

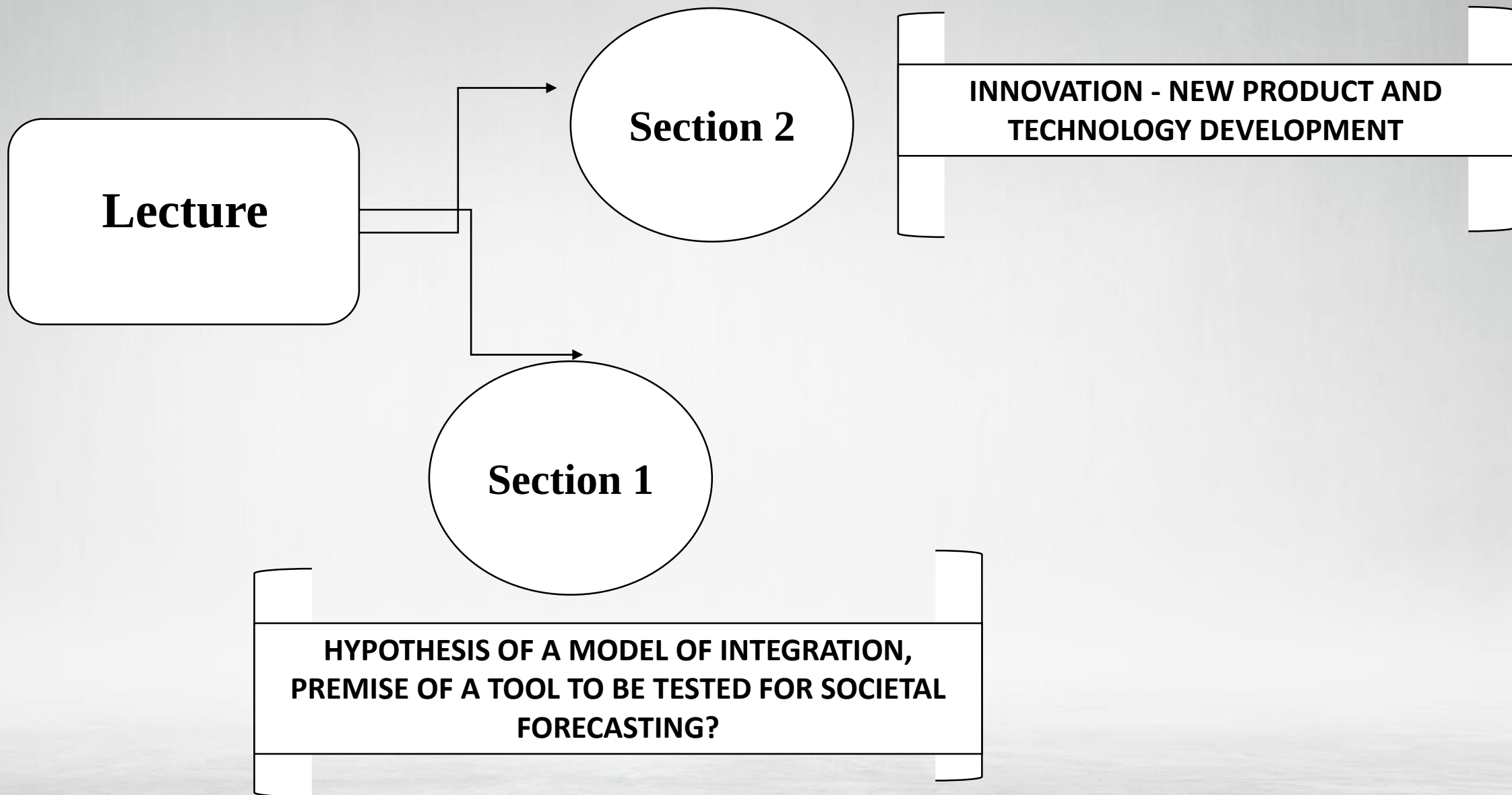


مجموعة جامعة
الجميع الذكية
للتعليم القابضة

MIDOCEAN
UNIVERSITY

Management of technologies

Lecture 7



Section 1

**HYPOTHESIS OF A MODEL OF INTEGRATION, PREMISE OF A
TOOL TO BE TESTED FOR SOCIETAL FORECASTING?**

SPHERES OF INTERESTS

The concept of sustainable development can be summarized with the long-term convergence of interests which may appear, a priori, contradictory. To be responsible supposes accepting and being subject to the consequences of one's acts, and also agreeing to respond. In the theory of the fascinating parts, the company is supposed to go in the direction of a general social consensus (if this option is in conformity with its interest).

