



Need-Seeking: Creating, Discovering or Recovering Needs?

Stéphanie Buisine¹(✉), Amandine Taton^{1,2}, and Andréa Boisadan¹

¹ CESI LINEACT, 92000 Nanterre, France
sbuisine@cesi.fr

² Châlons-Agglo, 51000 Châlons en Champagne, France

Abstract. Need-seeker approach, which orients new product development towards the satisfaction of future needs, has been recognized as one of the most efficient innovation strategies to date. But finding future needs to address remains a challenge for companies, entrepreneurs and practitioners, as they lack a methodological framework to structure their approach. In this chapter, we first elaborate on three paradigms for need-seeking: discovery of future needs, creation of new needs, and recovery of fundamental needs. We then provide examples of methods supporting each paradigm, and tentatively position them in terms of reliability and affordability, so that innovation teams can make informed choices in their application. Thereby, we expect to contribute to the field of prospective ergonomics and its concrete implementation, as well as to the promotion of radical innovation based on needs and uses rather than based solely on technology.

Keywords: Prospective ergonomics · Radical innovation · Future needs · Future uses

1 Innovation

From a macroeconomic viewpoint, innovation is acknowledged as a major factor of productivity, economic growth and population wellbeing [1]. It is considered as key to nurture western industry [2] and to reach a balance between social and economic approaches of growth [3].

Radical innovation shapes world's long-term transformations as it produces a significant impact on existing markets or creates new markets [4]. Radical innovation is implemented through products recognized as new (as opposed to incremental innovation, which relies on improvement of existing products) and this novelty can be testified by the introduction of a new technological feature and/or by new uses of existing technological solutions. While technological innovation is lengthy to develop and limited by the advance of science and research, innovating by making new uses of existing technologies is potentially unlimited and can be fruitful in a short term, provided that it is supported by a relevant and structured methodological approach.

1.1 Need-Seeker Innovation Strategy

Innovation observatories around the world highlight three main strategies developed within the companies that invest highest on research and development worldwide [5], namely: Technology-driver strategy (whose priority is to develop products of superior technological value, which may result in radical innovation based on new technology), Market-reader strategy (which focuses on creating value through incremental innovation and customization of products) and Need-seeker strategy (which aims to find unstated customer needs of the future, be the first to address them, and result in radical innovation through new uses). Although the three strategies all possess their own success stories, a long-term analysis [5] clearly shows that Need-seeker outperforms the two other strategies in terms of leading position on the market and financial return on investment. Hence innovation analysts recommend developing Need-seeker strategy in order to stimulate progress and growth. However, need-seeking is not straightforward as traditional ergonomic methods for needs analysis rather turn into a Market-reader approach. Need-seeking as in prospective ergonomics remains to be structured methodologically to be more widely adopted by practitioners, entrepreneurs and companies.

1.2 Discovery and Creation Paradigms

Need-seeking is mostly defined as *anticipating* future needs [5], but the very notion of anticipation is subject to debate, as one may consider the future as more or less deterministic, more or less chaotic, and therefore more or less likely to be anticipated. In this respect, entrepreneurship approaches notably contrast the discovery and creation paradigms, which can be illustrated through the metaphor of *mountain-climbing* vs. *mountain-building* [6]. On the one hand, the discovery paradigm (*mountain-climbing*) assumes that future needs can be approached (i.e., anticipated) through the careful study of current uses and unsatisfied needs. In other terms, the mountain exists and the challenge is to be the first one to reach the top: this paradigm fosters competition between companies on existing markets (which can also be called Red-ocean strategy – [7]). On the other hand, the creation paradigm (*mountain-building*) considers that the future cannot be predicted (or anticipated) and is to be invented. The mountain does not exist, the demand has to be created (Blue-ocean strategy – [7]). The latter view entails much more uncertainty but empowers creative people and inventors, as innovation opportunities appear here as endogenous to any company or entrepreneur. Conversely, if future needs are to be discovered, or anticipated, innovation opportunities are exogenous per se and entrepreneurs have to surround themselves with people exhibiting sharp analysis skills and experience.

To these worldviews, we add a third paradigm, relying on re-discovering, or recovering, fundamental needs. This is a pragmatic approach which does not attempt to anticipate but does not rely on pure creation either.

1.3 Recovery Paradigm

Before elaborating on this paradigm, it seems useful to clarify what we mean by “needs” in the need-seeker strategy. We do not aim to search for some new psychological needs,

as these are defined as innate and universal – hence it seems pointless to create, discover or recover new needs. For example, in Self-determination theory [8], human motivation process relies on three psychological meta-needs (need for autonomy, for competence, and for relatedness). Need-seeker innovation strategy rather focuses on functional needs, which determine product use. For example, World Health Organization [9] lists bodily, individual and societal functions, and we believe that innovation may impact these functional needs, either by meeting them (i.e., providing functional solutions), or by stressing them (e.g., when a product appears poorly usable).

