The best practices of commercializing nanotechnology in EU – example case Finland

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Finns, a nation of scientist and engineers

1916: Valio executive board explained the establishment of Valio laboratory
“Only a country whose economy is based on science can attain and preserve the first position in the economic contest between nations.”
Source: R&D Director of Valio at SHOK summit, Marina Congress center Helsinki 2012

2006: Finland is 1st in fraction of researchers in the population
Source: OECD

The best country in the world (Newsweek 2010)
2nd within the world’s innovation hot spots (HBR 2009)
The most competitive nation (IMD, Harvard)
One of the least corrupt (Transparency Intl.)
One of the best public education system (OECD)
One of the best in penetration of mobile and Internet
Science and innovation profile of Finland

Source: OECD Science, Technology and Industry Outlook 2010
Applications for high technology patents in Europe

Source: Eurostat
The sources of new ideas in Finnish industry

1026 company responses
% = “very important”
(%) = “important or very important”

Finnish nanotech business
The number of nanotech companies has tripled within 3 years

Nanocluster’s role in the growth
practical, customer oriented information on the opportunities, added value and implementation to several different industrial sectors and public sector
Now it covers the whole value chain

**Finnish Nanotech companies 1.1.2012**

<table>
<thead>
<tr>
<th>Category</th>
<th>2008</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Services</td>
<td>26</td>
<td>41</td>
</tr>
<tr>
<td>Tools and equipment</td>
<td>39</td>
<td>59</td>
</tr>
<tr>
<td>End products</td>
<td>16</td>
<td>29</td>
</tr>
<tr>
<td>Nano intermediates</td>
<td>15</td>
<td>31</td>
</tr>
<tr>
<td>Nano materials</td>
<td>73</td>
<td>94</td>
</tr>
</tbody>
</table>

- Today: number of companies whose business is only within this value chain position
- Today: number of companies whose business model includes this value chain position

2008 Finnish nano business was strongly based on nano materials. 2012 nano business in the whole value chain.
Nanocluster’s role in the change
- Service providers to microclusters 2008
- Improved by nano: materials’ and intermediates’ to end product players
...but do you think nanotech based service business really counts as nanobusiness?

Pure service business, which wouldn’t exist without nanotech

- Coating service, based purely on nano coating
- Analysis service, based on equipments for analysing nanostructures
- Imports: only nanomaterials
- Nanomaterials R&D service, based on nanomaterials know-how
- Consult business, only nano cases

Service business, only partially based on nanotech know-how

- Patent offices with a lot of nano experience
- Contract lawyers with a lot of nano specific expertise
- Consultants with nanotech cases, nanotech events & others
Including services in the business model is a success factor for nano companies!

<table>
<thead>
<tr>
<th>Business model</th>
<th>average success indicator</th>
<th>standard deviation</th>
<th>number of companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediates, Services</td>
<td>3.2</td>
<td>0.4</td>
<td>10</td>
</tr>
<tr>
<td>Materials, Intermediates, Products</td>
<td>3.1</td>
<td>1.0</td>
<td>14</td>
</tr>
<tr>
<td>Products, Services</td>
<td>3.1</td>
<td>0.8</td>
<td>7</td>
</tr>
<tr>
<td>Services</td>
<td>3.0</td>
<td>1.3</td>
<td>29</td>
</tr>
<tr>
<td>Materials, Others, Services</td>
<td>3.0</td>
<td>0.9</td>
<td>24</td>
</tr>
<tr>
<td>Products</td>
<td>2.9</td>
<td>1.0</td>
<td>44</td>
</tr>
<tr>
<td>Tools, Services</td>
<td>2.9</td>
<td>1.0</td>
<td>15</td>
</tr>
<tr>
<td>Materials, Intermediates</td>
<td>2.8</td>
<td>1.0</td>
<td>11</td>
</tr>
<tr>
<td>Tools</td>
<td>2.6</td>
<td>1.3</td>
<td>44</td>
</tr>
<tr>
<td>Intermediates</td>
<td>2.6</td>
<td>1.4</td>
<td>12</td>
</tr>
<tr>
<td>Materials</td>
<td>2.5</td>
<td>1.4</td>
<td>28</td>
</tr>
</tbody>
</table>

Average success indicator: companies estimated their success in nano projects using 7 different indicators, the results were turned in average success indicator for each company. The companies were clustered based on their activities within the value chain.
The expected growth makes sense...?
Nanocluster – gateway to Finnish nanotechnology expertise

- **Nanocluster = 8 local teams & coordination office in local development companies**
- Mission to foster the growth of Finnish nanotechnology based business
- Implementing Finnish nanotechnologies to industries – responsibly and profitably.
- Resulting in growth within the Finnish industries’ global competitiveness

Nanocluster reaches >90% of Finnish nanotech based business
The Finnish Innovation system

Parliament of Finland

Council of State

Ministry of Education

Ministry of Employment and the Economy

Other ministries

Research and Innovation Council

Universities

The Finnish Funding Agency for technology and Innovation (Tekes)

SHOKs - Strategic Centres of Excellence

The Finnish National Fund for Research and Development (SITRA)

The technical research centre of Finland and other research centres (VTT)

The Finnish National Fund for Technology and Innovation (TEKES)

Economic Development, Transport & Environment (ELY-Centres)

Industry Investment (FINVERA)

Industries & Enterprises

The Finnish innovation environment = public-private partnership

Source: Antti Valle, Ministry of E&E
Nanocluster’s role and added value within the Finnish innovation system

- **Improved by nanotechnology**
  Joint promotions for nano companies
  Practical information to potential users

- **Nanotech Finland**
  Brand, services and networks for kicking off global business

- **www.nanobusiness.fi**
  Neutral information & visibility

- **Networks**
  Microclusters, interdisciplinary networking
Promoting nano in industrial applications

Customer clusters: machinery, marine, forestry, food industry
Public sector: transport

Seminars
New business opportunities to nano SME:s
Renewal and added value to the customer sector

- Speakers: nanotech companies invited by Nanocluster
- Audience: invited by the customer cluster
- Materials: brochures tailored for customer point of view
- Matching: partnering event
- Promotion: small scale exhibition
- Roundtable: companies & scientists & end users
Promoting nano in built environments

Customer Clusters: living, tourism, well-being, marine
Public sector: elderly care, swimming halls...

