VILNIUS GEDIMINAS
TECHNICAL UNIVERSITY
FACULTY OF CIVIL ENGINEERING

TECHNOLOGY FORESIGHT AND SCENARIO PLANNING IN ENGINEERING

Professor Joanicjusz Nazarko, DSc, PhD, Eng

Łukasz Nazarko, PhD

Bialystok University of Technology, Poland

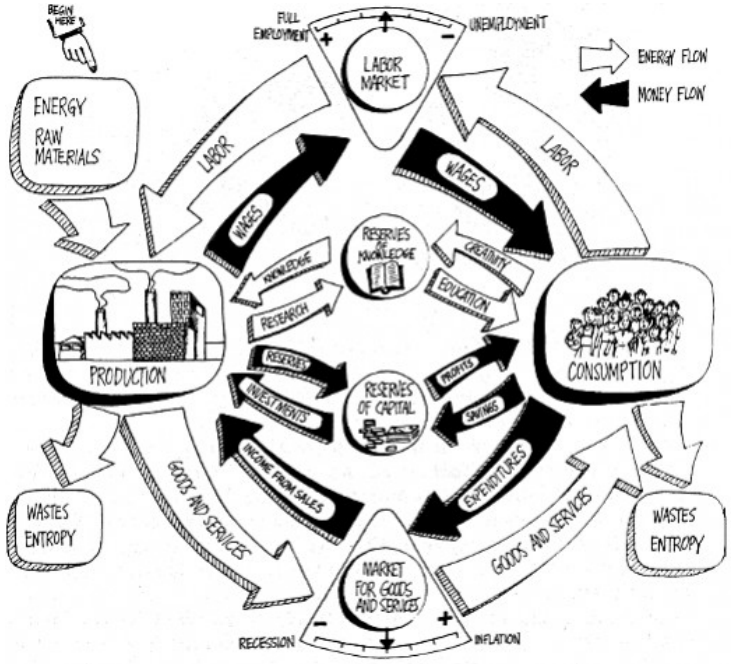
17-30 September 2014

PART III

- ✓ Description and Explanation of Selected Foresight Methods: STEEPVL Analysis

STEEPVL Analysis

A **STEEPVL** analysis is a tool to evaluate various external factors impacting a business, organization or process.



http://pespmc1.vub.ac.be/macroscope/chap1.html

STEEPVL is an acronym for:

- **S**ocial
- **T**echnological
- **E**conomic
- **E**nvironmental
- **P**olitical
- **V**alues
- **L**egal

Basically what is commonly referred to under the acronym STEEPVL is a way of looking at the future in terms of seven general subject categories.

STEEPVL Analysis

Social factors include the cultural aspects and include health consciousness, population growth rate, age distribution, career attitudes and emphasis on safety. Trends in social factors affect the demand for a company's products and how that company operates. For example, an aging population may imply a smaller and less-willing workforce (thus increasing the cost of labor). Furthermore, companies may change various management strategies to adapt to these social trends (such as recruiting older workers).

Technological factors include technological aspects such as R&D activity, automation, technology incentives and the rate of technological change. They can determine barriers to entry, minimum efficient production level and influence outsourcing decisions. Furthermore, technological shifts can affect costs, quality, and lead to innovation.

Economic factors include economic growth, interest rates, exchange rates and the inflation rate. These factors have major impacts on how businesses operate and make decisions. For example, interest rates affect a firm's cost of capital and therefore to what extent a business grows and expands. Exchange rates affect the costs of exporting goods and the supply and price of imported goods in an economy.

STEEPVL Analysis

Environmental factors include ecological and environmental aspects such as weather, climate, and climate change, which may especially affect industries such as tourism, farming, and insurance. Furthermore, growing awareness of the potential impacts of climate change is affecting how companies operate and the products they offer, both creating new markets and diminishing or destroying existing ones.

Political factors are basically to what degree the government intervenes in the economy. Specifically, political factors include areas such as tax policy, labor law, environmental law, trade restrictions, tariffs, and political stability. Political factors may also include goods and services which the government wants to provide or be provided (merit goods) and those that the government does not want to be provided (demerit goods or merit bads). Furthermore, governments have great influence on the health, education, and infrastructure of a nation.

Legal factors include acts of parliament and associated regulations, international and national standards, local government by-laws, and mechanisms to monitor and ensure compliance with these.

Values-based factors that deal with human ethics, morals and beliefs. Values are about what is most important in life, how things should be or people should behave, especially in terms of qualities such as honesty, integrity and openness.

