

Collaborative Business Networks of the Future

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We need to challenge our ways of doing business and find new and competitive business strategies to create and maintain a flourishing manufacturing industry here also in the future.

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Risto Raunio, Tieto Oyj



Foreword

The manufacturing industry is going through significant changes, both at the business and structural levels. This change is taking place everywhere, but especially to a major extent here in Finland. If we cannot adapt to the changes, many manufacturing industries will leave Finland. We need to challenge our ways of doing business and find new and competitive business strategies to create and maintain a flourishing manufacturing industry here also in the future.

This research is focused on an important approach to cooperation in networks. Value networks emphasise strategic-level cooperation and create value in networks. Concerning any business, the more value we can create for our customers, the more competitive we are.

In Finland we are rarely dealing with large volumes and long-term orders. Instead, we have to adjust to small lot sizes, fast changes and varying customer requests. The better we understand the real needs of our customers and the faster we can fulfil them, the higher value we are creating for our customers. Among small- and medium-sized businesses only a few companies can achieve this alone – and this is also the case for large companies. We need collaboration and pre-planned

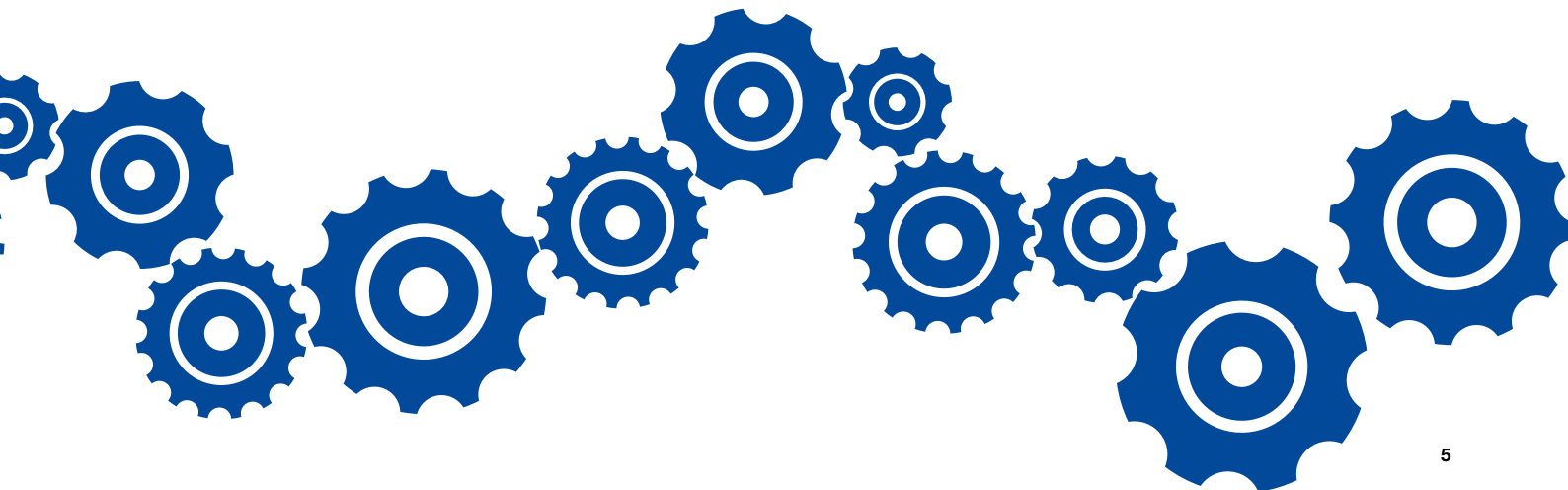
cooperation methods to make available the best competencies, suitable offerings and agile production capabilities.

In the current manufacturing industry information is taking an increasingly important role. When several companies are involved the availability of relevant methods, plans and designs are crucial. The previous can be achieved only by ICT tools enabling smooth and efficient collaboration between companies. Not any IT tool will make this change for us, but without tools – or with tools not supporting our business – it will be much harder. Proper tools are an enabler for conducting competitive and successful business.

There are a lot of new platforms of communication and cooperation; some of them are adopted from outside of business realm, some are raised more by technical development. This research covers the possibilities and strengths of both groups. From this document you will find practical steps for networking.

When new cooperation and new collaboration tools are deployed, it implies a cultural change in ways of doing business. And it is just this change in business culture that will provide the new competitiveness in manufacturing businesses.

Risto Raunio, Tieto Oyj



1. Introduction

The manufacturing industry is facing a radical, worldwide change. Globalisation, economic fluctuation and technological development are constantly inflicting pressure on industrial companies. No company is an island and no one is safe from competition anymore; not even in domestic or regional markets, as companies around the world look for ways to serve customers globally through the Internet. In order to prosper, Finnish companies – especially small- and medium-sized enterprises (SMEs) – need to develop the way they run their business: **they need to re-think their business logic, form innovative business networks with strategic relevance, provide a more service-based product portfolio, and adopt efficient information and communication technology (ICT) tools to enable and support the change.**

The management models that have traditionally been applied in the manufacturing industry are built on the concepts of material supply chains and logistics. The conventional concepts are no longer dominant in the industrial landscape that is becoming strongly based on production and management of information. Previously the decision on forming a business network was often based on opting between manufacturing a component or purchasing it from a supplier – the resolution was typically based on simple calculation of expenses. Building a modern business network is based more on the question **“how can we, as a group of companies, create more value for the customer?”** Networks are able to respond to demand more efficiently and more flexibly than traditional static organisations.

Collaborative business networks (CBNs) are becoming more and more an integral part of all industrial business operations. They are **flexible and innovative business networks**, where communication and information sharing between partners is essential. Inter-organisational collaboration between partners will be driven more by autonomous departments or teams having similar interests, rather than the companies as entities. These communities are built and dissolved rapidly in order to achieve a collaborative advantage. This development towards networked communities

means that using ICT is necessary for managing information in business networks. This requires ICT skills and experience from network partners, and may require changes in organisation and adoption of some new technology. However, the biggest challenge that industrial companies face will be the change of mindset that is needed: out with the old, in with the new.

Joining or building a CBN doesn't mean that you inevitably have to share all your business wisdom with partners and give up the competitive edge you have managed to gain over the years. There are many possible forms of collaboration and networks can be formed so that the companies complement each other without risking their market share or intellectual property. A well-planned and skilfully managed network can be more than the sum of its parts. For example, by combining partners from manufacturing, transport and training, a collaborative network can develop a tailored turn-key solution for the customer.

A company that you see merely as a long-serving subcontractor may have gained significant insight into your business while working with your company. Given a chance to collaborate on more profound, strategic levels, they might be able to boost the co-operation to a new level. In general, the role of SMEs in collaboration networks is crucial: while they may not be running the project or even participating for its entire duration, they typically bring in expertise to niche areas that is vital for success.

In order to succeed, companies need to consider which business model is appropriate for the co-operation and business opportunities of the network, and also satisfies the requirements set by customers, stakeholders and other interest groups. One way to think about the business model is to consider it as a way to summarise the key ideas of the organisation: operational functions and earning model, value proposition, channels, customer segments, customer relationships, key activities, key resources, key partners, cost structure and revenue streams. Another way, especially in the context of dynamic value networks, is to consider the model as a framework where a company is assessed

according to its position in the network and social relationships. This way the model is flexible and open, while renewing and reflecting on the business opportunities in dynamic ways.

Information sharing is extremely important for a successful business network. Companies need to be able to react swiftly to fluctuating markets, seize opportunities as they arise, and work efficiently in a demanding environment. The communication between participants must be timely and reliable. ICT tools are the most efficient way of sharing information between partners in a controlled, systematic manner. A well-planned set of common practices and suitable ICT tools may be a cornerstone of success for any business network. In this respect, companies should consider the level of their ICT services and ensure they use tools that are interoperable, user-centric, reliable and affordable.

The purpose of this publication is to provide Finnish companies with food for thought: How will the manufacturing industry change in the near future? Where are we now? What is required to cope with the change? How can SME companies turn the threat into an opportunity? What are the concrete actions that companies can take to get started with business networks and ICT tools?

Finnish companies – especially small- and medium-sized enterprises (SMEs) – need to develop the way they run their business.

No company is an island and no one is safe from competition anymore...

“How can we, as a group of companies, create more value for the customer?”

2. Collaborative Business Networks of the Future

The nature of industrial manufacturing and business is changing. It is obvious that business is becoming global, and also Finnish SMEs are facing competition from companies around the world. Interaction between companies and customers around the world has never been easier, due to advancements in communications and transportation. Access to the new global market place is available to everyone, thanks to the Internet. Anyone can order a complex, tailored product from a company residing on the other side of the world, and have it delivered to their business in a few days.

Digitalisation is another prevailing megatrend: tasks that used to be done manually or in the physical world are now done with computer-assisted tools or entirely in the digital world. Even traditional machinery is now often operated with computers, making the process faster, more accurate and secure, and less error-prone. Companies can promote their products and services, as well as build their brand, entirely within the Internet. They can interact with customers, sell and even deliver their products using the Internet. Personal contact between the seller and buyer no longer has the same significance as it used to have. Using the Internet, any company can reach more people faster and more efficiently, regardless of geographical restrictions or time zones.

This development has had a huge impact on many areas of business, as also customers are able to easily discover and select whichever seller they find best. During recent years we have witnessed how digitalisation has shaken up the traditional structures and business models in, e.g., banking, airline businesses and the music industry. As ICT becomes even more intertwined in the manufacturing processes, most fields of industry will follow the same trend in the upcoming years, with varying degrees of impact.

There are many megaprojects ongoing and under development in Finland, but a large share of the work is carried out by foreign companies and subcontractors. To keep more of the work in Finland in the prevailing difficult economic situation, new ways of working have to be introduced. For Finnish SMEs, forming a CBN has great potential for achieving a competitive edge. Dynamic CBNs are formed as a business opportunity arises, and are operated with the support of modern ICT tools.

