Future of Industry, Mobility & Making

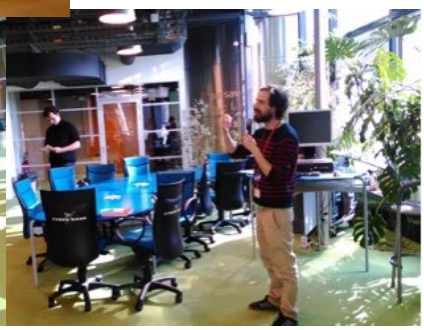
unReport #1

April 2015

unConference #1 Paris

5th & 6th of March 2015

at Carrefour Numérique²
FabLab La Villette
at Cité des Sciences et
de l'Industrie, Paris



. ABSTRACT

This first unConference on the Future of Industry, Making & Mobility (FIMM) gathered an interdisciplinary crowd on the 5th & 6th of March 2015, and is planned to continue in a second episode later in April in Rotterdam and in June in Yokohama, Japan. We hope this stream will continue further elsewhere.

At this first FIMM unConference joined automotive industry related businesses (Renault, OSVehicle), industry and mobility French ministry representatives, Fablab related people (FacLab, Carrefour Numérique², FabLab Oita, WoMa), Open Source and peer-to-peer economy folks (OuiShare), PhD students on labor organization and CAD innovation.

From the unConference organization to the unReport aggregation, the FIMM topic nourished questions that, discussion after discussion, started to get structured mainly around the factory model, the hardware standards and the users' status. Thus it then becomes possible to envision an evolution from the linear industrial model - from manufacturer to end-product to customers - to an eco-systemic industrial model, balancing between production means, hardware elements and users' skills.

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1. CONTEXT

Context : Targets for this session and perspective

"Discussing the industrial models that will best serve the Mobility in the coming two decades."

20 years ago, the Internet started to change our society. In essence, it freed the flow of information. Anything represented in the form of digital bits could be sent, received, shared, searched and processed globally, instantly and inexpensively. As a result, many new services and social movements came out. However, what we could deal with over the Net has been constrained to objects that can be recognized by human brains so far.

While algorithms continue to automate and replace some human tasks, the rise of affordable digital machines such as laser cutter, milling machine, 3D printer etc., connected to the Net, helps the emerging of new movements. FabLab, Maker movements, or Hacker-space are all part of these new way to work and produce. We can treat physical objects just like digital ones to process, share and change them across the globe. In other words, through the digital machine tools connected with the Net, our hands in addition to brains are now interconnected globally. In addition to Information Processing, we are now seeing Material Processing.

The movements of bits and movements of physical objects are going to intersect, co-exist and bring new types of societies we have yet to know. Welcome to the new world of "physital objects"!

Even at the scale of the large industry, it is already possible to witness the effects of this movement carried out by internet. On the working process organization, on the way to distribute goods, or on the ways to scientifically organize the work processes. Therefore, the industry appears to face 2 possibles paths : on one side arises the industry 4.0, a model of automated chains, with more algorithm embedded, connected parts that share data and improve the design. Next to this smart Internet of thing model emerge the distributed factory model, where parts may be delivered and assembled locally, where there is value to share knowledge or co-own the final object. As both of these trends are rooted into the fast growing digital and interconnected milieu, they however shape different futures of the post-fordist models. Or would there be a third way?

If we take the automotive industry as a first example to apply these thoughts about our industrial models, the first 3D Printed Car was just announced by Local Motors in US. Automatic or self-driving has been the popular topic recently. These indicate the new potential of connected objects from creating them to using them. Open Source Vehicle shows the possibility of people assembling their own cars, thus changing the links with auto manufacturers or with the legislator. Bicycles are shared in many cities including Paris, and Electric Vehicles are starting to be shared. Smart phones and mobile network services allow Uber, Airbnb and many more services offering new mode of mobility.

We can foresee the deep and wide social change of mobility of peoples, objects, information, money and energy will come in the next two decades. At this unConference, we would like to explore how the movements or mobility at large will be transformed in the next two decades from

now, and then, what characteristics the industrial production tools shall require to serve these behaviors smartly. In order to build a relevant vision, we will invite industry people and creative people working in these new fields, share their views, and hopefully draw the social framework for the next 20 years to come.

About the Co-hosts of the unConference #1

The Institute for HyperNetwork Society (IHNS)/ FabLab Oita, Japan

IHNS has its main office in Oita, a local city in Kyushu Island of Japan, and is actively involved in building the community networking with grassroots citizens as well as local government of Oita towards building the information society.

Carrefour Numerique² (FabLab La Villete, Paris)

The Carrefour numérique² aims to encourage new digital practices and allow everyone, particularly those aged 15-25 years, to take a different approach to science and technology. For this purpose, it has a production laboratory - the Fab Lab - and a laboratory for digital mediation - the Living Lab -

WoMa, fabrique de quartier, Paris

WoMa is the contraction of Working and Making and aims at connecting ideas to matter through collaboration. Let's get out of that old cliché notion of separating 'white collar dealing with gray matter' from 'blue collar enjoying manual labor'! Here, there will be no starched collars – we'll all hike up our sleeves to work and create together.

FacLab, Faclab, le FabLab de l'Université de Cergy-Pontoise

Le FacLab: Learn, Create, Share
Open to everyone,inside Cergy-Pontoise University, in Gennevilliers, FacLab helps you with your project's crafting and accompany you in the use of the machines needed.

Main presenters

Izumi Aizu (IHNS/FabLab Oita)

Izumi Aizu is the Principal Researcher at the Institute for HyperNetwork Society, and also a Senior Research Fellow & Professor at the Institute for InfoSocinomics, Tama University. He was a member of ICANN's At-Large Advisory Committee as well as Membership Advisory Committee (1998-99). He was also member of Multi-stakeholder Advisory Group (MAG) of Internet Governance Forum (IGF).

Carlo De Micheli （Head of Innovation, OpenSourceVehicle – Turin）

OSVehicle (Italy, Hong Kong)
Head of Innovation. Previously: Press, digital & media manager at OSVehicle, the company creating TABBY, an open source hardware development platform for vehicles.

Mickaël Desmoulins (FabLab Renault)

Mickael Works for engineering innovation management, converging between Renault and Nissan. His missions are to spread and promote an innovation and design culture. He built Renault's intern FabLab, sustains intern innovation methodically, and contributes to open innovation strategy, especially by representing Renault's interests with MINATEC IDEAs Laboratory.

Guillaume Attal (WoMa)

Part of WoMa, fabrique de quartier's seven founder, he impulses innovative practices in the urban field and shares his experiences and knowledge.

Other key participants

Laurent Ricard (FacLab, l'Université de Cergy-Pontoise)

Entreprener (Sc21, Imago Dream), author, lecturer, teacher and co-founder of two FabLab's in France (FacLab, at Cergy-Pontoise University and La Forges des possibles, at la Roche-sur-Yon). Convinced of personal crafting impacton Industry and society who announces the third industrial revolution.

Gerard Emond (DGCIS – STIC)

Representative for digital entreprenership at DGCIS, entreprener himself (start-up Yoosfer), and digital project manager for mon.service-public.fr at DGME.

Marc Chataigner (WoMa)

From his previous work experience, Marc has become an anthropologist with an operational mind set. Marc has been a key contributor in mobile phone, car and other transportation companies' projects. He has been able to provide well balanced and thorough solutions, with great empathetic ability for the user.

Participants and other interested by the unReport #1

Participants who attended the two days

Lionel Guillot (Renault)
Peter Troxler (independent researcher, Hogeschool Rotterdam)
Benjamin Tincq (OuiShare)
Ghislain Delabie (OuiShare,Techneo,ESTACA)
Olivier Cleach (Socioethique, Institut d'Ethique Appliquée (Université Laval de Québec), Ahmed Eisa (ISOC Sudan)
Lara Allouan (PHD in sociology au labratoire CPN)
William Diem (WardsAuto)
Mohamed Booga (PHD student on virtual reality tools)

Persons who could not attend but are interested to follow up

Daniel Kaplan (FING)
Emmanuelle Roux (FacLab)
Camille Bosque (FacLab)
Bernard Lledos (AirLiquide i-Lab)
Fabrice Poussière (SNECMA)
Quentin Vannier (Tesla)

A rough notes taken by Izumi Aizu can be found here.

