

Design Thinking and or Systematic Innovation Composite

Introduction

Design Thinking and Systematic Innovation each have their strengths and weaknesses. Combining the strengths of the two approaches provides all the benefits of both while rendering the weaknesses of each approach immaterial in the light of the composite.

Design Thinking

The origins, influencers, strengths and weaknesses, and approach of Design thinking are detailed.

Design Thinking Origins

Many people have contributed to Design thinking as we know it today, for brevity I share information about two people and their contributions; one contributing to the roots of Design thinking and the other to its fruits.

Herbert Simon

Nobel Prize winner in 1978, Herbert Simon in his 1996 book, “The Sciences of the Artificial 3rd edition [1]” argued that scientific thinking, which experiments with and discovers natural laws, differs from Design thinking which produces design artifacts that are adapted to human goals and purposes, yet still obey natural laws.

The designer is concerned with how artifacts (systems, products, or services) ought to be, in order to attain goals and to function. An artifact’s inner substance and organisation will be successful if it interfaces well with the few critical characteristics of the surroundings in which it operates. For example, if a business interfaces well with people and meets the needs of its surrounding markets, society and environment, then it is likely to be successful. These and many more aspects of design from Herbert Simon’s work have been foundational to Design thinking.

Tim Brown and Company IDEO

If Herbert Simon and others developed the roots of Design thinking, then Tim Brown President and CEO of globally recognised design company IDEO [2] and company personnel have demonstrated the fruits of the approach; value added products, services and processes.

IDEO continues to be a leader of creating change by design. They have helped organisations in healthcare, government, education, energy, retail, hospitality, services, and technology to solve some complex challenges through Design thinking collaborations. Tim Brown explains that, “Design thinking is a human-centred approach to innovation that draws on the designer’s toolkit to integrate the needs of people, the possibilities of technology, and the

requirements of business success”. He encourages diversity in team backgrounds, opinions, experiences and disciplines, as essential to the design challenges that IDEO faces.

The Design Thinking Approach

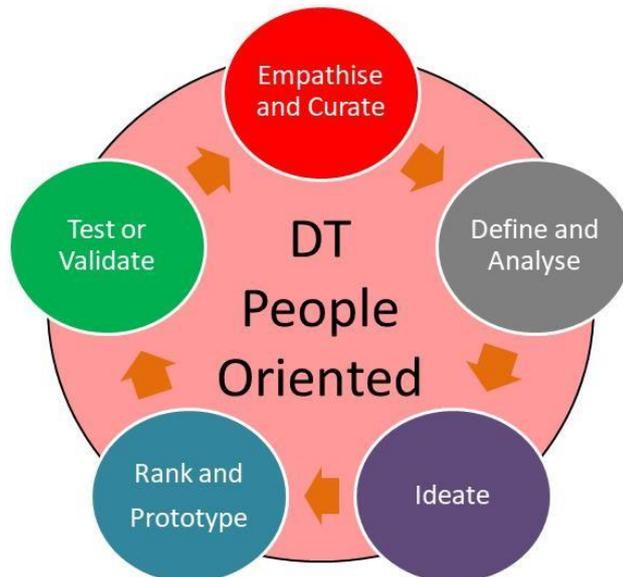
Design thinking is an approach where three to seven phases are used to guide innovation activities. Consider the popular five stage School Design thinking model from Stanford University [3]. The process often starts by design team members being immersed in the context of potential users who they empathetically question regarding their current situation. Their answers provide deep and contextual understanding of their needs, motivations and problems.

Further phases of defining and analysing recognise and select problems and establish features and functions that might support a solution.

The ideation phase follows by brainstorming solution ideas.

Next the prototyping phase creates simple artifacts and tests them. This identifies both problems and benefits of chosen features or of the whole solution.

The Design thinking phases may be revisited, or visited out of any implied sequence as ideas developed in each phase can trigger further ideas or actions in the other phases.



Design thinking teamwork is supported by traits of creativity, collaboration, empathetic consideration of user’s needs, curiosity, enthusiasm and thinking which includes creative and analytical thinking, questioning, making associations, sense-making, and finding and involving relevant people in company or industry networks.

The source of Design thinking innovation comes from the sum of participants' experiences, knowledge and sensitivity to the context and needs of the project, guided by the Design thinking phase activities and collaborative discussions.