Accordingly, we posit that many technological and/or use innovations can be interpreted, not as the discovery or creation of new functional needs, but as the recovery of fundamental functional needs. For example, augmented, tactile, tangible or spoken interaction solutions allow direct manipulation of data, which is not a recently appeared functional need, but represents a fundamental need we have unlearned with previous interaction solutions (e.g., soft keys, mouse and keyboard). When one develops expertise with a technological solution, be it an imperfect one, s/he may feel satisfied and no longer experience the fundamental need behind. The recovery paradigm consists in seeking this fundamental need to inspire new functional solutions and generate use-based innovation.

2 Need-Seeking Methods

In the present section, we describe and illustrate examples of need-seeking methods implementing the creation, discovery and recovery paradigms. Fig. 1 below emphasizes that these three paradigms can be organized along a double continuum: methods for discovering (anticipating) future needs may be the most reliable ones (with a high likelihood of generating successful innovations as outcomes) but the most difficult ones to put into practice (because they require time and specific resources). On the other end of the continua, methods for creating needs are affordable to any organization but appear as highly uncertain: an infinite number of ideas can be generated, among which the probability to pick up the next successful innovation may be quite low.

Methods attempting to recover fundamental needs lie in between the two ends of the continua: they require more resources than creation methods but remain less costly to implement than discovery methods. Similarly, they may offer an interesting tradeoff in terms of reliability and likelihood of success.

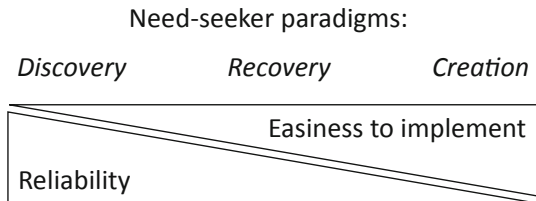


Fig. 1. Need-seeker paradigms (discovery, recovery and creation) organized along a double continuum: Reliability of the approach (likelihood of success in terms of innovation outcomes) and easiness to implement (in terms of time, investment or specific resources).

2.1 Discovering Future Needs with Lead Users

Needs analysis as traditionally performed in User-centered design process is highly relevant for improving existing products (i.e., incremental innovation) but may not be fruitful for discovering future needs. On the contrary, it may generate the so-called Innovator's dilemma [4] and thereby inhibit radical innovation: companies willing to develop solutions as close to market demands as possible are likely to miss radical innovation opportunities, because a majority of users prefer sticking to current dominant designs and tend to spontaneously reject a radical change in their habits.

Therefore, collecting ideas of radically different solutions or evaluating them should be performed with a specific kind of users, who are positioned ahead of Rogers' [10] curve of innovation adoption. Lead users are such minority users with whom companies are likely to discover future needs or future uses. By definition, lead users are precursors and are at the leading edge of important trends in the market. The Lead user method [11] consists in involving in the innovation process such users with a specific profile, exhibiting both strong critical-thinking skills with regard to existing products and strong creative-thinking skills to imagine alternative uses. Case studies (e.g., in the domain of sport or open-source software – [11]) have shown that involving lead users in an innovation project may grant access to needs that will later be experienced by many users and therefore may open successful innovation opportunities. The method was also formally tested with 3M company [12] in the sector of medical supplies and gave rise to the biggest innovation wave in 50 years in this division [13].

Although very effective, this method remains costly to implement, as finding Lead users requires time and formalizing their needs and ideas requires a skilled team.

2.2 Creating New Needs with Personas

Less costly methods might be found in the Lean startup framework [14] in which designers and entrepreneurs often rely on Personas to imagine user-centered, undreamed-of concepts that they subsequently test and improve through short iterations and continuous customer involvement. The Persona is a concept formalized by Cooper [15], Pruitt and Grudin [16] and Pruitt and Adlin [17]. It is a fictitious character representing a segment of population. According to Blomquist and Arvola [18], “a Persona is an archetype of a user that is given a name and a face, and it is carefully described in terms of needs, goals and tasks”. Representing a group through an archetype fosters empathy to designers and supports feeling and interpreting action, thoughts and emotions of the target segment [19, 20]. Personas can be used all along the design process, in the design, implementation, or test and measure phases [17, 19]. They can be materialized as posters or storyboards including a name, a face, a general biographical note (e.g., age, occupation, hobbies), and specific information related to the project (e.g., attitudes, expectations, and concerns regarding the target sector or activity), as well as virtual characters or avatars [20].