2. INPUTS - the keynotes

IHNS - Izumi Aizu

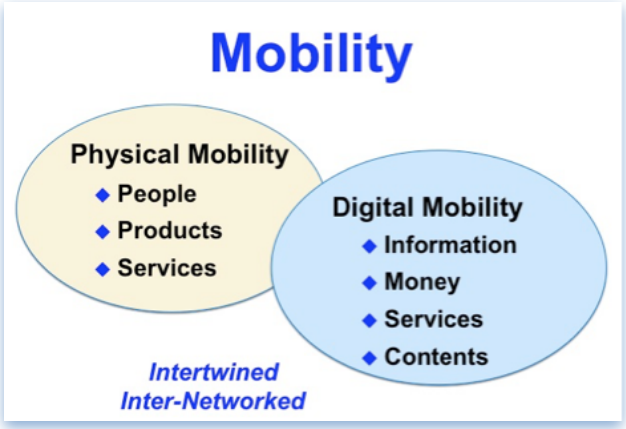
→ *link to the content of the presentation*

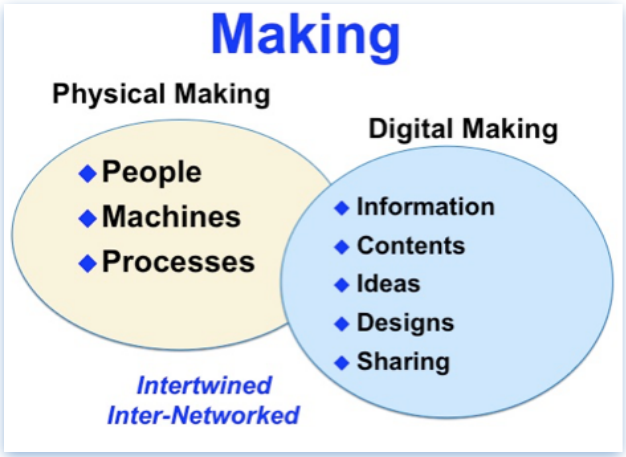
What is unConference

How to describe unConference ? It is, in my interpretation, a “Restaurant without Menu”. Participants will make the substance. Everyone will become a Chef.

Applied to our topic (Futur of Industry, Mobility and Making), we can use this spectrum to ask ourself : What will industry be like, when defined as a social system to produce and deliver services to citizens? Will it be “un-industry”, understood as citizens sharing and making their own products? Will conception and distribution include user ?

Actually, it has already started.





Digital products and exchange models have been limited to the need for physical mobility. It can now be applied to physical making, connecting people, digital machines and digital processes (with data sharing). It seems like traditional way of making and consuming is discarded.

Physical mobility : people product and services
Digital mobility : information, money, services and content

As an exemple, here is a competition to re-design what an Ice-cream Truck could look like ; it appeared in the results that even if design ideas for physical object are rich, they were very hard to improve. In other words, hardware improvements are pretty tough to implement, along the fact that product development is expensive and un-ecological.

Moreover all those difficulties to implement hardware, traditional industry is also challenged by new comers on the market. Similarly to what happened on the mobile industry market, it is very likely that we will encounter dramatic changes in the coming decades for most existing businesses.

Applied on the automotive industry market, as car energy source moves toward electric, so as more sale are expected (mostly for developing

countries middle class), how can car manufacturers will succeed to provide their products and services ? And will they be able to provide them the same way as the way they did so far (in the Western countries)?

For example, the “Turtle car” project, that takes place among Ghana craftsmen car reparation workshops makes the best out of used european cars, shipped in Ghana, where all the electronic is taken off, the chassis and the parts are re-assemble to make a new car. That project shows that, according to the means and technology available, according to the skills and know-how, according to local markets, there might be other ways to design, assemble, and distribute a car, better adapted to the customer need.

Beyond the question about emerging industrial models, mobility itself is also questioned : do we need our own car ? Could it be self driving ? Should it be connected ? What about the Autolib model : is it a threat ? To who ? rental or industry ? And what about Über who is now experimenting car sharing in Japan. What is certain is that all these cultural changes are to impact the markets, and moreover affect our perception of the product or services we want.

As a conclusions, through Carlo de Micheli’s keynote (OSVehicle project) at the “Future of Car Summit”, I saw that the automotive industry value chain and assembly line both had been changed. Thanks to all the Open Source projects, more and more car manufacturers seems to be interested in the Open Source model, perhaps as a business itself or as a new way produce ? And on the customer side, will the habit to be permanently connected extend to our mobility behaviors ? Would then a universal, connected and pluggable seat become a new way to envision what we really need in a car ?

OSVehicle - Carlo de Micheli

→ Link to the content of the presentation

→ First framework for OS vehicle. http://www.vimeo.com/osvehicle

“Build vehicles based on your needs”

Nowadays, our perception of what a vehicle is has changed : cars are more shared, like Autolib and ride sharing, or car pooling, new vehicles conceived to be used only in the city environment, or even cars that are able to drive themselves. So cars are not only made by traditional manufacturers anymore, but also by some other companies like Google for instance.

If we look at the OSVehicle project, one part of it is to make a chassis you can download as a digital file, and build it yourself or get it built. The other part is to develop the ecosystem of actors and services around this chassis. Also, for third party developers, this Open Source chassis makes you start with a zero initial cost for developing a car.

Besides, it is conceived to be easy to use. The chassis that lead to see the car as a kit (engine,wheels, etc.), can be assembled in an hour, with no specific tools nor technical skills (it took 55mn for non technician people).The OSVehicle is a city car basis you can design.

What we learn from this image, is that there is a design cultural shift : intelligence on board is more common and expected.

As a design cultural shift, intelligence on board is more common and expected.

The use of existing technology, based on Open Source, was chosen for OSVehicle project. This is easy and affordable because it depends on devices used on a regular basis, like a smartphone can be. Unlike on the Twizy car, organized around a proprietary design, and where each part is therefore expensive. The use of Open platforms based devices brings infinite possibilities, like apps that make your Android smartphone more than a caller/receiver device. Being digital, these tools can be adapted to new needs and also personalized in term of dashboard for instance.

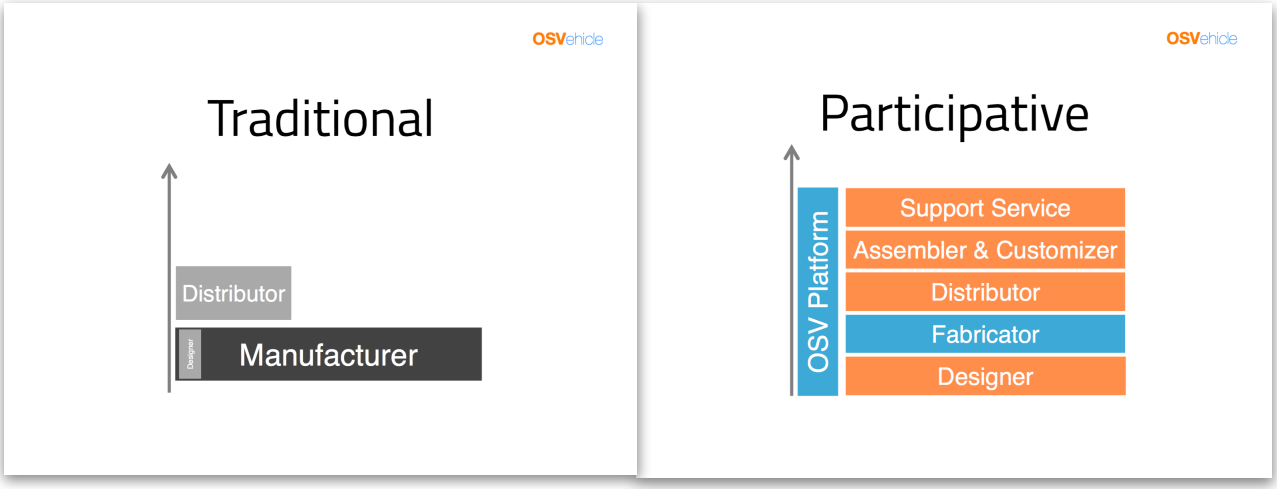
As for the choice of power source, the choice for electric engine was partly due to it's use in emerging countries (OSVehicle targeted futur market). We see in these countries that middle class start to appear, and, by that, new consuming possibilities. OSVehicle positions itself as a potential car provider on this market.

We ask ourself the question of OSVehicle relation to its environment, so OSVehicle is conceived as a connected car, and also made for the city, regarding current regulation in Europe. As the Smart City is one idea the city of tomorrow may look like, OSVehicle could be connected to it.

