"TRIZ Fundamentals" Summer Course

10-Day (80 hours) Hands-on Training Course and Certification

July 8-19, 2019
University of Twente, Enschede, The Netherlands

Principal Trainer: Valeri Souchkov, M.Sc, certified TRIZ Master
Assistant Trainer: Tom Vaneker, Ph.D

SYNOPSIS

A main goal of this unique intensive 80-hour hands-on course is to learn and master skills with modern TRIZ and Systematic Innovation for Technology and Engineering in order to increase creative and innovative productivity and performance of organizations and individuals. The course focuses on learning how to use the TRIZ paradigm and its techniques for solving problems arising in products and technologies and generation of new ideas and solutions. The course provides understanding of principles and fundamentals of systematic innovative thinking and techniques of systematic innovation and puts them in practice. The acquired skills help the course participants to resolve conflicting demands in a “win-win” way, maximize the use of resources, innovatively improve systems and processes, and invent new products and technologies. In addition to learning about philosophy, key concepts, process, techniques and tools, the participants acquire the basic practical skills of working with advanced TRIZ and Systematic Innovation techniques during the course, which help to extract root conflicts, resolve contradictions, identify and model system relationships, and apply the Trends of Technology Evolution to identify evolutionary potential of business systems and propose new innovative ideas. The course also includes xTRIZ additions to TRIZ to make problem formulation and solving processes more consistent and effective. xTRIZ is a practical framework developed by ICG T&C, which extends classical TRIZ. It has been tested at numerous real cases worldwide which have proven its effectiveness. The course contains different examples to better understand the nature of TRIZ and its thinking methodology and make it applicable to a large variety of problems, products, and technologies. The course introduces unique material developed by the author of the course and not available yet from any other sources apart from the parties with licenses from ICG T&C. During the course, the participants work on real-life projects. The course is official and introduced by the Twente University as a part of educational curriculum. Since 2010, this course is open to general public.
GOALS OF THE COURSE

- Understand and learn principles and fundamentals of advanced TRIZ and Systematic Innovation.
- Learn and master skills with techniques of xTRIZ and advanced TRIZ.
- Learn how to apply the techniques to real situations concerning improvement of the existing products and technologies as well as inventing new generations of products and services.
- Acquire practical skills by working on real-life projects.

TARGET AUDIENCE

- Bachelor Industrial Engineering and Mechanical Engineering students and M.Sc students in any engineering discipline of the University of Twente.
- Students of similar disciplines of European Universities.
- Engineers and R&D professionals, innovation professionals, new product and technology development professionals, technology managers, new business development managers, technology executive officers, Six Sigma specialists, technical creativity and innovation trainers and facilitators, consultants, lecturers.

Previous experience with TRIZ is not required.

VALUE OF THE COURSE

- The course participants will become capable of solving most difficult inventive problems arising within their area of competence. Such skill brings tremendous value to a problem solver due to considerably shortened time for finding solutions and guided search towards most effective solutions.
- The course participants will be able to use the course materials and acquired skills in their own practice.
- Knowledge of TRIZ positively affects short and long-term benefits that can be obtained by the problems solvers and their organizations due to the acquired ability to quickly and systematically search for new solution ideas and develop new generations of products and services.

STRUCTURE OF THE COURSE

Each training day (except the first and last days) is split to three parts:

- Selected presentations of practical assignments performed by the participants.
- Lectures on a new subject.
- Practical assignments using the material from the lectures.

COURSEWARE

The courseware includes the course slides, the course book “Guide to TRIZ and xTRIZ Techniques” with TRIZ and xTRIZ techniques as well as various reference materials, the book “TRIZ: The Right Solution at the Right Time”. Additional books can be available. All courseware (except third-party books) will be also made available in electronic form for individual use by each participant during and after the course.
COURSE OUTLINE

