Leena Parkkila & Kyllikki Taipale-Erävala (ed.)

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Process-SME Project - Exceeded Expectations

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Editors: Leena Parkkila & Kyllikki Taipale-Erävala
Authors: Seppo Saari, Petter Kyösti, John Lindström, Vinit Parida, Leena Parkkila, David Sjödin, Kristiina Starck Enman, Kyllikki Taipale-Erävala, Ross Wakelin
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Lapland University of Applied Sciences
Jokiväylä 11 C
96300 Rovaniemi

Puh. 020 798 6000
www.lapinamk.fi/julkaisut

Lapin korkeakoulukonserni
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Seppo Saari, Lapland University of Applied Sciences
Kyllikki Taipale-Erävala, University of Oulu

1. Foreword

This publication, 'Process-SME Project - Exceeded Expectations', is a collection of articles describing the work and results achieved in the *Business Model Innovation and Internationalization of Process Industry SMEs* project, which was conducted under the Interreg Nord programme from 1 September 2016 to 31 August 2019.

The main objective of the project was to improve the competitiveness of micro, small, and medium-sized enterprises (SMEs) whose customers are from the process/mining/energy/oil/gas industries, by supporting them in discovering needs and opportunities, developing new business models, building European partnerships, applying for EU-level funding for project proposals, as well as developing products, services and other offerings.

The participating Research, Development and Innovation (RDI) organisations were Lapland University of Applied Sciences (project leader), the Kerttu Saalasti Institute at the University of Oulu, Luleå University of Technology and NORUT Narvik AS. Additionally, several business development organisations brought in their SME networks and business development capabilities: NIHAK and Nivala Industrial Park Ltd from Finland, IUC Norr AB from Sweden and Forskningsparken I Narvik AS from Norge. After the last organisation was shut down during the project, their role was taken over by NORUT.

Finnish, Norwegian and Swedish project partners worked together with over 100 SMEs in activities that led to about 25 SMEs developing their business models or participating in EU-level project proposals. Over 40 SMEs took part in sectoral cross-border workshops with process industries using the Matchmaking Workshops model developed in national workshops in Finland. The companies' motivation and commitment to the project were the most important factors for their success. We would like to express our appreciation to them for all their efforts.

Other expected effects and results:

- the creation of methods and tools related to advanced business models;
- an updated ProcessIT.EU Roadmap that will impact policy/decision-makers on national and international levels;

- increased cross-border cooperation within the region among SMEs, larger process industry companies, networks and academies in order to enable the creation of advanced business models;
- dissemination of knowledge and best practices on a continuous basis on the project's web pages (see www.process-sme.eu);
- development of new methods used by SMEs when commercialising advanced business models globally; and
- an increased internationalisation of SMEs concerning business/research/development activities.

As part of the Interreg Nord programme, the project was financed by this programme through the EU, as well as Norrbottens läns landsting, Länsstyrelsen i Norbotten, Lapin Liitto, Troms fylkeskommun, Nordlands fylkeskommun, Norwegian IR and the participating organisations. Without their support, we would not have been able to conduct the project.

The project activities involved several types of know-how and capabilities. Because of this, a total of over 40 specialists in the participating organisations gave their input to the work being conducted. Thank you all very much.

All partners put their hearts into the project and are very proud of what was achieved and the forthcoming results. The title of this publication originates from the words of the manager of a large company who participated in a Nordic workshop. The manager, as is usual for those in such a position, had participated in several workshops, but his comment after the event was stunning and summarised the whole project: This exceeded all expectations.

Seppo Saari, Lapland University of Applied Sciences

2. The Description of the Process-SME Project

The Interreg Nord region is formed from northern parts of Norway, Sweden and Finland. It is geographically large (at 413,000 km2), but it has population of less than 1.5 million. The economy is largely based on natural resources and the process industry that refines them. In Finland and Sweden, the main sectors of the process industry are pulp and paper, mining, metal production and energy. In addition, Norway offers oil and gas production as well as fish farming. Major job providers are companies that serve the industry. Local and regional offices of large international suppliers are evident, but there are also many SMEs that work closely with a few large companies. In search of efficiency, the process industry is cutting down on supplier numbers. At the same time, suppliers must deliver services that are more sophisticated. In terms of the SMEs that supply the process industry, this means that there is a need for specialisation, which can lower overall sales. In other words, SMEs must specialise their products or services whilst simultaneously widening their market in order to grow, or retain, market share. To do this, SMEs are frequently having to adapt their business models into more advanced forms.

Often, new and sophisticated business models can only be realised with the aid of more sophisticated technologies, especially when an industry invests heavily in digitalisation in order to increase efficiency, availability and quality. In order to have the specialised resources to do this, most SMEs need to cooperate with other companies and research organisations. Whilst process industries in Northern Scandinavia have the same types of needs, and the number of SMEs is quite low, cross-border cooperation is necessary for the formation of the industrial ecosystems that are required.

The Process-SME project, or the *Business Model Innovation and Internationalisation of Process Industry SMEs* project, was developed to help SMEs improve their competitiveness by supporting the development of new and advanced business models and by building European partnerships.

The project was part of the Interreg Nord programme in partnership with the European Union's (EU) Interreg programme, Norrbottens läns landsting, länstyrelsen

I Norrbotten, Lapin Liitto, Troms fylkeskommun, Nordlands fylkeskommun, Norwegian IR financing and participating organisations.
The main purpose of the project was:

- To increase the number of SMEs that use cooperation and border-crossing business model innovations by:
  - finding business opportunities for regional SMEs in the process industry, in terms of new business models, product or service offer development and collaborations with other SMEs, larger companies in the process industry, universities and research institutes; and
  - developing and implementing a business modelling method involving an audit tool for evaluating existing business models and a roadmap tool for implementing new and advanced business models.
- To increase the level of internationalisation in the region's SMEs by:
  - developing a new ProcessIT.EU Roadmap to provide information on the needs of the process industry, from IT/automation to policymakers and decisionmakers to Research, Development and Innovation (RDI)-funding bodies from all over Europe (this will be applied in addition to calls for funding for RDI projects that target process industry needs within the sphere of IT/automation);
  - developing the capabilities of SMEs to go international through the commercialisation of advanced product/service offers for international markets and by increasing participation in EU project proposals; and
  - involving SMEs in international research proposals in order to give them access to researchers, research networks and international partner companies with complementary skills, competences and technologies (these internal activities will expose international customers to SMEs).

To enable further work to be carried out, we studied and analysed needs and opportunities, both within the process industry and within SMEs, to better understand them. We met with representatives from a total of 103 SMEs, consulted them on the topic and conducted interviews. To uncover the needs of the industry, we interviewed representatives of 17 large industrial companies, specialising in pulp, paper, steel and mining. We also defined international benchmarks by examining international market analyses, research reports and best practice. After analysing the background data, we were ready to start the main bulk of our work.

In the tool and method development section, the business model implementation method was developed further, by researchers at Luleå University of Technology in particular, with a goal of applying the business model method to participating SMEs and to other countries. From the launch of the project, we started to develop a new ProcessIT.EU Roadmap, or European roadmap, for industrial process automation in the context of international cooperation. Detailed descriptions of the business model method and ProcessIT.EU Roadmap are included in other articles within this publi-

cation. The business model method was practically applied by SMEs. The roadmap, which detailed the needs of companies, has since been applied to several European research and development proposals (H2020, ECSEL-JU).

