**Summary Critical Mass Regional Self-Assessment iWatermap**

*Location: Water Authority Friesland, Fryslân plein 3, 8914 BZ Leeuwarden*

*25 of September 2018 09.00 - 15.00*

After an introduction of all participants from the six European regions, Pieter de Jong, EU Representative for Wetsus and WaterCampus Leeuwarden, outlined the knowledge-based innovation system of water technology in Friesland, a province in the northern part of The Netherlands. The goal is to show some lessons in making innovation systems more effective to the six participating regions in the project iWatermap which consider water as a RIS3-priority.

Since fifteen years organisations in Friesland have been building and enforcing the water technology ecosystem in an EU non-heart region. The WaterCampus consists of three fundamental parts: (1) Wetsus, European Centre of Excellence for Sustainable Water Technology (breakthrough research); (2) CEW, Centre of Expertise Waterechnology (demonstration and upscaling); and (3) Water Alliance (cluster organisation).

Key elements are:

* In Friesland there is no university which plays a key and dominant role in the knowledge infrastructure. In 2000 the province of Fryslân decided to specialise in water technology to support the growth and development of the sector. Friesland was already home to several successful SMEs, such as Paques, with its headquarters in Balk (southern Friesland) and global leader in anaerobic water treatment technology. These SMEs needed more technical know-how to remain at the forefront. Therefore, the need for more fundamental and applied knowledge and skilled staff was business driven. Fryslân also had the first mover advantage and was considered a neutral ground by the different participating universities.
* WaterCampus invested in a balanced mix of public and private funding of its activities and infrastructure of water technology. Public funding had been made possible by combining regional, national and European funding programmes. This way more critical mass could be generated by combining participation from different public parties and funding types. Connecting local and international funding was an important factor. Wetsus created a business model in which various kind of SMEs and multinationals pay in cash to participate in the industry driven research programme, which executes breakthrough research and provided the latest knowledge.
* An essential factor of the WaterCampus is the long-term investment in developing a human capital roadmap, which provided study and career possibilities for any age and education level, varying from pupils to PhD students. The geographical concentration of the relevant active organisations within the ecosystem of WaterCampus made this integrated lifelong learning programme possible. Also, - more recently - the Centre of Innovative Craftmanship Water (CIV-Water) has been established which is essential for providing vocational education and training facilities (VET). In this way, water technology became accessible to a broader part of the student population and labour force. The availability and accessibility of the state-of-the-art facilities are of essential importance.

*The purpose of the following part is that the regions present their activities and strategy to develop a water technology innovation ecosystem and the challenges they are facing. All six regions presented a regional self-assessment, followed by answering questions by the participants. After the discussion, Miranda Ebbekink from consulting group Lysias provided structure and guidance, by reflecting on the regional self-assessment presentations and handed out an A4 evaluation form, based on scientific and theoretical literature.*

*These various studies and analysis form the basis for future strategies, policies and investments, to improve the innovation ecosystems, the water management and the potential for water technology SME and talent within the region. These analyses can provide excellent input in the current assessment of RIS3 strategies and operational programmes for European Regional Development Fund (ERDF). Through these analyses the participating regions become more aware about the regional potential and opportunities, which can be strengthened through current and future RIS3 strategies and ERDF policies and programmes. In this way iWatermap delivers on the promise to enhance the critical mass development of innovation ecosystems, while providing clear advice on how to improve regional innovation strategies and policies.*

**Crete (Greece)**

*Short introduction region (by Lila Karali, MSc Chemist)*

Crete is an island in the Mediterranean Sea with approx. 630.000 inhabitants (which is very similar to the province of Friesland). Agriculture and tourism play a dominating role in the economy. Especially there is a high water demand for agricultural purposes (81%). The hot summer of this year emphasized the urge of investing in the availability and more efficient use of water with the right quality and quantity.

*Evaluation strengths and weaknesses:*

Strengths:

* Availability of a technical University
* There is a huge water demand both from agriculture and tourism on which the economy of Crete largely depends. Therefore, efficient and effective water use plays a key role for further economic development.

Weaknesses:

* Sea water intrusion is a problem, leading to salinization of the underground water reserves. There is also water loss during irrigation. In addition, there are water losses due to the ageing of the water infrastructure.
* So far, there is no intensive cooperation and coordination among business, research institutions and government in the water field and especially in the area of developing a water technology innovation ecosystem.
* Momentarily, there are not many students studying specifically for water technology related jobs. The current level of vocational education and training in Crete is rather low.
* At this moment, there are many small organisations buying water technology for their problems; a few companies want to actively innovate, develop and sell solutions.

