OPEN INNOVATION AND CROSS-FERTILIZATION IN IT AND GARMENT-FASHION

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PLAN OF PRESENTATION

1. Context

2. Theories and research objectives

2.1. Theories of innovation

A. Evolutionary Economics;

B. Open Innovation.

2.2. Research Objectives CDO: Cross-fertilization in IT and garment/fashion (Wearables)

3. Preliminary Results and Methodology

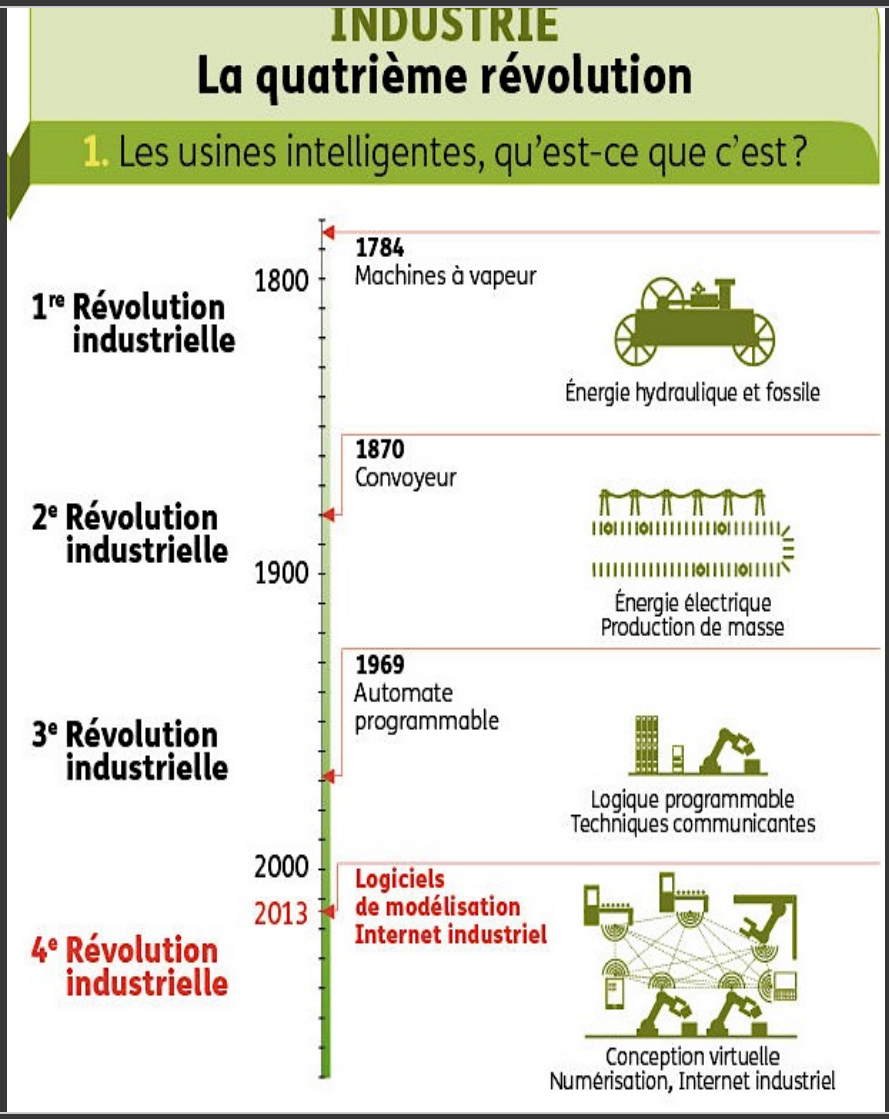
3.1 Methodology

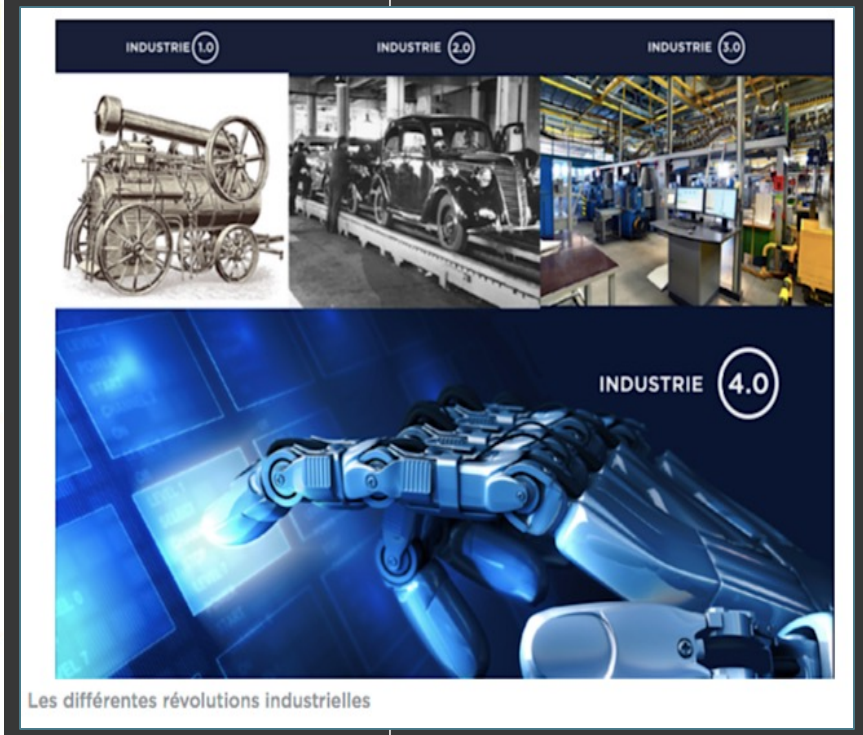
3.2. Intelligent and Technical Garments

- **A. What cooperation ?**
- **B. Definition**
- **C. Innovation, Textile & Rd :**
- **D. Smart clothing, fashion & IT**
- **E. With whom ? Various cases**

3.3. Challenges and limits to cooperation

PART 1. CONTEXT
4 TH INDUSTRIAL REVOLUTION IN INDUSTRY + CONNEXIONS





Les différentes révolutions industrielles

- 45 th Economic Forum (Davos, 2016);
- Unstable market, globalization;
- Technologies and digital economy;
- News industries & cluster markets;
- Important to be innovative.

