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Industrial and institutional views on eco-innovation: synthesis of the round table

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INTRODUCTION

This chapter synthesizes the round table chaired during the last part of the workshop by Pr. Bernard YANNOU with six industrial and institutional participants, whose short biography is provided below. The objective of the round table was to confront the research work presented in the previous parts of the workshop with the reality of companies and territories. Several questions were answered by the participants during one hour. The main messages are synthesized in the next sections.

First each participant was asked to present one typical example related to eco-innovation in his/her organization. Then the second part of the roundtable consisted in questions from the audience and from the chairman, before concluding on some key take away messages to academic researchers.

PARTICIPANTS TO THE ROUND TABLE

Chairman: Bernard Yannou (CentraleSupélec)

Bernard Yannou is a Professor in Design Engineering and director of the Industrial Engineering research department (Laboratoire Genie Industriel) of CentraleSupélec, France, where he also manages the Design and Ecodesign Engineering Research Group. His area of expertise is design automation,



design methodologies, product development, innovation engineering, ecodesign, artificial intelligence in design, design processes and organisation modeling. Bernard Yannou has conducted research for a number of industrial companies. He holds the chair of “Sustainable construction and innovation” of Bouygues Construction. He has supervised 23 PhD theses, authored or co-authored more than 60 international peer-reviewed journal papers, and coordinated 8 books on product design and innovation. He is member of the Advisory Board of the Design Society, member of the ASME, Associate Editor of the Journal of Mechanical Design, Design Science Journal, and International Journal of Design Creativity and Innovation.

Hélène Bortoli (ADEME)

Being an engineer in chemistry and urban planning, Hélène Bortoli-Puig has a 20 year experience in engineering, project planning in urban engineering, consultancy on international projects and environmental communication. Since she joined the French environmental agency ADEME (Agence de l’Environnement et de la Maitrise de l’Energie), she has been coordinating projects on environmental assessment and eco-design in the Product and Matter Efficiency department of the Circular Economy and Waste office.



Edouard Carteron (Steelcase)

Edouard Carteron joined the sustainability department of Steelcase in 2011 and has been an expert in design for environment for 4 years. After his Master of Science in mechanical and design engineering and Master's degree in Eco-design and Environmental Management (ENSAM), he had a first experience as an environmental engineer in the French wood and furniture Institute (FCBA). In addition to working on industrial Life Cycle Assessment studies and supporting the product development teams on the sustainability topics and on eco-design, he was also involved on the new developments about Water Footprint, helping Steelcase to position itself relative to this issue in the furniture industry.



Alexis Dousselain (Mairie de Paris)

Alexis Dousselain works at the Innovation and Businesses Office of the Economic Development Department of the City of Paris (Mairie de Paris). He is in charge of life sciences and green industries sectors (research, industries, SMEs). His area of expertise concerns incubators, funding, competitive clusters and experimentation. He has also managed the promotion of companies of this sector for the COP21 (2015 United Nations Climate Change Conference).



Laurent Greslin (Z.I. lab)

Laurent Greslin is an industrial designer who started his career by experiencing the work with various forms of matter. After graduating in cabinet making, he discovers forging and fire crafts. In 2002, he obtains a Master's degree in art and design (ESAD Reims), and learns glass blowing. Between 2003 and 2010, he manages the industrial design for the SEB group in the DELO LINDO consultancy. He creates his own design studio in 2010, called Z.I.lab., with the ambition to question and articulate his practice, from arts and craft to high-technology industry. Deeply concerned with issues on our production patterns, he proposes a designer's vision relating crafting excellence and mass production, eco-design and integration of relationship between stakeholders.



Pierre Tonnelier (PSA Peugeot Citroën)

Dr. Pierre TONNELIER is responsible of the Eco Design and Life Cycle Assessment team in the Environmental department of PSA PEUGEOT CITROEN since 5 years and has worked during 7 years on vehicle projects as an expert in recycling and vehicle end of life. He worked on many studies on Eco-design and DRF, and is member of the French network EcoSD.