Source: http://en.wikipedia.org/wiki/PEST_analysis

An Example of STEEPVL Analysis

Innovation-Oriented Development of Mazovian Enterprises

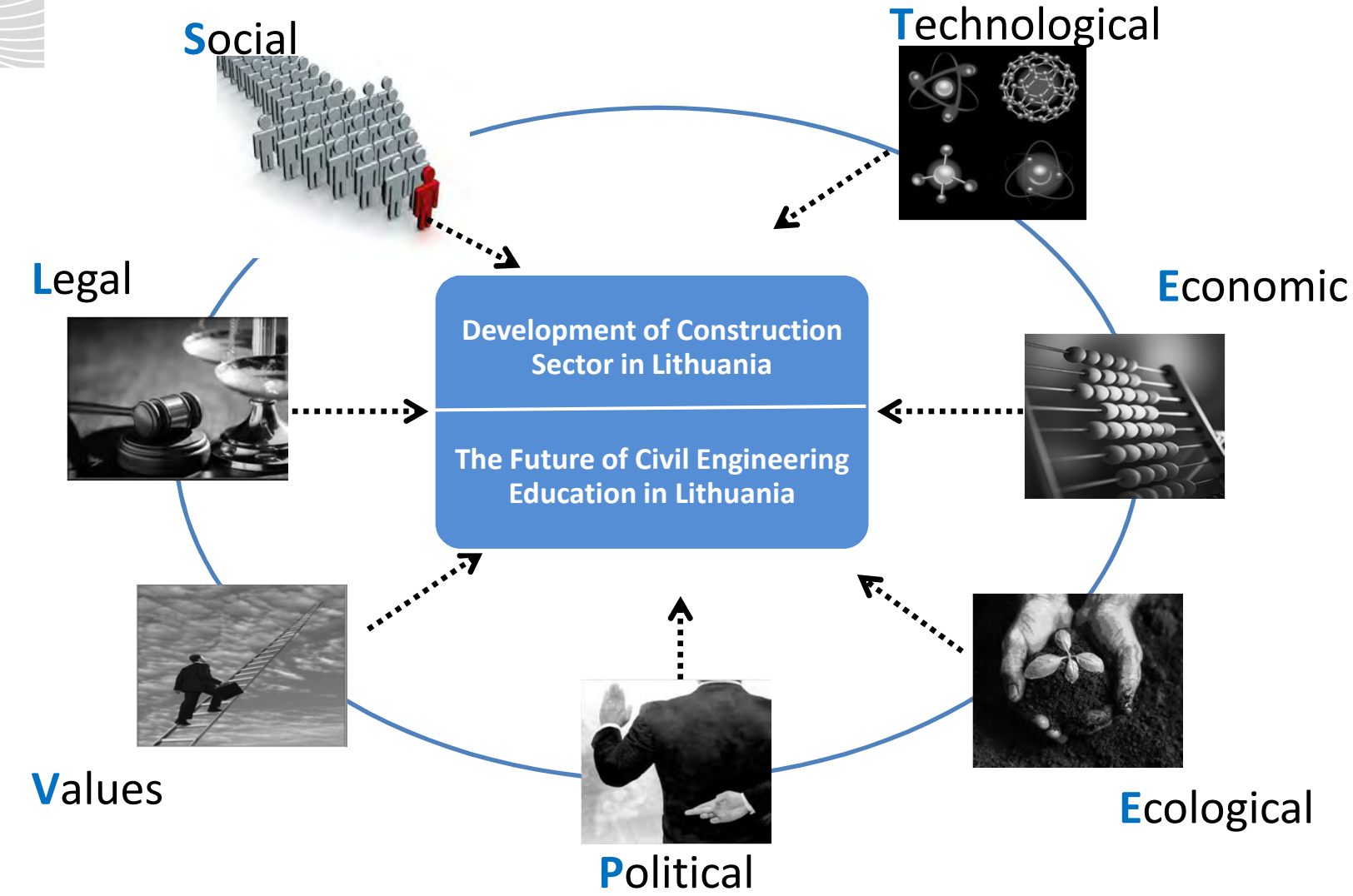
	Social Factors (S)
S1	Readiness to cooperate in a triad comprising business, government, and research institutions
S2	Propensity toward entrepreneurship in the society
S3	Preparedness of the government cadres in regard to industrial innovation support
	Technology Factors (T)
T1	System effectiveness of technology assessment and transfer
T2	Supply of innovative techologies
T3	Level of innovation of technological solutions in new enterprises
	Economic Factors (Econ)
Econ1	Availability of funds for innovation-related activities
Econ2	Effectiveness of institutions devoted to business support
Econ3	Strength of the relationship between government financial support for R&D and cooperation by R&D centers with industry
	Ecological Factors (Ecol)
Ecol1	Barriers to development resulting from environmental protection
Ecol2	Level of public support for implementation of environmental technologies
Ecol3	Development of green economy
	Political Factors (P)
P1	Preferences for extending credit to innovative SME's
P2	Compliance with EU regulations
P3	Promoting innovation in policies by provincial self-governance bodies
	Personal values-related Factors (V)
V1	Degree of readiness to cooperate
V2	Education
V3	Desire for personal development and for participation in new initiatives
	Legal Factors (L)
L1	Speed of legal procedures
L2	Legal definition of innovation
L3	Legal support for innovative solutions

Aims of STEEPVL analysis

STEEPVL analysis is used to:

- Define the drivers (driving forces) of scenarios
- Identify disruptive events that break the exisitng trends
- Expand and enrich the SWOT analysis

STEEPVL Analysis - Exercise



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http://www.esan.edu.pe/conexion/actualidad/assets_c/2011/04/precios_de_transferencia-miniatura-290xauto-4011.jpg

STEEPVL Analysis - Exercise

- Please get together in groups of 3-6 people
  - Nominate one group Chairman & one Secretary
  - The Chairman will organise the work and keep control of time
  - The Secretary will try to take notes of most relevant issues

- Confront your topic with the STEEPVL dimensions
  1. Individually identify 3 issues for each STEEPVL dimension (write them on the cards)
  2. Present the issues to your group
  3. Organise the issues: group similar ones, remove duplicates
  4. Select three most important issues in each STEEPVL dimension
  5. Present results of your work to the whole class

