



**PRIMAKOV INSTITUTE
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(IMEMO RAS)**

CENTRE FOR EUROPEAN STUDIES

Structural-topological analysis of multiple global connections system

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Content



The purpose of the structural-topological approach (STA) to the multiple global connections system investigation is to build the model that analyzes world multiple connections system such as unclosed unbalanced structure unlike most of models used nowadays.

Content:

- 1. Architecture of multiple global connections system within structural-topological approach*
- 2. Actors of multiple global connections system within structural-topological approach*
- 3. Structural-topological approach: theoretical aspect*
- 4. Testing practical implementation of structural-topological approach on the example of European integration analysis*
- 5. Advantages and disadvantages of structural-topological approach*
- 6. Questions to think about*
- 7. Literature*

Architecture of multiple global connections system



Architecture of multiple global connections system (MGCS):

- *from the viewpoint of consumer/realizer, it is the structure of resources/ consumer goods;*
- *from the viewpoint of realizer/author, it is the common patterns' structure of emergence, development and functioning of results obtained by realization of author's ideas (those in turn form system's environment) through time and space.*

Peculiarities of MGCS architecture	Relevant features of MGCS
Structural integrity of each systems' actor	Interconnection of subjects/ objects/ actors
Fractal (through space-time continuum)	Open and pericyclic
Multidimensional	Multisided
Asymmetrical (locally and at some point)	Unbalance (in the short run)
Equilibrium (through space-time continuum)	Dynamic balance (over a long period of time)

Actors of multiple global connections system



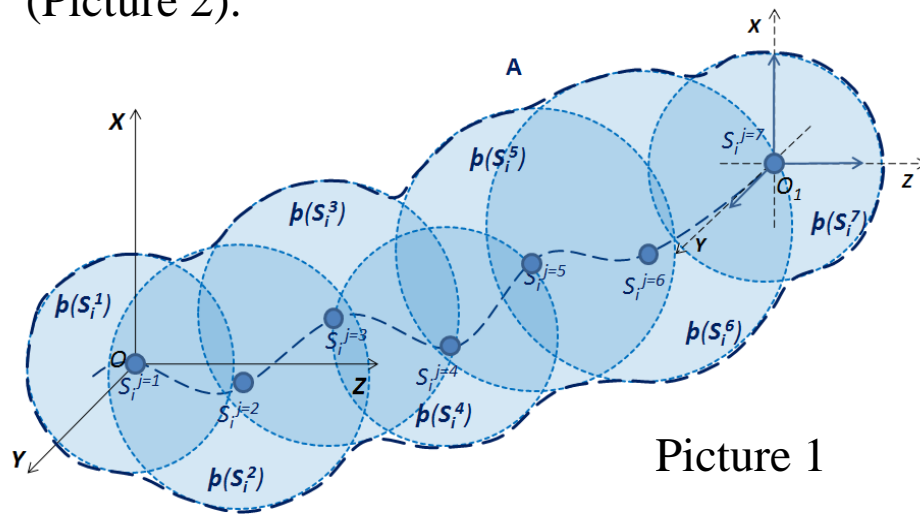
Actors of multiple global connections system (MGCS):

- *Author* create ideas or work items that can influence on world development on the global scale (for instance, invention of electric lamp);
- *Realizer* is a connecting link between consumer and author. He realizes and develops author's ideas or work items to global manufacturing and following world consumption (for instance, development of electric power infrastructure);
- *Consumer* utilizes world resources and productions in order to satisfy his/her needs (for instance, auxiliary power consumption).

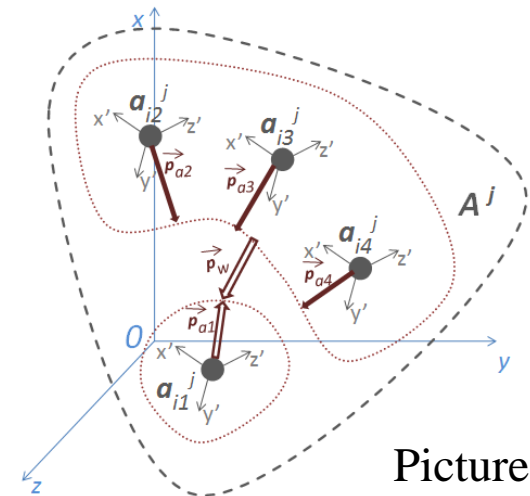
Specification	Homo Sapiens	Homo Consciens
Behavior Model	[Consumer; Realizer]	[Realizer; Author]
Interest	Personal	Social
Aim	Ownership and profit maximization according to economic rationality principle	Reasonable optimization and allocation of available resources, future world space extension
Action	Compare and make a choice	Realize and create ability to act
Operation	Exchange and production	Creation
Limitation	Resources, information, costs of searching in present state	Efficiency of action within space-time continuum