Maxime Trocmé (Vinci)

Maxime Trocmé is the Environment and Scientific manager of VINCI group, in charge of environmental topics in the Corporate Social Responsibility approach. He is the coordinator of research and innovation works on eco-design projects, through the management of an eco-design Chair.



TYPICAL EXAMPLES OF ECO-INNOVATION IN THE PARTICIPANTS' COMPANY OR INSTITUTION

To introduce the round table, participants were asked to mention one typical example of eco-innovation in their company or institution (product, product line, initiative...). What were the incentives, the difficulties, and the constraints inside or outside the organization to develop it? A synthesis of each contribution is proposed in the next sections.

How does ADEME support eco-innovation?

Hélène Bortoli introduced a very simple example of an SME supported by the French environmental agency ADEME to develop an eco-innovative offer. This company, called MobilWood, is a shop fitter, producing chairs, tables, shelves... This company faced two major problems:

- Economic slowing down,
- Important waste of raw materials.

ADEME assisted MobilWood to develop an eco-innovative offer to reach more profitable markets. A Life Cycle Assessment of existing products showed the major environmental impacts, related to transportation, varnish and glue. The specifications for the new offer were thus to work on disassembly, to exclude the use of toxic substances and reduce the amount of wastes. Innovation emerged from the design of a new fixing system without glue and varnish, and without toxic substances. The business model was totally redesigned as this offer is now sold as a service and not as a product.

This example shows that even with limited resources, SMEs may eco-innovate. Eco-innovation emerged here from environmental constraints and economic difficulties of the company. The main barriers to implement this approach was to gain the adhesion of employees as it induced radical changes inside the company. Another difficulty to overcome this new business model based on product-service system has been to gain a higher understanding of clients' needs.



An eco-innovative stool for Steelcase

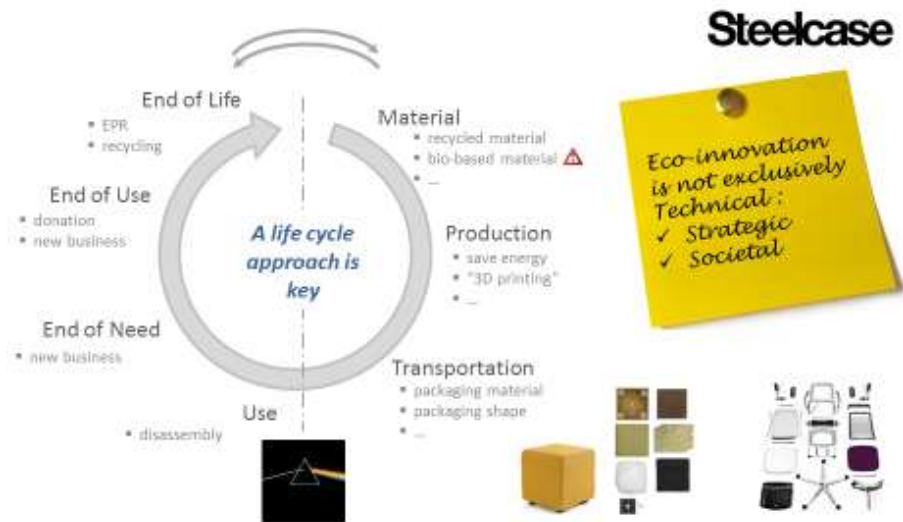
Steelcase is a leading company for office furniture and working space design. Eco-innovation is structured at Steelcase in three main axes:

- Life cycle thinking to avoid environmental impacts at each stage
- Particular focus on the use and end-of-life phases
- Particular focus on materials and their recyclability

Steelcase has also developed a take-back service at the end-of-life of products, which is now well known by customers and brings economic benefits.