Identifying STEEPVL Factors

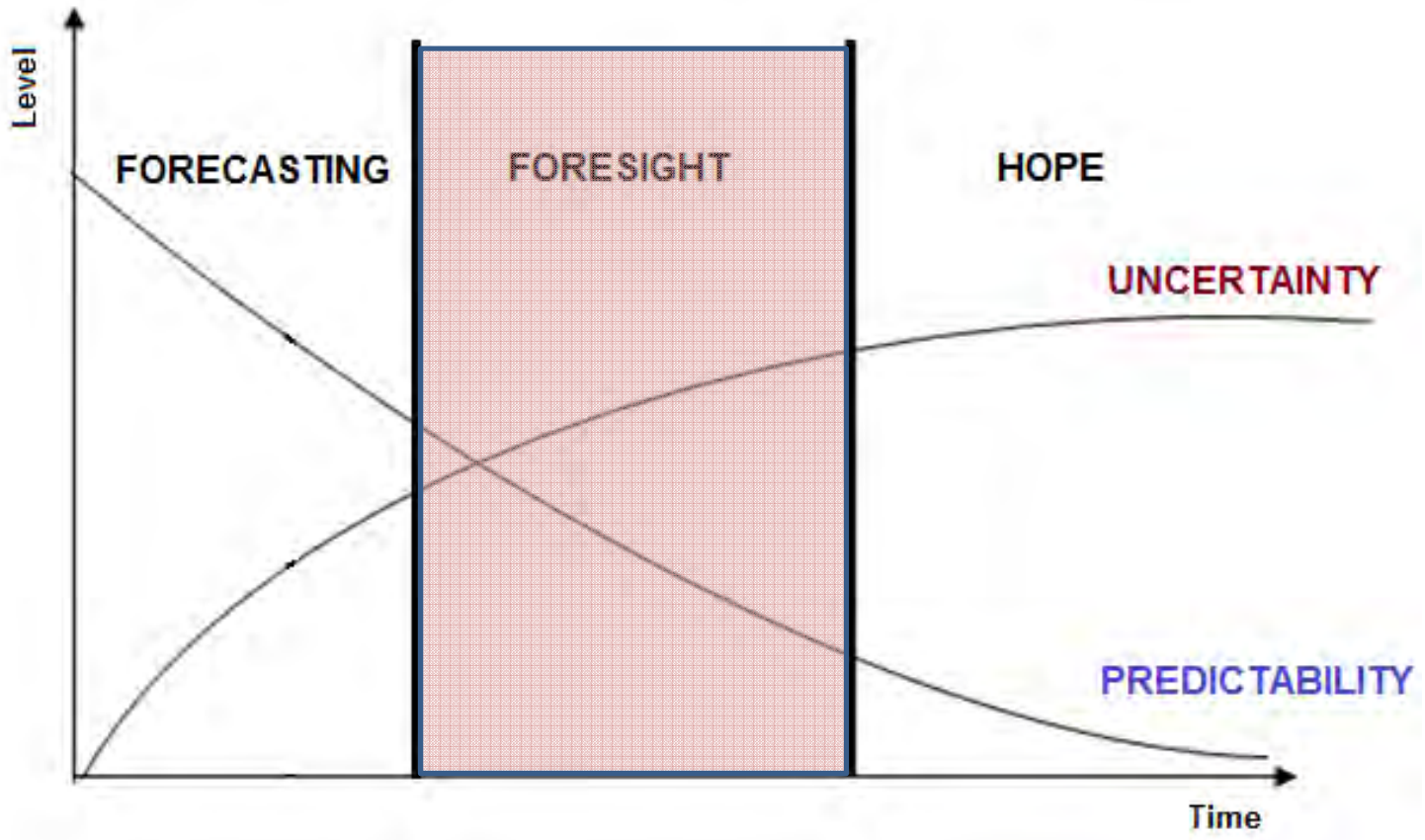
DEVELOPMENT of CONSTRUCTION SECTOR in LITHUANIA		
Category		**Factors**
S SOCIAL	S1	
	S2	
	S3	
T TECHNOLOGICAL	T1	
	T2	
	T3	
Econ ECONOMIC	Econ1	
	Econ2	
	Econ2	
Ecol ECOLOGICAL	Ecol1	
	Ecol2	
	Ecol3	
P POLITICAL	P1	
	P2	
	P3	
V VALUES	V1	
	V2	
	V3	
L LEGAL	L1	
	L2	
	L3	

The FUTURE of CIVIL ENGINEERING EDUCATION in LITHUANIA		
Category		**Factors**
S SOCIAL	S1	
	S2	
	S3	
T TECHNOLOGICAL	T1	
	T2	
	T3	
Econ ECONOMIC	Econ1	
	Econ2	
	Econ2	
Ecol ECOLOGICAL	Ecol1	
	Ecol2	
	Ecol3	
P POLITICAL	P1	
	P2	
	P3	
V VALUES	V1	
	V2	
	V3	
L LEGAL	L1	
	L2	
	L3	