- Modern view on innovation, innovation triggers and sources, evolution of products and technologies via innovation.
- Place of TRIZ in a modern innovation process. TRIZ as a theory for innovation front-end and as a collection of tools and techniques to support correct problems formulation and new ideas generation in a systematic way.
- Understanding systematic product and process evolution via innovative problems discovery and solving. Development of products and technologies towards the highest degree if ideality.
- Psychological inertia and its role in the development of innovative thinking skills. Fighting psychological inertia.
- Introduction to contradiction-driven technology evolution and problem formulation.
- Definition of an Inventive Problem. A process of solving inventive problems.
- Roadmap to the basic and advanced TRIZ techniques.
- **Problem Percepcion Mapping** technique for positioning of an inventive problem. Innovation Situation Questionnaire to formulate a selected inventive problem.
- **Root Conflict Analysis (RCA+)** technique for problem analysis by contradictions identification, mapping and ranking.
- Practice with **Root Conflict Analysis (RCA+) on real-life inventive problems**.
- **Contradiction Matrix** and **40 Inventive Principles** techniques for systematic contradiction elimination.
- Practice with **Contradiction Matrix and 40 Inventive Principle on real-life inventive problems on real-life inventive problems**.
- **TRIZ-based Function Analysis** technique to model functional interactions within a product or a process to discover a full set of problems and challenges which can be used for innovative improvement of a selected product or technology.
- Practice with **TRIZ-based Function Analysis of products**.
- **Trimming technique**: increasing benefits/costs ratio of products and processes.
  - Practice with **TRIZ-based Trimming Technique**.
- **TRIZ Catalogues of Scientific Effects**. Function-based of scientific effects to create and develop disruptive innovations.
- **Substance-Field Modeling** to build abstract models of problems.
- **System of 76 Inventive Standards**: a structured collection of practical techniques on eliminating negative and improving positive effects within products and processes.
  - Practice with **Substance-Field Modeling and 76 Inventive Standards**.
- Models of systematic products and technology development. Analysis of innovative potential of technical systems.
- **Feature Transfer**: A technique to create breakthrough innovations by transferring alternative systems features.
- **TRIZ Trends of Products and Technology Evolution** and specific patterns of evolution with examples.
  - Practice with the **TRIZ Trends of Evolution of Products and Technologies**.
- Introduction to **ARIZ (Algorithm of Solving Inventive Problems)**: logic of ARIZ, explanation of major concepts, structure, and working principles, resolving physical contradictions, fighting mental inertia. Problem solving process with ARIZ on the basis of specific example.
- **Ideas evaluation, selection, and landscaping**.
- Overview of additional tools of TRIZ and xTRIZ: Anticipatory Failures Analysis, Super-Effect Analysis, Multi-Screen Analysis, Creative Imagination Development, TRIZ Implementation aspects.
CERTIFICATION

Upon successful completion of the course, each participant will be awarded with the “TRIZ Practitioner (Advanced Level)” certificates issued by the University of Twente in affiliation with The TRIZ Training International Centre and signed by Valeri Souchkov, co-founder of the European TRIZ Association (ETRIA). B.Sc and M.Sc EU students successfully completing the course will also obtain 3 European Credits. In addition, participant will receive a certificate of the International TRIZ Association (MATRIZ) Level 2 on demand.

PRINCIPAL TRAINER

Valeri V. Souchkov, M.Sc, Certified TRIZ Master, is internationally acknowledged innovation and TRIZ expert, developer and trainer certified by G. Altshuller (the founder of TRIZ). He pioneered professional TRIZ activities in Western Europe and USA and has experience with delivery of TRIZ and Systematic Innovation services worldwide since 1989. He trained and assisted professionals of more than 200 customer organizations including Capgemini, DSM, DuPont, ING, LG Group, Orange, Reckitt Benckiser, Philips, Posco, Sekisui, Shell, Siemens, Thales, TNO, TNT Post, Vredestein, Unilever, Watson Marlow; as well as universities and government agencies. In total, he trained more than 6.000 professionals in TRIZ and Systematic Innovation. Valeri also a lecturer of TRIZ courses at the University of Twente in Enschede, visiting faculty member of TiasNimbas Business School in Tilburg, and invited lecturer on TRIZ of several other universities worldwide. In 2000 he originated and co-founded the European TRIZ Association (ETRIA), and was Vice President of the International TRIZ Association (MATRIZ). Valeri is editor of the Proceedings of TRIZfest International Conference, author and co-author of 4 books and more than 100 publications including journals and conference proceedings.