Theoretical aspect of STA

1. **Build socio-economic-political basis** - data evaluation tool that allows to represent any state or event uniquely in the form of linear-independent factors' combination (for example, social, economic and political factors);
2. **Introduce two systems of coordinates:** the first one forms the data space of states, the second one forms the data space of events (Picture 1). At any time each process might be resolved into composition of evoked and evoking potentials of actors' actions (Picture 2).



Picture 1



Picture 2

axis X – social factor of the world multiple connections, axis Y – economic factor, axis Z – political factor

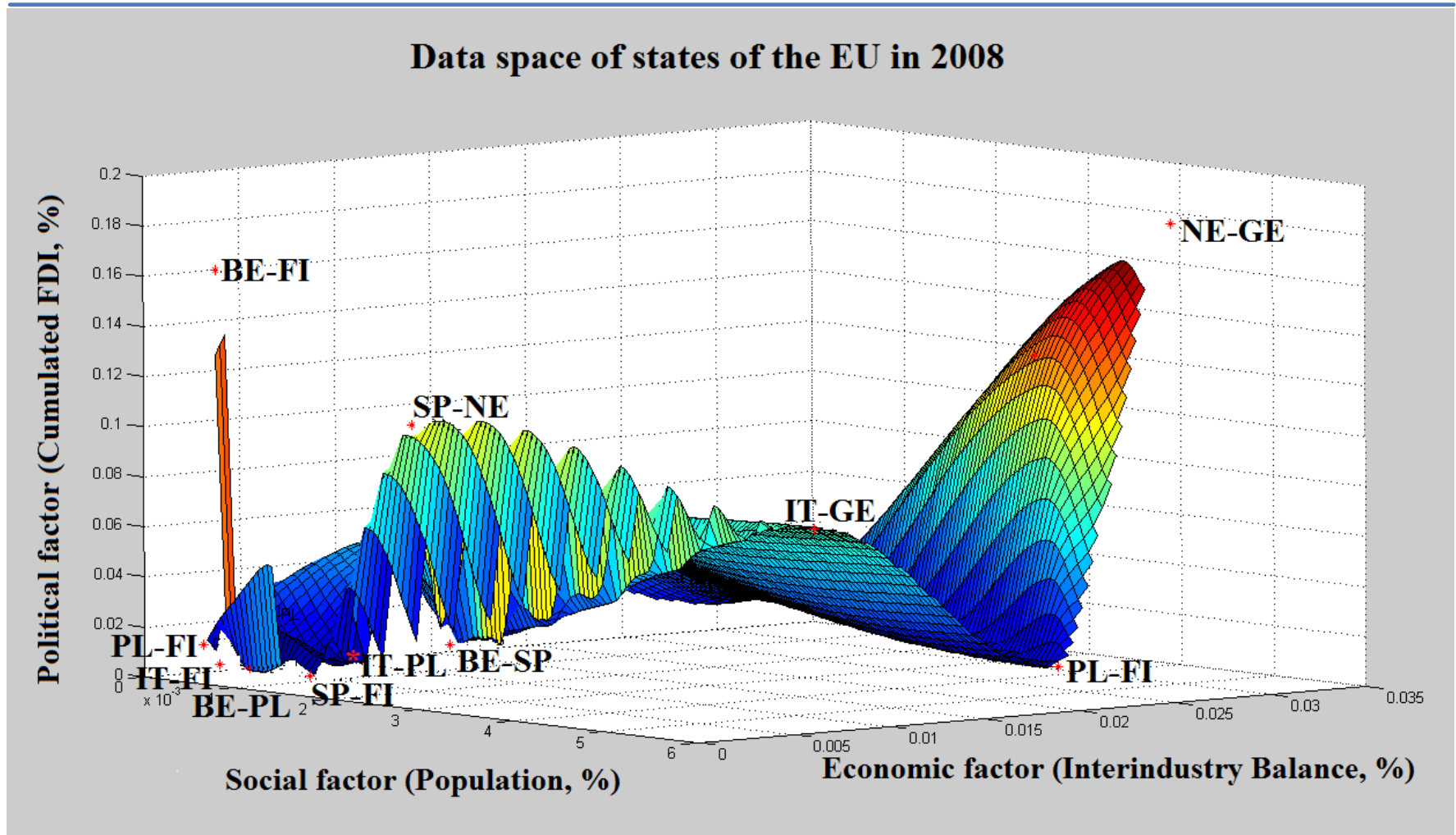
Theoretical aspect of STA



