowledge, to maintain a capability for systems integration. Networks enable benefits from the advantages of both integration and specialization[8]. As the cutting edge in the supporting technologies and subsystems shifts backwards in the supply chains, new kinds of managerial challenges emerge, such as how to mitigate the issue of technological *distancing*.

Moreover, in order to respond to the rapidly changing customer needs and technological evolution, systems operators need to introduce more new products in shorter cycles. Technological evolution makes product-service solutions more complex, as they integrate subsystems that exploit isolated expertise areas. Hence, the involvement of strategic suppliers in the OEM's innovation process is gaining a strategic foothold in technology management and sourcing. According to KONE's experiences, the efficiency of new product introduction (NPI) can be markedly improved by involving external resources in product development. Along with the development of supplier involvement operations, KONE's activities in the DIMECC REBUS program have been focused on the recon-

7 An original equipment manufacturer (OEM) is a company that makes a part or subsystem that is used in another company's end product.

8 Prencipe, A. 2011. Corporate strategy and systems integration capabilities: Managing networks in complex systems industries. In: Prencipe A., A. Davies & M. Hobday (eds.) The Business of Systems Integration. UK: Oxford University Press. 114–132.

figuration of the entire product development process, to better align with the requirements of supplier involvement practices. More generally, KONE's work has contributed to a systemized approach of involving the right competencies in a timely fashion for the right needs.

Evaluating the ESI pilot case in the context of balanced sourcing

Based on the Early Supplier Involvement (ESI) expertise at Aalto University, KONE's development activities started with the evaluation of an ESI pilot case, in which *Scanfil*, one of KONE's partner suppliers in the contract manufacturing industry, was involved as a new provider of external R&D resources. Along with an agile product development model based on the principles of scrum[9], the ESI pilot project introduced a technology sourcing method that conforms to the principles of *balanced sourcing*[10]. In the context of early supplier involvement, balanced sourcing enables benefitting from dyadic R&D collaboration by balancing between *transactional* and *relational* approaches.

For the relational and transactional modes in the ESI process, there is a trade-off between the benefits and costs. While relationally oriented practices usually enable innovative solutions with high effectiveness in the outcome, the costs of the innovation process, as well as the resulting production costs of the invented solutions, tend to rise high. In the transactional mode, on the other hand, when suppliers are subject to competitive pricing by the customer, costs are better controlled, whereas the effectiveness of the invented solution and the innovativeness of joint R&D activities often remain more limited. Balanced sourcing attempts to enhance the overall benefits of co-innovation and production by applying a relational approach in the R&D phase and a transactional approach in the volume production phase.

In our case of KONE and Scanfil's joint product development, balanced sourcing implies the two-stage contracting procedure highlighted in Figure 1. The NPI process started with the product design phase by KONE ($t_0 - t_1$), followed by the product development or implementation phase ($t_1 - t_2$), where the supplier was involved as an external R&D and prototyping resource. Based on qualitative assessment of the supplier's capabilities and track record, as well as the personal relations between the buyer and the supplier, supplier selection and joint R&D activities in this phase are conducted on a relational basis. Prior to the volume production phase ($t_2 -$), the buyer puts the production of the new product (subsystem) out for open tender, which the supplier of the product

9 In its original meaning, **scrum** refers to an iterative and incremental agile software development framework for managing product development.

10 Originally, the term was coined to describe a model for ensuring competitive pricing from suppliers while simultaneously nurturing cooperative relationships [Laseter, T. M. 1998. Balanced sourcing: Cooperation and competition in supplier relationships. San Francisco: Jossey-Bass Publishers].

development phase could also attend. In an ideal case, as the supplier knows that it may gain a competitive advantage to win the manufacturing contract – and the future projects of the customer – it has an incentive to provide substantial effort in the R&D phase for a solution that shows high innovativeness and high cost-efficiency at the same time.

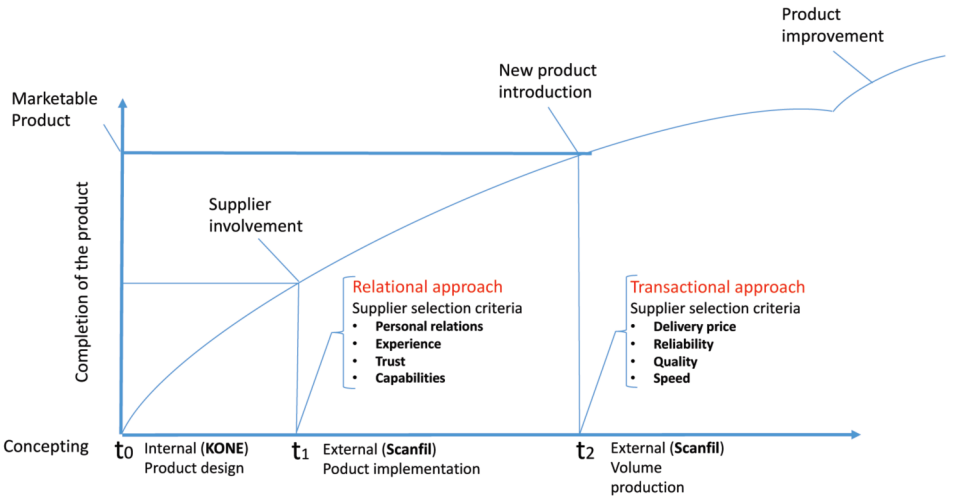

Figure 1. Balanced sourcing concept in the KONE-Scanfil ESI pilot project

The overall performance of the ESI pilot project was assessed by the project participants of both companies and Aalto University. Taking into account the two novelties in the pilot-project, namely the scrum technique and involving a contract manufacturer without previous experience of joint R&D projects with a customer, the outcome was generally considered a success. Most of the positive feedback was related to the shortened time-to-market. Building capabilities and the end-product itself were also appreciated by the stakeholders in the project. Moreover, the new product itself, a touch-screen panel, was well-received by end-users.