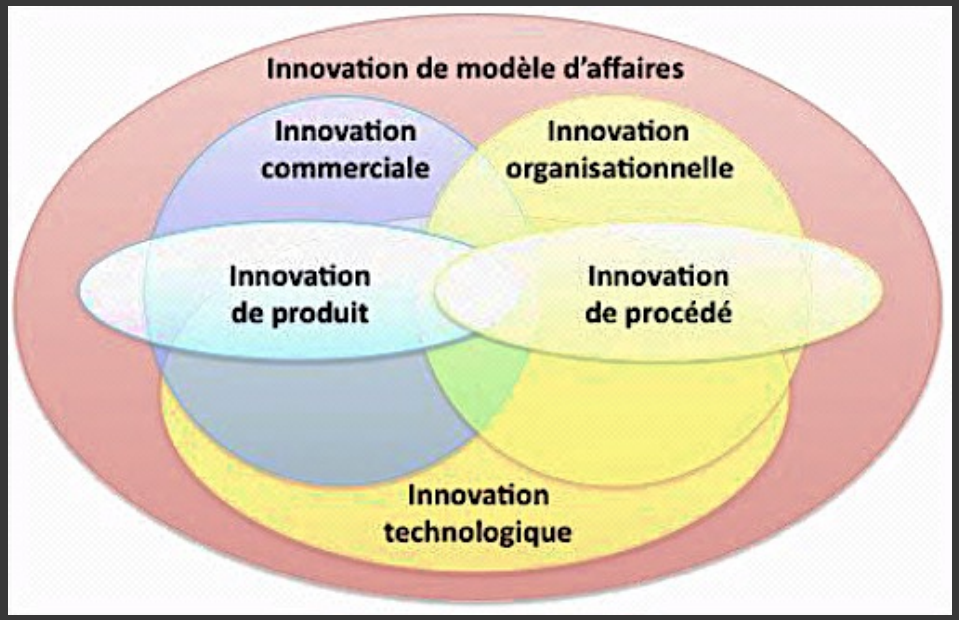
PROJECT INDUSTRY 4.0

- **In Germany** (2010), project **Industry 4.0**, ***smart factories*** : New vision of the production and value chains (Kurt, 2015).

- **In Québec (2013-2015),** project **PM 2.0** (Cefrio/ Ministry of Economy & Finances) : portrait of the Fashion Industry and Accompanying SMBs with ICT (Jolicoeur, 2013).
  - 15 companies of the garment industry : ERP, PLM, transactional site, etc.

TYPES OF INNOVATIONS

- CEFRIO/Québec : Various forms of innovation, often in contact with other sectors (garment, fashion and IT



Various forms of innovation :
Business Model, Commercial, Organizational, Product, Process, Technological Innovation.

[Cefrio, 2011. *White Paper, Innovation and ITC,* p 11.]

PART 2 : THEORIES AND RESEARCH OBJECTIVES

2.1. THEORIES OF INNOVATION

A. EVOLUTIONARY ECONOMICS

- *An Evolutionary Theory of Economic Change* by Richard Nelson and Sidney G. Winter ;

- Focused mostly on the issue of changes in technology and routines ;
- Accent on dynamic properties or economies, characterized by the frequent introduction of innovations of various forms, decentralized processes of production of novelty, and collective mechanisms of selection (Coriat et Dosi, 1995).

INNOVATION = PROCESS

- Freeman (1982) returns to Schumpeter and presents **innovation as a process** ;
- Innovation stems from a process that consists in **problem resolution** (Dosi, 1988, 2010) ;
- Innovation is **endogeneous** ;
- Presents itself mainly in the form of **gradual change** (not so much radical change… except ipod, ipad maybe…).

EVOLUTIONARY INNOVATION = PROCESS

(IN CONTRAST WITH ORTHODOX NEOCLASSICAL VISIONS)

- **Time dimension** ;
- **Non linear** ;
- A real **«technological trajectory»**, including choices, options that determine the **possible futures** (Path Dependency) ;
- Extension to the idea of a *social trajectory*, ***social innovation*** **for some sectors.**

INNOVATION PROCESS

- Innovation can appear in SMBs as well as large firms (not dependent on R&D);
- Process of **«pollennization»**: ideas circulate and bring about creativity, innovation;
- Innovation is a process of **cognitive learning** (Dosi, Freeman, Nelson et Winter…);
- «**Learning by doing, using, sharing**»… In the firm, network, or sector ; this is the source of innovation

2.1. THEORIES OF INNOVATION

B. OPEN INNOVATION

- A lot of interest over last decade or so, many articles… (Chesbrough….many others);

- Studied in relation with Business Models, Organizational Design and boundaries of the firm, Leadership and Culture, Tools and technologies to favour OI, Industrial Dynamics and Manufacturing (Berg et al., 2008).

OPEN INNOVATION VS TRADITIONAL VIEWS

(TROTT & HARTMANN, 2009)

- Not all the smart people work for us, so *we need to tap into the knowledge and expertise outside the company* (ref. to Nonaka, 1991: Creation of knowledge within an organization depends on tapping into tacit insights, intuitions and hunches of individuals….)*;*
- *External R&D can create significant value* (vs To profit from R&D, we need to discover, develop, produce and ship ourselves);
- We don't have to do the research to profit from it (vs if we do it, we get it to market first);
- Building a ***better business model*** is better than getting to market first (commercialization is important to win).

OPEN INNOVATION VS TRADITIONAL VIEWS
(TROTT & HARTMANN, 2009)

- If we make the best use of ***internal and external ideas,*** we will win;

- We should profit from others' use of our IP and we should buy others' IP whenever it advances our own business model *(vs we need to control our IP so that our competitors do not profit from our ideas).*

A REALLY NEW VISION ?