3. ***Separate data sets***, those (in some degree) qualitatively and quantitatively determined factors of states and events (related to actor analyzed) in a unique manner;
 - a) *Social factor*: population, birth rate, death rate, migration flows
 - b) *Economic factor*: GDP, Interindustry Balance, trade flows
 - c) *Political factor*: agreements, FDI, information on voting

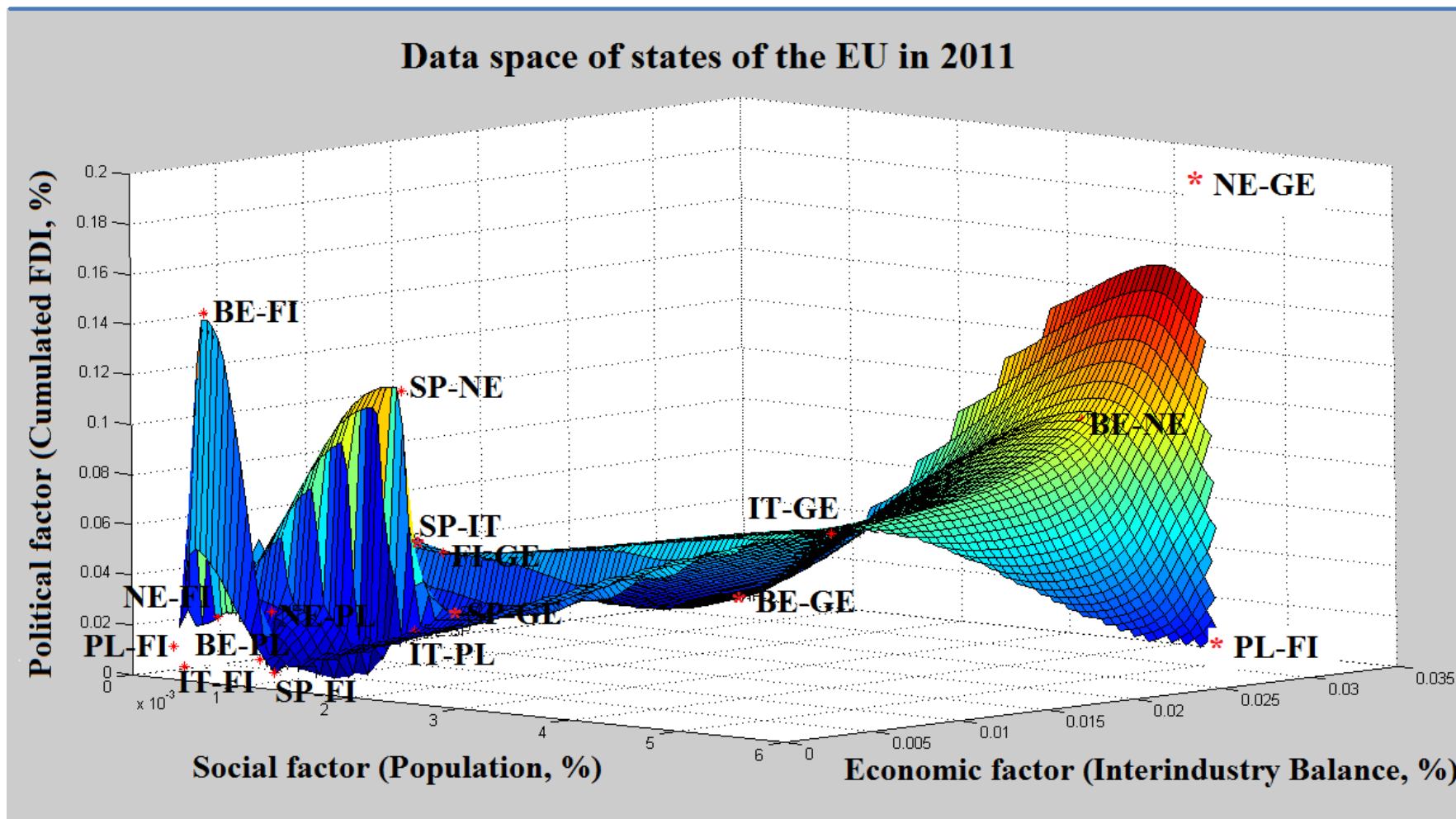
4. ***Calculate***, for instance, using numerical computing environment such as Matlab taking into account peculiarities of MGCS architecture:
 - a) *Structural integrity of each systems' actor*
 - b) *Fractal (through space-time continuum)*
 - c) *Multidimensional*
 - d) *Asymmetrical (locally and at some point)*
 - e) *Equilibrium (through space-time continuum)*