"In the end, we managed to build some kind of supply competence in a rather short time, according to our standards. I think that was a reasonable result. We managed to make the product with this model. In a normal project, it would probably have taken more time."

Aki Parviainen, *Maintenance Development & PFI Manager, KONE*

The novelties in the project also caused challenges that stress the importance of developing shared project management tools within and between the partner companies. In addition, in adjusting supplier incentives in the balanced sourcing approach, there is room for improvement. The overall assessments and suggestions of Aalto University pointed to the need to develop appropriate interaction capabilities to collaborate among the relevant functions within and across the boundaries of the firms. More generally, the issue of improving inter-firm collaboration is reducible to three fundamentals of doing together, namely: 1) what and why, 2) how, and 3) getting the most out of collaboration. These fundamentals are highlighted in Figure 2.

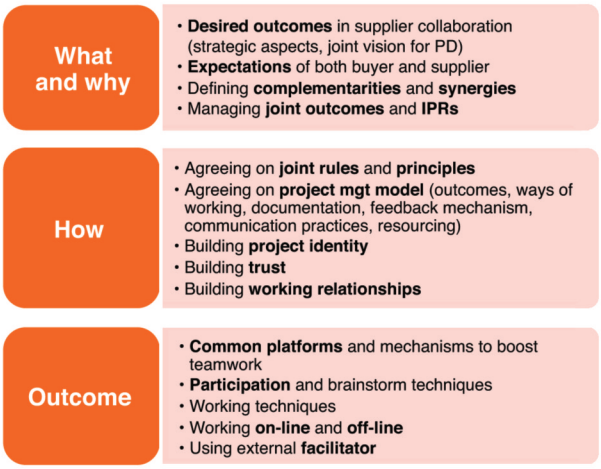

Figure 2. Three fundamentals of ESI collaboration suggested by Aalto University

Designing and implementing a new product development process

Among the recommendations of the ESI pilot assessment was establishing corporate-wide ESI practices by incorporating them in the strategy and the operations. This would require a) integration of supplier involvement processes to harmonize the operations between corporate sourcing and R&D, as well as b) effective project design to ensure expected performance in the joint R&D projects. It was concluded at KONE, however, that the ultimate issue at hand was a more fundamental one, requiring the reconfiguration of the entire corporate R&D process. The new R&D process, which was released in spring 2106, established clearer roles and responsibilities for internal and external stakeholders (individuals). At the same time, it helped align business and innovation strategies with technology management, and further linked them to supplier involve-

ment practices. This process is highlighted in Figure 3. As the product development cycles are still rather long, and proper longitudinal data on R&D performance is not yet available, the results will be seen in the coming years.

Nevertheless, the head of the R&D process development team, Mikko Mattila, states proudly that "an intermediate outcome is the fact that KONE is now using this new process in all of its product development projects."

Mikko Mattila, *Senior Process Specialist, KONE*

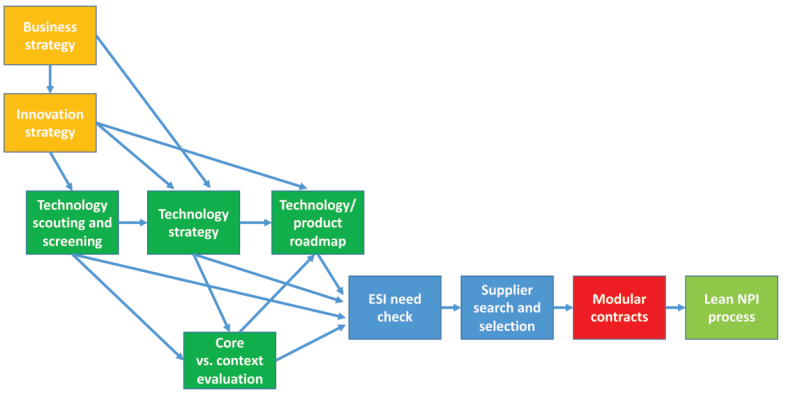

Figure 3. Generating ESI and lean processes from an aligned business and innovation strategy

Once the internal R&D process has been completed and the alignment between the different functions is achieved, it is then necessary to look at the competencies that are needed in product development to rapidly respond to customer needs. Within the new R&D process, linking strategy to product development operations, **ten descending elements** – highlighted by the sequential boxes in Figure 3 – of successful supplier involvement projects were identified:

1. **Business** strategy to describe what KONE's business is and how the business is made
2. **Innovation** strategy to define where KONE sees the biggest benefits in the business to develop the solutions
3. Technology **scouting and screening**, where technology, sourcing, and market intelligence competencies are combined, to look for current trends in the markets

