

System Model Innovation with Business TRIZ

Michelle Bindel

University of Leipzig
Faculty of Mathematics and Computer Science

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1 Introduction

TRIZ is a contradiction oriented systemic innovation framework that stems from technology and is constantly being expanded to other fields like Business and Management. Resulting among other things in Business TRIZ, which applies the general TRIZ approaches to resolve contradictions to business systems and business process landscapes. It has already been successfully used to solve problems in that domain, but there are still challenges to overcome and the tools are still continuously worked on. The aim of this paper is to explain the main approaches in Business TRIZ and to put the approaches pursued in Business TRIZ and its tools and methods in the larger context of innovation possibilities of business models. To do that we will look at the development of Business TRIZ, its tools and how they work together to form a systemically driven general framework. As well as the current state of business models and their innovation and how Business TRIZ can be used to innovate them.

This seminar paper is presented as an extension of a previous talk held in the seminar "Sustainability, Environment, Management" as part of the module Applied Computer Science. The seminar is held as a part of the WUMM project [1].

2 From TRIZ to Business TRIZ

TRIZ is an acronym of the russian phrase „теория решения изобретательских задач“ (Teoria reschenija isobretatjelskich sadatsch), translating to: theory of inventive thinking. It consists of a collection of over 30 tools, which offer a systematic approach for producing creative ideas. It is founded on the realization that the majority of inventions complies with a relatively small set of principles and that these principles can be used to boost our creative thinking. TRIZ does not replace creativity, but it provides thinking triggers and solution patterns. When confronted with complex problems, it is not necessary to use tedious trial-and-error to find a satisfying solution. Instead, it is possible to rely on TRIZ to be guided to strong and promising approaches. [2]

Initially TRIZ was created by Genrich Saulowitsch Altschuller [3], a russian engineer for other engineers, but within the last 15-20 years its application was also expanded to non-technical areas. Successful application to existing (seemingly unsolvable) business problems, triggered the development of TRIZ for Business and

Management, which has still been actively evolving during recent years. Because TRIZ focuses on studying high-level patterns and regularities of the non-linear (inventive) evolution of technical systems, the same or very similar general patterns can be applied to non-technical systems.

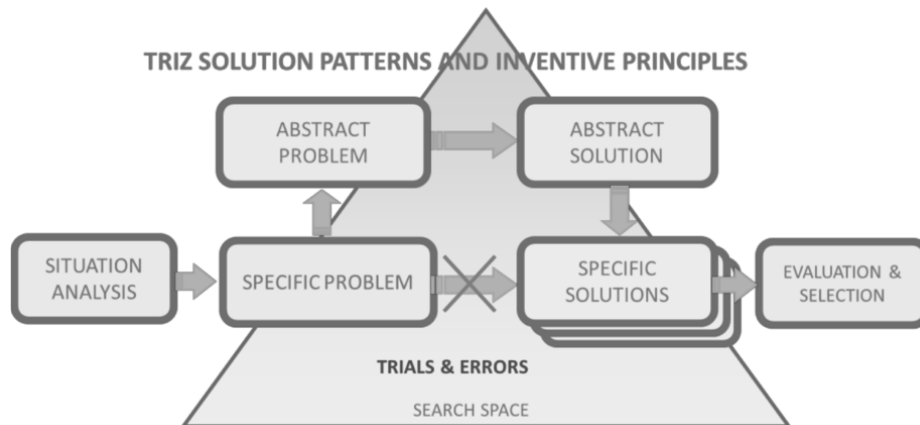


Figure 1 The general TRIZ Approach to problem solving [4]

In [5] Souchkov identifies several key reasons which make it possible to apply the principles of TRIZ to non-technical systems and in particular, business and management systems:

- “Inventive problems emerge due to conflicts of demands and none of solutions known in an industry where the problem emerged can help.
- Inventive problems emerge within systems and processes and relate to organization of and interactions between components of such systems.
- Challenges and problems are solved through transforming systems where they emerged.
- At a high level of abstraction, patterns of inventive solutions indicating how systems should be transformed appear to be common for most diverse types of men-made systems.
- General trends of innovative development (evolution) appear to be common for different types of men-made systems which might belong to very diverse domains. “

The three main approaches to TRIZ are the solving of contradictions, the concept of Ideality and the trends of system evolution. [6]

One of the earliest findings of TRIZ is that most problems are based on a dilemma or trade-off between two contradicting elements, that must be solved to find a solution. Such a contradiction results through a conflict in what we want to achieve: either two opposite states for one component (Technical Contradiction) or when improving one component worsens the state of another one (Physical Contradiction).