*Advice Lysias*

* Try to establish consortia of similarly minded companies willing to grow into solution providers and learn from regions dealing with the same issues (borrowed size strategy). Start a partnership, so you can profit from a wider range of researchers.
* iWatermap can help Crete to find its niche, what’s the competitive advantage?
* Look into blending (funding synergies) as a way to increase funds to strengthen the water ecosystem.
* Consider investing in inter-institutional collaboration and alignment of market demand and educational profiles. Take a closer look at the example of WaterCampus Leeuwarden. Create awareness of the expected shortage of students and initiate a mind-shift of the parties involved in water technology. This way also career perspectives in this area can be improved.

**Latvia**

*Short introduction region (by Janis Rubulis from Riga Technical University)*

Riga Technical University has compared its ecosystem to the complete infrastructure situated in Friesland. Rubulis concluded that two links are missing: there is no availability of facilities in vocational education and training and no business education for labour force apart from the university. There are 6 research fields in which water technology forms an integrated, but hidden part of the education profile (i.e. materials, processes and technologies). Latvia’s main goal is to establish a water technology knowledge triangle connecting scientific institutions, government and business for long-term cooperation.

*Evaluation strengths and weaknesses:*

*Strengths:*

* There are some good efforts in the educational system, including a water research laboratory and cooperation with industry (water treatment, waste water treatment and bio-energy production from waste) and a talent programme. Excursions and water lab trips are organized to schools. Also, there is a start of a water technology master thesis.

*Weaknesses:*

* Ageing population and brain drain; too many employees have reached 50 years or more and many skilled students choose to work abroad. Latvia can expect a shortage of talent in this specific field due to its ageing workforce.
* There is a lack of interaction and coordination between research institutions and business, as well as a lack of available resources for companies to accelerate and support R&D activities.

*Advice Lysias:*

* Use a regional lens and try to analyse why educational parties are involved in a limited way to solve the problem. Try a pilot in creating a vocational education and training programme with dedicated internships.
* Assess the sense of urgency and try to adapt the current educational programmes (symbiotic interdependency). Education is currently not actively involved.
* Be sure to include civic entrepreneurs to establish direct communication with funding agencies and improve interinstitutional collaboration.
* Make quantitative and qualitative indicators in monitoring.

**Murcia**

*Short introduction region (by Pablo Flores and Angel Martinez)*

Murcia - situated in the southeast part of Spain - is the driest part of Spain and is therefore facing many problems as a result of water shortages, especially after a long dry spell such as the last few years. Special attention is paid to the entity ESAMUR which is the regional entity for sanitation and waste water. This network has been established by the General Directorate of Water which is working on a plan of cleaning and purifying waste water with a total investment of appr. 180 million euros.

*Evaluation strengths and weaknesses:*

*Strengths*

* Education institutions, ranging from VET schools to universities (there are 3 universities in Murcia, out of which 2 are private), are actively involved in providing water technology related education to students.
* Murcia has a broad experience in setting up European water research and demonstration projects.
* There is mutual awareness among the stakeholders and there is no shortage of students to engage in excellent career opportunities.

*Weaknesses*

* There is an overkill of institutions in the area of the agro food network. As a result, there is confusion about which organisation is in the lead, for instance concerning the topic of water technology.
* There is a gap between student education and market demand. The region has the right technology centres, nevertheless forecast for jobs and skills needs can be improved.

*Advice Lysias*

* Create one voice, visualize all the interests of the stakeholders and invest in improving mutual relationships of the institutions which are actively involved in the water system.
* It would be wise to invest in more robust coordination mechanisms and establish clear indicators for monitoring and reflexivity.
* Consider investing in inter-institutional collaboration and professionalize mechanisms for continuous learning.

**Northern Portugal**

*Short introduction by Madalena Alves from Minho University (Centre of Biological Engineering)*

This region with approx. 3,7 million inhabitants wants to focus on acting in more international projects and wishes to establish a well-developed system of vocational training facilities in order to improve the skills of its students and labour force. Furthermore, Minho University aims to improve clustering and wants to expand its international activities. Although, water and water technologies do not seem to play an important role in RIS3 strategy at this moment. Water was seen as an environmental parameter instead of a RIS3 topic itself. Participation in iWATERMAP could help to support water technology as an official RIS3 topic. The extremely dry Summer of 2017 in Northern Portugal has also placed the importance of water higher on the political agenda.