4. **Technology management** to divide technologies by strategic and business value, complexity, and availability
5. **Core-context** assessment to divide competencies into black, gray, white sourcing, and the company's own competencies
6. **Road mapping and portfolio** management to be realized, in turn, through projects or other initiatives
7. Systematic starting points so that **new initiatives** can be separately evaluated against the core-context assessment
8. **Supplier selection** to select the optimal supplier with the right requirements
9. **Modular agreements**/contracts to serve all kinds of suppliers in all kinds of projects
10. A **product development process** with clear roles and responsibilities

One of the most notable elements of the new product development process description is the definition of clear *roles and responsibilities* so that the organization(s) can make fast decisions and enable *teams* to work individually with some level of *autonomy*. The autonomy is intended to boost innovativeness, and fast decisions are expected to lead to *fast implementation* of new products. This is also elementary in discussions with the supply partners. The *representatives* of supply partners need to have clear roles and responsibilities and close reliable contacts with KONE in order to rapidly understand project issues and the requirements of the product. This is enabled by clear responsibilities and roles in *sourcing* and *engineering*. These roles are the most important ones in involving the competencies in product design.

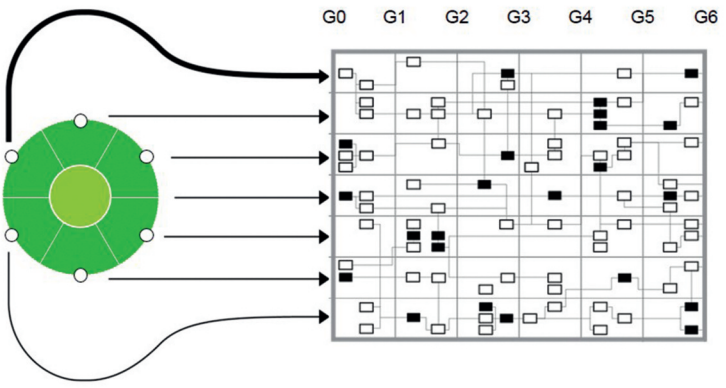

Figure 4. Team-based product development process highlighted. Each member of the core team (left) owns a *swim lane* in the process description (right), which is divided into gates

Ultimately, the quality of the final product is ensured by good design. This includes design for manufacturing principles, in which the supplier has the most capabilities. This is enabled by design reviews, where sourcing and suppliers also have important roles. In large and complex functional organizations and environments, a *phase-gate model* is the most suitable for product development projects. The alignment of different streams of work in a project requires quality gates. The DIMECC REBUS project followed these principles and introduced a new process that included clear roles and responsibilities in the small lean team. The complex project model can be drawn as a simple and lean process, but it requires time and commitment from all stakeholders and organizations. A core team, as highlighted in Figure 4, is assigned to all projects. A core team member is responsible for its functional area and the process description defines the responsibilities and their interfaces.

Figure 5. Paolo Angelucci presenting cases in KONE's R&D process at the ESI workshop at Aalto University, design factory, April 28, 2016

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DEVELOPING NETWORK CAPABILITIES

V

Antti Saurama, Peter Zettinig/University of Turku/School of Economics

Introduction

Improving a firm's position in its own industry ecosystem is important insurance for the organization's future. It requires deep insights into relevant stakeholders' business practices, operations, and even mindsets, in order to gain perspective on how value is constituted in their specific context and how value for the whole industry is generated. What sounds trivial, though, is not. Assumptions guide most actions, many assumptions are getting outdated over time, and what is at stake at large is the firm's ability to stay competitively viable.

Instead of guessing, through several approaches presented in this section of the book, the target is to co-create value on a dyadic partner or network level. Instead of strategizing on a firm level alone, a network-level approach makes it possible to find higher-order optima that do not only decrease guessing and investments based on assumptions, but provide the development of winning common actions that, over time, transform into shared understanding and an industry output that is of higher overall value.

The realization of this requires good facilitation of common project work and joint actions, which over time manifest in trusted shared routines and better reciprocal understanding of tacit situational and contextual details in partners' operations. On the other hand, this requires an organization to get fit for such changes. It requires the development of organizational means that create a position to recognize the raw materials for new opportunities that can be generated with network partners. Although this seems a small step, it often is not. It requires an organization that is usually geared toward efficiency to also be able to explore. **Therefore, networking capabilities, geared toward co-creation of value and innovation, are something that requires balancing the firm's external efforts to be in sync with internal structures and processes that enable both staying efficient and exploring better value produced by a network.**

Organizational efforts toward co-creation of value in different collaborations also involve the aspect of nurturing your structural capability to co-operate. In dyadic but also in wider network-level relationships,

legal contracts set practical frameworks in governing co-operation and dependencies. Hence, legal arrangements are, in practical ways, also setting conditions for developing co-creation and network capabilities. Well-defined contracts increase organizations' potential to deliver feasible impacts in networks, and at their best, act as a catalyst for transformation toward value co-creation.

This book section introduces three cases from the DIMECC REBUS program dealing with development aspects related to firms' network capabilities. Common to these cases are **transformative means** used for integrating firms' internal organizational capabilities, management, governance, and innovation activities, both with the external environment and with networks they operate, in ways that generate value in a co-creative and collaborative manner.

