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Creating Clustering and Open Innovation in new Technology Industry Sectors through "Mini-C

WORKSHOP 4 - Unusual experiences in clustering science and technology initiatives

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Title: Creating Clustering Behaviour and Open Innovation in new Technology Industry Sectors through “Mini-Clusters”.

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Summary

Many of the companies in the newer technology industry sectors exhibit less well formed clustering behaviours then the more established or traditional industries. This occurs even in places where there are relatively high densities and significant numbers of the new technology sectors. This lack of proper clustering behaviour reduces the overall competitiveness of these businesses as compared to those businesses that have the advantages of effective clustering. An STP can relatively easily foster collaborative behaviour within and amongst their “in-house” tenant base, but this is not the same nor as effective as establishing industry clustering behaviours across a recognisable geography. This paper outlines what clusters are and exemplifies the traditional methods of stimulating clustering behaviour before going on to define and explain the novel concept of “Mini-Clusters” as applied to the ICT industry and how it was successfully applied by one UK STP. Multiple use of this methodology proved to be more relevant and more cost effective than the traditional techniques and as a surprise outcome led to open-innovation becoming used within the cluster as a means of creating products and improved processes. Subsequent work on this methodology suggests that it will also be effective in other new technology sectors.

Clusters and the approaches to stimulating them

Michael Porter established the concept of business clustering in the modern industrial world with the Competitiveness of Nations (1990). He noted that clusters can be geographic, sectorial, horizontal (sharing resources) or vertical (supply chain), but however defined clusters are critical to the international competitiveness of businesses.

However, it has to be remembered that Porter was thinking of individual US states as the basic unit of geography, many of which are the size of small and medium nations, thus the smaller the nation the more important sectorial becomes relative to geographic and this becomes even more true at the level of regional economic development. Set against this is the fact that in many modern nations public sector cluster interventions are targeted at SMEs and for them local geography is important simply because SMEs tend not to travel far or have well distributed regional offices.

Regional approaches to Public Sector support of Clusters

The normal methods of public sector cluster stimulation are either national, applied to specific sectors or geographical, usually regional, but with targeted sectors within the region - so either way a strong sectorial bias. In order to understand the novel concept of Mini-Clusters and validate its effectiveness, the following analysis will contrast the

technique with the more conventional regional sectorial approach to cluster development.

In general the types of project that form the core of regional cluster programmes involve assisting networking, supporting innovation or subsidising elements of infrastructure relevant to an individual sector. By contrast, mini-clusters activity is focussed on:

• Creating intense networking activity where it is weak; or

• Securing specific outcomes e.g. innovation, exporting, additional sales.

In both cases the aim is to get businesses working together to produce outcomes they would not have achieved on their own.

The UK West Midlands – An Example of the Regional Approach

The West Midlands has a population of 5.3 million. It is a manufacturing centre in the UK but with some valuable high technology sectors as well as strong professional services and creative industries. The regional cluster programme evolved under the management of the regional development agency (RDA) from 2002 – 2010 and involved supporting 12 sectorial regional clusters reflecting either:

• Sectors representing existing regional strengths, including: Advanced manufacturing and materials; Automotive, rail and aerospace (transport technologies); Building technologies; Food and drink and Business and Professional services

• Sectors with potential for significant growth, including: ICT; Environment and energy; technologies; Medical technologies; Interiors and Lifestyle (design technologies); Digital Media

By examining in more detail the types of project implemented and the responses of businesses to them it is possible to show that the types of project that work well in the more traditional and well established industries such as “Advanced Manufacturing Materials” are sometimes less effective within the newer industry sectors such as “ICT”, particularly amongst the SME clients.

To illustrate the above assertion Table 1 below highlights a number of the key projects funded by the regional development agency over the period 2008 – 2011 in two of the cluster areas – the Advanced Manufacturing Materials (dominated by larger companies) and ICT (dominated by smaller companies.

The key lessons learned from this analysis are:

• Sectors dominated by SMEs such as the ICT sector, responded well to projects that helped them to network with each other across the region. But they responded poorly to specialised technology centres in that while some businesses utilised the services well, it was always in relatively small numbers.

• Sectors with a strong representation of multinational and larger companies responded much better to technology centres by engaging in larger and longer term projects based on these facilities. The larger businesses sometimes pulled in SME businesses in their supply chain to work with them on these projects. Where the services of a technology centre were very highly specialised (e.g. ADCOMP – see Table 1), utilisation by companies was lower.

• SMEs invariably responded well to business support measures targeted at their sector (MAS and ICTWM- see Table 1). The exception was the E-Innovation Centre which was based in a remote part of the region which most start-up and early stage innovation-led ICT businesses were not prepared to travel to in order to gain the benefits of the services on offer. More local ICT entrepreneurs, however, found the support valuable and used the centre well.

• Most companies appreciated networking activities, but responded best when this was combined with other activities.

