LOW-CARBON PROJECT DEVELOPMENT PROTOCOL (RUBIK'S CUBE SOLUTIONS) – SUSTAINABLE ENERGY AND MATERIAL MANAGEMENT

FOGARASSY, C. – HERCZEG, B. – SZŐKE, L. – BALOGH, K.

Abstract

"The Rubik's Cube can seem alive as it heats up in your hand. The fact that each face of the Cube is made of three layers of three blocks has an important meaning. The number three seems to have a particular significance, relevant in some strange ways to the relation between man and nature, creation-preservation-destruction and fossil vs. renewable energy innovations." (Ernö, Rubik, 1980). The Cube is an imitation of life itself - or even an improvement on life. The problems of puzzles are very near to the problems of energy usage, our whole energy consumption is solving puzzles. If you can solve the Cube perhaps you can find good solution to supply your energy demand on a sustainable way.

Keywords

ow-carbon economy, renewable project development, Rubik's Cube, layer-by-layer method

Introduction

The Rubik's cube was invented in 1974 by the Hungarian professor and designer Mr. Ernö Rubik. The Hungarian cube was firstly a success in the central European countries, and then it became a real triumph in the whole world, from USA to China. The object had been conceived at first in order to develop the faculties of visualization of the pupils in architecture. It turned out afterward that the educational dimension of the Rubik's Cube was much important. It is indeed a natural and material representation of some mathematical and logical principles (Goudey, 2003). The international interest in the cube began from 1980, a great number of Rubik's Cube was sold at this time. The Rubik's Cube is not only a game, the cube is a system - each face of the Cube is made of three layers of three blocks has an important meaning. Each side or component is further divided into interrelated sub-components (dices). It helps in identifying relations and dependencies across the colors and components. The cube allows simultaneous execution and quick integration and absorption of change requests across components without altering any "project" concept.

1. The Rubik's Cube Story

It took Ernö Rubik 1 month of extensive practice to resolve for the first time its puzzle. Before that, he wasn't even sure that there was a method to succeed. "This object is a wonderful example of the rigorous beauty, the big wealth of the natural laws: it is a perfect example of the human mind possibilities to test their scientific rigor and to dominate them. It represents the unity of real and beautiful, which means for me the same thing." [Ernö Rubik] (Source: Goudey, 2003).

The Cube can seem alive as it heats up in your hand. The fact that each face of the Cube is made of three layers of three blocks has an important meaning. The number three seems to have a particular significance, relevant in some strange ways to the relation between man and nature. "mother-child-father, heaven-earth-hell, creation-preservation-destruction, birth-life-death." [Ernö Rubik] (Source: Goudey, 2003).

2. The sustainable life = resolving the cube

The Cube is an imitation of life itself or even an improvement of life. The problems of puzzles are very near to the problems of life, our whole life is about solving puzzles. If you are hungry, you have to find something to eat. But everyday problems are very mixed they're not clear. The Cube's problem depends just on you. You can solve it independently. But to find happiness in life, you're not independent. That's the only big difference (Goudey, 2003).

In your work you can find different problems, you have to solve these problems, in your work you have to build up different projects and programs. If you have enough experience in the field of problem solving you can manage these challenges successfully and on an easy way. You can get experienced e.g. in project development, if you get an experience by practicing how to solve the Rubik's Cube.

2.1. Low-carbon economy concept

There is an urgent need to transition to a low carbon economy to address the global challenges of diminishing fossil fuel reserves, climate change, environmental management and finite natural resources serving an expanding world population.

The main priorities in a low-carbon economy:

- All waste should be minimized - reduce, reuse, recycle,
- Energy should be produced using low carbon energy sources & methods - renewable & alternative energy sources, fuels & sequestration,
- All resources (in particular energy) should be used efficiently - more efficient energy conversion devices, combined heat & power,
- Wherever practical local needs should be served by local production - food, materials, energy,
- There is high awareness and compliance with environmental and social responsibility initiatives - industry, commerce and individuals (LCE Ltd, 2011).

In the case of low-carbon economy it is very difficult to manage these types of requirements. We take into account the above mentioned priorities at the same time by using the Rubik's Cube protocol. This protocol is a good process to manage the sustainable development goals.