Piloting environments

1st reference, showroom, new products, new customers
- Finnish Hotel of Tomorrow FHOT 2008
- City of Helsinki’s new elderly care centre

Nano products promoted
- anti dirt coatings for kitchen & bathroom
- decorative glass tiles, glass walls, lightning
- anti moisture and anti dirt textiles
- indoor air purification systems
- sound shower technology
Spearheading nanotechnology in Finland

Well established business & high class research
- Nanomaterials
- Nanosurfaces
- Photonics
- Aerosols (www.fineparticleforum.fi)
- nEMS/MEMS
- Medical diagnostics

High class research, to be commercialized
- Nanocellulose
- Printed Intelligence (www.printocent.fi)
- Safety and metrology
- Modelling and characterization
- Nanoelectronics
The success factors; national point of view?
Simultaneous & parallel support of all public players

- **Infrastructure** investments: Ministry of education and science
- **Basic research**: FinNano program of Academy of Finland
- **Applied research**: FinNano & Functional materials of Tekes
- **Long term funding for the best**: Centres of excellence in research
- **Commercialization**: Tekes TULI funding, FinNano, Nanocluster
- **Skilled labour**: Graduate Schools, networked
- **Industrial R&D**: FinNano & Functional materials programs of Tekes
- **Cohesion** within the nano community: FinNano, Nanocluster
- **Domestic promotions to potential user clusters**: Nanocluster
- **International promotions**: Nanotech Finland: Nanocluster & Tekes
- **Growth**: Tekes Young innovative enterprises funding
- **Industry point of view**: participation & advice
- **External resources**: private service providers
The success factors; company point of view?
NanoCom project statistics on >250 nano companies

1. Focus in business point of view
   - Business model, strategy, team, IPR, customers, marketing
   - Market opportunities, scalability, costs, ROI

2. Well organized in-house innovation activities
   - R&D project management

3. Strategy for utilizing external resources
   - Technology support: incubators, R&D facilities, tech centers
   - Business support: development agencies, networks, clusters
   - Collaborations: other companies & research

4. Focus in production
   - Efficiency, reliability, reproducibility
   - Early planning

5. Funding

6. Getting prepared to tackle the insecurities

Identifying the best practices of commercializing nano
www.nanocom-eu.org
Success factor no 1: focus in business point of view

- Business model, strategy, market opportunities
- The team’s business skills
- Discussion with customers
- Scalability, costs, ROI
- IPR
- Marketing: focus on added value, not on nano
- Consider including services in the business model

Success factors focus in business vs statistics on >250 companies
- Recognized as key success factors by the companies
- Source of competitive advance
- Result strongly supported by 30 interviews
Success factor 2: well organized in-house innovation activities

- **Key success factor: R&D project management**
  - KSF especially for SMEs and companies in R&D phase
  - Also one of the key BARRIERS

Success factor *In-house innovation activities* vs statistics on 278 companies

- Statistically significant correlation with success
- Source of competitive advance
- Recognized as success factors by companies
- Result supported by interviews
Success factor no 3: strategy for utilizing external resources

Local support provides you competitive advance, once the basic needs have been satisfied.
- tech support: incubators, R&D facilities, technology centers
- business support: development agencies, networks, clusters

The successful ones have good partners!
- Collaborations with other companies!
- Research

Success factor local support and collaborations vs statistics on >250 companies
- Statistically significant correlation with success
- Sources for competitive advance
- Recognized as success factors by companies
- US companies rely on strong local business support in R&D phase.
Success factor no 4: focus in production

From proof of concept to proof of industrial performance
Proof of concept is not enough to make business. Industries need to know technical and economic performance in real industrial conditions

Need pilot applications at industrial scale:
- collaborative demonstration or scaling-up project
- interested industrial licensee

NanoCom: Success factors for production
- efficiency, reproducibility, reliability,
- early planning of production process
Success factor no 5: funding

ProNano: from selling to VC’s to partnerships with corporate investors
- Instead of VC, consider corporate investor from the targeted market
  Includes the opportunity to learn true client needs
- If you still go for VC, focus on market opportunities, not on nano

NanoCom: European VC see no nano specific issues in what’s attractive
- Strong management team
- Strong business model enabling a suitable exit
- 50% of VCs: strong IPR
- Interest in very early stage start-ups = strong scientific team
The next steps?
Nanotech value chains of industrial ecosystems

ETP needs & nano solutions ⇒ Key Nodes ⇒ Value Chains

www.NanoFutures.eu

Source: NanoFutures roadmap draft 05/2012 www.nanofutures.eu
Nanotech value chains of industrial ecosystems
Take home

- If you need brilliant partners, look www.nanobusiness.fi
  www.nanoresearch.fi
Thank you for your attention!
Don’t hesitate to contact us www.nanobusiness.fi