In order to get the industry and companies together, we organised several national and cross-border workshops. The method, which involved meetings known as Matchmaking Workshops, was simple. It involved the presentation of the project and the roadmap and business model tools, alongside presentations by representatives from the large industry and SME pitches. There was then time for scheduled SME and large-industry business, involving short introductions and familiarisation sessions. According to our survey, the Matchmaking Workshops have had promising results.

During the project, we have consistently updated the Process-SME website (https://process-sme.eu/). Featuring around 80 news articles and blog posts, it has disseminated both our results and some news. The web pages have attracted more than 2,500 visitors from several different countries.

While conducting the project with help of the industry and SMEs, our learning has led to one conclusion. In the near future, the focus and the needs of the industrial environment can be highlighted by two topics, namely digitalisation and ecosystems. Digitalisation is rapidly enhancing the industry, and SMEs must be able to develop their offerings to serve its needs. At the same time, the development of SME offerings means specialisation. Again, this means cooperation between companies with different capabilities. In summary, the future belongs to digital ecosystems.

John Lindström & Petter Kyösti, Luleå University of Technology
Seppo Saari, Lapland University of Applied Sciences

3. European Roadmap for Industrial Process Automation

The ProcessIT.EU network[1] is a European network that aims to create new ideas and larger research proposals together with academia, micro, small, and medium-sized (SMEs), large companies and public authorities. The basis for this engagement is the *ProcessIT.EU Roadmap for Industrial Process Automation, which seeks 'to provide guidance and input for process industry companies, providers of process industrial IT and automation solutions, researchers and policymakers and bodies/initiatives that craft calls for RDI-projects'*[2]. The first version of the roadmap, which was issued in 2013, was followed by a second version in late 2018.

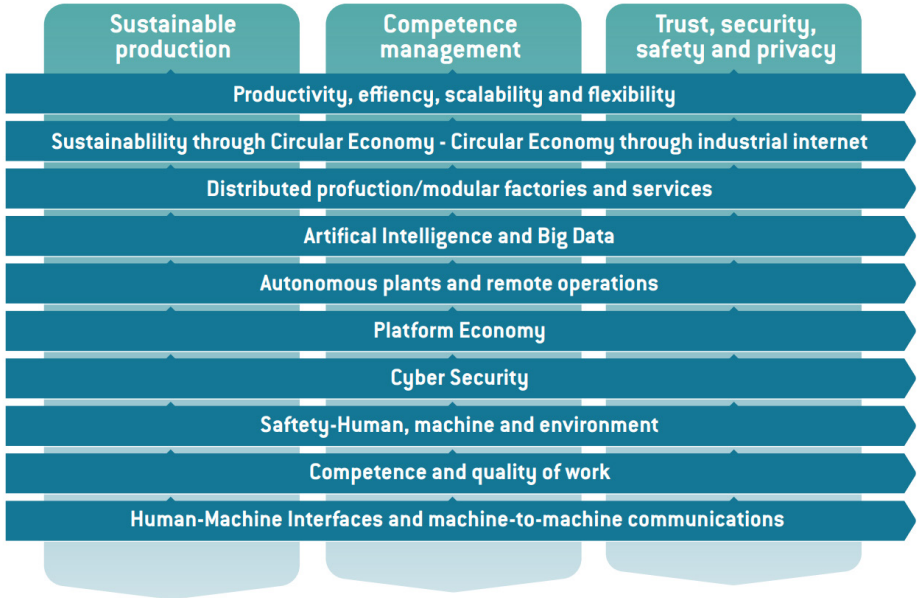

Figure 1. Industrial top-level needs and R&D areas.

1 For more information, see: www.processit.eu

2 http://www.processit.eu/Content/Files/ProcessIT.EU-roadmap_ver2_final_4-Sep-2018.pdf

The first roadmap was adopted by many Research, Development and Innovation (RDI) funding organisations, policymakers and manufacturing and process industry companies.

To date, research proposals that have been based on the roadmap span a number of large projects, which were later funded by H2020, ECSEL and SPIRE, among others. Examples of funded projects include the following: DESIRE, EuroCPS, AeroWorks, CompInnova, MANTIS, Arrowhead, Productive4.0 and Arrowhead Tools. The estimated amount of RDI funding is in the range of 400–500 M euros, which represents a significant amount in the European RDI landscape. A large portion of this amount has been used to support companies that are participating in RDI projects.

The continuous change that is necessary in the manufacturing and process industries concerning increased automation, efficiency, cost-effectiveness and sustainability requires that the strategic, tactical and operative perspectives be renewed every 5–10 years. Thus, there is a need to also update the roadmap to provide timely, insightful input. This updating was performed during the course of the Interreg Nord Process-SME project. The second version of the roadmap has three top-level need groups:

- Sustainable production
- Competence management
- Trust, cybersecurity, safety and privacy

These are all broken down and explained using 10 R&D areas, 9 gamechangers and new and emerging business models involving services, knowledge, risk management and a number of additional 'soft matters' (Figure 1). Further, the roadmap was crafted using a method that was developed by VTT Technical Research Centre of Finland LTD to be both rigorous and relevant, which are important factors for strategy input, policymaking and calls for research. The data on which the roadmap is based were collected from a number of stakeholders, including process and manufacturing companies, technology and service providers, academia and public authorities, during international workshops. A major difference from the first version is that the second version includes a section on business modelling, which makes it one of few in the industrial area to address this issue.

The roadmap has been presented and disseminated via websites, newsletters and presentations at workshops and events that were organised by the project as well as other European organisations and companies. The workshops that were organised by the project have targeted the mining, forestry/pulp & paper and offshore (petroleum/fish farming) industries. Additional workshops have targeted the European energy (ETIP SNET) and steel (ESTEP) industries.

In summary, many manufacturing and process industry companies need to increase their levels of automation and use of industrial IT processes to stay competitive, profitable and sustainable over time. This requires the continuous development of technology, competences, knowledge, organisational capabilities and business models.

Achievement of the above requires cross-border cooperation and joint efforts because it is difficult for any one company or organisation to acquire all the competencies and knowledge that are needed. In addition, being able to offer competitive products, services, solutions, product-service systems, etc. enables providers of knowledge, know-how and industrial process IT/automation to grow and expand their market reach by themselves as well as via partner networks and ecosystems.

Vinit Parida & David Sjödin, Luleå University of Technology
Kristiina Starck Enman, IUC Norr AB
Ross Wakelin, Northern Research Institute Narvik AS

4. Business Modelling Method for Process Industry SMEs

The Process-SME project was initiated to improve the competitiveness of micro, small and medium-sized enterprises (SMEs) that serve process industries by supporting the development of new advanced business models and building European partnerships. A key way to achieve this is by developing a business modelling method for implementing new advanced service business models for process industry SMEs. The methodology is specifically targeted at capitalising on new opportunities that are arising from digitalisation and the trend of servitisation, which include companies increasingly moving from selling products to advanced service solutions that consist of both product and service components.

The intention of the Process-SME project was to develop a generalised methodology that could be applied across a broad range of industries, companies and businesses in the region. The title of the project includes the term 'business modelling innovation', which we define as the guided evolution of a company's business strategy, including novel concepts or services (in addition to their traditional product offerings). The business model innovation tool is presented via a four-phase model, which includes conducting an opportunity analysis, designing a value proposition, developing a business model concept and evaluating the refined business model concept.

In phase 1 (opportunity analysis), business opportunities are discussed with the participating companies. Opportunities for new products, services or markets are then narrowed to one case to work with in phase 2 (design value proposition). In this phase, the new business opportunity is designed with the support of a value proposition canvas that meets the customers' needs. Phase 3 (develop a business model concept) integrates the designed value proposition into a business canvas model in which seven elements are added to the value position (https://www.youtube.com/watch?v=5Qi5z6Qt2LE). The business canvas model then consists of nine key elements: customer segment, value proposition, channels, relations, revenues, key resources, key activities, partners and costs. Phase 4 (evaluate the refined business model concept) focuses on mapping eventual risks and obstacles within the business model concept.