SPHERES OF INTERESTS

The taking into account of the fascinating parts is one of the ways to reach consensus outside of clear and feared constraints, but responds to various pressures.

Firstly the pressure of socially responsible funds is increasing without a formal link having been identified between socially responsible behaviour and better stock exchange performance. The absence of counter-performance makes the case for its development and tends to institutionalise what yesterday seemed alternative and radical.

SPHERES OF INTERESTS

Secondly, the pressure of public opinion is increasingly mounting. There are many examples to illustrate the concerns or the doubts expressed regarding problems of pollution, public health or food hygiene, by a hybrid but impossible to circumvent being, made up of a new "alloy" that would be at the same time parent, citizen, taxpayer, resident, consumer, employee, trade unionist and shareholder. The univocal communication of a company directed towards the exclusive attention of the institutional shareholder appears insufficient and sometimes truncated or dishonest.

SPHERES OF INTERESTS

Thirdly, the company cannot, without exposing itself to serious risks, function in the realm of refusal, opacity, contempt and incompetence, arguing against the inadmissibility of questions and new modes of evaluation, seemingly distant from its function of uncontested utility: to generate profit.

Companies, on the contrary, in a social and natural environment that is in constant change, will have to demonstrate porosity in order to anticipate understanding of the complex balance of power impacting directly on its activities (moral pressure).

INCUBATION OR INTEGRATION

The example of sustainable development clearly shows that the challenge is to find grounds of agreement between players with contradictory interests but who, despite everything, coexist.

How can grounds for agreement be found? Several observations can be made on this subject. the temporal dimension is given by possible evolution of the model which operates through the possible movement of the players from one sphere to the other. the choice of the players operates by the choice of contradictions that are accepted and not the opposite.

INCUBATION OR INTEGRATION

The objective is to adopt a simple mode of representation (fig.1), in order to predict, to a certain extent, the evolution of the system that requires knowing the players in each sphere and their relationships and having a photograph (measurements, indicators) that clearly defines the problems (contradictions) to solve.

The political process must solve the " limited conflicts " between people whose values differ and are sometimes opposed. The political process is initiated by the Government: it can thus, for example, inflate its importance to widen the intersection of the spheres or launch educational programs and research for companies and individuals the divided by the same values. It is each time a question of shifting the balance of the system.

SHIFTING THE BALANCE OF THE SYSTEM

Understanding the finite nature of the planet and the Biosphere combined with the uncertain economic challenge regarding the equitable division of the promises of science, technologies and development, for a human population in full demographic explosion, leaves the door open to reflection on the indeterminism of human evolution.

The theorem of Godel (known under the name of the theorem of incompleteness) of the undecidability of open systems (mathematical theorem which applies to cybernetics) makes it possible to understand better what transforms a deterministic system into an indeterminist system. This open breach of uncertainty makes it possible to formulate assumptions of forecasting suitable for renewing the contents of reflections and debates on sustainable development.

SHIFTING THE BALANCE OF THE SYSTEM

Here we propose three potential assumptions :

- the first one takes note of a final historical victory on a worldwide scale of market forces (pre-eminence of the business sphere): the exchanges between humans are controlled and dominated by the presence of only one reference mark, money, which has become a finality. With globalisation, world governance is ensured by multinationals which are ever more concentrated and which already, before the year 2000, monopolized a quarter of measurable economic activity employing only 61 million people on the planet (UNO figures): for the first time in History, "the rich no longer need to exploit the poor",

SHIFTING THE BALANCE OF THE SYSTEM

Here we propose three potential assumptions :

- the second scenario (or assumption): a Marshal plan for education and sustainable development. Pushed by world opinion increasingly conscious of the danger of capitalism without faith or law, of a civil society which makes its dissatisfaction and its distress heard, Politics returns to the international scene:

the application of morals (ethics) revisited and shared by society. This second assumption can find its marks in a reinforced alliance between the community of "scientific experts" and large industrial firms, closely and culturally bound, under the banner of a Marshall plan for the South.

SHIFTING THE BALANCE OF THE SYSTEM

Here we propose three potential assumptions :

This scenario renews links between public interests (States bypassed by globalisation) and private interests (multinationals) under a media focus on humanism and peace. Escaping to technology (industrial sensors and satellites, purifiers, biotechnology and genetic engineering, micro-electronics for monitoring and control, biomaterials etc.) becomes a pretext for saving the planet and growth. The logic of the market, individualism, and the new technical system, are combined together as in the past, but with the multiplication of codes, standards, rules, suspicions, labels, controls and monitoring.