3. Rubik based software development concept from the present (RCM)

There are various software development models evolved in the industry over the years. Each model has its own advantages, limitations, and constraints. These models are often bound to some organization, which further develops, supports, and promotes the methodology. A specific development model might not be suitable for all projects. Technology, resources constraints, time to market, and rapidly changing customer needs are different factors that a Project Manager must consider to evaluate and adopt a development model for a given project cycle. The Rubik's Cube software development methodology (RCM) is a general-purpose methodology, which is extremely useful in today's software development life cycle. It is especially applicable for incremental and legacy projects. The methodology (layer-by-layer method) suggests breaking software projects into logical components integrated together with defined interfaces. Identification and naming of these logical modules (analogous to sides of Rubik's Cube) is up to the Project manager (Ajay, 2011).

Our hypothesis based on the international experiences: the rubik's cube layer-by-layer solution (the most popular solution method) is a resolving method and a low carbon project development protocol in the same time.

4. Material and methods

The project development basically is an optimalisation process, which is based on different optimalisation fields. In the case of « low-carbon optimalisation » we have selected four different components: strategic fittings, market fittings, technical fittings, financial fittings.

The four sides (red, green, blue, orange) of this model are mapped to different project components, two sides (white and yellow) of the Cube are mapped to the input and output side of our project:

STRATEGIC FIT (RED SIDE)
MARKET OPPORTUNITIES (GREEN SIDE)
FEASIBILITY/TECHNICAL DETAILS (BLUE SIDE)
FINANCIAL EFFECTS (ORANGE SIDE)
INPUTS AND RESULTS (WHITE SIDE)
OUTPUTS AND RESULTS (YELLOW SIDE)

The « low-carbon optimalisation » divides a project into multiple components, it is not always necessary for each component to interact with other four components. While communication across components is the key, it is not mandatory that each component talks to every other component directly. Sometimes the communication is achieved via an interface cable or interfacing component. Important attribution – when we are executing acceptance technical relevancies at the blue side it is not always required to view the market opportunity that generates the executable for the project. Another example could be the financial feature (liquidity), which can be used in different form and independent from the market demands (Anderson-Doig 2000). Very important system attribution is that - some components of the project development require more frequent interaction amongst then others. From this aspect is very clear why so important the three dimensional project development structure. Generally we are planning and working only with two-dimensional strategic systems. (Two-dimensional structure shows the Figure 1.)

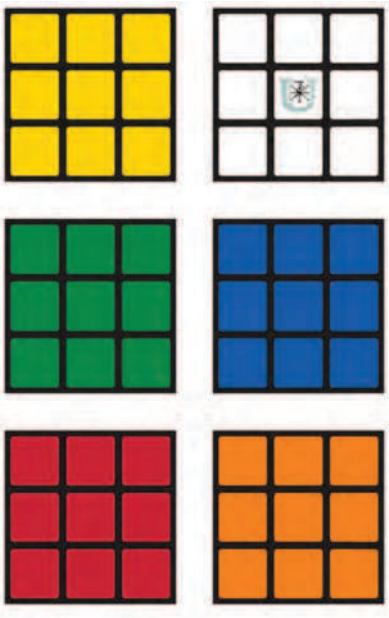


Figure 1. The two-dimensional parts of the Rubik's Cube by colours

The three-dimensional interpretation of the Rubik's Cube model will show to us the practical benefits of this project concept. For the deeper understanding the low-carbon project development protocol have to get acquainted with the meaning of the different sides.

Table 1. Meaning of sides of the Rubic's Cube

Colours	Meanings
white	INTPUTS AND RESULTS - Input requirements, market and governmental regulations to the products and services.
yellow	OUTPUTS AND RESULTS - Consumer's requirement, real value of the outputs (product and services).
red	STRATEGIC FIT – Relevant innovations to the profile, synergies and cooperation with other strategies (local /company/, sectoral, national, EU level).
green	MARKET OPPORTUNITIES - Market possibilities, position on the real and artificial market segments.
blue	FEASIBILITY - Harmony of the technological and market possibilities. Technical risks and opportunities.
orange	FINANCIAL EFFECTS - Type of finance, governmental tools, taxation, currency risk, liquidity.