Edouard Carteron chose to present the particular example of an eco-innovative stool for offices. This stool was redesigned from a previous generation with four targets: better quality, better style design, better sustainability and cost. During the design process, the focus was made on the end-of-life and materials. A recycled foam is used, whereas glue is not used anymore. The challenge was achieved, even if recycling could still be improved.

In definitive, eco-innovation at Steelcase is seen more like a step by step approach than a radical disruption in the particular context of office furniture.



Fostering eco-innovation in Parisian incubators

Alexis Dousselain works within the ecosystem of Parisian incubators (i.e. incubators developed and supported by the city of Paris) dedicated to green business and green innovation. Since Anne Hidalgo has been elected mayor of Paris, his role is to support SMEs development, but also to implement those green innovations in the space and the life of the city. An innovation network has also been created. It is noticed a growing awareness of the necessity to change current procurement process to foster public actors purchasing eco-innovation solutions for public spaces or in the context of public markets of Paris city.

Alexis Dousselain evoked the example of an SME, hosted in one Parisian incubator and producing natural grass. They developed a very innovative and resistant turf for stadiums, but it was also revealed particularly adapted for public spaces because of its really low water consumption. This turf was experimented in Parisian spaces. However some problems were encountered to include this kind of products in public procurement, as it contains non-organic elements whereas only natural floor can be bought. This case illustrated the reflection that needs to be initiated about public market rules to foster eco-innovations. The city of Paris is aware of the importance to provide eco-innovation insights on public purchases, however it is a hard task, because it is not possible to directly buy innovations from incubators.

In the future, the focus should be made to use more the innovative partners around the city, in particular start-ups and SMEs. The smart and sustainable city plan proposed by Anne Hidalgo goes in this direction by transforming Paris into a living lab to massively experiments products and services useful for cities.



MAIRIE DE PARIS 

Green innovation ?

- Reaching Paris' Climate Plan goals
- Useful to citizens and to urban life
- Ability to be implemented in concrete urban projects and to spread thanks to a viable business model

What City of Paris does :

- A willing support to local SMEs development
- Open public procurement to green innovation and to SMEs
- Integrate green products and services to urban projects
- Giving visibility to Green innovations

An eco-innovative chair by an industrial designer

Laurent Greslin is an independent industrial designer, founder of Z.I. Lab company. Z.I. Lab asks the question of production modes with a focus on territories. How to mutualize the forces existing on a territory, to allow the emergence of a “global and multi-technical plant”? When asking this question at the scale of a territory, eco-design and eco-innovation spontaneously emerge because transports distances are lowered. By extending this reflection, Z.I. Lab aims at working on project from the analysis of a life cycle. As an industrial designer, the most significant life cycle phase for Laurent Greslin is the use phase: how to extend it?

The chair proposed by Z.I. Lab is issued from these positioning. All elements are detachable, only mechanical connections are used. Certified wood is used for the base and wood machining is very simple. The shell is made of agricultural wastes (fibers of flax, nettle and plantain), developed in partnership with the technical center for wood, namely FCBA. The industrial process used to aggregate these vegetal wastes requires only 5% of resin (instead of 10 to 15% for regular composites). It is possible to adjust the color by changing the proportion of each fiber type. The cover is in thermos-molded felt that can be easily changed. All these elements are nestable that allows household use but also use in communities. The chair received two distinctions: the first prize of VIA (*Valorisation de l'Innovation dans l'Ameublement*), and a design label “*Observateur du design*”.

However the market is quite small for such a product, because manufacturing is not that easy and producers are not aware of this type of approach. But a self-production should be feasible. Advances should be obtained in the coming months.





Design for disassembly

L'innovation intervient dans l'usage d'une nouvelle typologie d'objets entièrement démontables visant à prolonger la phase d'usage, s'intégrant à la fois dans l'espace domestique et dans l'espace public.

