Project: FOTONIKA-LV

Unlocking and Boosting Research Potential for Photonics in Latvia – Towards Effective Integration in the European Research Area

Grant agreement no: 285912

Reports on three strategy planning and technology foresight workshops

WP4 - Knowledge Transfer and Research Training: Organization of Conferences, Courses and Workshops

Deliverable Number: D4.13

Public

Version 1.0

30.04.2015.

Section 0 Change Control

Version #	Date	Author
0.1	**15.04.2015**	**Dina Bērziņa**
0.2	**26.04.2013**	Sandra Smalina
1.0	**26.04.2013**	Arnolds Ubelis

Change History

Version 0.1 – Structure / Table of Content

Version 0.2 – Draft of the Deliverable

Version 0.3 – input from / approval by / …

Version 1.0 final release

Version 1.1 final version

Release Approval

Name	Role	Date
Dina Bērziņa	WP Leader	
Sandra Smalina	Quality Manager	
Arnolds Ubelis	Project Manager	

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Introduction

During the planning process following objectives were set for the Work package 4 related to Photonics foresight organization:

Objectives:

1) Organisation of 3 strategy planning & technology foresight workshops to contribute to the development of national RTD and innovation policy in the photonics domain;
    - ❖ Photonics technologies in Baltic countries;
    - ❖ Biophotonics;
    - ❖ Long-term policy and capacity building for photonics RTD in Baltic courtiers.

Two visits from Fraunhofer Institute for Systems and Innovation Research took place with participation of Dr.Kerstin Cuhls. She visited Riga in May 2013, to introduce FOTONIKA-LV participants with foresight concept. Kerstin Cuhls presentation is attached in Annex 1. She was invited speaker of the 1st regional workshop on strategy planning and technology foresight "Photonics, Quantum Sciences and technologies in Baltic countries", which took place in Riga in October, 2015.

The involvement and very supportive approach of Dr.Kerstin Cuhls was real success for the FOTONIKA-LV community as an opportunity to learn from top level world wide known expert who is assisting foresight processes in the world largest economies. This is an asset of the project which is supposed to be used to sustain foresight learning process of FOTONIKA-LV and to incorporate foresight in democratic decision making process in the country. Foresight up to now isn't used at all as an effective instrument supporting the development in the University and in Government level institutions.

Sustainability of contacts with Fraunhofer ISI will be ensured for coming years as well basing on personal scientific contacts and project by project base as well.

Kerstin Cuhls has been working at the Fraunhofer Institute for Systems and Innovation Research ISI in Karlsruhe since 1992 as a scientific project manager. She took her degree in Japanese studies, sinology and business administration at the University of Hamburg. In 1993 she was seconded for four months to the National Institute of Science and Technology Policy (NISTEP) in Tokyo, Japan, to assist in setting up a scientific cooperation. In 1997 she was awarded a PhD at the University of Hamburg (Japanology) on technology foresight in Japan.

From 2006 until 2007 Kerstin Cuhls fulfilled the intra-departmental, cross-cutting function of a foresight coordinator in ISI. From 2008 until 2010 she was Head of the Business Area „Futures Research and Foresight". From 2011 to 2012 she was Professor for Japanology at the Ruprecht Karls University in Heidelberg, Center for East Asian Studies, where she taught amongst others Innovations in Japan, Management of International Enterprises in Japan or Time Concepts in East Asia.

Kerstin Cuhls had teaching assignments on "Innovation Policy and Management in Japan" at the University of Bremen, in 2009 on "Innovations in Japan: Actors, Topics, Policy" at the Ruprecht Karls University, Heidelberg, and, at the end of her interim professorship, on "Demographic Change and its Implications in Japan and Germany". Since 2010 she has been teaching in the Masters program „Futures Research" at the FU Berlin.

From 2007 until 2009 Kerstin Cuhls was project manager of the BMBF Foresight Process. She now manages follow-up projects and is involved in the second cycle. She already coordinated the German foresight studies Delphi '93, Mini-Delphi 1995, Delphi '98 and monitored the BMBF

Futur Process, inter alia as "scientific secretariat" for both evaluations by an international committee. Kerstin Cuhls teaches in various seminars on priority-setting, foresight and Delphi methods (UNIDO, ESTO/EU, others) and works in different regional, national and international foresight projects, as well as in a comparison between Japanese and European innovation policy. She is involved in several Advisory Boards (institutions, journals).

FOTONIKA-LV project manager assistant Sandra Smalina were seconded to Fraunhofer Institute for Systems and Innovation Research to strengthen cooperation and to study Foresight process organisation and implementation.

During the project implementation, FOTONIKA-LV became informal member of the *FP7-PEOPLE-IRSES- project GA-2011-294959-IFA –" International Foresight Academy*" coordinated by Austrian Institute of Technology.

Two FOTONIKA-LV participants (Sandra Smalina and Ojars Balcers) were invited to 2013 Summer School: «Future studies and foresight as an instrument for public engagement in policy making for a complex and uncertain future».

1. The 1st regional workshop on strategy planning and technology foresight - "Photonics, Quantum Sciences and technologies in Baltic countries"

AGENDA

Time: ***October 9 – 11, 2013.****, Wednesday-Friday*

Venue*: Institute of Atomic Physics and Spectroscopy (Association FOTONIKA-LV , Šķūņu 4. auditorium, 4. floor., Old Riga*

Chair: **A. Ubelis (chair)** (www.lu.lv/FOTONIKA-LV)

Wednesday, October 9

Arrival

14.00 – 14.20 *Welcome addresses representing Estonia, Lithuania and Latvia*

14.20 – 14.40 ***Dr. A.Ubelis, Dr.A.Ekers***
Needs of strategy planning and technology foresight for photonics and quantum technologies domain in the region

