

Workshop on Design Innovation and Creative Problem Solving, IIT, Hyderabad, India, Jan 15-17, 2015

Outline:

This workshop aims to introduce broad areas of design innovation and creative problem solving. The emphasis will be on methodologies like TRIZ, systematic Innovation and Technology Forecasting.

TRIZ theory:

- is a valid tool to support systematic innovation carried out in a scientific, repeatable way;
- aims at defining creative and inventive solutions (no compromises);
- makes it possible to break free from psychological inertia, abstracting from the reference context; makes it possible to rephrase complex problems and turn them into problems that can be faced and solved with well known, traditional solutions;
- makes it possible to define innovative solutions for the industry.

By carrying out a cascade rewriting and reformulation of the original system, employing conflict abstraction and modelling concepts, TRIZ offers the opportunity to research a solution to a problem from different perspectives and analysis levels, following a path leading to the definition of a solution.



With TRIZ, you can:

- accelerate the innovation processes;
- make research and development activities more efficient, increasing the relationship between efficient proposals and resources used;
- define a product or process that stands out among the competitors thanks to its creative and inventive content, or for the original way it uses to satisfy a customer's need.

A business process can be considered as a technical system able to generate value by manufacturing products (or delivering services) under boundary conditions, such as market demand, raw material availability and product requirements. When the process is not able to exploit the available resources according to the potential, its capability to survive market competition decreases dramatically, due to the delicate balance between benefits provided and involved costs.

Within this context, the analysis of the emerging technologies and their potential impact on markets, economies and societies requires **reliable and repeatable methods and tools** since the related information plays a critical role for strategic decisions of private and public organizations.

Additionally, there are two industrial needs:

- a) To forecast the research and development of process technologies to eliminate uncertainties, infancy

problems and related costs, and to better exploit competitive advantages in an aggressive market.
b) To focus R&D resources on those technologies, which are the most promising along three axes of evolution - technology, product and organization.

The final result of the FORMAT project was the development of an innovative Forecasting Methodology, supporting decision making in Manufacturing Industries.

Facilitators:

Prof. B Gurumoorthy, Professor, Indian Institute of Science, Bangalore

Prof. Gaetano Cascini, Professor, Politecnico di Milano, Milan, Italy

Dr. Shankar Venugopal, Director, Technology & Innovation, Cummins Inc., Pune, India

Dr. Bala Ramadurai, Co-founder, TRIZ Innovation India, Pune, India

Convenors:

Dr. Prasad S. Onkar

Dr. Deepak John Mathew

Neelakantan P.K.

Course content:

Brief introduction to Systematic Innovation:

- a. Objectives and context
- b. Main obstacles to innovation
- c. Why traditional approaches to innovation are not suitable anymore

Inventive Design and Problem Solving

- a. Essential concepts of TRIZ (Theory of Inventive Problem Solving)
 - i. Patterns of Engineering Systems Evolution
 - ii. Overcoming Contradictions as the mechanism behind technical evolution
 - iii. Applications for product and process innovation, patent circumvention, failure prevention
- b. How companies in Europe and South Korea are investing on TRIZ training and internal development
- c. Best practices in industry

Supporting R&D Decisions through Technology Forecasting

Innovation, Market and the Society, motivation and objectives of Technology Forecasting

- a. Technology Forecasting, so many methods out there, how to choose?

- b. The FORMAT Project (FOrecasting and Roadmapping for MAnufacturing Technologies)
 - i. Identifying the forthcoming problems of our technical systems
 - ii. Envisioning scenarios of evolution through the TRIZ patterns of evolution
 - iii. Quantitative trend extrapolation
 - iv. Case studies

Q&A, summary and conclusions

Inventive Design and Problem Solving

Topic 1: Essential Concepts in Inventive Problem Solving

- How to represent in a conceptual map the state of a technology and the potential directions of investigation? Network of Problems
- How to perform big picture thinking by thinking in space and time? System Operator (9 windows)
- The definition of function and classification of functions (Useful Function, Harmful Function, Resources)
- Ideality = Useful Functions / (Harmful Functions + Resources)
- How to perform root cause analysis in a simple manner? 5Whys
- How to question the problem? Do it the journalist way - 5W + 1H

Topic 2: Case Studies from Industry

Applying Inventive Problem solving - Workshop using examples

A facilitated team activity

Supporting R&D Decisions through Technology Forecasting

Topic 1: Some Methods of Technology Forecasting

- How to gather expert opinions and elicit their knowledge? Expert elicitation methods (Delphi)
- How to perform trend extrapolation using logistic models, growth and substitution for predicting the next big bet?
- How can we combine qualitative and quantitative methods of technology forecasting? FORMAT
- How can we envision the future and share the vision reliably with your peers? Scenarios

Topic 2: Case Studies from Industry

Applying Technology Forecasting concepts - Workshop using examples

A facilitated team activity

Envisioning workshop/session;

Registration:

For TEQIP Universities/ Institutes/ Colleges: **Free Registration**

For Non-TEQIP Universities/ Institutes/Colleges: Rs. 3500/-

The registration includes Registration kit, tea coffee during the sessions and lunch on all the three days of the workshop.

Contact:

Convenor,

Organising Committee,

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