Economic Impact of Traditional Regional Clusters Programme

The economic impact of traditional regional Cluster programmes is illustrated by the UK West Midlands regional development agency programme that operated from 2002 to 2008 and was publically funded to the level of about £100 million.

The economic impact in terms of attributable increased business sales lay between £300 million and £1,100 million i.e. between 3 and 11 times public expenditure costs. The impact analysis also showed that:

• Much of the gain was from business investment in new products, processes and services

• The programme promoted and achieved greater collaborative working

• The programme established and developed networks and partnership infrastructures.

There is also some evidence that this type of support has some lasting value. In mid-2010 public sector support for clusters was largely extinguished. Nevertheless, the majority of the Committees established to oversee each of the Clusters still exist. They meet regularly and are creating new lower cost activities on a self-help basis. The activities are mainly based around either networking or innovation. With the support of universities in the region the innovation dimension is the most active component of on-going activity.

Table 1. Cluster Projects Financed by the UK West Midlands RDA

<Table 1 goes here>

Notes to Table 1

1. Advanced Manufacturing Materials

a. MTC (public private organisation – 2/3 public 1/3 private funding. Working on high value manufactures involving advanced metal joining, fabrication, tooling and automation)

b. MAS (business support for SME manufacturers) – special programmes for automotive and aerospace and early stage manufacturing businesses with an innovative product – building new world class manufacturing competencies)

c. ADCOMP (Thermoplastic composites demonstrator project)

d. COMSTAR (Computational modelling for advanced materials – demonstrator)

e. CNC training – training for SME manufacturers

2. ICT

a. Accredit – ICT suppliers quality standard to improve the processes, performance and productivity of SME businesses

b. BtOG – Bridging the opportunity gap – assisting ICT SMEs to access EU funding opportunities.

c. E-Innovation Centre – an innovation centre specialising in the support of start-up ICT businesses in fast moving markets such as web technologies, RFID, multi-media etc.

d. ICT Excellence Club – peer to peer working and an annual innovation competition

e. ICT West Midlands – delivers activities that catalyse innovation, including an annual ICT regional conference

f. Specialist Technology Centres for: Mobile and wireless, open-source software development, computational intelligence.

The Mini-Cluster Approach to Improved Clustering Behaviour

Mini-Clusters, is a term devised by the University of Warwick Science Park to describe either groups of 10 – 30 SMEs in a specific cluster meeting informally with no pre-specified agenda other than to provide a meeting point for exchange of ideas and to seek strategic alliance partners or even smaller groups of 5 – 12 SMEs, who work together under the guidance of a professional facilitator on a specific well defined agenda that the SMEs are agreed upon. In the latter case, the agenda is most often designed to:

• Address market opportunity, either in the home market or internationally that, on their own, none of the SMEs could expect to secure;

• Develop and exploit a new technology (innovation) combining the expertise and technologies of several participants;

• Address purely business process problems such as: training, quality control etc.

Between 2002 and 2005 the University of Warwick Science Park developed the mini-cluster methodology and applied it successfully to address different problems relevant to ICT SME businesses with the objective of securing true “clustering behaviour” across a defined geography by creating collaboration in areas of mutual interest including innovation, increased sales, exports etc.

The programme involved the establishment of 10 ICT mini-clusters in one sub-region of the West Midlands. This sub region covers a population of approximately 800,000 people with about 22,000 companies. The 10 ICT mini clusters attracted over 100 SMEs (out of about 800 ICT companies in this area). Less than 50% of the time of two high calibre business people with strong facilitation skills was employed to generate and organise the mini-clusters. The mini-clusters were subdivided into:

• Five geographical mini-clusters to attract the ICT SMEs in a local geography and help them to know and interact with each other, and;

• Five innovation and technology mini-clusters each with its own narrowly defined objectives.

Critical to the success of the innovation and technology mini-clusters was the role of the professional facilitators whose remit was to:

• Recruit ICT SMEs to the programme and bring them together for events and meetings

• Gain the trust of each of the companies by demonstrating that they understood their difficulties and opportunities and could access resources to help them – this proved to be critically important. The facilitators had wide experience of working with the ICT sector, had a good appreciation of the state of the market and market opportunities and understood the processes of innovation and were well connected to a wide range of SME business support programmes, the local universities and other resources in the area that they could draw into these mini clusters as and when it was appropriate or advantageous to the individual companies or groups of companies.

• Help “like-minded” SMEs to identify complementary skills from within the mini-cluster that they could use to deliver an innovative idea for a new product or service. This applied particularly to the innovation and technology mini-clusters. In this type of group the facilitators learned that not only did they have to spend some time across the first 3 or 4 meeting establishing the trust of the ICT SMEs they also had to break down the competitive barriers that existed between the SMEs inhibiting them from discussing opportunities within a group. It was at this stage that a few SMEs left a mini-cluster because they could not come to terms with the open-innovation format of activity being pursued, or because they could not see a meaningful role for themselves in the majority decision agenda selected by the rest of the group. The facilitators had a small budget they could use to “seed” new activities in the innovation and technology mini-clusters, typically with resource up to a value € 12,000 per mini cluster. This proved to be invaluable in getting the participants to start working together. As open-innovation project work progressed the participating SMEs became more willing to contribute resources to the activities needed to bring about an innovation.

