Clusters and how to make it work:
TOOLKIT FOR CLUSTER STRATEGY

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Clusters are the magic answer to regional economic development. Firms in clusters are more innovative; cluster policy dominates EU policy; 'top-sectors' and excellence are the choice of national policy makers; clusters are 'in'. But, clusters are complex, clusters are 'messy'; there is no clear logic and no one agrees to how it can be successful.

Everybody, policy makers, academics, urban planners, regional development agents, cluster organizations, businesses and industry, all have their own ideas and solutions for how cluster strategy should be. Some seek collaborations and networks as ideal ways to innovate, others seek answers in value chain approach, others in research and development and sometimes in the triple-helix, and yet others in econometric benchmarks; consultants seem to offer a 'one size fits all' solution. And they are all right in their optic but it is not enough. Clusters are diverse, complex and unpredictable. They each have a history and a cultural context in which they flourish, or do not. There is a need for a more integrated approach that recognizes all the various facets of clusters. This toolkit is intended for policy makers who want to develop strategies for success from a deeper understanding of principles and patterns in cluster dynamics. To illustrate the ingredients of the toolkit, the case of Karlstad and Region Värmland have been included.

Karlstad and Region Värmland have a strong paper and pulp industry that has been established since the 17th Century. The Karlstad and region is facing new challenges due to changing contexts, for example,

- Changes in global markets in the paper and pulp industry, leading position threatened?
- Caretaker role of paper and pulp industry in the region is changing (patterns of patronage in the past still lingering)
- Rural – urban migration and brain drain
- Expanding urban hubs, Stockholm, Guttenberg and Oslo, with Karlstad in the middle (threat of absorption or redundancy)
- Shortage of technical personnel due to urban pull and lack of interest in technical careers
- Sustainability agenda due to climate change and environmental pressures
- Consumer demands for 'green' products

Ingredients of Toolkit
a. **'Wicked Problems'**
b. **Current economic landscape**
c. **Drivers of change**
d. **History, geography and culture**
e. **Changing competences for changing landscapes**
f. **Regional playing field: scope, identity and rules**
g. **Stakeholders**
h. **Differences that count**
i. **Collaborations and interactions**
j. **Emergent ideas and structures**

k. Self-organizing processes

The Toolkit

Toolkit Ingredient	Karlstad case
a. Recognizing *complexity* and 'wicked problems' Policy makers have recognized that they increasingly have to deal with system-wide types of problems that have a lot of elements that interact with each and are found in different levels and places[1]. These problems are often connected to other problems and they are 'wicked'[2]. The term 'wicked problems' has been used to understand when problems are complex. They have the following characteristics[3]: • There is no agreement about the problem. Multiple stakeholders with conflicting values and interests. Consensus is not possible, only more or less acceptable 'solutions'. • There are many ways to 'explain' the problem that is often part of a 'system of problems'. Each explanation creates possible solutions: multiple explanations and solutions possible. • Each solution alters the problem, not solve it. Solutions create new problems. There is no turning back. • Stakeholders and/or political forces need to seek solutions based on collective processes and judgements. • There are no expert answers. Each wicked problem is unique. High levels of uncertainty of outcomes. Solutions often by 'trial and error'. These characteristics can serve not only to 'diagnose' whether there is a wicked problem but they also offer a perspective to gain deeper understanding of the nature of complex social planning challenges[4].	The city and the region need to deal with the problem of changing economic conditions and perspectives. There are many stakeholders: the paper and pulp industry, cluster organizations, local municipality policy makers, Region Värmland policy makers, local, regional and national politicians, university and research institutes, businesses, citizens, technology institutes, etc. Each stakeholder has his/her view, interest, perspective, ideas about what the core issue is and how it needs to be solved and what the priorities are, etc. Some examples: • The national government and ministry of education focus on prominent (academic) universities and allocate funds for fundamental research and development to support innovation and develop competitive advantage. Industry has a greater need for applied research, according to one interviewee, but funds for applied research seems to have less a priority in national policy. • Local Karlstad industry are not happy with the education system and have opened their own 'technology centre' to train young people for the labour needs of the region. • Local city council is seeking answers by demanding more efficiency and collaborations amongst the cluster organizations. • The paper and pulp industry are concerned about global market changes but it is 'business as usual'. • National and local governments do not seem to recognize the need to 'save' the paper mills for their innovation value – a lot of spin-offs coming from the mills according to the cluster organization. • Local residents dependent on the paper and pulp industry but not appreciating their value to the community and history. • Spin-off from the paper and pulp industry is that new clusters were formed – engineering and machinery, ICT and packaging clusters. Are they competitors?
b. Understanding how the current economic structures are organized in the region – Current economic landscape The way businesses, industry, university and municipalities are connected to each other. • How value chains are linked? • What horizontal and vertical linkages are	• The tradition of the regions is of small municipalities with one big plant and many SME serving the plant. • Paper and Pulp Industry is dominant in the Region Värmland with Paper Mills having an important position. There are 3 other clusters besides The Paper Province, namely