Identifying STEEPVL Factors

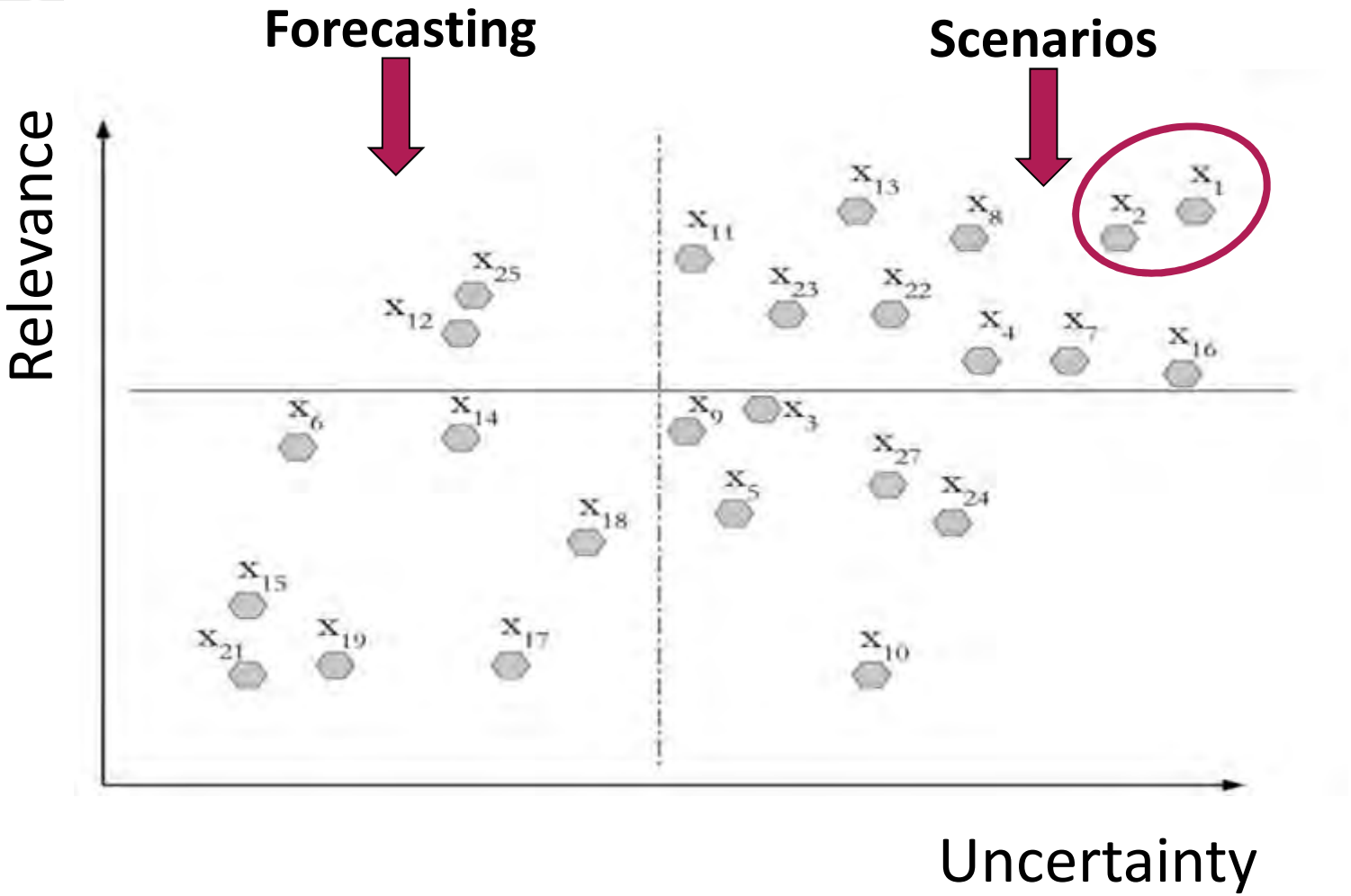
The FUTURE of CIVIL ENGINEERING EDUCATION in LITHUANIA		
Category		**Factors**
S SOCIAL	S1	Prestige of Civil Engineering studies
	S2	Stress on cooperation and team work during the studies
	S3	Stereotypes of engineering studies in the society
T TECHNOLOGICAL	T1	Application of new technologies in education
	T2	Communication among students and between students and teachers with use of new IT tools
	T3	Research and teaching technological infrastructure
Econ ECONOMIC	Econ1	Government spending on Civil Engineering education
	Econ2	Public support for research in Civil Engineering
	Econ2	Construction companies' funding for Civil Engineering education
Ecol ECOLOGICAL	Ecol1	Focus on ecological issues in the study programme
	Ecol2	EU promotion of "green" materials
	Ecol3	Construction of energy-efficient buildings
P POLITICAL	P1	Government's promotion of technological studies
	P2	Government's prioritization of engineering studies
	P3	Efficiency of policy system in Lithuania (ability to introduce reforms)
V VALUES	V1	Self-realisation as a value
	V2	Satisfaction with one's education quality and qualifications
	V3	Professional career as a value
L LEGAL	L1	Level of difficulty to get a professional certificate in Civil Engineering
	L2	Regulations allowing study and work at the same time ("sandwich studies")
	L3	Guarantees of getting a job after graduation

