

A Design Thinking Approach for Museum Institutions

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A Design Thinking Approach for Museum Institutions

Luigi Nasta and Luca Pirolo

Abstract

In these recent years, museum institutions are facing challenges such as deepening diversity among audiences and within the workforce, shifting authority and keeping pace with the creation of a digital offering to be provided in the new shared economy. Additionally, museums cannot just deliver knowledge as information anymore. They are forced to seek to be relevant and meaningful for the audiences and the society. Thus, a visitor-centered approach needs to be developed. The design thinking framework can help museum professionals to face the challenges they handle in today's world. Indeed, this approach is focused on people and not on a specific product or service. The goal is to understand the needs of customers, their wishes and, based on this information, find the best solution to respond to the type of problem identified or the strategy to be developed. For this reason, the ratio of this discipline provides that people are stimulated to find alternative, creative, and innovative solutions designed and built on the reality of the facts and not dictated by instinct. The aim of this chapter is to investigate the characteristics of the design thinking approach and to analyze how this framework can be implemented in museum institutions.

Keywords: design thinking, museum institutions, visitor-centered approach, creativity

1. The design concept

Design is an extremely versatile discipline characterized by different interpretations in philosophy and practice which involve considerable efforts to understand its nature. Defining design uniquely is controversial, both because the designers themselves are unable to give a distinctive definition capable of gathering all the themes related to it, and because, over the decades, the term has had different meanings, evolving.

The history of design is not simply a history of objects but of changing points of view on what is the object of the design itself [1]. A starting point on the study is represented by the thought of Herbert Simon [2] who defines design as the elaboration of artifacts to achieve goals. His reflection leads to the relationship between the natural world and the artificial one. "A forest may be a phenomenon of nature; a farm certainly is not. The very species upon which we depend for our food our corn and our cattle are artifacts of our ingenuity" [2]. The artificial object synthesized by men with the desired properties which can or may not imitate nature can be defined as an artifact, created by using the same basic natural materials or different ones.

The artifact is also considered as an interface between the internal environment, i.e. the organization and the design of the artifact itself, and the external one, i.e. the environment in which it is located. "If the inner environment is appropriate to the outer environment, or vice versa, the artifact will serve its intended purpose" [2].

The most obvious and popular definition regarding design is that it represents the shape of products and therefore refers to style and esthetics. In fact, design is often associated with the shape of the product and not with its function [3]. However, despite numerous criticisms, the term has always remained closely linked to the esthetic aspects, reducing it to the exaltation of beauty since, as Raymond Loewy claimed, "ugliness doesn't sell".

Reducing design to simple esthetics distances the concept from innovation. It is a recent trend to extend the meaning of design, following broader meanings that concern various areas of knowledge [4].

Design is described as a problem-solving activity [5], a process that becomes a prescriptive sequence of activities related to the cognitive process of exploration [6]. Over time, the practical applications of design have extended to anything capable of producing artifacts deriving from the usage of creativity to generate a product, a service, or a process innovation [4]. Companies like IDEO, Apple and Decathlon think about the product no longer and not only as an object for which to design a shape, but as an experience and bearer of meanings [7]. Kotler and Rath [8] suggest that product design is a strategic tool for optimizing consumer satisfaction and corporate profitability through the combination of performance, shape, durability, and value in relation to environments, information, and identities. Consumers buy products for several often not obvious reasons which include both functional utility and psychological satisfaction.

The interpretation of design linked to the function can be found in Maldonado [9]. Designing the shape means coordinating, integrating, and articulating all those factors which in one way or another participate in the constitutive process of the shape of the product. More precisely, it alludes to factors relating to the use, function and individual or social consumption of the product, as well as to production. In this sense, design is interpreted as an activity capable of combining all the factors involved in the realization of the shape of the product, referring both to the technical, functional, economic and productive aspects, as well as to the symbolic, cultural and social ones.

The dimension linked to meaning is revealed with Krippendorff [10]. He involves design with the meaning of the products attributed by users and by the relationship with the surrounding environment. Therefore, the meanings depend on the context and the culture. The same artifact can invoke different meanings at different times, in various contexts of use and for different people. Since the meaning is not univocal, it is the responsibility of the designer to observe the actions that imply it, understand them, and establish a dialog with the interested parties.

More holistic is the design definition of the International Council of Societies of Industrial Design: "design is the creative activity whose goal is to establish the various qualities of objects, processes and services and their systems in the life cycle. In addition, design is the central factor in the humanization of technology innovation and cultural and economic changes." This definition expands the concept of design and connects it to management, to the ability to understand consumer needs, to strategy.

Design is increasingly becoming a frequent the answer to the multiple challenges that managers face: growing competitive pressure, managing complexity in organizations, customer orientation and social responsibility.

Talking about design today means recognizing the widespread presence of activities, skills, actions, products related to design within the economic system.

This constitutes an essential point for defining an economic and social improvement strategy based on an advanced development concept that has its strength in the ability to add value to the system of products, services, and businesses.

2. Design in the business context

Within the company context, design can take on different facets based on how it is integrated and conceived within the organization [11]. The value that a company gives to design depends on its history and its evolution. For this reason, a company that has recently approached design will probably integrate it into strategy only after using it as an operating tool.

The design can be considered as an operational tool and therefore linked to the initial phase of the design practice concerning the styling of the product. In this case, the design has an esthetic significance for the product and does not give it any other added value to the organization.

In another case, design can be an important resource for the company but simply linked to the realization of the product. In this circumstance, design is given its autonomy, its time, its space, and the possibility of developing a product starting from a project specification. In this case, the company prepares a project group which, however, is not involved in the organizational and decision-making dynamics of the company, dealing only with the project specification.

Design can also be perfectly integrated into process management and contribute to a company's vision of the future. The ability of design to anticipate the needs of consumers, imagine possible future scenarios and put them into a solution, made it fundamental within companies and allowed it to play a role in all phases of the creation of a product, from the initial idea to its commercialization. This has helped to create designers with diversified training, able to dialog with all the actors in the design process but has also prompted companies to seek outside their borders different skills to reorganize the entire value chain (**Figure 1**).