SHIFTING THE BALANCE OF THE SYSTEM

Here we propose three potential assumptions :

These first two scenarios, that can follow each other in time while still overlapping, have the characteristic of falling under the continuity of a "determinism" of development already quite observable at the present. They are both faithful to this vision where meaning (truth) is external data, transcending and independent of human conscience.

- In the third scenario (or assumption), it is not in poverty but in wealth that the problem of poverty resides. In this current of thought, there is an understanding there that the majority of Northern countries stamp an ecological imprint on the World of taking away much vaster resources than their territory possesses for the population which lives there.

SHIFTING THE BALANCE OF THE SYSTEM

Here we propose three potential assumptions :

An understanding too that what is taken away by world growth from the Biosphere adds up, every two years, to that taken away by Humanity until 1900! By refusing to separate the ecological crisis and the social crisis, those that hold this third assumption do not dispute the implementation of a "revolution of efficiency":

to produce better with less taking away and less emissions, such as those of the second scenario of scientific ecology propose. Their criticism focuses more on the way in which this revolution of efficiency can be used to justify the blind pursuit of growth and its counter productivities.

SHIFTING THE BALANCE OF THE SYSTEM

Here we propose three potential assumptions :

The alternative to this revolution of efficiency programmed on a planetary scale lies less in the sophistication of techniques than in another rationality to be found within shortened chains of production-consumption. That is to say less intermediaries and transport, less active participation in long exchange circuits, onconcrete life spaces of exchanges and decisions reduced to the level of the territories to which one initially feels oneself to belong.

SHIFTING THE BALANCE OF THE SYSTEM

Here we propose three potential assumptions :

Finally, this third scenario is characterised by the conviction that a revolution of efficiency will have effect only when associated to another more intimate revolution on the scale of the individual: a revolution of sufficiency. The revolution of efficiency does not know where it is going, if it is not accompanied by a revolution of sufficiency (voluntary restraint) registered in an ethic of everyday life.

SHIFTING THE BALANCE OF THE SYSTEM

Here we propose three potential assumptions :

These three scenarios are only pure socio-economic and political forecasting, but show the existing place for a possible societal forecasting. Forecasting based on a model that has to be developed and validated, and which companies would do well to appropriate to have future competitive benefits. Indeed technological innovation being par excellence the science of linking, it could arise tomorrow from questions on the evolution of the links between the values held by the different stakeholders.

MODES OF APPLICATIONS TO COMPANIES

HISTORICAL OVERVIEW OF THE TECHNOLOGICAL FORECASTING CONCEPT

Even though the definition of forecasting was given in 1957 by Gaston Berger, the development of the concept came in the 70's. Indeed, the frequent errors of forecasting and particularly the lack of predicting the crisis, lead to a serious examination of the foresight approach. The impossibility to foresee the future only with data coming from the past explains the limits of classical econometric models. The latter do not integrate non quantitative parameters such as individual behaviour in a project.

MODES OF APPLICATIONS TO COMPANIES

HISTORICAL OVERVIEW OF THE TECHNOLOGICAL FORECASTING CONCEPT

More precisely, the specificity of the forecasting concept comes from its temporal dimension, its field of application and its objectives :

- temporal dimension : foresight is used in short or medium term considerations because it needs a strong stability of the external parameters of the system under study. Conversely, the forecasting concept deals with a long-term perspective and so can take into account changing environments and evolution in the associated parameters.

MODES OF APPLICATIONS TO COMPANIES

HISTORICAL OVERVIEW OF THE TECHNOLOGICAL FORECASTING CONCEPT

More precisely, the specificity of the forecasting concept comes from its temporal dimension, its field of application and its objectives :

- application field : foresight must precisely define its field of intervention in order to increase its degree of pertinence (fragmented vision). Whereas forecasting takes into account the interrelations within the different fields (global and systemic vision).

MODES OF APPLICATIONS TO COMPANIES

HISTORICAL OVERVIEW OF THE TECHNOLOGICAL FORECASTING CONCEPT

More precisely, the specificity of the forecasting concept comes from its temporal dimension, its field of application and its objectives :

- objectives : By definition, foresight tries to see in the past what will occur in the future. Indeed, most of the foresight methods are based on an extrapolation of trends in a short-term view to reduce the risks of errors.

Forecasting has another objective. It tries to classify better and to understand better the key elements of the present situation. It gives more importance to knowledge of the mechanisms and the means that lead to the most desirable future. The time scale is usually between 10-15 years.