The degree of Ideality indicates a ratio between the perceived value delivered by a certain system, product or service and all types of expenses and investments needed to produce this value. It is used to compare two competitive systems and is defined as useful functionality of a system minus all negative factors that diminish its value, and divided by costs:

$$\text{Degree of Ideality} = \frac{\text{Value Creators} - \text{Value Reducers}}{\text{Costs}}$$

If the Trends of Evolution are reproducible, then consequently evolution is not random and TRIZ can be used to predict the future evolution of certain technologies. Instead of listening to the demands of the customers, we listen to the „voice“ of the products. By knowing which principles form the basis of the product, we can predict how it will evolve according to the Theory of Systems Evolution.

3 TRIZ Tools

Several tools and techniques were developed by Altshuller and his colleagues in the advancement of TRIZ. To exemplify some of the more popular tools (that are represented with current use cases in the *Business TRIZ Online Spring 2021* Conference [7]) are explained here, as it would go beyond the scope of this paper to name them all.

The *Function Analysis* helps to identify (hidden) interactions within a system with negative effects or insufficient performance, that may be poorly controllable, thus uncovering potential for further improvement. It makes it possible to rank functions delivered by system components and create a functional hierarchy, while establishing different levels of value delivered by system components. Valuable functions should be improved, and unimportant ones should be trimmed. An

extended version of the *Function Analysis* was adapted to deal with intangible components such as, business decisions or knowledge and information. [5]

After we have identified the contradictions in a business system, the *Contradiction Matrix* provides a systematic access to the most relevant subset of the *40 Inventive Principles*. The columns and rows of the matrix correspond to the parameters that are affected by the contradiction. The selected Inventive Principles do not offer an exact solution, but generic strategies and recommendations that have already successfully resolved similar contradictions. They still must be translated to a specific solution, that can be applied within the context of our specific problem. In the context of Business TRIZ the *Contradiction Matrix* has been updated by Mann in form and content to make it easier for users to connect it with problems in the area of business. [8]

While TRIZ on first glance can seem like a simple toolbox, the variety of tools can be placed in a systemically driven general framework and as a uniform process model, they unfold their full potential. Years ago, Eversheim noted in [8] that the TRIZ methodology does not provide a strict sequence or specific procedure in the application of the tools. However, since then, ways of structuring the toolkit have been suggested to provide some clarity on how the tools should be used.

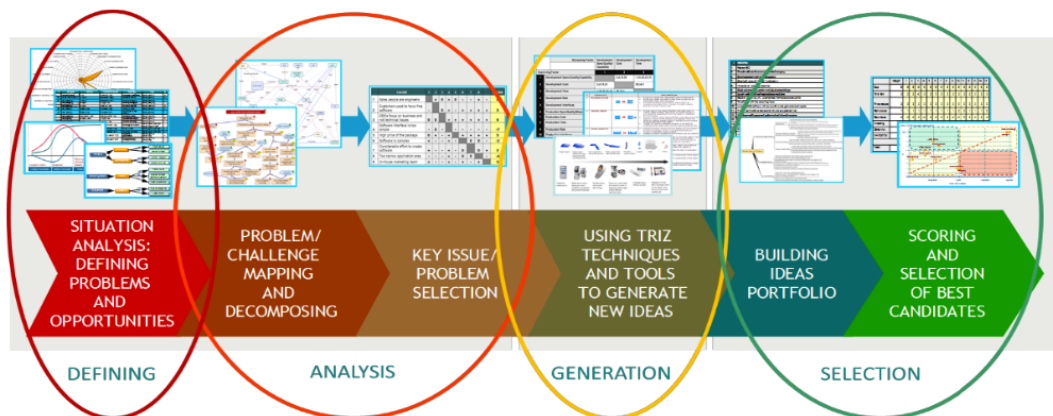


Figure 2 A typical stage-gate process with TRIZ [10]