Les qualités environnementales fortes identifiées par le FCBA lors de l'analyse de cycle de vie sont :

- Utilisation majoritaire de matières renouvelables
- Utilisation de déchets agricoles
- Démontabilité du produit pour le transport et le stockage
- Entretien du produit facile grâce à la coupe en feutre sensible
- Réparabilité du produit rapide par remplacement de l'élément de l'assise ou du dossier
- Matière certifiée PEFC / FSC
- Collocable - NB - 125
- Domestique

* Filière Construction Bois et Ameublement / Centre technique



How eco-innovation is structured at PSA Peugeot Citroën?

PSA Peugeot Citroën specifically works to include environmental aspects during the innovation process. The objective is to introduce methodologies to perform environmental assessments of innovations. Two types of innovations are considered: incremental innovations, that mainly concern small components of the vehicle, and structural innovations, that may have major impacts. Different approaches are used to include environmental considerations.

For incremental innovations, some specific tools are used, like:

- Checklists on substances (including future regulations)
- Tools focused on recyclability
- Simplified Life-Cycle Assessment (LCA) in some cases

Most of these incremental innovations are not eco-innovations as such, because they are not driven by environmental issues.

On the contrary, structural innovations are driven by environmental considerations from regulations (NOx or PM emissions from Euro 6 regulation for example, or CO2 emissions). Of course, all automotive constructors work on these aspects, however PSA Peugeot Citroën goes beyond the regulatory scope with a voluntary eco-innovation approach based on complete LCAs performed for each structural innovation. Performing these LCAs is a hard task because of the lack of information in the upstream phases of the innovation process, but it brings a real added value to propose more environmentally-friendly cars.



Eco-innovating in the construction sector at Vinci

Vinci is a global leading company in the sectors of concession and construction. It is a contracting company involved in all life cycle stages of buildings and infrastructures by financing, designing, building or operating them. There is no unique business model. So the challenge for Vinci is to create innovative tools fitting this organization of entrepreneur community and regarding environmental performance and eco-innovation.

That is why Vinci has launched in 2007 a scientific chair in eco-design with ParisTech academic cluster. MINES ParisTech considers building energy performance, whereas Ecole des Ponts ParisTech considers sustainable mobility and AgroParisTech biodiversity. Scientific results are available to all stakeholders (principle of corporate sponsorship). Open-source approaches are used to foster the dissemination of these results, because most of the time Vinci does not design the projects, but interact with architects or engineering companies.

Eco-innovative projects have been performed through this chair, for instance in the building energy performance domain. *Oxygène* project is a typical example and concerns the guarantee of the energy performance of a building, which highlights the importance of the design choices all along the life cycle. Generally, Vinci does not use the buildings they have constructed, so there is a clear need to measure the energy performance in a scientific and shared way. Lots of investors now want to be part of green building projects; this type of approach is also a guarantee for the finance sector. 50 major construction projects have already been carried out with *Oxygène*, representing 300 to 400 million euros of investment. It is implemented thank to a software designed by MINES ParisTech, with about 300 architects of engineering companies using it.

ARE ECO-INNOVATION AND ECONOMIC PROFITABILITY COMPATIBLE?

Once all the participants have proposed elements characterizing their involvement in eco-innovation, a general discussion was engaged through several questions. This discussion is synthetized in the next paragraphs under the topic: are eco-innovation and economic profitability compatible?

For Edouard Carteron (Steelcase), the company involved in an eco-innovation approach must be deeply motivated. A study from *Pôle Eco-conception* has shown that eco-design can bring profitability. At Steelcase, it is really difficult to quantify the benefits. Actually in B to B business like office furniture, all customers are interested by green products. However sustainable considerations are only one aspect in tenders, all along with costs, quality, delivery... It is thus really hard to know if the sustainable considerations proposed by Steelcase help winning the tender or not. About 80% of tenders now have sustainability concerns in this sector.

