

Behind-the-scenes of eco-innovation at renault: from collective action to breakthrough concepts

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Abstract The automotive sector is organized for mass production of complex products. Therefore, the reign of a dominant design is ineluctable. Nevertheless, carmakers shall bring to the market ground breaking products. How to solve this paradox? How to invite ideas, delve deeper into the best ones, conceive ground-breaking innovations and bring them to life in realistic prototypes? Renault proposal is to enable an eco-innovation community. This community shares three pillars: a common culture, original structures and collaborative practices. This work propose to provide a feedback of these pillars implementation. A common culture arise within the Renault Creative People network. They enhance original means of emulation (temporary expositions, social networks) to reveal ideas. An original ‘think tank’ structure gather engineers, designers and customer specialists: this is the Cooperative Innovation Laboratory (LCI). Finally, two Practices support eco-innovation activities. In one hand the Collaborative Life Cycle activities (Co-LCA) framework. It counts five steps: explore, engage, elucidate, evaluate and extend. In the other hand the landing process guarantee a successful implementation in vehicle development. Three case studies are described. The first one is a concept aiming to a crazy target “zero footprint mobility”; the second is the Renault Twizy Delivery concept to tackle ‘final kilometers’ logistics and the last one is the Electric Vehicle Footprint study. Our case studies confirm the needs to create new work-

places, new tools based on social network and new skills for managers-facilitators, such as flexibility, reactivity, empathy. Astoundingly, those skills are currently developed by online gamers! Could they be the future top manager of eco-innovation?

Keywords Life Cycle · Innovation · Creative · People · Collaborative LCA

1 Introduction

Renault [1,2] objective is “to make sustainable mobility a driver of global development and progress for everyone”. In 2011, Renault made a voluntary commitment to reduce the average carbon footprint of all vehicles sold worldwide by 10 % between 2010 and 2013. This is the very first indicator of its kind in the automotive industry worldwide. In one hand, innovations are a key lever to progress, on the other hand collective action needs to be organized. In 2014 [3], the target is successfully achieved, it is equivalent to a savings of 5.5 million tons of CO₂ eq.

This paper aims to provide an effective feedback on practices in terms of collective action to support an industrial group to reduce its environmental footprint. Several communications and two PhD works are synthetized and organized hereafter in three pillars: a common culture, original structures and collaborative practices.

2 Materials and methods

Automotive is a mass production industry. Regarding the large offer brought to the customer, the competition is very high. In this context, innovation is not an option. Hooge [4] points out specificities of innovation process such as creat-

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ing new relations to tackle uncommon technical field and new organization and decision schemes.

2.1 Eco innovation for mobility systems

Renault held a workshop in 2013 to describe what could be eco-innovation for mobility systems. Our conclusion [5] is that functional economy [6] embeds four main trends of eco-innovation. The two first ones are product oriented such as service economy [7] and eco-efficient design. The two others are territory oriented and comprise industrial ecology and circular economy. Those four trends have in common one fundamental requirement: collective action.

2.2 Collective action

A genealogy of collective action by Hatchuel shows its evolution from ancient Greece (people debate), Roman (laws creation), industrial time (entrepreneurs and shareholders investments) to current practices (stakeholders dialogue). Segrestin [8] precises that collective action needs to be organized. Gray et al [9] propose to build collective gamestorming on three pillars: structure, culture and practice. We propose to illustrate how an industrial group can develop those success factors.

2.3 Field of experimentation

This paper proposes a feedback from the Renault Group. This carmaker as launched several disruptive product such as Espace, Twingo, Scenic, ZOE, and Twizy. Since the beginning of this new millennium, the Group took the risk to strengthen collaborators' creativity culture, set up new collaborative practices and build specific structures. This enables the emergence of valuable innovations through stakeholder engagement.

3 Results

This chapter will illustrate actions taken to create culture, structure and practice in the field of eco-innovation. Four emblematic examples will be presented: The Renault Creative people and Zero Footprint project, the Cooperative Innovation Laboratory (LCI) and VELUD project, finally how to organize activities with the Collaborative LCA scheme applied on electric vehicle and landing process.