In terms of business model,OSVehicle aims at creating a new value chain, that generates activity for new independent actors. Instead of trying to integrate all the value like car manufacturers traditionally do, the OSVehicle project envisions this value chain as distributed and local.

The kit is distributed by OSVehicle, then all additional changes, other parts crafting, assembly and so on, will rely on other independent actors that may become potential business. OSVehicle thinks of those independent actors as linked to a local market and existing production facilities, which may create sustainable local jobs.

Our experience shows us that user's interested by making an OSVehicle our project can be either a single person, or a community. So far OSVehicle project has received requests to start project from 90 countries, there were 10 000 downloads of the vehicle 3D CAD files, 200 request for new



THE WAY VALUE MAY BE DISTRIBUTED AMONG THE NETWORK

projects, 100 letters of intent. Carlo di Micheli pointed out that the Interested profiles are very different, from engineer to Porsche passionate, or college student willing to launch a startup.

Questions

Challenge is to make a sustainable ecosystem. In order to do that, you need a low cost development and to check viability first. By making your car Open Source you lower the value of a vehicle on the market. What is your design ?

OSVehicle team designs a platform for new car models to appear and for this chassis to be adapted and improved. That is the main reason for us to choose Open Source; because Open Source ecosystem is an accelerator, for our project or the one connected to it.

Do you think that one platform is enough or could there be several platforms that coexist ? And also, is there similar projects, and if yes, what do you think about them ?

About the number of platforms, we do believe that many of them could work, as long as they are Open Source and collaborative. That way, the created ecosystem remains an innovation accelerator. It shall be the same for companies and manufacturing plants, they may join the eco-system as soon as they contribute to that open ecosystem.

As for other projects, I can think of Local Motors, who build a car that costs 100 000$ or the wiki speed, who is 25 000$. OSVehicle costs 6 000 $. Price would be the main reason why we are not positioned on the same market, or that we do not have the same project in the end. We want it to be affordable.

What is your business model ?

It is “sell kits and Do It Together experiences”, like a consulting group. We can give to a group of persons an interesting workshop based on how to build and design a car, in a collaborative way.

Are you competitive with manufacturers, and what about the traditional production line efficiency ?

One way to lower the costs is to use existant items. Yes, we are competitive, as we depend on standardized parts and low cost development, or even reuse. We use existing manufacturing companies and their efficiency to produce our chassis. We also did conceived it to be easy to produce.

What is your use for virtual reality ? Is it to design cars ?

We do mainly use virtual reality to test car's interface or for crash testing. We also use this tool in a dynamic way, for simulation experience.

What would be your project main problem ? And your main advantages ?

Battery is our main problem, as it represents 20 to 30 % of the car's price.
Our main advantage would be that we did build a platform and a lot of technologies can be applied or tested on it.

What if Google asks to buy your company ?

Personally speaking, and not for all of OSVehicle team, it's fine with me, as long as the project remains OpenSource.

Renault - Mickaël Desmoulins

Renault's purpose is to facilitate access to mobility for everyone, through more than a 130 000 selling points. This gives you an idea of our company's scale and purpose.

Nowadays, Renault company realizes a change of paradigm in the automotive industry, and also a change of markers. The relationship of this industry toward climate and economy has changed the perception of what mobility is.

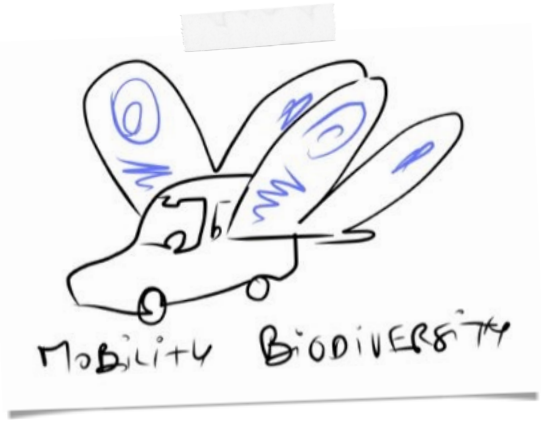
On average, cars are used 2 to 3% of time and by 1.2 person. Car manufacturers have now new users with different habits and ways to use the car. Also, we see new players entering this market, like Google or others, developing their own product. Cities are also changing, as the way we move within it. For instance car sharing or services like Autolib reveal that citizens' needs regarding the vehicle, are now different. We do not use our own car, and we don't use it for the same things.

An other shift is the opposition between digital and manufacturing way of thinking. Large manufacturers think more of standardized items, whereas the digital industries think more of personalized and customizable devices.

In our industrial field, we now can see two different streams : relocalization and democratization. Relocalization in term of production and democratization of markets as old competitors remain and new ones emerge. For this industry, it is a cultural shift to have new comers and also to answer new needs, like customization. Traditional car manufacturers stopped to be only car providers on a stable market.

New challenges also come from the design field. For instance, cars are designed and produced with new digital tools, like 3D printing. It is a challenge Renault has to integrate in its research field.

To talk more precisely about innovation, at Renault, we think of it in two ways : exploitation (a classical one) and exploration (a disruptive one). Exploitation is the fact that you use a validated idea and exploit it the way it is. This is the field of known things. Exploration is new and uncertain, but it helps new ways to conceive and produce to appear.



At Renault's FabLab, we see ourselves more connected to the exploration side. But let's see what's its use inside the company.

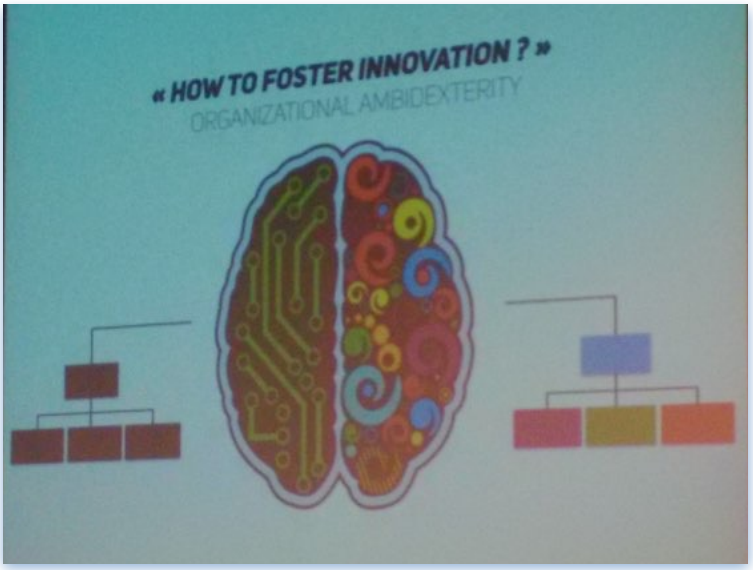
We do realize that the FabLab helps to clarify and share mid term and long term vision. By being open to everyone in the company, and through all the exchanges that take place there, FabLab helps to give everyone in the company a prospective view.

This space's mixity, in term of different publics, helps workers from different part of the company to mix and share visions. By enabling company's workers to get a more shared vision of Renault, it helps to boost innovation capabilities in every section of the company.

The fablab is a sharing, talking and creative space, for everyone within Renault. For us, the fact that everybody can contribute, explore, and develop oneself is a reality shift. But giving more workers the right tools, to grasp better the whole vision and purpose of what they contribute to by working, gives them purpose and boosts, nonetheless productivity, but also feedbacks from every department of the company.

Fablab is a new playground. People can make their own tools in it, work in a different way, or improve their creativity in a disruptive approach. Serendipity, as transversal exchanges are current in the lab, by sharing with other person's with different habits, it helps to resolve a lot of particular problems. Everyone share their innovative projects, through different type of outputs like video, sketches or 3d printed parts.

It is also a nice way to ask what you could not do inside the company, as you feel more free to speak, and also to confront to the reality of making, in an iterative way. It exercises agility as you use different media for different purposes.



We talk about being 'global ambidextrous' : it is a place where people meet and join creativity network. We are, through the FabLab, linked to companies' FabLabs outside Renault, and other structures like Usine IO, a Makerspace oriented toward industrialisation, or ICI Montreuil, more craft oriented.

Questions

Is there any project at Renault's Fablab of a vehicle user can design himself ?

We don’t have such project at the moment. Our Fablab is first a community ressource, in order to boost connections among employees within the enterprise. Our Fablab is restricted to our company users.

What are the results so far? Are people coming to the Fablab ?

So far, we see people coming from each part of Renault company. The projects we have seen in the Fablab are mostly personal ones, and not really for rapid prototyping of Renault’s projects yet.