4.1. Layer-by-layer method

How to solve a Rubik's Cube (standard cube (3x3x3)) is the recurrent question that we make ourselves when we see a scrambled cube for the first time. Having billions of combinations, it is nearly impossible to solve a Rubiks Cube by trial and error. There are several ways to solve a Rubik's Cube using the easiest methods for solving the cube for beginners. The simplest method of resolution for all the models, is to solve the cube by layers, beginning from the Bottom layer to the Top layer. The layer by layer method that is often used for the 3×3×3 cube is usually used on the Rubik's Revenge. One of the most common methods is to first group the centre pieces of common colours together, then to pair edges that show the same two colours. Once this is done, turning only the outer layers of the cube allows it to be solved like a 3×3×3 cube (Rubik's Revenge, 2011). In the case of layer-by-layer method we can find the analogy between the project development process and Rubik's Cube solving. On the next Figures 2., 3., 4., 5., 6., 7. you can follow the Rubic's Cube layer-by-layer solution process and the project development process in parallel. From the explanation at the Figures we can see the coherences and synergies among the project development components.

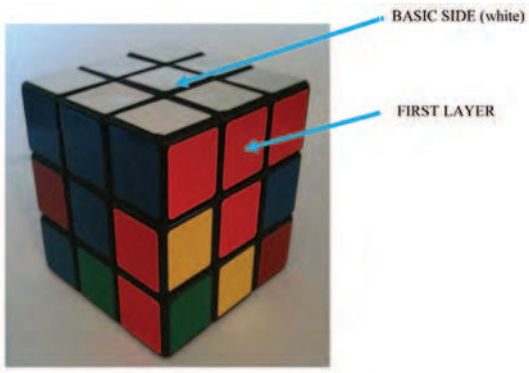


Figure 2. The first side (input side) and layer – the basis of the project development

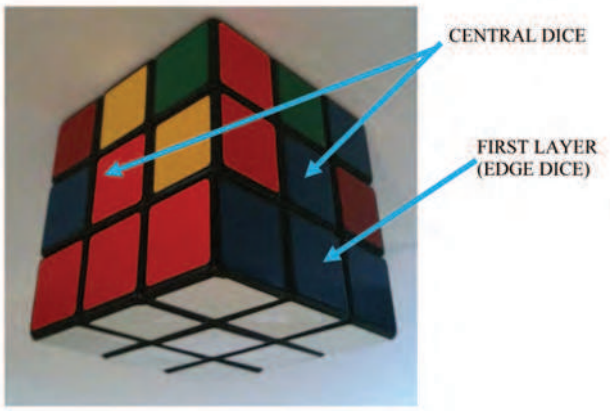


Figure 3. Central dice – it shows the coherences and structure of the project development process (the central dice is a fix point of the cube and fix character of the project component)

Each side and each dice of the Rubik's Cube harmonizes with the element of the project development. The central dices are the stabile components of the cube sides and project components. We can't move them from the original stand. The edge dices are mean coherent contact between two colours and two project attributions.

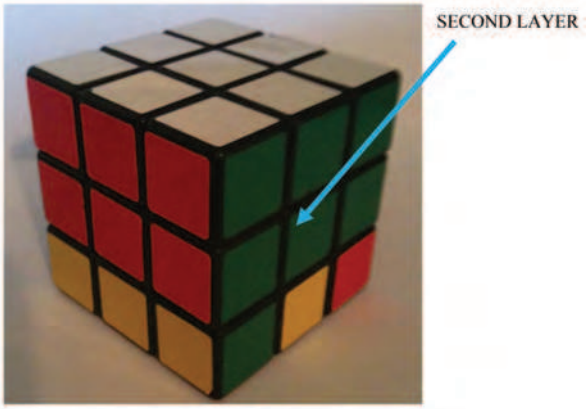


Figure 4. Above the first layer - second layer will shows the harmony among the colours and project development components