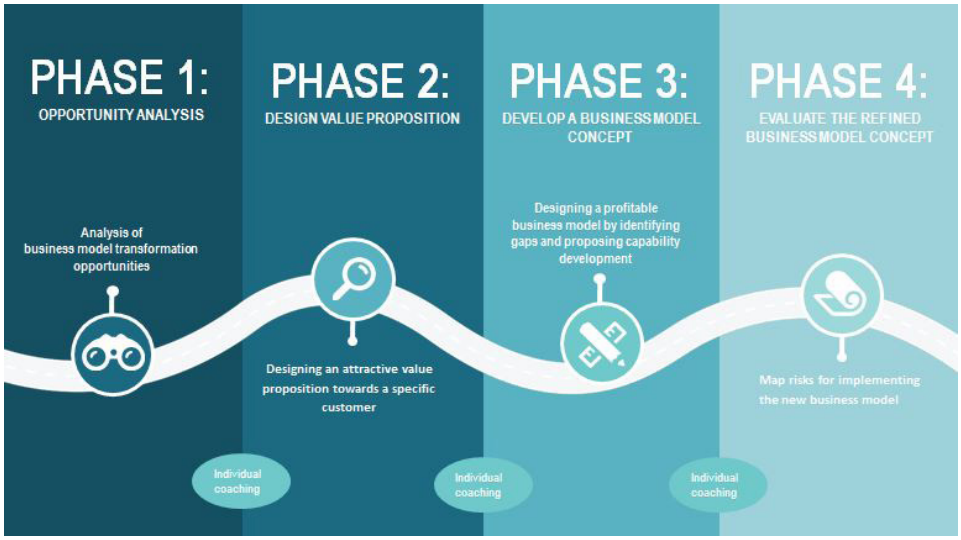

Figure 1. Overview of the business modelling method for process industry SMEs

The business model method was developed based on diverse activities, including benchmark studies of academic and non-academic papers, interviews with leading process industry customers from the mining, pulp and paper and steel industries and in-depth interviews and workshops with more than 50 SMEs from the Interreg Nord region. Through these activities, specific requirements, suggestions and process steps for the business model method were captured and evaluated. The project team has worked extensively to develop a method that is generalised for the range of SMEs that are present in the north of Norway, Sweden and Finland, including their challenges.

The initial idea for the proposed method, including its four phases, will enable SMEs to revise their business models. Below, we provide brief insights into the different phases and specific activities that should be carried out in each phase (see Figure 1). Importantly, the method has been tested and validated with a selection of SMEs from the Interreg Nord region. The results of those tests are discussed for each phase.

PHASE 1: OPPORTUNITY ANALYSIS

Key activities: The first phase focuses on the analysis of new business model innovation opportunities through identifying one or more new business model opportunities that build on digitalisation and/or servitisation. The opportunities are discussed within the expert group to establish a common understanding, evaluate the targeted customer segments and select opportunities to go forward.

The practise of the business model innovation tool with participating SMEs began with the opportunity analysis phase. Discussions were conducted with the entire group (consisting of the coaches and the different SME companies). One company at a time presented the opportunities that they had identified, which were then discussed

and analysed in terms of the 'Magical Triangle tool'. Because the company owners had no experience with this tool, the project team actively assisted them with using it. Searching for new business opportunities required brainstorming the thoughts of large customer segments first and subsequently moving towards specific target groups. Some of the companies had quite clear thoughts about target groups and new business opportunities, while others found it challenging.

The interviews with the SMEs highlighted that it is challenging to narrow thoughts and focus on opportunities in a group setting. Companies at this stage prefer to think about their own business opportunities rather than discussing those of other companies. This results in feelings of confusion from the distraction of listening to others and attempting to understand their business ideas when one is preoccupied with his/her own ideas. The tool itself is quite interesting as a starting off point, but the issue of the approach's efficiency for resource-restricted SMEs must be considered. This issue was raised earlier in a blog post[1] on the project's webpage.

PHASE 2: DESIGNING THE VALUE PROPOSITION

Key activities: This phase focuses on designing an attractive value proposition towards a specific customer segment through a) finding the customer's job-to-be done and gaining areas and pain points; b) analysing how SMEs' products, services, capabilities and competitive advantages could create unique value and relieve pain/create gain for the customer; and c) building the customer value proposition (CVP) by ensuring the value fit towards the customer.

The task of designing a value proposition canvas was firstly assigned to the SMEs as a homework exercise; the company leaders were tasked with getting to know and practising with the tool. Some inspirational videos on how the tool works were included (https://www.youtube.com/watch?v=ReM1uqmVfPo). The homework was followed by hands-on coaching sessions. This coaching dialogue was executed by using Post-it Notes® and an A3-sized value proposition canvas. Post-it Notes® are a good tool for brainstorming because they can be either removed, replaced or added. They also gave every participant the opportunity to write down his/her thoughts and add them to the value proposition canvas. This session created dynamic discussions and helped the group visualise thoughts towards a new proposition. Moving from large segments to target groups was required for creating a market persona, which is a fictitious representative of a target group. A desired persona adequately represents the properties of a target group by highlighting the pains and gains that the group has experienced. This exercise resulted in the SMEs' changing their view of their customers; it became clear how to begin packaging their value proposition to relieve the target group's pains (significant needs) and add desired gains. For the SMEs, it was not immediately obvious how challenging it would be to define target group personas. Narrowing large segments to target groups went relatively easily, but adding the details

1 https://process-sme.eu/2019/03/11/servitization-swallows-human-resources/

of the target groups' needs and experienced pains resulted in the need for further investigation to ensure that the postulated pains of the target group were realistic.

Feedback from this phase was positive. The hands-on coaching was appreciated, and it was found helpful for guidance, questioning, inspiration and leading thoughts for understanding and implementation. *'This phase was very interesting. We have taken our quite diffuse thoughts to a clear value-adding proposition towards our customer with confidence. Today, we understand how to design a value proposition, and we know how we need to present it to our target market. However, it is still challenging to create a persona; therefore, more coaching is desirable, although the use of the tool per se is clear.'* (Manager from SME A).

PHASE 3: DEVELOPING A BUSINESS MODEL CONCEPT

Key activities: This phase focuses on designing a profitable business model by identifying gaps and proposing capability development through the following: a) reviewing required changes in key elements of the current business model; b) evaluating the feasibility of changes and adjusting the business model; and c) implementing changes in key elements by developing new capabilities.

This phase also began with accompanying homework tasks and videos. It moved from focusing on the target groups' pains, gains and personas to the challenge of adding the chosen value proposition to a business canvas model. Adding seven key elements in this phase was not easy; therefore, 30-minute Skype coaching calls were offered to help the project move forward. Without face-to-face coaching during this phase, there was an increased risk that the tools *per se* would tell a story; without anchoring the steps in between, you can lose the tale while moving towards the next phase and tool.

The interviews showed that the companies found this task challenging in that it was difficult to complete it without assistance. The tool raised many questions instead of providing answers. Clarity of the additional seven key elements of the business model tool were not obvious; thus, additional coaching sessions were amended. One by one, the SMEs' obstacles and questions were removed and answered, which helped complete the full business model canvas to support the designed value proposition canvas. The understanding of the tool was raised to a higher level. The additional coaching was appreciated by the SMEs because many of the raised questions were answered, and clarity on how the value proposition is added into the canvas's additional seven key elements became rewarding and meaningful.

