Prospective ergonomics in the ideation of hydrogen energy usages

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1. Introduction

Developments in technologies are likely to provide an ongoing challenge for ergonomics within the scientific, social and economic domains. The future has become an area of work for ergonomics, meaning that the initial stages of a project are dependent on the capacity to anticipate the characteristics of work situations and practices.

To design and imagine new products and services so as to satisfy the end-users implies that we focus the design on those users. But how do you center the design on the users when you don’t know who they are or will be? When designing an information system, for example, users are generally accessible; but when there is no product, no service, no user, and no situation to analyze, how ergonomics intervention could be powerful?

2. Conceptual Framework

In these cases, Robert and Brangier (2009) suggested developing a prospective view of the intervention, and integrating prospective and creativity in the ergonomics interventions processes. Prospective ergonomics’ aim is to develop prospective schemas by mobilizing a body of knowledge relative to the human and capable of describing needs, products, services and future systems. Through its focus and objectives, prospective ergonomics clearly differs from corrective and preventive ergonomics while being complementary. It adds little explored dimensions, including knowledge (methods, concepts and processes) which will enhance traditional approaches such as:

• Producing knowledge about future users;
• Stimulating creativity and organisation in innovative projects;
• Previewing artefacts so as to tailor product use or future services;
• Understanding forms of appropriation of artefacts;
• A priori identification of errors, drop in user rates, performance reduction and other unfortunate experiences;
• Studying product and services successes and failures comparable to the ones we wish to create or belonging to the same technological ecosystems, in order to learn more about functionalities, connectivity, mobility, user interfaces, aesthetics, etc.
• Using trends to define the direction innovation is taking.

To give rise to innovation, there has to be a creative bubble. If creativity can be defined as an individual and collective capacity to imagine a new concept, a unique object, an innovative product or service, a new solution or simply an unusual fact, the notion of creativity augments creative ideation using techniques and contextualisation. Creativity mobilizes psychological techniques for an enumeration of ideas that an individual or a group would be able to generate. Creativity demonstrates the capacity of individuals to use techniques to increase creativity, leading them to produce a large number of ideas. The creativity of an individual or a group is therefore their capacity to produce, depending on the methods and techniques, a large number of solutions, ideas, or concepts in a limited amount of time. With creativity, prospective ergonomics therefore relies on the power of individual and collective ideation working together efficaciously and efficiently to produce prospective scenarios and solutions. Ideation is therefore a central process in any type of prospective project and concerns a generally collaborative and cognitively meticulous activity.

3. Context

The aim of this communication is to present and discuss an innovative method related to prospective ergonomics to produce new ideas on the usages of hydrogen energy. While a large number of debates are taking place concerning the emergence of a hydrogen civilisation, the Lorraine Region (north-east of France) has undertaken to transform its territory into a showcase for the development of hydrogen power. To accompany these radical changes, the aim of this research is to think about how hydrogen and the
technologies associated with it are going to challenge our daily lives: What are the predictable reactions and problems? What are the pitfalls to be avoided, the development strategies to promote it?

4. Method to elaborate representations of future users’ needs

Nowadays, ergonomics uses creative and participatory based on social situations to understand users’ needs. Because these needs are socially constructed, presented, discussed and shared, new technology cannot be designed without understanding how it is embedded in its social context. Our approach is both based on the theory of the social construction of technology and on methods to produce the social construction of the user's needs.

With participatory and creative methods, the construction of users’ needs is seen as a process and a result of a complex collective activity produced in social situations brought about by a group of people coordinated by a facilitator an innovative method called.

In this study, the data collection was focused on:
- Definition of 3 communities of practice in order to decide which social groups are relevant to imagine future users’ needs for hydrogen use.
- Identification and participation of 14 experts. The experts’ list was validated with the stakeholder;
- Animation and conduct of focus groups to obtain verbalisations about their real needs and expectations;
- Analysis of 9 hours of video records; representation of ideas of each relevant social groups, ideas for improving functionality, usability, acceptance of the hydrogen energy; better representations of future users, considerations on the future of the hydrogen cells...;
- The identification of new and original ideations.

5. Case study: exploration of hydrogen energy usages

We will present a case study which consist in ideations of new usages for hydrogen energy and present the results in the following way:

5.1 Lexical analysis

A lexical analysis of the focus groups was done with IRAMUTEQ software. Analysis shows that four major categories appear: (1) “production, distribution and storage of energy” (with 32.9% of terms); (2) “globalization” (with 27.4%); (3) “transports” (with 26.6%); (4) consumer quality of life (13% of words).

5.2 Personas

The personas method complements approaches focused on user analysis, activity and the user context. The personas approach proposes focusing on specific or canonical users. The principle is therefore to design a use or a product adapted to different types of people, representing typical future users. As part of this exploratory study, personas help restore the majority of the issues addressed in the focus group, and the logic of action of future users.

5.3 Card sorting

Card sorting will help to understand experts’ expectations and ideations. It is often useful to know how experts group information. Those cards sorting were developed with three focus groups on transport, distribution, and for stationary uses (housing, buildings).

Finally, we discuss the relevance and robustness of this innovative method to produce new ideas and to develop data to write accurate representations of future users (personas).

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References