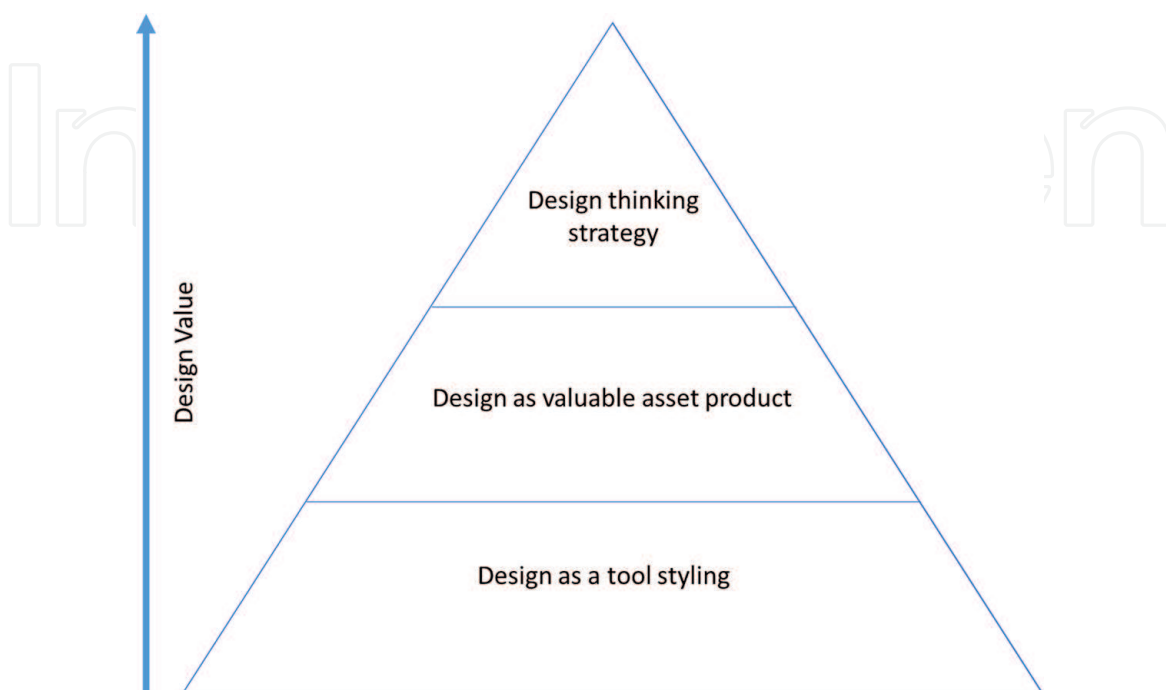


Figure 1.
Design value in the business context. Source: Personal adaption from Celaschi et al., 2011.

The long-term value for the company is created through three key changes: the transition from function to purpose, in which the product becomes important for its social utility and not only for its performance; the increasing importance not only of the final outcome but also of the processes involved used to conquer the motivations of the consumer; in the third instance, the relevance of co-design, where the user is not a passive entity but actively participates in the design of the product.

The creation of a business model in which design and management shorten their distance and work together for a joint vision of the organization, not only creates value for the company by increasing the performance achieved, but directs the company towards innovation and its exploitation with respect for social responsibility.

3. Design thinking: origins and perspectives

Although the concept of design thinking is quite current and today it is considered a useful approach for companies, the roots of its meaning are to be found elsewhere, shifting attention to the literature of the last century, which in addition to influencing the concept of design thinking, represents a model for contemporary exponents of the approach.

Herbert Simon is one of the first to offer idea for the development of some concepts related to design thinking. For Simon, the natural sciences deal with how things are, while the design deals with how they should be through the creation of artifacts that respond to specific objectives. Therefore, it could be said that design is the transformation of existing conditions into preferred ones. However, this transformation does not follow a linear path but rather it tends to adapt to the surrounding environment. The adaptation is explained by Simon with the example of the ant that, in the path to take to return home, adapts to the obstacles it encounters along the way not being able to have an overall and complete vision of the surrounding environment [2]. To carry out the non-linear path that leads him to the solution, the designer uses problem solving: the individual defines alternatives with respect to a goal to be achieved and chooses among the alternatives the best compared to that given goal, but not the best in absolute. This is because man has a limited rationality and therefore when he seeks a solution or wants to achieve a goal, he does not do so in full awareness of all possible opportunities, but only with respect to what he is able to know.

Another point of reference is represented by the thought of Bauchanan [1], who takes up Rittel [12] and his idea of wicked problems. Wicked problems are a class of indeterminate and tiring problems of the social system. They are difficult to define and for which there is no single solution. Each wicked problem is unique, and the designer's effort is to try to minimize the error since each solution is a one-shot operation, an attempt that matters significantly and has consequences. This class of problems concerns issues such as sustainability, climate change or public policy, i.e. the location of a highway, the regulation of taxes or the change in the school system.

The wicked problems approach brings out the uncertainty in which the designer operates having to conceive and design something that does not yet exist. If in a linear approach a designer has a specific problem to solve based on defined conditions, a wicked problems approach, based on indeterminacy, gives the designer a universal scope.

The wicked problems approach contains peculiarities typical of the themes of design thinking. Indeed, the object of design can be applied to any area of human experience. Design thinking is considered a bridge to connect the knowledge of liberal arts and sciences, adapting them to current problems and purposes. Bauchanan [1] underlines the absence of the impossible, considered as a limitation of the imagination that can be overcome through a better use of design thinking, an

instrument characterized by the integration of signs, things, actions and environments that respond to the concrete needs and values of human beings under various circumstances.

Design thinking was also analyzed from a managerial point of view. By discussing the mutual interactions and influences of management and design, managers became curious about the way designers think and operate within the company. Design thinking has become a tool for the entire planning area to contribute to innovation and replace strategic management to face a complex reality [13]. In this sense, design thinking becomes a broader approach, capable of involving the organizational systems of companies, influencing the behavior of managers, and solving complex problems. Not surprisingly, it is increasingly common that managers are asked to be a little more designer by adopting a “design attitude” [14].