14.40 – 15.30 **Dr. Kerstin Cuhls.** Lecture on EU and wordlwide experience

15.30 – 16.00 Coffee break

16.00 – 17.00 **Dr. Kerstin Cuhls and Co** Lecture on Basics of Foresight

17.00 - 17.45 **Dr.A.Puga (LV),**
Insight in Foresight activities in Estonia, Latvia and Lithuania

17.45 - 18.00 **Summary of the first day**

18.00 – 19.30 **Come together coffee event and small poster session**

Thursday, October 10

10.00 - 16.00 **Training: Foresight Methodology**
Option (possibly 2-3 non EU partners (CA, South Korea, Argentine, Ukraine) from Foresight academy IRSES project can contribute)

19.00 – 21.00 **Social event**

Friday, October 11

10.00 - 15.00 Strategy planning and technology foresight in Latvia and in Lithuania and in Estonia. Efforts to design roadmap

15.00 - 16.00 **Finalisation**

Goals of the seminar were:

- To introduce FOTONIKA-LV community, photonic industry representatives and governmental institutions representatives with essence of the foresight and its potential in future planning;
- To define existing situation main problems for photonic industry;
- Make road mapping exercise for one of photonic sub-sectors.

Planned outcomes of the seminar were:

- Photonic community introduced with foresight main principles;
- Listed photonic sector problems and challenges;
- Listed sectors where photonics is part of the industry;
- Defined sector with the largest photonic usability and created 1st draft of science and technology roadmap for photonic opportunities.

