



Design Thinking: Methodology for Problem finding and Problem Solving
Romita Swarup¹
Dr Payal G Mehta²

ABSTRACT

Design Thinking the most happening and innovative practical approach is about finding the problem and then solving it using its various stages. It has stages of understanding, observation, problem articulation, ideation, prototyping and testing. This process starts with finding the problem using the understand, observation and empathy stages, then the phase moves into problem solving, where the problem is precisely articulated moving to idea generation and finally prototyping and testing the solutions with the stakeholders. The solutions coming out can be both tangible/intangible representations of these ideas. This cycle is iterative in nature and it is followed until all the stakeholders are satisfied with the solutions. Depending upon the insights that are gained during the process, design thinking is capable of producing innovative solutions in an iterative manner which is very much distinct from the traditional methods. This methodology used to solve wicked problems which the paper also talks about. It follows a structured iterative methodology which makes it robust in nature, also it produces solutions which are as per the varying times and needs of the stakeholders. The traditional problem-solving methods are more structured and sequential in approach which results in producing solutions that are liner in nature. These traditional methods involve critical steps such as problem identification, data collection, analysis, solution generation, evaluation, implementation, and monitoring. Such methods are more following reasoning that is logical in nature and analytical in thinking. And thus, small incremental improvements come out of such practices. Also, the focus might not be on the stakeholders which design thinking considers as the core. This shift from traditional problem-solving to problem-solving through Design Thinking allows the development of solutions that better align with user needs and effectively navigate real-world complexities.

Keywords: Design Thinking, Divergent Thinking, Lateral Thinking, Problem Finding, Problem Solving

INTRODUCTION

Today the world is going through challenges where the “Earth” has to be also considered as a stakeholder, each of the product or a serve that is generated or created must be earth centric, and for these organizations and businesses need a structured approach as these challenges are the complexities of today's situations. The Design Thinking framework provides a systematic approach when it comes to solving these

¹ Research scholar. School of Doctoral Research and Innovation. GLSU, Ahmedabad

² Doctorate in Interdisciplinary: English Literature & Management. Faculty Of Law, GLS university, Ahmedabad, India. payal.mehta@glsuniversity.ac.in



complex challenges and using creative and efficient tools and techniques. This structured approach brings in innovation, creativity, and also fulfils then needs of the stakeholders using much of an emphasis on the stages of it. The foundation for exploring how Design Thinking can be methodically used to identify and then solve a range of issues in various contexts is laid out in this introduction.

LITERATURE REVIEW

Definition of Wicked problem:

Issues related to methods are often described as ill-defined, ill-structured, or even "wicked" problems, as outlined by scholars such as Buchanan (1992) and Cross (1982). In such cases, the delineation between problem formulation and design specification becomes blurred, with alternatives being explored collaboratively with clients and users. Interestingly, designers may engage in this process even when the initial problem could have initially been treated as well-defined, according to the insights of Cross (2006, 2011) and Thomas & Carroll (1979) (Horst Rittel, 1973).

Definition of Problem Solving

Problem solving happening in the real world were majorly defined and guided by the goals of the daily living (Sherry, 1996)

Newell and Simon (1972) introduced a framework to understand problem solving, which serves as a crucial link between learning and performance. Their examination of means-ends problem solving offers a broad representation of human cognition. However, this framework requires enhancement with a strength concept to explain the diversity in problem-solving approaches and the development of problem-solving proficiency through practice.

Since the 1970s, researchers investigating problem solving have predominantly adopted either Simon's approach or a descriptive approach rooted in the Gestalt tradition. Early studies on problem solving often centred around puzzles or games, such as the Tower of Hanoi task (described below). Subsequent research has increasingly shifted towards investigating more intricate tasks drawn from real-world domains such as science and writing (Kevin, 1998).

TRADITIONAL STEPS OF PROBLEM SOLVING

Traditional approaches when it comes to problem-solving take an organized approach, some of these approaches are the five-step model developed by Dewey in 1933 This process consists of identifying the issue, analysing it, coming up with solutions, selecting the best solutions, testing it with stakeholders, and then putting it into practice.

To successfully implement problem-solving approach, interpersonal skills and fundamental skills of critical thinking abilities are needed. This adaptation is crucial for creating an environment where all participants can engage meaningfully in the



problem-solving process and contribute to finding solutions collaboratively (Kolb Sharon, 2005) .