- Trott & Hartmann (2009) and others question whether this is really a « new » way of doing things;
- Did the « old » paradigm of closed innovation ever exist ?
- May be a true theoretical distinction, but does not really exist in industry, but false dichotomy may help get the message accross;
- Similarity with quality circles, Theory Z in J firms, Reengineering…

CRITIQUES OF OI

- Many authors still present a linear vision of the flow of the innovation trajectory (important to include loops, feedback, feed-forward, Nonaka, etc.);
- No fixed point of origin as in the (outdated) «technology-push» and «market-pull»;
- Danger of knowledge leakage… so need to have a good balance of openness and closure, suitable relationships governance structures and management instruments;
- Also a risk that internal structures close up, limiting the free flow of knowledge between different departments, while the company has opened up to external knowledge

2.2. RESEARCH OBJECTIVES CDO : CROSS-FERTILIZATION IN IT AND GARMENT FASHION (VS WEARABLES…)

- Analyze the institutional and organizational foundations of **collaborative innovation** processes and **intersectoral collaboration** ;

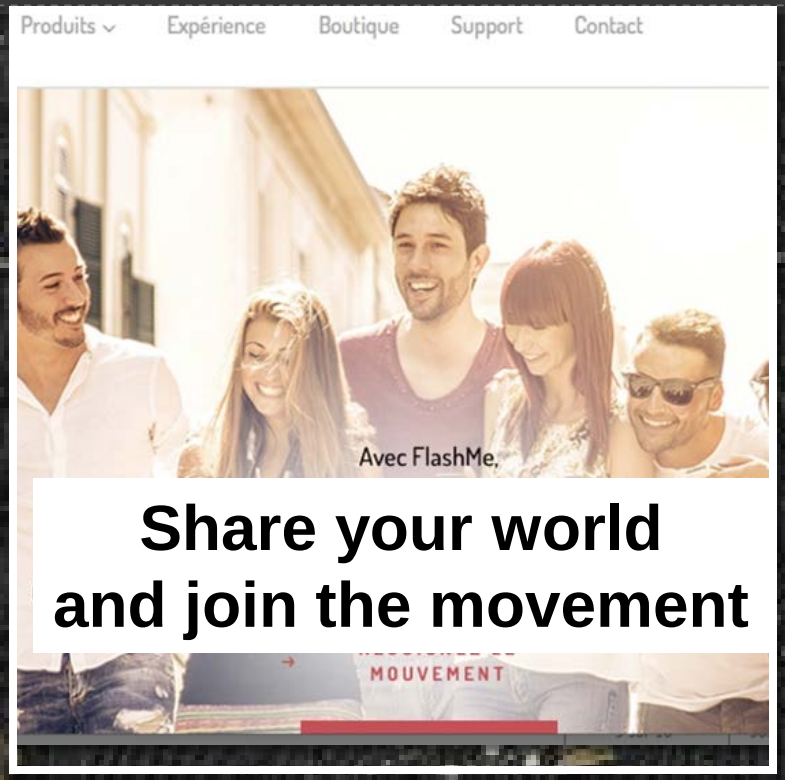
- Analyze cases of **cooperation** between IT firms and firms from **garment/fashion/wearables**…, as well as in the reciprocal contribution and the nature of exchanges between these firms and their contribution to innovation/creativity ;

- Study **cross-fertilization in IT** and garment/fashion/wearables… (in fact with *health sector also)*

KNOWLEDGE SPILLOVERS & COLLABORATION

- Knowledge spillovers and sharing between **creative sectors** (garment, fashion) and **IT firms**;

- **Inter-organizational mobility** and **knowledge-sharing**, **knowledge spillovers** (firm to firm, professional associations, educational and intermediary organizations to firms , etc.).



« Innovator is the builder of a seamless fabric » *(Hugues, 1983)*

PART 3 : PRELIMINARY RESULTS

Clothes and Garment industry, wearable object, fashion accessories, connected object [applications, algorithms…] : Computing, electronic elements, etc. [built-in integrated sensors, mini-sensors and Nanotechnologies]…

3.1. METHODOLOGY

- **Documentary research**, **Participant observation** and **Qualitative Interviews** with **companies and intermediary organizations** (20 interviews, 1h30 to 2h).

- **Thematic analysis**, 4 themes :
  - **Innovation ;**
  - **Collaboration ;**
  - **Cross Fertilization ;**
  - **Training.**

3.2. INTELLIGENT GARMENTS AND TECHNICAL TEXTILES

A. WHAT COOPERATION ?

❑ EMERGENT ECOSYSTEM

The organization of the **ecosystem** around digital innovation and wearables is based on logics of **interaction** and intersectoral challenges between **various *actors***, *important* ***role of actors*** (Crozier et Friedberg, 1977).

❑ COOPERATION/INTERACTION (Becker, 2010)

- **Forms of cooperation** : dynamics of construction of the ecosystem (talents, business models...);
- **Challenges** of cooperation between : artists (BL, JB, VL), inovators and the IT professional or health professional, etc…

Context of wearables: «*Wearables ("mettables*) will be a market of 50 billion $ in 2-3 yrs…*» (Rhys, 2013).

Beside all code there is something and this is my IT platform… For the first time when you flash the QR code that will lead you on a activation page which inform you about what you want to put on… you sharing phone number, videos, status… (OA)

With the NFC «When you approach your phone of the electronic chip the informations about your animal is going to appear on your phone… (OA)

2 Enterprises (OA, Paris)

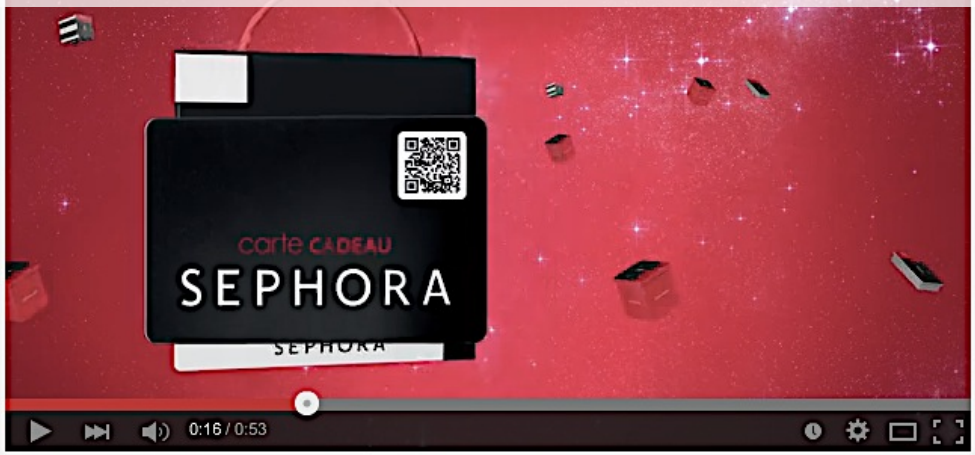
Passive communicating objects, *QR code* + *NFC* :