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[1] OECD, Global Science Forum, 2009.
[2] Rittel and Weber, 1973.
[3] Adapted from Battie, 2008 and Rittel and Weber, 1973.
[4] Ritchey, 2005 – 2011??

present? • Is there a dominance of large industries? • Are there specific sectors dominating the region? • How homogenous is the area? • How are research and innovation linked to businesses? • What public policy support and funding incentives exist for economic development? • How are the triple-helix connected?	IT cluster, Steel and Engineering cluster, Packaging Arena that were spin-offs. • Clusters are independent and have a 'comfortable position'. They have achieved success in the past and seem to be complacent in their success[5]. • Bigger companies tend to use their own R&D facilities but are slowly changing and are collaborating more often with university. • Karlstad University's Service research centre (CTF) is one of the leading research centres in service innovation. Regional companies were not aware of the potential value of the research centre for them • Municipality and Regional development agencies fund and steer cluster development • There is no national and governmental level policy on clusters, only at the regional level.
c. Understanding the factors that affect the development of the region now and in the future – drivers of change The current landscape of region and clusters are changing rapidly. There are different developments that are affecting these changes, such as shifting geo-political powers and markets, EU internal market and innovation policy directives, national and European laws and regulations, digitalization of commerce and industrial processes, social network developments, etc.	• Internal drivers of change – companies seek growth and innovation in products and areas adjacent to their own core business • The demands of local government of Karlstad for more collaboration amongst cluster organizations to improve efficiency and reduce duplication. • The need for SME to collaborate to vie for complex tenders and projects. • External drivers of change – the pressure of the urban cities of Oslo, Gothenburg and Stockholm that are expanding around Karlstad create an urgency for Karlstad to survive and to be independent and not become a satellite town of one of the other cities. The national funding and attention are more focussed on the bigger cities as well. • EU policy providing funding and stimulating local regional developments and clusters. The Paper Province was named a 'world-class cluster' by the European Cluster Observatory. • EU policy pushing for 'bigger, multi-sectoral, high-tech, excellent clusters' that break down barriers between segments and sectors. • Environmental regulations to ensure sustainable forest resources, pollution measures for both air and water contamination • Competition from Brazil and other up-coming markets • Technology innovations have led to spin-offs that are relevant for other industries and therefore the scope of the clusters, IC and Steel and Engineering, becomes larger than only the paper and pulp industry.
d. Understanding the development of the region – history, geography and culture	Karlstad is a Swedish, provincial town and the region is dominated by its paper and pulp industry for more than three centuries. Small communities dominate the region

[5] Interview municipality Karlstad

The first step in understanding complex problems is identifying the key elements that have resulted in how the region has become. Understanding the history, the geography, the demographics of the region and critical events in the past is important to be able to understand issues about future developments from the context of the local setting.

usually with one main industrial player – paper mills in the Region Värmland. The presence of the river and the lake enabled logging and transport of timber to paper mills that in turn had sufficient water to process the wood. Transport of finished products was also served by shipping. Water and forests are important natural resources of the area. Skilled labour and technological innovation and service from ICT, Engineering and Machinery companies were also important to the growth of the industries and the region. However, the paper and pulp industry is also huge, dominant and in some ways slow to change as it is a big investment industry (similar to many traditional industries in the world). The steel and engineering cluster and the paper and pulp industry are heavy industry that are male-dominated and have a tendency to 'take care of the region' and the citizens respond to this by letting them dominate the region and take care of them[6].

The communities in the region (as is in rural Sweden elsewhere) are small and have a history of 'trust' and collaboration (based on stakeholder interviews). Another historical and cultural value of Sweden is that of equality which affects policy and funding decisions as well as local collaboration patterns.

e. **Understanding how regions expect to deal with the changes and where the gaps are – changing competences for changing landscapes**

Another aspect to be understood is changes in the context relevant to cluster and regional development. It is important to understand how regions and clusters perceive and react to these changes and to track these developments. The level of alertness to external changes and the implications for the region need to be monitored. Not acting on changes to the environment can impact the future of clusters and regions. What new competences and knowledge is needed in the region to meet future challenges?

The region has grown by adapting to growing markets and offering specialized paper products through the help of technology, specialized machinery and skilled labour. The mills also consolidated over the year so that the 400 mills are now reduced to a few huge mills that dominate the landscape of Karlstad region. The city and regions surround are dependent on the paper mills and their related industries. The wave of consolidation allowed economies of scales, efficiency and specialization. Environmental demands by EU and national policy and in recent times, by consumers meant that new innovation have driven the changes of the industry. The industry has had to change to meet both market and environmental pressures to be competitive and viable. The region was part of the community serving the industry and it grew with the industry. It was a locally driven development but has been changing to meet new demands from outside. More recent developments in emerging economies have put pressure on the region and the paper and pulp industry. Mills in Brazil for example are becoming competition for Swedish mills.