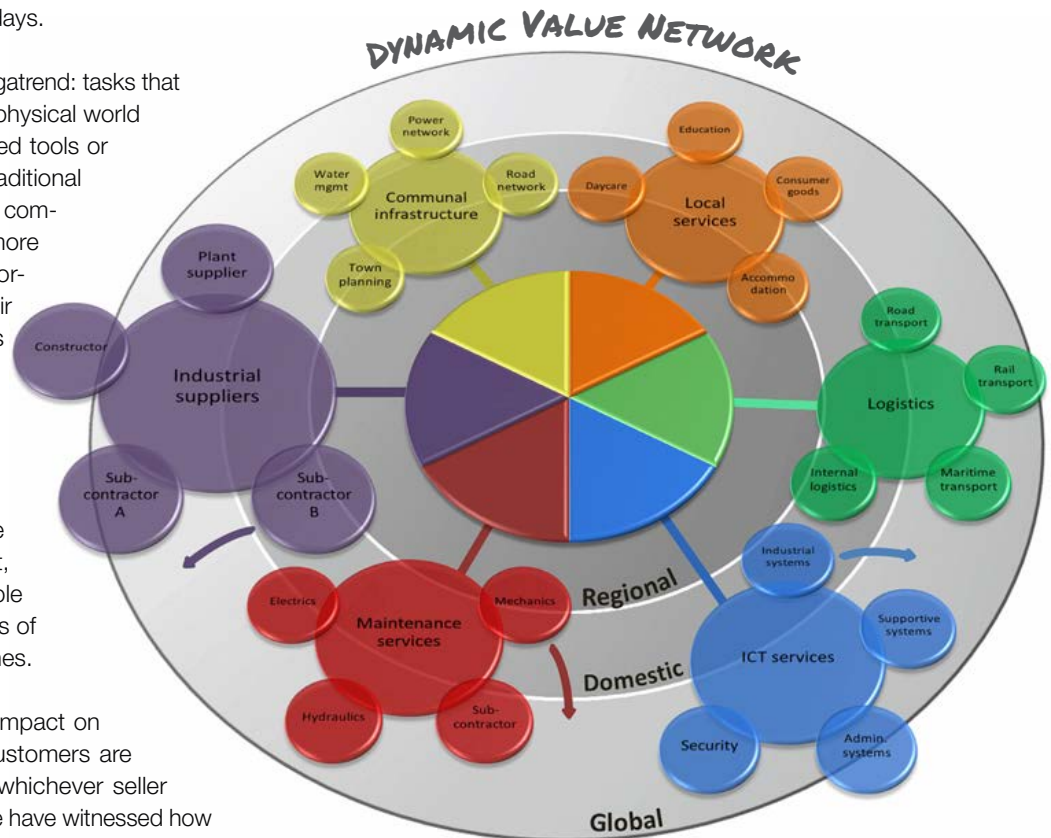
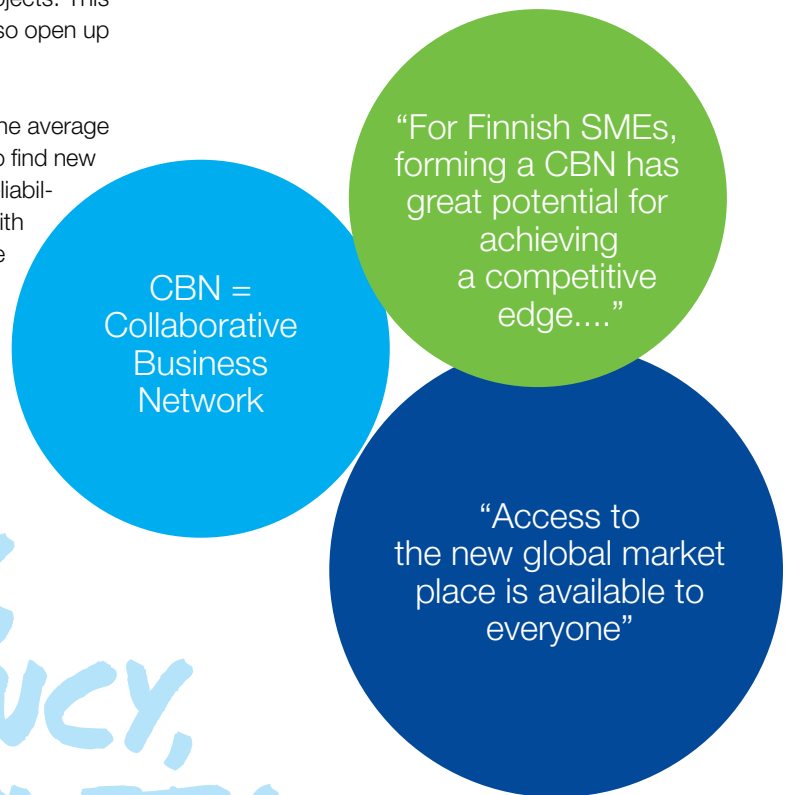


Figure 1. Dynamic Collaborative Business Network.

Figure 1 illustrates an example of the structure of a dynamic CBN. Much of the communication and manual work required to build and operate a CBN has to be automated using Internet-based tools. With CBNs, local SMEs can join their forces and they will be able to participate in larger, more demanding projects. This will not only help in the current situation, but it will also open up new possibilities for reaching the global market.

As competition often comes from countries where the average cost of workforce is lower, Finnish companies need to find new ways to stay competitive. Quality, efficiency, and reliability are some of the merits traditionally associated with Finnish industries. In order to remain as a credible alternative in the global market, these characteristics now need to be highlighted, while adding innovativeness and ability to co-operate to the list. Finnish industrial companies need to prepare themselves for the change, and make sure that they are able to demonstrate the required capabilities.



QUALITY,
EFFICIENCY,
RELIABILITY,
INNOVATIVENESS,
CO-OPERATION

3. Business Networks in Transformation

Global megatrends are having a far stronger influence on Finnish companies than ever before. For example, manufacturing has gone through major changes driven primarily by globalisation, specialisation and customer demands. Along with these changes Finnish manufacturers are facing the growing complexity of processes and supply networks, cost pressures and growing customer expectations for quality, speed and custom products. Therefore enterprises increasingly specialise and outsource processes which are not among their core competences.

On the other side, this opens new business possibilities for SMEs as a part of changing supply chains and dynamic value networks. The key differentiator is the optimal formation and orchestration of suppliers and other collaborators. The winner is the one who has the most dynamic CBN supported by efficient tools and working methods. In manufacturing, a supply chain common practice is to have multiple tiers of suppliers adding increased complexity and quality challenges. Figure 2 presents how manufacturing networks are transforming into dynamic networks from the traditional tier layer into complex networks.

A CBN is constituted by a variety of organisations that are largely autonomous, geographically distributed, and different in terms of their operating environment, culture, and goals, collaborating to better achieve common or compatible goals, and using computer networks to support interactions. CBNs have several advantages as follows:

- Decreased marketing expenses - SMEs are stronger together.
- Decreased risk – in a network the risk is usually divided between participating companies, this is a positive issue especially for SMEs.
- Ability to participate and deliver megaprojects – CBNs support agility and specialisation.
- A CBN has agility – a CBN responds to changes in a business environment with greater agility compared to big companies.
- A CBN supports common innovation, product and service development where companies are unable to accomplish this alone.
- A CBN can offer more complex projects and deliveries than one company alone.
- Complex project and deliveries need specialised knowledge - niches are needed, a suitable role for SMEs.

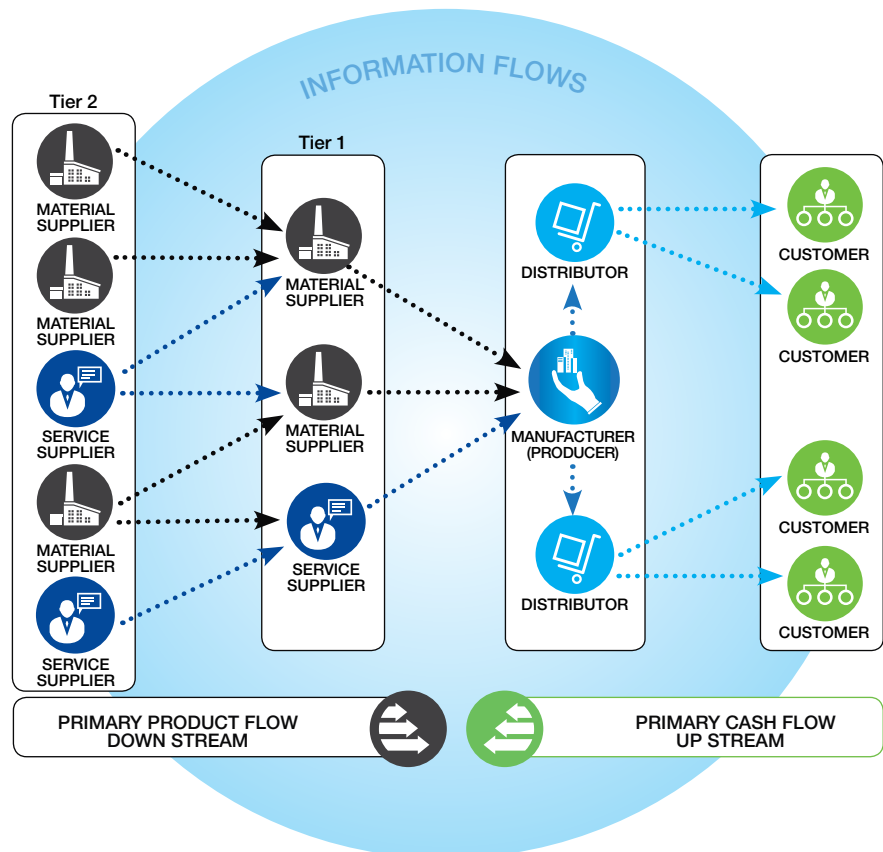


Figure 2. Picture adapted from Supply Chain Manufacturing Model by APICS.