1) FLASHME, no 1

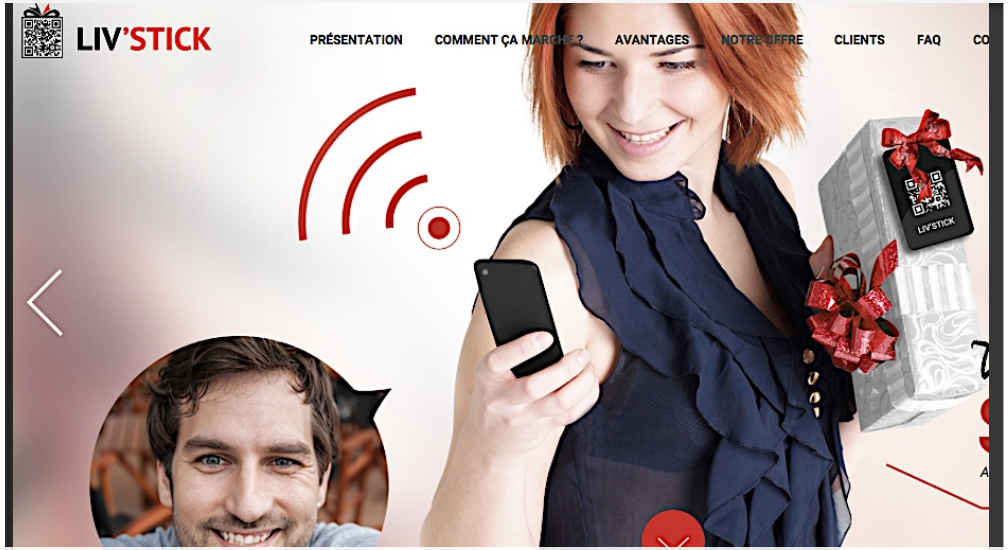
Idea of wearing objects or signs that give information ON us, or give us information… (OA)

Connected and communicating objects : the first collect information all the time; the others exchange info… (OA)

I always have to improve aesthetically the products so I can use the work of designers



A video attached to a present : personalization…



For me, what I need is to push the viral marketing on social network… It's a skill i don't have so sometimes i have to buy it…

2) LIVSTICKS no 2

Ex: Sephora, Nicolas wines with a video on the wine bottle; Conforama…

Connected objects ask a continual capture of informations sent on the web which help with sharing data. For example, there is wristband connected to networks that analyse your pulse rate, your pressure, etc., and send them to your smartphone. These are expansive, they need research, development and are made with complex process.

3.2. INTELLIGENT GARMENTS AND TECHNICAL TEXTILES

B. DEFINITION (DIFFERENT THINGS)

- ***Smart textiles*/Functions** :

Adaptability, Reactivity & Sensibility... (Use electronic components, specific materials or both). An intelligent textile can : « *Think, React and Adapt. It can heal, communicate, change color, be connected to internet, etc.* » (Moretti, 2011) .

- **Three generations of smart textiles with smart feature** :

The third generation… They contain components integrated in the fibers themselves, duringh the process of production of fibers or thread (CTT, 2016).

3.2. INTELLIGENT GARMENTS AND TECHNICAL TEXTILES

C. **INNOVATION, TEXTILE & RD** : **The intermediary organisation** (OV)

Innovation, collaboration and cross fertilisation

The innovation can't be created alone.. *In all the different projects everything is new, we always learn… We learn due to different enterprises from multiple sectors (Case OV)*

Textile, Garment and IT Ecosystem

- ***These products are difficult to make and expensive to charge (Case OV)***
- ***Strategics orientations…***

When we speak about IT, we need to have ***mixed interventions from garments, textile professionals with electronics professionals****… What is important is to have a dialogue between the electronics industry which is a significant industry in terms of volume of production with the garment industry which is an industry of SME (small and medium-size firms), that develop the technologies and will pollinate others industries (OV)*

R&D IN SMART CLOTHES, *WEARABLES*

Lots of companies ***« are spin off, or marketing enterprises…*** *The amount of money which is used for R&D is huge » (OV)*