RESULTS OF THE FORESIGHT WORKSHOP

Presentations attached in Annex

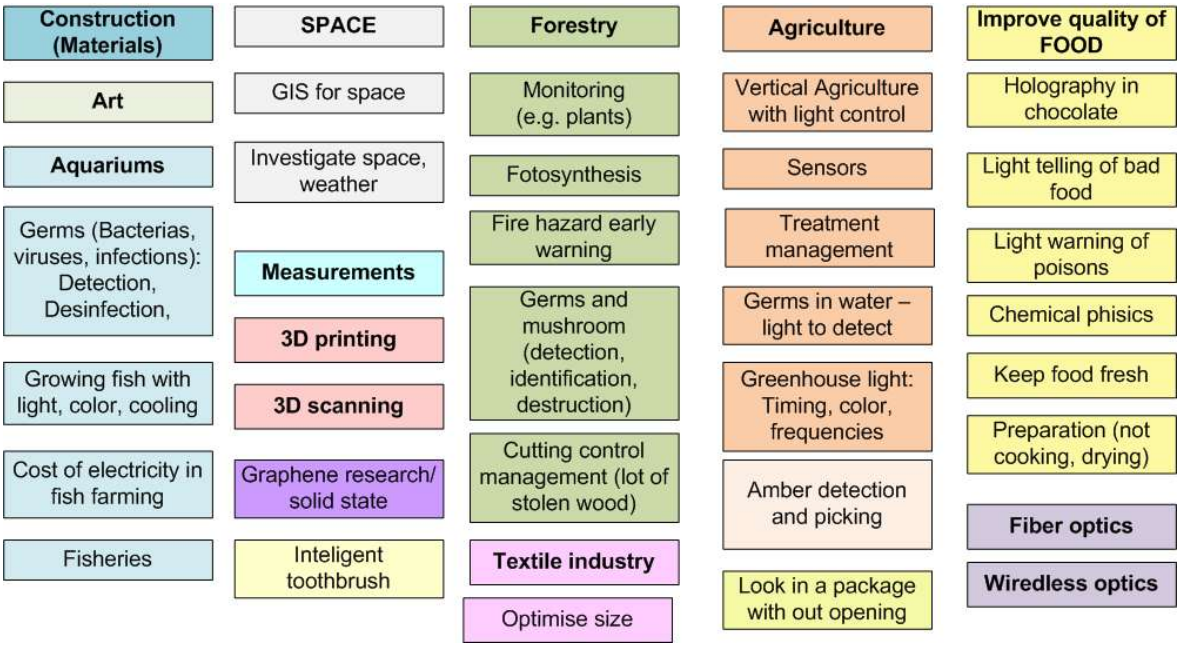


Figure **1**. *Group work - Usage of Photonics in different industries*

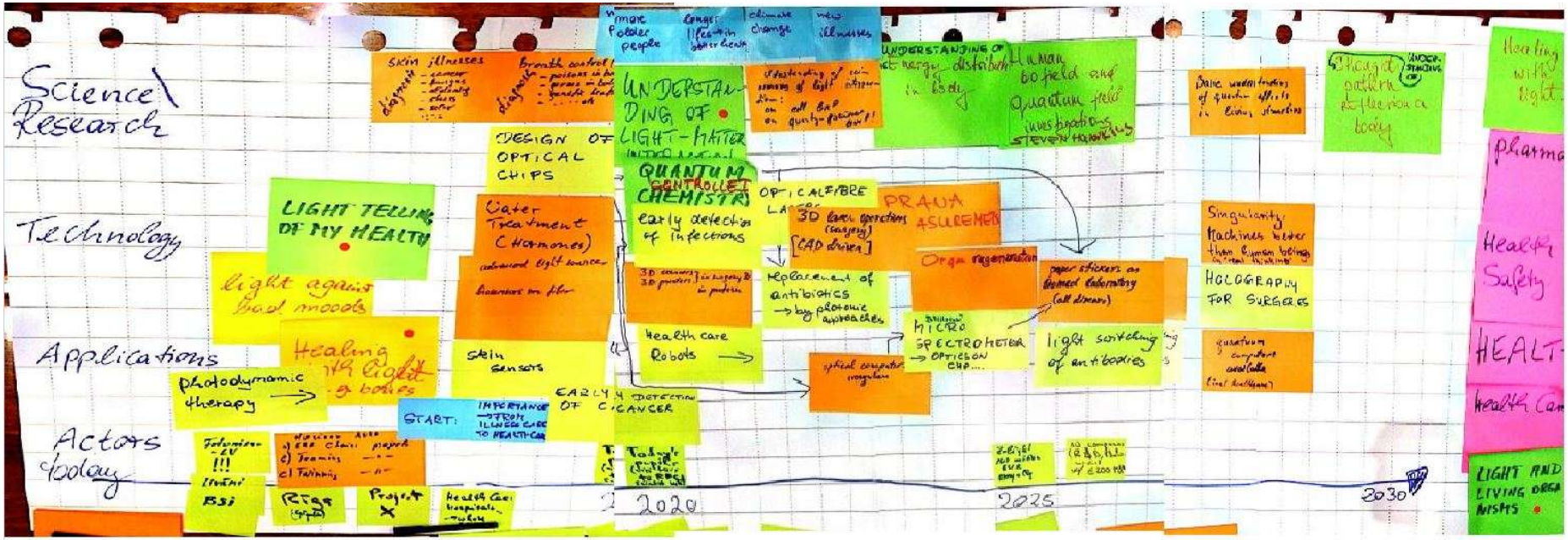


Figure **2**. *Biofotonics roadmap – seminar outcome*

During the sessions the following crucial stages for the organisation of future foresight events were identified

1) Planning phase to:

- Identify context and problems;
- Set aims and desired outcomes;
- Provide analysis of situation and stakeholders circle;
- Set plans how to achieve aims and outcomes within the right format of the seminar (different types of social communication formats can be used to contact stakeholders);
- Ensure public participation to reach common understanding of challenges and problems;
- Ensure information circulation and plan for public engagement.

2) Participatory phase could be divided into more stages and variety of participation methods can be used.

3) Concluding phase: Systematisation of results, dissemination among participants.

2. The 2nd workshop on strategy planning and technology foresight – "Vision statement for FOTONIKA-LV"

Aims of the workshop were:

1. To formulate VISION statement of FOTONIKA-LV for 2050.
2. To identify common statements within the different groups and discuss conflicting statements.
3. To identify and to define action fields and most important characteristics for the Vision

The 2nd Workshop was organised in three sessions were:

- 1st session was dedicated for formulation Vision statement 2050
- 2nd session - to complete action fields For Vision characterisation
- 3rd session – to complete characteristics for Vision implementation.

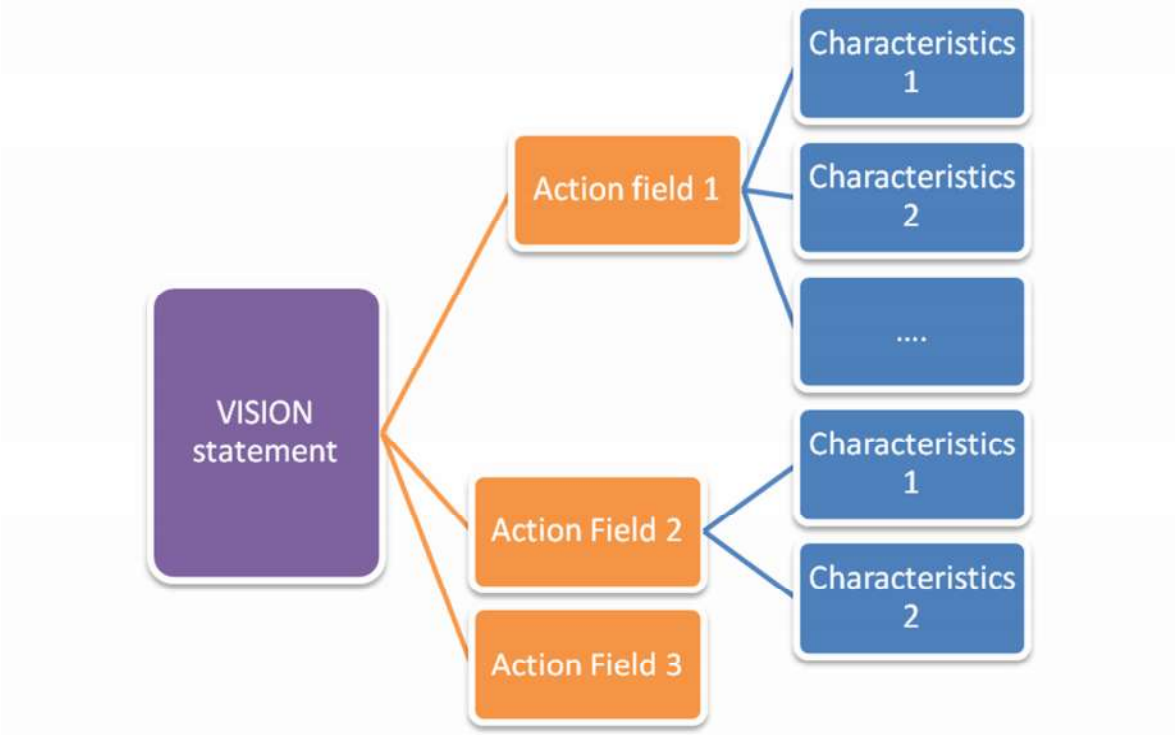


Figure **3**. *Foresight structure*

1. Formulating FOTONIKA-LV Vision statement 2050.

Samdra Smalina presented FOTONIKA-LV vision development methodology and organisation. The presentation is attached in the annex 5.