Source: APICS, Supply Chain Management Fundamentals, Version 2.2, 2011Ed. pg. 1-6

Building and participating in collaborative business networks

A new opportunity, such as emergence of a megaproject on home ground, might induce dynamics in the surrounding business ecosystems. For local companies a megaproject offers an international project on the domestic market. This kind of emerging megaproject offers companies new business and networking possibilities in a large-scale international company network on home ground. The optimal formation of a CBN is a key competitive factor in networking. Therefore the networks structure, management and partner selection need to be carefully considered.

Creation of business networks requires creation of mutual trust, matching goals, information sharing, commitment and adaptation. Companies need to be prepared for those before commitments of building or joining a CBN. When thinking about joining or building a CBN there are many issues companies need to think about carefully; these are presented in Figure 3.

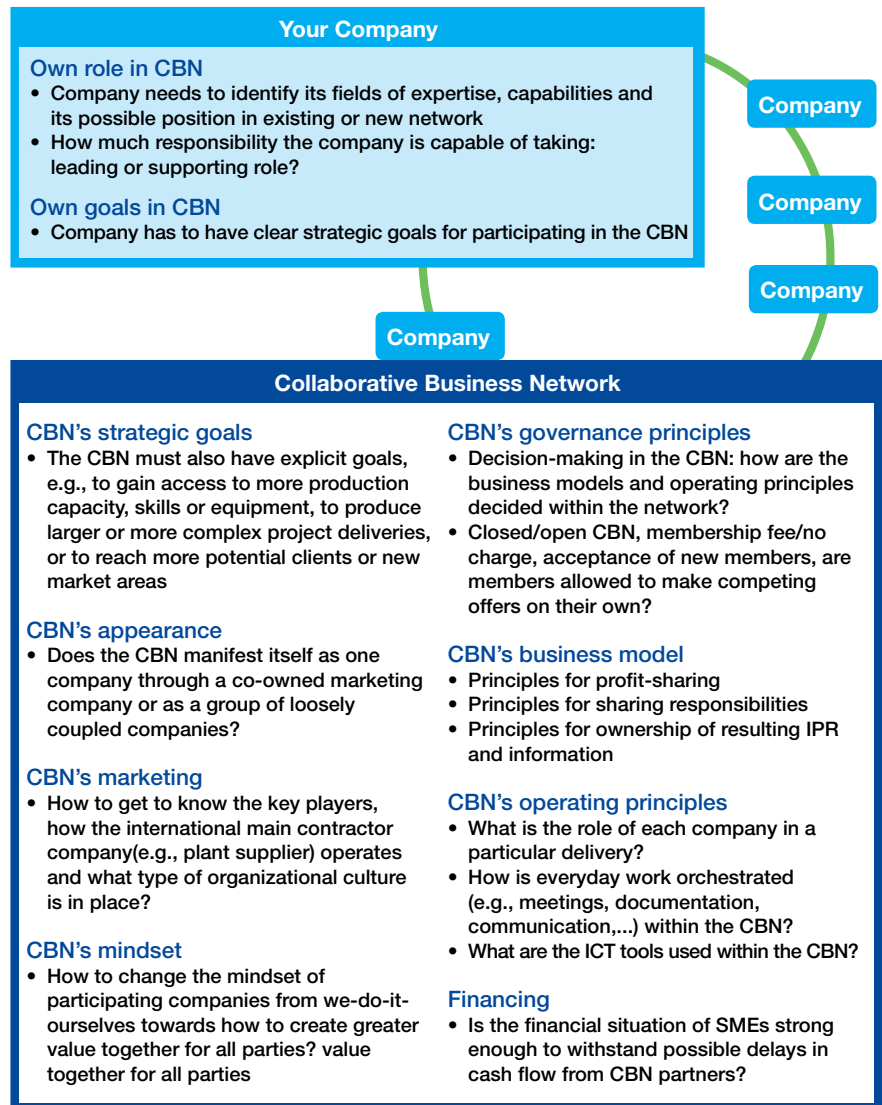
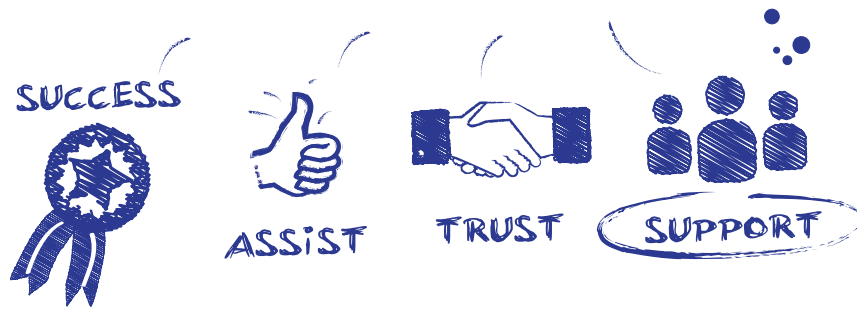


Figure 3. Things to consider when joining or forming a CBN.





The nature of business networks is changing into more dynamic consortiums. This concept means that when a business network finds an interesting opportunity and takes on a large project or delivery, there is a core group of companies that is mainly responsible for leadership, while the other companies – that play a more supportive role in the project – may join or leave with relative ease as the project progresses, as seen necessary by the core group. All the bureaucracy has been minimised so that the line-up of participating companies can be swiftly adjusted according to the task at hand. The role of supportive members is to bring in niche expertise lacking among the core members, or simply add more resources in the form of equipment or workforce. Once the task has been finished, the supportive company can leave, letting the core members continue toward completion.

In this type of environment, it should be as easy as possible for the supportive members to join as well as leave the project: fundamental issues such as warranties and profit-sharing must be distinctly defined in the project agreement. There should also be a common template for the contract agreement, declaring the default procedures, roles and responsibilities for conducting a project in the business network context.

Where to find partners, how partners find your company?

The simplest way to form a more strategic network is obviously to find **suitable partners in the current business network**. Typically partners can be found in a vertical direction – meaning customers, suppliers and subcontractors that often contribute in work done by your company. Potential members for the network can also be found outside the circle of familiar business partners. Competitors that are roughly of the same size may well benefit from combining their forces: instead of fiercely competing and pushing down the contribution margin as individual companies, in a co-operative relationship they might be able to serve bigger clients, produce bigger deliveries faster, or develop new types of products or services.

The nature of business networks is moving towards dynamic consortiums where networks are built upon business opportunities or megaprojects' needs. The **business community concept** is one way to find suitable partners for business networks. A business community is formed by companies that are willing to take part in projects and that have already proven their capability to operate in such an environment. A company wanting to affiliate with the community must qualify by expressing not only the technical capabilities required to participate in demanding technical projects but also the ability to participate as a reliable member of a business network. As a business opportunity rises, one company takes initiative to form a network to tackle the particular challenge, and approaches other members with required skills or equipment to join in.

One possible way to sidestep these problems and organise the business network is by using a **network broker**. The broker is an organisation or authority that is in charge of managing the community, identifying opportunities and communicating with potential customers. The broker can act as a coordinator and administrator of the collaborative network, taking share of the profit. A network broker can also simply work as a web portal by collecting the company information around a certain business possibility.

In the future, building of business networks may also be facilitated by **automated matchmaking**. This could mean, e.g., that a computer system tracks potential business opportunities and matches suitable companies that might form a network and take on an opportunity. Based on capabilities, previous co-operation as well as collaboration skills, the system could propose an optimal network line-up and trigger companies to start negotiations for potential collaboration.

There are multiple options to find partners for your business networks. Companies must also present themselves as an eligible partner. In today's business environment it is clear that a company needs to have an existing **web presence** in order to be credible in the eyes of other companies. Building a strong web presence involves branching out beyond your website to



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FOR THE NETWORK CAN
ALSO BE FOUND OUTSIDE
THE CIRCLE OF FAMILIAR
BUSINESS PARTNERS.**

maximise your chances of being discovered by new clients or partners. Choose suitable social media sites and present your expertise on Facebook, Twitter or LinkedIn on a regular basis. You can also present your references by uploading videos or updating a company blog. The Web is the place where other companies are nowadays looking for partners, so update often, and make your pages interesting places to visit.

The traditional way to get involved in business networks is to market you yourself proactively in a relevant direction. For example,

if you find out about an upcoming call for tenders, contact the organiser in advance to discuss the work and to promote your company. Typically, the best contact would be the management or the purchase function of potential customers or megaproject organiser. Study and learn how to operate efficiently in a collaborative network, and make sure your company can use information systems, digital tools and communication channels properly. In this respect, the size of your company is not a fundamental factor for success. Smaller companies, especially those with expertise in niche areas, can play a significant role in a collaborative network.



CASE MINING ICT CONSORTIUM

In northern Eurasia there are large mining investments going on, and this has activated companies also in the Oulu region to join forces in order to offer ICT solutions for mining industry.

Local companies with strong ICT and manufacturing expertise have formed a consortium to offer cost-efficient, innovative solutions especially for mining industry. The development of Mining ICT Consortium was initiated in 2013 by BusinessOulu. Candidate companies were invited to common workshops during 2014, and the consortium started to build up. By gathering combined offering for the consortium the aim was to find ways to use ICT as a simple, value-generating tool for mining companies. The target is to offer accurate and reliable information throughout the mining business and to improve productivity and profitability of

mining companies. The fundamental idea is utilisation of information, enabled by new ICT technologies.

Mining ICT Consortium combines the products and services of participating companies to enable offering larger entities to customers. The customer can acquire the whole service through one contact. Consortium members include Conlog Group, Elektrobit Oyj, Ericsson Oy, Sandvik Mining and Consortium Finland Oy, Safeobject Ltd., and VTT Technical Research Centre of Finland Ltd.