Example of a Montréal company

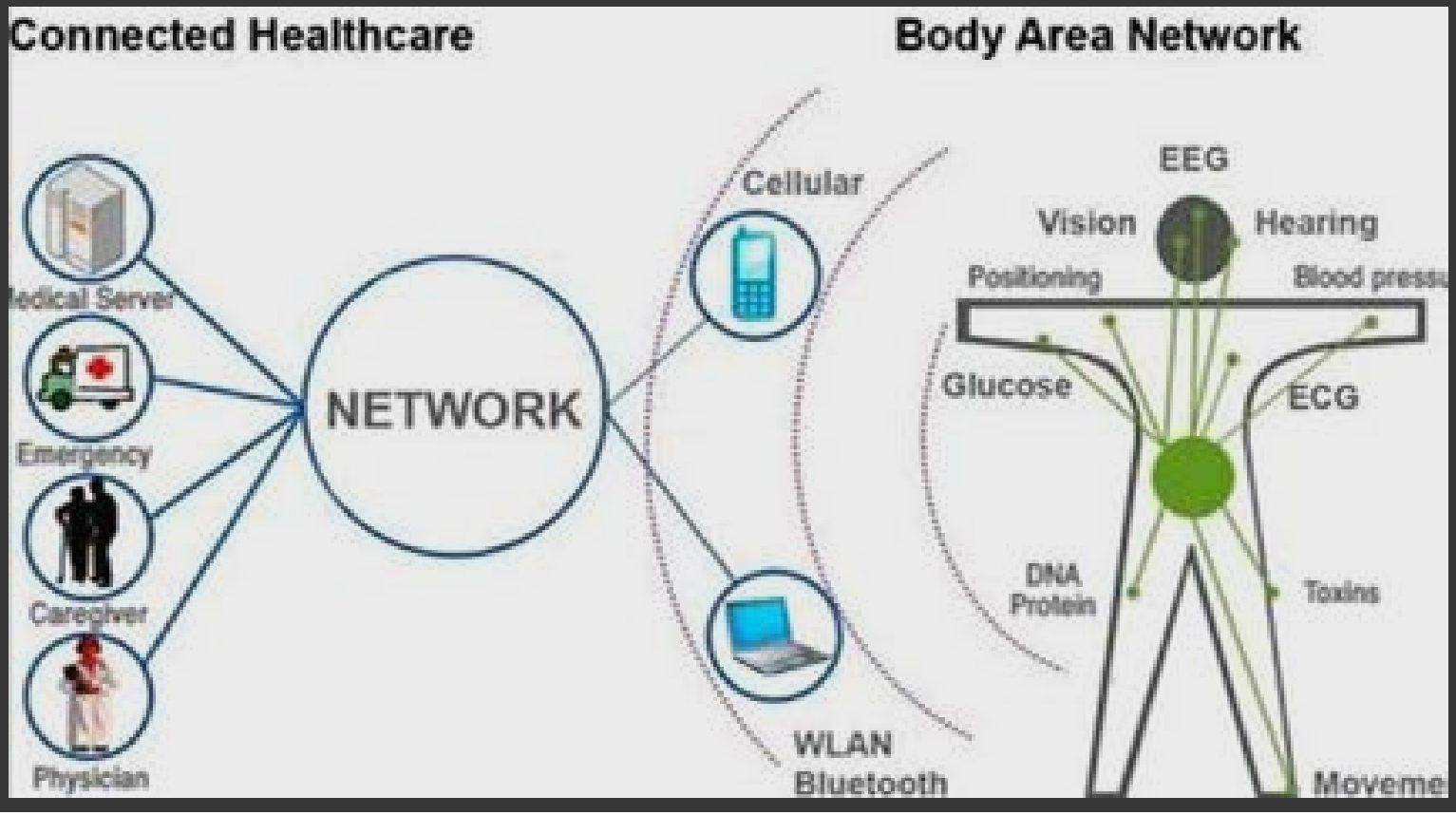
Let us suppose that they have 10 million in investments *[…], that means that a part is for the marketing, the other part is for the R&D, so one day they will be able to sell the products, but it's going to take time before they sell enough to cover the 10 million … But in a certain way they don't need to recover their expenses because they are just going to fetch funds […] with investors from R&D …* ***And there are a lot of companies that use this money and then they just die… (Case OV)***

SMART TEXTILES FOR HEALTH APPLICATIONS : CONNECTED HEALTHCARE

In the healthcare industry, *to obtain data is something pretty easy, we can do it with the textile industry and with anything else. Now the problem is the* ***processing of this data****, its how we use them, how we integrate them into the* ***health system****, and how me manage them ? […] We are going to* ***use integrated technologies with processing expert systems*** *which are going to react after a certain number of signals. So for the health system, it's for* ***society*** *that it is interesting…(OV)*

INNOVATION AND SMART TEXTILES FOR HEALTH APPLICATIONS : CONNECTED HEALTHCARE

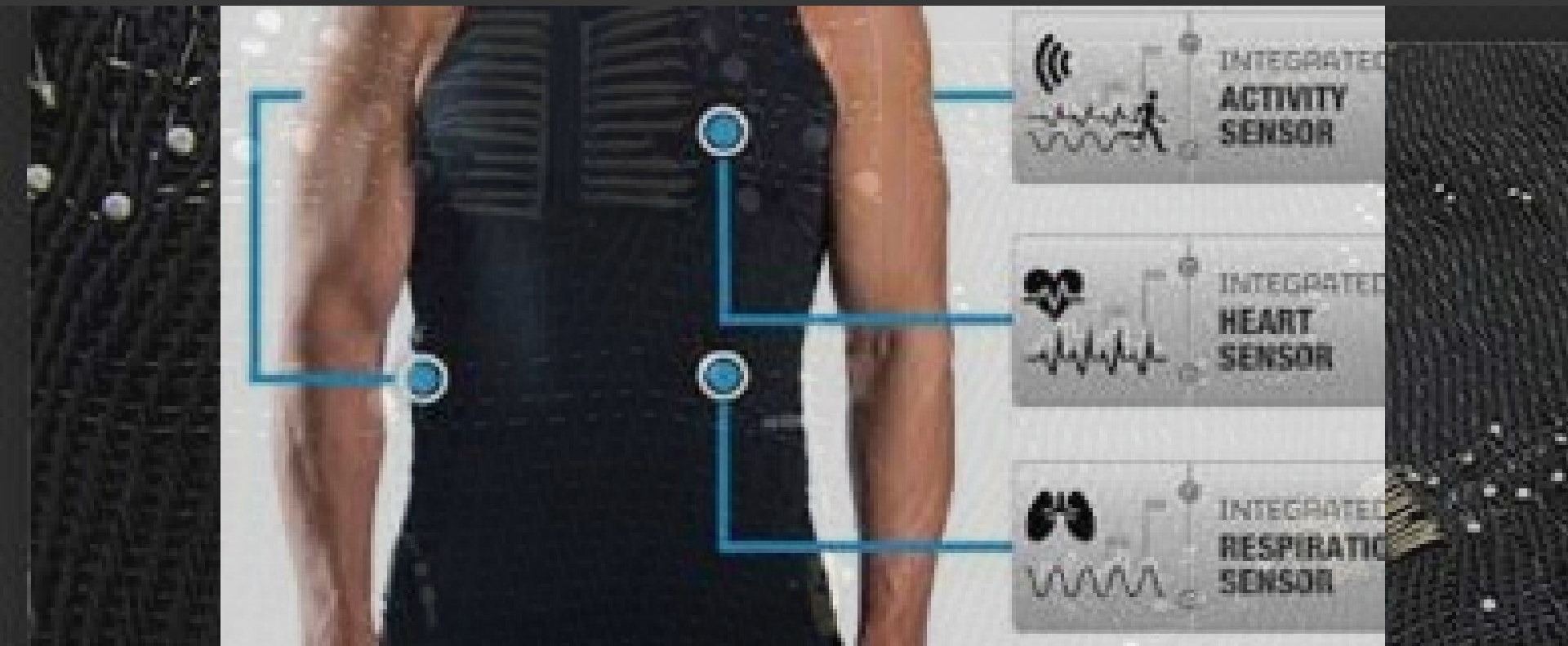
Clothing based on smart textiles with captors can monitor various elements of people's health (Futura 2014, cf. Stepan Gordutsa, Univ. Laval)



« *Our life is full of interactions with created objects fibers* » (Rhys, 2013).

