Data, Knowledge and design creativity

Irene Chiocchia
Management engineering

Spring school 2019
Design Methods and Processes

Contents

1 The role of Creativity in the Innovation Process

To identify the most relevant factors influencing the capability to innovate we should analyze the innovation process.

Innovating means designing and bringing to the market a novel and valuable product, service or process.
"Designing" highlights that the process require analysis, focus and planning.

We can think of the innovation process as a funnel: at first we have an high number of ideas, then we try to shape them into concrete projects, by selecting and combining them. Then, by assessing the compatibility with company's culture and their feasibility, projects are further defined to develop an invention, that after reaching the market will turn into innovation.

But what makes a company or an individual better at innovating than others? Their ability go faster, more frequently through the funnel, to bring more and higher quality ideas.

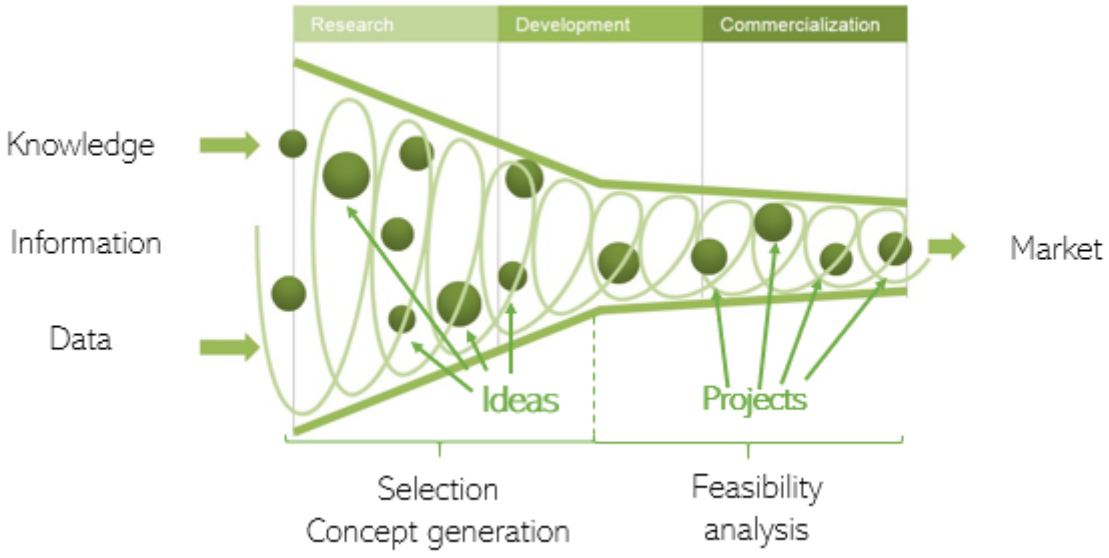
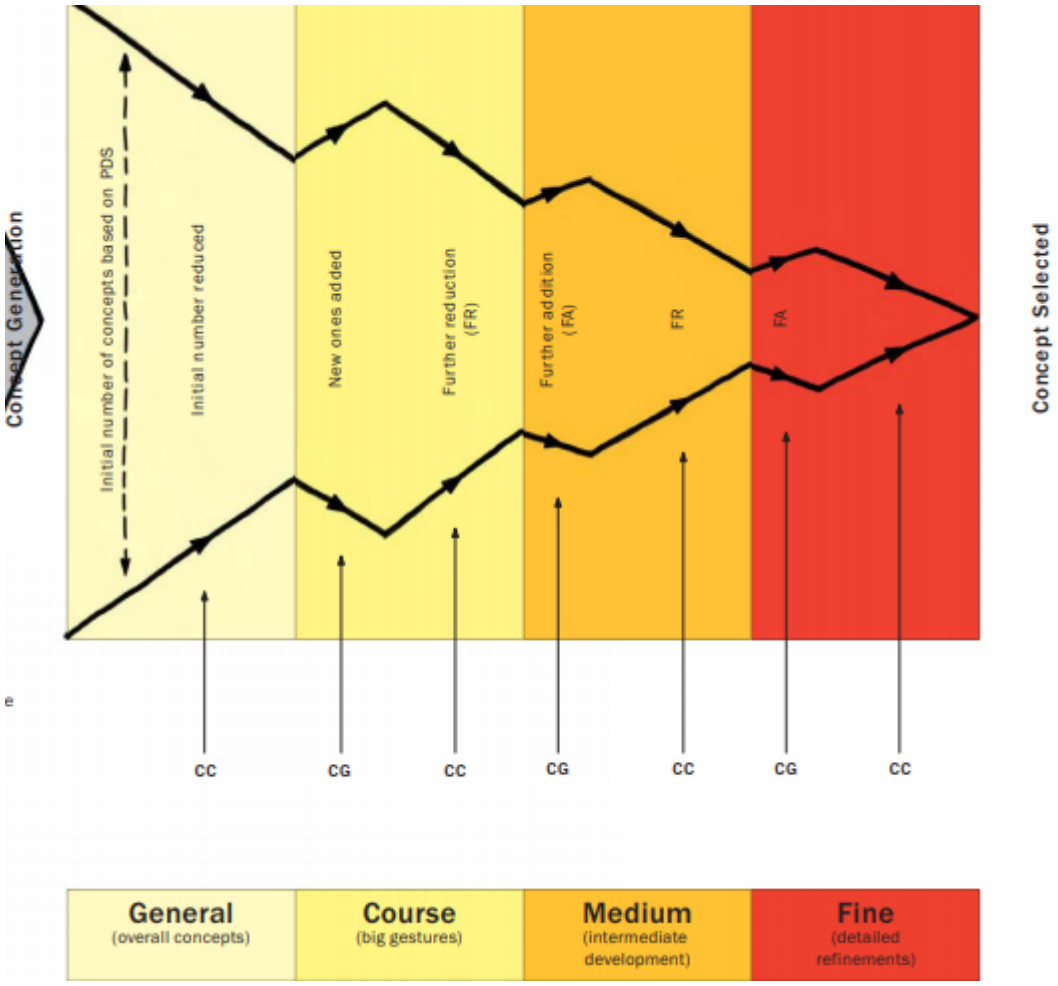