PHASE 4: EVALUATING THE REFINED BUSINESS MODEL CONCEPT

Key activities: This final phase's focus was on mapping the risks of implementing a new business model through the following: a) identifying business model risks; b) ranking business model risks (likelihood and consequence); c) suggesting mitigation

activities and control mechanisms for the risks; and d) evaluating risks vs potential profits and consequences for the existing business model.

In the fourth phase, the companies were able to evaluate the refined business model concept by mapping the possible risks with the newly defined value proposition. Some of the key elements in the business model required evaluation, re-modelling, possible steps back towards the value proposition and redefining pains and gains, which were added to the business model canvas. This then required that the remaining key elements be adjusted to support the redefined value proposition in the best possible way. We summarised this phase's session by redefining the four phases from being linear to loops. With loop thinking, when you design and define the different phases, you can go back and redefine as well as redesign and thereafter move forward within the loops' phases.

The interviews showed that progressing too quickly from the value proposition phase to the business model tool created confusion and a loss of focus. The ability to see the insights of the business model tool was lost. It was concluded that more coaching would clarify the results of each phase and fully explain why each was added to the next one. While this phase was also appreciated, more coaching would improve the results.

The business model method is currently being used in collaboration with SMEs to evaluate its application and benefits. The project team is applying the business model method in a series of workshops with 10 hand-picked SMEs from the Interreg Nord region.

Leena Parkkila, Lapland University of Applied Sciences
Kyllikki Taipale-Erävala, University of Oulu
Kristiina Starck Enman, IUC Norr AB

5. Matchmaking Workshops

As part of the project, two national events, called Matchmaking Workshops were held in Finland, and three Nordic Matchmaking Workshops were held in Finnish, Swedish, and Norwegian large process industry companies and micro, small and medium-sized enterprises (SMEs). The goal of the Matchmaking Workshops was to look for cooperation and to find future business opportunities among SMEs, and between SMEs and large process companies in the field of mining, the forest and paper industry, steel and ProcessIT industries, as well as in the maintenance area. Another goal was also to network with each other.

The goal of the SMEs was to become suppliers of large process industry companies and to offer new, innovative products and advanced services. All of the companies involved in the workshops sought to improve their competitiveness, find new customers, and enter new international markets.

The target companies of the Matchmaking Workshops were SMEs and large process industry companies that had been interviewed in the Process-SME project. The two national workshops in Finland were tailored to the interviewed SMEs and large companies; only those invited could attend. The joint Nordic workshops, in turn, were more open events, and companies from different countries were invited to take part; the events also attracted companies from other fields.

NATIONAL MATCHMAKING WORKSHOPS

In Finland, the networking of companies and the search for common business opportunities were carried out for the interviewed companies in workshops targeted at different industry branches. The Lapland University of Applied Sciences (LUAS) from Kemi and the University of Oulu, Kerttu Saalasti Institute in Nivala, NIHAK, and Nivala Industrial Park Ltd organised two workshops for the mining, forest, and steel industries for SMEs and large companies in process industry. The venue was Technopolis, Oulu, Finland. The Mining Industry Workshop was held in December 2017, and the Forest and Steel Workshop was held in March 2018 (Table 1).

Table 1. National Matchmaking Workshops in Finland

National Workshops	Branch	Time	Number of participants
Oulu, Finland	Mining	13th of December 2017	18
Oulu, Finland	Forest and steel	21st of March 2018	19

In the workshops, invited participants were people in leading positions at large companies, which gave SMEs direct contact to those who decided large corporate purchases (Figure 1). Additionally, SMEs were able to share their professional know-how, information, and offerings about their products and services. This was experienced as a very successful contact method, because in recent years it has become difficult for SMEs contact the right person in the purchasing department in large companies. This is often a problem for SMEs because familiar purchasers may have already retired. The Matchmaking Workshops allowed SMEs and purchasers from large companies to update their purchasing connections and networks.

Figure 1. Workshop in Oulu

NORDIC WORKSHOPS

The model for the Matchmaking Workshops was developed at the Finnish national workshops, and then it was transferred to the Nordic level. Three Nordic Matchmaking Workshops were held: the first was in Gällivare, Sweden, in November 2018; the second was in Kemi, Finland, in January 2019; and the third was in Narvik, Norway, in May 2019; see Table 2. The Gällivare ValueMine workshop was organised by IUC Norr. The SMEs and large companies interviewed during the project were invited to the workshops. In addition, other companies were invited from the mining field and

related industries. The project partners from each country (Finland, Sweden, and Norway) also invited their own company associates to each Nordic workshop so that there was inter-Nordic representation.

Figure 2. The Gällivare ValueMine workshop

The Gällivare ValueMine workshop (Figure 2) was attended by about 70 people from Finland, Sweden, and Norway. The joint Nordic workshop held in Kemi, Finland, with the theme of Forest and BIO, was attended by corporate representatives from the forest and paper industry and the bio product industries in Finland and Sweden. Organised by LUAS and University of Oulu, approximately 50 participants took part in this workshop.

Approximately 15 people took part in the Norwegian workshop in Narvik. The workshop's theme was offshore industries and focused on petroleum and fish farming.

Table 2. Nordic Workshops

Nordic Matchmaking Workshops	Branch	Time	Number of participants
Gällivare, Sweden	Mining	29th of November 2018	Approx. 70
Kemi, Finland	Forest & BIO	24th of January 2019	Approx. 50
Narvik, Norway	Offshore (petroleum & fish farming)	28th of May 2019	Approx. 15

The themes of the joint Nordic workshops were based on the project's goals and the regional relevance of the process industry. Decision-makers at the large process com-

panies were invited to make presentations and participate in Matchmaking discussions with SMEs. The SMEs from Finland, Sweden, and Norway were able to present their expertise, network, and discuss cooperative opportunities with the company representatives. On the evening before the joint Nordic workshops, joint dinners were held allowing everyone to discuss and network with each other.

Workshop invitations were sent via email to targeted persons within targeted industries, announced on social media (LinkedIn/Facebook), and featured on the project webpage. Below is an example of the first page of the invitation (Forest & BIO in Kemi), see Figure 3.

Figure 3. The first page of the invitation

The structure and content of the national and Nordic workshops were similar. Each workshop began with an opening speech by Project Manager Seppo Saari. Welcome speeches were also given by representatives from the local mayor's office at the first two workshops.

Next, the project staff introduced some parts of Process-SME project content: specifically, the Roadmap for industrial process automation in Europe, the Business Model Innovation Process for SMEs, and a presentation about the local business environment.

Representatives from large process industry companies who gave presentations focused on the challenges in their particular industry and the new needs for new innovative services. The SMEs who gave speeches introduced their businesses, their knowledge base and skills, and offerings for large

Figure 4. Face to face discussions

companies. Before ending the workshop, SMEs and large company representatives had an opportunity for face-to-face discussions (Figure 4).

Below is an example of the content from the Nordic Matchmaking Workshop (ValueMine in Gällivare), see Figure 5.