Practical implementation of STA



Note: NE – Netherlands, DE – Germany, FI - Finland, PL – Poland, IT – Italy, SP – Spain

Practical implementation of STA

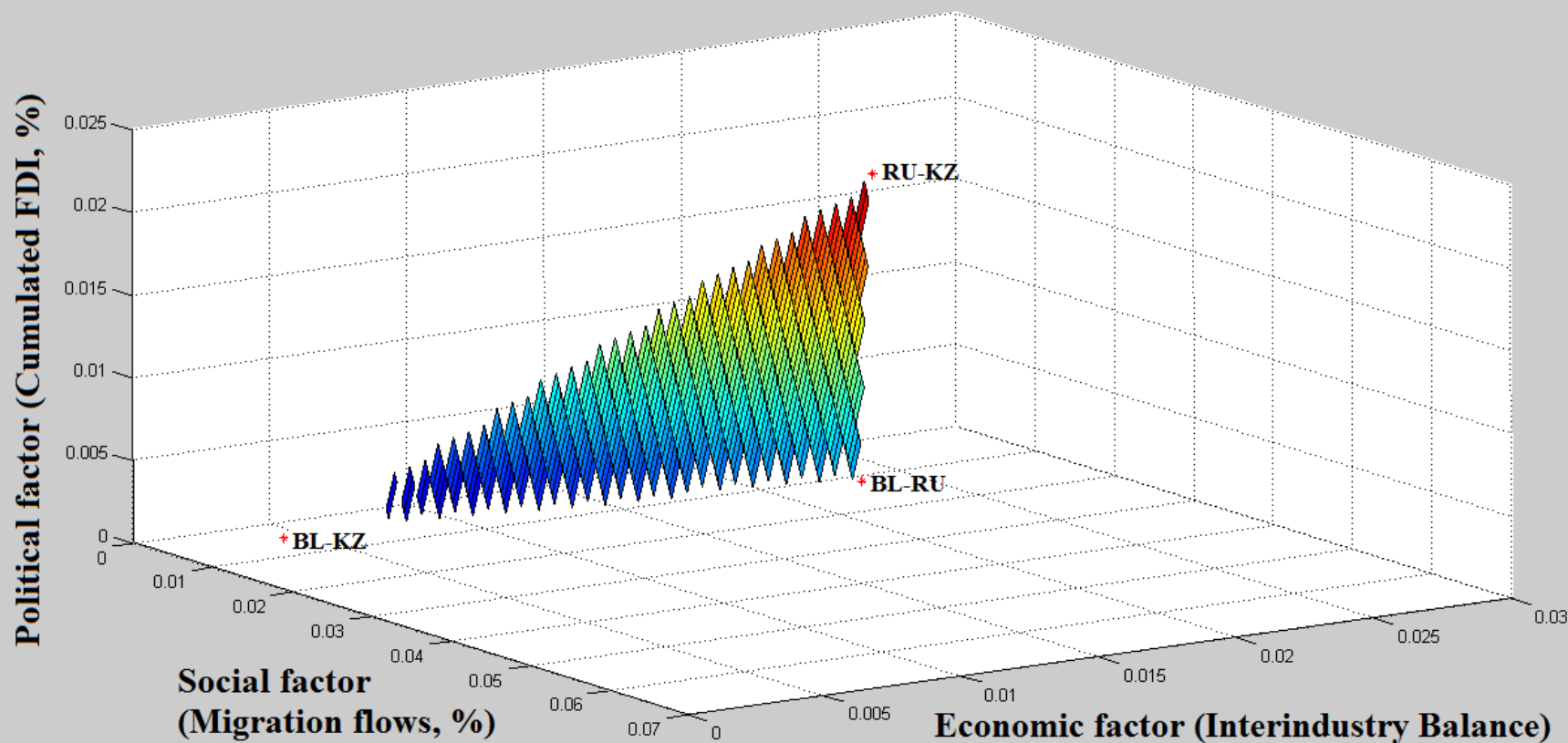


Note: NE – Netherlands, DE – Germany, FI - Finland, PL – Poland, IT – Italy, SP – Spain