Figure 1: Innovation process



process22.png

Figure 2: Innovation process2

Throughout the innovation process there is an alternation of convergent (analytic) and divergent (synthetic) thinking: a reduction in the number of concepts based on rational decision making is followed by the creation of new stimulus to creativity leading to an increase in the number of alternative to design.[1] This is illustrated in figure 2.

2 Role of data and knowledge in the creative process

Data, information and knowledge, have a crucial role in the creative process since they stimulate ideas generation and help to validate ideas.

Data, could be considered the raw material from which we derive ideas and knowledge. It has to processed, analyzed and used in an appropriate way in the innovation process.

Knowledge result from the personal elaboration of data and information through time. It is used consciously in the creative process to trigger or support ideas, but with respect to data has an higher degree of complexity.

However,we should consider that innovating and creativity are not such linear, sequential processes. This is due to the high impact of the irrational component, indeed, a big part of the process takes place in the subconscious.
In creativity, it is fundamental the elaboration of information both consciously and unconsciously. There is a continuous interaction between the world of knowledge (K space), where it is modeled what is known using laws and belifs, and the world of creative ideation, of the "desirable unknown" (the C space of concepts).
The systematic dialogue between them leads to a process of dual expansion of the unknown and the known, of simultaneous creation of new objects and new knowledge.
One stimulates the other: knowledge stimulates creation and creation stimulates knowledge.
Innovative design cannot be reduced to a mere exercise of creativity or to increasing knowledge of what already exists[5].
It cannot focus only on the expansion of the C or K space, but on the interaction and integration of these two worlds, related to two different ways of thinking and operating.