PROGRAM 29 of November
ValueMine

08.30 Registration to the workshop, coffee and sandwich

09.00 Program and Opening speech
Seppo Saari, Head of RDI, Lapin AMK

09.10 Roadmap for industrial process automation Europe
John Lindström, Luleå University of Technology

09.25 Business Model Innovation Process for SME
Vinit Parida and David Sjödin, Luleå University of Technology

09.40 Industry co-operation – from mechanics to cloud
Erik Hagenrud, Business Sweden/IUC Norr

09.50 Process industry - challenges in the mining industry and the need of new innovative services:
- LKAB, Håkan Tyni, IT Security Manager
- Boliden Mines, Kasper Huuska, Head Of Sourcing
- Outokumpu Chrome, Heidi Karjalainen, Category Manager, Services and Invest, General Procurement
- Hannukainen Mining/Tapojärvi, Jyrki Törmänen, Mine Engineer
- Nussir, Magnus Karlsson, Mine Manager

12.00 Lunch break

13.00 Innovative SME's in the northern countries – services for the mining industry, cooperation
- eMaintinance365, Anders Dalstål, Sales Director
- M-Solutions Oy, Janne Montonen, CEO
- Optimation/MBV Systems, Tomas Eriksson, CEO
- Nome Oy, Juha Hautala
- BnearIT, Anders Hermansson, CEO
- Kaltio Technologies Oy, Jyrki Polet, Director
- Gefa Systems, Ulf Karlsson, CEO
- Muon Solutions Oy, Marko Holma, Chief Geologist
- Nussir, Øystein Rushfeldt, Mining of the future
- Momek, Roger Skatland

15.00 Coffee break

15.15 Time for business and cooperation – meeting forum between SMEs/process industry

16.30 Summary of the event – end of the workshop

The participation cost
500 SEK/person.
Sign up here:
https://goo.gl/acsZF6

Part of Interreg project Business Model Innovation and Internationalization of Process Industry SME's. Financed by:

Figure 5. The content of the program

Presenters received advance instructions to ensure that the workshops focused on their purpose: to clearly lift up SMEs' value proposition and the future needs of large companies in the field of process industries. Company representatives were given guidelines that focused specifically on the length of time and content of their presentations. Adhering to a strict schedule enabled SMEs to enhance domestic and international cooperation with other SMEs and with large companies. In turn, large companies had the opportunity to meet possible subcontractors.

PARTICIPATION IN WORKSHOPS

The companies involved in the project are presented in Table 3. The list of companies includes participants in both the national and Nordic workshops.

Table 3. Participating companies

Finland	Sweden	Norway
Large companies		
Efora Oy, Hannukainen Mining/Tapojärvi Oy, Metsä Fibre Oy, Metsä Group, Outokumpu Chrome Oy, Outokumpu Oyj, Stora Enso, Terrafame Oy.	Boliden Group, LKAB, SCA Munksund, Smurfit Kappa Kraftliner AB (Piteå).	Apply Sørco, Equinor, Momek Group, Nussir AS.
SMEs		
Aikolon Oy, Augumenta Oy Betamet Oy, Insinööritoimisto 3D Hacklin Oy, Juvatec Oy, Kaltio Technologies Oy, KFLeading Ky, Koivukuja Yhtiöt Oy, Lapin GPS-Mitta Oy, M-Solutions Oy, Muon Solutions Oy, Nome Oy, Norrhydro Oy, Northern Crown Oy, Pohjaset Oy, Suomen Kaapelitarvike Oy, Tapiservice Oy, Timegate Instruments Oy, Tmi Sukellustyöt J.Takkula, Tornion Sähköpojat Oy.	Adopticum AB, BnearIT AB, Data Ductus AB, Design Thinking, eMaintenance365, Gefa Systems AB, Gisab, Infra Management AB, Jama Mining Machines AB, Malux Solutions, Mobilaris Industrial Solutions AB, Optimation / MBV Systems, Rock Solutions North AB.	2K Tech AS, Arctic Oiltools AS, Dime AS.

COMPANIES' FEEDBACK ABOUT WORKSHOPS

We collected feedback from participating companies at all the Matchmaking Workshops, and we also did so systematically on a large scale in spring/summer 2019. The goal of feedback collection was to find out what the project had achieved from the companies' perspectives. We contacted the representatives by phone or in-person.

The project was described as *'business-like and meaningful'*. The arrangements of the project/workshops *'were good; presentation times were suitable; short; and face-*

to-face meeting times were suitable'. Additionally, the project *'was good, because it enabled to meet (large company) people face-to-face'*. One high-level professional presentation keeper stated that *'the event exceeded his expectations'*.

The following comments are examples of the types of cooperation SMEs achieved through the project and workshops:

- 'We made good connections, conducted discussions, and one early cooperation has sped up.'
- 'From the workshops we have not directly gotten any cooperation, but we have been able to send an offer.'
- 'Something comes out of every meeting, but the way large companies operate is slow.'
- 'We have gotten into two large companies; the cooperation with other SMEs was not on the list.'
- 'We have reached a new constituency. Our order books are full for the next three months; it's usually two weeks.'
- 'We have not gotten new orders, but we got new contacts that are good for a small company.'
- 'No concrete (issues) so far, contacts have not changed for euros.'
- '(The workshops) were good presentations, from which we got ideas.'
- 'Thanks to the workshop we met a 'surprising' customer, which I would have never approached without the workshop.'
- 'Project/workshops enabled direct contacts to certain company/people that otherwise had not been possible.'
- 'Could have arranged the contacts ourselves, but we found the meeting useful.'
- 'Had useful meetings in the course of the workshop.'

SMEs also offered topics and issues to develop for future workshops:

- 'In some cases, large company participants were the 'wrong' persons (purchasers), who do not understand the need of the (factory) processes.'
- 'I did not participate the Nordic workshops because of language (English).'
- 'The workshop was focused on larger companies (than my company is).'
- 'I am very disappointed in large companies' behaviour; they do not answer phone calls and emails (when first contacted in workshops).'
- 'For us (not so good English speaking) the English presentation template would be a great idea.'

In summary, all SMEs were impressed by and benefitted from the Process-SME project. SMEs have also expressed their willingness to cooperate with us and with this project organisation in the future.

John Lindström, Luleå University of Technology
Seppo Saari, Lapland University of Applied Sciences

6. Development of European RDI Cooperation

In today's world, and especially within the EU, production, trade, services and RDI (research, development and innovation) are international in scope because of their highly developed specialisation. In addition, the development of RDI cooperation in the Process-SME project has aimed to achieve at least European-level cooperation, in which the Horizon 2020, ECSEL-JU and other European RDI programs have played a central role. In practice, some RDI has been financed regionally and some nationally while the demanding projects have been financed at the European level.

The development of RDI cooperation is based largely on the findings presented in the renewed ProcessIT.EU Roadmap (described in Section 3 of this publication), which are based on the existing and projected needs of the industry and of the companies – including SMEs – that serve it. These needs are similar at the regional, national, European and global levels. The topics for RDI cooperation were chosen to serve the industry and SMEs in our region. International and European RDI cooperation is necessary for many SMEs as well as larger providers of high-tech products, services, knowledge and expertise so that they can develop their offers, competencies and international networks. International networks enable many smaller SMEs to contact and discuss potential business with customers they otherwise would not be able to meet. International networks also provide access to competencies that are required in the next steps of RDI but are not accessible in a local, regional or national environment. Thus, European RDI cooperation has many facets related to access to markets and customers, access to needed competencies and the advanced development of an organisation's employees who participate in crafting RDI proposals and subsequent projects.

The project has participated in a number of project-brokerage events at which many organisations meet to initiate RDI ideas, consortia and proposals. After a project proposal has been crafted and submitted, many of the partners who participated in its development stay connected and continue to cooperate in the future. Thus, the project

brokerages represent an important means of getting things going and providing the initial spark for long-term international RDI cooperation.