PREDICTABILITY vs. UNCERTAINTY

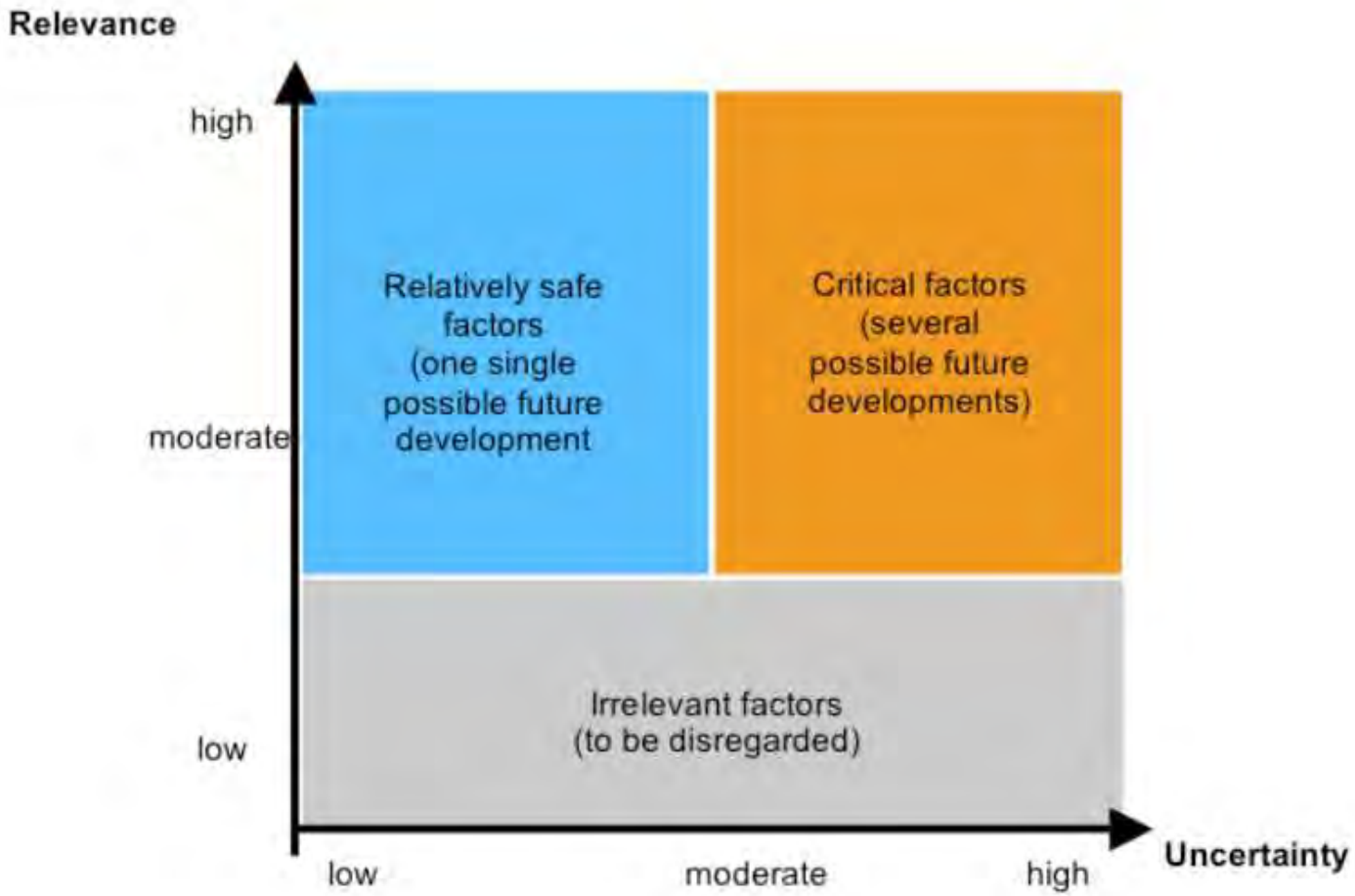


Sourse: J. Y. Kaivo-oja, T. S. Katko, O. T. Seppala, *Seeking convergence between history and futures research*, „Futures" 2004, No. 36, p. 531.

Forecasting vs. Scenarios



Relevance-Uncertainty Evaluation



Source:

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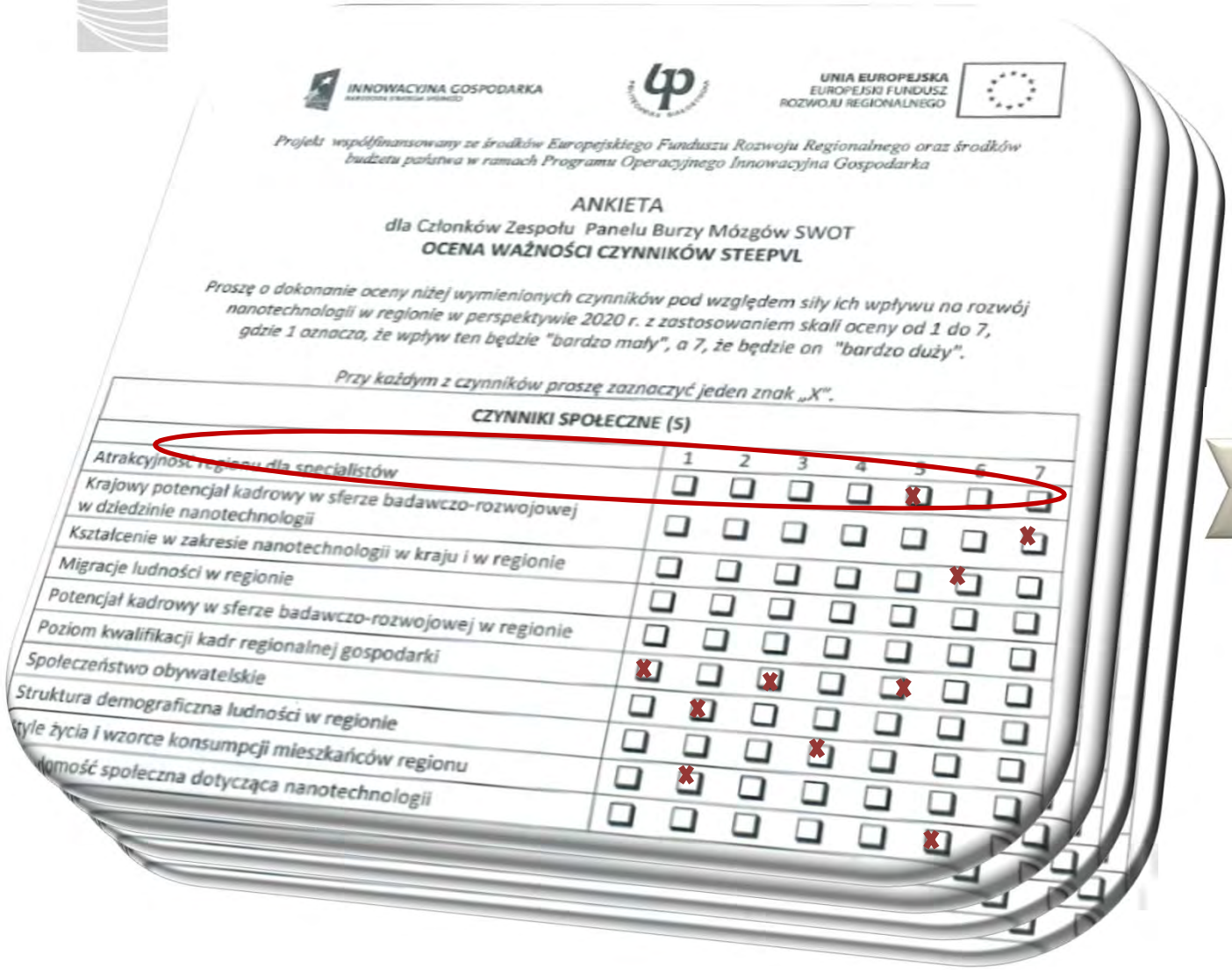
STEEPVL Factors Evaluation



INNOWACYJNA GOSPODARKA

UNIA EUROPEJSKA
EUROPEJSKI FUNDUSZ
ROZWOJU REGIONALNEGO

Projekt współfinansowany ze środków Europejskiego Funduszu Rozwoju Regionalnego oraz środków budżetu państwa w ramach Programu Operacyjnego Innowacyjna Gospodarka

ANKIETA
dla Członków Zespołu Panelu Burzy Mózgów SWOT
OCENA WAŻNOŚCI CZYNNIKÓW STEEPVL

Proszę o dokonanie oceny niżej wymienionych czynników pod względem siły ich wpływu na rozwój nanotechnologii w regionie w perspektywie 2020 r. z zastosowaniem skali oceny od 1 do 7, gdzie 1 oznacza, że wpływ ten będzie "bardzo mały", a 7, że będzie on "bardzo duży".

