Establishing a Digital Innovation Hub

ReconCell, Blue Ocean Robotics

John Erland Østergaard, Co-CEO of Blue Ocean Robotics
**Innovation Ecosystem by I4MS**

**I4MS** (ICT Innovation for Manufacturing SMEs) is the initiative promoted by the EC to support the European leadership in manufacturing through the adoption of ICT technologies.

**I4MS** sees an “Innovation Ecosystem” as complex structures formed by interactions of the participating community with an environment. A healthy ecosystem

- can thrive and grow
- regulates itself and adapts to market changes
Digital Innovation Hub business models & stakeholders

The stakeholders of an ecosystem community can be:

- Industry participants
- Start-ups
- Collaboration institutions
- Technical and business services

The community is interacting with the following environments:

- core markets as main environment
- adjacent markets from which know-how is shared

Market driven ecosystem composed of matured companies (experience), start-ups (innovation), and institutions (knowledge and systematics)!
The **Digital Innovation Hubs** are organisations or consortia of organisations that maintain, expand and create the (regional) ecosystem on I4MS related activities.

This includes networking, matchmaking, brokerage and dissemination activities.

They include one or more (transnational) Competences Centres and also offer innovation services to activate, support and stimulate the valorisation of I4MS technologies (e.g., awareness creation, dissemination of information, network development, incubator activities) by SMEs.

www.I4MS.eu

Create local interaction, awareness and incubator activities!
Digital Innovation Hub (DIH)

- In the framework of I4MS initiative, **Competence Centres** are any organisation (university institutes, research technology or private organisations) offering technological infrastructure and accompanying skills and competences to support the scale-up and valorization of an I4MS technology.
- The centres have an (semi)-open approach (multiple client) and offer technical infrastructure and expertise to translate the I4MS research/technologies into opportunities for business.

For adoption of technologies such as in manufacturing a local competence center is essential!

www.I4MS.eu
Digital Innovation Hubs as Tools for Digital Transformation

- Digital Innovation Hubs hold significant potential to support and assist SMEs and start-ups and could become key actors in bringing digitisation within the reach of all industry sectors.

Roundtable on Digitising European Industry, Working Group 1
Digital Innovation Hubs: Mainstreaming Digital Innovation Across All Sectors
First Report, December 2016
I4MS Map
“Every region, be it more or less industrialised, has a lot to gain; regions should build on their strengths, specificities and know-how to develop their economies, create new jobs, new spin-offs, develop entrepreneurship, and attract investors. They should shape ecosystems covering the entire value chain - from the scientific basis, up to deployment - in order to benefit the citizens, the service sector and the industry. Nevertheless, to take full advantage of such technologies, regions should team up and learn from their experiences, and exploit both expertise and value chain creation complementarities”

Cécile Huet, Deputy Head of Unit Robotics & Artificial Intelligence, DG CONNECT, EC
"Our ambition should be to empower any business, wherever it is located in Europe, and especially SMEs, to master its digital transition. Regions and local authorities have a key role to play in this effort, with digital research and competence centres leading the way. My objective is to have at least one world class digital innovation hub in every region in Europe. It is my ambition to work with Member States, regions and the private sector in order to mobilise the necessary investments to make this happen. At EU level we have planned at least 500 million Euro of investment in such initiatives in the next 5 years."

Commissioner Oettinger at Hannover Fair
Establishing a DIH with I4MS Mentoring

ICT Innovation for Manufacturing SMEs (I4MS) is an European initiative with the objective to support the European leadership in manufacturing through the adoption of advanced ICT technologies. A key objective of I4MS phase 2 is to expand the initiative to countries and regions not currently involved, with the aim to establish a Digital Innovation Hub in every European Region.

To create participation of new regions in the I4MS initiative, some regions will need the support and mentorship offered by the I4MS initiative. In two phases of the open calls, a total of 29 proposals have been selected to prepare feasibility studies for Digital Innovation Hubs. These projects will receive financial support as well as mentoring and coaching services.

www.I4MS.eu
Integration of

- 3D vision & monitoring
- Programming by demonstration
- Cooperative autonomous robots
- Smart, affordable reconfigurable
- Workcell design
- Business modelling techniques
- Force-based control, learning and adaptation capabilities
- Robot assembly cell simulation and visual robot programming

→ Evaluation on real use cases provided by SMEs
→ New start-ups are incorporated (see http://flexhex-robot.com/ and soon the Reconcell company!)
Establishing a DIH with I4MS Mentoring

ReconCell:

Partners from Slovenia, Germany, Denmark mentoring **5 Hubs** from: Lithuania, Spain, Serbia, Denmark, Estonia