- The first case presented is a transformation journey by MacGregor involving an **internal change of business logic** from an engineering provider to an industrial service provider, and toward the exploration of totally new growth concepts. This case brings out the challenges in business logic when balancing current business with future opportunity creation, and when balancing organizational stability with the need to change.
- The second case highlights the **transformative leading experience** of Scanfil in the change from subcontractor to early-supplier-involvement (ESI) partner. The case details potential activities and capabilities in paving ways for business renewal and expansion in dyadic R&D process facilitation and customer collaboration.
- Third, we introduce **contractual mechanisms** as means to govern and develop **collaborative relationships** in networks. Rather than giving a company-specific case, this chapter builds a wider understanding underlying the program's efforts to understand how dependencies between firms are structured; how they affect inter-firm collaboration; and how contractual arrangements can be constructed to support and foster collaborative relationships.

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DEVELOPING NETWORK CAPABILITIES

Tommi Keskilohko, Henri Paukku/MacGregor
Antti Saurama, Peter Zettinig/University of Turku

Boosting growth at MacGregor: Organizing for opportunity creation

Summary

Survival of the fittest is not defined by who is the biggest or strongest in an industrial environment, but who is best suited to adapt to a rapidly changing environment. Looking at the maritime markets, like merchant shipbuilding, the post-2008 era has been a good test of adaptability and resilience. But crisis is the other side of the coin from where opportunity lies. We find that especially those firms that are not merely adapting to changes, like following industry trends toward reducing costs and pushing further commoditization of products, are the ones that are at the forefront of industry transformation. **That means taking the opportunity that crisis provides and enabling space for game-changing actions and industry leadership.**

The DIMECC REBUS program provided room to ponder these questions. We set out to understand how we can better understand turning a crisis into an opportunity, how to develop business concepts that put a firm in the driving seat of industry change, and what the implications are for actions to find a new balance between organizational stability and change – because to alter an industry, a firm needs to find ways to transform itself.

Utilizing the DIMECC REBUS program, MacGregor made a significant step toward designing its approach to transformation in order to rebalance priorities for present and future business. The result is an organizational innovation proposal, the MacGregor Growth Lab, a concept that is currently being evaluated for implementation.

Balancing organizational stability and change: The environmental challenge

The development of a business strategy that transforms transactional exchange relationships between buyers and suppliers into a solution business is a challenging endeavor. It implies a deep understanding of your stakeholders. **It requires questioning sometimes hard-wired assumptions about how value in your partners' business is constituted.**

It demands the development of an exploratory approach to define your own role in producing value in interaction with your stakeholders. Engaging in such fundamental external redefinitions of your business environment and your own role requires changes inside the organization. This encompasses contemplating questions such as the following:

- What are the internal challenges of such transformations within a multinational firm like MacGregor?
- How can efficient routines be preserved, while at the same time top-level capabilities are dynamically reconfigured to produce positive change?
- To what extent is this transformation merely reorganization; to what extent does it require deeper changes in terms of individual mindsets and how firm-level organizational identity and culture are affected by it?
- How can such orientations be organized to produce efficient stability in the current businesses, and at the same time produce substantial opportunity-generating structural elements for future growth by developing a 'teams-within-hierarchy' type of approach for balance?

In the course of DIMECC REBUS, these questions have gradually emerged as an outcome of close collaboration and exploratory actions, rather than having been in place at the beginning of the project. The direction, though, was clear: this project should create opportunities through intensive exploratory research and actions, and was fostered through continuous collaboration efforts within a DIMECC REBUS team consisting of highly committed practitioners and academics.

Balancing organizational stability and change: The internal challenge

The internal challenge to maintain relevance in dynamic business contexts can be summarized by the demand to be viable today while at the same time investing in new viable business models and actions in the future. While these demands are clear and easy to accept, they require rather **'contrasting mindsets'** to materialize. Current viability in MacGregor's cargo handling business is generated by a mix of high engineering competencies, good management of suppliers' resources and processes, good relationships, and deep insights into the operations of shipyards, ship owners, and operators, among other important aspects. Especially during times when markets stagnate or shrink, this requires drawing on efficiencies, in order to sustain the tightening pressures that drive business toward commoditization and lower margins. These tendencies are served by strong, efficient routine systems that are able to deliver by drawing on extant knowledge and meticulous planning. Future viability,

on the other hand, requires a different approach and mindset. If aspects are fundamentally new in a business concept, then you cannot rely on extant knowledge, you cannot extrapolate it to adapt, and the routine system that is geared toward exploiting given certainties cannot readily handle new requirements because the needed actions concern exploration and experimentation. **An explorer only knows what they will find after the fact; the journey cannot be predicted. Nevertheless, it's a journey that is necessary, and an organization can try to view it as 'insurance policy' for tomorrow's viability.**

What do these competing demands require in order for them to materialize? They need leadership – to balance the known, the efficient, and the plannable with exploration, facing the unknowable, and viewing opportunity as being part of uncertainty. They also need an organization that is capable of handling distinct mindsets and qualitatively different actions. Actions of performing efficient routines need to be balanced with actions that drive the generation of new opportunities. These opportunities are only partially readily available in an environmental context as described above, but these opportunities need to be constructed together with a combination of existing external partners and new partners that were not previously considered directly relevant. The question that emerges is what kinds of organizational solutions can deal with both requirements?