GENERAL

- Training will be conducted at the University of Twente campus, "Horst" building, in Enschede, The Netherlands.
- The course will run on business days. The weekend (Saturday-Sunday) is free.
- A training day lasts at least 8 hours including lunch and breaks. Usually the training day starts at 09:00 and finishes around 17:30, with a lunch break from 12:30 to 13:45.
- The second half of each day (except the first and the last days) will be spent by doing practical assignments in groups, therefore the groups might select their preferred location.
- During the course, the participants learn by working on their own projects. It is desired that the participants bring their own problem(s) to the course provided the information can be disclosed publicly.

LANGUAGE

The course is conducted in English.

FEES, TERMS AND CONDITIONS

- For a non-student participation, the full course fee per seat for the 80-hour (3 European Credits) course is EUR 2,400 (excluding 21% Dutch Value-Added Tax, EUR 504). This fee applies only to those participants who do not have an official student status within the European Union.
• 21% Value-Added Tax (VAT) should be paid by organizations located in the Netherlands as well as EU organizations which do not have registered VAT number, and all non-business organizations independently of residence. Paid VAT can be later reclaimed in full from the Netherlands Tax Authorities by residents located outside the European Union.
• 30% discount is available for full-time staff members of non-profit educational or academic organizations and full-time international students.
• For a non-student participation, 10% discount is available in case of early registration (before May 01, 2019).
• Payment should be done on the basis of the invoice sent to a registered participant by ICG T&C after registration. Term of payment is two weeks from the date of the invoice.
• Officially registered students of the European Universities should contact us as soon as possible for financial details.
• Price covers: full participation in the course, the course materials and handouts, as well as 3 months after-course "Questions and Answers" support, certificate.
• Accommodation and travel expenses are not included to the course fee and are arranged by each participant independently. There is a selection of B&B places and hotels close to the campus. Prices range from EUR 40 (B&B) to EUR 70-120 (hotels) per night. Please contact us for further details.
• Full payment of the course fee prior to the starting course date is obligatory.
• Payment of the course fee by non-student participants will be based on an invoice issued by ICG T&C upon registration. Payment term is two weeks since the date of the invoice.
• Note that a total number of participants as well as percentage of non-student participation is limited. Therefore we advice you to make your definite reservation as early as possible.

CANCELLATION

• If participation in the course is cancelled by a customer one month before the course starting date, ICG T&C provides 100% refund of the total amount of fee(s) paid by a customer. Otherwise ICG T&C retains 20% of the paid fee.
• If the course is cancelled by ICG T&C or the University of Twente, ICG T&C guarantees full refund of the total amount of fee(s) paid by a customer within two weeks after cancellation announcement unless it is explicitly agreed otherwise with a customer.

MAINTENANCE AND SUPPORT

• The course fee includes 3 months of free “Questions and Answers” support by ICG T&C by phone, fax, or e-mail.
• During the first 6 months after the last day of the course, ICG T&C expert might be available to the customer’s organization for additional training, consulting, or coaching for total up to 5 days with 20% discount of standard ICG T&C rates.

FOLLOW-UP SERVICES

For non-student participants, the follow-up services might include:

• Training of different groups and teams within a customer organization.
• After-training individual and group coaching.
• Assistance with Innovative Projects, facilitation of working sessions.
• Assistance with corporate-wide TRIZ and Systematic Innovation implementation.
FURTHER USE AND APPROPRIATE LICENSING

The course content learned and the courseware obtained during this course might be used by the customer organization and the course participants without limitation both internally as well as externally in their any work activities which are not related to training on subjects of TRIZ, xTRIZ and Systematic Innovation. However, to use the course content (except which is in a public domain) and courseware for independent training activities (both internal and external), a relevant accreditation and license(s) should be requested from ICG T&C.

COPYRIGHTS

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REGISTRATION

A link to registration is located at: http://www.xtriz.com/summercourse.htm

CONTACT AND FURTHER INFORMATION

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The University of Twente is a fully accredited international entrepreneurial research university with 3.300 scientific and educational staff and over 10.000 students of more than 70 nationalities. It is located in Enschede, The Netherlands.

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### Two-Week Summer Course on TRIZ Fundamentals for Technology and Engineering

**Day 1:**
- **Goal:** Understand basics and key principles of TRIZ: evolution, contradictions, ideality, problem solving.
- **Content:** Inventive tasks and levels of solutions, Psychological inertia and barriers to strong solutions, Triggers of innovation, Systematic approach to ideas generation, TRIZ background and key principles of Systematic Innovation, Systems evolution via contradictions resolution, Key principles of problem solving, Criteria of “right” solutions, Use of Resources, Ideality-Value Formula and Ideal Final Result.
- **Practice:** Building a multi-screen diagram, defining driving and current contradictions.