Evaluating network partners and own possibilities

When building a CBN companies need to evaluate both their own capabilities and possible partners' capabilities. The evaluation of partners is a crucial role, as the network is as strong as its weakest link. For evaluation purposes network partners can use the same model as companies use in a supplier evaluation.

Many companies use the Carter 10C¹ model when evaluating possible partners or subcontractors, this applies also to CBNs. The supplier evaluation is done by using proprietary ICT tools both for the initial selection and ongoing evaluation and benchmarking. The C factors are weighted according to the situation and evidence is reviewed to confirm a supplier's score for each of the evaluation criteria. Carter's model evaluates 10 variables as follows (Figure 4):



Figure 4. The 10 Cs checklist by Carter.



¹ Available at <http://www.raycarter.co.uk/>

Orchestration of collaborative business network

Managing a business network has several phases. Figure 5 presents a network's lifecycle model, where the main phases of a lifecycle are introduced. This document overviews these phases only briefly.

Once companies have identified a business opportunity with suitable partners they can participate in quotation for tenders. Once the business network has been formed, the members need to define an efficient way to participate in competitive biddings of a project or deliveries. A business network has to have mutually agreed methods for all the phases of bidding competition.

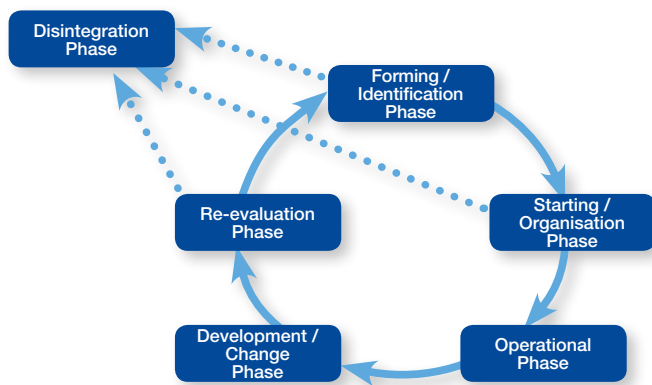


Figure 5. Lifecycle model of a network. (Valkokari et al., 2006)

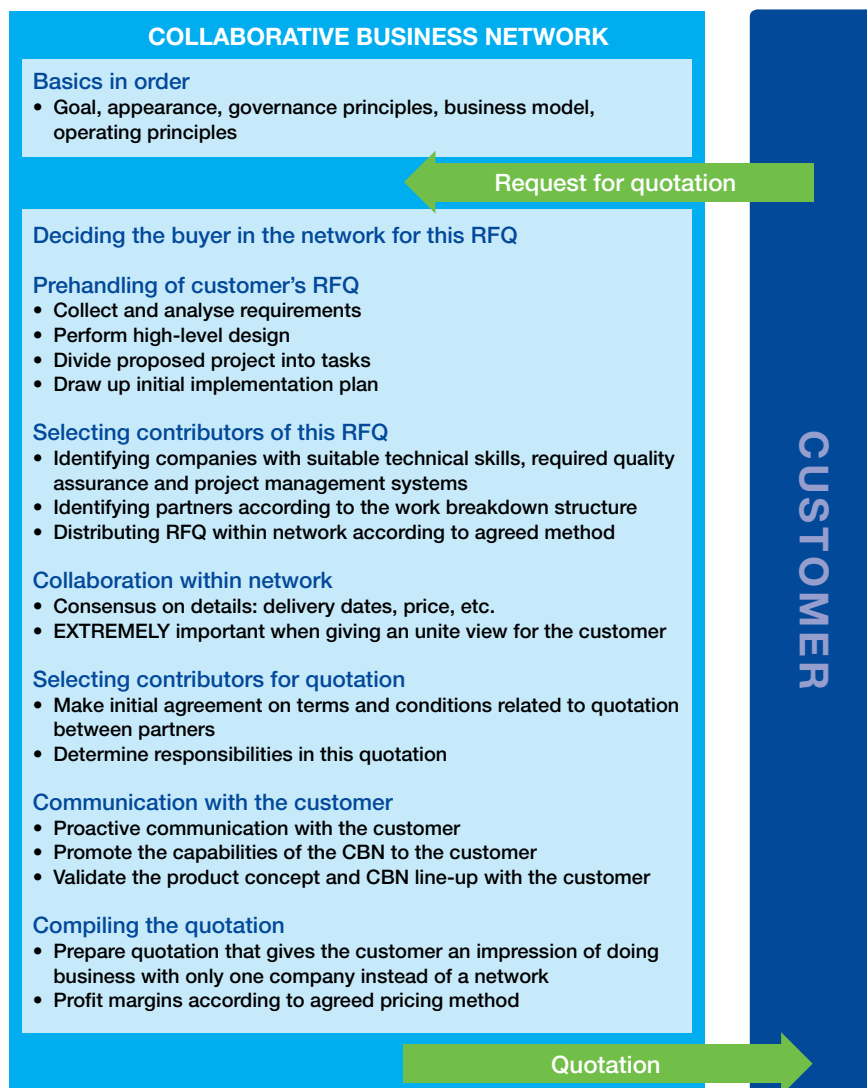
THE FIRST STEPS FOR PARTICIPATION REQUEST FOR A QUOTATION INCLUDE:

- Identifying the business opportunity for business network, such as megaprojects in a certain regional or domain area.
- Offer requests in several open portals.
- Actively gather information on big investments from public sources
- Get familiar with timetables of big projects and with the procurement person involved. Introduce your services and capabilities to key persons.
- Hilma, national portal for public procurements <http://www.hankintailmoitukset.fi/fi/notice/view/2010-000062/>
- Ted, Tenders Electronic Daily, European portal for tenders, <http://ted.europa.eu/TED/main/HomePage.do>

When competitive biddings are open and request for quotation is available for the business network, the process has to be managed effectively with as little manual work as possible. One characteristic of a business network is that it combines the expertise of more than one company in a delivery or project, which implies that there will always be some overlap in expertise and thereby competition between the companies. One company of the network needs to host the bidding process within the network. For the customer, dealing with the business network should appear as dealing with one company. The host for each order will use competitive bidding among the networked enterprises in order to achieve a competitive price and good terms of delivery.



The following figures (from Figure 6 to Figure 8) review the operational phase of the network's lifecycle from the procurement process point of view in an engineered-to-order (ETO) manufacturing project. Figure 6 raises some important aspects while preparing a quotation with a network.



Perhaps the biggest challenge in operating in a business network is ensuring effective execution of the implementation. As companies tend to follow their own processes and use their own systems and tools in the comfort of their own premises, the risk of insufficient or inaccurate communication between partners is evident. The organisations participating in a common undertaking need to be ready to share information with the network, and they need to have the supporting processes and tools available.

In an ETO manufacturing project there are typically several technical components that are interdependent in many ways. The final product may consist of mechanical and electrical subsystems that are nowadays often controlled by embedded software. Some components may be purchased off-the-shelf, while some are developed from scratch during the project. Designing and implementing the connections, interfaces and the interaction between components is therefore a fundamental task that may dictate the success of the entire undertaking. The entire design process should be carried out ensuring that the designers of various subsystems have access to all information that might have significance for the particular task at hand.

Especially changes and refinements of already agreed designs or plans require special attention. Any change that might affect the structure or behaviour of other components needs to be communicated and evaluated between designers. Communication and information sharing must be planned with care as it is the absolute cornerstone of any such design process. It is important that each company makes

Figure 6. Important issues during quotation process.

distinct decisions internally about who is acting as the contact person, and what are the related responsibilities as well as the risks involved. In collaborative networks, the role of communications is clearly highlighted.

As the project proceeds and the deliverable product is being built, the progress is monitored constantly. Risk management is performed simultaneously with implementation to predict problems and prevent them from happening proactively. In case unexpected events still occur, event management procedures are launched to solve any potential crisis situation. Managing information without proper tools during design and product building processes is close to impossible. Modern ICT tools provide means for process management (e.g. digital material management, logistics) and communication (e.g. interactive video conferences, collaboration working spaces). Usage of certain ICT tools has to be agreed inside a CBN as part of building the network.

Successful competitive bidding process with important issues is presented in Figure 7, where the phase between sending a quotation and waiting for an order is pictured.

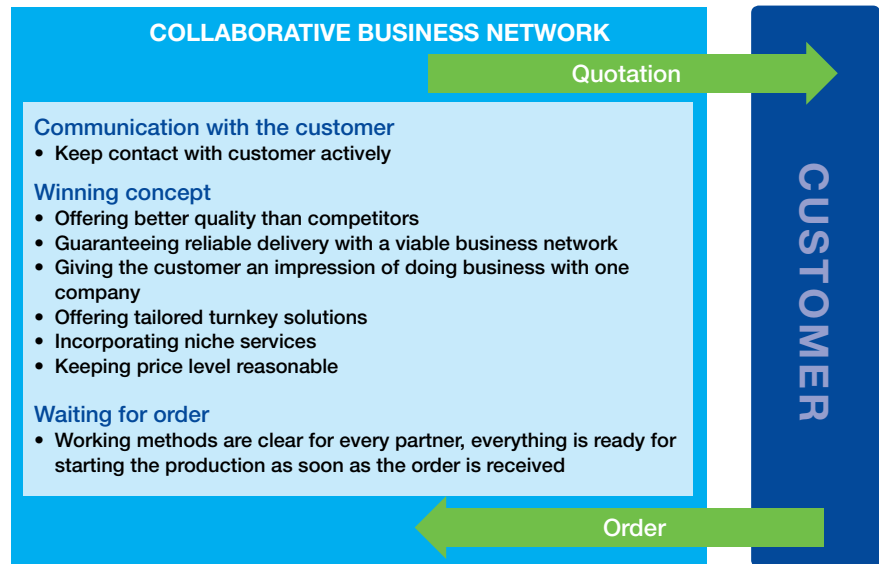


Figure 7. Quotation process in the CBN.