MODES OF APPLICATIONS TO COMPANIES

Seven Principle of technological forecasting

1. Design tasks should be considered with a view towards the future; the relevance of a scientific choice in a technical decision depends partly on an analysis of the possible future and the consequences of the decision on this probable future.
2. The future is multiple and uncertain. We can only talk about multiple evolution scenarios. Furthermore, there are breaks between the past and the future: the emergence or questioning of some basic concepts.

MODES OF APPLICATIONS TO COMPANIES

Seven Principle of technological forecasting

3. The approach must be systemic and global. As evolution accelerates, interdependence is increased, everything affects everything else.
4. We need to talk about qualitative and quantitative variables.
5. Pluralism and the complementary type of methods increase efficiency. This "methodological wisdom" is justified in the complexity of the phenomena.

MODES OF APPLICATIONS TO COMPANIES

Seven Principle of technological forecasting

6. Information and forecasting are not neutral. The research worker influences the object that he or she is studying.

7. Maximum questioning of accepted ideas. Technological forecasting cannot be reduced to a simple extrapolation of current trends. These seven assumptions are fundamental for technological forecasting and highlight that a systemic approach is the basic framework for any forecasting purpose. Thus, purely statistical methods cannot be developed since analysis by averages can only take account of accepted opinions.

MODES OF APPLICATIONS TO COMPANIES

Technological forecasting tools

Different tools have been produced for the use of technological forecasting approaches. They are always built using a scenario type approach that consists of:

- analysing the studied phenomenon: by listing internal variables,
- studying the environment of this phenomenon: by listing external variables,
- identifying key variables within this set,

MODES OF APPLICATIONS TO COMPANIES

Technological forecasting tools

Different tools have been produced for the use of technological forecasting approaches. They are always built using a scenario type approach that consists of:

- classifying key variables into driving variables (that influence the studied system) and dependent variables (that describe changes to the studied system).
- analysing evolutions of these variables in the past and germs of change, and possible new trends,
- formulating assumptions for the future form of these variables,
- consolidating these assumptions within complete evolution scenarios.

Section 2

**INNOVATION - NEW PRODUCT AND TECHNOLOGY
DEVELOPMENT**

USAGE AND ERGONOMICS AS COMMON REFERENCE POINT FOR COOPERATION AND INNOVATION AMONG DISCIPLINES

INTRODUCTION

Periodically generating innovative concepts is no longer sufficient today to stand out on very widely fought over markets. Innovation is not a simple effort of creativity. In fact, today is admitted that to act on innovation, it is necessary to act on the quality of design. In other words it is necessary to act on its means and its organization.

Although design activity depends on the strategic choices of company, it is important to preserve two parallel organizations. On the one hand it is necessary to use existing resources and skills in order to meet the needs of the present and on the other hand, the company has to seek new resources and new skills in order to anticipate future needs. Thus, innovation is seen as a specific activity organized within industrial systems like recent result (Hatchuel and Weil, 2002) indicate.

USAGE AND ERGONOMICS AS COMMON REFERENCE POINT FOR COOPERATION AND INNOVATION AMONG DISCIPLINES

INTRODUCTION

But like all projects, the innovating project is a multidimensional, evolutionary and living object with human nature as an essential component.

Organized or specific, an innovating activity "must be centred on the actors and their practices" (Yung and Chauveau, 1995), especially in their relations and in the co- operation that they will be able to build. Therefore, it is very important to take into account the intrinsic characteristics of each project group's profession in order to effectively confront the various actors' representations of the project. At this time, their practices must be analysed to define the conditions of co- operation.

USAGE AND ERGONOMICS AS COMMON REFERENCE POINT FOR COOPERATION AND INNOVATION AMONG DISCIPLINES

INTRODUCTION

Thus, to generate an innovation dynamic, it is necessary to put its actors into a total co-operation process to reach a common objective. A collective construction of the objectives and strategies must be carried out to create the group consciousness needed for innovation. In order to innovate through a human centred process, extracting knowledge about human behaviour is no longer sufficient; it also requires setting up a creation and knowledge transfer process based on human activity. We identify use as a broad term including several realities concerning the user's activities and practices.

A cooperative process supported by approaches and tools must be set up. The question of the responsibility for driving this process must also be put.

COOPERATION UPSTREAM FOR CO-DEVELOPMENT. THE CHALLENGE FOR AN INNOVATING DESIGN PROCESS

Product design is no longer the work of one single person. It is necessary to call upon several actors, from different disciplines and/or trades and to thus share several visions or representations of the product and the design process.

The difficulties lie in the capacity to set up a co-operative environment in which a common discourse is adopted to facilitate communication of points of view and representations between the actors of the process. The challenge is not only "to coordinate better", but also "to cooperate better" to build the solution.