For example, in [10] Souchkov later formulated a clear “stage-gate-process”, for dealing with every type of innovation task. It includes four main steps where each step is supported with specific TRIZ tools adapted for business innovation:

- Defining: the Preparation and Situation Analysis, where goals are identified and fixed, revision of demands and constraints is performed and project planning is established.
- Analysis: the Problem is analyzed, by using analytical tools to structure a situation, build its model, decompose a challenge identified and extract key problems which must be solved to meet the project goals.
- Generation: where a list (portfolio) of new solution ideas is generated.
- Selection: the most promising solutions are ranked and selected, and follow-up implementation problems are investigated.

4 Business Model und Business Model Innovation

Zott, Amit, and Massa note in [11] that it is not universally agreed upon what a business model is. Through a literature review, among the young and quite dispersed literature, they show that research on the topic is evolving in separate silos that are separated by the different interests of the researchers. Common themes among those are:

- business models as a new unit of analysis
- business models explaining how firms do business, in a system-level and holistic approach
- business models explaining how value is created
- encompassing boundary-spanning activities performed by firms

They propose that by merging these interconnecting and mutually reinforcing themes business models could be studied in a more unified way. Another suggestion to advance the study of business models is for researchers to help others better understand what a business model in their respective papers is meant to denote, by employing more precise concepts. This all suggests that the field is moving toward conceptual consolidation, which they believe is necessary to pave the way for more cumulative research on business models.

While the definition of business models is hard to pin down, it is necessary to talk about in a precise way that makes further research on the topic possible. Comparable to business models, there is a variety of definitions of business model innovation and a consensus in the scientific community is still lacking. But researchers generally agree that the business changes in a way that results in an

increase to the value proposition. In this study [16] the following definition was developed as a synthesis of selected definitions from the literature:

“Business model innovation changes the business model in a way that results in a measurable increase in the value proposition. The innovation of business models often does not directly affect the value proposition but is usually found in the key activities and key resources, which then influence it.”

Why is business model innovation a relevant topic in academic research? To understand how it creates and extracts value, every company needs at least one clearly defined business model and for larger organizations, it is common to have multiple business units and business models. While business models are necessary for entrepreneurs starting a company, they are also essential for established companies wishing to sustain a competitive advantage in the marketplace. The rapidly developing technology causes constant disruption to the marketplace and may render existing business models ineffective anytime. Thus, many consider the innovation of business models a key to competing in the modern economy. And the innovation is necessary at many levels of the organization and not just at the top.

Generating a new business model and successfully implementing it may come with a lot of profits. Also a new business model can be expensive and risky and executing the wrong one can mean insolvency. Depending on its implementation, the management of business model innovation can provide a firm stability or uncertainty. But knowing when or how to change a model is difficult. Business model innovation requires an iterative process and takes art and skill on behalf of the modeler. Despite the often-experimental nature of creating a successful business model, there are few dynamic methods for business model generation. The business landscape is filled with a large range of business models, but the way new models are generated and innovated are not clear. The concepts and tools to simplify and understand this environment are missing in the literature. Consequently, research on business model innovation has significantly increased.

5 Business Model according to TRIZ

In this chapter we show on what definition of a business model TRIZ bases its approach to business model innovation. In [6] Souchkov forms a conceptual basis and names structural prerequisites on which the TRIZ tools can operate. He presents

a new approach to business modelling which introduces building blocks to describe and represent business models.

According to him a business model is a broader term than a business system or a business process, which are defined and controlled by the business owners. Additionally, a business model also encompasses all the components such as external suppliers, customers, and sometimes even competitors – all parts of a supersystem that is involved in the process of capturing and delivering value. That is why business models should be analyzed within a larger context than business systems. In turn, business process models are context-independent and are used to model flows and activities arising within business systems and between business systems and components of their supersystem.