Martin [15] and Brown [16], fathers of two different interpretations and applications of design thinking, do not turn to research on design studies and on the management of organizations, but formulate an approach that derives rather from experience gained during practical activity. Despite this, both theories are gaining recognition from designers, companies, and governmental agencies.

Martin sees design thinking as a useful and necessary tool for training managers. For him there are two forms of business thinking: analytical and intuitive. Analytical thinking is based on quantitative data and standardized processes, while intuitive thinking is about how to use instinct to guide creativity and innovation. Analytical thinking is the most common in management schools being easier to measure and more coherent. Martin uses the labels of reliable for analytical thinking and valid for the intuitive one. Companies prefer to privilege reliability, and this implies that they cannot create valid solutions that exploit the three inductive, abductive, and deductive logics.

Business schools generally tend to focus on inductive thinking, based on empirical evidence, and on the deductive one, based on already accepted premises that guide future actions. The design schools emphasize the abductive logic of the way of thinking, based on “what it could be”. An abductive approach sees in the project constraint a creative opportunity and a challenge; managers instead perceives it as an obstacle.

The use of design thinking to deal with indeterminate organizational problems favors reasoning and the continuous generation of idea through abductive, deductive and inductive combinations, an activity particularly important for companies that deal with both the exploitation of the existing and the exploration of the new [17]. Organizations that live in routine and that have developed the ability to always produce the same goods, keeping the cost and quality level constant, are unable to innovate. The search for a balance between abductive, deductive, and inductive reasoning that takes the form of generating an idea, predicting the consequences, testing, and dissemination (**Figure 2**) is the best way to innovate, using design thinking.

Another approach is the one proposed by Tim Brown and Tom and David Kelley. They provide a model for innovation that arises from the practice of consulting IDEO, a company that has started to market itself as an innovation organization and not as a design one, thus emphasizing the dependence between the two concepts. The design thinking of Tim Brown and the Kelley brothers is therefore a response to the innovation challenges of organizations that deal with complex issues. The approach starts from the assumption of bringing together what is desirable from a human point of view with what is technologically feasible and economically sustainable [16]. The model adopts a human-centered orientation and therefore to the market and the analysis of consumer needs and their relative satisfaction, representing one of the most important peculiarities of design thinking. One of the most interesting aspects is that design thinking considers all potential innovators, using

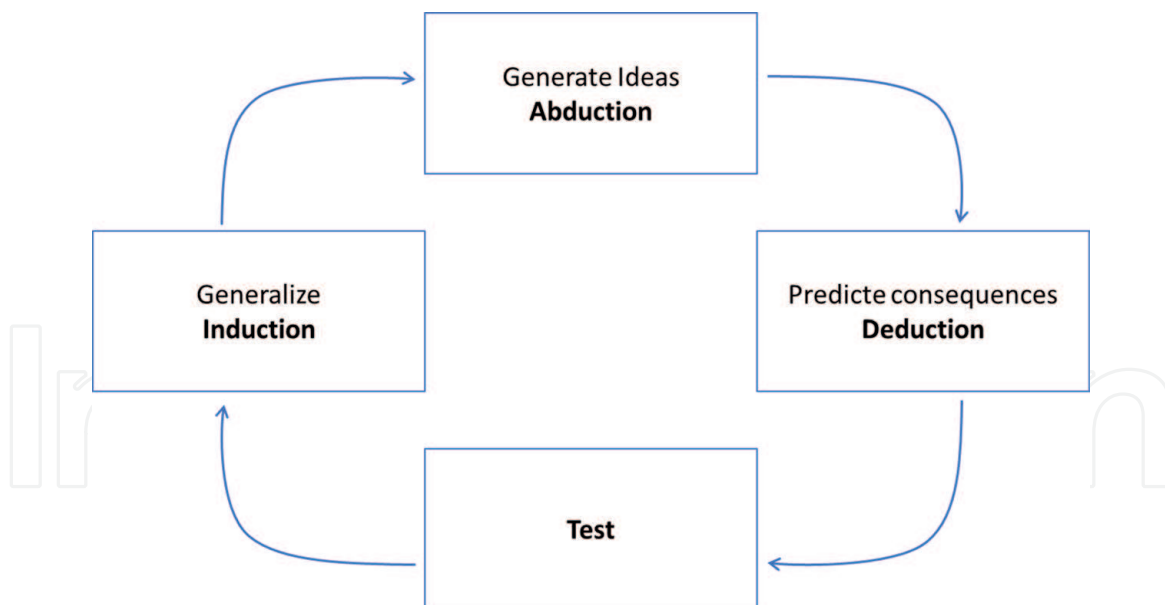


Figure 2.
The design thinking process. Source: Personal adaption from Martin, 2009.

the skills that everyone has, in particular problem-solving. Another important topic contained in the approach is that of social innovation and the contribution that can be made through design thinking by creating products, services and organizations to support them for less developed communities in order to improve their quality of life.

Today, to deal with changes in society and the environment, an approach to innovation that manages to integrate with companies and society is necessary to create breakthrough ideas, capable of being implemented and successful. The design thinking approach is proposed as a solution to this need by suggesting a model that through the tools possessed by designers is able to create an innovation capable of integrating people's needs and therefore giving them meaning with what is technologically feasible and functionally possible in the near future and which responds to the economic success of companies and can become part of a sustainable business model (**Figure 3**).

If the classic designer tries to solve each of these constraints, the design thinker will place himself in a position of harmonious balance. In this model, the design has moved from a tactical role to a strategic one, starting to move in different areas and setting aside the idea of building on what already exists and looking for mere improvement features. The approach is based on the belief that the design belongs to everyone and for everyone, that the ideas and skills that everyone has can be expressed through alternative brainstorming methods in which sharing, the importance of team work and exaltation of diversity is enrichment for all and allows important results to be achieved [18].