Design Thinking Strengths

Design thinking's strengths are its 'empathetic listening and contextual immersion' and 'prototyping' phases, which together, incorporate the voice of the people, job, and the context of the solution's local environment.

Design thinking is people, job, context, and solution focused. It is an outward-looking approach that seeks to establish the voices and real needs of customers within a market.

Design thinking motivates the implementation team by its process inclusivity which includes direct participation from team members and users who are all active participants.

Design Thinking Weaknesses

Design thinking's 'ideation' phase is relatively weak, as it relies on idea generation without technical guidance from established product and technology improvement trends or known and reliable innovation principles.

This weakness is somewhat alleviated by the ability of experienced and diverse Design thinking teams to generate a rich understanding of a problem and its context.

Another way of making the solutions more robust is the use of prototyping as a group collaboration and exploration activity. This helps to ensure that new products and services match known user needs before actual product or service implementation and rollout is undertaken.

Systematic Innovation

The origins of systematic innovation, its influencers, strengths and weaknesses, and the approach of systematic innovation are detailed below.

Systematic Innovation Origins

Genrich Altshuller, his immediate students, and an expanding base of practitioners and corporations have contributed to the success and dissemination of systematic innovation approaches. Dr. Ed Sickafus in the 1990's developed an easy to learn and use, integrated version of Altshuller's work while working at the Ford Motor vehicle corporation. He named this approach, Unified Systematic Inventive Thinking (USIT).

Genrich Altshuller [4]

Once, a patent clerk in the Soviet navy, Genrich Altshuller is known as the father of TRIZ, which is a Russian acronym for ‘theory of inventive problem solving’ and is recognised as a systematic innovation technique. His curiosity led him to ask, “How do things get better” and his environment, capacity, perseverance and research gave him the answers.

He is said to have studied around 400 000 patents before coming up with insights detailing some fourty principles of invention. He also found eight important trends of improvement that now still guide innovators to improve artifacts.

Altshuller’s findings were introduced to the Western World when students of his emigrated to the US and Europe after the fall of the Berlin wall and end of the Cold War in November 1989. Many of these students worked for or partnered with companies in these and other Western countries to help spread, evolve and expand Altshullers’ systematic innovation approach.

Dr. Ed. Sickafus [5]

Dr. Ed Sickafus pioneered Unified Structured Inventive Thinking (USIT) within Ford Motor Corporation in starting 1997, and subsequently shared this knowledge with interested parties in at least 43 countries.

USIT integrates scientific thinking with synthesized principles from TRIZ. USIT moves through phases of problem definition, problem analysis and **problem solution**, before any implementation or pilot phase is started.

TRIZ, USIT, and to a lesser extent, Design thinking may all be thought of as systematic innovation techniques.

USIT makes TRIZ easier to learn and helps to naturally incorporate scientific thinking and physical, chemical and geometric effects into systematic innovation.

It uses methods to ensure holistic and imaginative thinking such as drawing the problem to activate holistic thinking, and generalising terms to expand the size of the solution space.

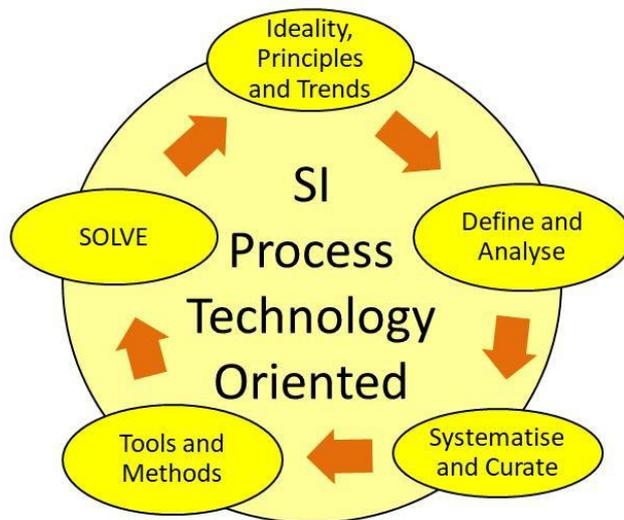
Biomimicry effects, new principles and trends, and the integration of other innovation techniques continue to complement the systematic innovation approach, providing that they guide practitioners in reliable and repeatable ways to improve artifacts.