The logic and challenges of growth

During the past few decades, MacGregor has transformed from a transaction-based product-oriented company to a customer-driven company with a wide portfolio of offerings, ranging from products to services and solutions. This transformation journey passed several important milestones, including:

- Outsourcing of steel production as early as the 1980s, partly resulting in the remaining organization focusing more on innovation, customers, and sales aspects;
- Numerous company acquisitions and mergers to widen the portfolio of offerings and strengthen internal capabilities;
- Continuous extension of services that provide stability in fluctuating markets and better margins in an increasingly global competition;
- Introduction of solution-based business approaches by 2010, shifting the focus to customer value, and making the first steps toward considering ship owners and operators as key customer groups in the value network.

Over decades, the logic of growth has accordingly changed in the company. The challenges related to differentiation and the need to offer com-

plete systems has been tackled through acquisitions. The challenge of global competition has been tackled through efficient production via outsourcing, and through extending services. The challenges related to maximizing customer value have been managed through creating solution-based approaches in collaborative relationships with the direct customers' customers, the ship owners. Growth-directed activities have been supported by the overall growth of global trade and the need for shipping goods and transportation. Until 2008, growth was neither determined by adaptability as such, nor by extensive exploration activities.

The post-2008 era saw a need to revise parts of the established growth logic. Markets for newly built merchant ships have seen dramatic downturns, and investments have gradually been shrinking in reaction to temporal overcapacities caused by economic uncertainties and oscillating trade volumes. Developing solution-based business concepts, MacGregor has invested in exploring and experimenting with 'utility' and 'value-in-use' perspectives applied to a multitude of important stakeholders. These have produced new opportunities for organic growth. Facing uncertain times in well-understood markets, MacGregor needs to ensure best-possible support for organic growth. This means making new investments in future opportunities, to buy an "insurance policy" for future viability in a changing market environment. This means creating new organizational approaches to enable transformation. As part of DIMECC REBUS, MacGregor ventured into developing and proposing the Growth Lab concept.

"Organic growth in mature markets is always challenging. What is needed are intelligent ways to explore and exploit, and to set the mindset toward future opportunities."

Tommi Keskilohko, *Director, Customer Solutions, MacGregor*

MacGregor Growth Lab – Organizational solutions geared towards business concept Innovation

An approach to exploring future opportunities is being considered in the organizational innovation concept, the MacGregor Growth Lab, which was developed during the DIMECC REBUS program.

The concept is grounded in internal venturing models, an entrepreneurial core and mindset structured as a system geared toward business-level innovations. The Growth Lab concept proposes establishing an organizational unit that is capable of exploring new business concept-

level innovations, as a regular activity at MacGregor. To implement this, the Growth Lab needs to operate under different governance and operational modes, compared to other operational units in the company.

Key characteristics of the Growth Lab concept include:

- Independence from routine operational tasks
- Transformative entrepreneurial orientation by key actors
- Agility and rapid experimentation
- A highly interactive boundary spanning internal and external organizational hierarchies

The Growth Lab is proposed as an internal venturing unit, exploring and identifying new business opportunities to boost MacGregor's new business development and launch, and nurturing rapid implementation. The Lab's intended role is to *identify opportunities and to generate new business concepts* in close collaboration with internal (business units, divisions) and external (customers, co-operation) partners. Besides co-creation of new concepts, the Growth Lab is intended to be *responsible for developing commercialization until activities can be executed within regular organizational structures and routine processes.* Part of the Growth Lab concept is that no leads or business is actually shifted from other units to the Lab, as it generates totally new business. The Lab operates under principles of flexibility and freedom to explore, trial and error, experimentation, and 'minimum viable products/services,' which are tested rapidly in collaboration with industry stakeholders. The Growth Lab design requires it to operate as an independent unit, and requires direct reporting to division heads. The lower level of formal reporting requirements is designed to aim at a higher degree of freedom, supported by lean governance, which is considered a requirement for this type of innovation activity.

"The MacGregor Growth Lab proposal is designed to take the role of a new business incubator for the company. It serves as an internal venture function that focuses on developing new business and, subsequently, growth."

Henri Paukku, *Director, Cooperation & Funding, MacGregor*

Figure 1. **Features of the Growth Lab concept**

To sum up: Balancing exploitation of given strengths and exploration of new opportunities

Balancing exploitation and exploration activities is a top management priority, which is geared toward ensuring that an efficient organization captures today's certainties profitably, while engaging in exploring what the future might bring. The Growth Lab concept envisions ensuring that exploration is performed. Other than R&D, these innovation activities are geared toward holistic business concept innovations that target connecting internal and external resources, and that put MacGregor in the driving seat of co-creation for entirely new value propositions.

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DEVELOPING NETWORK CAPABILITIES

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Leading the change via learning and adopting best practices at Scanfil

Scanfil is a medium-sized contract manufacturer (CM) operating globally. As competition in the CM industry becomes increasingly fierce, there is growing pressure to develop new capabilities and services that would ensure long-lasting partnerships with the customers. Based on these drivers, Scanfil's goal in the DIMECC REBUS program was to boost the transition from being a standard contract manufacturer to being an early-supplier-involvement (ESI) partner, and hence to facilitate customers' R&D process. Scanfil collaborated proactively with academia to gain better understanding of the emergent technologies, and their roles in searching for new business opportunities within the surrounding business ecosystem. On aggregate, Scanfil's transition was fostered with two streams of activities, together with Aalto University: a) *retrospectively*, in providing "lessons learned" from an ESI pilot project conducted with KONE, and b) *prospectively*, in assessing the business impacts of the rapid experiments in 3D-printing technologies. Together these activities provided the basis for the business renewal and expansion toward new B-to-B services. The renewal was further facilitated by Scanfil's acquisition of a Nordic competitor, Partnertech, in fall 2015.