Przy każdym z czynników proszę zaznaczyć jeden znak „X".

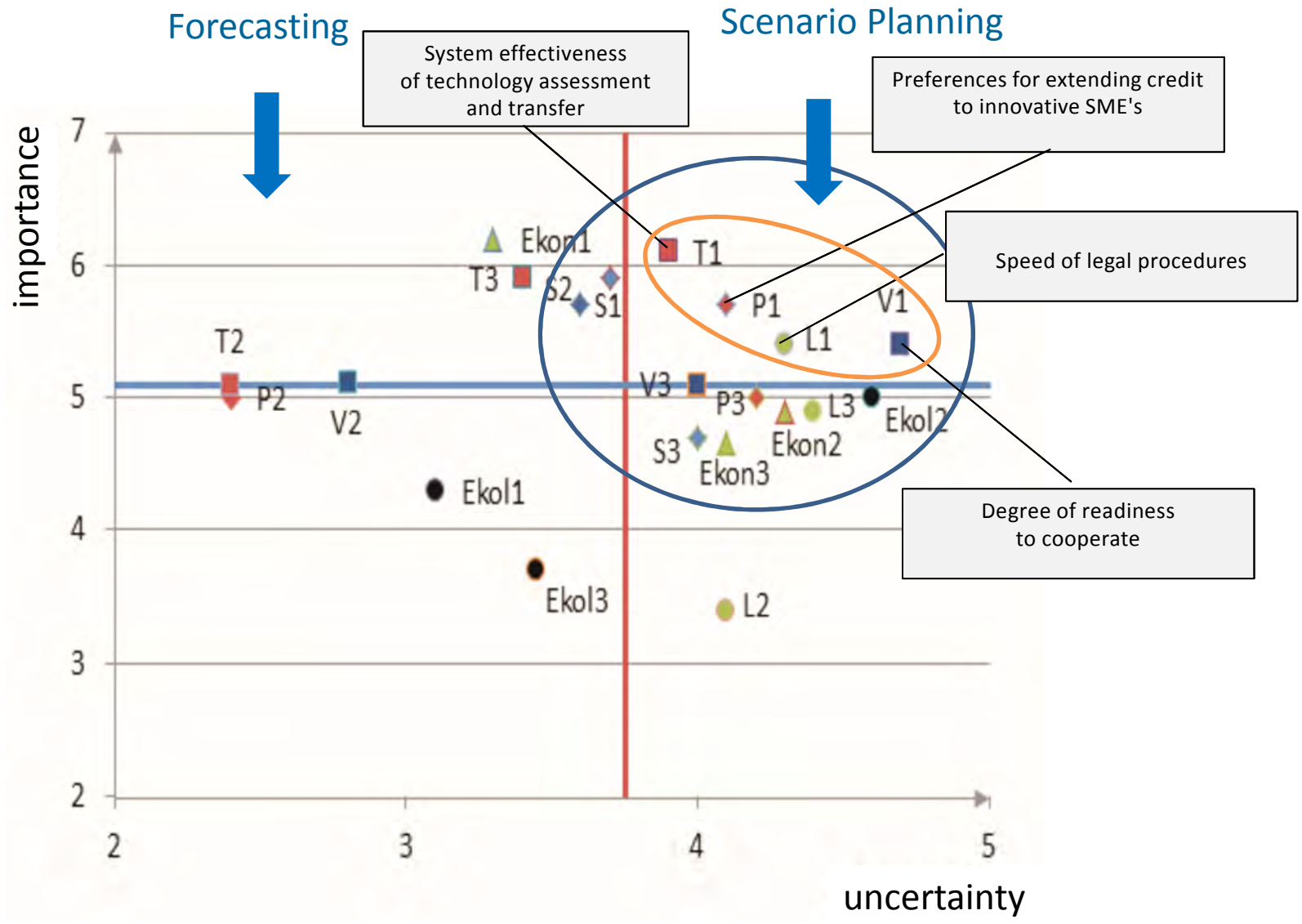
CZYNNIKI SPOŁECZNE (S)

	1	2	3	4	5	6	7
Atrakcyjność regionu dla specjalistów					X		
Krajowy potencjał kadrowy w sferze badawczo-rozwojowej w dziedzinie nanotechnologii							X
Kształcenie w zakresie nanotechnologii w kraju i w regionie						X	
Migracje ludności w regionie							
Potencjał kadrowy w sferze badawczo-rozwojowej w regionie							
Poziom kwalifikacji kadr regionalnej gospodarki	X		X		X		
Społeczeństwo obywatelskie		X					
Struktura demograficzna ludności w regionie				X			
Style życia i wzorce konsumpcji mieszkańców regionu		X					
Tożsamość społeczna dotycząca nanotechnologii					X		

Mean value

$$\overline{X}$$

An Example of STEEPVL Analysis
Innovation-Oriented Development of Mazovian Enterprises



Exercise

- *Evaluate relevance of the STEEPVL factors in the area of the Future of Civil Engineering Education in Lithuania*