**Day 2:**
- **Goal:** Understand and learn RCA+ (Root Conflict Analysis).
- **Practice:** Practice with problem perception mapping, building RCA+ diagram of the problem, Identifying contradictions with RCA+, ranking contradictions and selecting problems.

**Day 3:**
- **Goal:** Understand, learn and practice Contradiction Matrix and 40 principles and evaluation techniques.
- **Content:** 40 Inventive Principles: innovative problem solving strategies and recommendations, Contradiction Matrix for systematic access to 40 Inventive Principles, Generating ideas with 40 Inventive Principles, Idea combinations and building on Ideas Portfolio, Different versions and limits of Contradiction Matrix, Ranking and landscaping the ideas generated.
- **Practice:** Practice with customer projects: solving specific problems extracted from RCA+ with 40 Inventive Principles, and generating Ideas Landscape.

**Day 4:**
- **Goal:** Understand, learn and practice with Function Analysis, Scientific Effects, and Trimming.
- **Content:** Function Analysis: system modeling on the basis of functional interactions, Discovering existing and potential problems and challenges from functional system models, Comparative Ranking and selecting problems to solve, Catalogues of Scientific Effects, Functional hierarchy and Rules of Functional Idealization (Trimming).
- **Practice:** Practice with application of a system of inventive standards to solve problems and generate new ideas to innovatively improve systems.

**Day 5:**
- **Goal:** Understand, learn and practice Substrate-Field Modeling and a System of 76 Inventive Standards.
- **Content:** Substrate-Field Modeling and Analysis, Substrate-Field Resources, System of 76 Inventive Standards, Evolutionary structure of the system of 76 Inventive Standards: link with Trends of Technology Evolution, A tree and navigation among 76 Standards, Problem Solving with Inventive Standards.

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**Week 2**

**Day 6:**
- **Goal:** Learn TRIZ-based Theory of Systematic Technology Evolution, Learn Functional Evolution.
- **Content:** Technology Evolution models: S-curve, Bell-Curve, change of parameters of value, investment decisions, Evolution towards local ideality and adaptive variation of technologies and products, Laws of Technology Evolution, Functional Evolution: Understanding how different systems evolve their functionality.
- **Practice:** Identification of S-Curve transitions and change of main parameters of value during analysis of a selected system evolution, Analysis of functional evolution of a system.

**Day 7:**
- **Goal:** Understand and getting an overview of a system of TRIZ Laws and Trends of Evolution.
- **Content:** Process of Evolution Forecast and Innovation Roadmapping, Evolutionary Potential Analysis and radar plots to explore product’s evolutionary potential, Improvement Ideas Generation with Technology Evolution Trends and Lines, Evaluation and landscaping for innovation roadmapping.
- **Practice:** Exploring evolutionary potential of a selected system and generating radically new ideas through application of lines of evolution to a selected subsystem.

**Day 8:**
- **Goal:** Understanding and learning basics of ARIZ-85C (Algorithm of Solving Inventive Problems).
- **Content:** Introduction to the logic and philosophy of ARIZ (Algorithm of Solving Inventive Problems), Explanation of problem modeling and solving parts of ARIZ: Problem modeling, Mini-project, Conflict Diagrams, Dealing with psychological inertia, Resource Analysis, Technical and physical contradictions, Ideal Final Result (Parts 1-5 of ARIZ-85C), Case walk through ARIZ with a real problem.
- **Practice:** Practice with the problem modeling and problem solving parts of ARIZ.

**Day 9:**
- **Goal:** Performing the course project.
- **Content:** Performing a course project on development of new innovative solutions on the basis of the material learned during the course and using the TRIZ techniques, Coaching of the groups performing the course project.
- **Practice:** Performing the course project by process with TRIZ from situation analysis to ideas generation and evaluation.

**Day 10:**
- **Goal:** Finalize course project. Learn about the use of TRIZ in real world, Discussions.
- **Content:** Finalizing the course project, Contemporary TRIZ, versions of TRIZ, TRIZ Supporting Software, Aspects of TRIZ use and implementation, Integration of TRIZ with other methods (QFD, DFSS), Discussions, questions and answers.