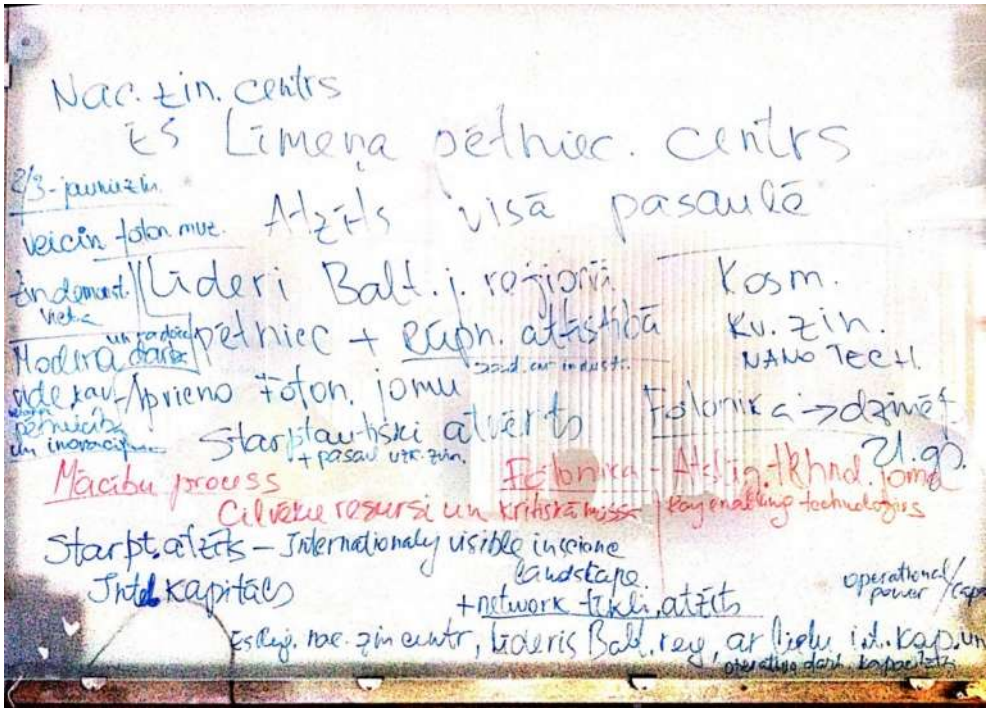


Figure **3**. *Foresight structure*

RESULTS OF THE FORESIGHT WORKSHOP

FOTONIKA LV VISION-2050

NSC FOTONIKA-LV is an internationally arecognised, open, multidisciplinary national photonics research center with significant research capacity in quantum science, space science and related technologies that provides a modern working environment for research, innovation and training processes, and that is a leader in the Baltic States in photonics research as well as in collaboration with industry.

VISION ACTION FIELDS AND CHARACTERISTICS OF FUTURE FOTONIKA-LV

Action fields	Characteristics – Description of positive developments and features (from perspective in 2050)
PUBLIC AND POLITICAL	Presence in policy Visibility Capacity to influence policy Stable finance flow from state
RESEARCH, INNOVATION AND LEARNING PROCESS	Visibility, demand and competitive quality in European Research Area Active presence of young scientists Languages International cooperation Innovation marketing, management Defined field: Photonics and specifically quantum sciences, space sciences (including astrophysics) and related technologies
INDUSTRIAL TECHNOLOGY AND INDUSTRY	Active support to local industry and research driven SMEs specifically and large scale collaboration with industry in EU and world wide IPR assets and commercialisation Persistent advances in quality and quantity Excellence – capacity and competence to use worldwide available scientific and technological knowledge for Latvia
VALUES	Loyalty of Personnel Knowledge Excellence in science and technologies Scientific methodology Academic freedom Education Influence on society Corporate responsibility towards sustainable development
MODERN CREATIVE WORK ENVIRONMENT	Technical infrastructure ensuring the best available productivity for RTD activities and up to date work conditions "Critical intellectual mass" - quantitative and qualitative Esthetical working environment Research community covering 3 generations (young 17-34, middle 35-50, experienced >51)

Public and political

Presence in policy

Visibility

Capacity to influence policy

Stable finance flow from state

Research, innovation and learning process

EU competitive quality

Active presence of young scientists

Languages

International cooperation

Innovation marketing, management

Defined field:

biotechnologies, informatics, nano technologies, cognitive technologies (training centers, excessive machine, bio impulse), critical technologies

Industrial technology and industry

Collaboration with industry (Local and international)

Commercialization

qualitative and quantitative development

Creativity

Excellence

A competence to use worldwide scientific and technological knowledge for Latvia

Patent

Values

Personalitie

Knowledge

Excellence

Scientific methodology

Academic freedom

Education

Competitive natural sciences

Influence on society

Sustainability

Corporate responsibility

Modern creative work environment

Technical infrastructure

"critical intellectual mass" - quantitative itative

Esthetic work rooms

Functionality

Up to date work conditions

Participation of 3 generations (young iddle 35-50, experience >51)

3. Foresight meeting on technology development using TRIZ methodology

Various reasons and obstacles did not allow performing initially planned foresight activities. Therefore to compensate that, the opportunity was used to recruit Dr. Alexander Narbut (Ukraine) during February – April 2015 in the REGPOT project to give contribution to innovation development of FOTONIKA-LV. A.Narbut is a Master (Expert) in Methodology of Inventive Problem Solving TRIZ (*see CV below)*. He holds more than 35 patents *(for example, created in Samsung*) and has more than 30 years' experience in innovation development. A.Narbut gave more than 16 full day lectures on TRIZ methodology which included the technology planning (foresight).

Figure 4. A. Narbut giving lecture in Association FOTONIKA-LV in April 2015.

TRIZ is a methodology of innovative problem solving created in 1950ties-1980ties in Soviet Union and later used in industrial companies all around the world. TRIZ can be used to solve technical problems, scientific problems, and social problems and to obtain results that are patentable. TRIZ contain its own methodology for the development of systems and technology. These trends for the development of system can be used to develop system in this direction and also to plan the development.

TRIZ has 4 main methodologies (tools) how to plan the development of systems:

1. Using S-curves of development.
2. Using Laws of development.
3. Using Systems of Standards.
4. Using trends of Development.

TRIZ says that under the name "systems" there are technical systems and also other systems, for example, management systems. Therefore advices on predicting the development of systems are advices on the development of the technology and on the management (for example, on technologies in the research laboratories, and on management of the scientific institute).

