TRIZ TOOLS USAGE FOR ADVANCED PROJECT SCOPE STATEMENT DEVELOPMENT.

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Abstract

The paper presents a TRIZ tools usage for advanced Project scope statement development. This research aims to develop a simple framework (model) that could help to faster and with better quality, produce one of the most critical and time-consuming parts in V-model or Waterfall model project management approach. To realize the authors offered to use “Dimension - Time - Cost Operator” and Thinking in Time and Scale (as well known as Classical multi-screen scheme by G.S. Altshuller). Usage of this approach shown on the HMI project, from the perspective of new HMI development for Home-automation part.
Keywords: *Dimension - Time - Cost Operator; Thinking in Time and Scale; Project scope statement;*

Аннотация

В статье представлено применение инструментов ТРИЗ для продвинутого управления проектами. Это исследование направлено на разработку простой структуры (модели), которая могла бы помочь быстрее и качественнее создать одну из наиболее важных и трудоемких частей в подходе к управлению проектами V- или каскадной моделей. Для реализации авторы предложили использовать оператор РВС и системный оператор (также известное как классическая многоэкранная схема Г.С. Альтшуллера). Использование этого подхода показано в проекте HMI с точки зрения новой разработки HMI для домашней автоматизации.
Ключевые слова *оператор РВС; Системный оператор; Проектное управление;*

1. Introduction

Accordingly Project Management Institute definition “Project scope statement” is primarily output of Define Scope Process. Development of project scope statement is a time-consuming activity and may require multiple stakeholder participation including experts from outside the organization.

Project Scope statement can include:

- Product Scope
- Project Scope
- Deliverables
- Acceptance criteria of the product
- Out of scope activities
- Constraints and assumptions

There are some reasons to have this stage as one of the most time-consuming and critical parts of the project. The 1st point is the criticality for the project. Why is this step accepted as one of the most critical? Due to the fact that there are defined final product, it’s features, technologies, constraints and assumptions. The next question is, why it so time-consuming? To describe detailed enough, to think from different system levels and point of view in un-systematic approach can take a considerable amount of time. Un-structured way to go via various features can lead to useless time usage, and high risk to miss several parts. There could be a topic which was not coming in mind to discuss.

Research question: How to increase speed of creating but not lost the quality of “Product Scope”, “Deliverables”, “Acceptance criteria of the product” and “Constraints and assumptions connected to the Product”?

2. Theoretical approach

Tools definition from TRIZ point of view will be shown in this chapter, and a practical approach with the example of usage will follow in the next chapter.

2.1. Size - Time - Cost Operator

Based on glossary of TRIZ and TRIZ-related “Terms Size-Time-Cost Operator” or “Dimensions- Time-Cost Operator (STC Operator)” is a method and a technique which proposes to reduce psychological inertia to come up with innovative solutions while solving an inventive problem by either radical increase or decrease of one of three parameters of a technical system or a material object: size, time costs.

Operator Size-Time-Cost (STC) proposed by Heinrich Altshuller. It was used in earlier ARIZ versions, in the creative imagination development course. STC Operator of different features (size, time of life or time of operation, and cost of the system) employed to overcome mental inertia in the problem definition and to solve process.

Introducing an object or process, we unwittingly associate it with specific (familiar to us) ideas. Our understanding of the object is quite rigidly related to its parameters such as size (s), time (t) and cost (C). Gradually changing these parameters of the object from given to very small and very large, we try to find critical points where the problem is solved qualitatively differently (or "behaviour" of the object in such conditions changes qualitatively). Thus, we feel the effect of the law of transition of quantity into quality.
The STC operator is a series of thought experiments that help to overcome the usual ideas about the object or process. A significant change in parameters can be used not only to reduce psychological inertia but also in various studies.