Practical implementation of STA



Data space of states of Russia, Belarus and Kazakhstan in 2011

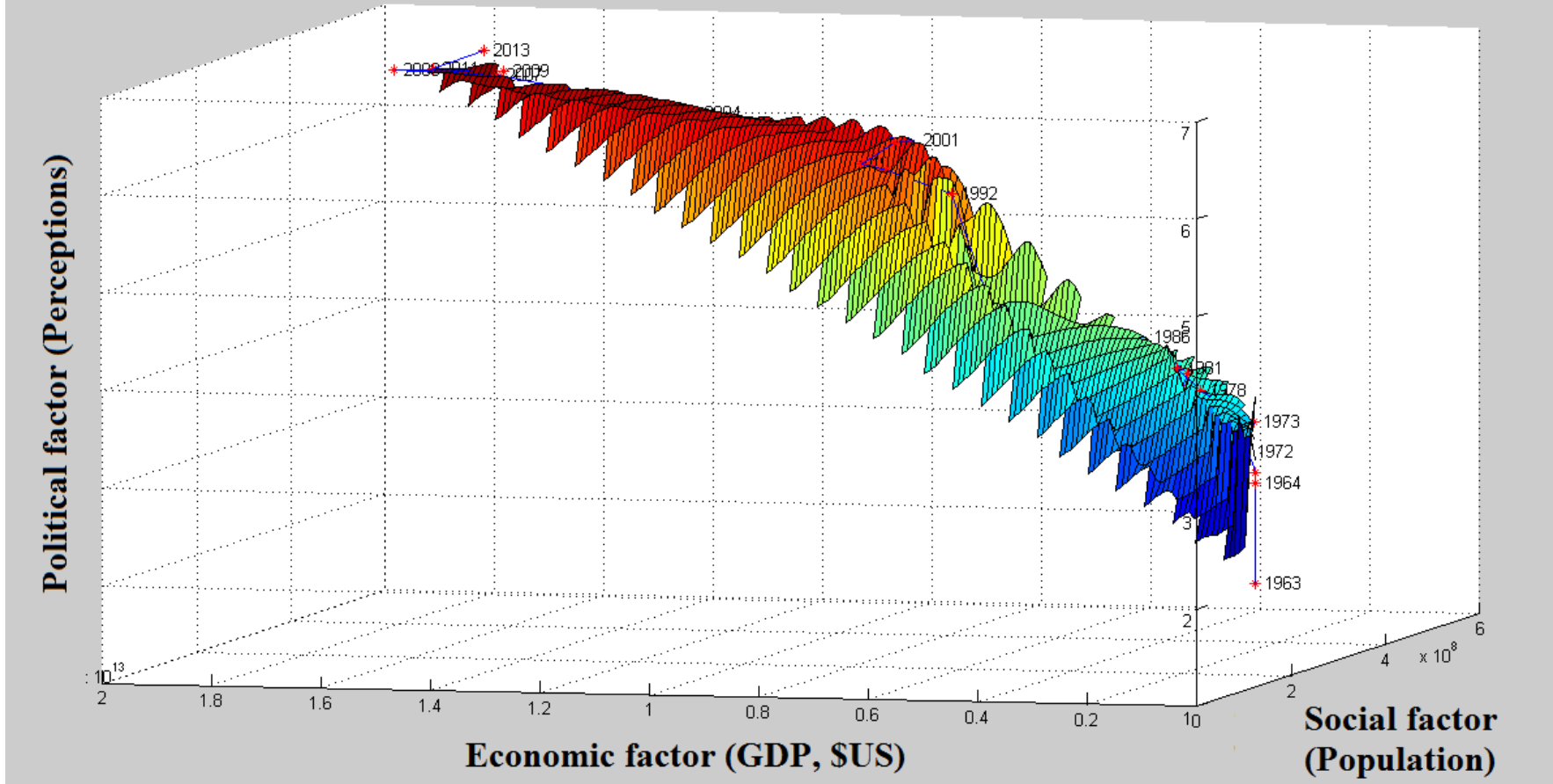


Note: BL – Belarus, RU – Russia, KZ - Kazakhstan

Practical implementation of STA



Data space of events of the EU (1963-2013)