Design thinking may be able to solve complex problems, which are not limited to products but can concern processes, services, interactions, forms of collaboration, communication, and strategies [19]. However, everything is guided by a human-centered vision, in which the market is put at the center, in which needs are the engine of all innovative ideas, giving people what they want and thus transforming the latent need into demand.

For a company that has understood the value of innovation and considers it a competitive lever, it is essential to use design thinking and its tools to guide growth, improve the quality of activities, decisions, and results.

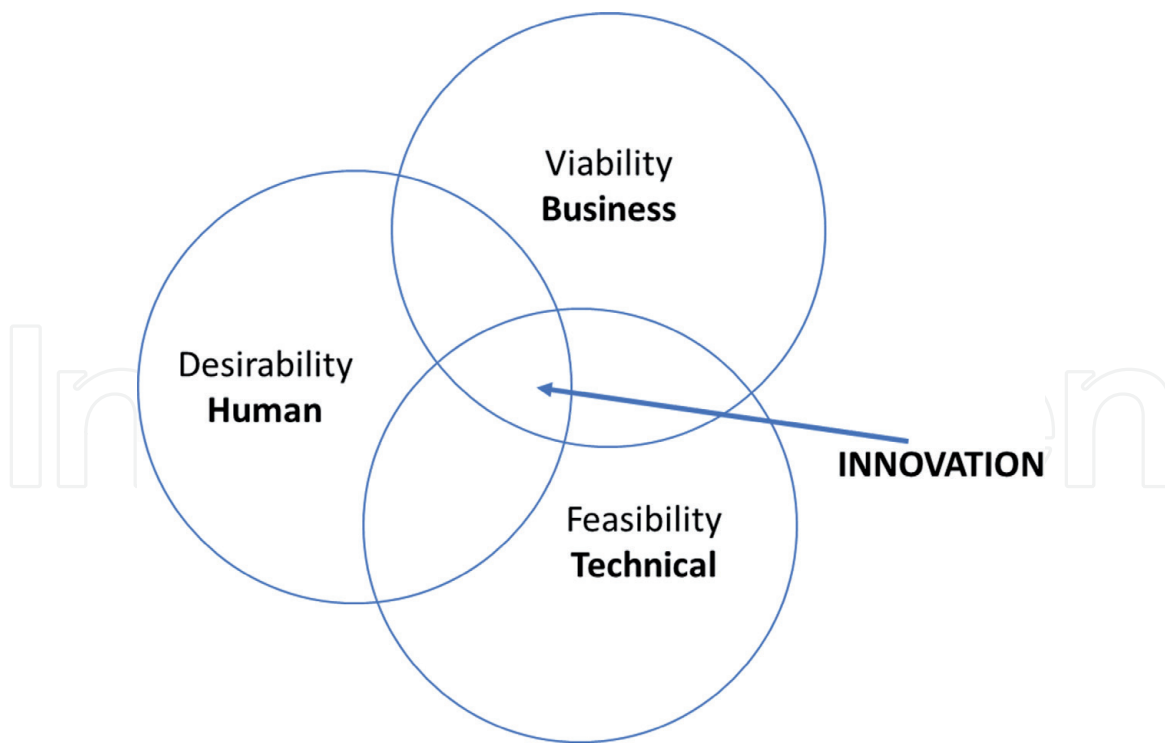


Figure 3.
Innovation in the design thinking model. Source. Personal adaptation from Brown, 2009.

3.1 The models of the design thinking process

In the wake of the design methodologies, the design process was divided into various steps to facilitate the planning of the project activities and their scheduling. The first references to a multiphase structure of the creative process come from Poincaré [20], who, through his reflections on the creative thinking process to solve mathematical problems, gave impetus to Wallas [21] who divided the creative process into four phases: preparation, incubation, lighting and verification. This classification was the starting point of the search for movements in the field of creativity in design that sought new models to better describe the stages of a process. As demonstrated by some design researchers, the classification and the respective visualization of the different phases of the design process depends above all on the methodological paradigm in which the creative process in the design is analyzed and described [22–24]. In the design methodology there was a paradigm shift in the 1980s, from the analytical and rational logic, to the holistic one of progressive affirmation of design solutions. The problem-solving paradigm moved towards the interpretation of the design process as a reflective practice [25] and as a co-evolution of problem-solution spaces [26]. In the new design thinking movement, the problem-solving approach is still dominant, but it is holistic and non-linear [17, 19, 27]. Instead of a sequence of stages, most of these models describe the design thinking process as a space overlap system [28] and as an iterative process [29], and therefore can be assigned to new design paradigms of progressive affirmation.

In the domain of design thinking applied to business and innovation, some process models have been published and defined as the most appropriate. These are the “3 I” model [28] developed by the consulting firm IDEO and The Stanford d_School model developed in 2008 from the collaboration between the Hasso Plattner Institute and the d_School of Stanford University, two of the most prestigious institutes in the field of design.

3.2 The “3 I” model

This model was developed by IDEO, one of the leading companies in design-driven innovation consulting and takes its name from the three phases into which it is divided: inspiration, ideation, and implementation.

Inspiration represents the initial phase in which it is necessary to identify the problem or challenge that must be face. The goal is to observe people and their lives, to understand how they think, feel and act. The inspiration stage can in turn be divided into three sub-phases:

- understand the reason, the opportunity or the problem that pushes people to face a challenge; in other words, begin to understand what are the right questions that need to be asked to solve the problem;
- observe people in their own context of life with the aim of collecting as much information and data available on their way of acting, feeling and thinking to determine the real needs, desires, dreams and problems to be solved or satisfied;
- point of view that indicates the reformulation of a design challenge, transforming it into a statement of the problem to be faced in the following phase of ideation.