There were no defined objectives when opening this space at Renault. Nevertheless, we did build a great community among the users, and through them further within the company. Now, it is considered a success within the enterprise.

On site, a lot of talking happen, lot of enablers reveal themselves. We also host many inside workshops. Coming to the Fablab is now considered as a habits disruption.

3. OUTCOMES - the questions

Given the Future of Industry, Making & Mobility first unConference, the co-hosting team started with emerging questions. Those were assessed during the unConference discussions among the participants, and then instead of answering these question, more questions arose udring the discussions.

At that stage, the FIMM unConference has no't produced any answers, as it was not meant to be. On the opposite, the FIMM unConference happened to be a great place to share the questions an expert and multi-disciplinary crowd has in common.

The questions we started with,

when setting up the FIMM unConference #1

- What is the new shape of mobility for the next two decades?
- What if we could distribute the way to produce cars/mobility, or access to cars/mobility
- What if the end users become part of the production/distribution chain for mobility services in the era of distributed manufacturing?
- What are the key elements and current activities that would change the mobility? Who is working on these and how?
- What should be done? What should be avoided?
- What are the links and possible combination in-between the “Industry 4.0” and the “Distributed Manufacturing” models? Any “Third way?”
- What are the roles of mobile network services?
- What should be done for the next 12 months?
- How does Internet impact the mobility, the way of making and using the automobiles?
- At the age of internet, objects and services more than only softwares are hacked, improved by users. What industry and production process will be relevant to produce such "not ready to use objects" but rather "objects as resources" for end users?

The questions we ended up with,
after the end of the FIMM unConference #1

- As the Industry 4.0 and the Distributed Manufacturing models emerge, is there a third way ? Around an "**open factory**" model ?
- As the industry rethink its relationship to the supply chain, how does the **ecosytem** of contributors structures itself ?
- As the **vehicle** hardware embed more and more pieces of software, thus entering the 'physital' era, what is then the right scale at which to structure one's business ?
- As customers becomes more and more agile and enticed to hack what they use, industries shall rethink what is the place **users** may hold in the manufacturing/distribution processes ?
- As the markets evolves toward smaller series, how the **ways to certify** vehicle for road safety shall evolve to enable third parties to take place into the process and maintain the level of safety for the end user ?
- As the vehicle produces **data**, as much as its use and its production or maintenance, how to collect, structure, segment and distribute these data to make the best use out of them ? In term of potential business as much as in terms of road safety.

1. Industry 4.0 vs Distributed Manufacturing

Cultural shift

As the industry embraces digitalization, as manufacturing embed computerized machines, as design processes develop into digital collaborative models, as most files and data constitute the digital realm of companies, industrial developments take ground in what appeared to be a digital 'milieu'. Apart from the manufacturing efficiency through machines, the digitalization of work brings along disruptive ways to collaborate and innovate, within corporation or in-between contributors themselves.

As for today, the two main directions the industry seems to be heading to are the 'Industry 4.0' model and the 'Distributed Manufacturing' model:

- **Industry 4.0** is a collective term for technologies and concepts of value chain organization.[1] Based on the technological concepts of cyber-physical systems, the Internet of Things[2] and the Internet of Services,[3] it facilitates the vision of the Smart Factory. - *cf. Wikipedia*

- **Distributed Manufacturing** is a form of decentralized manufacturing practiced by enterprises using a network of geographically dispersed manufacturing facilities that are coordinated using information technology. - *cf. Wikipedia*

From those two directions, the FIMM unConference #1 attendees wandered if there were to be a third way, combining the Industry 4.0 technical efficiency and the Distributed Manufacturing eco-systemic agility.

From a large company point of view, both of these industrial orientations are driven by the need of most industries to be able to deliver small sets of items, and not be bound to produce series of

100.000 pieces at once. Succeeding to lower that threshold of what minimum quantity of items to be produced in order to remain profitable would mean lowering the cost of entering a new market, thus enabling businesses to innovate and experiment new lines of products.

From the entrepreneurial community perspective, Fablabs are considered as the best resources to enable the Distributed Manufacturing model to emerge and enable individuals to start their own business. But the experiences shared among the FIMM unConference #1 attendees proved that the Fablab business model cannot be only built on developing the assets required for the Distributed Manufacturing network. Even if Fablabs and Makerspaces stand as ressource places for entrepreneurs and makers, and thus potential distribution knots of the Distributed Manufacturing network, Fablabs and Markerspaces do create their main value on coaching, teaching and guiding individuals to achieve their goal, not on producing and selling end products only.

Following that idea of the third way path, the FIMM unConference #1 attendees wandered what if large companies and industries would massively go into the Open Source field, following Tesla footsteps for instance. That path was coined among the FIMM unConference #1 attendees as the '**Open Factory**' model.

Put in a simplistic way, if a regular factory and its assets remain restricted for everyday people, a Fablab is, as an attempt to give access to everything, a 'workshop open to the public'. Along with these accessible tools and machines, in these Fablab places governance was first meant to be opened to each contributors and each project a reason to collaborate.

Moving further along that path, when large corporations today launch intern fablabs, they aim at embedding these governance and collaboration modes within the company's working processes. As mentioned during the FIMM unConference #1, the 'Open Factory' model may reach the point where, as a beginning, part of the factory assets - tools, machines, knowledge - may be set 'open'. As if, while going 'open', the factory was getting closer from the Fablab initial idea, technology made accessible to each project holder.

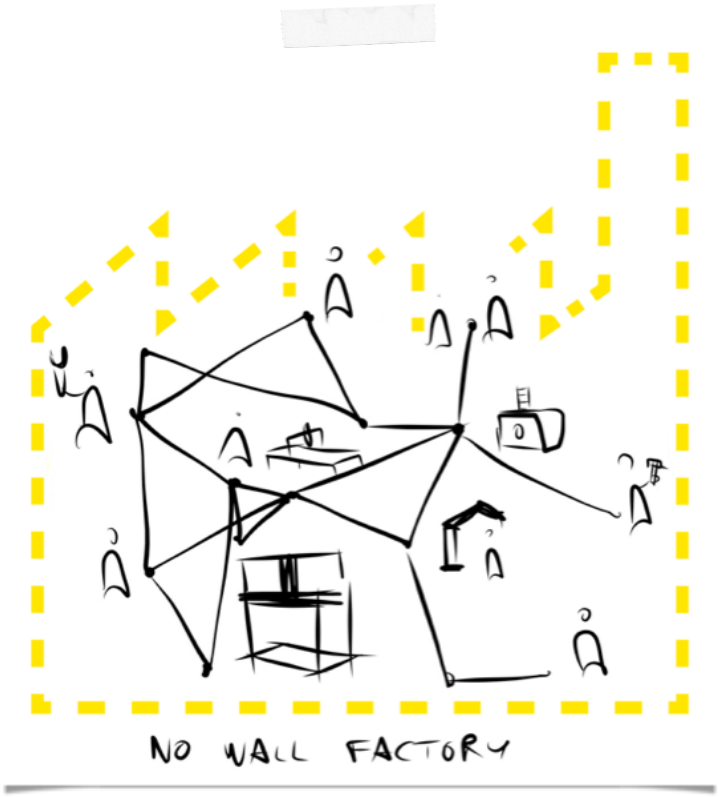
That is how the FIMM unConference #1 attendees came to think of an 'open factory' as an open platform, on the model of Open Source Ecology, a platform aiming at sharing designs of all essential tools to build a sustainable settlement.

From this transformation emerges the question of that 'Open Factory' business models : if not based on intellectual property, assets property and end product sales, what can be learned from Open Source Models.

From that field of discussions, arose a set of questions

- What qualities of both models could be combined into that Open Factory model ? And what shall we expect from it ?
- In the Open Factory model, what data or knowledge manufacturers could (and what should they not) release open source to fuel the ecosystem of potential contributors ?
- How to evaluate the value of yet un-shared data or knowledge ?
- What could be business models of such an Open Source design and manufacturing processes ?