*Evaluation strengths and weaknesses*

*Strengths*

* The region has a wide range of regional higher education institutions (3 public universities, several private universities and 4 public polytechnic institutes) and there is inter-university collaboration. Furthermore, the Centre of Biological Engineering organizes several accessible events, such as the Science and Technology Week, Summer in the Campus and ExpoBiotec.
* The region already has experience in setting up strategic partnerships with international organisations, i.e. with the MIT Portugal Program, which links the region with the Massachusetts Institute of Technology.
* The northern region is topping the list of patent applications from Portugal.

*Weaknesses*

* There is a low level of integration of regional science & technological system entities and organisations in international partnerships and European project and programmes.
* The level of business cooperation is low and there is a great demand of market diversification and business intelligence.
* The region lacks specialized people in the area of water technology and there is a low range of educational training facilities. Also, the number of Portuguese PhDs integrated in private companies is rather low when compared to European averages in other member states.

*Advice Lysias*

* Ensure technology transfer and investigate precisely how hindrances can be eliminated in order to improve the integration of PhDs in private companies.
* Put more effort in niche-specific coordination activities and consider to invest in improving inter-institutional collaboration and alignment of market demand and educational profiles. Take a deep look at the possibility to provide courses at high schools and vocational schools.
* Consider to make a start with building a cluster organisation and register water in policy priorities, make this explicit in a long term approach.

**South Moravian Region (Czech Republic)**

*Short introduction region (by Jihomoravský Kraj from Czech Renewable Energy Alliance (CREA))*

South Moravian Region has a population of almost 1.2 million inhabitants; the statutory city is Brno with 380.000 residents. Its RIS strategy is based on 4Cs + C: Competitive advantage, Choices, Critical mass of resources and talent, Collaborative leadership and Common sense. The region didn’t include water technology in the RIS3-strategy, but considers the following challenges and tasks in the water sector as a priority, such as water treatment, treatment of sludge, green infrastructure, floods and counter measures, technology innovation and to be adaptive to potential exterior situation as a result of climate change (drought, erosion). Although, the regional government included water technology in an alternative strategy ‘the JMK Strategy 2020’.

*Evaluation strengths and weaknesses*

*Strengths*

* The region consists of educational institutions at different levels which are actively involved in water developments. Besides that, investments have been made to make continuous learning possible and furthermore biological camps are organised for talented high-school projects. Since 2017 the region has been involved as partner in ‘Climate Green’.
* There is some potential in strengthening cluster majority with neighbouring regions and the existence of critical mass in the industry sector. Moreover, there are good examples of MSC’s that play an important role in the field of hydro & energy.
* The region has gained some experience in international water technology related projects in various fields, such as climate change and agriculture.

*Weaknesses*

* The interconnectivity between business and academia is not optimally organized.
* There is a lack of coordinative efforts to align educational levels with specific institutions.

*Advice Lysias*

* Professionalize mechanisms for continuous learning, monitoring and reflexivity and create an ecosystem which makes clear which party can act as a change agent and thus can improve the strategic positions of the various cluster organisations.
* Aim for collaboration between several clusters of neighbouring regions in order to discover interesting new niches. It would be wise to put more effort in cross border cooperation. Focus on internationalisation.
* Pay more attention to develop mechanisms in order to improve collaboration between business and academia.

**North-East Romania**

*Short introduction region (by Simona Popa, member of the North-East Regional Development Agenda (RDA))*

North-East Romania considers ‘safe and clean water’ as one of the 4 societal challenges in its RIS3 strategy and wants to find solutions with Q4 representatives. Therefore, RDA wants to specialise in pollution and water recovery technologies and to set up an industrial water monitoring and management system (Energy & Environment). The region wants to develop innovation competences for future generations, support innovative enterprises and to be supportive in clustering initiatives and internationalisation.

*Evaluation strengths and weaknesses:*

Strengths:

* There is a high number of PhD’s and doctoral schools in North-East Romania and most of them choose a technical profile. There are many research centres and higher education institutions, as well as various centres of excellence.
* The environment engineering and impact assessment research centre offers a wide range of research directions related to water management.
* The region puts some active effort in launching customership.
* The region was the first region in Romania to develop a dedicated RIS3 strategy.