The three sub-phases must be covered repeatedly, considering the feedback collected and the possible opportunities for improvement at each iteration, trying to empathize with the people observed to understand them in depth. During the inspiration phase, the design team should be able to build a brief containing a series of constraints that help the team itself identify a framework from which to start, objectives to be achieved and parameters to measure obtained progresses and results and potential ones. It must be generic enough to allow the team freedom of action, develop creative ideas and think outside the box, but it must not be too general either, risking to make the team wander with no grips to cling to during moments of uncertainty and doubt about which direction to take. Once the initial framework has been defined, the inspiration involves understanding what people really want and what they need; it is necessary to use ad hoc tools since traditional methods, based mostly on simple interviews, are limited to asking people for these concepts: unfortunately people are often unable to provide this information since they do not even know what they really need.

Ideation is the phase in which a meaning is giving to everything that has been observed and heard in the previous phase, generating as many ideas as possible and identifying opportunities to be seized, developing and refining, iteration after iteration, the ideas identified, up to choose the best one to implement. Even the ideation stage can be broken down into three sub-phases, which, like the previous ones, must however be a cycle to be covered and retraced continuously: design, prototypes, and tests. The goal is to devise as many solutions as possible, create fast and inexpensive prototypes to build and test them from the initial stages, in order to immediately collect feedback and sensations to understand if the team is heading in the right direction, reducing time and resources on ineffective solutions. Among the good practices in support of the phase are optimism, abstaining from judgments and criticisms, visual representations of the paths and concepts addressed, and the multidisciplinary skills and knowledge of the people involved in the design process. Also, in this case, the key word is to iterate, pursuing perfection, but in small steps until the identification of the solution deemed best and in which to invest in the third and last phase of implementation.

Implementation is the final phase of the design thinking process according to the “3 I” model and consists in giving life to the best solution among those identified in the previous phases. The goal is to present the proposal to the market, choosing the most suitable way to share and promote it and evaluating the impact it will have, both in economic and social terms. This last step can also be broken down into three sub-phases which are:

- storytelling: it helps to communicate the chosen solution to all stakeholders, internal and external to the organization, through the use of a language suitable for each of them, which can be made up of meanings, images and references to past experiences. The goal is to correctly convey to the market the meaning, the value, and the type of impact the solution will have for the people who will adopt it;
- pilot: intended as a pilot prototype, completer and more defined than those created in the design phase. In this case the costs and production times will be greater because the pilot prototype must be tested by potential users as if it were the real product/service that is going to be launched into the market. Like all the phases described above, this one is subject to more and more iterations, at the end of which feedback and impressions are collected to continuously improve the pilot until the final optimal characteristics are identified;
- business model: to correctly launch the asset on the market and implement its commercialization, a reliable business model should be developed. In the business model, strategic decisions will have to be made relating to financing, marketing, production, related auxiliary services, in short, everything needed to transform the idea into a complete product/service/experience to be offered to the market.

All these phases of the process are strictly interconnected and must not be carried out in a linear way but as a circular sequence, with an approach of continuous revisions and second thoughts that consider feedback and impressions to arrive at the optimal solution (**Figure 4**).

3.3 The d_School of Stanford University model

The model has been developed in 2008, from the collaboration between the Hasso Plattner Institute and the d_School of Stanford University. The approach remains, as in the previous case, of a scientific-engineering and iterative type and the phases to be implemented cyclically are five:

1. Empathy: since this is a human-centered approach, empathizing with the subjects involved is the basis of the model, to understand their needs by taking their point of view and to be able to produce solutions suitable and innovative for them. Once again, therefore, the starting point is to understand how the people

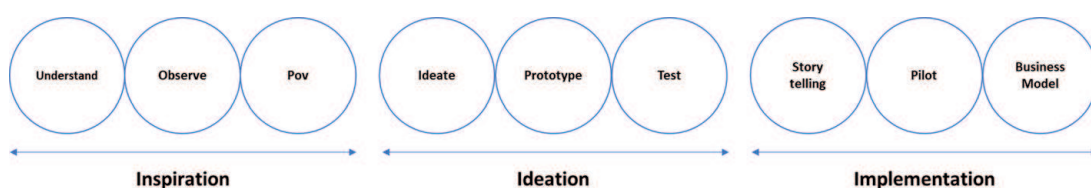


Figure 4.
The “3 I” model. Source. Personal elaboration from Brown and Wyatt, 2010.

who are addressed think, feel and behave, with the aim of deducing their needs and their desires, but also the beliefs, convictions and values they possess, without asking them explicitly. For example, to collect data and information about the customers, organizations might observe if differences or ambiguities exist between what a subject says and what he does instead. To empathize with people, it is necessary to:

- Observe, viewing users and their respective behaviors in their life context, i.e. social, work, family;
- Involve stakeholders in the challenge through meetings and interviews;
- Identify with the users themselves by living the same experiences.

2. Definition: the objective is to define the problems to be faced and the opportunities to be seized, structuring the information collected in the previous stage to produce a point of view from which generate innovative solutions, aimed at satisfying the latent needs of users. The output of the phase is represented by a specific challenge to be faced, which represents the vision of the project; the more the vision will be clear and well defined, the more likely it will be to find a successful solution. Indeed, the better the problem is known, the easier it will be to find the best solution. Vice versa, the less clear a problem is, the more difficult it will be to find a solution of considerable impact. The definition phase also serves to collect and view all the insights gained in the empathy phase, always with the aim of defining the right challenge to start and begin to glimpse possible solutions to the problem. A good vision, in addition to capturing the hearts and minds of the people involved, must:

- Frame the problem and focus the team's attention on it;
- Inspire the team;
- Allow members to make decisions independently and simultaneously;
- Avoid defining universal concepts that are good for each user, which is not only impossible given the great diversity of people, but also counter-productive since generalization makes the team moving away from the peculiarities of the challenge.

The vision is based on the point of view identified and assumed during the phases of empathy and of definition, that is a sort of micro-theory relating to the challenge, the reference environment, and potential users. Defining the point of view in the right way means defining the vision and consequently an innovative solution suitable for overcoming the described challenge. A useful methodology for this purpose is to continually ask the question "how can we....?", thus offering a good starting point for brainstorming, the main activity of the next phase of ideation. Since the process is dynamic and iterative, brainstorming can also be used upstream of the ideation phase, as a transition activity aimed at generating a point of view and a vision.