Relevance Evaluation

Category	Factor	Relevance				
		Low → High				
		1	2	3	4	5
S Social	S1	x				
	S2			x		
	S3		x			
T Technological	T1				x	
	T2					x
	T3		x			

Relevance Evaluation

Category	Factors	Relevance									
		Evaluator									Mean value
		1	2	3	4	5	6	7	8	9	
S Social	S1	4	4	5	3	4	5	3			**4,00**
	S2	4	5	3	3	3	3	2			**3,29**
	S3	3	3	4	2	5	3	4			**3,43**
T Technological	T1	5	5	5	5	4	4	4			**4,57**
	T2	5	4	3	4	3	5	1			**3,57**
	T3	4	5	4	5	5	4	4			**4,43**
Econ Economic	Econ1	5	5	5	5	5	5	5			**5,00**
	Econ2	4	4	3	3	3	4	4			**3,57**
	Econ3	3	3	4	2	4	4	5			**3,57**
Ecol Ecological	Ecol1	3	4	3	5	4	3	3			**3,57**
	Ecol2	4	5	4	4	3	3	3			**3,71**
	Ecol3	5	5	5	5	5	4	3			**4,57**
P Political	P1	3	5	4	5	5	3	4			**4,14**
	P2	5	4	2	3	4	5	5			**4,00**
	P3	5	3	4	3	3	2	3			**3,29**
V Value	V1	5	4	3	5	4	3	3			**3,86**
	V2	4	3	1	3	3	1	3			**2,57**
	V3	4	4	2	4	5	2	5			**3,71**
L Legal	L1	3	3	4	5	3	3	3			**3,43**
	L2	5	5	1	3	4	2	5			**3,57**
	L3	4	4	4	2	5	3	5			**3,86**

Exercise

- *Evaluate predictability of the STEEPVL factors in the area of the Future of Civil Engineering Education in Lithuania*

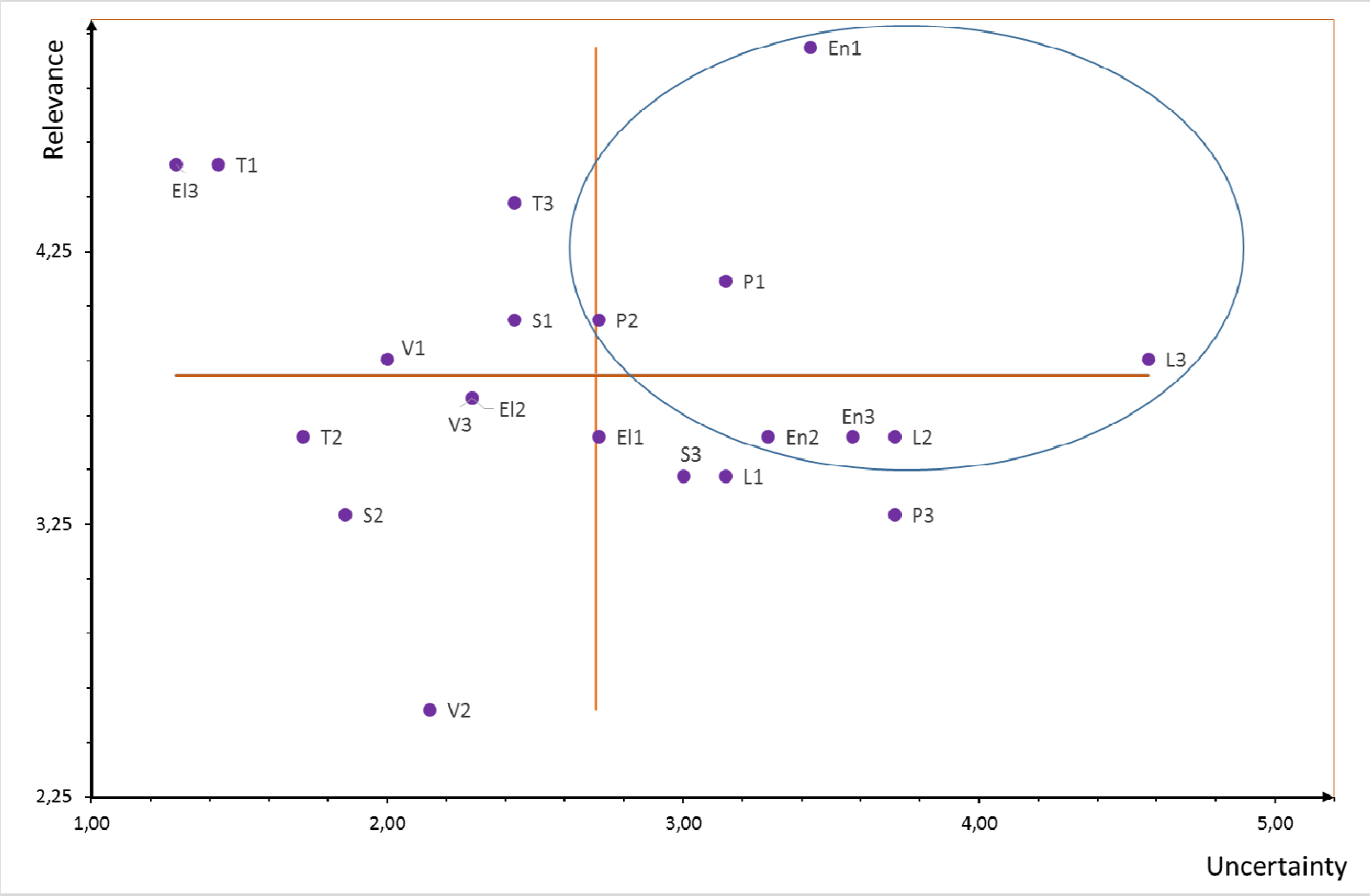
Predictability Evaluation

Category	Factor	Predictability				
		Low → High				
		1	2	3	4	5
S Social	S1	x				
	S2			x		
	S3		x			
T Technological	T1				x	
	T2					x
	T3		x			