It functions as a reflective thinking process that guides individuals or groups through a series of questions related to a given topic. Conventional process of problem solving is not user centric and it happens in a linear manner which many a times does not result into solving the real-world problems of the real users.

21ST CENTURY PROBLEM SOLVING METHODOLOGY

Companies that are driven by design have a very different performance as compared to those who have not yet adapted the design approach. These companies have almost 200% surpassed the S&P index in terms of customer loyalty, satisfaction, innovation and financial performance over last decade. This is attributed to the ability of Design Thinking to assist companies in the development of inventive products/services that fulfil the expectations and wants of the users while delivering a positive user experience. More competent, effective services/processes that reduce cost, enhance employee satisfaction and involvement can be achieved by using the Design Thinking approach. This also leads to healthy innovative culture and creativity in organizations and fosters growth in newer markets thus overcoming competitors in the industry.

IDEO, a design consultancy based in the United States, is one of the pioneers of the Design Thinking methodology & has helped popularize it through its projects & publications. Design Thinking guarantees superior performance for companies due to its human-centered, iterative, and co-creative nature. It serves as a reliable process for problem-solving by emphasizing the creation of solutions that are needed by users, practicable to implement, and financially acceptable in business world.

Companies can develop solutions that are very much needed by users, they are practical in terms of implementation because technology plays a major role in today's times and financially these solutions can be adhered. When it comes to development of such solutions Design Thinking makes this possible for the companies. And because of this approach of Design Thinking, various managerial problems like customer loyalty, employee happiness, revenue tapering, overhead cost increasing, product not being sold, performance can be faced.

DESIGN THINKING

The broad discipline of design includes the purposeful creation of products, services, systems, and experiences to meet specific needs or deal with particular problems. An organized framework for approaching problems creatively is provided by **Design Thinking**, a process based on empathy, ideation, and prototyping. It promotes interdisciplinary cooperation and iterative procedures, which enable the investigation of many viewpoints and the improvement of concepts. Design Thinking puts the end-user at the centre of any process, whether it be organizational strategy, service improvement, or product creation. This results in solutions that are not only aesthetically pleasing but also very efficient and easy to use. Businesses and industries may enhance their services and promote a culture of constant adaptation and



improvement in a constantly changing environment by adopting design and Design Thinking.

To make Design Thinking more accessible, it was important to explain how the process uses a set of tools and techniques, for the creation of "human-centered innovation process that emphasizes observation, collaboration, fast learning, visualization of ideas, rapid concept prototyping, and concurrent business analysis" (T, 2010b).

Design Thinking tools, such as ethnographic studies like being on the field, making personas, journey maps, various ideation tools, prototyping, and testing, are particularly distinctive. However, these tools are not used uniformly; practitioners select them based on organizational objectives and project needs (Magistretti Stefano, 2021). The flexible nature of Design Thinking methods adds to its appeal, allowing users to tailor a program based on their skills and preferences (Jarryd Daymond, 2023).

Design thinking is successful in generating products/services/processes that are based upon user feedback and this forms much better, improvised results. The usability of the tools and techniques of this process the feasibility of their results, contribute to it being popular in various business and management contexts. Design thinking is widely used by people of various domains when it comes to understanding their users and also understanding the challenges faced by them, as it results in giving solutions that are solving their problems. Initially pioneered by David Kelley, a Stanford University professor and co-founder of IDEO, Design Thinking was officially named as such in 2003 by Tom Kelley. It encompasses a structured approach with multiple steps and principles to guide project execution. Tim Brown and David Kelly are the originators and formalizers of Design Thinking, Tim Brown's method has inspiration, ideation and implementation, where the inspiration stage is related to problem that has to be solved considering market opportunities (Tim, Design Thinking, 2008)

PROBLEM SOLVING USING DESIGN THINKING

1.6.3.1 Definitions of Problem Solving

By Definition: The theoretical framework adopts (Krulik Stephen, 1980) definition of a problem as articulated in their book "Problem Solving: A Handbook for Teachers" (1980). According to their definition, a problem is described as "a situation, whether it involves quantities or not, that individuals or a group of individuals face, which necessitates a resolution, and for which there seems to be no evident or straightforward means or path to achieving a solution".