COOPERATION UPSTREAM FOR CO-DEVELOPMENT. THE CHALLENGE FOR AN INNOVATING DESIGN PROCESS

An innovating project is set up to find an unknown solution to a problem which one wants to solve. That is to find one or several innovating ideas at various levels of the design process; the innovating project requires flexibility, evolution, branching out and modifications. Participant's co-operation around an innovating project being essential to approach complexity and to create creative space.

In these co-operative approaches, individualism is no longer desirable and must give way to a "group awareness". This collective awareness is essential, through interactions between individuals, for the co-operative definition of the project objective. This co-operation aims to answer the fundamental question "what to make and how?" In general, this group awareness must be generated upstream of the design process by interacting in order to generate a "levelling situation" between the participants.

COOPERATION UPSTREAM FOR CO-DEVELOPMENT. THE CHALLENGE FOR AN INNOVATING DESIGN PROCESS

The division of the risks related to innovating design activity (choice, decision.) is necessary for a free co-operation, which refuses that one individual assume the responsibility for a choice, and that only one point of view is used to make a decision.

A necessary upstream co-operation to take into account the user in the product design processes. Thus, to take into account the users' real activity, this upstream awareness group on the innovating project is particularly essential in our human centred design positioning.

COOPERATION UPSTREAM FOR CO-DEVELOPMENT. THE CHALLENGE FOR AN INNOVATING DESIGN PROCESS

Indeed, to take into account the user in a design product step is not the simple fact of bringing new data. It is a "state of mind". To be effective and real, i.e. so that use prescribed by the design corresponds to real users' needs, this state of mind must be present in all the actors of the design process.

However, to have a state of mind it should be learned. A participative step gathering a body of what Boulier (2002) calls "representatives of the users" must be set up to build group awareness on usage. Some tools for joint design and for the diffusion of this state of mind must accompany the step for learning through the practice of this state of mind, i.e. while doing. This group awareness centred on the user must be developed as soon as possible in order to start off with the same knowledge bases.

COOPERATION UPSTREAM FOR CO-DEVELOPMENT. THE CHALLENGE FOR AN INNOVATING DESIGN PROCESS

Taking usage into account in design projects depends on the social context of the company, i.e. of the design actors' capacity to modify their modes of communication and co-operation. Because finally, even though some approaches propose that information resulting from ergonomics is appropriable and usable by designers, certain designers' practices slow down the effective taking into account of these parameters despite their quality.

The practices of designers can indeed be directed by experience, i.e. by the confidence accorded to already tested solutions. Thus, the act of designing becomes intuitive and owned by one individual. According to Broberg (1997), it is more significant to train designers and to change their mode of co-operation than to accumulate and transmit the bare necessities of ergonomic information.

COOPERATION UPSTREAM FOR CO-DEVELOPMENT. THE CHALLENGE FOR AN INNOVATING DESIGN PROCESS

The challenge for the effective taking into account of user and usage, is thus to create the conditions of co-operation from the beginning of the project, allowing the development of collective awareness about usage in projects.

A participative approach to joint development for an innovating activity

A collective construction of the objectives and strategies are then necessary to create group awareness for innovation. Global approaches are emerging today with the aim of generating this joint attitude to upstream design development.

They are called participative preconception approaches and are useful both for market anticipation (prospective) and for the genesis of innovations (development).

A participative approach to joint development for an innovating activity

However, an approach should be accompanied by the necessary tools in order to generate the impulse for cooperation. Simply enrolling the actors in an approach is not enough to generate interaction and participation. Certain impulses or sparks are needed to generate this sort of involvement. Impulses are thus necessary to implement interaction and innovation.

However, in the processes of collective design (an activity of participative design in which all the actors are considered as experts), the essential problems are due to "linguistic barriers" between professions. Several registers separate the participants whereas the objective is to build a common discourse.

A participative approach to joint development for an innovating activity

Roussel (1996) suggests "drawing up a filter" between information from different professions in order to translate information resulting from the expert analysis. He also proposes that ergonomics formalize a "Common Reference System of usage" in order to translate the ergonomic point of view of the product and to direct designers into ways of finding solutions that respond to usage. We think a shared or common set of themes, unifying all the translations of each expert, must be used to spark co-operation. Moreover, as our research is oriented towards innovation, our set of themes must also be a source of innovation.

We think that the theme of usage is sufficiently appropriate in our industrial context to respond to our problems of innovation, co-operation as well as taking into account the problem of real user needs. Thus, our research hypothesis to date can be formulated in the following way: usage is a federative theme adapted to our context, which can be the basis for sparking co-operation and the generation of innovation.



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Thank You