- How could it be relevant to change scale ? Scale-up from small series (up to 100 products) to large series (from 10 000 pieces) ? And scale-down from large series to small series when needed ?
- What is the added value of the “brand” (such as Renault, Tesla) if they don’t “own” the end product design and distribution anymore ?
- What is the value of all the assets large manufacturers manage ? Shall they make the best out of their idle capacities in existing infrastructures (like Amazon B2B services) ?
- How to design for a ‘Distributed Manufacturing’, i.e. design without mastering the assembly line, design for an eco-system with not yet defined format nor set of tools ?
- Are Fablab’s ment for people or for emerging project to test and produce equipment ?
- Following the Microsoft exemple (giving software to start-ups so they may develop their project with microsoft tools), can we think of manufacturers as providers or sponsors ? For tools only ?
- Rises the question about Industry role toward open and collaborative projects : is the assembly line ? The branding ? To produce in large quantities ?
- As innovation increases innovation, should it remain collaborative and distributed ? Or may projects that come from Open Source become stand alone business ?



2. Design and manufacturing eco-system

Cultural shift

On one hand, the Internet world re-introduce the peer-to-peer (P2P) economy possibilities. In the software industry, the 'Agile' method and Creative Commons licences have shown how an industry may reshape the way it runs and thinks about its ecosystem.

In the 'traditional' industries, where the B2B actors of the network are bonded by buyer/supplier contracts, from the R&D, design or engineering parts, all the knowledge and working process may be 'proprietary' (or the integrated value). In the P2P environment, these processes gain in efficiency and quality when they are collaborative (or distributed and adopted among the network).

The FIMM unConference #1 participants did realize that, the collaborative way of creating services and products is inspired in its form and management, by typical managerial technics of putting people in competition, but adapted to a distributed production way. The key word being "emulation" and "advice sharing", that seems to be Renault Fablab purpose.

Because with Open Source, user get to understand what he uses and to how it is built, that path nourishes creativity, mainly because when user know how things are made, it is easier for him to fork it or hack it. For instance ,in the case of OSVehicle, they designed a chassis as a platform that enables any user or company to design their own cars from it.

In a P2P ecosystem, the value has to be distributed among the ecosystem for it to sustains and for contributors activity to grow. There may not be any asset centralization. The value there is not only based on money, but it may rather be knowledge, reputation, network, etc. Most often, there are values of the Commons.

On one hand, that balance has yet to remain, and while such a loose structure appears to be relevant for generating new ideas and solutions, the FIMM unConference #1 participants thought it may not ensure a stable development of the network. For instance, when Tesla releases its battery patent for an ecosystem to emerge, Makerbot closed its open source system, or Huffington Post became a private corporation without giving incentives all the first contributions, and the common value created is gone (or privatized).

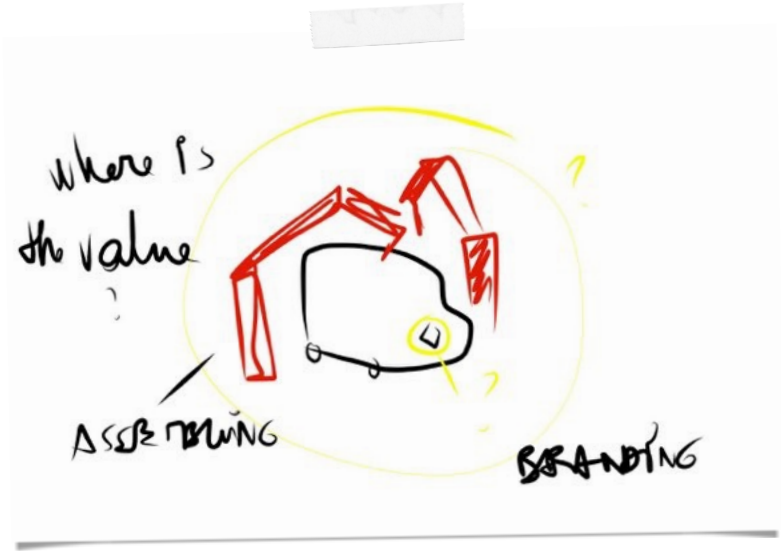
On the other hand, as the historical industrial leaders' power fades, all other alternatives businesses gain legitimacy. Most of the technical and managerial innovations FIMM unConference #1 participants discussed were not new. They are just not banned anymore, and even taken seriously.

Among these alternatives have arose the Open Source models. Beyond the name Open Source, there are not always fully 'open' ressources, but licensed knowledge or data. That Open Source community has tried and tested different business models to last (WikiPedia, Tesla, Arduino, etc.), but more interestingly, these Open Source projects happened to be game changers on their markets ; Arduino selling PCB's as a way to penetrate it, Tesla sharing their electrical battery patent to boost their electric charger format adoption, etc.

During these reflexions, the FIMM unConference #1 participants also thought that Open Factory could serve an open village, based on a network. This network would include local production means,and a more global network of open ressources.

Questions

- How to distribute the value among the ecosystem to make it last and keep its balance ? How to ensure a sustainable distribution ?
- If there is no binding contract, what are the necessary rules/values the ecosystem actors needs to share or agree on in order to work ?
- Economical model to distribute/attribute value ? Arduino model ?
- How to understand the innovation generated by Open Source processes and collaborative imagination ?
- In an ecosystemic organization, with peer reviews, when shall the certification take part ? (In the automotive industry, it used to be the first batch of a new product produced in large quantities on the assembly line ; in an open manufactory world, the homologation may be the parts and pieces, or even the worker and assembler himself)
- Which ecosystems are likely to last : end-user's ecosystems ? brand as a standard?
- As the ecosystem may structure itself as an Open Air Factory, could the ecosystem become a brand in the end (a patented standard kind of) ?
- Are these Open Source based companies creating a new market or invading the old one ?
- As this "Open Factory" idea would emerge as distributed, open and able to produce from standardized tools and files, and since fablabs are more oriented for experiments and prototypes, due to their heterogeneity, may the standardisation of tools (3D printers, CNC, laser, Arduino, …) and process be the right answer?
- How these tools could change and take support on existing facilities in order to be able to suit different scales
- In term of regulation, in which direction should industrial lobby weight, in their business self-interest or in their P2P ecosystem interest?



3. Vehicle in a 'physital' age

Cultural shift

As was mentioned in the introduction of this unConference #1, objects has now to be thought as 'softwares embedded hardwares'. We enter a 'physital' world.

Since already decades, vehicles follow the same path, taking on board more and more pieces of softwares. OSVehicle project goes even further by, for instance, using Android tablet as part of their onboard devices. The 'standard' is to be understood as the essential common denominator upon which to build an ecosystem, may it be the car or the process itself.

By re-dismantling down the end-product into autonomous parts, OSVehicle team brings to the table the question of the industry 'standard' : is the 'platform' the correct standard, the 'finished and ready to use vehicle', or even a 'fleet of vehicles'?

The question of 'standard' leads to the question of 'compatibility' in-between parts and pieces, or even processes. In the software industry as much as in the hardware industry, the standard is here to allow third parties to work together and develop within the eco-system. And to reach a standard, either regulation apply (in automotive industry for instance) or adoption rate distinguished the winner (Tesla, Arduino, Blue-ray, VHS, USB, …). Following the example of Android for smartphones, a platform may for instance be suited for individuals, small companies or large corporations to build their own apps, accessories or even smartphone on top of it.

Pointing out what the standard is for an industry boils down to asking what is the 'core element' of the system, i.e. where value may aggregate. FIMM unConference #1 participants' bet was that in a 'physital' era, there is no more 'finished objects', but rather 'ready to hack' parts. Their vision points out that the value may not be anymore only in the end product (i.e. the vehicle), but in the way to produce-edit-distribute a service (i.e. Car as a service).

As the discussion went on, it let to crystallize even more around the topic of business models and trying to identify what is the 'basic element' of that business model : the ready-to-use vehicle? the ready-to-make chassis and platform? the fleet of cars-on-demand ? As the market evolves and as the customer's expectations evolve, the brand that could evolve according to them ?

Questions

- What if industry aims at limited series rather than large series, the mass-produced business model principle doesn't apply ; so what shall it be ?
- What is the difference between the customization (of a standard certified object) versus the creation of a single item (a unique and non standard object) ?
- What kind of people is looking for customization and/or creation of single item?
- What is the best way to reach compatibility ? By imposing standard (law) or by reaching mass adoption (Tesla, Arduino)?
- Shall the standard be closed (Apple iPhone dock) or open (mini USB) for better business ? What is the most relevant economical ecosystem to support the vehicle ni a 'physital' age?
- What about "open platforms", such as Android ? Car manufacturers don't want to become smartphone docks, so they develop their own navigation systems and software platform ; while OSVehicle sees Android as an interesting platform to use and easily add functionalities.

- What security features to implement in the open systems ?
- Where lays the value of software versus hardware ? Do they have to be embedded always ?