CONNECTED T-SHIRT : HEXOSKIN CASE (MONTRÉAL)

3 captors for the **heart + 2 to collect data** on breathing, volume of air, intensity of movements, steps, cardiac rythm: *Collects data during physical exercise (heartbeat, breathing, effort…) transmits the data to a platform through smartphone or other devices…*



LIMITS OR CHALLENGES

Problems or challenges for smart textiles (or e-textiles) (Futura, 2014, cit. Younès Messaddeq) :

- ✓**Connexion of the textile to a Wifi;**
- ✓**Electrical connexions ;**
- ✓**Washable textile ;**
- ✓**Resistance to detergents.**

Need for cooperation between various sectors: textile, garment, IT, health…

Intersectoral connexions: Information and Portability

IT industry: Medicine, Health, Wellness, Safety, Sports, Supervision, Gerontology…

D. SMART CLOTHING, FASHION & ITC

- **Information platform** (Corps/Internet)

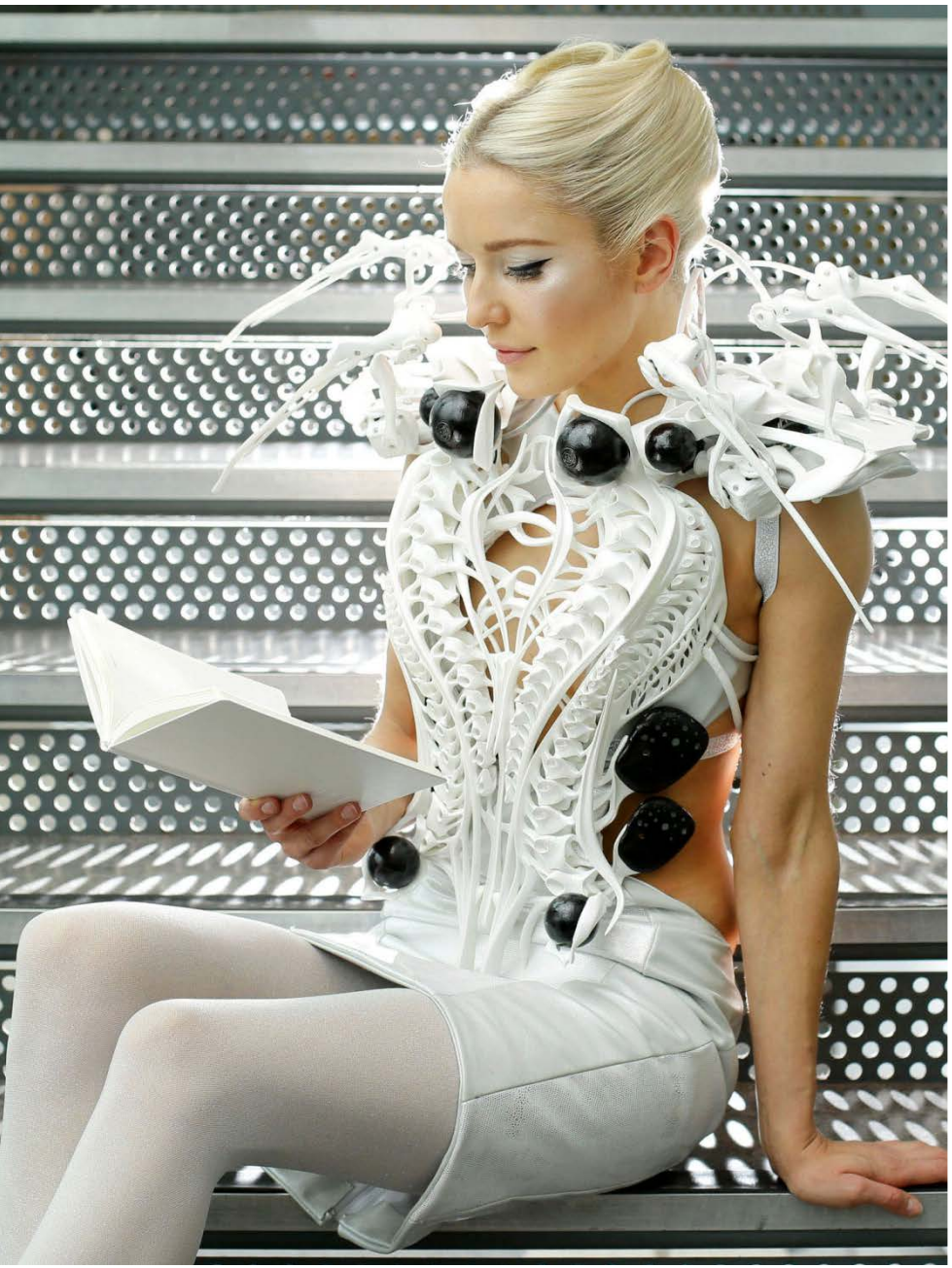
«By using internet, clothes are going to become a platform of communication and relay information » (Futura. 2014).

- **Communication** (Codes/Signs)

The garment allows to send messages *which we would not be able to send otherwise, verbally,* ***these are codes… Clothes which speak and which are intelligent*** *[…] which allow to communicate (Fashion designer, Montréal, MSP)*

- **Technomode** (Jullier and Château, 2013)

When we talk about technomode, we talk about garments that integrate technologies […] : ***The fashion also became 2.0*** *(Fashion designer, Montréal, YG)*



The biggest challenge for my students[…]is not the ***technical*** *aspect, because […] it can be learned ! It's a very* ***home-made work*** *because we need to make a sewing of the circuit… Everything which is sewn, all the finishes, all the embroidery, all the junctions between a hard element and a soft element, like a circuit with a thread, must be executed in a certain way […] as the* ***Haute Couture in fashion design;*** *otherwise the circuits are not beautiful enough, they are not functional, and they do not last very long (VL, Montréal).*