3.1 Culture—Renault Creative People: innovation is everyone's business at Renault

Renault [10] explains that Renault Creative People is an internal creativity initiative dedicated to innovation that

is based upon the company's information technologies: intranet, shared spaces and more. The objective is to allow all Renault Group staff—wherever they are in the world—to put forward ideas for innovations, work through them and play an active role in their implementation.

Renault Creative People consists of three main pillars:

- A forum that invites ideas on the intranet, which periodically calls upon all staff to suggest ideas for innovation on a precise theme. Two calls for ideas were made in 2014. Requests for ideas can be made following topical exhibitions in a dedicated innovation room: emotion, connected vehicles, CO₂/environment and universal design (taking into account the issue of disability) are some of the themes that have been covered in recent years. We can similarly raise calls for ideas on topics specific to the business, such as reducing vehicles' fuel consumption and CO₂ emissions, connected lifestyles, new services, social business, biomimicry, etc. The ideas hosted on the forum are reviewed by a jury that filters, evaluates and redirects the best of them towards incubators where they are worked upon in sharing zones. Each call generates on average 200 eligible ideas.
- Incubators delve deeper into the best ideas arising from the forum by allowing interested parties to get together where they can bring their contribution to a specific idea in a shared working zone called "Creative lab".
- The ideas workshop is the place where the subjects worked upon in the incubator are reviewed each week. The ideas workshop acts as a place for free exchange, where constructive criticism and encouragement are the key words, without any taboos and in a good-humoured environment.

As an example, discussions within the Creative Lab enabled Renault to discuss potential action plan to drive towards a zero footprint mobility. From 130 original ideas (BT), a collective work end up with the key and pragmatic research paths and a new decision procedure (Fig. 1) including shared value creation as described by Porter and Kramer [11].

Based on this work, the group can draw a roadmap toward a Zero Footprint mobility.

3.2 Structure Cooperative Innovation Laboratory (LCI): a start-up inside the company

Renault [10] explains that the Cooperative Innovation Laboratory (LCI) is an independent structure right at the heart of Renault. Its mission is to conceive ground-breaking innovations including disruptive vehicle concepts and bring them to life in realistic prototypes, delivering appreciable value to customers. A place of creative freedom established by senior