Predictability Evaluation

Category	Factors	Predictibility									
		Evaluator									Mean value
		1	2	3	4	5	6	7	8	9	
S Social	S1	4	4	5	3	4	5	3			**4,00**
	S2	4	5	3	3	3	3	2			**3,29**
	S3	3	3	4	2	5	3	4			**3,43**
T Technological	T1	5	5	5	5	4	4	4			**4,57**
	T2	5	4	3	4	3	5	1			**3,57**
	T3	4	5	4	5	5	4	4			**4,43**
Econ Economic	Econ1	5	5	5	5	5	5	5			**5,00**
	Econ2	4	4	3	3	3	4	4			**3,57**
	Econ3	3	3	4	2	4	4	5			**3,57**
Ecol Ecological	Ecol1	3	4	3	5	4	3	3			**3,57**
	Ecol2	4	5	4	4	3	3	3			**3,71**
	Ecol3	5	5	5	5	5	4	3			**4,57**
P Political	P1	3	5	4	5	5	3	4			**4,14**
	P2	5	4	2	3	4	5	5			**4,00**
	P3	5	3	4	3	3	2	3			**3,29**
V Value	V1	5	4	3	5	4	3	3			**3,86**
	V2	4	3	1	3	3	1	3			**2,57**
	V3	4	4	2	4	5	2	5			**3,71**
L Legal	L1	3	3	4	5	3	3	3			**3,43**
	L2	5	5	1	3	4	2	5			**3,57**
	L3	4	4	4	2	5	3	5			**3,86**

Relevance-Uncertainty Evaluation



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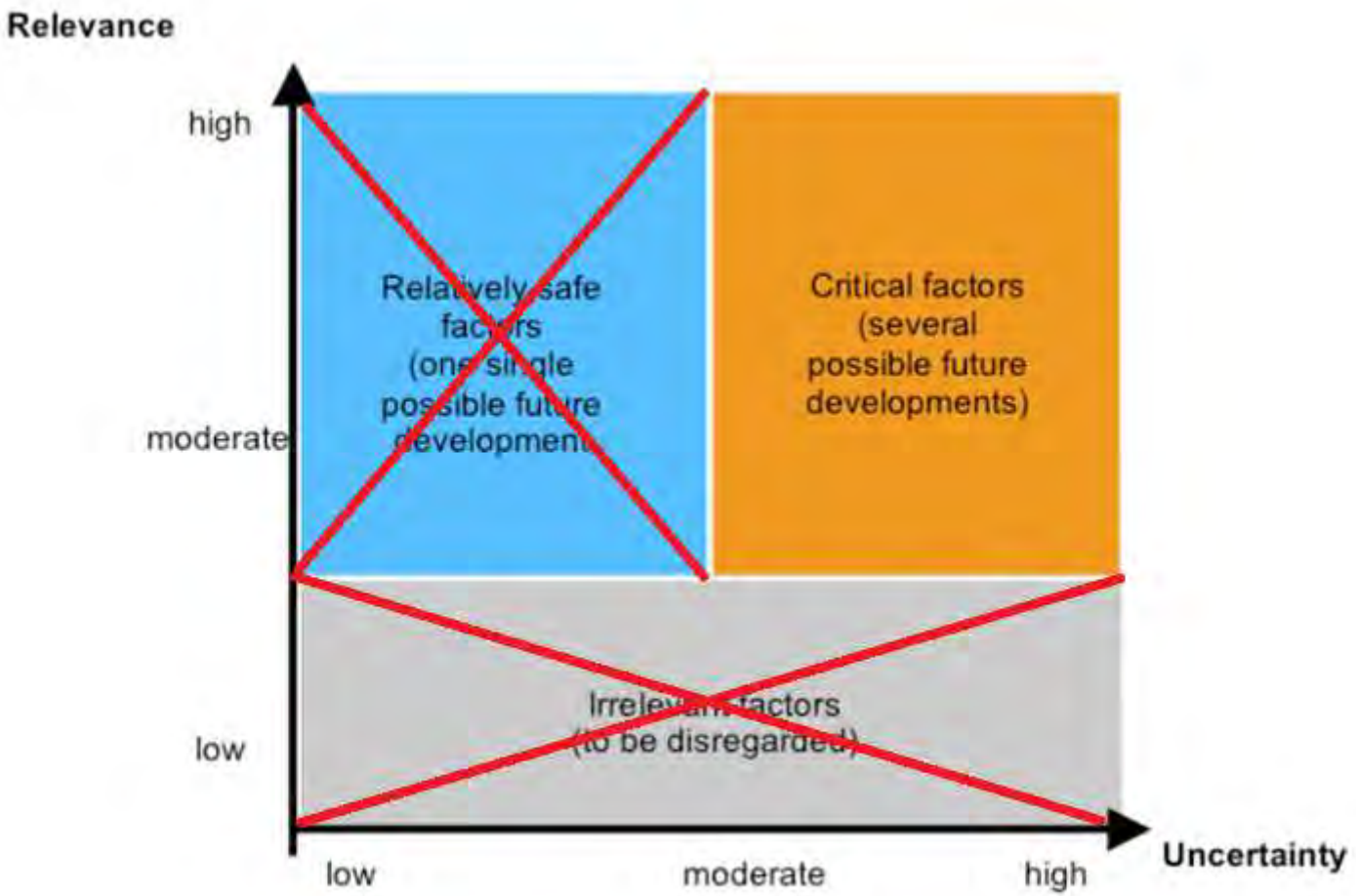

Source:

Relevance-Uncertainty Evaluation

The FUTURE of CIVIL ENGINEERING EDUCATION in LITHUANIA		
Category		**Factors**
Econ ECONOMIC	Econ1	Government spending on Civil Engineering education
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