4. Certification in a peer-to-peer industry

Cultural shift

Hacking and customizing tools and objects have continued to take place through the industrial age, but back then it was not named 'hacking' nor 'forking' yet. It was merely a way to adapt a tool or object to better suit one's uses.

And so, as mass produced products slowly reached the market, the middle-man was to adapt industrial objects to the end-users' needs. Until the point where regulations were expected in order to ensure that the industrial end product will retain all the specifications it was designed for before being sold to that middle man.

And then think about the automotive industry, with local regulations and homologation requirements (different in EU, US or other places), that aim at allowing only 'road safety approved' vehicles on the road.

In the digital age, hacking is the similar process as degrading and improving physical object. In the automotive industry, similarly as you may customize the color of your car by painting it yourself, you may be able to tweak its driving skills by hacking into the code.

As the hardware and software may be hacked, setting the device and the code "open" enables many contributors to fork and bring innovations along the process. Most of Open Source projects develop along that path.

But then, as the industrial-and-closed end-product could be 'approved' by certifying its design as well as the assembly line that produces it in million identical pieces, how would a relevant 'certification' process apply to such 'open' industries, where each part may be hacked ? Shall items like brakes, fuel, security, not be 'open' ?

Moreover, as for today the 'road safety certification' is framed upon the first batch of vehicles to be then produced, in large quantity at the exact replica ; as mentioned in the 'Open Factory', while industries are aiming at producing smaller series of identical objects, how would then a certification process be relevant and cost saving on a smaller batch ?

During the FIMM unConference #1 discussions, participants even went further, wandering if there was a need for such mandatory 'certification' process ; what about detailing the licences, and allowing users to 'use at their own risk' (i.e. 'use at your own risk' licence) ?

Questions

- At which scale could the certification process appear ?
- Certify each parts individually (like today)? the assembly machines and process (like today) ? The machine operators and workers skills ? Each users' skills and ability to 'hack and edit' or 'use only' ?

- Should fragments from a whole object to be distinctly certified ?
- In EU, OSVehicle or Twizy are running under 80km/h, in order to have less road safety homologation issues, and have more freedom to innovate ; what about regular vehicle case ?
- Apart from the speed, what other fields could be segmented in order to allow freedom to innovate on different parts of the vehicle ? Owner's skills, peer reviews, … ?
- What could help to make the certification evolve ?
- Corporations used to sell "certified" products ; may they succeed to sell things without having them certified ?
- What responsibility for "users" (i.e. "at your own risk" license)

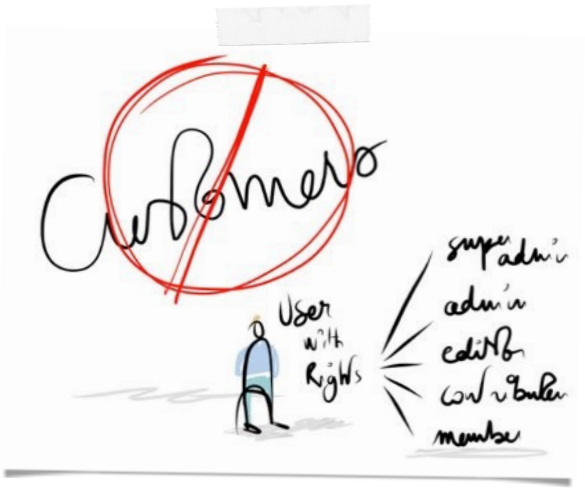
5. User's role as a contributor

Cultural shift

In the Internet era, after the web 1.0 emerged the web 2.0 when customers eventually had something to say, share and comment. On top of the customers associations, the Internet network transformed the posture of the customer so dramatically that all major brands now engage themselves with community management and envision their brand as a 'discussion platform'.

The enduser is not only a customer anymore, he/she has something to produce, promote, share, interact, etc. The interconnected digital tools he/she use allow him/her to organize him/herself among peers. With Internet, the peer-to-peer organizations have now powerful tools to help organization and governance perform.

The user may still remain a customer, meaning that he pays for an object or a service ; but the important part here is that this contribution in money (financial contribution) is only a single type of contribution that may be asked to users, while they could - and would like to - contribute on many different levels.



Today, online and offline user may be a contributor, a creator, a distributor, a designer, an assembler, a reseller, a buyer, a worker, a project leader, an idea owner, … He may contribute in different phases ; during the idea generation, the design part, the promotion and distribution, the experimentation, … or even only in data production, advice or improvement ideas. As technology and user experience design evolve, it gets easier for even unskilled people to contribute or make their own project.

Taking that figure of the user, also coined 'pro-sumer', when he faces 'physital' objects (i.e. software embedded hardware), he becomes either a 'hacker', forking what could be forked, or an 'entrepreneur', developing new business opportunities among users. In both cases he feel more responsible and aware of what he uses and consumes.

Questions

- On ‘physital’ objects, what could be the ‘rights’ for users, from ‘use only’, to ‘edit’, to ‘hack’, …?
- What skills or status shall the user reach in order to unlock the ‘edit rights’ or ‘hacking rights’?
- What data collection (incoming) and data providing solution (dispatching) useres would be willing to contribute to ?
- For which feedback or reward ?
- Can we help / allow people to build their own object or car ? So what would be the use for manufacturers ?
- Are pro summers able / willing to design and produce it ? Or only enjoy it ?
- How many potential pro-sumers are there out there ?

6. Data sphere and value

Cultural shift

In the fast growing Internet era, as objects and behaviors produce data that may be relevant to markets, it becomes impossible to design and produce commodities that do not fit into that framework.

The data business aims at creating ‘intelligence’ out of aggregated data sets, in order to gain efficiency in production, safety on materials of parts, performance in serving end-users expectations, or event evaluate team’s member contributions to reward them. Such data businesses cannot be avoided by companies; if one part of the ecosystem doesn’t take its data into account, a third party company shall soon do it for them and sell them that service.

Regarding the automotive industry, the manufacturing processes and materials are monitored and data are useful to improve them, technical parts and assembled products are made to take part in the Internet of things, data on the end-user’s behaviors are harvested, and finally, market data are also aggregated to provide some market intelligence.

Along all the product life cycle, from design to manufacturing, from use to maintenance, from selling performance to use variability, data are produced. Two main business have emerged, one about collecting and structuring the incoming data (regarding ‘users’ behaviors’ data and ‘parts and pieces’ data, ‘assembling’ data, etc.), the second about providing and segmenting the aggregated data, for them to be useful and monetized (for end users, for manufacturers, for designers, …).

Question

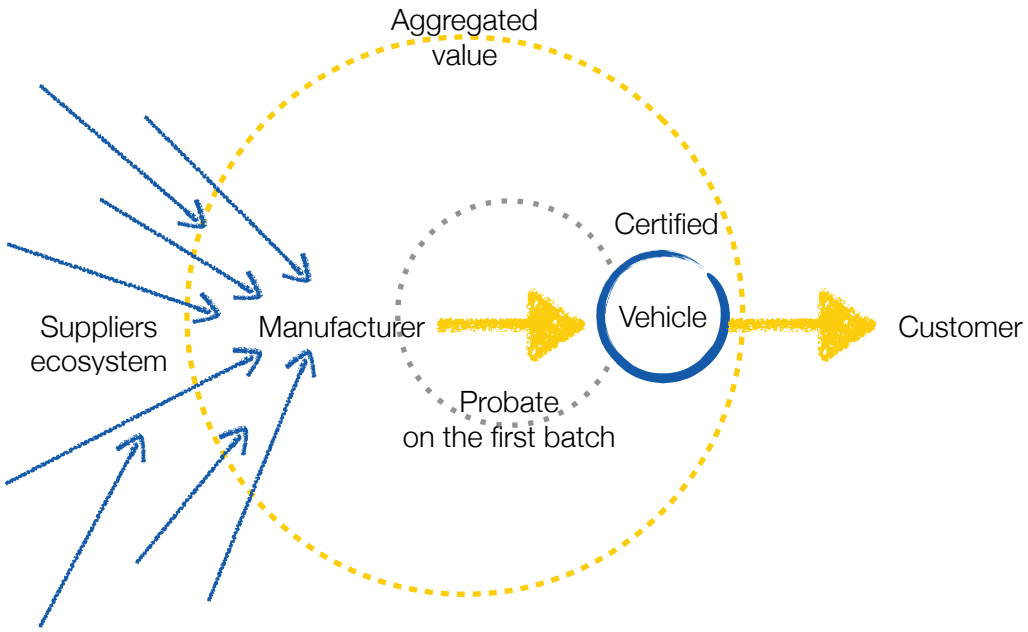
- Who may share data, use data, etc ?
- How anonymous must these data be in order to be collected and provided ?
- How to evaluate the value of data ? or their ‘sharability’ ?
- When provided and distributed, what is the revenue stream of this data business ? Where is the added value, in the content (data) or the distribution network (marketing) ?