Toward new principles of collaborating

The assessment of the ESI pilot project that was conducted with KONE prior to the start of the DIMECC REBUS program provided an ideal starting point to identify the determinants of a successful joint R&D project and to incorporate R&D services in Scanfil's offering. Joint development of technologies and products between two firms is much more than agreeing on the technical details and contractual responsibilities with respect to the expected project outcomes. The question is essentially about the qualities of human interaction capabilities and how they are mobilized to support technical development in the collaboration. On the basis of dyadic data collection and the 'lesson learned', the principles of R&D collaboration practices were established to support Scanfil's servitization strategy. These principles are highlighted in Figure 1.

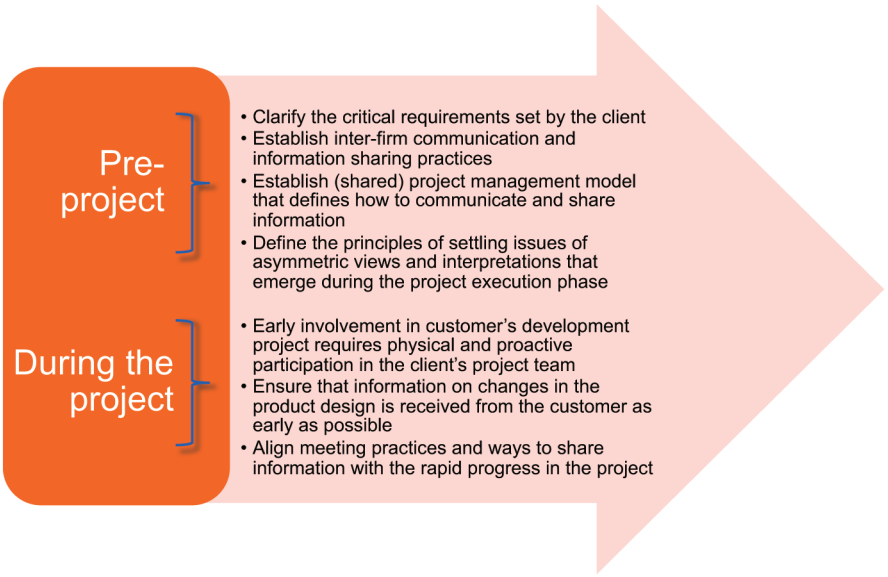

Figure 1. The principles of successful R&D collaboration with the customer

In the joint R&D projects, stakeholders typically hold symmetrical and partially asymmetrical views of the project goals, as well as of the capability requirements, with possible gaps emerging during project execution. Moreover, these issues are tackled and reported only afterwards, in our case by the researchers at Aalto University. The lessons learned suggests that firms' capabilities and the overall productivity of ESI projects – in the case of less experienced R&D collaborators – could be enhanced by an intermediary third party, "the project facilitator." The project facilitator can build mutual trust and enhance learning of the right collaboration practices, based on the right interaction capabilities. In particular, the project facilitator would ensure that: a) project goals and specifications are settled and agreed on unanimously ex ante, b) that adequate quality and sufficient interaction capabilities exist and are employed on both sides, and c) when rectification of project progress is necessary, the project facilitator will intervene.

"We lacked a shared and transparent project management model with the customer. This is something that is needed and will ensure that the flow of information is more structured at the outset of the project."

Tommi Kangas, *Global Account Manager, Scanfil*

Emerging technologies in Scanfil's business ecosystem

Scanfil's way of business development emphasized fast experiments in the front-end of the innovation process. On the basis of the observed challenges in the manufacturing processes, as well as the prior knowledge of the new opportunities associated with 3D-printing technologies, the industry-academia innovation team explored how 3D printing can enhance 1) rapid prototyping, 2) small batch production, and 3) tool-making. As Aalto University was able to offer diverse 3DP technologies in the different experiments, and then to suggest the most appropriate ones, Scanfil gained state-of-the-art knowledge of the usability of 3DP in specific contexts in service and manufacturing processes. In conducting the focused experiments, the co-innovating team became increasingly convinced that 3DP technologies are characteristically *disruptive*, and in the long term they will change firms' business logic.

In the course of collaboration, it soon was realized that the utilization of emergent technologies requires a more holistic approach to business innovation. The management of Scanfil saw not only the importance of the new technologies and their potential in the contract manufacturing processes, but also their wider implications for different parts of Scanfil's business model. This stressed the urgency of reassessing a) customer needs and benefits, b) the required resources, c) the processes of serving customers, and d) the development of a customer-oriented mind-set. Scanfil was provided with a roadmap to show how the adoption of 3DP technologies will bring about change (incremental and radical) in a) service concepts, b) assets and resources, and c) service processes (see Figure 2). In contract manufacturing, servitization follows essentially from the insourcing of customers' design and product development activities, which the adoption of 3DP technologies further facilitates. From a longer perspective, 3DP-enabled production also fosters changes in the traditional supply chains of contract manufacturing. That supports the outsourcing of 3DP-enabled production and design activities down through the supply ecosystem.