By Definition: Krulik and Rudnick characterize problem-solving as the process through which individuals utilize their existing knowledge, skills, and comprehension to address the demands of an unfamiliar situation. In such instances, students must amalgamate what they have learned and apply it to a new and distinct context (p. 4). This definition is in alignment with the concept of transfer, which constitutes the eighth element of problem-solving. Transfer refers to the phenomenon wherein learning or performance in one situation facilitates learning or performance in

another situation (Ormrod, 1999, p. 348) (Romita, Empowering Indian Management Students: Cultivating Problem-Solving Through Design Thinking., 2023).

Problem solving is the cognitive process of defining the problem, analysing, and resolving a specific issue or challenge in an organization. It involves a systematic approach to understanding the problem. More so the focus in on solving the wicked problems faced by managers. A wicked problem is a complex and multifaceted problem that is difficult to define and has no clear, definitive solution. Wicked problems keep occurring from time to time. They involve multiple stakeholders with conflicting interests, uncertain outcomes, and interdependent parameters, making it challenging to address effectively. The goal of problem solving is to come up with the solution space addressing the problems of the stakeholders in the real world.

Design Thinking is a problem-solving methodology and it has gained prominence for its effectiveness as it addresses the complex problems referred to as the "wicked problems." Wicked problems are considered by their multifaceted nature, interconnected variables, and the absence of clear solutions. Wicked problems keep coming up from time to time in spite of being addressed. Design Thinking being a structured and empathetic methodology it allows the organizations/companies to navigate these intricate problems. The process begins with the problem finding among the users using the understand, observe and empathy, then articulating the problem in a precise, clear and comprehensive manner and then coming up with solutions to the same and testing them by building tangible or intangible prototypes with the users, in the problem-solving phase.

Design thinking in solving wicked problems, encourages a beginners' mindset and embraces ambiguity along with collaboration. It lays stress on the importance of continuous iteration and learning from failures, such that there is adaptability to adjust to the evolving challenges. Being user centric and this keeping the user at the centre of the problem-solving process along with incorporating diverse perspectives, Design Thinking aims to generate innovative and sustainable solutions for the wicked problems. This approach fosters a creative and open-minded culture in organizations that is favourable in tackling the complex problems in the dynamic interconnected world.

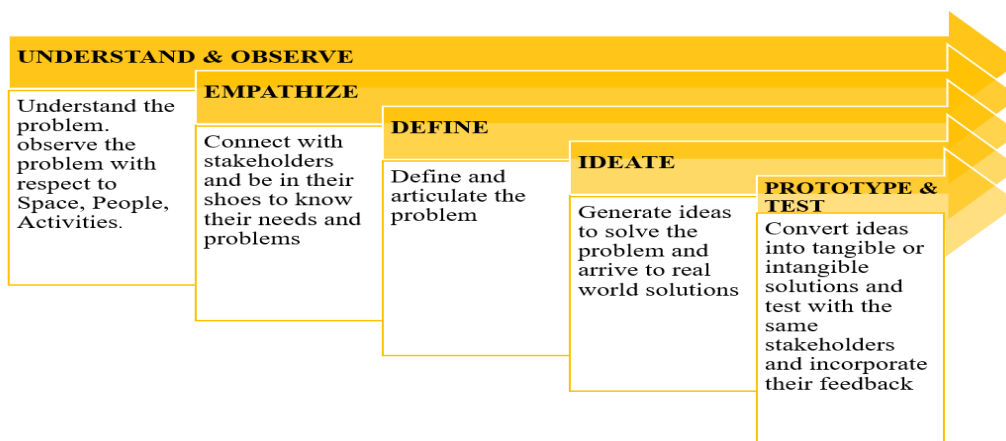


Figure 1 Design Thinking Problem Solving Steps. Figure created by Author



Understanding During the understanding stage, a comprehensive perspective of the business is pursued. A viewpoint involves expressing opinions on the sector, industry, organization, and stakeholders based on personal perspectives. The next perspective entails conducting secondary research on the sector, industry, company, and specific departments. And the last perspective considers trends within the sector, industry, organization, and among stakeholders, focusing on three critical aspects: Human, Technology, and Business.

Observation serves as a method for studying the current state or the "AS-IS" condition. Through observation we get information that is much valuable and it is difficult to get such information using the old methods, it gives detailed descriptions. Thus it helps in knowing organizations, processes/services in a more intricate manner and in-depth. Design thinkers engage in field observations to derive major insights, identifying problems.