- For each data set, who owns the intellectual property, the producer (even if he/she doesn't know what data he/she produces) ? The collector who structure the data ?
- All along the manufacturing process, and before/after during the product lifetime, what are the relevant data to collect ? And with what structure?
- Similarly, to each markets, what are the relevant data to provide, and for which segment?
- Are there new markets for used Cars ? For Open Source hardware ? For traditional industry ?
- Are manufacturer the best actors to collect and provide data? Who are the challenging actors on their market? (Waze, Google, …)
- What are the correct 'elements' size : is it the 'vehicle' data? the 'parts' data? the 'pool of vehicles' data? At which level data collection/providing is the most relevant? (and business wise)
- What if vehicle driving and manufacturing becomes just data production activities ? What if there only value was data production ?
- How to design an object or a car for data production ? How to design and produce data sensitive goods ?
- Where is it more efficient to put your knowledge, into an automaton or into a worker ?

4. CONCLUSION

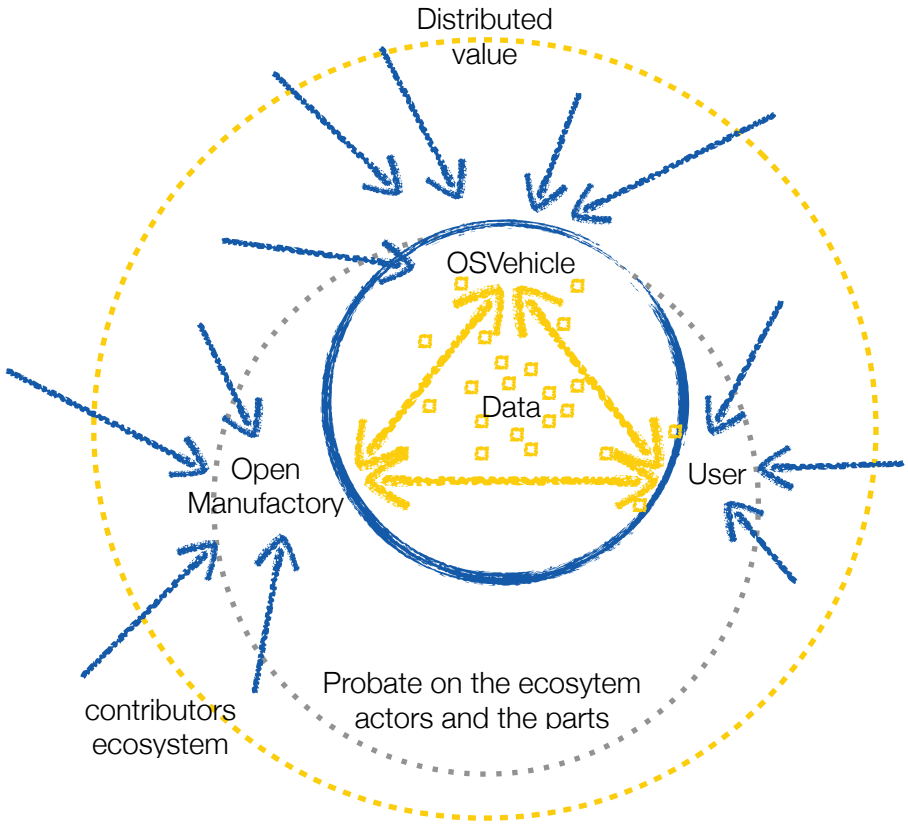
When witnessing the way these questions matured and got structured, the image of a new balance emerged : from the manufacturer —> commodity —> customer linear path, the idea of industry moves toward an interconnected Open Factory <—> Physital Object <—> Users eco-system.

After discussing among car manufacturers, Fablab people and researchers, it appeared that the linear manufacturing process, in which the car manufacturer incorporates all the added value and ensure and end product safe and ready to be used by a customer, seems not to be the only relevant one any more.



VALUE AGGREGATION AMONG THE LINEAR MANUFACTURING PROCESS

As most large industries power fades along with the question of how to maintain high margins, alternatives distributed business models are less denigrated and even appear to hold some interesting value production.



VALUE DISTRIBUTION AMONG THE ALTERNATIVE MANUAFCTURING ECO-SYSTEM

May it be the assembly line, the supply chain, the design process, the value aggregation, all these tracks seem to follow what the Boston Consulting Group coined as The Deconstruction of Value Chains

As a conclusion, we may add that the topic interests many people, from students to manufacturers, to car dealers, to open source guys, to software and hardware crowd, etc.

Lastly, this first FIMM unConference encounter opened the path to schedule next meetings around the FIMM topics. Later in April in Rotterdam and in June in Yokohama will be hosted a second session, where Renault team and OSVehicle team are invited to follow up these questioning around the Future of Industry, Making & Mobility with the multi-disciplinary crowd who will attend that second session.

. METHODOLOGY

Organisation and methodology

Using online tools

For the preparation work, we used such online tools as Google Document, Skype and Facebook. Regular Skype meeting was held almost every week since Jan 15, 2015. Shared document was especially effective in collecting all relevant information and material into one space, using different time to add and modify the plan. It helped us to define the topic and gather the speakers and other guests

Facebook closed group FIMM was also useful in exchanging rough ideas, sharing reference material, bringing new people, and also keeping contacts with some people who could not attend the meeting, such as people in Oita, Japan.

The unConference format

The unConference format will help us to best explore these issues with the persons attending. An unConference is an event where the themes discussed are proposed and coined by the participants themselves.

This event will take place at the FabLab de la Cité des Sciences et de l'Industrie (co-host of this event), on the 5th and 6th of March, from 14:00 to 18:00. We scheduled into 2 half-days to enable the participants to immerse into the topic and build a collective vision without having the stress and exhaustion of a single full day.

The outcomes of this March session is gathered and structured into an “unReport”, then shared with each participants of the session, with their discrepancy, and after that most portion will be published in public.

This unConference takes part into a Research program on the changing industry on social and digital fabrication carried out by Izumi Aizu (The Institute for HyperNetwork Society & FabLab Oita, Japan), and shall be continued in a second edition in Japan in June later this year.

Day 1 & 2 schedule

Day 1 - (Mar 5 from 2pm to 7pm)

- Keynotes and Q&A session with key players : Izumi Aizu, OSVehicle, Renault Fablab
- Definition of topics among all participants and discussion in sub-groups.
- Reception at ***Bancs Publics***

Day 2 - (Mar 6, from 1pm to 5pm)

- Follow up of Day 1 discussions in sub-groups

- Outcomes of the group sessions:
- Major issues of the future of industry shared by the participants
- Will and guidelines to keep on developing the FIMM unConference

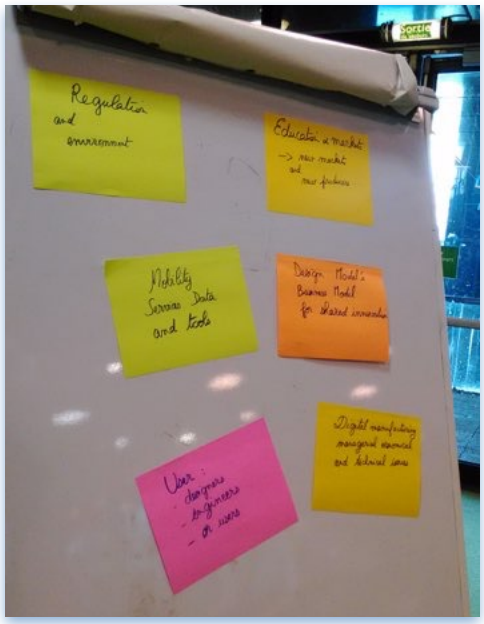
Exercises

Day 1

On day one, in order to define topics for the workshops, every participant was asked to write down the questions and topics he/she wanted to discuss, in regard to the keynotes and our main unConference subject.

This process was meant to focus and identify what we, as actors of this unConference, understood as valuable. In other words, that list of topics appeared as a reflexion on the same thing by different eyes.

We did organize all these topics during this unConference, and build some subjects families, as reported below. We have finally voted to choose the ones we wanted to work on on Day 1.