The largest RDI proposals have involved 60–110 international partners from 15–25 countries. Countries outside the EU have also been involved, including Norway, Switzerland and Israel. Industrial companies usually comprise the majority of the partners in the largest RDI proposals, complemented by academia and research institutes. These proposals also commonly include about five to 10 SMEs from Sweden, Finland and Norway. To date, the project has been involved in forming consortia and conducting pre-planning for about 15 European RDI proposals. Most of the cases have led to proposals, although in some cases preparation had to be stopped for various reasons, and some cases are still under construction.

The project's efforts at RDI proposals and cooperation have resulted in stronger SMEs, new large projects, such as Productive4.0[1] and Arrowhead Tools (started in May 2019), and extended networks and ecosystems.

To conclude, the effort spent on European RDI cooperation has been well justified, and more is required in future in response to intense competition and lower hit rates. These challenges demand high-quality RDI proposals, strong project consortia and the resources for participating in such efforts over time.

The project's work has comprised participating in brokerages, forming consortia and pre-planning projects. The preparation itself was accomplished with other financing. The partners have participated in the following consortia and projects as preparation while conducting the Process-SME:

- Arrowhead Tools
- AutoMod
- CHAMPS: Cooperative Health & Safety Management for Complex Systems of Systems
- CHARM: Sensor systems and digitalisation in harsh environments
- Cybersecured PSS
- Digital Mine: Digitalisation in the mining industry
- Drone Swarms: Autonomous drone swarms
- ERPA: Efficient and reliable analytics
- ERPA II (Efficient & Reliable Predictive Analytics 2)
- HOLMES: Artificial intelligence in the process industry
- LICMA (Life-Cycle Management for Large-Scale IoT Systems)
- Maelstrom
- PREDICTnCONTROL
- SERENGETI: Maintenance of electric grids
- Smart PdM

1 https://productive40.eu/

Kyllikki Taipale-Erävala, University of Oulu

7. Published Writings from the Process-SME Project

ARTICLES AND CONFERENCE PROCEEDINGS

The Process-SME project has created several writings, journals and proceedings. The following are some examples of these texts, beginning with academic texts.

Sundén, L., Parida, V. and Sjödin. D. (2018). Exploiting digital opportunities through business models: Empirical insights from leading Swedish manufacturing companies. *Conference proceedings.* The Spring Servitization Conference 2018 (SSC2018), 14-16 May 2018. Copenhagen, Denmark.

Abstract: *Servitization represents transformations towards selling integrated product-service solutions that deliver higher value in use for customers. Advanced services such as performance-based contracts hold the potential to improve a customer's core operational processes, and guarantees a certain level of product and service output. Prior literature acknowledges that a major challenge for manufacturing companies is to identify, define and offer performance-based business models, as this requires changes in all dimensions of the business model, including value creation, value delivery and value capture. Although past works have provided insight into why advanced service business models imply a radical shift in business logic, and what capabilities are needed to deliver performance-based contracts, they have not provided adequate insight into how the journey to develop performance-based contracts unfolds. Thus, the purpose of this study is to enhance understanding about how the performance-based business model journey unfolds for a manufacturing firm.*

The research adopted an exploratory case study designed to capture insights from the successful development and implementation of a performance-based business model within the telecommunication industry. In the early 2000s, a global provider of communication technology introduced a business model based on "delivered capacity, on request of one of their customers, an Indian telecommunication company, as a solution to a rapidly growing market". To enhance understanding about how successful perfor-

mance-based business models come about, 20 semi-structured interviews were performed with key persons, and secondary data like reports, presentation material and internal documents, were analysed using MAXQDA software.

The preliminary results based on the data analysis of the successful implementation of a performance-based contract answered questions such as what triggers the change, what the activities and steps that needed to be taken were, what their outcomes were and what guided managerial decisions. For example, the findings showed that factors such as a fast-growing market and need for high up-front investments trigger decisions towards the development of performance-based business models. This required new activities related to supporting close collaborations between provider-customer teams and identifying new value-capturing mechanisms. Thus, this study holds valuable insights for both academia and practitioners related to performance-based business models.

Keywords: Digitalization, business model, servitization, PSS, industry 4.0

Taipale-Erävala, K. and Muhos, M. (2018). Competence-related challenges for micro-enterprises entering the field of servitization. *Conference proceedings*. 13th European Conference on Innovation and Entrepreneurship (ECIE 2018), 20-21 September 2018. Aveiro, Portugal.

Abstract: *The purpose of this study was to examine the competencies that micro-enterprises (micros) need in order to enter the field of servitization. Servitization is a great business opportunity for micros, but it is important to know what competencies a firm needs when targeting the longer and more profitable customer relationships that servitization may offer. Micros possess limited human resources and thus competencies, and it is crucial for them to understand competence-related challenges, in order to operate successfully.*

This empirical study was conducted by employing a qualitative research approach in order to enrich the collected data and the findings. The multiple case strategy used here allowed for an extensive examination of the phenomenon of interest. Data were collected by means of interviews in eight Finnish subcontracting micros in the fields of forestry and mining, to produce new information about the competence-related challenges faced by micros entering servitization.

The results show that micros face competence-related challenges in servitization in terms of entrepreneurship, functioning under change and financing. Entrepreneurial competencies are strongly linked to recognizing opportunities and envisioning future business opportunities. There is also a need for change competencies, both for micros and customers, including the ability and willingness to change by renewing employees' skills and methods of working. Financial difficulties and a lack of understanding regarding future economic responsibilities, were highlighted as challenges. This competence-based approach to studying micros in the context of limited human resources, allowed us to identify the competence-related challenges that micros face in the industrial mega-trend of servitization. In addition, this study addressed academic and practical application gaps in the study of micros.

Keywords: Micro-enterprises, competencies, servitization, case study, Finland

Parkkila L., Leinonen J. and Sipola J. (2017). In English: Process industry SMEs are looking for growth through networks and networking. Lumen 3/2017, Lapland University of Applied Science, Theme article.

Abstract: *The purpose of this article is to illustrate the major challenges facing SMEs and the networking of SMEs and large companies. In the Process-SME project, 31 process industry SMEs and 7 large process industry companies were interviewed in Lapland and northern Ostrobothnia in the autumn of 2017. Representatives of the large process companies were from the metal, forest and mining industries.*

From the interviews with the SMEs, their key challenges were identified as competence; marketing and sales; and financing. The regional reports of 2017 SME barometers in Lapland, northern Ostrobothnia and Finland showed major challenges in marketing and sales, followed by staff development and training, networking and financing. In other words, both studies yielded almost the same results.

In the interviews with large process industry companies, it became clear that large companies have a tendency to reduce the number of their subcontractors. For this reason, micros and SMEs could be encouraged to network with each other, to become suppliers of large-scale services to large process industry companies. In turn, to achieve the best possible networking with large companies, SMEs should have a good reputation and mutual trust and openness. They should also be aware of the delivery requirements of suppliers for large companies.

Keywords**:** SME, large company, challenges, networking

Parkkila L., Leinonen J. and Sipola J. (2017). Original Finnish: Prosessiteollisuuden pk-yritykset hakevat kasvua verkostoista ja verkostoitumalla. Lumen-lehti 3/2017, Lapin ammattikorkeakoulu. Teema artikkeli.
http://www.urn.fi/URN:NBN:fi:amk-2017121421366

Tiivistelmä: *Tämän artikkelin tarkoitus on antaa kuva pk-yritysten suurimmista haasteista sekä pk-yritysten ja suuryritysten verkostoitumisesta. Process-SME -hankkeessa haastateltiin syksyllä 2017 Lapin ja Pohjois-Pohjanmaan maakunnissa 31 prosessiteollisuutta palvelevaa pk-yrityksen ja seitsemän prosessiteollisuuden suuryrityksen edustajaa. Suuryritysten edustajat olivat metalli-, metsä- ja kaivosteollisuudesta.*

Pk-yritysten haastatteluiden tuloksena saatiin selville avainhaasteet, joita olivat osaaminen, markkinointi ja myynti sekä rahoitus. Syksyn 2017 pk-yritysbarometrien alueraportit Lapin alueelle, Pohjois-Pohjanmaalle sekä koko Suomeen osoittivat markkinoinnin ja myynnin tuottavan eniten haasteita. Seuraavina olivat henkilöstön kehittäminen ja koulutus, verkostoituminen ja rahoitus. Toisin sanoen molemmat tutkimukset antoivat lähes samansuuntaisen tuloksen.