For the Business TRIZ approach to system innovation Souchkov cites the definition by Johnson, Christensen and Kagermann [12]:

"... a Business Model is a description of how your company intends to create value in the marketplace. It includes unique combination of products, services, image, and distribution that your company carries forward. It also includes the underlying organization of people, and the operational infrastructure that they use to accomplish their work".

This definition was later structured by Souchkov [12] into four groups of components that any business model is comprised of:

- "Value Proposition: value captured and offered by a business organization to the market. It can be a technical product, financial product, or any type of service.
- Profit Formula defines how a business system makes money based on delivering its value proposition. In the simplest case, it is "buy low - sell high" retail formula. Innovative business models introduce different variations of approach to sales: lease, monthly payments, credit payments, dynamic pricing, and so forth.
- Key Activities define main processes and main actions needed to create or add value and deliver it to the market.
- Key Resources are all kind of resources (labour, capital, equipment, etc.) required for successful implementation of key activities."

Later Souchkov [6] deems these four components too general and writes that they miss the business structure. He points to the business model building blocks defined by Osterwalder and Pigneur [14] as the *Business Model Canvas*. While still forming the structure of a generic business model, it is more detailed, but still compact. In their approach, a business model can be assembled through combining generic building blocks which specify the way in which the business system operates in detail. In their model they distinguish between nine building blocks:

1. Customer Segments: An organization serves one or several Customer Segments.
2. Value Propositions: It seeks to solve customer problems and satisfy customer needs with value propositions.
3. Channels: Value propositions are communicated and delivered to customers through communication, distribution, and sales channels.
4. Customer Relationships: Customer relationships are established and maintained with each Customer Segment.
5. Revenue Streams: Revenue streams result from value propositions successfully offered to customers.
6. Key Resources: Key resources are the assets required to offer and deliver the previously described elements.
7. Key Activities: all types of activities needed to perform and support the above-mentioned building blocks.
8. Key Partnerships: Some activities are outsourced, and some resources are acquired outside the enterprise.
9. Cost Structure: The business model elements result in the cost structure.

When developing a business model, each of those blocks can be filled with a specific context that is specific to the respective business scenario. It helps to capture and visualize the most vital and relevant information.

In a business model each of those building blocks is filled with its own content that is dependent on the specific type of business, service, or product it represents. Simultaneously each of those blocks can contain a generic pattern. It is possible to reuse those building block patterns across different business domains and can be seen as analogue to the physical principles in technical TRIZ. So, when the need to design a new business model or improve an existing one arrives, it is possible to choose the most fitting pattern or batch of patterns from a predefined pattern

database. One such database does currently not exist but is a topic of further research in the field of business innovation.

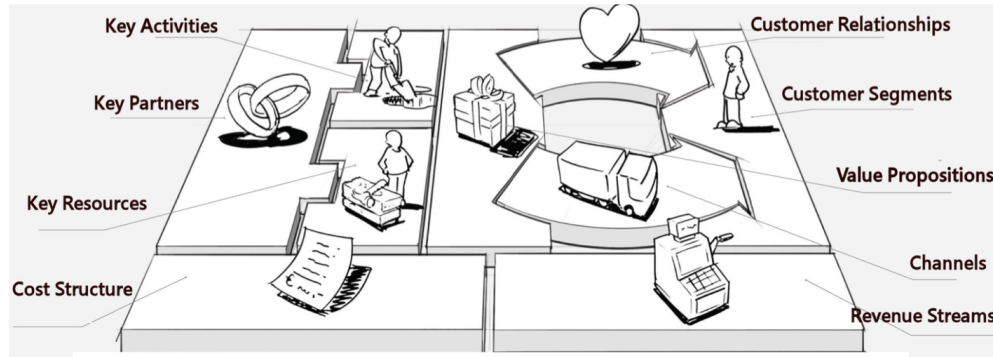


Figure 3 Building blocks of a business model [6]

On that basis, we see that innovation is possible in two different ways. One, by changing the content of one or more of those building blocks, to improve the business model in a mild or radical manner. And second by building a completely new business model out of several building blocks.

