

Empower Academia for Knowledge Transfer for Value Creation in the Atlantic Area

National Bootcamp: France

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- a) profile relevant Blue economy sectors at national level, enabling benchmarking and future comparisons;

The French National Bootcamp was organised at the Station de Biologie Marine de Concarneau. This is the oldest marine station of the world which remains active and is a key actor in knowledge transfer in the blue economy. The bootcamp gathered members of the triple helix such as local councils' representatives, companies' CEO and academic researchers in order to discuss about collaboration opportunities and knowledge transfer in the blue economy and specifically in the marine **bioinspiration** sector. This field is having a great economic potential and can be very useful to mitigate climate change. Bioinspired materials can be applicable to different fields such as health, engineering or biofouling. The participants were experts in these fields and had the opportunity to present the state of their researches or innovations.

Bioinspired materials are very promising for the **health sector**. Indeed, participants could show that their innovations can face up different types of diseases and pave the way for new curing methods. For instance, one of them presented a pump inspired by dolphin movements capable of helping to cure cardio vascular diseases. Another one has created a company which is using jellyfish cells for regenerative medicine applications. These examples

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show that the maritime environment can inspire companies to innovate in the health sector. Furthermore, bioinspiration can also be used to **engineer** different types of machines such as underwater robots or marine infrastructures mimicking biological structures. Fouling has always been challenging navigation and marine infrastructures. Current antifouling materials are highly polluting and dangerous for the environment, some participants could present **biobased antifouling solutions** during the bootcamp, which were more efficient than traditional antifouling.

France has a great potential to develop innovations in the field of the marine bioinspiration. For instance, it is the **second largest maritime territory** in the world and it contains up to **10% of the known species**. Some of the universities offer study programmes for this field such as the Université de Bretagne Occidentale and **175 research teams** were identified in this field at the national level. However, Germany is a leader in this area and has a much denser network of involved organisations.

b) Identify needs, market opportunities and trends

Bioinspiration is growing as a field of research and as a market in France. The participants of the bootcamp showed their enthusiasm considering this growth and the opportunities offered by the biomimetic sector. The participants highlighted **the environmental needs** to invest in bioinspiration and to replace some environmentally dangerous technologies. This key element pushes **French authorities to support the development of biomimetics**. Indeed, the ministry of economic transition and solidarity is favouring the growth of the sector through the organisation of scientific conferences, meetings between industries and academic researchers or the communication of biomimetic results in the society at different levels through international conferences. One partner of a society of knowledge transfer specialised in the field mentioned that **scientific publications grew exponentially** in the past few years, showing that there is a growing interest from the scientific community. Innovation and market potential exist in various fields; however, a lot of the existing knowledge are still at a **very early stage level**. Although, some firms find a way to commercialise their product in **niche markets**.

c) Profile main barriers of communication and relationship between the Triple Helix players in order to determine the most suitable subjects and materials that should be provided to Academia researchers, so that they will be capacitated to mitigate such barriers and foster cooperation

Across the two days, most of the actors mentioned the fact that they were cooperating with other research or private organisations. However, cooperation was often done **with similar organisations**. This was very common for private firms which collaborated efficiently with other private firms in order to lead researches in consortium and to develop a new product. The barriers to cooperation can be explained by the following points.

During the bootcamp one participant mentioned the fact that his SME had to collaborate with a large French company to develop antifouling solutions. The cooperation was very

efficient and they develop a product with a high potential value. When they were questioned on possible relationships with universities and research centres, the participants explained that the large company with which they collaborated disagree to cooperate with public research bodies to be able to keep the results of their research private. Thus, it appears that companies prefer to work together than with universities because of the **lack of trust** in public research. We can assume that companies prefer to keep the results of their research private in order to keep a **comparative advantage** on the market. This fear is also linked with a second point highlighting communication difficulties between universities and private firms

During the bootcamp, one of the striking elements showing differences between universities and public firms was the aim of their research. When researchers in the bioinspiration were linking their research with societal aspects, private firms focused on the **profitability of their product**. Some of them mentioned that they do not look for extending common and public knowledge but to create profits. Thus, there is an important divergence in the way actors see the aim of their researches. This difference can be seen as being linked with the **institutional organisation** of each structure.

Finally, another structural difference was mentioned several times which is the **cultural difference between universities and companies** when they collaborate with each other. For example, working time habits can be a problem as companies are more likely to work under time pressure than universities.

- d) Best practices on R&D, tech transfer and innovation promotion initiatives (financial and policy) in order to get information on concrete tech transfer activities we should look at when preparing our learning materials and the acceleration methodology.

The bootcamp was an occasion for participants to present collaborative projects and experiences in knowledge transfer. Several examples showed that many actions and projects could be considered as best practices. We identified several types of best practice. It appears that **public funded projects** are quite efficient in terms of fostering collaboration and knowledge transfer. Then, organisations in the biomimetic sector seem to play an essential role in France regarding knowledge transfer capacities in this field.