Weaknesses:

* More than 60% of North East Romania is not connected to water-sewage service due to its overall rural landscape.
* There is a lack of an organizational framework to facilitate collaboration and communication among stakeholders (over-clustering) and the coordination is weak between authorities at national and regional level. As a result, the region experienced some delay in the implementation of the RIS3 process.
* Insufficient development of environmental technologies and management tools.
* There is no framework for connecting employers with universities in order to improve practical and entrepreneurial abilities. Consequently, the level of technological transfer is low.
* Ageing of staff.

*Advice Lysias*

* It would be wise to delineate the tasks and responsibilities between RDA and cluster management organisations (who is the authoritative power, who is coordinating?). Ensure a policy learning loop.
* Furthermore, for professionalising the water ecosystem it is necessary to pay more attention to developing mechanisms for continuous learning, monitoring and reflexivity.
* Prevent over-specialization and try to come up with more pragmatic ways to ensure strategic learning and timely updates of niches.
* Institutional entrepreneurship is needed; try to find civic entrepreneurs.

*After all the presentations have been given, Miranda Ebbekink from consulting group Lysias continued by giving an overview of theoretical backgrounds for strengthening innovation clustering facilities. She provided all the participants the following lessons (which is not limitative):*

* The series Silicon Valley show a perfect example of how different cluster stakeholders are both competing and cooperation to gain economic success. These two elements are essential for a business ecosystem. It’s a must see.
* There should be more focus on follow-up projects. It is important to incorporate mechanisms for continuous learning, monitoring and reflexivity established in the ecosystem (e.g. data on patents, continuity in project consortia etc.). Qualitive and quantitative indicators to establish success are not always mentioned; they are essential for creating a continuous process improvement carrousel.
* In some regions water technology is not always explicitly specified as a priority within the RIS3 strategy. For this reason, change agents are needed to update the strategy and create a leeway to influence the strategic framework of the regions.
* Strategic coordination and system learning capabilities are needed to find out what’s your own niche and promising cross-overs. It’s important to interact with external competitors, otherwise the critical mass is solely based on internal points of view. In this way, you are in a better position to find your competitive advantage. It is recommended to visit other companies outside your ecosystem.
* Build a brand around the history of a region. Create a common identity and stimulate cooperative behaviour to strengthening and adopting common branding.
* Be aware of the risk of being a ‘cathedral in the desert’, which means do not only care of appearance, but pay special attention to the interaction of supportive mechanisms “under the hood” within the innovation ecosystem.
* A cluster leadership means that a different set of competences is required. Make these explicit and address this to the relevant players within the ecosystem. Make explicit who is steering the wheel and avoid confusion of tongues.
* It is essential to establish a cooperative and co-creative culture where there is an atmosphere of trust among the parties established for making failures (learning culture from failures). Create an open atmosphere, make accidental meetings (create serendipity) and give space to entrepreneurial discovery (turn good intention to positive action).
* Embrace embedded natives; they feel home in different institutional worlds and they can perfectly act as a linking pin. Be aware that the organizational bigwigs are not always acting as the top of the bill.
* Leadership 2.0 means civic entrepreneurship. Civic entrepreneurs are ‘the worker bees’ - those deeply committed to the daily goings-on in the cluster. They safeguard the cluster effort’s continuity and they aim to redirect followers by inspiration, not by power. Its leadership cannot be formalised: relationships, timing and flexibility are the key.
* A well-developed innovation cluster performs as a collective organisation, is cross-institutional, prefers informal leadership and has a well-balanced leading structure. In such a system, mechanisms create awareness amongst cluster enthusiasts of the much-needed paradigm shift from hardware to soft- and orgware - acknowledging the cruciality of co-production as true ongoing synergy in ever-changing collaborative (policy) actions.
* Be aware of 4 power sources for strengthening leadership within clusters:
  + Referent power; ability to gain personal approval and loyalty based on charisma (Steve Jobs as role model);
  + Expert power; knowledge based on expertise and skills (Einstein);
  + Interpretive power; ability to utilize information, persuade and redirect knowledge in order to create new mindsets (the discourser);
  + Network power; ability to employ and exploit contacts on personal relationships (networker).

*Ebbekink ends her informative presentation by offering several interesting articles and papers on creating and perpetuating a robust innovation ecosystem.*