6 Business Model Innovation in Business TRIZ

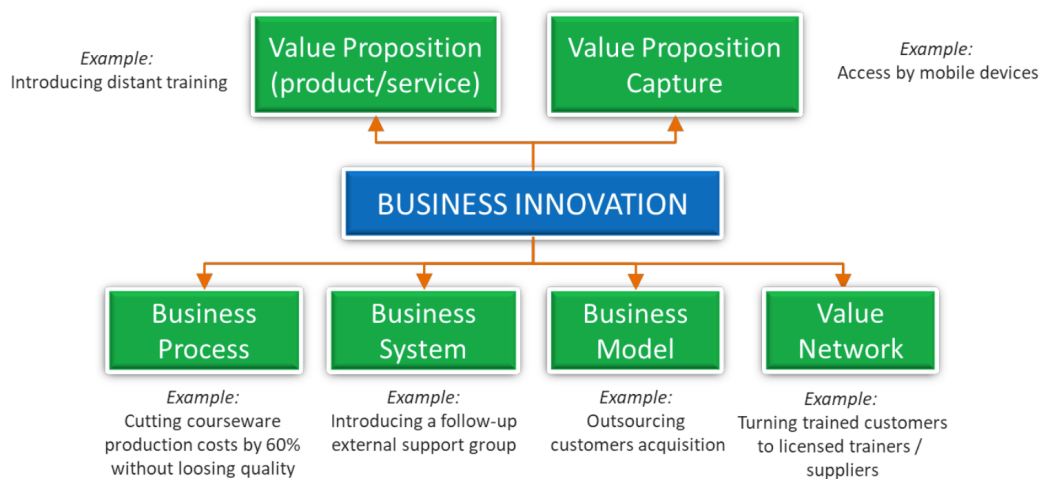


Figure 4 Business Model innovation as an important part of Business Innovation [5]

The ever-changing business environment requires continuous innovation of the ways in which we practice business and the technology involved in it. Random methods of idea generation are not efficient enough to keep pace. That is why the focus rests on finding systematic methods that support a continuous process of new

business ideas generation. Since TRIZ is a leading systematic discipline for supporting the early stages of innovation, it is only logical to explore the applicability of TRIZ to business model innovation as well.

It is important to distinguish the term business model innovation from the whole of business innovation. While Business model innovation has become very popular and is affecting all other types of business innovation it is only a part of it. Souchkov [10] differentiates between them by saying “when we consider business system/network innovation we focus on the components change while when we focus on business model innovation, we primarily change the relationships between the components of a business system and its supersystem.” In [10] Souchkov shows a list of examples for typical tasks in business model innovation and describes the possibilities of the application of key TRIZ tools and concepts such as Ideality within the context of business models.

	Typical Task	Example
1	Increase quality and reliability: reduce impact of negative factors, eliminate negative and undesirable effects, decrease fragility, volatility and variability.	Asking a community to provide feedback on the training material (for bonuses)
2	Increase performance: increase values of key performance parameters.	Introducing “full immersion” training.
3	Increase scalability.	Introducing a franchising model.
4	Increasing market size/share.	Localizing the courseware and attracting local native speakers as trainers.
5	Restructure “system-supersystem” relationships	Outsourcing courseware development to a third party.
6	Introduce new revenue streams	Reselling related products from third parties
7	Introduce new offerings.	Creating and distributing new low-cost video tutorials
8	Radically decrease cost.	Licensing new material from third parties rather than developing own materials
9	Introduce a radically new business model.	Introducing a new model of payment through royalties based on from future customer’s revenue.