- high technical knowledge, a lot of innovation in the mills, very specialized in narrow sectors – how do you broaden the base of the application from PP to other sectors?
- collaboration is in the genes
- but the old industries are in inertia – don't want to change the rules, the business models – they are used to be self-sufficient, self-contained.
- The industry was the whole value chain.
- New business have to come from borders and cross-sector collaborations – bio-medicine. Waste – adding value by using waste as resource;
- To be clean and green – these require new

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[6] Interview Cluster manager, The Paper Province

	competences and these need to be developed and they need to come from outside. - The self-contained culture is not helping them to think different and to use their knowledge and competences beyond their own borders - By joining other sectors to search for new products and industry, the need for broadening existing knowledge to serve new industry - Creative people are needed – the region is strong in engineering … - New competences if you are liaising at the borders… - The strengths – Swedish strength in (Ulrich) need to be recognized and used in the search for new competences and new businesses - how do you use this in the future – to find new combinations, to be leading in the industry,
f. Identifying the reference frameworks of the region/cluster – regional playing field: scope, identity and rules The definition and identity of the region and cluster are important reference frameworks that need to be verified. There may be policy definition of a cluster but the stakeholders in the cluster may have differing definitions and weightage given to the role and boundaries of the cluster. The firms in a cluster may be operating from their company perspective rather than a cluster perspective. There may be different and even conflicting expectations from the different stakeholders on the role of cluster organization, policy guidelines and intervention, etc. The definitions and identities ascribed to a region/cluster are often unspoken and may have an impact on the development especially if they are divergent. The stakeholders' mental models of what is important and what their priorities are and where the boundaries are of the businesses are and that of the cluster, how individual stakeholders react to regional changes and if not, is their focus more international, who is in the cluster and how is power distributed in the cluster, and how policy development takes place, all have influence on the cluster's development.	**The paper province** The cluster in Karlstad is an established cluster of more than 13 years. There is a cluster organization and there are … cluster members. The municipality of Karlstad funds this and other clusters. The recent developments in Karlstad involve funding rules that will diminish cluster independence as all (4) clusters funded by the municipality are required to increase efficiency by reducing duplication of administrative and other aspects of cluster management by working together. The cluster organizations will need to collaborate closely and their scope activities are being changed through funding structures. A similar demand is being made of cluster organizations in the region by the members who pay contribution to them… Next level collaboration Karlstad – scope –thinking: inter-cluster needs to be the scope, within this, it is the inter-firms collaboration is the way. Triple-helix collaboration needs to be existing
g. Understanding the players and how they perceive, connect and act – *stakeholders* The way stakeholders interact and communicate in the region or cluster is relevant to understanding how the region/cluster will develop. The types of collaborations, the perceptions on competition and collaboration, factual information on the interaction patterns can help map where innovation is being sought and where potential merge of new clusters can be found. Consolidation of businesses, where merges and acquisition are prevalent, especially if this is cross-sector based, is often indicative of new	**The Paper Province** Stakeholders in the Paper Province are the businesses in the cluster, the cluster organization, the local municipality, the university, the regional government, New stakeholders.

cluster development[7].	
h. Understanding the competitive advantage of the clusters – *differences that count* Recognizing the need for diversity in clusters in ways of thinking, knowledge, organizing, the degree of openness to new ideas, etc. need to be mapped to understand where complementarity and new innovation could be generated.	
i. Understanding changes the interactions are bringing to the region – *collaborations and interactions* Exploring the patterns of interaction in the cluster/region – how often are stakeholders meeting each other, who is taking part in collective strategy development and how often are they meeting and if there is an increase in the number of meetings and a change in the quality of the meetings – from informal networking to more focussed theme and strategy related sessions. The outcomes from the meetings could indicate the transformations that are taking place between those involved and possibly the diffusion of knowledge and ideas beyond the meetings. The interactions in collaboration projects where new knowledge and businesses meet often result in innovation.	
j. Understanding the new patterns that are emerging – *emerging ideas and structures* The changes in how stakeholders are interacting and the way business is done, the new players in the field, the new rules that are dominating economic participation and measures of success, new routines that are being established in business and innovation, are all part of the emergent cluster development. Understanding these emergent patterns can help understand the direction and opportunities that clusters and regions are evolving.	Karlstad's clusters are pushed to work together to create 'excellence' through collaborations by EU cluster policy and that of the local municipality
k. Understanding where the changes are coming from centrally steered or are they bottom-up initiatives – *self-organizing processes* The role of centralized steering and room for self-organization in clusters and regions are important to map and to understand how these local initiatives can be supported and complimented by policy interventions.	Karlstad – funding rules of city municipality is an example of policy driven change in cluster development. The changing demands of firms for more 'value for money' from the cluster organization is an example of bottom-up developments that is forcing cluster organizations to re-think their role and consequently breaking lock-in patterns of the role of cluster organizations that have seeped in.

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[7] PWC Report….

The diagram below illustrates how clusters (and regions) develop through self-organizing from an existing landscape of complexity and drivers of change to a new landscape entailing the solutions, but creating new complex problems and possibly, new drivers of change. The diagram also offers a framework to analyse cluster dynamics in response to the changes in the environment as described in this paper.

Moving from insights to issues for policy agenda, using Karlstad case

Issues that emerged from the Karlstad case:
- Need for culture change
- Value chain broaden

Strategy focus:
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