3. Ideation: it represents the phase in which, developing the divergent and creative thinking of the team, many ideas are produced, to then choose those or

the one to be explored and prototype in the next phase. The solutions generated, in addition to responding effectively to the problem to be overcome, could also open new perspectives, thus making it necessary to revise from the earliest stages. To develop this research and this type of thinking, as anticipated, powerful discussion tools can be used such as brainstorming, related to themes or concepts identified in the early stages which must be deepened to find insights and ideas on which the solutions to come will be based. The design process must allow the team to abandon obvious and banal ideas or to go beyond these using them only as a starting point. Additionally, the design process must allow the team to look for opportunities, even potential ones to be seized, and for new areas to explore, and give fluidity and flexibility to the range of possible solutions with high innovative content. Once again, the goal of the ideation is not to identify the best result, but a range of possible solutions that reconcile the characteristics of the challenge and the reference environment with the needs and requirements of the users. The selection of the best idea will be made later, based on the feedback received and the feasibility and desirability characteristics of the solutions. Once again there is an overlap between the design phase and the subsequent prototype and test phases, which is however necessary to identify the optimal solution. The output of the design phase is given by a small group of ideas to be submitted to the next prototyping phase; the number of ideas to be prototyped must be the right tradeoff between product innovation potential and feasibility understood both in economic and temporal terms. Prototyping each idea produced, as well as just one, would in fact be ineffective, first for economic reasons and, secondly, to not lose most of the innovative content produced during the ideation stage.

4. Prototyping: the conversion of the idea into reality, making the conceived solution tangible. The prototype has the task of conveying the concept or idea behind a solution, therefore it does not necessarily have to be complete or finished. The simpler it is, the more possibilities exist to try different combinations and alternatives before identifying the final optimal solution. In addition, the more people involved can try it, test it, and interact with it, the more successful the prototype will be, because in this way empathy between user and the solution is increased. Like the previous ones, this phase is also based on research and iterations: initially the challenge, the problem and the solutions are less defined and consequently the prototypes generated will be not clear as well, but, as the solution takes a determined shape, even the prototypes will become clearer and more detailed. There are many different forms of prototypes, from tangible products to bulletin boards containing post-its, from role-playing games to story boards; in other words, prototype is anything that can be used to submit a concept or even an idea for a solution to possible users or stakeholders involved in the process. The prototypes, in addition to sharing and communicating a solution to some selected subjects, can be used to seek insights and ideas in the ideation phase and are also useful for testing possible solutions and verifying their potential impact on the market. In general, when building a prototype, the team must avoid excessive attachment to it. Moreover, it is necessary to be extremely practical by ensuring that it responds effectively to a question and, finally, it is always necessary to design taking the point of view of the user, continually making questions like “what do we want to test?” and “what behaviors do we expect to observe?”.

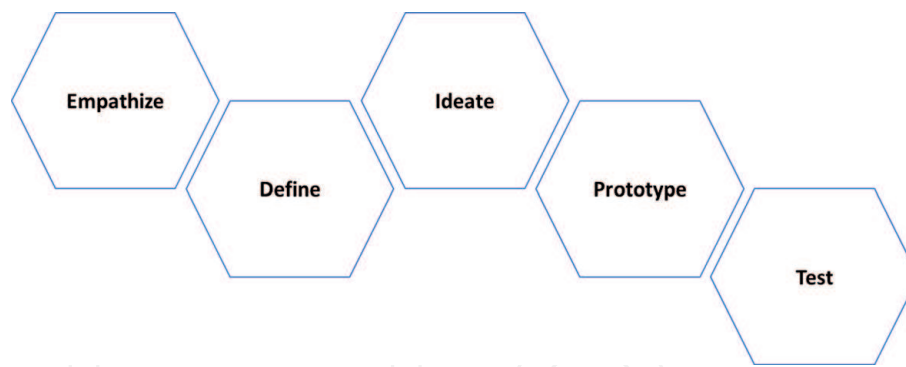


Figure 5.
The d_ School of Stanford University Model. Source: Personal elaboration.

5. Testing: the verification phase is generally performed in parallel with the presentation of a prototype, so much so that it is often difficult to separate the two activities. However, it should be noted that to test a solution or a prototype it is not enough to show it to possible users, but an evaluation system must be designed. In general, the testing phase is aimed at obtaining:

- Feedback to finalize prototypes and solutions;
- Information to increase the knowledge of potential users;
- Understand the point of view: the test can also reveal that not only the optimal solution has not been identified, but that the wrong challenge has also been defined and therefore the whole process must be restarted.

Obviously, if the test is positive, the solution will continue in the implementation phase until it is proposed to the market. The type of test to perform will depend on the type of prototype or solution. However, a generally valid rule of thumb is to always defend and protect the prototype as if the team knows they are right but question it and try it as if they know to be wrong (**Figure 5**).

4. Design thinking for museum management: how to innovate cultural experiences

In recent years, a particular trend is spreading among the various companies: just as the industrial sector is transforming the offer, based mainly on the product, towards an experience-oriented economy, in the same way museums are forced to innovate its offer, in terms of visitor experience and educational opportunities. At the same time, they must also modernize their internal organization to support this transformation. The reason is that the advent of the experience economy has changed the dynamics of the various institutes, cultural and otherwise: they must face a radical change in order not to sink into an increasingly competitive environment, in which the consumer is looking for more engaging and customized experiences.

Since in this context the needs and expectations of consumers become the main objective, design thinking seems to be the perfect methodology to adapt the museum offer to the wishes of visitors, thanks to its human-centered approach and its nature of problem-solving.