Prosessiteollisuuden suuryritysten haastatteluissa selvisi, että suuryritysten suuntauksena oli alihankkijoiden määrän vähentäminen. Tästä syystä pitäisi mikro- ja pk -yri-

tyksiä kannustaa verkostoitumaan keskenään, jotta he pääsisivät suurteollisuuden palvelujen toimittajaksi. Jotta verkostoituminen pk-yritysten ja suuryritysten kanssa toteutuisi mahdollisimman hyvin, tulisi pk-yrittäjillä olla maine kunnossa ja molemminpuolinen luottamus ja avoimuus sekä suuryritysten vaatimat toimittajavaatimukset kunnossa.

Avainsanat**:** Pk-yritys, suuryritys, haasteet, verkostoituminen

BLOG POSTS

Totally 60 blog posts were published on the website www.process-sme.eu during this project. Readers are encouraged to visit these pages, to observe the various project themes.

The blog authors include Ross Wakelin, Kari Kutuniva, Katariina Ala-Rämi, Petter Kyösti, John Lindström, Seppo Saari, Harri Jokela, Sakari Nokela, Sami Kaarto, Kyllikki Taipale-Erävala, Timo Liimatainen, Anders Högström, Matti Muhos, Vinit Parida, Janne Montonen, Leena Parkkila, David R Sjödin, Saku Törmälehto, Kaisa Liinamaa and Geir Frantzen.

As follows, there are exemplary national blog posts from Finland, Sweden and Norway.

INDUSTRY INVESTS NOW IN NORTHERN FINLAND

Seppo Saari

After world economics started to suffer from the 2008 financial crisis in the US, it felt like all new investments ended in northern Finland. The trend continued until fall 2016, when we recognized clear growth in our services and the willingness of companies to participate in RD projects. Now the number of investments is fast-growing on a level unseen since the hydropower stations and main roads were built from the 1950s to the early 1970s.

Several investments are occurring in the mining industries. Agnico Eagle has a €160 million investment going on in their Kittilä gold mine to build a 1,044 m-deep shaft. At the same time, the processing plant's processing capacity will be raised from the current 1.6 million tonnes per year to 2.0 million tonnes per year. Meanwhile, Outokumpu Chrome has in their Kemi mine an ongoing project called Deep Mine. The new production level, begun in 2017, will be built to 1,000 m deep, while the current one is but 500 m deep; the project will be ready in 2020. Terrafame nickel mine in Sotkamo is also planning to invest in nickel and cobalt chemical production, as both are necessary for accumulator production. The plan is to produce 150,000 tonnes of nickel sulphate and 5,000 tonnes of cobalt sulphate.

Closed mines opened and new permits being audited

Laiva gold mine in Raahe was closed some years ago, but now it has been opened again by Firesteel Resources. Pahtavaara gold mine in Sodankylä was similarly closed, but Rupert Resources bought it in 2016; they are exploring the site and aim to open it again. In addition, Hannukainen Mining – owned by Tapojärvi – is planning an iron ore mine in Kolari, where they will also produce copper and gold. Boreal Bioref, too, have for some years been planning a pulp and bio product factory in Kemijärvi in eastern Lapland. At the moment authorities are auditing water and environmental permits for these projects, and the goal is to start investing in very near future.

Renewing start-ups in planning

Metsä Fibre started a feasibility study to renew their Kemi pulp mill. There are two options: replace the existing mill entirely, or lengthen the lifetime of the existing mill through modernization. If a new mill is built, the capacity will grow, more electricity will be produced and bio product variety will grow. A company Kaidi Finland is also planning a bio refinery in Kemi, with the goal to produce 225,000 tonnes of biofuel, made up of 75% diesel and 25% gasoline. The company has already received their approved environmental permit. Investments would amount to €900 million. In addition, some bio and recycled material-based power stations are planned, such as Oulun Energia building a new 215 MW bio power station that will be in production in November 2020.

The investments under construction or in the final decision process make together almost €1 billion. Those investments in the planning phase will make €3 billion, if they are all built to the planned scale. For companies serving mining and process industries, this is a huge market both for the construction phase and after starting production. This also means that our regional and national SMEs must develop their own activities, products and processes, as well as invest in co-operation and servitization.

A critical topic is the demand of qualified personnel. A lack of qualified staff can be, to some degree, covered by training and educating personnel in co-operation. In the long run, though, we should all ensure that young people take advantage of the future opportunities and study engineering.

AUTOMATION AND ROBOTIZATION – AFFECTS COMPANIES' BUSINESS MODELS AND COMPETITIVENESS

Anders Högström

The ongoing digital structural change taking place in industry will majorly impact industrial development in the coming years. It is important that companies, in the context of their business pages and business models, look at how they can strengthen their competitiveness. An important sub area is the ability to increase the degree of automation in a company's production system.

The rapid development that is taking place through increased digitalization, automation and robotization, creates great opportunities for industry. However, while efficiently enhancing the competitiveness of many companies, there are challenges, not least for SMEs. Smaller companies usually have fewer resources and are not always aware of how automation and robotization could help strengthen their development, or how a development could be realized. Making use of opportunities for robotization and production flow automation is today necessary for companies in industry, to be internationally competitive. According to Eurostat statistics, only a few tenths of Swedish manufacturing companies have an advanced level of digitization and automation, which is lower than other northern European countries. Lower prices and advanced technology means that robots today are becoming more accessible, more capable and easier to use. By technological achievements, new automation solutions have also evolved, such as collaborative robots that can work safely side by side with people. Potential has thus also significantly increased for companies where there have previously been challenges to introducing automation solutions.

Focusing on automation and robotization

As a result of our work to develop the region's industry, IUC Norr AB has, in collaboration with IUC Sweden, taken the initiative to focus on automation and robotization, to reach small- and medium-sized enterprises with knowledge, analysis, demonstrations and contact networks.

The project will begin in fall 2018, and be carried out in collaboration with IUC Sweden's network of industrial development partners in Sweden and the Robot Valley, Swerea IVF, Automation Region. IUC Sweden is a network dedicated to industrial and industrial SME operations across the country, and has the task of participating in development efforts aimed at SMEs, with the aim of increasing their competitiveness.

This objective in quantitative and qualitative terms means that:

- *84 SMEs should be given the opportunity for an initial analysis.*
- *56 SMEs should undergo in-depth preliminary studies for automation.*
- *120 people from SMEs should participate in lectures and mini fairs.*
- *50 people from SMEs will have the opportunity for in-depth automation training.*

IUC Norr sees the importance of regional initiatives being initiated in collaboration between parties in Finland, Norway and Sweden. The collaboration established under the Interreg project business model is a collaboration platform that can begin these initiatives in our region. IUC Norr is looking for collaboration in automation and robotization with universities and industrial partners in northern Finland, Norway and Sweden.