Figure 8 points out some issues after receiving the order and during the implementation of ETO project.

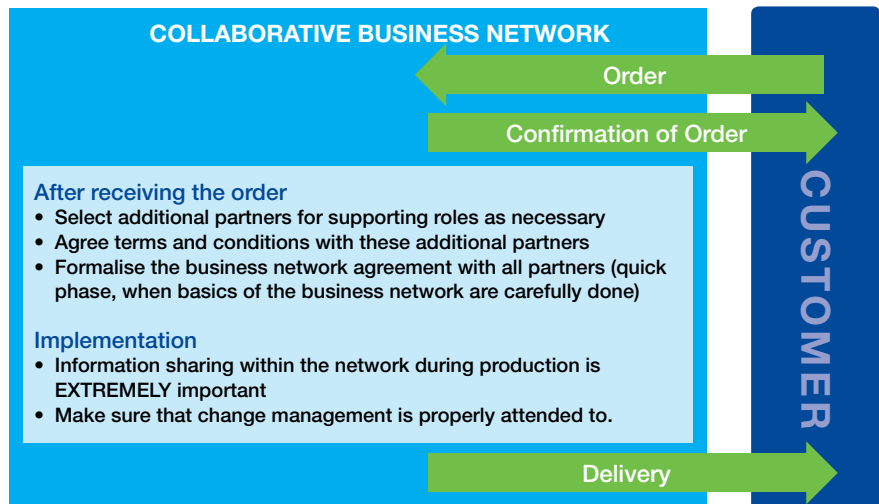


Figure 8. From order receive to delivery.

How to develop the network after a project is finished

- After the manufacturing project has ended and the final product delivered to the customer, it is time to reflect on the work done. Issues requiring special attention, summarised in post-mortem learning experiences, are as follows Customer feedback, questionnaire at least, preferably a face-to-face meeting
- Feedback session for CBN companies, identifying pros and cons
- Knowledge sharing between companies, what we learned as a network
- Development plan according to feedback

In order to develop the processes of individual companies as well as the network as a whole, the participating companies should evaluate the project and point out the positives and negatives.

These learning experiences should be used to develop the network further and improve the way it runs its business. The findings may be technical, process-related or tool-related; all aspects that may help improve the satisfaction of business partners as well as customers or end-users are relevant.

Several techniques and tools have been developed to support the evaluation of service providers' or suppliers' capabilities, as well as estimating the success of a single project. These tools can also be utilised when assessing the capabilities of various actors of a network. A post-mortem-type feedback session where positive and negative feedback can be given to other participants is a simple and straightforward way to develop the network. For long-term development, the activities of the network should be constantly monitored, measured and evaluated, and corrective actions, as well as new improvement ideas, should be promoted on a regular basis.

CASE ATOMI-INFRA OY

Large-scale international investment nuclear power plant, Hanhikivi 1, on home soil;

How can SMEs compete with international companies?

Eight companies from the area of Central and Northern Finland decided to join their forces in order to be able to compete with large companies for large-scale investments. The preparation work started in 2012 and it took two years to build up a joint company called Atomi Infra Oy. The start-up company focuses on infrastructure construction as the participating companies have expertise in areas of hoisting services, transportation, mining, municipal infrastructure construction, concrete building and terrain construction.

Atomi Infra Oy can now provide large project constitutions instead of several small projects. They also feel that they are a more credible partner with a combined turnover of over 300 million euros and over 1000 personnel.

Atomi Infra is built up by the following companies: E. Helaakoski Oy, Pentti Hämeenaho Oy, Suomen Maastorakentajat Oy, Kuljetuspolar Oy, Maanrakennus Kamara Oy, T. Majjala Oy, Niskasen Maansiirto Oy and VRJ Group Oy.

4. Networks, Value Networks and Ecosystem-Based Value Networks

Typically every company is a part of some business network. It has become critical in terms of their survival for companies to network with other organisations and companies tighter than before.

Value networks and ecosystems

The changing business environment has driven companies to combine forces to compete jointly in the market. Both large organisations and SMEs commonly form collaborative business networks – voluntary-based economic and social co-operation

between independent companies. The logic of creating and capturing value in a network is an important and ever-changing component of the business model of any company.

Value networks consist of social and economic actors that are connected by value propositions and held together by competences, relationships and information, which are possessed by each party and shared among the network through common standards and protocols. Through network relationships companies can specialise and gain capabilities, resources, new business opportunities, and other benefits that they would not be able to attain alone.

Relationships in a business network can be categorised as:

- **Operational partnership** means mechanical control of the cooperation, for example purchasing from a subcontractor, where the bond between parties is quite loose and thin and the cooperation might be short-term. Organisations are independent actors concentrating on their core competences through this kind of relationship.
- **Tactical partnership** is about integration of know-how. It is not tightly controlled through a contract but provides a more open environment to let the relationship develop. This kind of partnership necessitates interactive communication, control system, tools for evaluation and proper indicators and learning outcomes that are adopted into practice.
- **Strategic partnerships** are also based on mutual trust and know-how integration, but the objectives are related towards joint knowledge capital and strategic benefit. A strategic net is intentionally formed, identifiable and a limited (but not necessarily fixed) set of linked resources, activities and actors that share a common goal.

Value networks can also be categorised, for example, by their:

- **Structure** – horizontal, vertical, multi-directional
- **Objectives** – business opportunity, marketing, manufacturing, R&D, service provider
- **Mode of operation** – project delivery, service provider, production, renewal, innovation
- **Level of operation** – operative, tactical, strategic
- **Number of participants** – bilateral, multilateral
- **Composition** – open/closed, static/dynamic
- **Duration** – short-term, long-term
- **Administration and control** – juridical contract, collaborative business networks, ecosystems.

One way to control the collaboration is to establish a joint venture where the stakeholders, inputs, risks and outcomes are clearly defined. The value and earning logic of a single company in the network is based on its inputs (knowledge, machinery, etc.) and what kinds of activities it is offering the network. Additionally, the synergy benefits and results of the network also affect the earning logic and pricing.



Pricing methods can be divided as follows:

- **Network-based pricing** (total to margin), partners' costs are known – margin is calculated according to the total price – profit is shared according to the costs [strengthens commitment, requires clear rules].
- **Network-based pricing** (margin to total), partners' costs are known – margin is added to the costs and total price is summed after that – profit is shared according to costs and margin.
- **Total sum of prices**, all product and service prices are summed forming the price – hub company gets highest margin – hub company gets highest profit (due to highest risk) [resulting network has no strategic relevance].

However, earning logic is always influenced by markets, customers, need, competitive advantage, productivity, profitability, risks and possible payments of investments.

The concept of ecosystems has a different kind of earning logic, as there is an inherent need to operate together. However, this does not always mean the lowest prices or even regular cash flow for the network. The more important priority is to guarantee the promises made to the customer and see potential business opportunities.

An example of a complex value network can be found in the context of megaprojects. They are distinguished from more conventional projects by their complexity, size and the number of involved actors. Formation of a business network around a megaproject is influenced by many issues, such as the nature of the construction process, existing networks, and required standards.

Typically, the realisation of megaprojects calls for a large network of actors that are connected through varying arrangements and relationships, including multilevel connections. This kind of network structure allows SMEs to enter megaprojects – maybe not at the first level of tenders but as part of the smaller subcontract of a megaproject.

Dynamic value networks and business ecosystems

Since market forces are becoming more severe, increasingly turbulent and volatile, companies should be able to form network linkages more quickly and also be able to dissolve them rapidly – and form new linkages as market conditions dictate. This calls for a more dynamic approach.

A dynamic value network can be seen as a spontaneously sensing and responding structure of largely loosely coupled value proposing social and economic actors. The structure can be spatial or temporal. Acting as a part of value network requires rethinking of the company's business model:

- how to create more value for the customer,
- what is the provided service or product, and
- what is a company's own role in the value network?

A dynamic value network operates to co-produce offerings, exchange offerings, and co-create value; this inherently includes dynamics. Agility and adaptability is needed also for growth of organisations that are members of the dynamic value network,

and they must constantly learn how to serve customers better with changing needs.

Networks have different degrees of flexibility and openness, depending on the purpose of the network. The same actor can be part of different types of networks across time and typically the net of actors change during project evolution. Hence, network type, network roles and network management are an evolving framework for network dynamics. Actually, a dynamic, flexible and loosely connected value network is close to an ecosystem, which can be seen as a kind of next step of a value network.

A business ecosystem is an extended economic system of mutually supportive divergent interacting organisations. Similar to value networks, these organisations possess core capabilities that are exploited in order to create a total experience for the customer, and complementary capabilities are used to create new innovations. Business ecosystems are focused on commonly created value, renewal, and innovation in order to achieve a sustainable competitive advantage.

Business ecosystems compete among other business ecosystems but there is also rivalry between the ecosystem members.

CASE THE BUSINESS KITCHEN

Can dynamic ecosystems exist in real life?

The Business Kitchen in Oulu may currently still be small-scale, but it represents a new way of thinking about cooperation between public and private sectors. It encourages people in entrepreneurship, collaboration and networking without traditional organisational boundaries, leading to innovative ideas, new networks and businesses. The Business Kitchen provides a working space for anyone who is just passing by but also for long-term working. Based on mutual learning and co-creation, it connects higher

education students and business life. Business Kitchen can be seen as a self-organizing and evolving business ecosystem executing and developing activities without a specific strategy or strict rules. It provides an open, social and flexible working environment where the work community is perceived as a wider concept than usual. The community is the people who you interact with, not only those who work within the same organisation. (More information: www.businesskitchen.fi.)

As a member of an ecosystem, a single company cannot only think about its own benefits but it also needs to take into account the benefit of the network.