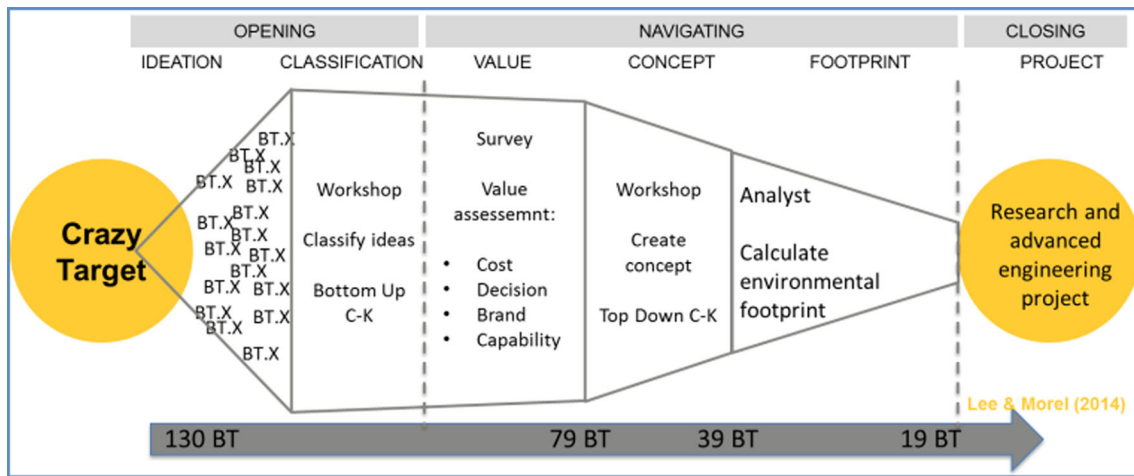


Fig. 1 Activity chart to generate advanced engineering projects

management, the LCI brings together Engineering, Product and Design specialists in the same workspace. The result of this original organisation is a dynamism and ability to create and react which make it an extraordinary melting pot of ideas. It is spearheaded by three key deciders: Director of Engineering, Director of Design and Director of Product Planning. These three people guide and coordinate the LCI’s projects in a collaborative manner. The objective is to step outside the framework of conventional programmes and create a fertile breeding ground for completely original ideas, by taking advantage of the group’s combined engineering experience. Examples include the Renault Twizy, the NEXT TWO autonomous and connected electric vehicle prototype, EOLAB and many more besides. By virtue of being a flexible and dynamic organisation, the LCI is able to progress within a matter of days—sometimes just hours—from the idea stage to physical realisation (design model, prototype, etc.), which enables decisions to be made rapidly on a concrete basis. This entity represents a real strength for the company and demonstrates the distinctive character of the way Renault goes about innovation.

Exploring new solutions for urban deliveries, Re-evaluating urban logistics.

Twizy Delivery Concept is a research prototype that forms part of the VELUD (electric vehicle for sustainable urban logistics) project. The VELUD initiative aims to run a pilot delivery scheme in Paris with an electric LCV (light commercial vehicle) in order to reduce the impact of urban deliveries on air quality. Based on the Renault Twizy, this prototype explores an alternative for deliveries in built up areas.

The central focuses of this project are the following: (1) experimenting in the sphere of new uses for ‘final kilometres’ logistics; (2) testing the adaptive potential of modular cargo zones in accordance with the goods on-board; (3) defining an intelligent management of the fleet to achieve optimum activity and an efficient delivery service.

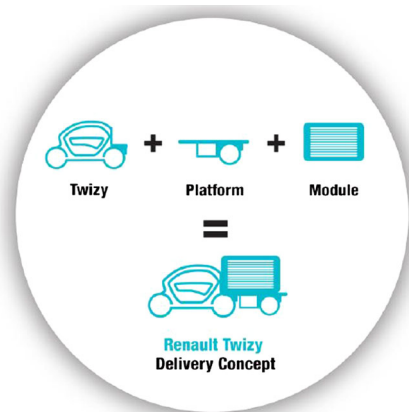


Fig. 2 VELUD concept

The prototype (in Fig. 2) innovates through its specification—a small electric-powered vehicle to which is attached a trailer, which is capable of holding up to 15 adjustable containers depending upon the load in a total space of one cubic meter.

3.3 Practice: Collaborative Life Cycle activities acheme, opening up to the outside world

Innovations raise new challenges and drive companies to rethink their organization. This is the case of electric vehicles. To conduct the environmental assessment, the industrial group propose to set up a collaboration with its stakeholders. The potential heterogeneity and various motivations of the actors involved in this experimentation remind the “exploration partnership” described by Segrestin [6]. Aggeri and Aquier [12] point out that, in this context, questions of cohesion (share the same goal, same values) are essential, even

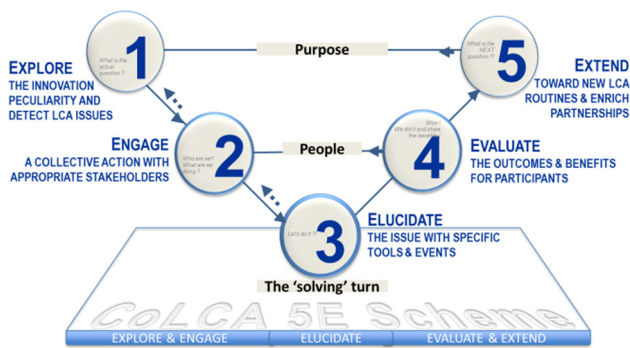


Fig. 3 Collaborative Life Cycle activities scheme

more than questions of coordination (task assignment, project management). This activity need an original organization.