NOTES FROM NORD CONFERENCE OF NORWEGIAN OFFSHORE INDUSTRY IN HARSTAD

Ross Wakelin

The Nordområde Conference was held in Harstad from 30 October to 01 November. The conference covered the oil and gas and aquaculture sectors, with an emphasis on the business opportunities for suppliers. For instance, petroleum companies are seeking greater involvement with local suppliers, while the fish farming industry is experiencing rapid growth at present. In addition to the presentations on industry-supplier relationships, there were four presentations and a panel discussion concerning the expectations of how digitalization will affect the industrial market, and the plans for a petroleum branch strategy for the digitalization of the petroleum sector.

As such, the conference was a very good match for the Process-SME project's interests, and would have served well as a forum for the planned workshop in Norway focusing on the offshore sector. However, the timing of the northern conference was not good, coming close to the date for the "ValueMine" workshop in Gällivare, 29 November 2018. The following is a short summary of the Nord conference's content.

Topic 1: A Blue Sea – Three blue business areas – Analysis and possibilities

This section emphasized the growth that is occurring within the offshore industry and flow-on/ripple effects. There were two presentations, one from the NHO Trade politics department director and the other from a research manager from the SINTEF Oceans research institute. They both emphasized the role that technological innovations play within new production facilities and operational optimizations, particularly highlighting the interaction between technology and biology.

Topic 2: Market opportunities for the supplier industry

The second section covered the relationship between petroleum companies and their suppliers. Equinor (formerly Statoil) told of the use of local supplier companies, and the flow-on effects for local companies. In particular, the planning for the start-up of the Johan Castberg well production was covered. Supplier companies in the north were encouraged to make alliances with Equinor's existing main suppliers, both in the

construction and operation phases. Lundin (a Swedish petroleum company) then gave a presentation about the status and further plans for the Alta/Gohta field in the Barents Sea.

Topic 3: Digitalization in the petroleum sector

As is happening elsewhere in industry, the petroleum sector is giving increased attention to the application of new digital technologies. Equinor presented their "Digital Roadmap" and there was a presentation regarding the digitalization expectations for the Aasta Hansteen field development. There followed a presentation that suggested what aspects of digitalization suppliers should focus on, and then a presentation from Cognite that gave practical examples of gains from new digital technologies applied in petroleum development and operation. There was then a panel discussion with these presenters, with questions from the audience. One concern raised was the wide range of operating systems used on the different sites, and the complexities for suppliers to be adept in all of them. To some extent this was countered by the presentation by Cognite – digital solutions are largely open source and flexible.

Topic 4: Future developments in fish farming

With the downturn of the petroleum sector, there has been a focus on applying offshore competence in other sectors, such as fish farming, which is presently experiencing rapid growth. A variety of presentations highlighted the application of new technologies to fish farming utilizing competences from the petroleum sector. This combination of fish farming and petroleum competence was told as offering new opportunities to the supplier industry. Experiences from a collaborative network of 70 companies established in Senja were presented, showing the advantage of collaboration. The fish farm operations indicated what challenges they faced, and the suppliers in the network worked to develop technological solutions. Indeed, the network was a test area for developing new technologies. This was further highlighted in another presentation on development concessions, which are a strong driver for development and the adoption of new technologies. The overall impression was that it was easier for new suppliers to gain access to the fish farming industry.

The scale of the fish farming operations was illustrated in a presentation by NSK, where they described the development of the "Havfarm" concept. Whereas fish farming has traditionally been located in sheltered fjord arms, there is interest in shifting the operations out to the open sea. The Havfarm concept was developed by NSK for Nordlaks, and is currently under construction in China. To illustrate the scale of the Havfarm, it was superimposed over the oil platform Goliat. This is a large-scale facility, therefore requiring a high degree of automation to operate in the open sea.

The conference was a good match with the interest areas of the Interreg Process-SME project. Further details from the conference are available. The presentations will be made available online; at the moment only the presentations from last year's conference

are available: http://conventorkonferanser.no/konferanser/nordomradekonferanse-2017/presentasjoner-2017/

On the downside, the conference was expensive – the participation fee was 8,000 NOK, and a joint display stand was quoted at 140,000 NOK, which could have instead been used to promote supplier companies from the Interreg project. As it were, only 3 of the 75 attending companies had a display stand; therefore, the favoured approach between companies was direct contact in the breaks between sessions.

Seppo Saari, Lapland University of Applied Sciences

8. Future Considerations for Northern Industries

The2orole of natural resource-based industry is large and expanding in the Northern regions of the Nordic countries as described in a blog, titled INDUSTRY INVESTS NOW IN NORTHERN FINLAND, Part 7. In addition, the industry is investing and growing rapidly. This offers new opportunities for companies, including the SMEs serving them.

While conducting the *Process-SME* project, we cooperated with 103 SMEs and 17 larger industrial companies in the Interreg Nord region. Simultaneously, we worked with a large number of RDI organizations, SMEs and large process industry companies, as well as with various intermediaries all around Europe and even farther afield. In addition, we learned a lot while helping companies develop their products, services and business models, especially through mutual cooperation.

First, we noticed that our industries here in the North are well developed and in the front line in many areas, even in a global context. Circular economy, energy efficiency and material efficiency are present in every industry, based on cross-sectoral digitalisation meeting the needs of all three areas. For example, it is impossible to manage circular economy solutions without digitalisation. Digitalisation can be considered an all-encompassing umbrella for all industrial, economic and social actions and operations.

Second, the business environment is changing. In the past, and even today, businesses were selling products or services from one company to another. Today, and especially in the future, product-service combinations are getting more complex. Additionally, business models often involve more than the traditional two companies. We are moving towards ecosystems, which means going from supplier–customer relations towards complex multi-actor ecosystems where everyone benefits from the cooperation.

Third, RDI, sophisticated technological and ICT applications are needed to address the needs and opportunities of industries in the future. This means combining capabilities from several academic organisations, industrial companies, system providers

and various types of SMEs. Given RDI and digital-based technology, it is obvious that working on a regional or a national level is not enough when operating in a global digital environment.

In order to further promote Northern industries' businesses, on 1 October 2019, we will begin a three-year project entitled *DigiProcess - Supporting digitalization of process industry ecosystems: Developing service ecosystems among the process industry and SMEs*. In it, we will tackle all the above-mentioned needs. Many companies have already expressed their interest in participating in the new project, and we are always ready to welcome new participants from Northern Sweden and Finland.

AUTHORS

Kyösti Petter, Project Manager,
Luleå University of Technology

Lindström John, Professor,
Luleå University of Technology

Parida Vinit, Professor,
Luleå University of Technology

Parkkila Leena, Project Engineer,
Lapland University of Applied Sciences

Saari Seppo, Senior Specialist,
Lapland University of Applied Sciences

Sjödin David, Associate Professor,
Luleå University of Technology

Starck Enman Kristiina, Business Developer,
IUC Norr, Industrial Development Center

Taipale-Erävala Kyllikki, Post-Doctoral Researcher
University of Oulu, Kerttu Saalasti Institute

Wakelin Ross, Researcher
Northern Research Institute Narvik AS
NORUT (Narvik)

This publication 'Process-SME Project – Exceeded Expectations' introduces a Nordic project Process-SME, which main objective is to improve the competitiveness of SMEs whose customers are found within the process, mining, energy, oil, and gas industries. The project supports these SMEs by identifying their needs and potential opportunities, developing new business models, building European partnerships and applying for EU-level funding for project proposals on SMEs' business behalf. Furthermore, the Process-SME project aims to develop SMEs' products, services and other offerings.

Interreg Nord
European Regional Development Fund
EUROPEAN UNION

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