3 How data could boost creativity?

3.1 Data to detect customers needs

Accounting for customers' needs is the main requirement to design products with market potential.[1] We can investigate people needs with different degrees of intimacy:

Data could allow to gather information about what people say and how they behave, allowing to detect their least intimate needs (explicit, observable needs). However, thanks to the development of AI, machine learning and other emerging technologies we can go a bit deeper.
For instance, By using natural-language processing, we can figure out that a consumer is interested in sports cars without the person ever having said so. Computer vision can analyze the videos and images people engage with and infer relevant themes and interests.

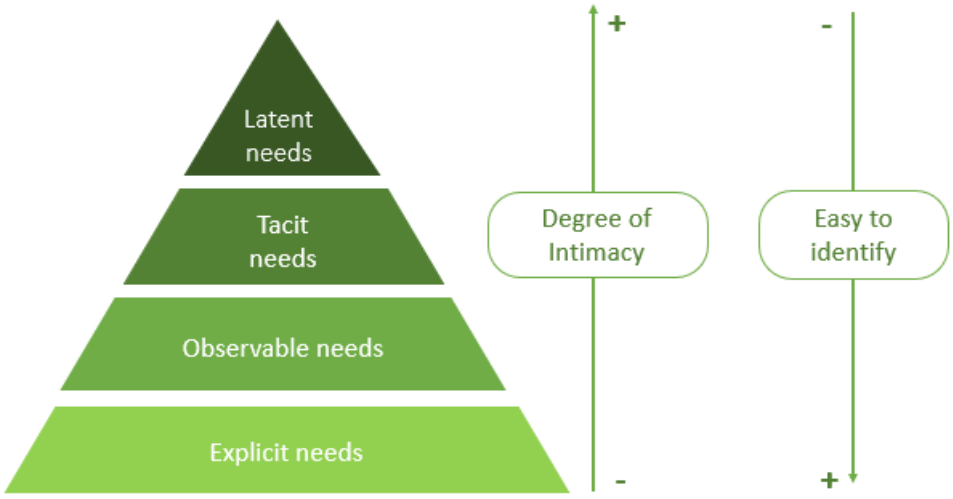


Figure 3: Pyramid of needs

3.2 Segmentation

The high amount of detailed data available increase the understanding our customers and the possibility to design something valuable for them. We can get information about people preferences, lifestyle, desires in such a precise way that we can get to know customers one by one.
The more detailed and specific the understanding and description of needs, the more effective their translation into design specification of Products or PSS(Product Service System). [3]

This is particularly relevant in human centered design which consider the consumer needs as the

focal point of their design processes[6], and for the definition of Personas, Personas represent an aggregate of target users who share common behavioral characteristics[6] and that could help driving design decisions.

Data about customers' interests and behavior allow for highly personalized services and products, (i.e. Spotify collects data about tracks listened everyday by users and suggests playlists, artists and songs that suits the most the user tastes).
Therefore, harnessing data to improve segmentation and design have led to higher differentiation; competition is moving away from price alone. [7]

3.3 Customer experience

Data enables the creation of memorable and personalized experiences that build loyalty and engages each individual through their interests, and passions. It allows to create a one to one relationship and higher intimacy with customers.
By gathering data from users in a variety of situation (i.e. when online or using other services and products) we can monitor their behaviour and spot potential value creating points in their customer experience.
For instance such data could suggest to modify the way people interact with products or services, or change the layout of stores.
Basing on historical data we could predict customers behaviour, critical points or future improvements.

In PSS[3] data transfer enables the interaction among the different parts of the system contributing to customers' experience, which could be perceived as more complete and full filling with respect to the experience generated by a single product or service. Therefore the creation of PSS thorough data management could lead to the creation of a competitive advantage

3.4 Decision making

Taking decisions is crucial for design effectiveness.
In order to choose the right direction, managers or inventors could use collected data from research, or their intuition. However, even in this latter case we are still using data, which have been elaborated into knowledge and our mental patterns
There could be different degrees of data integration: decisions are rarely based only on intuition (Unconscious process[7]), or only on on the outcome of algorithms or simulations.
There is not a right level of integration, which depend on the task to carry out and on the objective to reach.