• Transition the mini-cluster towards independence from the facilitator as the project progressed

The Mini-Cluster project had several outcomes that might have been anticipated. The project:

• Validated the methodology as practical and workable for any growing or emerging technology sector (e.g. environment, bio-medical, digital media etc.)

• Met or exceeded targets for employment and new product development.

• Established much greater networking amongst ICT businesses across the sub-region

• Generated high levels of client satisfaction

However, there were also two very important unanticipated outcomes. First, the technology and innovation mini-clusters interacted positively with the geographically oriented mini-clusters creating unexpected synergies:

• Some of the companies that started out in a geographic mini-cluster moved to a project specific technology cluster – but also remained engaged with their geographic mini-cluster

• Most of the technology mini-cluster SMEs also joined their nearest geographic mini-clusters

• Sometimes two or more geographic mini-clusters would combine to put on an event that had a wider regional appeal.

The above synergies are shown diagrammatically in Figure 1

Figure 1. Mini-Cluster Synergies

<Figure 1. goes here>

The second unanticipated outcome was that the methodology proved to be a practical, effective and SME friendly means of implementing the concept of open-innovation. It ensured that competitive barriers were properly addressed, engendered cooperative behaviour patterns and secured positive outcomes for the participants in a relatively short time-frame.

The University of Warwick Science Park had first conceived, developed and tested this clustering methodology before the above described ICT sector project was initiated. In these early trials SMEs had been drawn together around an innovation or market opportunity. The sectors engaged included laser technology, healthcare, serious games and advanced engineering. All proved to be amenable to the mini-cluster approach. Therefore, there is reasonable confidence that the technique will work in the fast moving new technology sectors where other forms of clustering behaviour have yet to become established.

<Case Study box goes here>

A brief case study

One of the most successful ICT technology specific mini clusters was the Serious Games mini cluster. Serious games is the application of computer gaming technology to solve business problems. Most computer games companies have specific software "engines" that they have developed and each has particular strengths in solving specific problems. These companies often suffer from periods of heavy demand interspersed with other periods of low demand. Therefore the mini-cluster group saw the embryonic serious games agenda proposed by the mini-cluster facilitator as a way of opening a new market with less variability in demand. Once the group of companies had established some mutual rapport, the facilitator introduced senior people from both the public healthcare and defence sectors. Within a few months one of the companies led the way assembling software engines from within the group to demonstrate the feasibility of a battlefield triage training package. Clearly, training in assessing urgent and time critical medical conditions in real battle conditions would be dangerous as well as very expensive, so a software simulation approach has many advantages. Within a few months the UK ministry of defence placed a contract for the full system to be developed.

The Economic impact from the Mini-Cluster project.

The total public expenditure cost of the 3 year mini-cluster project described above was € 150,000.

The estimated economic value of the outputs directly attributable to the project from employment increases and new sales was between € 1.3 million and € 2.2 million giving a multiplier on the public expenditure of between 9 and 15. This is generally regarded as very good and is significantly superior to the more traditional regional approach. Furthermore, once the project ceased all of the geographic mini clusters and some of the technology specific mini clusters continued to meet regularly. The facilitators had clearly established a networking and open-innovation system that had sufficient value to the ICT SMEs that they were prepared to use their own resources to sustain on-going meetings and joint working. In all probability the economic output recorded above has continued to grow, although probably at a slower pace given the 2008 recession. The professional facilitators believed that their facilitation services, the network of other resources they could draw on and the modest "seed" financial resources they could offer to get the mini-clusters working were needed over a period of at least 18 months and preferable 2 years if each group was to become self-sustaining once their services were withdrawn.

Conclusions

There are many ways of stimulating Cluster behaviour that lead to improved business competitiveness. Large technology centres work well for larger businesses, although some SMEs from the larger companies' supply chains do become involved. By contrast mini-clusters proved to be particularly effective with the new technology based sectors where clustering behaviour had not already become well established.

The Mini-clusters approach is more efficient in securing innovation, through an open-innovation approach, that involves larger numbers of SMEs but does depend on high quality professional facilitators to secure success.

The overall economic impact of the mini-cluster approach to fostering clustering behaviour within the new technology sectors proved to be higher than the more traditional regional methods.

The mini-clusters continued to operate long after the public sector intervention had ceased, adding even further value. These small cluster groups and the interactions that developed between them also demonstrated the need for this type of activity to be started in young technology sectors where the clustering behaviour of more mature industry sectors has yet to become an embedded form of behaviour.

References

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