Empathy represents a crucial phase in understanding stakeholders at a profound level. It involves the ability to comprehend and genuinely care about their feelings, to precisely imagine how they feel, and resonate with their emotions. Empathy is experiencing users' feelings firsthand, often achieved through interviews using tools like questionnaires, personas, 5W+1H, laddering, journey maps, empathy canvas, and uncovering hidden insights.

Problem Definition At this stage, the design problem/challenge is precisely defined/written. A thorough understanding of the problem/challenge and its constraints facilitates the progress of precise solutions, fostering clarity among all team members regarding the actual problem. Accurate problem definition lays the foundation for accurate solutions.

Idea Generation involves exploring various tools that designers use to generate creative ideas, which can be translated into solutions and action plans. Techniques such as sketching, creative thinking, SCAMPER, are employed in this phase. Ideation is where ideas are cultivated, often through collaborative sessions also.

Prototyping & Testing involves collecting crucial information for bringing ideas into the real world, exploring visual elements. Design ideas are presented and articulated to gain stakeholders' acceptance and secure approval. Models, mock-ups, storyboards, drama, apps, websites, systems, are used to convey ideas effectively. Testing is the process of refining these prototypes and presenting them for feedback from stakeholders for real-time implementation.

PROBLEM FINDING AND PROBLEM-SOLVING CONCEPTS

Design thinking is broadly divided into two phases:

1. Problem finding
2. Problem solving

The process begins with the problem finding among the users using the understand, observe and empathy, then articulating the problem in a precise, clear and



comprehensive manner and then coming up with solutions to the same and testing them by building tangible or intangible prototypes with the users, in the problem-solving phase.

Problem solving space: As Business environments are constantly been challenged and face difficulties, problem-solving in the organization holds an important role. It involves identifying, analysing, and finding effective solutions to these challenges. Problem-solving is about addressing the problems logically and in a structured manner such that the core issue gets highlighted and this often requires critical thinking and a systematic approach. Businesses that excel in problem-solving are capable of handling these complex situations more effectively thus maintaining operational efficiency.

There are three major concepts on which problem finding and problem solving are based. Let us look into these three concepts.

Root cause Analysis

Problem finding stage is where the participant has to go on the field and find the problem. These problems are of the real people in the real world, hence the best way to find these problems is to be with them i.e., with the stakeholders, and conduct ethnography study. Live in their environment and walk their shoes. Observations have to be made and interviews have to be conducted. Normally we consider the problem that we see and without digging deeper into the needs and wants of the stakeholder designers fall short of reaching to the actual reason of the problem. The root cause analysis (Rooney J. James, 2004) of the problem is about finding the actual reason of why the problem is happening and what actually is the problem. Those problems that the stakeholder is facing and not just the superficial data. There are many tools that can be used to find the root cause. One such tool is called *5W+1H* and the next is asking *Why 5 times*.

5W+1H tool allows the participant create questionnaires that start with who, when, what, where and why (Knop Krzysztof, 2018). Once the questionnaire is ready, the stakeholders are interviewed. These interviews using this tool gives a set of horizontal data. The participant then has to choose the area/data that is very interesting, intriguing and eventually dig deeper into it using the *5 Why* tool.

5 Why tool is also known as ***laddering***. All questions start with *Why*, based upon the answer given by the stakeholder the next *why* question is created from the answer the stakeholder gave. This process of creating questions from the answers given by the stakeholder is repeated five times and it is found that by the time one reaches the fifth *why*, one comes to know about the actual cause of the problem (Alan, 2016).

1. Human Centred Approach

Design thinking is a human centric approach where empathy is at the core it, which has focus on understanding the human needs, pain points, desires, expectations and the problems they are facing. In a similar manner emerging technologies have been



designed for day to day lives of people and so both have to work hand in hand and it is also essential that development is aligned with the human centred values.

DESIRABILITY	FEASIBILITY	VIABILITY	SUSTAINABILITY
The products and services being designed should be as per the needs of the users and such problems that the stakeholders face must be addressed.	This factor looks into the idea/solution generated is technologically practical to implement.	Businesses and organizations must be ready to put in money behind the ideas that are chosen.	Defined problem and the proposed solution must be environmentally, socially, and economically sustainable.

Let us look at the four domains on which Design Thinking works:

Desirability:

- Focus: User needs and desires. Societal Values
- Key Question: Do people want this solution?
- Methods: Empathy canvas, stakeholder interviews, user personas, journey maps.
- Outcome: Solutions that are aligned with the stakeholders and impart compelling user experiences.