First, some of the participants were already involved in other public funded projects in which they could collaborate with other types of organisations. For instance, one participant was a partner of the MARINEFF project which is funded by the **Interreg France Channel England** programme. In their consortium, universities, public authorities and large companies were present and their collaboration was successful to develop marine bioinspired infrastructures. Besides European projects, other participants got already involved in national and regional public funded projects in which they could collaborate with different organisations. For instance, one member of the project MANTA - MArNe maTeriAls: Development of bio-inspired and sustainable (bio)materials to lower the marine environmental impact, explained how its university collaborated with other actors such as private laboratories. This project is financed by the national programme called **Le Programme d'investissements d'avenir** and gather institutional, academic and private actors. Despite the cultural gap between both organisations, the collaboration was working quite well in the

framework of the project. Overall it appears that the creation of consortiums through public funded projects can foster cooperation and thus knowledge transfer between different types of organisations.

In addition, several organisations are having a key role in knowledge transfer in the biomimetics sector such as business innovation centres and **public infrastructures** involved in knowledge transfer actions. Indeed, one of the latter has created different tools allowing researchers and industrials to find partner in the bioinspiration sector. In France, it is a major actor capable of creating brokerage events and link actors with each other to boost innovations, knowledge transfers and collaboration in the blue economy. Besides this public actor, a relatively young **BIC** is now an important actor permitting the creation of new consortiums composed of private and public stakeholders. However, the members of this BIC receive only a few percentages of funding from the public sector, which was viewed as a weakness for its development.

- e) Identify innovation policies and R&D&I capacity to support development, as well as current constraints for innovation, including key areas requiring funding intervention, so that the consortium can provide information and suggestions to improve such policies at national level.

Some researchers mentioned the fact that public administrations were not supporting enough the development of biomimetics. This can be due to the lack of knowledge in the importance of the marine environment. One of the researchers present at the bootcamp explained that biomimetics and marine biology should be taught in university programs preparing students to work in public administrations. Consequently, the importance of the sector will be supported by decision makers who would be much more aware of the importance of marine biology. The strengthening of biology in training programs could be suggested by the EMPORIA4KT project to improve national research and technology transfer policies. This could also be done through continuing education sessions.

Moreover, the lack of public administration support toward organisations allowing knowledge transfer has been highlighted by participants during the event. This would be a key area where funding interventions are needed.

SWOT ANALYSIS

Strengths (of the national TH stakeholders ecosystem)

- Strong network of key organisations for knowledge transfer in France
- Around 124 biotech companies are located in Brittany and Pays de la Loire
- Strong research sectors for the blue economy and bioinspiration at the national level
- Cooperation between the members of the triple helix are already in development, especially through public funded projects
- Regular organisation of national networking events in the bioinspiration

Weaknesses ((of the national TH stakeholders ecosystem)

- Lack of financial support from public administrations for innovations in the bioinspiration
- Companies working in this field remain small
- Lack of industrialisation in the bioinspiration
- Weaker cooperation of companies in European projects
- Cultural gap regarding working systems and research aims between universities and companies

Opportunities (of the national TH stakeholders ecosystem)

- Important potential of development in the French maritime territory
- Demonstrated support from the French state to innovate in the bioinspiration and to support companies
- Great number of biomimetics' future applications allowing to link many actors from diverse areas

Threats (of the national TH stakeholders ecosystem)

- Companies working in collaborative projects are more likely to work with other private firms
- Study programmes in biomimetics remain low
- Lack of knowledge from public decision takers in marine biology
- High competition with other countries such as the US, China and Germany

GENERAL CONCLUSIONS

The French National Bootcamp was a great opportunity to discuss about innovations and collaborative projects in the bioinspiration with the members of the triple helix. It allowed each type of actor to express their views on their experiences. Overall it appears that the biomimetics sector is in development and collaborations are boosting this growth. Participants showed that the research sector is doing advanced researches on different applications allowing innovation possibilities in various fields. There is a growing network of SMEs commercialising products based on bioinspired research, and public administrations have a positive attitude toward the development of cooperation to foster bioinspired innovations.

Regarding knowledge transfer, the bootcamp confirmed that some of the limits, that the EMPORIA4KT is facing up, are existing in France such as the cultural gap between firms and universities. Although, the cultural gap has been mentioned by participants involved in collaborative projects, this barrier did not stop the creation of projects and stakeholders are learning to deal with this limit. It appears however that knowledge transfer can be hard to be done as firms prefer to collaborate with other firms than to initiate a collaborative project with academic stakeholders.

Public funding appeared as a key element allowing knowledge transfer and the bootcamp demonstrated that efforts need to be done to influence public administration to

finance organisations working on knowledge transfer, develop specific funding to the blue economy sector and foster cooperation through public funded collaborative projects, which seem to be a solution to link different actors and overcome knowledge transfer traditional difficulties. Generally, efforts must be made to bring actors closer to each other and foster efficient innovations.