"Customers urge the product to undergo a test run and fiddling, and then rapid feedback to design; we want to speed up this process. The delivery chain needs to be developed to attain this goal. 3DP certainly has its role in prototyping and in volume production, too. These can be adapted in this traditional business concept, as well, but when we talk about, for instance, the future spare-part business, 3DP can radically change the whole supply and delivery chain. I guess this needs harder strategic bulldozing in the company."

Petteri Jokitalo, *CEO, Scanfil*

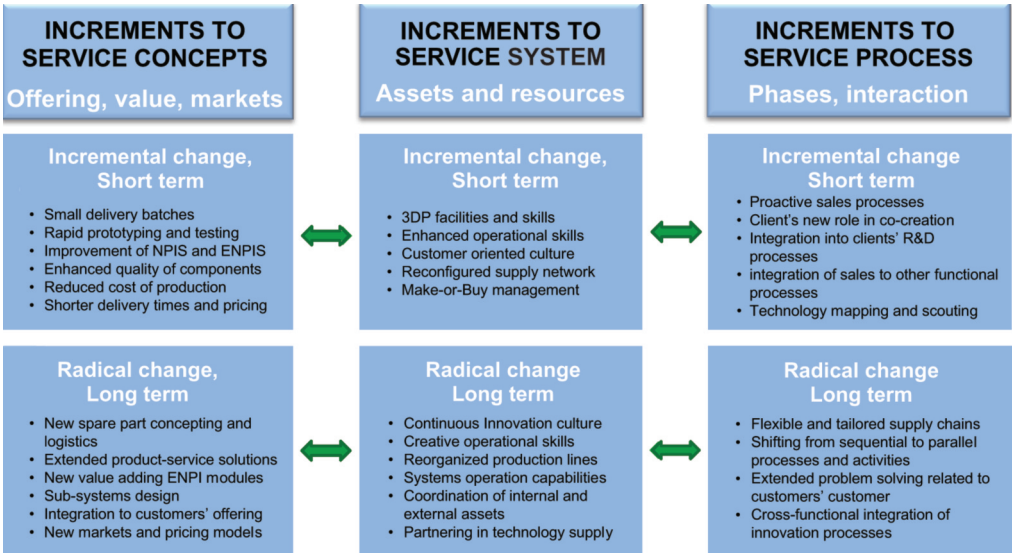

Figure 2. How 3D printing technology influences business development in the CM operating model

One of the success factors in the industry-academia collaboration was Aalto University's ability to provide cross-disciplinary expert services on a one-stop-shop basis. This required close coordination of activities between two university departments: the department of industrial engineering and management, and the department of mechanical engineering, and their respective research groups.

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DEVELOPING NETWORK CAPABILITIES

Anna Hurmerinta/University of Turku

Contracts and cooperation in DIMECC companies

Summary of motivation and achievements

Cooperation can be governed both by relational governance mechanisms and by formal contracts. The two mechanisms can actually complement each other, and combined use of contracts and relational governance promotes cooperation. However, contracts are not always used to support cooperation. Moreover, their design does not always match the *collaboration function*. One reason for this is that contracts are often full of legalese, namely words and definitions that their end-users do not understand. Another reason is that contracts are designed to fulfill a *safeguarding function*, according to which the main function of a contract is to fix parties' rights and obligations as clearly as possible in the event of a dispute.

In DIMECC REBUS, the faculty of law, UTU, conducted a survey and an interview study for companies that have participated in DIMECC's[11] research programs, to answer the following research questions:

1. Do companies use contracts to support relational governance, and if they do, how?
2. What kinds of contractual techniques a) support, and b) hinder relational governance, and how?
3. Do lawyers and other contracting professionals perceive contracts as a useful means to support relational governance?

Sixty-five contracting professionals from companies operating, for example, in heavy manufacturing, construction, computing, and engineering participated in the survey. Twenty-three contracting professionals participated in the interview study. The results shed light on contracting practices that companies utilize in their daily work and that can be used in companies when further developing contracts to better support cooperation.

11 To be precise, the survey was conducted for companies that have participated in the research programs of DIMECC's predecessor, FIMECC (Finnish Metals and Engineering Competence Cluster). The timeline of its implementation was 5.9–15.10.2016.

Key results and impacts

Companies are dependent on and cooperate with their customers and suppliers

Companies represented by the survey participants are highly networked with their customers and suppliers, and are especially dependent on their component suppliers and service providers. When the participants were asked to describe the ways in which their company was dependent on the deliveries and/or performance of other companies in practice, 95% of all respondents (n=65) described their dependency on suppliers in their open answers, whereas dependency on customers was mentioned in only 18% of the responses. Although companies try to manage this dependency by having at least two suppliers for every component, their entire production may depend on the performance of a single supplier.

Even though the companies are dependent on their suppliers more often than on their customers, cooperation is emphasized particularly with customers. The most obvious reason for this is the customers' vital role in all businesses.

Cooperation with both customers and suppliers is intended to be long-term, communication is continuous, and cooperation and communication are formalized through oral or written agreements. These most typical dimensions of collaboration are highlighted with bold lines in Figure 1. Development projects are one important way to cooperate with both customers and suppliers. Companies also cooperate with their customers in technical design. Cooperation with suppliers, in turn, is needed for schedule and quality management. Companies arrange regular meetings and communicate with their suppliers and customers. They also utilize tools to support and monitor the results and effects of cooperation.