Regional Digital Innovation Hubs under I4MS mentorship should

- use the network in their respective field to organically develop and grow the European digital innovation ecosystem for manufacturing companies
- bring new competence centers together with relevant regional manufacturing SMEs
- provide any manufacturing company in Europe with access to the most sophisticated digital technologies and competences
- help manufacturing companies to master the transition to a digital economy

www.I4MS.eu
Establishing a DIH with I4MS Mentoring

The creation of a Digital Innovation Hub is an **evolutionary process** that can take years in the making and a lot of effort to **translate research into commercialized products, services and value chains**. Understanding the development stages allows DIHs to anticipate problems and plan their activities. The development of a DIH can be depicted in **5 distinct evolutionary phases/stages**. In each stage, a DIH faces different challenges and its funding needs vary accordingly:

1. Preparation Stage
2. Initiation Stage
3. Stabilization Stage
4. Continuous Growth Stage
5. Termination Stage
Example of a successful Hub initiated already in 2002.

RoBoCluster

Bringing together Danish expertise in the field of robotics research, development and design
Example of a successful Hub initiated already in 2002.

RoboCluster is rooted in a unique collaboration between industry and research institutions, a collaboration that has led to a concentration of knowledge and skills within the development and application of robotics.

RoboCluster was established in spring 2002 as a local growth environment based at the [Maersk Mc-Kinney Moller Institute](http://www.mcmi.sdu.dk) at the University of Southern Denmark. In 2006, RoboCluster gained regional anchoring as a Regional Technology Centre for robots, automation and intelligent systems.

Today, RoboCluster is established as a national innovation network for robots, automation and intelligent systems. Organisationaly, RoboCluster is still based at the University of Southern Denmark and its physical location is the RoboLab at the Odense campus of the University of Southern Denmark. **RoboCluster is one of 22 innovation networks in Denmark supported by the Danish Ministry of Higher Education and Science.**
**Innovation Network**

RoboCluster is an innovation network that brings together Danish expertise in the field of robotic research, development and design.

RoboCluster is supported by the Danish Ministry of Higher Education and Science.

We are situated in Odense where there is a large concentration of robotic developers, companies and researchers. But our partners, members and business partners are scattered all over Denmark and abroad.
Purpose
Our purpose is to strengthen interaction and knowledge transfer between research institutions and companies and thereby strengthen innovation and research in Danish companies.

In other words, we provide a link between research and industry with the aim of creating innovation and growth in Denmark.
**Partners:**
Our partners are leading technical universities and organisations from all over Denmark. The partner group count several Danish technical universities, industrial organisations and technical sub networks that binds us close to tech businesses.

**Members:**
RoboCluster’s active members are a balanced mix of tech developers and end-users.

Common to all RoboCluster members is that they all have an interest in robotics and automation and have a desire to develop and innovate in collaboration with leading knowledge institutions.
Services
RoboCluster offers activities that:

• Provide companies with insight on tech trends and new demands
• Support companies to identify and test ideas
• Help companies to create new partnerships

All activities are hosted with the purpose to cross borders and boundaries and enter new markets, new partners, new application areas – both in Denmark and abroad.
ROBOCLUSTER THEMES IN 2016

- Waste management
- Agriculture
- Construction industry
- Manufacturing industry
- Health
A cluster...

**strengthens productivity.** Businesses working in a cluster achieve productivity growth that is 3.6 percentage points higher than average.

**4x**

**stimulates innovation.** Businesses working in a cluster are four times as likely to be innovative compared to businesses that do not join.

**stimulates new start-ups** because in a cluster it is easier for entrepreneurs to see where a new product or service that is not already covered by a business in the cluster is needed.

**makes it easier to raise capital.** Investors perceive offering capital to a business that is part of a cluster as less risky.

*Source: Michael Porters “The Competitive Advantages of Nations”*
EVERYTHING TO GAIN: Become a member of the innovation network. It is FREE. Register here: http://en.robocluster.dk/network
ROBOCLUSTER Creates a Strong Danish Robotics Cluster

RoboCluster is a national innovation network, building bridges and generating innovation.

We have three ways of stimulating networks, innovation, development and results:

- Events and conferences
- Study trips
- Innovation projects

What RoboCluster does:

- Clarifies requirements
- Matchmakes across disciplines
- Advises on fund-raising
- Creates innovation projects
Blue Ocean Robotics as a Hub Member
Essence of creating a successful cluster/hub

Key components according to Blue Ocean Robotics

• Passionate enthusiasts with long endurance
• Embrace “circus family” and “diversity”  
  - avoid “them and us” culture,  
  - especially “prejudice” btw. commerc./acad.
• Create cash-flow, funding, value
• Build on existing strong local positions  
  - in industry and in academia
• Triple Helix  
  (commercial, academia, government/NGO)
**RoBi-X**

*RoBi-X* is a range of partnership programmes for co-creation of robotic solutions, incl. design, development and commercialization.