1. Using S-curves of system development.

Systems are developing in a way of S-curve. The main parameter "I" evolves during time t according this curve.

Stage 1 – the system is starting to develop;

Stage 2 – the system is developing rapidly;

Stage 3 – the development of the system is decreasing;

Stage 4 – the system is not developing, even starts to decline.

When system comes to stage 3, the development is decreasing, and a new system B is starting to be developed that realizes the same function, but is based on new technical or physical principle.

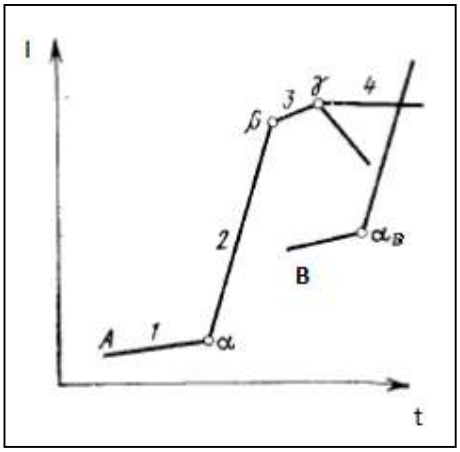


Figure 5. The S-curve of the system.

The evolution of various parameters during the development of the system can be seen in Figure. We can see that the number has two peaks – when the system enters to rapid development and when the decline is starting. The level of inventions decreases during the time with the next peak at the moment when the system enters to rapid development. The profit of the system has the highest peak when the system is developed to the highest level.

These trends of the development can be as guidelines for the development of the system. For example – if we see that only low level inventions appear on the certain system, then it predicts that the system is in decline region. Or – when we see that the system is only in the first stage, then to come the rapid development, the system needs some high level invention.

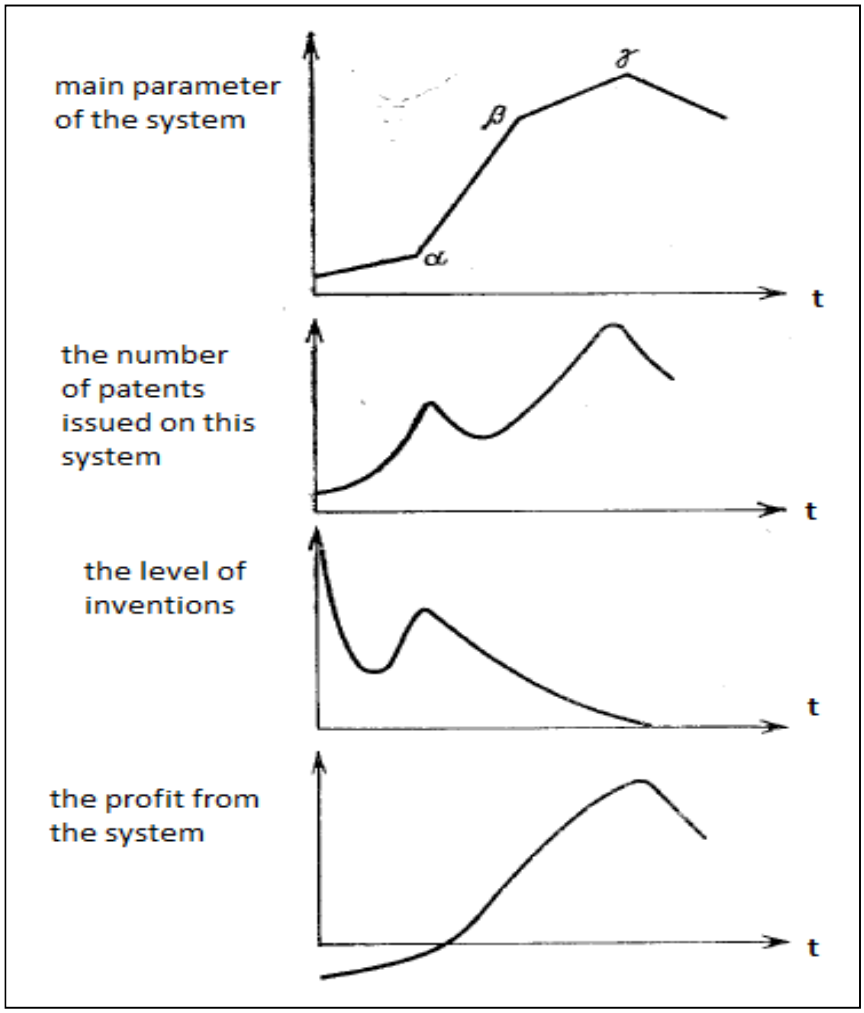


Figure 6. The description of the system during the development

2. Using Laws of development.

TRIZ has so called "Laws of the development" for technical systems. These laws gives advices on directions for successful development of systems. These laws can be used to predict the development of the certain system.

For technical systems there are laws of viability (G.S.Altshuller named their laws of «statics») and actually laws of development (laws of «kinematics» and «dynamics»).

Laws of viability:

1. The law of completeness of parts of system.

The Necessary condition of basic viability of technical system is presence and the minimal serviceability of the basic parts of system.

2. The law of «power conductivity» systems.

The Necessary condition of basic viability of technical system is through pass of energy by all parts of system.

The Important value has consequence from this law: That the part of technical system was controlled, it is necessary to provide power conductivity between this part and controls.

3. The law of the coordination of rhythmics of parts of system

The Necessary condition of basic viability of technical system is the coordination of rhythmics (frequency of fluctuations, periodicity) all parts of system.

Laws of development of systems:

4. The law of increase of a degree of ideality of system

Development of all systems goes in a direction of increase of a degree of ideality.

All elements of system are superseded to a subsystem, and functions – to supersystem.

It is the main law of development of systems. Other laws «provide » its action.