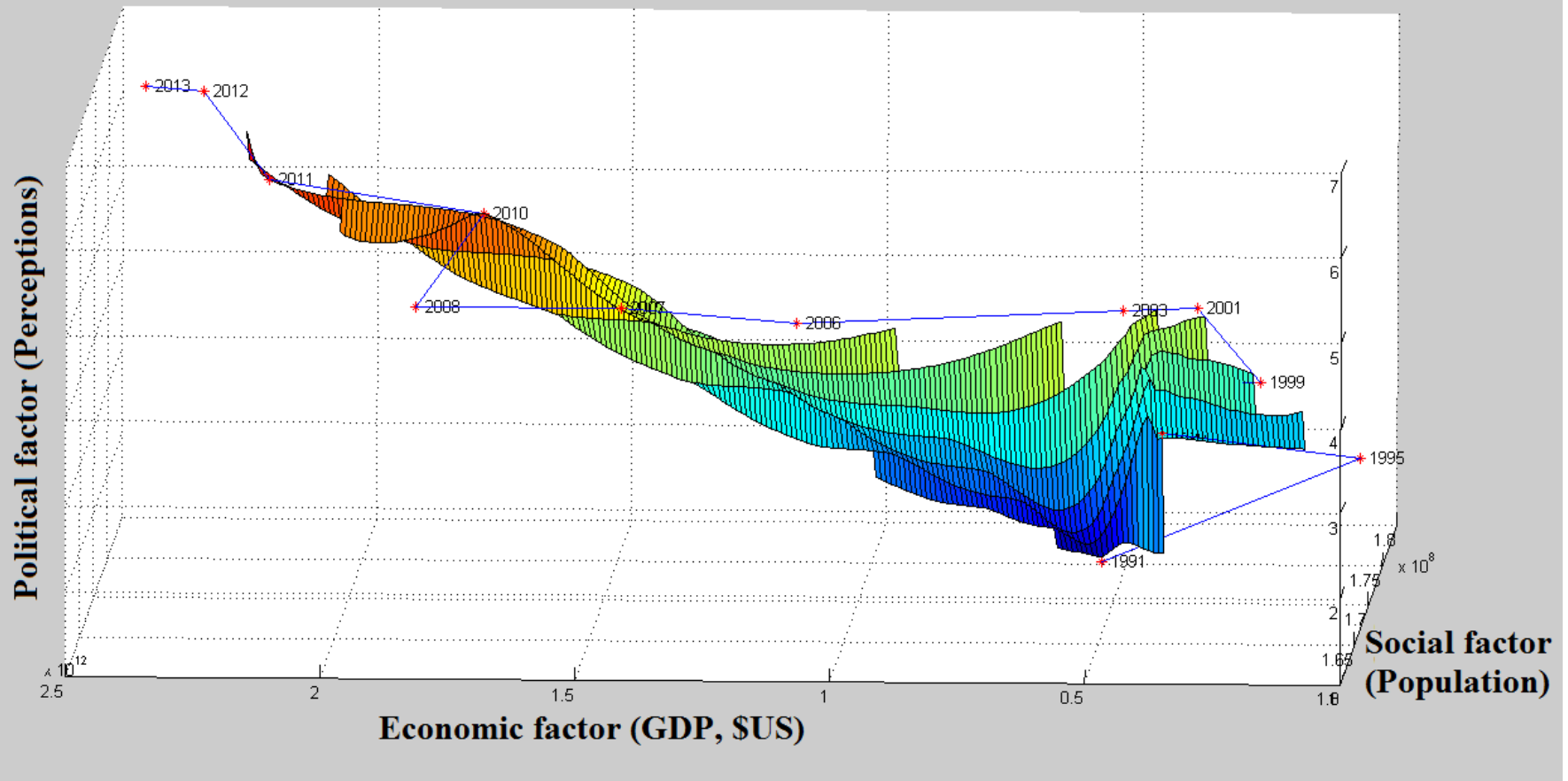


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Practical implementation of STA