On a theoretical viewpoint, Persona efficiency may be related to priming process, which refers to “the incidental activation of knowledge structures, such as trait, concepts and stereotypes, by the current situational context” [21]. The mere activation of a concept or a stereotype (here: the Persona profile) activates some associated semantic information networks likely to shape ideation accordingly: in an automatic and unconscious way,

one's thoughts, ideas, and behaviors are influenced by the concepts activated [21, 22]. This phenomenon may explain why Personas help designers imagine concepts that are adapted to users. However, this often results in an overwhelming number of ideas among which designers struggle to identify which one may result in actual need creation and successful innovation. Hence the uncertainty of the method.

2.3 Recovering Fundamental Needs with Extraordinary Users

As previously stated, this approach consists in uncovering fundamental needs hidden by long-term use of products and technologies, in order to find new solutions – radically-new solutions to old needs. Typical or representative users may not be able to access their fundamental needs, which are deemed to be satisfied for a long time by contemporary products. To elicit hidden fundamental needs, it is more fruitful to refer to non-typical, or extraordinary users [23] whose functional needs are not satisfied by contemporary products designed for typical users. Those can be found among off-standard or off-target users. Off-standard users are those experiencing a limitation in their capabilities while using products (e.g., children, seniors, users with a disability), and off-target users are those who do not belong to the marketing segment of the product and have never had the opportunity to develop expertise its use (e.g., children, non-users).

Because children's capacities are under development, they may experience, depending on their age, several limitations, be they physical (e.g., height, grip), motor (e.g., strength, dexterity) or cognitive (e.g., literacy, understanding). These characteristics are likely to highlight functional needs in terms of easiness, simplicity, accessibility, and so on. For example, it is reported that the first graphical user interface was invented because the challenge was to design a computer that would be so simple that a child would be able to use it [24]. This special need of children later proved to be generalizable to the whole population. Children are also capable of expressing spontaneously "impossible" demands that adults would self-censor. For example, in reaction to his 3-year-old daughter insisting to see instantly the photos he took of her, Edwin Land ended up inventing the Polaroid in 1943 [25].

The integration of the special needs of users with disabilities into mainstream product design is called Universal design [26, 27]. Its primary purpose is product accessibility, whereas our aim is to foster radical innovation through the generalization of special needs. For example, addressing special needs of people with severe motor impairment (wheelchair users) gave rise to radical innovation in the sector of fitness equipment for the general population [23]. Stretching their (lower limbs') muscles is a fundamental need of wheelchair users (to avoid muscle retraction, recover after surgery, maintain joints, manage pain, etc.) that they can hardly meet autonomously. The design of a fitness device to practice stretching revealed that it is actually a fundamental need for everyone: it happened to become a radical innovation and a best-seller in fitness industry, which was previously focused on weightlifting and cardio training only.

Finally, people with no prior experience of a given product may be more likely to express unmet functional needs than expert users. The expert may indeed have developed routines and strategies to increase efficiency and overcome limitations of the product so that s/he may no longer see them. For example, in a pedagogical experiment [28], needs of users and non-users of nail polish were analyzed through a simple user test.

Target users (women) did not comment much on nail polish devices, just mentioned that the brush used for the test was not flexible enough and too small. On the contrary, off-target users (men) commented a lot on the devices (bottle, cap, brush), which appeared highly unusable with fingernails freshly painted; they also emphasized the difficulty to paint nails of the dominant hand (with their non-dominant hand) and so on – obvious fundamental needs that target users did not mention. These may nonetheless be actual needs for all, as target users interviewed in this study were still 60% dissatisfied and 80% to find nail polish application difficult (this reached 100% of off-target users).

All in all, because it requires field studies, the Extraordinary user method appears as more costly to implement than the Persona method, but more affordable than the Lead user method, because lead users hold a much more specific profile and are more difficult to spot out of the general population. In terms of reliability, the Extraordinary user method may be less effective than the Lead user method, but more reliable than methods for creating new needs, which are subject to the highest uncertainty.

3 Conclusion

To face innovation challenges of the twenty-first century, companies should learn from proven successful strategies and strive to implement them in their own framework, adapt them for their own market and customers, in compliance with their own constraints and organizational culture. We focused here on Need-seeker innovation, a strategy acknowledged as efficient to generate new products, services or business processes based on “future needs”. To help practitioners, entrepreneurs and companies knowingly structure their own Need-seeker approach, we first described three paradigms supporting respectively the discovery of future needs, the creation of new needs, and the recovery of fundamental needs. We provided examples of methods in each paradigm illustrated by a few application cases and discussed their reliability and affordability. We thereby expect to contribute to the promotion of need-seeking, prospective ergonomics, and radical innovation based on the value added to customer uses and need satisfaction.