Feasibility:

- Focus: Technologically practical and works with organizational capabilities. Environmental care, human machine collaboration
- Key Question: Can we build and deliver this solution with our current resources and constraints?
- Methods: Technology assessment, resource analysis, prototyping, feasibility studies.
- Outcome: Solutions that are technically possible and realistic to implement.

Viability:

- Focus: Business model and economic sustainability. Productivity, human job retention
- Key Question: Can this solution be financially successful?
- Methods: Business model canvas, market analysis, value proposition design.
- Outcome: Solutions that can generate profit and sustain a business.

Sustainability:



- Focus: What is the Environmental impact and along with this what is the social impact.
- Key Question: Is the idea getting generated environmentally maintainable and socially responsible?
- Methods: Life cycle assessment, sustainability frameworks, impact analysis.
- Outcome: Solutions that reduce the negative impacts the planet, thus adding to long-term ecological balance and well-being of the planet.

2. Lateral & Divergent thinking

Till now we saw the problem finding phases of Design Thinking and now let us look at problem solving concept. Problem solving is as simple as solving a problem of the stakeholders that have been identified through problem finding. Problem solving is where ideas have to be generated and these ideas have to be designed and devised in a manner that they solve the problem identified. Creative thinking encompasses lateral thinking and divergent thinking. (Chaudhari, 202) Lateral thinking and divergent thinking are the two practices or tools to produce innovation and for creative problem-solving. Here the ideas generated are much different from the traditional methods of ideations and this brings in a great leap in the field of creative thinking when it comes to innovative solutions. Divergent thinking is a technique where ideas are generated that are originating from one point or sources, thus multiple ideas get generated. Which are possible for solving the problem, thus leading to open-ended exploration rather than converging on a single correct solution. These techniques emphasize creative thinking, innovation, solutions to the wicked-problems.

The study of creativity has a deep-rooted history within psychology, investigating this multifaceted topic through processes, the personality traits of creative individuals, and the characteristics of creative products and environments (Plucker & Makel, 2010, pp. 49, 51). Edward de Bono's way of approaching creativity, particularly with the aid of lateral thinking, intersects with this field of inquiry. However, his theory of lateral thinking lacks recognition as a coherent and empirically validated theory within psychology (Higgins, 2015, p. 20; Moseley, 2005; Sternberg & Lubart, 1999). Critics note that de Bono's extensive publications predominantly cite his own previous works, relying on anecdotal accounts and case studies conducted by himself and associates, without situating his work within an academic context (Burgh, 2014; Dingli, 2008; McPeck & James, 1983). Psychologists argue that such commercial ventures diminish the rigor of academic efforts to understand creativity (Sternberg & Lubart, 1999), yet acknowledge the potential utility of de Bono's tools without outright dismissal due to lack of empirical validation (Begbie, 1970; Sternberg, Kaufman, & Pretz, 2002, p. 99). De Bono himself rejects academic participation, citing disinterest in its adversarial traditions and preference for a more lateral, non-critical approach that fosters new possibilities (Dingli, 2008), which aligns with his successful application of methods globally in educational, governmental, and corporate settings (de Bono, 1983, p. 115; de Bono, 1995; Dingli, 2008; Moseley, 2005, p. 137) (Joseph, 2016).

Lateral thinking is a way of thinking to solve problems where the problems residing are looked upon from unusual perspectives and with novelty. Lateral thinking promotes creative and imaginative thinking to produce solutions that might not be



immediately apparent rather than adhering to a conventional, linear route of reasoning. For example, you make use of a tool called forced connection to get results in lateral thinking. Where a list of random words is made, and the problem identified is forcibly connected with the first random word. This generates an idea, if the idea is not generated the same technique is used with the next random word. The more the random words the more the solutions. However, because a random word by nature is completely different from the problem and when forced to connect with the problem, results in generating out of the box ideas and that is called lateral thinking. You get a completely radical idea. Usually, the ideas generated are linear or incremental but using Design Thinking the problem solutions are radical. According to (Lawrence A S Arul, 2013) lateral thinking is a style of problem-solving that looks for answers to challenging issues by utilizing unusual techniques or components that logical thinking would normally ignore.