Quantitative information should support the "Gut feeling" and human intuition.[8] Data would be used as justification, proof and as an objective measure of the feasibility of the product design.
In order to make meaningful the huge amount of data which is collected, the experience, the big picture view of a person that has expertise in a specific field is needed.
The output of algorithms could be used for local and quantitative based decisions. In this way designers could focus on value adding activities, and come up with more creative solutions. Indeed, Data also give them the freedom and the resources to focus on a bigger picture.

3.5 Increased functions of Smart products

Smart products, collecting and using continuously data could have capability in 4 areas, each one building on the previous one:[9]

- Monitoring of product's condition, operation, and external environment through sensors. This capability represent a core element in value creation in medical devices and could reveal warranty compliance issues as well as new sales opportunities, such as increase in product capacity due to high utilization.
- Controlling, the ability to respond to specified changes in product condition or environment. (i.e. Philips Lighting hue light bulbs via smart phone, turning them on and off, programming them to blink red if an intruder is detected, or dimming at night)
- Optimizing, through the application of algorithms and analytic to in-use or historical data to improve output, and efficiency.
  The optimization could involve involve an individual product design("inside product") or the connection among different products ("Outside product").
- Autonomy, as the ability to act in coordination with other products and systems.Human operators merely monitor performance or watch over the system, rather than over individual units.

4 Limits of data: Innovation of meaning and latent needs

Fist, we should be aware that data gives information only about the past and present, which could be used to make prediction about the future. However, we should consider also the great impact of uncertainty, and of other qualitative or undefinable variables which may not be considered when making predictions.
Moreover, information regarding people preferences and behaviours could be used to reach explicit and observable needs, however, latent needs are could not be spotted using quantitative and analytic methods.
Latent needs belong to the deepest and unconscious part of ourselves and are related to what we think is meaningful and important to us. Being able to spot, make explicit and satisfy such needs is an important driver of innovation and value creation.

The use of personas and user-centred design may limit the design alternatives that are available to the designers.[6]
An innovation which is based on intangible elements and is aimed at changing the reason why people buy and use a product/service could be defined as "Innovation of Meaning" or "Design push innovation".
Advancement in technology that allow to discover new meaning in a novel technology, in this case we speak about "Technology Epiphany".

For instance we can think about Yankee candles: the idea did not come up using data about users behaviours and preferences, nor from a shift in the technology. Michael Kittredge, the founder, had a new vision, he defined a different reason why people should buy a candle: not for lightening a dark space, but for creating a cozy atmosphere, spreading a nice fragrance.

An innovation of meaning results from an "inside-out process", which is different from the process followed when developing a "Technology push" innovation which is based on quantitative reasoning and technical data, or a "Market pull innovation" which is based on the analysis of customer data[10].

In "inside-out" approach we start form ourselves. We focus on our own perception and understanding of what is meaningful for us as well as for other people. To look deeper into others we need first to dig into our unconscious desires and needs.
Once that we defined an idea through our intuition, we should make it stronger and understand if it has a real market potential.
In order to do this, first we need people,who challenge our vision make it stronger, and only after we should gather quantitative data from customers and the environment.
Indeed, the most relevant resource in this process is the personal interpretation of latent needs.

When talking about innovation of meaning is more relevant to speak about direction, vision and purpose, instead of data and information.

4.1 Why looking for a direction may be more useful than looking for data

Nowadays, it is plenty of information easily accessible to everyone. People could come up with ideas to solve problems in a short time.
However, this may not lead to a proportionate increase in the rate of innovation, conversely it could also reduce it.
Indeed, plenty of ideas could generate a paradox of choices: we cannot identify precisely the differences between ideas, or spot the most meaningful or useful.[10]

Therefore, in a world overcrowded with ideas, we don't need more ideas, we need a direction. We need something or someone guiding us in understanding what is more meaningful, giving us a purpose for purchasing or using a product of service which is not related to the satisfaction of a deep and intimate need.