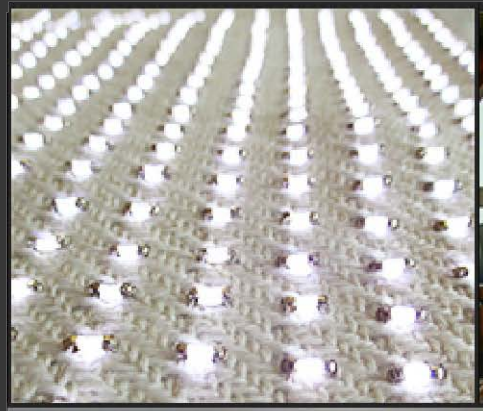
NO-FEE-INTEL-SPIDER-DRESS : Wearables art works, fashion and technologie/ Designer Anouk Wipprecht, Austria (smart dresses)

PHOTOCHROMIC DRESS: Amy Winters, créatrice Anglaise

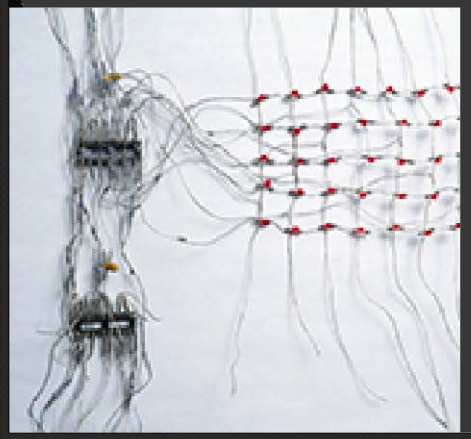
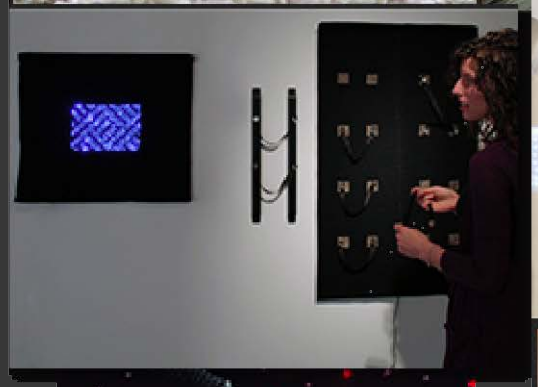
DRESS IN ILLUMINATING LED

FLEXIBLE TEXTILE ELECTROLUMINESCENCE

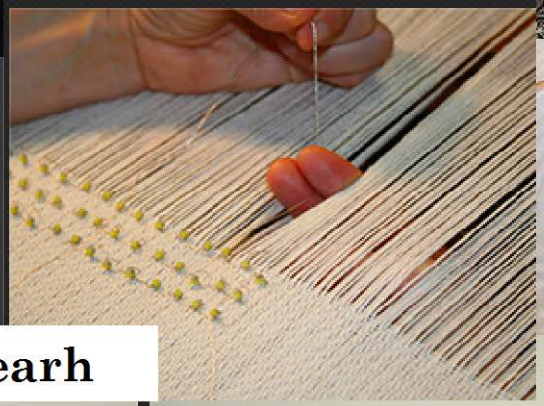
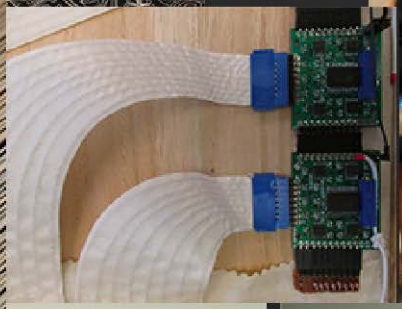
RUMES LED ET OLED DES BLACK EYED PEAS, 2011

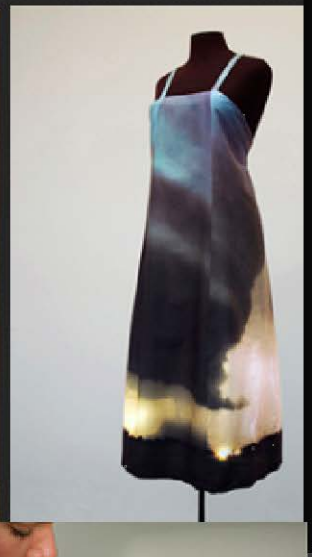






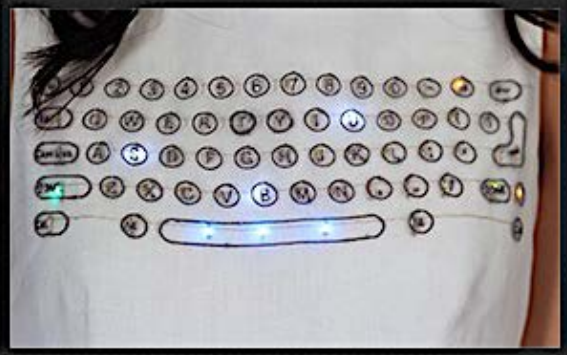






rnado Dress

Univ. Concordia researh

White Keyboard Dress: Typing a Word



The embroidered "keyboard" of this dress acts as a display. When typing on an iPAD that is connected wirelessly to the dress, the letters of the keyboard become illuminated. The back of the dress is connected with two silver ribbons. When clipped together, the dress is switched on and when unconnected, the dress is turned off.

Research Laboratory : Studio subTela

(Univ. Concordia. Research, Innovation: art, textile, fashion, techno...).

When we type on an iPad connected wirelessly to the dress, *the letters of the keyboard are illuminated… LED was sewn on the dress by using an Arduino platform and a wireless XBee system !(VL)*

E. WITH WHOM ? VARIOUS CASES

- **VL :** Ahead of the crowd in wearables ;
- **BL :** Textile, garment and IT. Creative objects, with artistic touch. Has some business interest, but rather limited, not centered on commercialization, rather on research with IT and artistic people ;
- **OS** : A business which is oriented towards well-being, sports, IT, health…Collaboration with other brands to market its products.