Business models in a dynamic business environment

In order to respond to the challenges and possibilities of the ever-changing business environment, companies need to think further ahead and build flexibility into their value creation systems. A business model can be defined in many ways.

A model can be seen as a way to summarise the key ideas of the organisation's way to operate and earn including value proposition, channels, customer segments, customer relationships, key activities, key resources, key partners, cost structure and revenue streams. A model can be defined, for example, through a framework where a company is analysed through its position in the network and social relationships.

Business models can also be built around the business opportunity. Business opportunities can be analysed in terms of boundary, priority, timing and way of exit. One way to build a business model around a business opportunity is to propose the following questions:

- what? (offering, value proposition, customer segments, differentiation),
- how? (key operations, basis of advantage, mode of delivery, selling marketing),
- why? (basis of pricing, way of charging, cost elements, cost drivers) and
- where? (location of activities or items, internally or externally in the network or ecosystem, applicable to all preceding items).

An ecosystemic business model combines several business models and includes the ideas of open innovation linked to an evolving and loosely coupled structure. Open business models expand the company's boundaries to create and capture value by collaborating with outsiders. The business ecosystem

concept helps to think about how to respond to the dynamic and changing business environment, and how to move towards dynamic and adaptive business ecosystems.

Opportunities and challenges of building collaborative value networks

External linkages with other companies are beneficial, but companies may also find themselves encumbered with collaborating with several other companies through various systems. Creation of business networks requires creation of mutual trust, matching goals, commitment and adaptation, and that typically means that changes in the network do not happen overnight. In order to be dynamic, companies need to find ways to accelerate bonding and mutual trust.

A new opportunity, such as emergence of a new megaproject, offers diverse companies a possibility to proceed in networking. In the context of construction-related megaprojects, such as the construction of a nuclear power plant, there is a need for a huge amount of labour, material and other resources. For a small local construction and industrial company, participating in the megaproject alone is nearly impossible. This provides a potential opportunity for companies to re-organise, join resources and to network in order to be able to build competitive offerings and to answer broad calls for bids.

However, a network built for a single project may not necessarily pay off the made investments. That is why long-term networking goals need to be considered. When the focus is on long-term collaboration, interactive learning between project partners is made possible, and reductions in overall transaction costs can be achieved.

The challenges a company may face vary depending on its network position and level of capabilities. Figure 9 presents a four-field of these levels. One company may reach different levels depending on its knowhow and relationships in the current domain when taking part in different networks.

A

A company that is still not a network member and needs to develop its capabilities in order to take part in the networked project deliveries.

If the company does not possess the needed skills and capabilities to be able to build a competitive offering on its own, its best option is to build network relationships with complementing capabilities. For example, a company might lack the needed experience for demanding documentation on a special project but have the necessary technical know-how, or the company might be technically capable but have shortcomings in manpower or machinery.

The challenge is how to identify potential network partners. The options are to start to build a new network or to try to join an existing one, but in both cases the company needs to be seen as an enticing partner by other companies. If the company is not well-known and appreciated already, it needs to start actively communicating its competences and aims.

B

A company that has relevant capabilities but not well-established network relationships

A company has better chances of entering a network because of its capabilities needed for the specific project. However, if the supply structure for the megaproject allows, and the company has sufficient resources and capabilities special enough, it might be able to operate on its own.

This type of company might still benefit from participating in a networked offering, since other companies might then, for example, take charge of tasks that are not core areas of business for the company. In addition, the networked offering might appear as more attractive to the buyer, if it is well coordinated and convincing. If the company has special capabilities, it might be able to negotiate a beneficial deal with others. Also the risks are shared. The company needs to recognise the benefits that networking could offer and work systematically to gain those. Networking skills and skills to operate as a part of the network are crucial, but might be overlooked in a company that is accustomed to operating on its own.

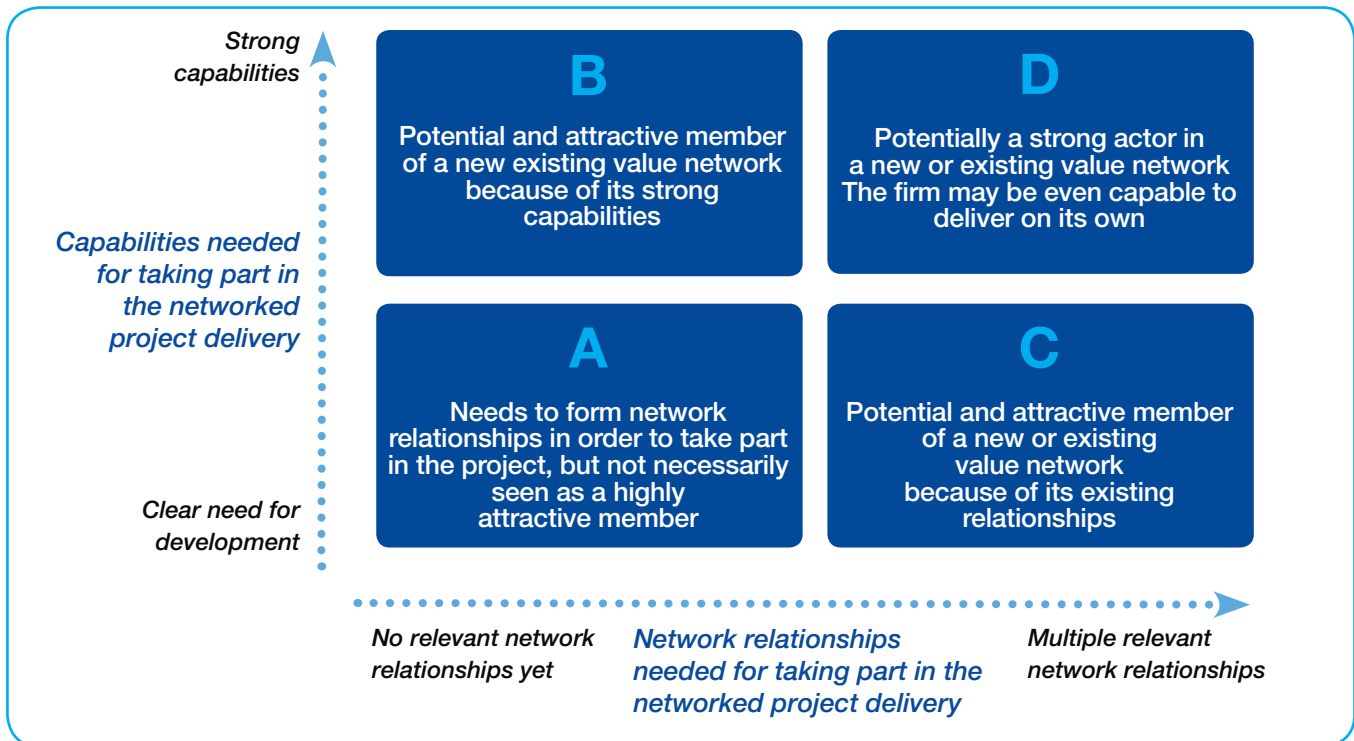


Figure 9. Capabilities and network relationships needed for taking part in a networked project delivery.

C A company that is not strong in capabilities but has relevant network connections.

This type of company may operate as a network builder or coordinator, or assist other companies in these tasks. However, if a networked project offering is about combined value creation, the role of this type of company might be consultative rather than a technically strong contributor. Otherwise, this type of company faces the challenge that it might not have the needed technical capabilities and in that sense it does not appear to the other co-operators as a potential network member.

D A company that has strong network relationships and strong capabilities needed for the project.

If this type of company sees opportunities in taking part the project, it could act as a hub company and build an even larger, new network, or it could develop its existing network to answer the needs of the current megaproject. This type of company may overlook the new emerging competitive networks as it relies on its existing connections.

IN SUMMARY

Grasp the opportunities: What can the company do and what are the first steps to take?

Be active: Take part in trainings and info sessions, take care of existing network relationships, contact the main parties directly, utilise services and support from public parties.

Identify and communicate your capabilities clearly and convincingly: Define your desirable position in the network.

Get experience in order to be convincing: Conduct pilot projects or networking with experienced companies that have relevant references and appropriate quality and documentation systems.

Plan for the future: What are the long-term goals of the network?

5. ICT Tools in Collaborative Business Networks

ICT is typically seen as the most significant technology in speeding up economic growth, and it will function as the engine of industrial renewal. The adoption of ICT expertise will be essential in all fields of industry, and it will be necessary also for growing areas such as the medical industry and environmental technology.

Traditionally, information systems have typically been developed in a way that ensures that all the confidential business information is kept safely within the company, or even within a single department of a company. Changes in the business environment have also caused changes in requirements for information systems. Enterprises have workers, partners and other stakeholders in different time zones around the world, and the hectic pace of action is more a norm than exception. Availability and transparency of data are vital for any enterprise, especially in knowledge-intensive businesses. Information needs to be up-to-date in practically real-time at any location in the world, and it needs to be available on a mobile device. The increased significance of intra-company teamwork and inter-company networks has emphasised the need to be able to share information in a safe and flexible manner.

Information technology plays a significant role in all business process areas. Internal processes of enterprises and relationships to partners, suppliers and customers are dependent on ICT. The Internet has greatly accelerated the diffusion of inter-organisational networks and has intensified collaboration between organisations. Regardless of company size and type of business, virtually all organisations' ICT systems are nowadays interconnected.

Digitalisation has also brought challenges: as computer systems have become involved in more and more business processes, the volume and complexity of the created information has increased manifoldly. This has made communication more difficult, both within the company and especially between enterprises. Users need to be able collaborate more with others to increase productivity: employees need user-friendly, timely ways to share information and data.

The digitalisation trend will also affect the business models that companies use. Supply of services to other end-users and especially to other companies will be emphasised. Operating solely in the Internet is not necessarily the way to maximise success: the biggest winners will likely be companies that are able to apply the new technologies in imaginative ways and create novel applications to support their operations in domains where ICT is not yet fully utilised. However, simply adding new technology to old business logic is not the key to success. New business innovations, a strong portfolio of products and services as well as solid management skills will all still be crucial factors in the future.