Here are the topics and key words that emerged :

- Regulation and Environment
- Mobility : Services Data and Tools
- User : Designer ? Engineer ? User ?
- Education and markets : new markets and new producers
- Design and models : business models for shared innovation
- Digital manufacturing : managerial, economical and technical issues.

Day 2

As for Day 2, the topics we discussed appeared after a remark by a participant : practical cases would be more interesting, and more productive to reach the main unConference purpose.

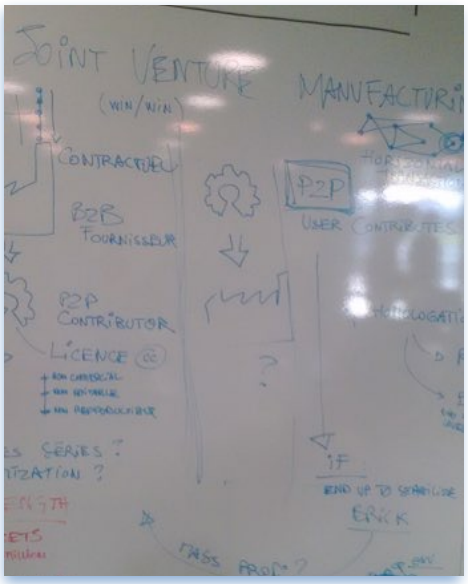
One of the idea of methodology, we did not end up using on Day 2, but we feel like relating in this report, was to use as a discussion start commercial videos from Renault and OSVehicle. Each of these videos translate different visions of the automotive industry. The idea was to ask participants in subgroups to imagine the future ideal automotive industry envisioned by Renault or by OSVehicle, and imagine the anti-ideal automotive industry envisioned by Renault or OSVehicle. The objective was to list the pro's and con's of each industrial vision.

Not being able to run this exercice during that unConference session, we did nevertheless hold to two practical cases as discussion topics agreed by all participants. Then we did form two teams, each team working on one of the case first, and then switching to the other one.

The two topics were :

- What would an Open Factory look like ?
- What could be a joint venture between Renault and OSVehicle ?

Each workshop had a moderator, and someone taking notes. This could be the same person. They were two hours long. It took the form of a conversation, trying more to converge, build and understand, more than being right or defending an idea. We did learn a lot from one another, and more, together.



. GLOSSARY

Industry 4.0
Industry 4.0 is a collective term for technologies and concepts of value chain organization. Based on the technological concepts of cyber-physical systems, theInternet of Things[2] and the Internet of Services, it facilitates the vision of the Smart Factory. Within the modular structured Smart Factories of Industry 4.0, cyber-physical systems monitor physical processes, create a virtual copy of the physical world and make decentralized decisions. Over the Internet of Things, Cyber-physical systems communicate and cooperate with each other and humans in real time. Via the Internet of Services, both internal and cross-organizational services are offered and utilized by participants of the value chain.

Distributed Manufacturing
Distributed manufacturing also known as distributed production and local manufacturing is a form of decentralized manufacturing practiced by enterprises using a network of geographically dispersed manufacturing facilities that are coordinated using information technology. It can also refer to local manufacture via the historic cottage industry model, or manufacturing that takes place in the homes of consumers.

Fablab and other makerspaces
A Fablab (fabrication laboratory) is a small-scale workshop offering (personal) digital fabrication.
A fab lab is generally equipped with an array of flexible computer controlled tools that cover several different length scales and various materials, with the aim to make "almost anything". This includes technology-enabled products generally perceived as limited to mass production.
While fab labs have yet to compete with mass production and its associated economies of scale in fabricating widely distributed products, they have already shown the potential to empower individuals to create smart devices for themselves. These devices can be tailored to local or personal needs in ways that are not practical or economical using mass production.

Makerspace
A Makerspace (also referred to as a hacklab, makerspace or hackspace) is a community-operated workspace where people with common interests, often in computers, machining, technology, science, digital art or electronic art, can meet, socialize and collaborate.

Third places
In community building, the third place (or third space) is the social surroundings separate from the two usual social environments of home and the workplace. Oldenburg calls one's "first place" the home and those that one lives with. The "second place" is the workplace — where people may actually spend most of their time. Third places, then, are "anchors" of community life and facilitate and foster broader, more creative interaction.

. Projet emblématique pour **action immédiate n°2**

P2 AUTOMOBILE POUR LA GÉNÉRATION CONNECTÉE, CONÇUE À PLUSIEURS ET PROTOTYPÉE EN FABLAB

CONSTAT

Depuis 30 ans, la France se caractérise par un fort mouvement de désindustrialisation. En 2009, le secteur des « activités d'art, spectacles et récréatives », employant ainsi plus d'actifs que l'ensemble de l'industrie automobile, constructeurs et équipementiers réunis : soit 380 000 personnes contre 244 000. Le numérique peut concourir à freiner ce mouvement en favorisant la relocalisation de la valeur ajoutée grâce notamment à la refonte des procédures de conception et de prototypage des nouveaux produits.
Pour atteindre cet objectif, les industriels doivent lancer des projets marketing mobilisateurs qui parlent à l'imaginaire. Ces projets associeraient un large écosystème pour concevoir et prototyper de nouveaux produits dans le cadre d'une approche agile et ouverte.
L'industrie automobile pourrait porter cette ambition afin de ré-internaliser la valeur dans le produit lui-même et contrecarrer la baisse inexorable de sa marge compte tenu du poids croissant des intermédiaires. L'objectif serait ainsi de minimiser la prise de risque du prototype en s'ouvrant à l'extérieur tout en internalisant la valeur dans le produit et les services associés.

PROPOSITION

Réinventer la valeur ajoutée du véhicule automobile en lançant un projet audacieux, multimarques autour d'un acteur tel que la Plateforme de la Filière Automobile (PFA), pour concevoir et prototyper de manière agile et ouverte (procédure inspirée de Wikispeed[30] et des *FabLabs*), un véhicule connecté qui soit en prise directe avec la réalité de l'environnement dans lequel il évolue en s'appuyant notamment sur un accès en temps réel à l'information pour sécuriser et optimiser les trajets. Un thème mobilisateur pourrait être « un véhicule sûr pour naviguer dans un monde instable ». Alors qu'il n'est plus possible de traverser de nombreux territoires à bord de sa voiture (Cf. Nicolas Bouvier, *De l'usage du monde*), l'idée serait d'utiliser la connectivité numérique pour permettre à nouveau de parcourir le monde réel et non de se contenter de surfer dans le monde virtuel.

DYNAMIQUE DU PROJET

Les représentants de la filière automobile (consortium PFA) ont été consultés sur le sujet, ainsi que Renault. Le cadrage du projet est à poursuivre avec ces acteurs et des écosystèmes innovants qu'ils ont su fédérer.

30 Wikispeed est un constructeur automobile qui fabrique des voitures modulables et *open* source. Wikispeed innove en appliquant les méthodes agiles issues du monde logiciel. Elle utilise des outils *open*-source et des méthodes de lean management pour améliorer la productivité : http://fr.wikipedia.org/wiki/Wikispeed, http://wikispeed.org/

To Fork / to Hack
To use an existing item for another purpose than it's original one, by knowing how it is build.

Open Source
In production and development, open source as a development model promotes a universal access via a free license to a product's design or blueprint, and universal redistribution of that design or blueprint, including subsequent improvements to it by anyone.

Commons
The commons is the cultural and natural resources accessible to all members of a society, including natural materials such as air, water, and a habitable earth. These resources are held in common, not owned privately. Today, the commons are also understood within a cultural sphere. These commons include literature, music, arts, design, film, video, television, radio, information, software and sites of heritage. The crowdsourcing movement and among others Wikipedia are examples of the production and maintenance of common goods by certain communities in the form or videos, music, or encyclopedic knowledge that can be freely accessed by anyone without a central authority.

Peer-to-Peer
Peer-to-peer (P2P) computing or networking is a distributed application architecture that partitions tasks or work loads between peers. Peers are equally privileged, equipotent participants in the application. They are said to form a peer-to-peer network of nodes. It is also used to name person to person exchanges.

Smart City
A smart city (also smarter city) uses digital technologies to enhance performance and wellbeing, to reduce costs and resource consumption, and to engage more effectively and actively with its citizens. Key 'smart' sectors include transport, energy, health care, water and waste.

Note : Rapport “La nouvelle grammaire du succès : La transformation numérique de l'économie française” - Philippe Lemoine

5. ENDNOTE

This unConference #1 and its unReport #1 were produced mainly by the following three people.

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