- **VL:** ***«DO IT YOURSELF»*** (DIY), **WEARABLES NETWORK: TEXTILES, TECHNOLOGIES & FASHION** (MONTRÉAL)

A challenge in knowledge transfer: *Engineers vs designer*

The engineers really wanted to use materials they knew… *I really had to convince them to* ***use electrical embroidery threads…*** *They really had to experiment to* ***create an interactive garment, to realize that the conductive textiles worked very well…*** *(VL)*

I sometimes have more ***common points with engineers*** *from the point of view of attention to detail* ***than I do with artists*** *(VL)*

❑ BL (MONTRÉAL)

Collaboration between clothing, textile and IT

*This belt has a number of **different designs on it,** one of them is this wyvern, it's done in **medieval times it's a medieval dragon like figure.** So he's telling us that this is too big, it has to be smaller. He does all these renderings on **his computer** and it takes hours, if not a day, to render it and find out how the signal goes… He can get that based on entering this into his computer and doing **a lot of configurations on it…** And we don't care if its perfect, we just want it to be able to connect… So we laughed at each other because our priorities, our values are so different, **but we're getting good results** (BL).*

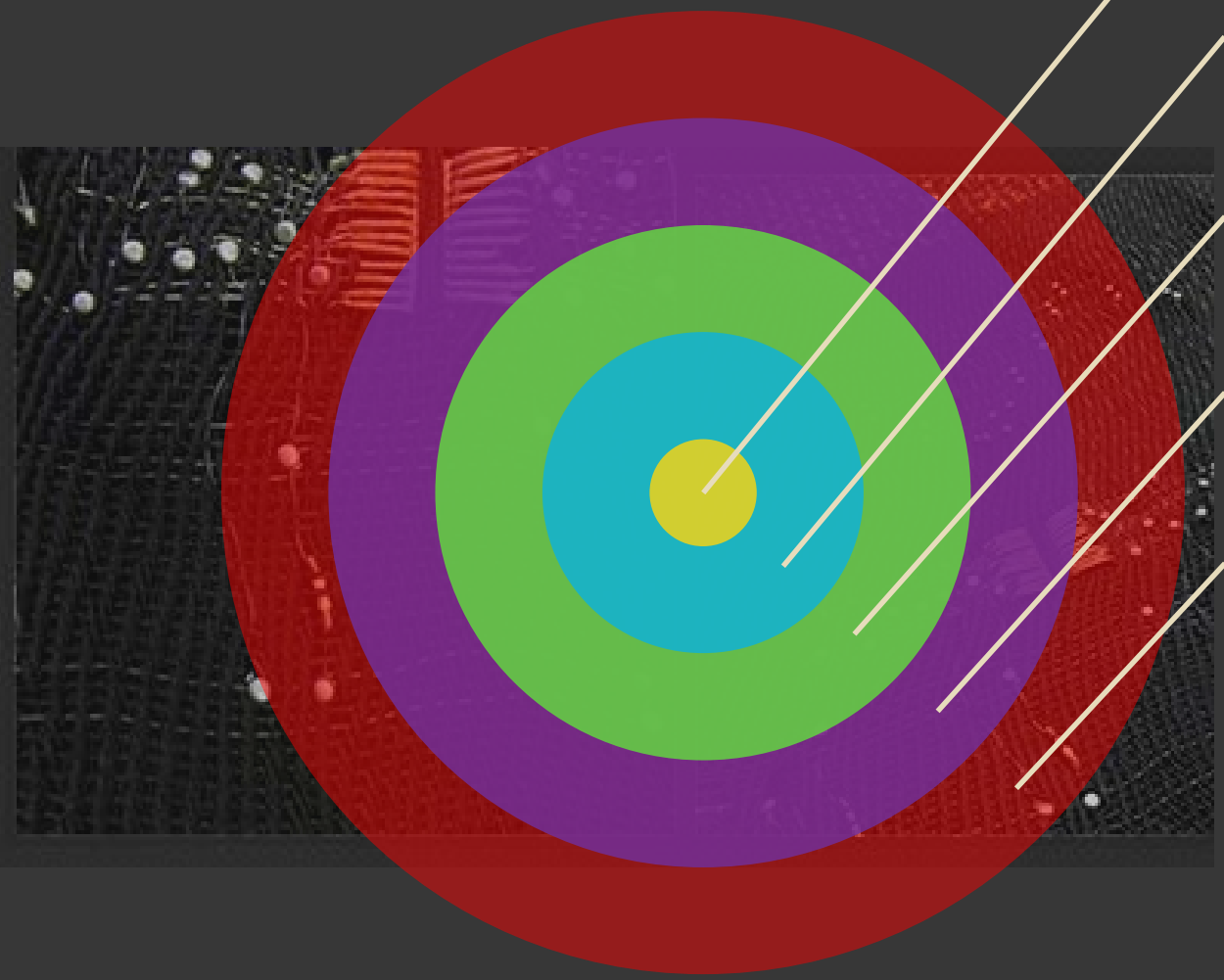
Limits to collaborations: artisans, artists vs engineering and mass production

*I think they probably think that **my techniques are really craft-based** and take a lot longer than someone **working in engineering**... (BL).*

❑ THE OS CASE (MONTRÉAL)

OS Case (smart clothing): Got together with **Ralph Lauren** to create a connected t-shirt. Designer Joanna Berzowska, Univ. Concordia)

OS is known because they made a deal with […] ***Ralph Lauren, then*** *it's brands which are already* ***recognized****… (VL)*
OS, it does not arise from an ***artistic practice*** *[…] it is really a* ***business*** *(VL)*



INNOVATION

R&D,
TRAINING...

COLLABORATIONS
SUPPORTS
(Public, Private)

CROSS
FERTIZATIONS
EMERGENT
ECOSYSTEM

IT, GARMENT.,
TEXTILE...

DYNAMICS OF DIGITAL OPPORTUNITIES

3.3. CHALLENGES AND LIMITS TO COOPERATION

- Some **cooperation in educational institutions** (Concordia : Arts and IT) but rather individual and **a few companies in Technical Textiles and Intelligent** (Health) Clothing;
- **Trust-Building** is important for cooperation, takes time as we know…;
- **Different objectives:** Arts in university, IT, Health objectives... and different timelines (Art vs business);
- *Ongoing Research, very* ***preliminary results***

L'iAesthete defines itself by the list of what he loves and what he possesses. One can be confuses with the other one: we possess what we like because the «aura of the original» whose loss Walter Benjamin regretted is not current in the **iMonde**. Here reign **clones**, and not the reproductions of an original abstentee. Hard changement, l'iAesthete can immediately produce this list under our eyes, just the time to cherish our **phone or our tablet computer**. The fact that this list stay private is rare, it offers itself much on the **web consultation** via the «page» or the «mu» of the interested. Indeed, the list of the favorite works became a inescapable passage of the **«social networks»** which is not surprising if we admit that the identity is build by the taste, therefore the **sociability** (Jullier and Château, 2013).