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**RoBi-Design**
- Front-end innovation
- Co-investment
- Ideation and conceptualization
- User-centred designing
- Business case
- Business planning

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**RoBi-Go-To-Market**
- Standardization
- Production
- Commercialization
- Strategy and business modeling
- Supplier-/integrator involvement
- Sales and joint venture network

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**RoBi-Develop**
- Product development
- Prototyping and testing
- Demonstration (on-site)
- First customers
- Pre-commercialization
- Funding and scalability
Spin-Out Companies
Spin-In Projects

WallMo

LapTics

Multi Tower
Spin-Out Project

UV-Disinfection Robot
Thank you for your attention!

ReconCell, Blue Ocean Robotics

John Erland Østergaard, Co-CEO of Blue Ocean Robotics
Contact: jeo@blue-ocean-robotics.com, see more at www.blue-ocean-robotics.com and follow us at LinkedIn.
Focus is 50/50 presentation and debate. I included John both to presenters and to debators. Will send you questions tomorrow. Anyway they will be based on reflections to presentations and advice to Lithuania, nothing too fancy and no special preparation needed for debate.

Presentation: 20 minutes for the presentation and 10 minutes questions/answers
Questions Edgaras

From BOR we wanted as much as we can about Digital Innovation Hubs, EU strategy, how BOR became a hub, what it means to be a hub, how BOR plans to expand as a hub, what challenges it faces, what HUB services provides. Ideally - how it differentiates between BOR as a private company, and BOR as a hub.

We definitely need broader perspective than only BOR or only Odense. Imagine that John is talking not only on behalf of the company, but on behalf of all digital innovation hubs for robotics "movement" :)

From Joost we expect to talk about the whole ecosystem in Odense, about robotic cluster, where BOR is also part of it, also about investment decisions the city needed to make, maybe even bold statement: "from nearly dead shipyard industry to flourishing robotic cluster".
RoBi-X

RoBi-X is a range of partnership programmes for co-creation of robotic solutions, incl. design, development and commercialization.

RoBi-Design
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- Business case
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RoBi-Go-To-Market
- Standardization
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RoBi-Develop
- Product development
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Blue Ocean Robotics
Other possible slides
Odense Robotics
Odense Robotics is Made Up of More than 170 Organizations and Businesses

Companies

- Robot / Components
- Automation
- Specialized Partners
- Others / Advisors

Education

- University of Southern Denmark
- Lillebaelt Academy
- Technical College of Southern Denmark
  - Tietgen School
  - Kold College
  - University College Lillebaelt

Knowledge & Research

- University of Southern Denmark
- Lillebaelt Academy
- Research and Technology Organisation (RTO)
  - Danish Technological Institute - Robot Technology
  - DELTA
  - Alexandra Instituttet
  - Force Technology

Financing

Clusters & Networks

Odense Robotics, 2015
Odense Robotics

THE TRIPLE HELIX OF INNOVATIVE AUTOMATION PRODUCTS

SECTOR PUBLIC
- Odense Robotics
- Invest in Odense

SECTOR BUSINESS
- More than 80 Robotic and Automation Companies in Odense

SECTOR EDUCATION & RESEARCH
- The Maersk Mc-Kinney Moller Institute for Robotics
- Technological Institute
- Robocluster

Odense Robotics, 2015
The companies expect growth from the current 1,800 employees to more than 3,000 in 2020.

**Odense Robotics, 2015**
Odense Robotics

**Odense is among the 10 major hubs for robotics in the world**

- **30+** Higher Education Programs
- **80+** Robot & Automation Companies
- **10+** Clusters & Networks
- **10+** Knowledge & Research Institutes
- **2200+** Jobs in the sector

Odense Robotics, 2015
Odense Robotics

ODENSE ROBOTICS HOUSES AN ECO SYSTEM OF DIFFERENT BUSINESS STRATEGIES

Odense sees successful companies of all four types. Optimize your current position or follow one of the paths towards a new business strategy.
THESE INNOVATIVE COMPANIES WERE CREATED IN COLLABORATION WITH SCIENCE

Bandcizer
Corepath Robotics
Sensohive
Scape Technologies
TriVision
Odico
Amrose
Universal Robots
Mobile Industrial Robots
Lindø Welding Technology

... IN ODENSE, AMONG THE 10 MAJOR HUBS FOR ROBOTICS IN THE WORLD
Odense Robotics

EXPLANATION EXAMPLE
18% of manufacturing firms has an automation degree of 45% and thus has a potential of automation of 55%.