Figure 5 Typical innovative tasks for business model innovation

An important role in the application of TRIZ to business models plays the concept of business building blocks explained in chapter 5, that helps translate the TRIZ methods to the components of the business model. They describe business models

clearly and in a structured way without overloading it with numerous details and make it possible to systematically assess and analyze business models with the TRIZ analytical tools and to innovatively modify existing business models or to design new, innovative ones. They help to locate and define problems, contradictions, and areas with high evolution potential. [6]

PROJECT GOAL	PREPARATIONS	ANALYTICAL TOOLS	PROBLEM SOLVING SUPPORT TOOLS	TOOLS TO EVALUATE SOLUTION IDEAS
Inventing a new business product or a new business model	<ul style="list-style-type: none"> • Trends and competitors Analysis. • Problems scorecard. 	<ul style="list-style-type: none"> • Multi-Screen Analysis (MSA). • MPV and S-curve Analysis. • Trends and Lines of Business Systems Evolution. 	<ul style="list-style-type: none"> • Lines of Evolution of Business Systems and Business Processes. • Principles of Contradictions Elimination. • TRIZ-Navigator for Business Models 	<ul style="list-style-type: none"> • Multi-criteria • Decision Matrix. • Pair Ranking

Figure 6 A selection of common phases of innovative projects, relevant for business model innovation and the TRIZ tool supporting these [5]

Business models tend to evolve according to the generic TRIZ trend of Increasing the degree of Ideality. The Ideality formula as introduced in chapter 2 applies to both business and technical systems where:

- Value Creators are all parameters, useful features and functions of a Value Proposition (product or service) which are positively perceived by the market
- Value Reducers are those features, functions, harms and any other factors that reduce the perceived value
- Costs are all direct and indirect expenses required to generate and maintain Value Creators

The higher the degree of Ideality of a specific Value Proposition within a certain segment is, the more competitive the Value Proposition will be. In turn, the degree of Ideality of a specific Value Proposition depends on the degree of Ideality of a business model used to create the Value Proposition. To increase the degree of Ideality of any business model it is possible to innovate in all three categories: Increase Value Creators by increasing the perceived value of the offerings in many

different ways. Eliminate Value Reducers by working against all harmful effects that negatively affect the perceived value of the offering. Eliminate or Reduce Costs without both decreasing Value Creators and increasing Value Reducers.

While it was claimed in earlier works that Typical Patterns of Business Model Innovation are identical to the patterns known for technical systems and already represented in the TRIZ knowledge bank, that has proven only partly true. Studies show that there are also several unique patterns specific to the business domain. Similar to technology and engineering, there are a number of universal high-order patterns of solution strategies which resolve contradictions and overcome barriers created by solutions known within the system's domain. In [15] it was tried to structure such patterns and apply them to exemplary scenarios of business model innovation to demonstrate their effectiveness.

Next to the direct approaches to use the TRIZ principles in business model innovation, over the years there have also been successful attempts to combine them with other frameworks that try to foster innovation in business. In [17] a business model innovation model based on the respective advantages of Case-Based Reasoning (CBR) and TRIZ is proposed. A structured framework for setting up a comprehensive SWOT analysis integrating TRIZ-based tools is introduced in [18] that is supposed to help define high reward areas of innovation in the early phase of planning processes. In [19] TRIZ tools are shown to contribute to the Lean canvas analysis and helping especially start-ups to accelerate a methodical innovation process of their business model.

7 Discussion and Conclusion

It has been proven multiple times that the adaption of TRIZ to Business TRIZ was successful. Souchkov reports about many promising experiences with the use of TRIZ to deal with business and management innovative challenges from different countries. [5] While the introduction of TRIZ was rather slow, compared to methods that are backed by less extensive frameworks, it is still relevant and has not vanished into insignificance. Old hurdles to TRIZ are still relevant [20], as it needs a significant amount of studying before it can be successfully applied and the original technical domains it evolved in having a different language and concepts than the business audience is used to.

Through the nature of the fast-moving field of business and management there are constantly new challenges emerging and new fields of study, like business model innovation, opening up. And that TRIZ is being applied to these new problems by researchers, shows its continued relevance in the innovation sciences. The development of Business TRIZ still proceeds and like the business landscape the methods and tools of TRIZ always need to be adapted to the current needs. There are already many successful cases of that (reformulation of inventive principles, inventive standards, ARIZ). Also, it doesn't involve inside a bubble, but is being put in combination with other current approaches, which shows its versatility.

The innovation of business models is one such exemplary area in which the work through TRIZ has been welcome and helpful but might never finished, as the constantly changing nature of the business world dictates.

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