The source of innovation in the systematic innovation approach is actually ‘Big Data’ **insights** gleaned from patents. Patents are a formal and somewhat structured and reliable source of data. The patents are sourced from many and varied industries, cover a growing range of technologies, and are kept current by the numerous new submissions each month around the world.

Systematic Innovation Approaches

Systematic innovation approaches are based on knowledge of innovation principles, trends, tools, and guidelines which foster medium and high-value innovations in a reliable and often repeatable way. Practitioners of systematic innovation, improve their innovation, scientific, engineering, structured thinking, and success of innovating with increasing use of the approaches.

Use of systematic innovation methods increases the speed, efficiency and effectiveness of innovation thus compounding its usefulness over time. Thus a company like Unisys can have a strap line like “Imagine it. Done!” Canadian company, Bombardier (involved in the Gautrain), says it like this, “The evolution of mobility.”



Systematic innovation approaches guide one in solution search: I have often come up with an innovative plausible conceptual solution using the approaches and then conduct an Internet search for the concept which the approaches led me to. Mostly I find a small startup company actually exploiting the concept. In a sense, this gives me the ability to both conceptualise a solution and somewhat validate it. This may even be a way to find disruptive and other innovations and their creators while they are generally still under the radar. When I don't do the search I am still often surprised by an innovation concept that I have come up with, later being reported by some company within the next six to twelve months.

Systematic Innovation Strengths

Systematic innovation is known for its product, service, problem, process and technology focus. It brings ‘the voice of the product or service’ and ‘the voice of technology’ into the solution space. Systematic innovation is often inward-looking, where it fosters innovative solutions while it builds science, technology, engineering and other thinking competences in its adherents.

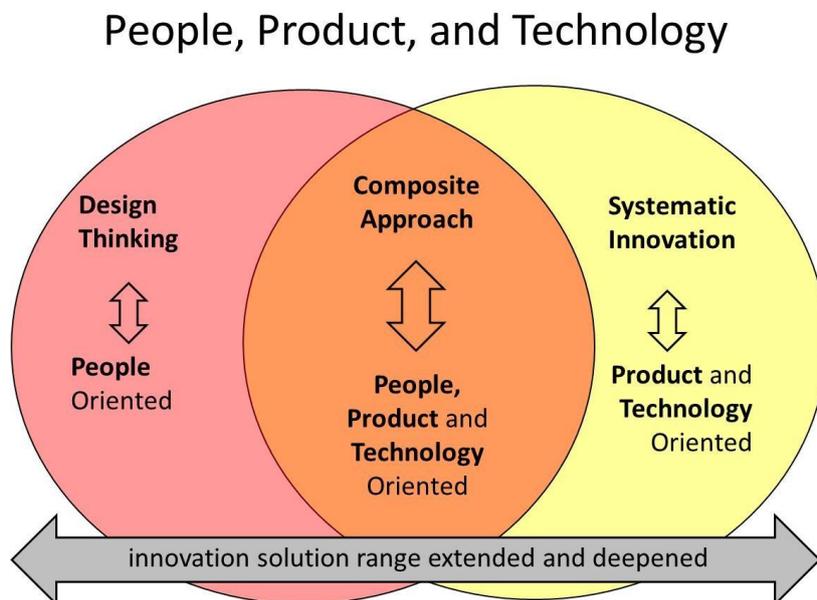
It uses insights gained from patent data and trends applicable across **all** industries. Systematic innovation focuses on solution search while at the same time effectively reducing barriers to novelty. The approach drives intrinsic motivation in practitioners and often leads to the delivery of high-value benefits from breakthrough innovations.

Systematic Innovation Weaknesses

Systematic innovation approaches have good mechanisms to deal with people and context, but do not emphasise these, and this can therefore result in inventions with low market validation or uptake. Notwithstanding this, its ability to craft breakthrough technology and product innovations often does deliver spectacular products or services and high market uptake. Systematic innovation has a steep learning curve, which is effectively alleviated by USIT's easier-to-learn-and-practise techniques, but still resting on the strong foundation of TRIZ.