But how can museums use the design thinking process to engage and delight visitors? There are several steps to integrate the design thinking mindsets into museum practice:

- Museum professionals must get out from their desks and face-to-face with customers. This can help organizations discover, test, and validate ideas for solving real-world customer needs. In museums, this process is simplified since staff can walk into the galleries during the opening hours and observe and talk to visitors. They have access to them right outside their office doors. By getting away from their desks and into the galleries, they can learn about their visitors' needs and shift their perspective from institution-centered to user-centered. Additionally, museum staff can also talk with a broader range of people like the parents who regularly drop their sons off at the museum for education programs or the millennials who have checked the website several times but have never come to any of the museum events they read about online. By speaking with this audience, the staff gather rich, individual stories, develop insights around how to meet the needs of current and potential visitors, and test their insights with prototypes;
- Before investing time and money on developing new digital or analog products, services or experiences, museums should identify assumptions and test them before starting implementation. For example, a museum might want to redesign the exhibition web pages by starting from the assumptions that some visitors check the website before a visit and some of them arrive at the museum with a very clear agenda in their mind. But then, after conducting some initial interviews, the museum might discover that most visitors do not even consult the website in advance, they are overwhelmed when they arrive and they need guidance and recommendations around where to start and what to see and do. This might lead to new opportunity that consists of providing onsite in-gallery recommendations of what not to miss. Thus, rather than redesign the website, the museum staff can focus on reviewing their daily printed guide and prototyping new in-gallery digital signage as well;
- Many museum projects start with the solution. By jumping to the solution, museum do not ask why they are building something but rather what to build. This often means that they set out to solve the wrong problem and miss potential opportunities. In the example reported above, the museum staff can demonstrate that by recognizing the opportunities around the onsite visitor experience before diving into the details of implementation, they were able to holistically consider the needs of their visitors, from online users to onsite guests;
- Some museums, especially those about science and natural history, are keen to prototype almost everything, from exhibition installations to digital offerings. However, these represent the exceptions since the concept of prototyping is still very limited with regards to cultural institutions. Museum staff are so invested in the details of the solution that meaningful changes are nearly impossible to be provided. And when prototype happens it is done late in the development process. Prototyping is an essential step of the design thinking process and requires to be done by museums if they want to create innovative cultural experiences for their customers.

4.1 The Museo Egizio: how to use the design thinking to rethink the audio guide

The Museo Egizio or Egyptian Museum of Turin is one of the oldest Egyptian museums in the world. Founded in 1824, it ranks second only to Cairo. It represents one of the most visited museums in Italy where it competes with the renowned ones of Rome, Florence and Naples. In 2016, TripAdvisor recognized the Museum Egizio as the most appreciated Italian museum by the visitors.

The audio guide, which provides recorded information while touring the museum, represents the most relevant device used to help the visitor to interpret what the museum has to offer. Given that relevance, the museum management decided to ask a consulting company to implement a training process able to aid the museum staff at developing ideas to redesign the audio guide and, in the meantime, bring the staff together while experimenting innovative working procedures.

After accepted the challenge, the consulting company developed a program focused on two main principles:

- **Visitor-centered:** the visitor is at the center of the whole process and the museum staff needs to get in contact with him. This is the only way to develop innovative services and involve museum staff in their everyday routines with satisfaction;
- **Team based:** all the members of the museum staff must be involved in the process of redesigning the audio guide. Everyone can provide an impact and a unique point of view on how things should be done. The creative process can be developed while continuing the museum daily activities just by adopting a flexible *modus operandi* and creating small interdisciplinary teams. Working with smaller teams has two main benefits: the members can provide unique perspectives to the problem to be solved and the main activities are not interrupted. Few plenaries have been organized by the consulting company to present the results of the research and to bring all the people together.

The consulting company decided to adopt the design thinking approach to help the Museo Egizio redesign the audio guide and they focus on the two phases of the design thinking model described by the d_School of Stanford University since they better fit the museum context: empathy and prototyping.

4.1.1 Empathy

In the past, the museum has been considered a place where objects are collected and preserved. Putting the visitor at the center of the museum experience requires the development of innovative approaches based on empathy. Museum staff needs to understand what visitor wants and design thinking methods can help the organizations at achieving these results.

4.1.2 Visitor observation

One of the main methods to understand what visitors want is to observe them by seeing what they do and how they behave. Taking notes can help comprehending what are the emotions visitors feel and what are their unfulfilled needs.

Museum staff can make observations directly while walking in the corridors or standing in the halls. Direct observation allows to understand visitors' needs and desires. The consulting company asked the museum staff to plan between 30- and 60-minutes session of visitor observation. This amount of time represents the

optimal choice to get important information about the visitor without neglecting the daily activities to be done.

At the end of the observations, the museum staff conducted interviews with the observed visitors to confirm the information collected. Then, they shared this information in quick meetings.

4.1.3 Visitor interviews

Visitor research should be conducted by museum staff since they can develop a meaningful conversation with the visitors which can provide useful information about their desires. These conversations can take place in the halls and they can be shorter or longer. Usually, longer conversations happen with selected visitors. The objective is to add more insights to the information collected during the observations.

4.1.4 Immersion

Putting the visitor in the center means understanding how he acts when he lives the museum experience. This means that is necessary that the museum staff re-walks the same path of the visitors. For example, curators are usually in charge of listening to the audio guides before they are provided to the visitors. However, the curators represent just few members of the museum staff and they cannot provide a fully comprehensive perspective on how audio guides should be modified. For this reason, it is necessary that all the museum staff goes over the visitor journey in the museum. It could be useful to put himself in a specific visitor's shoes such as a parent with children or a business traveler with no time at his disposal.

The results can be surprising since the museum staff, usually involved in every-day routine, does not really know what visitors feel when they enter in the museum. Having time to re-trace their paths allows the museum staff to get to know them in terms of their needs or problems.

4.1.5 Interview with internal experts

Even if the visitor is put at the center of the entire process, it is extremely important to confirm the information collected by interviewing the internal experts of the museum who are in direct contact with the public such as the front-end staff, the social media managers, the security guards. These people can provide useful information to complete the puzzle. Additionally, internal experts can help to bring all the museum staff together since their expertise can represent an important force to building teams and strengthening relationships.

4.1.6 Definition

The work conducted during the first stage allows the museum staff to put together both the pros and the cons of a visitor's museum experience. Starting from this map, the staff can identify what are the problems that is necessary to tackle and the needs to be satisfied with the redesigned audio guided.