New Concepts for Business

In the near future, advanced ways of manufacturing will further change production processes. The cycle from design and prototyping to production, then to customer usage, servicing and disposal, is becoming shorter and faster. The role of data in industry has come and is becoming extremely important. More and more businesses are becoming data-driven. All process information, including processes from procurement to production, is available in digital form, making it possible for companies to analyse it and learn from it. The vast amount of data made available by digitalisation is referred to as Big Data.

The incredibly massive amount of data that companies produce can be analysed in new ways to provide insight that can be instantly communicated across the relevant actors of the system. This will change the way companies see their production methods, products and customers – and the entire business.

In the future, the factory itself will become smart and it will be able to predict, react and adapt faster and more effectively. The impact of adjustments in production can be simulated and production processes can be changed to minimise loss in response to unplanned events. While the technological change seems somewhat unavoidable, it also provides a great opportunity to



companies. Those that are agile and find the way to adjust their business can find new partners, clients, innovations or even completely new ways of doing business.

The pervasive nature of new technology that people nowadays use in their everyday lives is also causing changes in the business landscape. Thanks to new Internet-based tools, people are capable of interacting in ways that have changed the way information is transmitted.

Social Media is transforming industrial working methods

The new possibilities presented by Social Media have been recognised by the industry and in a surprisingly short period of time social tools have become quite extensively used. This societal trend is identified also by the European ActionPlanT which recognises the human element as one of the key elements regarding ICT, stating that manufacturers need to appreciate and use ICT to integrate workers and customers to a greater degree in their day-to-day operations and businesses.

Functional internal networks promote more cost-effective work, improved information sharing and collaboration between departments and employees. This turns into savings in calendar time, less overlapping work and re-work. Employees find their work more effective, flexible and meaningful. Work done in these internal networks can efficiently be supported with social tools.

Use of social tools in business promises a vast potential that is yet to be harnessed. Globally the trend is from systems of records

towards systems of engagement. The term systems of records refers to the current enterprise systems that are designed around more or less formal, precise pieces of information ("records") while systems of engagement are more decentralised, they incorporate technologies that encourage peer interactions both intra- and inter-organisationally, and often leverage cloud-based technologies to enable those interactions. While social media holds a great promise internally, companies should also consider collaborating more with customers and end-users. To remain competitive, companies must systematically understand and serve customers that are increasingly powerful as a group.

One of the prevailing trends is to dispense with proprietary software tools that may be expensive, require dedicated servers or are infrequently needed, and replace them with cloud-based services. Cloud-based services are operated through the Internet, and the application as well as the related data is stored on a remote server. This makes it possible to access the information with any Internet-connected device, from any location, while the costs are calculated by the actual usage of the service. Cloud services are not only feasible for the end-user, but they are also described as a more environmentally sustainable solution.

Renewing standard and operation rules

While the aforementioned trends are clearly emerging, there are still issues that need to be resolved to turn the scenarios into reality. The device manufacturers, legislative authorities and scientific community need to find a consensus on standards and regulations that guide the up-and-coming new technologies. The need to revise legislation does not only apply to technological



standards. For example, the EU has noted that the evolution of Big Data has exposed gaps in EU competition, consumer protection and data protection policies that do not seem to have kept up with this development. The questions regarding ethics, open access data as well as data ownership are also to be resolved, e.g.: Who owns the results of an analysis that combines freely available Big Data from different sources?

The amount of data transferred via the Internet using a variety of technologies will multiply in volume. To ensure the widest possible connectivity between various devices, systems and users, there needs to be clear, reasoned and tested definitions for architectures, protocols and interfaces.

As more and more information is transferred through the Internet, the risk of misuse also increases. Companies need to take into consideration cyber security, confidentiality and securing of intellectual property when they are transferring data and networking through the Internet. New ways of analysing and combining massive amounts of data from different sources may well bring forth privacy issues. When sensitive information is shared, there have to be commonly agreed upon ways to share it in a secure and controlled way among selected parties.

Future of Industrial ICT Systems

All signs suggest that with regard to ICT systems, the manufacturing industry is on the verge of a fundamental shift. The shift is actually two-fold: firstly, the products that are being manufactured are becoming smart, in the sense that they often contain microcontrollers and software that is relevant for their operation; and secondly, the equipment and systems used by the manufacturer to produce the end-product are also becoming supported or controlled through computer systems.

Increasingly more of the tools and systems will become automated or computer-controlled: smart manufacturing is steadily becoming reality. The realisation of the Industrial Internet is providing connectivity that will first enable monitoring processes and equipment with more precise real-time data, regardless of geographical location. The next step is analysing the processes with advanced algorithms and huge volumes of data, giving deeper insight into what is happening, and revealing cause and effect. This capability to monitor and analyse will pave the way for predicting events, enabling for example proactive maintenance of equipment. As more experience and data is gained, industrial systems will be able to optimise their own actions and automatically make decisions on parameters, material selections or batch orders.

The key issue in ICT adoption is the capability of combining the old world of manufacturing with the new world of ICT technology, it is about utilizing ICT systems in an innovative and versatile way in order to bring the company's operations to a new level. Those companies that are capable of adapting their operation to match new demands are most likely to pull through, while those that are capable of coming up with new solutions and innovations are most likely to find new customers and even boost their business. The single most important factor influencing the outcome is the company's ability to assess their own position in the value network and predict how the radical change will affect their operations.

In the future, companies are likely to look for ICT systems that are more open to collaboration partners. Data security remains as one of the pivotal requirements, while sharing information in a controlled fashion will become important. The connectivity of systems as well as the ability to collect data to streamline the activities will both be given high priority.

Connectivity between various information systems and devices will be a vital requirement in the future. Systems need to be designed so that sharing information between other systems as well as users is made as easy as possible. This requires that information sharing is considered when designing system interfaces. In future, systems may enable companies to join collaborative networks dynamically, automatically giving access to information that is relevant for full-bodied participation in the network.

Sharing information between partners of a business network also serves as a breeding ground for new innovations. Challenges, potential solutions and novel ideas that are openly shared and resolved in co-operation make the network stronger and may also lead to new innovations. Systems that drive innovative and strategic collaboration – and not only support operative collaboration – are likely to become increasingly popular. Some studies already suggest that a production network with superior knowledge sharing mechanisms between users, customers, suppliers and manufacturers will be able to 'out-innovate' competitors with less effective knowledge-sharing.

The first step towards modern ICT infrastructure is to draw up a systematic development plan. For many companies in the manufacturing industry, ICT tools are not the core competence. There would likely be demand for ready-made ICT solutions for operating in modern, networked business environments. These types of solutions might combine interconnected tools for project

management, resource planning, data management, financial administration and communications, in addition to technical tools needed for production. However, organisations should accept the fact that there is no single solution that would fit the purposes of all organisations. What works for one organisation is not necessarily going to work for another. Each company should regularly evaluate the ICT tool set they are using – just like any enterprise asset – and make adjustments as seen feasible.

Collaboration tools to support business networking

Numerous tools exist that can be used for networking purposes. For effective operation, a business network requires a set of tools for content management, collaboration, remote meetings and operational purposes. This document only provides a short overview of some open-source and commercial collaboration software. Tools have been selected due to their popularity and expected relation to collaborative business networks. These tools and links are provided as example solutions and this report does not evaluate their suitability or ranking.

Networking phase

There are various means for networking purposes. For companies, the most important thing is to make your company visible on the Internet and advertise your capabilities on the Web. Tools for this purpose are a bit like traditional yellow pages on the Web or company portals, some even domain-specific or project-specific. When thinking about participating in a web portal try to balance the costs and benefits. Some examples in Finland around a specific domain or geographical areas are:

- **Lisää kauppaa** company portal for promoting local companies in the Oulu area to participate in large investments. <https://www.lisaakauppaa.fi>
- **Partnerbook** is a tool for companies and organisations with the aim of creating networks and furthering marketing. <https://www.partnerbook.fi>
- **Federation of Finnish Technology Industries** membership listings. <http://teknologiateollisuus.fi/en/membership/member-companies>



Content management tools

- **M-Files** is a comprehensive enterprise content management system with a cloud version using a Microsoft Azure cloud platform. M-Files support ad hoc collaboration and workflow capabilities. <http://www.m-files.com>
- **Dropbox** is a file hosting service on a cloud which offers file synchronisation, a user can create a special folder for his/her computer and it will be then synchronised so that it appears as the same folder from any user computer. It is also possible to create shared folders which allow users to collaborate on a set of files. <http://www.dropbox.com>
- **Google Drive** is a cloud service which offers a large amount of storage space. It is the home of Google Docs, which is a collection of collaborative applications on a cloud for document editing, spreadsheets and presentations. <http://drive.google.com>
- **Microsoft SharePoint** is a professional enterprise web application for content and document management.