Composite Design Thinking and Systematic Innovation Approach

A composite approach makes sense, as innovation approaches must cater for people, service, product, and technology orientations. The composite approach extends the range of solutions possible, and often leads to more robust and higher value solutions. It caters for approaches which require a strong emphasis on people (voice of the customer) and on the product (voice of the product) while taking note of technology trends.

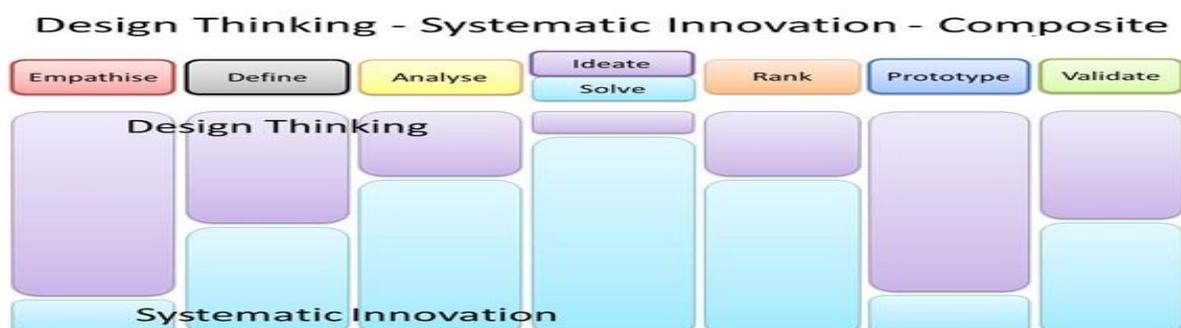


The strength of forming a Design thinking and systematic innovation composite approach comes from the complementary nature of the two approaches. Use the composite approach to play to the strengths of each approach relative to the specific problem context.

The table below provides more detail on the nature of the systematic innovation approach as it relates to each of the Design thinking phases.

Ref#	Design Thinking Phase People Focused	Systematic Innovation Approaches Product and Technology Focused
1.	Empathise Immersive experience, gather context and curate ideas. (Strong benefits).	Explore Problem or Opportunity Generally relatively weak practice around empathy and people context. Can be strong if 'Local Quality' principle, drawings, and generic terms specifically include people or if there are specifically structured interviews to identify clear people-related needs and goals relative to the job tasks to be done.
2.	Define and Analyse Curate team ideas gleaned.	Problem Definition and Analysis Phases Create a well-defined problem statement. The problem definition and analysis use various systematic methods to remove psychological inertia and to ensure that innovation progresses. Core problem issues are identified and analysis methods are used to discover required functions.
3.	Ideate Mostly brainstorming. (A relatively weak method of sourcing effective innovation ideas, especially where the solution has significant technology requirements).	Problem Solution Phase – Solve Systematically Most companies have innovation / problem solving methods which omit the problem solution phase, choosing to jump straight into prototyping or implementation. This is often a costly mistake. Use systematic innovation principles, trends, tools, resource mapping, solution algorithm, functional analysis, scientific effects databases, and other solution supporting methods. (Strong continuous or breakthrough innovations in products, services, processes, and problem solving).
4.	Rank and Prototype Active prototyping of top-ranked solutions (Different, but on a par benefits to systematic innovation. Use combination approach as applicable).	Rank Plausible Conceptual Solutions Ranked solutions may be selected for prototyping. High-value solutions are pursued and secondary problems arising are solved during prototyping or pilot projects. (Weaker path to market than Design thinking unless solving a mutually agreed difficult problem for a customer. In which case a ready buyer already exists. Systematic innovation can generally help one to conceive likely product adaptations that may be required into the future – which helps strengthen the longer term strategy required).
5.	Test or Validate Use prototype and market validation (Different but on par benefits to systematic innovation. Use combination approach as applicable).	Test or Validate Use of focus groups and senior users for validation is recommended. (Different but on par benefits to Design thinking. Use combination approach as applicable).

The diagram below offers my current view on the relative contribution of Design thinking and systematic innovation for a problem requiring a strong people-context and technical innovations.



For solutions requiring little direct user involvement, such as improving a popular product's manufacturing process, quality or costs, systematic solution approaches would likely be more effective. Conversely for people-sensitive problems, for example negative employee behaviours, or increasing employee motivation, Design thinking might be the favoured aspect of the composite.

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