4.1.7 Ideation

Once problems have been identified, the museum staff can start thinking about how to solve them. In this stage, techniques like brainstorming are used. As

explained above, brainstorming allows people to show their creativity even if the time available to discuss a specific problem seems limited.

4.1.8 Prototyping and testing

The last two stages of the training process are prototyping and testing. They represent important tools to foster innovation and avoid mistakes in a museum environment. Prototyping means creating examples of the final products to see if the idea has been developed in the right way, if it can be appreciated by visitors and, if it solves the identified problems. In the museum environment, usually paper prototypes are created to test a new signposting or the position of an information desk. Paper prototypes are frequently used since they are cheap and easy to create.

Once prototypes are created, they are tested among the visitors in the museum environment. In the Museo Egizio, for example, visitors identified the main problems and opportunities of the ideas presented by the museum staff. This gave an important feedback on how to improve the following version of the audio guide. Additionally, visitors felt to be at the center of the creative process, and this reinforced the idea that the museum appreciated their contribution.

The design thinking steps need to be repeated more than once until a satisfactory prototype is obtained. Only in this way, museum staff can be assured about the developed ideas and can be satisfied for the effort made during the entire process.

At the end of the training, the Museo Egizio staff was able to collect relevant information, develop ideas and gain knowledge about the audio guide and the visitors' needs. Additionally, they were pushed to experiment a new way to work together where creativity, collaboration and interdisciplinarity were the main driving forces. This brought some members of the staff to realize how much they are important for contributing to the creative process.

4.2 The Queensland museum: a design thinking approach to encourage innovation

The Queensland Museum in Brisbane, Australia, aims at connecting visitors to Queensland by being the repository of the state's natural and cultural heritage. It has several campuses and more than 1 million people visit them every year.

In 2011, because of an organizational renovation, the Queensland Museum decided to establish an internal creative agency with the objective of fostering innovation, increasing audience engagement, and implementing design thinking processes in the organization. The agency had the goal to develop a 5-year strategic plan by reasoning about new exhibitions and experiences to offer to visitors.

One of the main exhibitions the agency thought during that period is *Lost Creatures: Stories from Ancient Queensland*. Launched in 2013, this exhibition has been used as a test to implement a design thinking process which involved not only the museum staff but also external stakeholders such as volunteers and people from the closest communities.

4.2.1 Empathize and define

During the discovery stage, the agency decided to ask the museum staff to interview different audiences within the museum environment. This allowed to create an "empathy map" that, in turn, provided useful information about what visitors expected about exhibition topics.

Specifically, for *Lost Creatures*, the agency asked visitors to select the most appropriate words to describe what they expected from their experiences in the

museum. The most chosen words became the experience criteria which provided the agency and the museum staff with some specific goals to be developed.

In addition to the interviews, the museum staff had to undertake a space analysis to identify the main strengths, weaknesses, opportunities and threats; synthesize the work developed in the past and review what has been proposed by the curators; take inspiration from different case studies and settings to inspire more creativity.

4.2.2 Ideate

Building on the experience criteria discovered in the first stage, the museum staff brainstormed some ideas to respond to the visitors' needs. Starting from more than 50 ideas, the team selected few of them to take into the prototype and test stage. Among the others, the museum staff focused on the development of geological timeline, iconic specimens, immersive atmosphere using color, lightning and building connections to key fossil sites.

4.2.3 Prototype and test

As in the Museo Egizio case study, the prototype and test stages allow the team to create essential examples of the product/service to be offered to visitors by using basic materials, especially cardboard models, notes, collages, drawings. Then, the prototypes are showed to the visitors in the museum with the objective to collect useful insights on what works and how improvements can be made.

Queensland Museum staff presented three prototypes for Lost Creatures: a "timeline tunnel" of iconic objects, a large-scale reconstruction with the objective of creating a sense of "wow", one of the feeling arose in the previous stage, and modules with the overall theme of extinction.

The prototype and test stages have been repeated several times as the project Lost Creatures evolved in time and, three months after starting the design thinking process, the team decided to approach the visitors with the prototypes. Since prototype tests usually work better at a real scale, the agency decided to show them in the gallery. This helped the museum staff and visitors as well to better comprehend the issues related to spatial design.

In the end, even if the Queensland Museum staff encountered practical issues in delivery the outcomes of the design thinking process, some ideas remained in the final project and the exhibition started in December 2013 with great appreciation of the visitors. Moreover, ideas that have not been implemented Lost Creatures have been developed as separate funded projects such as a digital tourism app for regional paleontology sites.

5. Conclusions

The industrial design world has been using design thinking to move away from just making products to designing services and systems. Similarly, to innovate, museums are moving away from just traditional exhibitions to more collaborative and multifaceted experiences and services.

Design thinking gives museums a simple process to encourage innovation and new approaches. Most people and organizations are inherently creative problem solvers, but the clear processes of design thinking further help instill a creative culture and help build a common language. The process strongly supports innovation through collaboration internally with staff and externally with visitors. Projects

become especially energized by the involvement of many diverse people, including those who might typically feel isolated from design processes.

Design thinking can be used in almost any stage and at any scale in a museum project. The process gives a clear pathway to involve audiences, drive investments and build better staff collaborations. For museum staff and project delivery, advantages to applying design thinking include breaking down the silos of organizational projects which might be isolated in curatorial or exhibition areas; involving staff, audience and people from many fields and backgrounds that helps to energize and widen the innovation process, giving museum staff “fresh eyes” to a project; defining clearer challenges and project scopes that helps avoid designing for too many groups which can result in weak ideas; testing of fast and rapid prototypes that helps avoid wasting investment, i.e. capital, time or emotional attachment in a project, going in a wrong direction; finally, valuing time constraints and forcing faster and stronger choices that helps avoid too much overthinking or stalling of projects.

The visitor centered museum requires to rethink all working methods and curatorial practices. With its focus on both empathy with visitors and interdepartmental teamwork, design thinking is a powerful tool to help the reinventing processes and practices in a way which is both effective and easy to follow.

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