In the construction sector, only one main criterion is considered as predominant to the others: cost. So this is quite impossible to sell a more expensive building because it is eco-designed. The challenge is thus to give more environmental value for the same cost.

For Alexis Dousselain (Mairie de Paris), the question of economic profitability of eco-innovations is crucial. That is why the city of Paris has launched a global concertation about circular economy (*“Etats généraux de l'économie circulaire du Grand Paris”*) to associate private and public partners in order to develop circular economy, create economic activity and jobs, develop companies while saving public funds in a win/win situation. The objective is to prove that a smart and sustainable city is profitable for everyone.

As a synthesis of these first testimonies, it seems that if one is able to prove that there is an improvement of the sustainable performance along an increase in services, probably the projects in eco-innovation and circular economy would flourish.

As a continuation of economic profitability, the chairman raised the question of the importance of internet of things and big data analysis to solve this lack of proofs. For Alexis Dousselain (Mairie de Paris), it is clearly a way to solve many problems concerning environmental issues associated with innovative services and products. It is a very strategic area on which the city of Paris is working to develop innovative ways to get, manage and exploit these new data sources.

Another point raised by the audience to promote eco-innovation approaches deals with the connection between major companies and SMEs. Is there a role to play for big companies to be “mentors” in eco-innovation for small organizations? For Pierre Tonnelier (PSA Peugeot Citroën), large companies like PSA Peugeot Citroën have the ability to put some human resources on these subjects, and also to develop or adapt methods and tools to their organization. At its level, PSA Peugeot Citroën is also trying to push relevant information or knowledge to its whole value chain, including small partners, to involve them in eco-innovation approaches. However as these partners often design very small components on the scale of a car, it may be absurd because the environmental impact is not directly linked to their products.

Finally, a last question asked by the audience concerned the capacity of eco-innovation to reduce costs. Often what is asked by customers is cost reduction and not environmental improvement, while eco-design is a lever to foster innovation. Has some participant experienced eco-innovation as a lever for cost reduction? For Maxime Trocmé (Vinci), such approaches have been experienced on materials and conduct to remove a lot of concrete, leading also to cost reduction. Working on eco-innovations is in that sense a way to design low energy consumption buildings at the same price.

CONCLUSION: FINAL INDUSTRIAL AND INSTITUTIONAL MESSAGES TO

TAKE AWAY FOR ACADEMIC RESEARCHERS

Finally, at the end of the session, the chairman asked the participants to deliver a message to the academic researchers developing models in eco-innovation.

For Edouard Carteron (Steelcase), a lot of methods and tools have already been developed and experienced, however many companies are still not involved in eco-design and eco-innovation. Academia should work on this gap. On the other hand start-ups are often more committed than major companies. A second lead is to promote collaboration between researchers and large companies.

Alexis Dousselain (Mairie de Paris) underlines that Paris is and wishes to remain a major research center in Europe, and thus needs to develop tools to support researchers in the development of projects, companies and partnerships. Moreover there is a lack of indicators to characterize what a sustainable city is, how to design and manage it. Researchers are welcome to contribute on these subjects.

For Laurent Greslin (Z.I. lab), who is also teaching in an industrial design school, tools that are able to support an industrial design project with an understanding of environmental impacts and impact transfers are still missing, and should be developed.

Pierre Tonnelier (PSA Peugeot Citroën) asks researchers to continue their work in eco-innovation and to create more knowledge on how environmental concerns may be incorporated in the global value chain of companies. In other words, how to make environment a classical aspect of design, a theme amongst others?

Finally, Maxime Trocmé (Vinci), who used to be an academic researcher and is managing a scientific chair in eco-design, experimenting prototypes is crucial. Researchers should put more emphasis on experimenting, testing and validating their proposals, as companies like Vinci are ready to collaborate on these topics.

As a general conclusion, eco-innovation appears to be a noteworthy academic and field issue with already several notable successes.