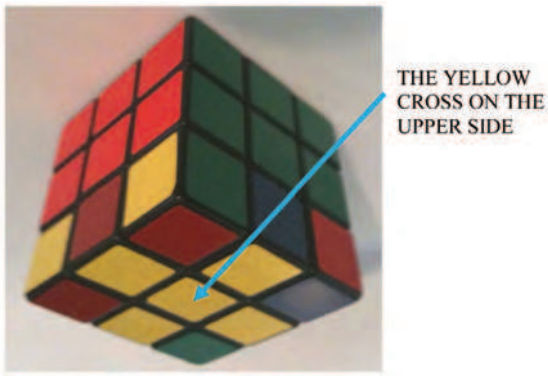
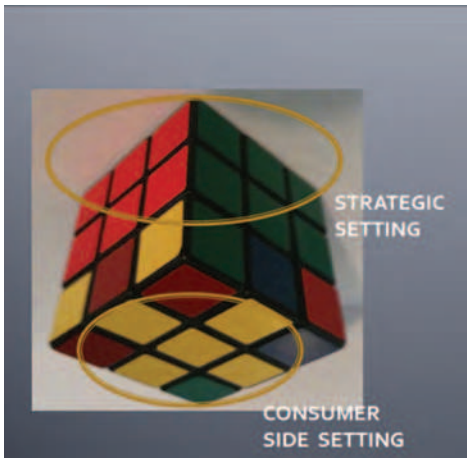


Figure 5. The mystical yellow cross

After the second layer the yellow cross on the upper side means – harmonization of the strategic targets and the consumer's requirements. In this step we have to find the final element of the final colour. The sixth colour will shows to us the right direction to the success. By this way we can find the relevant « consumer requirement » in the case of project development goals.



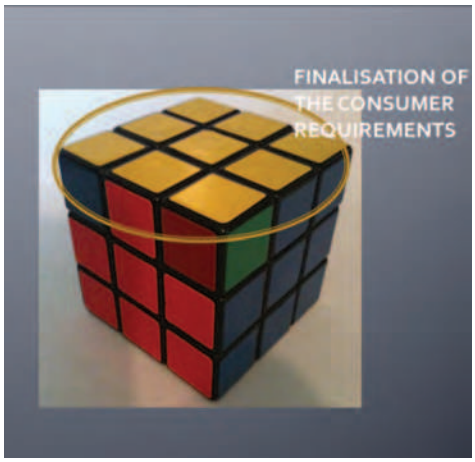


Figure 6. Strategic and consumer settings in the case of project development process

The „consumer" side fitting on the output side is the most important moment before the finalization of the Cube. Because of the sustainability the most important movement - input (white) side and output (yellow) side have to be in coherences before finalization.

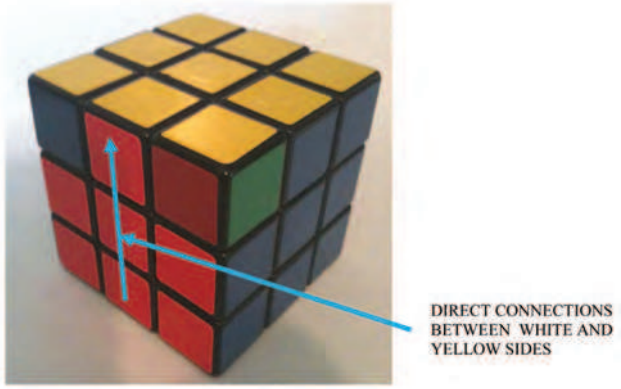


Figure 7. Creation stable contact between the input and output sides on four channels

After the harmonization between the input and output sides and requirements we have left only one engagement – to find the final element of the Cube.

Conclusions

The described "low-carbon project protocol" provides a helpful aspects of handling a sustainable project development by making an analogy to the way a Rubik's cube layer-by-layer solution. This protocol covers features like parallel development of components, identifying logical groupings of components, segregating them based on their dependencies on each other. The Rubik's Cube based low-carbon project protocol enables a project to deliver a working component even when rests of the components are not ready for a customer facing delivery.

Findings:

- Layer-by-layer solution is the model solution of the innovations – we can easy follow the innovation process step by step.
- Each side and each dice of the Rubik's cube harmonizes with the element of the project development :
  - A. central dice (stabile component of the cube side (relevant color) and project phase).
  - B. edge dice (coherent contact between two colours and two project attributions)
  - C. corner dice (very complex and complicate contact between three different colour and project phase)
- The low-carbon project development process is a parallel project protocol with layer-by-layer Rubik solution. This type of algorithm can define a special sustainable and low-carbon (minimal material and energy input) development.

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