5 Insight from personal experiences

This year I worked on a project for a well known Italian gym network, which was aimed at creating an personalized customer experience by using data, without losing the centrality and personal touch of trainers. At first, In order to get insight, we collected a lot of data related to the company's offering and positioning, its competitive environment and so on.
However, we realized that we were focusing too much on local improvements of performances, preventing us to find a radical innovation. Moreover, there was not a clear tie among different parts of the idea.
After some struggle, by looking at our personal experience, we found our direction: building a gym community. By leveraging on social interaction we want to give people a new reason to go to gym, and boost their motivation.
We would match people in teams by using personal information that they could fill in in a survey. During classes and during completion data about the way people interact and make group exercise would be recorded by the personal trainer, in order to track progresses and give personalized suggestions. Therefore, the personal trainer will keep his key role, not being overcome by fully automatized and digitized solution.

Data and knowledge were fundamental for a project aimed at defining a manufacturing plant layout. We managed to find an optimal solution by applying and combining models and principles studied during our bachelor to data related to the specific case (area of the departments,shape of the available area, exit routes...). Therefore, the final solution was the result of an original combination of knowledge and data.

In the first project data helped us finding ideas, for local improvement of the service, while we found a meaningful solution only when we managed to look into ourselves. Data collection and elaboration was still an important gear of the whole mechanism. However, the structure and the connection among items was defined by a cohesive and meaningful vision.
In the second project the contribution of data and knowledge was prevalent, although also personal elaboration and intuition played a role.

6 Conclusion

Data's and knowledge's volume and quality affect deeply the output of the innovation process.
However, they are only raw material, which should be shaped by human elaboration to give them a meaning and create a purpose.
Data should be critically analyzed and selected in order to create valuable solutions.

Data, knowledge and personal elaboration are essential for the creation of innovative solutions. There is not one factor prevailing on the other in absolute terms, it depends on the characteristics of the problem to address and objectives to attain. The key is finding the perfect balance between data and intuition, synthetic and divergent thinking, C and K areas expansion, and being able to change it according to the situation.

What can you do to improve your creative potential? We should not treat creativity, human elaboration and data analysis as separated fields.
According to McKinsey, businesses that have successfully integrated creativity and analytics have grown more than twice as fast as those that haven't.[4]
In particular, McKinsey observed that Integrators, that use a great amount of data and integrate them in the creative process, have a growth of more than +10% yearly, while those companies that uses both data and creative process but separately have a growth between 3% and 10%. [2]
Therefore, we should focus on their integration: data and intuition, in the innovation, creative and decision-making process should strengthen mutually, in order to improve our creative potential.
Providing the appropriate tools to interpret and visualize data could enable people to better understand them and to be inspired by them.
Moreover, we should empower people to unlock their creative potential, and look at data not as an obstacle to imagination, but as a catalyst.

References

[1] Buxton B. *Sketching user experiences: getting the design right and the right design.* Morgan Kaufmann, 2010.

[2] McKinsey Company. The most perfect union: Unlocking the next wave of growth by unifying creativity and analytics, 2018.

[3] Müller P. Larsson T. Stark R. Ericson, Å. Product-service systems: From customer needs to requirements in early development phases. *Proceedings of the 1st CIRP Industrial Product-Service Systems (IPS2) Conference, Cranfield University, England*, pages 62–68, 1-2 April 2009.

[4] Serenity Gibbons. Why you can't choose between creativity and data. *Forbes*, 2019.

[5] P. Le Masson. C-k theory: A model for creativity. *Paris Innovation Review*, April 2017.

[6] Tomasz Miaskiewicz and Kenneth A. Kozar. Personas and user-centered design:how can personas benefit product design processes? *Design Studies*, 32:417–430, 2011.

[7] Bharadwaj N. and Noble C. Finding innovation in data rich environment. *Journal of product innovation management*, 34:560–564, 2017.

[8] Mina Nacheva. Is big data putting an end to creativity in marketing? *adverity*, 2019.

[9] M.E. Porter and J.E. Heppelmann. How smart,connected products are transforming competition. *Harvard Business Review*, 92:64–88, 2014.

[10] Roberto Verganti. *Overcrowded - Designing Meaningful Products in a World Awash with Ideas.* MIT Press, 2017.