MANUFACTURING COMPANIES THAT ARE AUTOMATED

90% 11%
75% 1%
60% 4%
45% 9%
30% 18%
26% 1%

DEGREE AND POTENTIAL OF AUTOMATION IN DANISH MANUFACTURING COMPANIES

- Denmark has the 5th highest robot density in the world.
- Nevertheless, Danish manufacturing companies still have a large potential for further automation.
- The blue colours illustrate the potential for automation and the inner white colours illustrate the percentage of companies which at present have automated the production to a certain degree.

Copenhagen Business School, April 2013
Odense Robotics

Automated increases production in Denmark

“We hear from union representatives, that utilizing new technology has actually generated more jobs because there is more to do.”

Mads Andersen
Union representative for 3F’s Industry Group

“In the future there will also be a need for people to operate the robots.”

Mads Andersen
Union representative for 3F’s Industry Group
Digital Innovation Hubs in I4MS

Key components

• Passionate enthusiasts with long endurance

• Embrace “circus family” and “diversity”
  - avoid “them and us” culture,
  - especially “prejudice” btw. commerc./acad.

• Create cash-flow, funding, value

• Build on existing strong local positions
  - in industry and in academia

• Triple Helix
  (commercial, academia, government/NGO)
Status on few-of-a-kind production

- Only ca. 15% of production is performed by robots
- Robots are used primarily for large batch size production
  - Most SMEs do, however, also ‘few-of-a-kind’ production
- Set-up times for robotic workcells are long, hence robot solutions are expensive
  - Require engineering knowledge about assembly processes
  - Require programming skills
  - Vision is still an issue
  - Require a lot of fine-tuning by trial and error
- Especially SMEs avoid the use of robots because of these complexities and costs
- Assembly is still done manually
- Production moves to ‘low wage countries’
- Risk: Engineering knowledge follows production
Objectives

- Design a new kind of an **autonomous robot workcell**.
- Attractive not only for large production lines but also for **few-of-a-kind production**, which often takes place in SMEs.
- Based on new technologies including **programming by demonstration, visual monitoring, automatic reconfiguration and executing** assembly operations in an autonomous way.
- The workcell can be nearly **automatically reconfigured** to execute new assembly tasks.
Thank you for your attention!

ReconCell, Blue Ocean Robotics

Claus Risager, Co-CEO of Blue Ocean Robotics
Ecosystem Assessment

I4MS sees an “Innovation Ecosystem” as complex structures formed by interactions of the participating community with an environment. A healthy ecosystem

- can thrive and grow
- regulates itself and adapts to market changes
Ecosystem Assessment

Regional Digital Innovation Hubs should

- use the network in their respective field to organically develop and grow the European digital innovation ecosystem for manufacturing companies
- bring new competence centers together with relevant regional manufacturing SMEs
- provide any manufacturing company in Europe with access to the most sophisticated digital technologies and competences
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*ReconCell establishes an End-User Manufacturing network that the DIHs could make use of and should contribute to with their network.*
DIH business models and stakeholders

The stakeholders of an ecosystem community can be:
- Industry participants
- Start-ups
- Collaboration institutions
- Technical and business services

The community is interacting with the following environments:
- core markets as main environment
- adjacent markets from which know-how is shared
Information about I4MS DIH-ecosystem; presented by Ales

**DIH business models and stakeholders**

- I4MS’ new business model refers to the way an organization, e.g. an SME, makes money.
- The DIH should bring innovative technology solutions in the field of manufacturing to SMEs so they can experiment and try to work out new ways to access the market.
- ReconCell and HORSE (?) have both pilot factories that analyze the integration of new technologies into manufacturing SMEs
- ReconCell and HORSE have Open Calls for additional pilot factories next year, the DIH’s feasibility study and feedback will be important for the process
DIH business models and stakeholders

The Digital Innovation Hubs should take their analysis from the proposal and further focus on:

- Identifying and assessing the potential ecosystem and its stakeholders including research organizations and firms (supply and demand)
- Preparing a business plan on how to develop their DIH
- Organizing innovation activities with local and regional administrations and industry, including an investigation about possible funding sources
- Describing a business model and their possible services
- Analyzing the added value of the DIH on regional, national and international level, especially by developing 3 use cases
- Planning on how to continue after mentoring