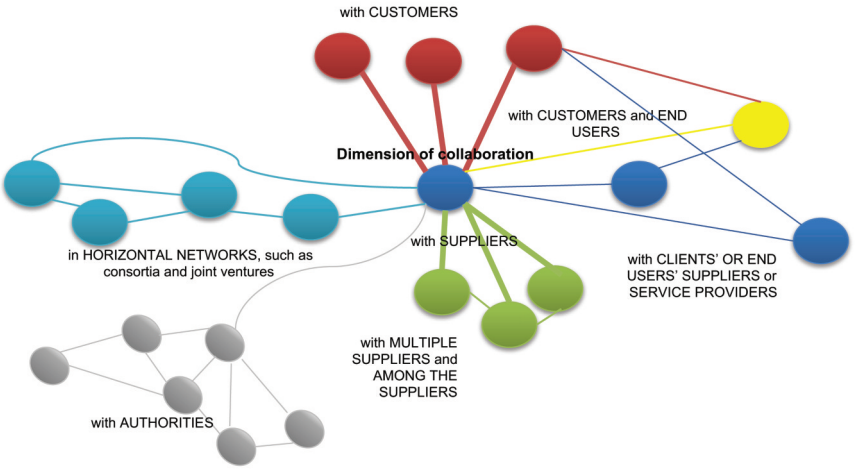

Figure 1. Collaboration in participant companies

Multilateral cooperation in networks, ecosystems, and so on is, in turn, non-recurring; communication with other network actors is casual; and written agreements are not used as often as with customers and suppliers. For example, cooperation between companies represented by the respondents and their clients' or end-users' suppliers or service providers is almost non-existent. If there is cooperation, customers are responsible for orchestrating and coordinating it. Cooperation with other actors, such as authorities, consortium partners, research institutions, and classification societies, was also reported to be non-recurring, and communication was very casual.

Cooperation agreements and clauses affecting cooperation

Even though companies do not cooperate horizontally or multilaterally as often as vertically and unilaterally, different kinds of cooperation agreements are commonly used in the respondents' companies. Most commonly used were research and development agreements, as well as cooperation agreements on sales and marketing. Companies also use consortium agreements and joint ventures to govern cooperation.

Interestingly, respondents considered not only traditional cooperation agreements (such as the above-mentioned agreements), yearly contracts, and frame agreements, but also supply agreements, project agreements, and non-disclosure agreements to be cooperative by nature.

Written agreements were favored in general, but especially with customers and suppliers. In the interview study conducted shortly after the survey, written contracts were favored, especially by lawyers. However, it became apparent that at least practical things are often agreed without complying with the change management process specified in the contract. Sometimes changes, or even entire deals, can be agreed orally.

The most common clauses that appear in written agreements of the respondents' companies, and that affect cooperation, were clauses that safeguard the parties in case of a dispute. These include dispute resolution clauses that require parties to refer any dispute arising out of their contract to a court of justice, arbitration, mediation, or other similar procedure; and clauses on conflict management, under which parties agree to settle minor disputes, for example, in site meetings or by project organization, or by which parties agree to seek reconciliation by negotiation before referring their dispute to an official dispute resolution process.

Contracts also manage business relationships by regulating the process for contract changes and parties' communication, and by setting up schedule and quality management procedures (such as KPIs) for the business relationship.

The least commonly used were clauses that require in-depth co-operation between contracting parties. These clauses include, inter alia, open book clauses that, for example, require the parties to disclose to each other their costs and margins, profit-sharing clauses, terms containing a pain/gain share mechanism, other incentive clauses or risk-sharing clauses, and clauses that, in certain situations, grant one party the right to make decisions or take legal actions that are binding on the other party.

Contracts as a means to support cooperation

Based on the results, it seems that respondents' companies use contracts quite traditionally to *safeguard* their business relationships. Some of the clauses used in their contracts also carry out contract's *coordination* and *adaptation* functions. Clauses that are specifically designed to function to *support cooperation* are, in turn, rather rarely used.

The respondents considered contracts to be a predictable and effective means to encourage cooperation. For example, **contract negotiations were considered a good means for the parties to get to know each other, to align their interests, and to record everything in a written agreement.** Respondents also considered **a clear contract to be imperative for good cooperation.**

Although contracts do not, *per se*, hamper cooperation, certain clauses are difficult to agree on. Such clauses include clauses on intellectual property, clauses on non-disclosure, clauses on change management, clauses on liquidated damages, and clauses on exclusivity. Incompleteness of contracts, such as inconsistencies, gaps, or ambiguities in contracts, may also hamper cooperation. The atmosphere of a business relationship is also affected negatively by imbalanced or unfair contracts and a "twisted" focus in contract negotiations or in the final contract.

The results shed light on the collaborative practices the companies use, and on the role of contracts in governing and affecting these practices. The results reported here are about the survey. Analyses of the 23 interviews and the contractual documents of the companies will further advance our understanding of the many functions of contracts in business relationships. It seems that the **participating companies have an interest to develop their contracts to better meet the need for further collaborative practices.** This study aimed to support the companies in this development process.

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