References

1. OECD: Oslo Manual: Guidelines for collecting, reporting and using data on innovation. 4th edn. OECD, Paris (2018)
2. Midler, C., Beaume, R., Maniak, R.: Réenchanter l'industrie par l'innovation. Dunod, Paris (2012)
3. Le Masson, P., Weil, B., Hatchuel, A.: Les processus d'innovation: Conception innovante et croissance des entreprises. Hermès Science, Paris (2006)
4. Christensen, C.: The Innovator's Dilemma. Harvard Business Review Press, Boston (2016)
5. Jaruzelski, B., Staack, V., Goehle, B.: Proven paths to innovation success. *Strategy Bus.* **77**, 2–16 (2014)
6. Alvarez, S.A., Barney, J.B.: Discovery and creation: Alternative theories of entrepreneurial action. *Strategic Entrepreneurship J.* **1**, 11–26 (2007)
7. Kim, W.C., Mauborgne, R.: Blue Ocean Strategy: How to Create Uncontested Market Space and Make the Competition Irrelevant. Harvard Business School Press, Boston (2005)

8. Deci, E.L., Ryan, R.M.: The “what” and “why” of goal pursuits: human needs and the self-determination of behavior. *Psychol. Inq.* **11**, 227–268 (2000)
9. World Health Organization: International classification of functioning. In: *Disability and health: ICF* (2001)
10. Rogers, E.M.: *Diffusion of Innovations*, 5th edn. Free Press, New York (2003)
11. Von Hippel, E.: *Democratizing Innovation*. MIT Press, Cambridge (2005)
12. Von Hippel, E., Thomke, S., Sonnack, M.: Creating breakthroughs at 3M. *Harvard Bus. Rev.* **77**, 47–57 (1999)
13. Lilien, G.L., Morrison, P.D., Searls, K., Sonnack, M., von Hippel, E.: Performance assessment of the lead user idea-generation process for new product development. *Manage. Sci.* **48**, 1042–1059 (2002)
14. Ries, E.: *The Lean Startup: How Today’s Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses*. Crown Business, New York (2011)
15. Cooper, A.: *The Inmates are Running the Asylum*. Macmillan, New York (1999)
16. Pruitt, J., Grudin, J.: Personas: practice and theory. In: *Proceedings of the Conference on Designing for User Experiences*, pp. 1–15. San Francisco (2003)
17. Pruitt, J., Adlin, T.: *The Persona Lifecycle: Keeping People in Mind Throughout Product Design*. Morgan Kaufmann Publishers, San Francisco (2010)
18. Blomquist, A., Arvola, M.: Personas in action: ethnography in an interaction design team. In: *Proceedings of the Second Nordic Conference on Human–Computer Interaction*, pp. 197–200. ACM Press (2002)
19. Bornet, C., Brangier, E.: méthode des Personas: Principes, intérêts et limites. *Bulletin de Psychologie* **524**(2), 115–134 (2013)
20. Buisine, S., Guegan, J., Barré, J., Segonds, F., Aoussat, A.: Using avatars to tailor ideation process to innovation strategy. *Cognit. Technol. Work* **18**, 583–594 (2016)
21. Bargh, J.A., Chen, M., Burrows, L.: Automaticity of social behavior: direct effects of trait construct and stereotype activation on action. *J. Person. Soc. Psychol.* **71**(2), 230–244 (1996)
22. Dijksterhuis, A., Van Knippenberg, A.: The relation between perception and behavior, or how to win a game of trivial pursuit. *J. Person. Soc. Psychol.* **74**(4), 865–877 (1998)
23. Buisine, S., Boisadan, A., Richir, S.: L’innovation radicale par la méthode de l’utilisateur extraordinaire. *Psychologie du Travail et des Organisations* **24**, 374–386 (2018)
24. Isaacson, W.: *Steve Jobs*. JC Lattès, Paris (2011)
25. Nonaka, I., Zhu, Z.: *Pragmatic Strategy*. Cambridge University Press, Cambridge (2012)
26. Vanderheiden, G.C.: Design for people with functional limitations resulting from disability, aging and circumstance. In: Salvendy, G. (ed.) *Handbook of Human Factors and Ergonomics*, pp. 2010–2052. Wiley, New York (1997)
27. Vanderheiden, G.C., Tobias, J.: Universal design of consumer products: current industry practice and perceptions. In *Proceedings of the XIVth Triennial Congress of the International Ergonomics Association and 44th Annual Meeting of the Human Factors and Ergonomics Association*, pp. 19–22 (2000)
28. Buisine, S., Bourgeois-Bougrine, S.: The creative process in engineering - Teaching innovation to engineering students. In: Lubart, T. (ed.) *The creative process - Perspectives from Multiple Domains*, Chapter 7, pp. 181–207. Palgrave Macmillan, London (2018)