It has e-mail notifications, blogs, wikis and discussion forums. SharePoint includes also some social networking. <http://sharepoint.microsoft.com>

Communication tools

- **Skype** is communication software for audio and video conferencing between two or more people. It uses VoIP for audio and web cameras for video. Skype has instant messaging and the possibility to send files to participants. <http://www.skype.com>
- **Lync** is a Microsoft video conferencing and chat application. Lync can be integrated into other Microsoft applications like Microsoft SharePoint and it can retrieve contacts from the Microsoft Exchange server. <http://office.microsoft.com/lync>
- **GoToMeeting** provides audio, video and screen sharing for groups of people. <http://www.gotomeeting.fi/fec/>

Social Networking tools

- **Co-op** is an application to keep everybody on the same page. The main function is a Twitter-like message stream to ask questions and share links and knowledge with co-workers. <https://www.coopapp.com>
- **Yammer** is an enterprise social network service bought by Microsoft. Collaboration methods include file sharing, knowledge exchange and collaborative page editing in real time. <https://www.yammer.com>
- **Hall** is a bit like daPulse with on-line collaboration features like video conferencing and white board-like creation of notepad-styled documents. Communication is organised using networks and rooms. Hall has strong bank-level security with sophisticated data encryption. <https://www.hall.com>
- **MangoApps** is a collaborative enterprise social network service. It has features like micro blogging, chat, surveys, to-do lists and management of documents, ideas, projects, tasks and events. <https://www.mangoapps.com>
- **Elgg** is an open-source networking engine for building social networking applications. Elgg provides blogging, file sharing and a bookmark repository. <http://www.elgg.org>

Meeting tools

- **Doodle** is a meeting scheduling tool. The meeting organiser sets up a poll with candidate times for a meeting. <https://www.doodle.com>
- **Vyew** is a web meeting and online collaboration tool in a cloud. Participants of a Vyew session share a white board where they can sketch documents with drawing tools, upload and save documents. It supports VoIP, webcam and video conferencing. <http://www.vyew.com>
- **The IBM Sametime** product family include applications for instant messaging, online meetings, finding experts, finding answers from experts. The application makes it possible to see online availability and location of colleagues and experts. <http://www-142.ibm.com/software/sw-lotus/sametime>

Business process tools

- **ProcessMaker** is an open-source web-based BPMN modelling tool for small- and medium-size organisations. Business processes are modelled with a graphic designer to a workflow which is executed by the users assigned to different activities of the workflow. <http://www.processmaker.com>
- **Intalio designer** is open-source Business Process Management System (BPMS). It is built on the popular Eclipse platform. Business processes are modelled graphically. The designer converts the BPMN model to an executable BPEL process. <http://bpms.intalio.com>
- **Wade** is an open-source middleware for the development of distributed agent-based applications with workflow management. Wade is an extension of Jade (Java Agent Development Framework). <http://jade.tilab.com/wade>

Enterprise resource planning for operational phases

- **WebERP** is an open-source web-based accounting and business management system for SMEs. WebERP features include sales orders and quotations, sales analysis, accounts receivable, purchase orders, account payable, inventory management, multi-currency bank accounts, shipment costs, contract costs, general ledger and fixed assets. <http://www.weberp.org>
- **OpenERP** is an open-source ERP web application with a modern appearance. OpenERP includes sales and purchase management, CRM, project management, warehouse management, manufacturing, asset management, human resource management, issue tracker, fleet and event management. <http://www.openerp.com>
- **Lean System** is a lightweight, agile and flexible ERP from Tieto. Project management is integrated as a core component in sales, planning, procurement, production and finances. For production planning, Lean System offers graphical views to orders and resources with a graphical simulation environment. <http://www.leansystem.fi>

6. Summary

Today's business environment is under continuous change and the speed of the change is faster than ever before. Finnish SMEs are facing the influence of global megatrends in their home field; they need to adapt their organisational culture and business models to meet global needs and demands. The EU has identified technological megatrends that are seen to influence industrial enterprises as follows²:

- **Dynamic collaboration** - efficient and secure collaboration between many different stakeholders, collaborative manufacturing, service management and customer engagement via social media and other Web 2.0 tools, offering value-added services or even 'products as a service'.
- **Enterprise mobility** – 'on-the-go' and 'always-on' users, new opportunities and businesses in the mobile world.
- **Real-world connectivity** – sensors, automation controllers and embedded systems, seamlessly and bi-directionally interact with real-world objects and systems on a global scale, 'Internet of Things'.
- **Manufacturing intelligence** – real-time analysis over a large volume of data from processes, products and business systems.

The underlying factor in these megatrends is ICT, everything is being digitalised and we are living in the middle of the Industrial Internet revolution. This is transforming the industrial world far more than we can imagine. It is fundamentally changing the way we design and manufacture products, and what these products can do. It is making the complex supply and distribution networks that tie the global economy together faster, more flexible, and more resilient. The Industrial Internet will also affect the way people work, it is empowering human beings to unleash more broad-based and distributed creativity and entrepreneurship³.

While digitalisation is everywhere, it also reinforces the ability of companies to collaborate. The Internet is blurring the importance of location dependency - companies can market their services and make acquisitions globally. They can form alliances and business networks upon demand; they can evaluate possible partners online and select the best ones. In global networks companies are collaborating via a variety of ICT tools – video conferencing, document sharing, joint design, virtual meetings.

There are also socio-economic megatrends that are affecting the industrial environment. These megatrends are demographics and consumption, global competition and innovation and all-round sustainability. Even though globalisation is usually perceived to have a negative effect on SMEs it also provides SMEs new business possibilities. Smaller, dynamic enterprises are able to put innovation into practice more rapidly than their bigger and slow-moving counterparts. They can also form agile networks to meet fast changing demands. On the other hand, the trend of sustainability creates possibilities for niche companies when industrial processes are moving towards low carbon footprints and energy efficiency.

One trend in industrial investments is that project deliveries have grown into mega projects, large-scale investment projects costing more than 1 billion USD and defined as initiatives that are physical, very expensive and public. The trend is similar in Finland and near-by Finland, there is large investments ongoing in Northern Finland - Fennovoima's nuclear power plant and several mining investments in Lapland and Northern Sweden, oil and gas fields in Norwegian Sea. The scale of these projects is huge for SMEs, therefore they have to join the forces and form collaborative business networks in order to be competitive in large investments.

SMEs need to develop their own expertise and working methods, as long as organisational culture permits, to face the demands of international customers. In most Finnish companies

²ICT for Manufacturing. The ActionPlanT Roadmap for Manufacturing 2.0, <http://www.actionplant-project.eu/>

³GE Reports <http://www.gereports.com/>

the basics of business are in good condition - they are able to produce high-quality products in time. SMEs need to improve their quality policies and they need to be certified; this is one of the major issues when suppliers are evaluated for large deliveries. Companies need also to rethink their expertise areas and differentiation strategies.

Above good quality, SMEs need to encourage themselves in the area of marketing. They have to make themselves visible in seminars, exhibitions and on the Internet. Above traditional marketing, visiting customers in face-to-face meetings, online visibility is equally important. Companies need visibility in the same online sources where suppliers and customers go for information. Define company online strategy – keep company websites updated, show quality certificates, promote references via stories, pictures and videos.

In the future work will be done increasingly in different types of networks requiring determinant preparation towards international collaborative networking abilities. Companies must be able to join and leave dynamic networks in different phases – design, construction or maintenance. They have to adapt and operate themselves in different organisational cultures and they have to share and publish project-related information in timely manner.

Hopefully this report will encourage Finnish SMEs to develop themselves into international, high-quality network players. Finnish companies have abilities to be successful in international competition as they join forces creating collaborative business networks.



**DYNAMIC
COLLABORATIVE
ENTERPRISE
MOBILITY
REAL-WORLD
CONNECTIVE
MANUFACTURING
INTELLIGENCE**

FURTHER READING

European small business portal (Eurooppalainen pk-yrittysportaali), http://ec.europa.eu/small-business/index_fi.htm

Tekes – the Finnish Funding Agency for Innovation, <http://www.tekes.fi/>

Helaakoski, H. (2007) Adopting agent technology in information sharing and networking, VTT Publications : 671, VTT, Espoo, ISBN 978-951-38-7073-7; 978-951-38-7074-4 , Available at <http://www.vtt.fi/inf/pdf/publications/2007/P671.pdf>

Valkokari, K.; Valjakka, T.; Hakanen, T.; Kupi, E.; Kaarela, I.. (2014) Palveluverkoston kehittämisen työkirja. VTT. 38 s. ISBN 978-951-38-7438-4. Available at: http://www.vtt.fi/inf/julkaisut/muut/2014/VTT_Palveluverkoston_kehittamisen_tyokirja.pdf

Valkokari K., Salminen J., Rajala A., Koskela M., Kaunisto K. & Apilo T. (toim.) (2014) Ekosysteemit ja verkostojen parviäly. Tulevaisuuden liiketoiminnan suuntaviivoja. VTT Technology 152. VTT. 112s. ISBN 978-951-38-8089-7 (nid.) 978-951-38-8090-3, Available at <http://www2.vtt.fi/inf/pdf/technology/2014/T152.pdf>

Jansiti, M. & Levien, R. (2004). The Keystone Advantage: What the New Dynamics of Business Ecosystems Mean for Strategy, Innovation, and Sustainability. Harvard Business School Press.

Jussila, A. (2013) The formation and development of strategic business nets in the context of a megaproject. Master's thesis, University of Oulu, Juvenes Print.

Osterwalder, A. & Pigneur, Y. (2010). Business model generation: A handbook for visionaries, game changers, and challengers. Hoboken, NJ, Wiley.

Stähle, P. & Laento K. (2000). Strateginen kumppanuus – avain uudistumiskykyyn ja ylivoimaan. WSOY, Porvoo.

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Collaborative Business Networks of the Future



Manufacturing industry is going through a radical change. Due to volatile economic situation and global competition, industrial companies around the world are under constant pressure. Having the required technical skills and equipment is no longer sufficient as potential customers ask for more complex products, better quality and faster deliveries.

In order to succeed in this challenging situation, Finnish manufacturing companies need to re-build the way they run their business. They need to re-evaluate their business logic, build innovative business networks and adopt supportive ICT tools. By joining their forces in a collaborative network, companies can offer larger tailored solutions than any of the companies could offer by itself, or even develop completely new products and services. The ability to co-operate and form flexible, collaborative networks is particularly essential for a small enterprise, as it enables participation in megaprojects. Operating as a collaborative network requires clearly defined roles for each company, as well as efficient ICT tools to support information sharing and communication.

The purpose of this publication is to offer Finnish manufacturing companies new ideas as well as concrete advice on how to develop their business models, collaborative networks and ICT environment, and remain successful against the tightening global competition.

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