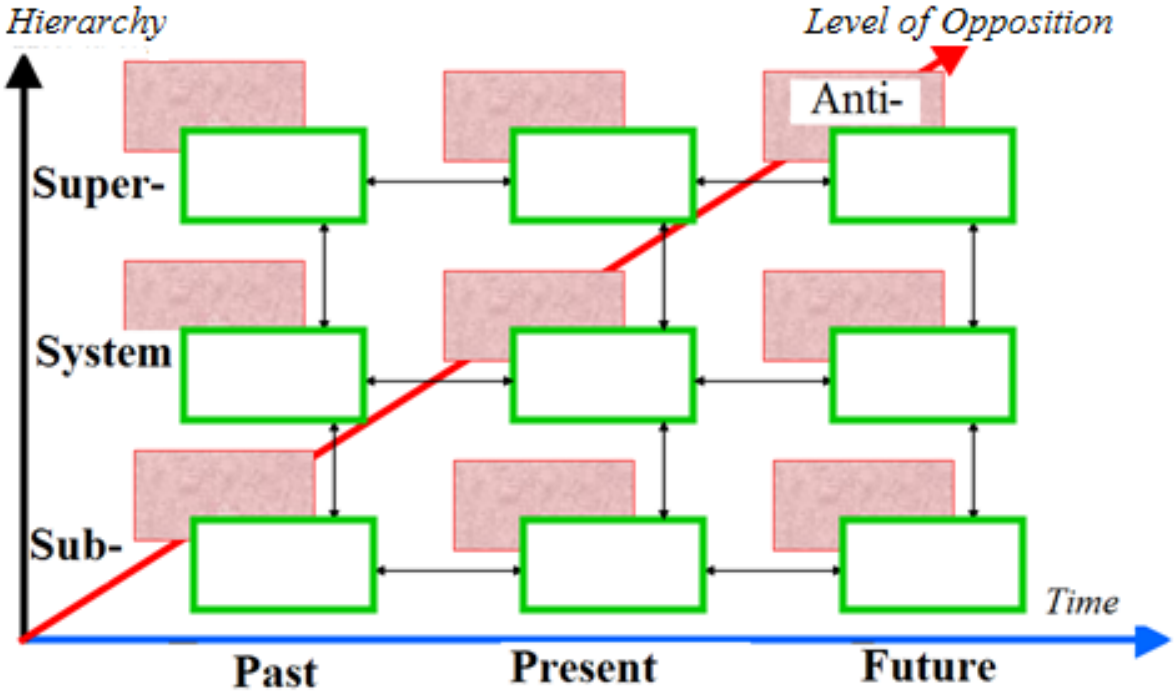
2.2. Thinking in Time and Scale

The System Operator (Multi-screen scheme) was proposed by Heinrich Altshuller. It is a pattern for the correct thinking process, to review from the big picture to the small detail and from the past to the future of the System. There are two axes - one level of the System and other is time. It contains the following analysis criteria:

- The System is the object that we are going to study or even transform.
- The Subsystem is what enters the System - its constituent parts.
- The Supersystem is a higher-level system, part of which is the object we are studying.
- The Past. How was look like the System in the past? What were its properties, capabilities, tasks?
- The Present. What is the System today? What it looks like currently? What are its functions?
- The Future. What happens to the object after a while? What exactly? Why?

Besides, Altshuller identifies such a thing as “anti-system”. It means a particular object/group of objects that in one form or another oppose the System we are studying.

This is shown in following picture:



The classical multi-screen scheme allowed to:

- Analysis of resources available within the system;
- Analysis of problems arising in the system and their link to sub-system, super-system, etc.;
- It helps to avoid the limits of 5+/-2 (psychological inertia);
- It gives the view of the problem not in isolation, but in interrelation [with other problems].

3. Practical approach and usage example

3.1. Usage of "Size - Time - Cost Operator" for product development

To use STC Operator practically, need to be risen several approaches/questions as below:

- Reflect on the intended improvements under the following 6 'unrealistic' condition.
  - Increase/decrease dimension till extreme value – what additional features problem will appear, how it could be solved.
  - Increase/decrease time of operation (cycle time) till extreme value – what additional features problem will appear, how it could be solved.
  - Increase/decrease cycle cost till extreme value – what additional features problem will appear, how it could be solved.
  - Collecting these problems and features will propose the next possible steps in development or more clearly show limit values.

On the example of HMI Interface development as home-automation part using before described, we will get:

- HMI (Human Machine Interface) development by Size - Time - Cost Operator usage
  - Big, huge interface – big screen, enough space

- Extremely small, not visible – move the interface to the user device
- Slow interface – allowed to use less powered computer
- Extremely fast interface – need to compute only necessary operation but not graphic and another interface “nice” features
- If we had an unlimited budget which maximal features we will add to this interface which still is possible to use – graphical colure interface, interaction cycles, touch screen
- If we have no budget for this interface – reuse another interface, have the interface in another device, instead of led to move the interface to the user device, and change this in Machine to machine interface.
- Result: moving to M2M interface, fast&cheap without graphical representation, graphical representation moved to the user device.

3.2. Thinking in Time and Scale usage for product development

Thinking in Time and Scale as a practical approach will lead us to raise the question as follows:

Table 1

	Past	**Present**	**Future**
Super-S		Questions from super system: Where this will be integrated What system can have interaction with this product What kind of data and how another system can have What limitation give an environment	Our prediction on how this will be changed for the next generation. This can lead to adding the next function even in the current generation or keep a possibility for this Expected environmental changes
System	Currently existing product will be the predecessor	Development object Questions from product level: For which systems this product is or can be a super system	Next generation
Sub-S		Questions from subsystems: What my subsystems can be reused in other projects How my subsystems differ from the predecessor	Expected new features of the product, Wished changes in materials, data, speed…

Applying this to HMI development this approach to HMI (as part of Home-automation) development, we can see the following results as in Table 2.

Table 2

	Present	Future
Super-S	Integration in various (Home) automation system, proprietary and open, interaction with same devices, integration with managing devices, integration with devices with can/should be managed by this device. What maximum data can we check, save, transmit. How this data can be analyzed and what outcome we will get. How will we use this outcome to adjust the current system?	What integration is on development? What are the global trends?
System	What is a new function which we can overtake? What is our function which we can overgive? What we can re-use from similar other product? (New measurement, new transmissions…)	What is a new function which we WANT overtake? What is our function which we WANT overgive? What we WANT re-use from similar other product?
Sub-S	What are the new technologies available for us? What we oblige to take to have compatibility with old solutions?	What technologies we need in the future?

4. Conclusion and Discussions

As it was mentioned in the introduction, the Scope Statement is time-consuming and critically important. To build structured approach for defining Scope Statement in enough level of detail, and don't forget to describe part of the System, authors offer to use "Size - Time - Cost Operator" and "Thinking in Time and Scale". Usage of the tools gives us the framework and typical question answering on which with Product owner Project manager and the expert can get enough detail information.

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