5. The law of non-uniformity of development of parts of system

Development of parts of system goes non-uniformly; the more difficultly system, the more non-uniformly development of its parts.

6. The law of transition to supersystem

Having exhausted opportunities of development, the system is included to supersystem as one of parts; thus the further development goes already at a level of supersystem.

7. The law of transition from a macrolevel to a microlevel

Development of working bodies of system goes to macrolevel, and then at a microlevel.

8. The law of increase a degree of vepoling

Development of technical systems goes in a direction of increase of a degree of vepoling.

Non-vepol systems aspire to become as vepol.

In a vepol systems development goes in such directions:

Mechanical fields pass to electromagnetic;

The degree of dispersiveness of substances is increased;

The number of connections between elements is increased;

«Responsiveness» between elements is increased.

Researches show, that practically all laws of development of technical systems are feasible also for other systems. Only it is necessary to take into account specificity of systems in one of items of the

law 8. Instead of «Mechanical fields pass to electromagnetic» (that typically for technical systems) is allowable to specify – «the degree of controllability fields is increased».

3. Using Systems of Standards.

TRIZ has some standards for solutions to certain schemes of the problem. These standards shows solution principles to these problems and also some next steps for the development of the systems. Now the system of standards has such structure:

The Class 1. Construction and destruction of vepol systems.

The Subclass 1.1. Synthesis of vepols.

The Subclass 1.2. Destruction of vepols.

The Class 2. Development of vepol systems.

The Subclass 2.1. Transition to complex vepols.

The Subclass 2.2. Forcing up of vepols.

The Subclass 2.3. Forcing up by the coordination of rhythmics.

The Subclass 2.4. Fepols (in a complex-forced vepols).

The Class 3. Transition to supersystem and to a microlevel.

The Subclass 3.1. Transition to be-systems and to poly-systems.

The Subclass 3.2. Transition to a microlevel.

The Class 4. Standards for detection and measurement of systems.

The Subclass 4.1. Roundabout ways.

The Subclass 4.2. Synthesis of measuring systems.

The Subclass 4.3. Speeding up «measuring» of vepols.

The Subclass 4.4. Transition to fepol's measuring systems.

The Subclass 4.5. A direction of development of measuring systems.

The Class 5. Standards for application of standards.

The Subclass 5.1. Features of introduction of substance.

The Subclass 5.2. Introduction of fields.

The Subclass 5.3. Use of phase transitions.

The Subclass 5.4. Features of application vepols.

The Subclass 5.5. Experimental standards.

The specific description of each standard can be found in TRIZ literature (for example, in Альтшуллер Г. С., Злотин Б. Л., Зусман А. В. Поиск новых идей: от озарения к технологии (теория и практика решения изобретательских задач). — Кишинев: Картя Молдовеняскэ, 1989.; the original TRIZ literature is in Russian)

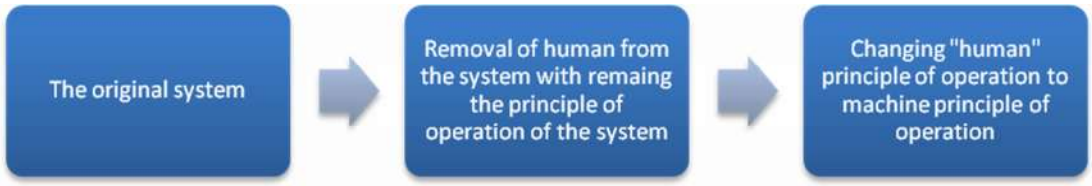
4. Using trends of Development.

TRIZ has some trends of the development of the system (see: Альтшуллер Г. С., Злотин Б. Л., Зусман А. В. Поиск новых идей: от озарения к технологии (теория и практика решения изобретательских задач). — Кишинев: Картя Молдовеняскэ, 1989.).

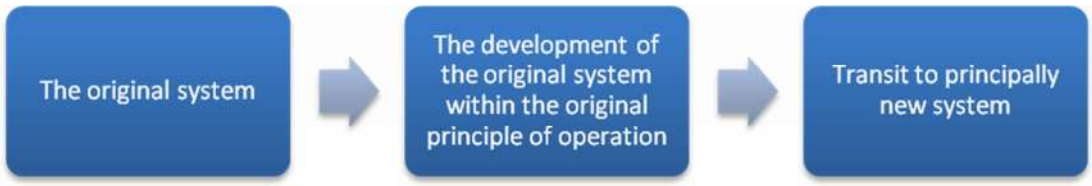
Some of these trends are:

1) Stages of the development of the System

2) Removal of human from the technical system

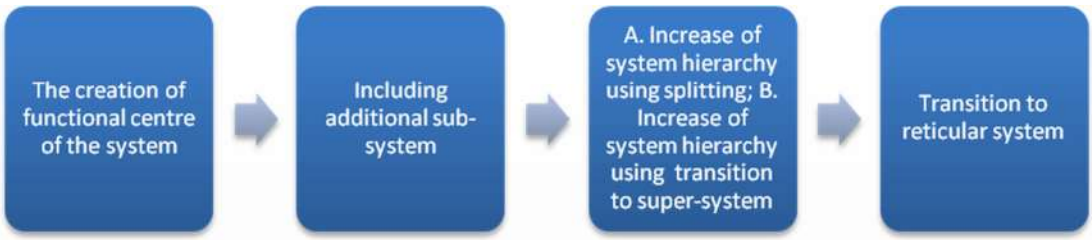


3) The increase of ideality of the system

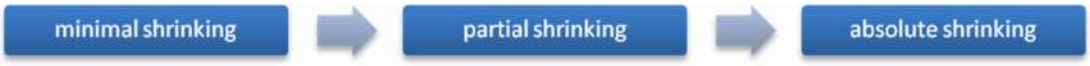


4) Expanding and shrinking of the system

Expanding of the system

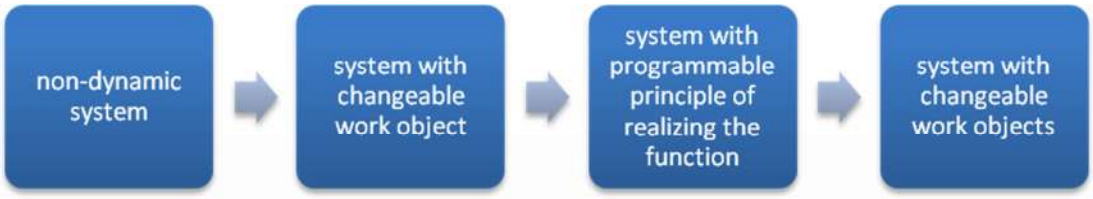


Shrinking of the system

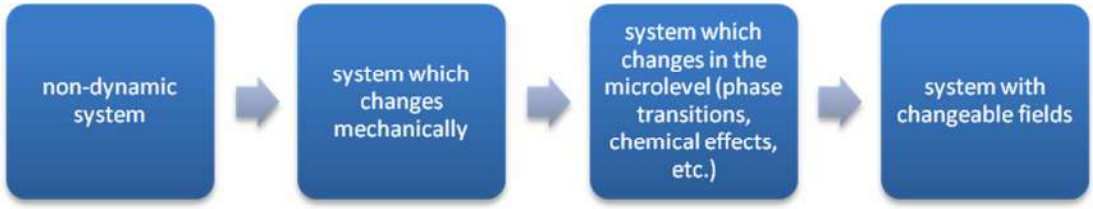


5) The increase of dynamics and conductivity of the System

Transit to multi-functionality



The increase of levels of freedom



In lectures A.Narbut described also the general schema of dealing with certain project (see Figure), when using various TRIZ tools. The description of this scheme was useful for understanding the general process of successful innovative project realisation.

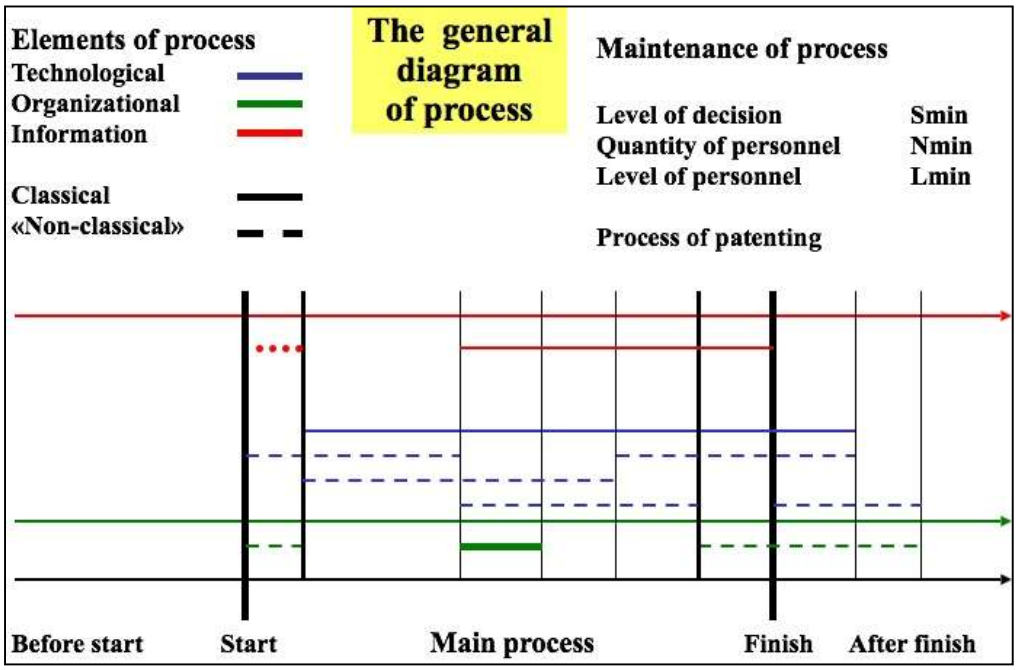


Figure 7. The general diagram of using TRIZ during the realization of the project.

As the summary of the work, A.Narbut published 2 books (RUS and ENG edition, each about 150 pages) on TRIZ methodology for scientists in FOTONIKA-LV and other.

Figure 8. Books published by A.Narbut on innovation methodology TRIZ. The publication supported by REGPOT project

Report in the abstract book.

A.Atvars, A.Narbut, TRIZ knowledge for FOTONIKA-LV, The FOTONIKA-LV conference "Achievements and Future prospects", 23-24th April 2015, Book of Abstracts, University of Latvia, Latvia.

Two books by A.Narbut published:

- A.Narbut ed. Classical TRIZ. Project's manual. Short Russian Editing, University of Latvia, 2015, 162 p.

- A.Narbut ed. Classical TRIZ. Project's manual. Short English Editing, University of Latvia, 2015, 144 p.

CONCLUSIONS

Despite persistent efforts of the FOTONIKA-LV team to initiate foresight mentality in the decision making process at the University of Latvia and on state level the overall aim is far to be reached. Much more favourable attitude and more financial and human resources are needed to develop national wide strategies and policies in the domain of photonics at national and Baltic regional scale in order to support relevant resource effective high added value industry development and accordingly to facilitate intellectual investment in sustainable development of the region.