Divergent Thinking is a way of thinking which we can call as a process/method to come up with creative ideas by keeping in mind various solutions and perspectives. It is characterized by the generation of numerous ideas in an open-ended manner, without immediately evaluating or judging them. Divergent thinking encourages exploring multiple avenues and considering various viewpoints to solve a problem or explore a concept. Divergent thinking as the word itself suggests is a way of thinking where multiple sets of ideas are generated to one single problem at hand. Divergent thinking encourages a free flow, and quick stream of ideas, thus it has no limitations and judgements, while in convergent thinking, focus is on identifying a single right answer. This strategy creates lot of chances and opportunities enabling people to think creatively and unconventionally and think both inside and outside the box. As it helps unearth new ideas and unusual solutions that might not arise through linear, logical thinking alone, divergent thinking is essential in brainstorming sessions, creative problem-solving, and design processes (E. De Bono, 2015).

CONCLUSION

Design Thinking framework thus, offers a versatile approach to problem finding and problem-solving and that is human centred. It empowers individuals and teams to come up with innovative ideas leading to feasible desirable, viable and sustainable solutions that address real-world challenges effectively. Design thinking encourages the skills and the method of problem solving and also develops creativity among teams and organizations leading to continuous improvement in handling complex issues. Design thinking is a strong approach that has an iterative nature of understanding, observing, empathizing, defining problems/challenges, ideating, prototyping, and testing. It generates deeper insights into user behaviour and challenges. It ensures that solutions are not only innovative but also practical and ultimately driving meaningful and lasting improvements in people's lives.



BIBIOLOGRAPHY

- Alan, C. J. (2016). The problem with '5 whys'. *BMJ quality & safety* .
- Chaudhari, S. P. (2021). Design thinking for libraries: A deep knowledge of user and their problems. *Social Science Research Network*, 20, 164-169.
<https://doi.org/10.2139/ssrn.3916393>
- Design Thinking: User-Centered Multidisciplinary Methodology Based on People and Innovation. (2017). (pp. 173-182). Berlin: Springer.
- E. De Bono. (2015). *Serious creativity: How to be creative under pressure and turn ideas into action*. Random House.
- Horst Rittel, M. W. (1973). Dilemmas in a general theory of planning.
- Jarryd Daymond, E. K. (2023). Design Thinking in Business and Management: Research History, Themes, and Opportunities .
- John, A. (2007). *Decision Making and Problem Solving strategies*. London: Kogan Page Limited.
- John, A. R. (1993). Problem solving and Learning. *The American Psychological Association, Inc*, 35-44.
- Joseph, H. (2016). Exploring creative Information Literacy Practices via Divergent thinking. *CUNY Academic Works CUNY Academic Works* .
- Kevin, D. (1998). Problem Solving. *A companion to Cognitive Science*, 289-298.
- Knop Krzysztof, M. K. (2018). Using 5W-1H and 4M Methods to Analyse and Solve the Problem with the Visual Inspection Process – case study. *EDP Sciences*.
- Kolb Sharon, S. S. (2005). Active Problem Solving: A Model for Empowerment. *Teaching Exceptional Children*.
- Krulik Stephen, R. J. (1980). *Problem Solving: A Handbook for Teachers*.
- Lawrence A S Arul, X. S. (2013). Lateral Thinking Of Prospective Teachers. *Journal of Educational Reflectio*.
- Magistretti Stefano, A. L. (2021). Framing The Microfoundations Of Design Thinking As A Dynamic Capability Forinnovation: Reconciling Theory And Pract. *Journal of PProduct Innovation Management*, 645-667.
- Micheli Pietro, W. J. (2018). Doing Design Thinking: Conceptual Review, Synthesis and Research Agenda. *Journal of Product Innovation Management*.



- R, M. (2009). Why Design Thinking Is the Next Competitive Advantage. *The Design of Business*.
- Romita, S. (2023). Empowering Indian Management Students: Cultivating Problem-Solving Through Design Thinking.
- Rooney J. James, V. H. (2004). Root Cause Analysis For Beginners. *Quality Progress*.
- Sherry, W. S. (1996). *Everyday Problem Solving*. San Diego: Academic Press.
- T, L. (2010b). Design thinking in business: An interview with Gianfranco Zaccai. *Design Management Review*.
- Tim, B. (2008). Design Thinking. *Harvard Business Review*, 86.
- Tim, B. (2008). Design Thinking. *Harvard Business Review*.