Our experimentations [13] on electric vehicle [14] allows us to propose, test and improve the Co-LCA scheme (see Fig. 3) to support Collaborative Life Cycle activities management. It displays key moments of participation during the process: explore, engage, elucidate, evaluate and extend. The closed loop and step by step representation through stages are similar to the Plan do check act coordination scheme. Nevertheless, the explorative context invited us to emphasize the question of cohesion and implement a people centric level. The cohesion and feedbacks are managed through a reflexive effect at the People level (engage \Leftrightarrow evaluate benefits) and at the purpose level (explore \Leftrightarrow extend). A relatively simple image that reflects those characteristics (stage-gate and reflexivity) is a ‘V’ shape. This straightforward image can help to explain how and why the scheme will function.

The scheme is validated by a confrontation with the ‘V’ shape design scheme of Renault Engineering Processes and an empirical confrontation with activities from a company providing support for NGO-Corporation dialogue. They both confirm the scheme design and operability. It is apply with more than 100 stakeholders. Altogether, they solve key methodological questions and set up new LCA rules to calculate the LCA of the first electric vehicle [14].

As a summary, this new routine is a Collaborative-LCA (Co-LCA) instrument; it provides guidance for LCA practitioners who want to implement a participative way to conduct LCA studies. It defines new activities for the LCA practitioner and monitors how actors and organisation are transformed.

3.4 Landing process: being successful in implementation

This research [15,16] studies the integration of innovation projects into vehicle projects. The starting point is the observation of a failure to integrate innovations in the final products, despite the number of innovations originally

planned. This research is potentially applicable to the overall automotive industry and, more generally, to large companies (notably industrial ones) that differentiate the preparation of the innovations upstream and the development of products downstream. This distinction leads to organize the convergence of the innovations with the products sold to the customer. The main objective of this project is, by facilitating this convergence, to increase the number and the added value of the innovations which will be integrated into products. This work was prepared by conducting a thorough evaluation of the follow-up of the integration of innovations in five vehicle projects and the analysis of twenty case studies of innovations touch down. These stemmed mainly from the fields of “energy/environment” and “life on board”. This touch down process was realized through two tools, “synchronizator” and “profilor”. The analysis of these cases was completed with 155 interviews. This subject lies at the frontier of two worlds: the innovation’s world, its flexibility and its creativity; and the vehicle’s world, its established processes and its huge resources. The concepts that we propose will contribute to improve and inform the academic knowledge, as well as to facilitate the practitioners work. We propose in our research three main concepts. The first concept, the “touch down process” itself, is presented through the metaphor of the landing of a plane (innovation project) on an aircraft carrier (vehicle project). This touch down concept does not correspond to a single moment: it is a complex process starting from the upstream preparation to the downstream development activities and including key stages, as well as the application of the conditions (the “recommendations”) to facilitate its implementation. The second concept, called “intrusiveness”, consists of qualifying the innovations with regard to the impact (technical, organizational, managerial, financial) that they generate in the targeted vehicle projects. It facilitates the identification of different landing schedules according to this impact. The third concept, called “profiling”, consists of identifying, for a given innovation project, all the appropriate vehicle projects as early as possible. Reversely, it also allows, for a given vehicle project, to select all the relevant innovations as early as possible. The implementation of these concepts in the company where we led our research allowed: for the proposal of an adaptive touch down process according to the level of intrusiveness of the innovations; for an estimation from the beginning of the innovation projects which are the more interesting for the company in terms of value and contribution to its image; for the spread of innovations in the largest possible number of vehicle projects; and for strengthening the management of the innovation projects downstream to facilitate their integration into the products. These propositions are at once subjects of discussion for the academic world as well as guidelines for practitioners who could potentially implement them in other large industrial groups.

4 Conclusions

Innovation needs to be organized. At the end of this work, a comprehensive environment is proposed. It is based on structure, culture and practice. New projects are now under development to create new spaces and collective action tools.

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