The reason behind the situation is clearly stated by TECHNOPOLIS experts in 2014 in their report on evaluation of Latvian RTD system:
Latvia. Innovation System Review and Research Assessment Exercise: Final Report, TECHNOPOLIS, April 20, 2014
(http://www.cfi.lu.lv/fileadmin/user_upload/lu_portal/projekti/cfi/Citi_dokumenti/Starptautiskais_izvertejums/Methodology_of_the_assessment.pdf)
From page 37:

> *The difficult financial climate, short-term planning within the state, insufficient administrative capacity and the low political priority of innovation and research and a heavily bureaucratic tradition all make it hard to implement research and innovation policy in Latvia. ....*

From page 38 of the same report explains why the success of excellent national research structures has been neglected by the state and by university decision makers and administration

> *... But the most powerful reason behind these issues of implementation seems to be a lack of political commitment to the idea that research and innovation are important drivers of development and growth....*

The FOTONIKA-LV team has challenging tasks ahead but still will continue to build on the outcomes of REGPOT project and following it's corporate mission will sustain its activities in raising awareness on foresight methodology at the University of Latvia and nation-wide.

4. Annex. CV`s

Curriculum Vitae

Personal Information		
	Name: Alexander (Theodor)	Surname: Narbut
	Nationality: Ukraine	Marital Status: married
	Children: 6 children	
	Registered Home Address: 26 – 60, Ladozka Str., Zaporizhia, 69121, Ukraine	
	What field you are trying to apply in Turkey: TRIZ for technology, TRIZ for education, TRIZ for management and social processes	

Keywords (please, choose one or two most adequate areas for your professional activities and type them here):
TRIZ

Education History					
University / Department	**Period** MM.YYYY to MM.YYYY	**Major** * Key word, accurately	**Degree**	**Graduation Year** MM.YYYY	**Thesis**
Classical TRIZ*OTSM Laboratory (COMCON*TRIZ International, Korea University for Technology and Education)	09.1998 till now	TRIZ, Mathematics. System Researches	***Doctor of Sciense Professor***	09.2010 registered 01.2011 registered 08.2011	Contemporary Classical TRIZ - Science About Evolution of Technical Systems
TRIZ Laboratory of G.S.Altshuller	09.1975 to 09.1998	TRIZ	***TRIZ Master***	registered 09.1998	
National Technical University, Zaporizhia, Ukraine (USSR)	08.1976 to 06.1986	Radio-design	***Magister***	registered 06.1986	
			Bachelor		
State Engineers Academy, Zaporizhia, Ukraine (USSR)	08.1969 to 04.1973	Semiconductors			

Professional Experience (Job Career)			
Total years of experience			
Organization	**Period** MM.YYYY to MM.YYYY	**Position**	**Describe your responsibilities including role in detail**
FRT corporation (COMCON*TRIZ International, Narbut TRIZ School), Ukraine	09.1975 till Now	President and scientific director	TRIZ for researchers, TRIZ for using, TRIZ for education
Science and Practical Center TRIZ of Academy of Science of Ukraine	09.2011 till Now	CEO	TRIZ for researchers, TRIZ for using, TRIZ for education
National Technical University, Zaporizhia, Ukraine (USSR)	04.1977 to 08.1986	Engineer	The engineer of science-researcher department
Plan of Semiconductors, Zaporizhia, Ukraine (USSR)	09.1975 to 04.1977	serviceman	The serviceman for special technology equipment
State Engineers Academy, Zaporizhia, Ukraine (USSR)	08.1969 to 04.1973	student	The student of semiconductor's faculty

Research & Development Project (main)			
Organization (Univ. or Company)	**Period** MM.YYYY to MM.YYYY	**Subject / Title**	**Describe your responsibilities including role in detail**
Kiev Polytechnic Institute, Ukraine Classical TRIZ*OTSM Laboratory	09.2010 till Now	Education, Consulting and Researcher of TRIZ	The Scientific Head
Korea University for Technology and Education	05.2008 to 08.2011	Education and Consulting TRIZ Project	The Head of Project
Milano Polytechnic University, Italy	08.2009 to 04.2010	Education and Consulting TRIZ Project	The Head of Project
Agency of Innovation, Latvia	10.2007 to 06.2010	Education and Consulting TRIZ Project	The Head of Project
Agency of Innovation, Changwon, Korea	01.2005 to 08.2006	Education and Consulting TRIZ Project	The Head of Project
Korea TRIZ Association	04.2004 to 03.2005	Education and Consulting TRIZ Project	The Head of Project
Samsung Electronics	04.2002 to 04.2004	TRIZ using, TRIZ education, TRIZ researchers	The Engineer-researcher
National Institute of Strategy Studies, Ukraine	09.1994 to 10.2001	Consulting Project	The Head of Project

Winning Awards / Grants / Prizes / Scholarships (main)		
Month and Year of Winning	**Place / Detail**	**Title**
02.1981	Moscow, USSR	Prizes of Government Committee of Science and Technics of USSR
05.1981	Kyiv, Ukraine	Prizes of Union of Journalists of Ukraine
06.1981	Kyiv, Ukraine	Prizes of Ministry of Higher Education of Ukraine
		FRT corporation (COMCON*TRIZ International) is founder of TRIZ Price since 2003.

Publications (Most Relevant)	
Title	**Journal / Proceedings**
Classical TRIZ*OTSM. Practicum Patent's Examples	Handbook. Ukraine, 2012.
TRIZ. History of the Instruments	Handbook. Ukraine-Korea, 2006 (also 2008, 2010, 2011, 2012), Latvia, 2008, 2010).
Projections of Economy	Handbook of TRIZ information found. Ukraine-Korea, 2005.
TRIZ. From start to stars	Handbook of TRIZ tasks. Ukraine-Korea, 2004 (also 2008, 2010).
More 300 TRIZ publications total	*From 1975 till Now*

Patents		
Subject	**Applied No./Date**	**Registered No./Date**
A COMPOSITE COOKING APPARATUS	KR20050052082 (A)	2005-06-02
Also published as:	EP1536670 (A1)	
	US2005115959 (A1) US7026587 (B2)	
	JP2005166630 (A)	
	CN1622698 (A) CN100490592 (C)	
One example is show. **Total more 35 patent's unique published from Samsung Electronics only.**		

5. Annex. Foresight seminars presentations