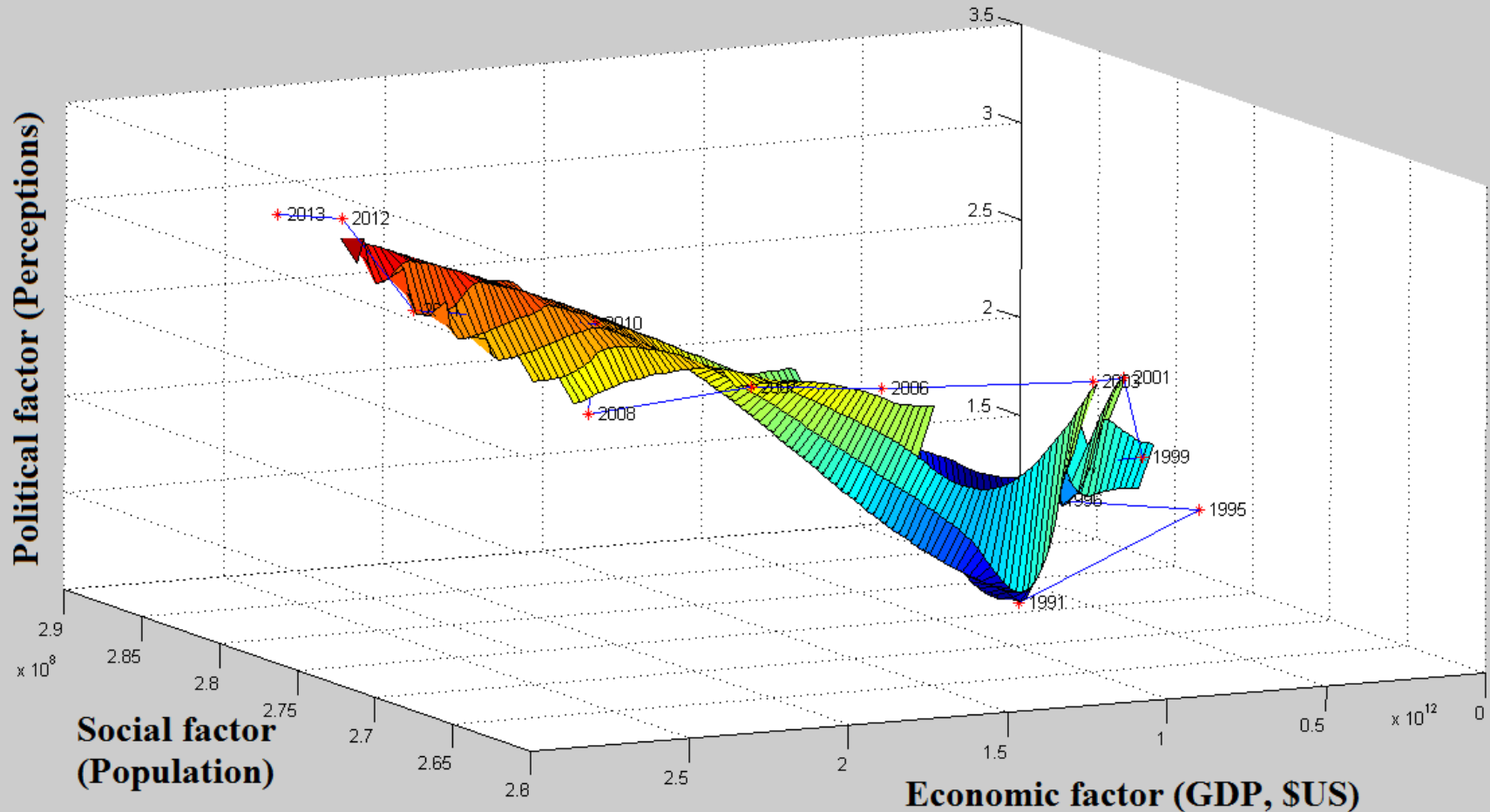
Data space of events of Russia, Belarus and Kazakhstan (1991-2013)



Practical implementation of STA



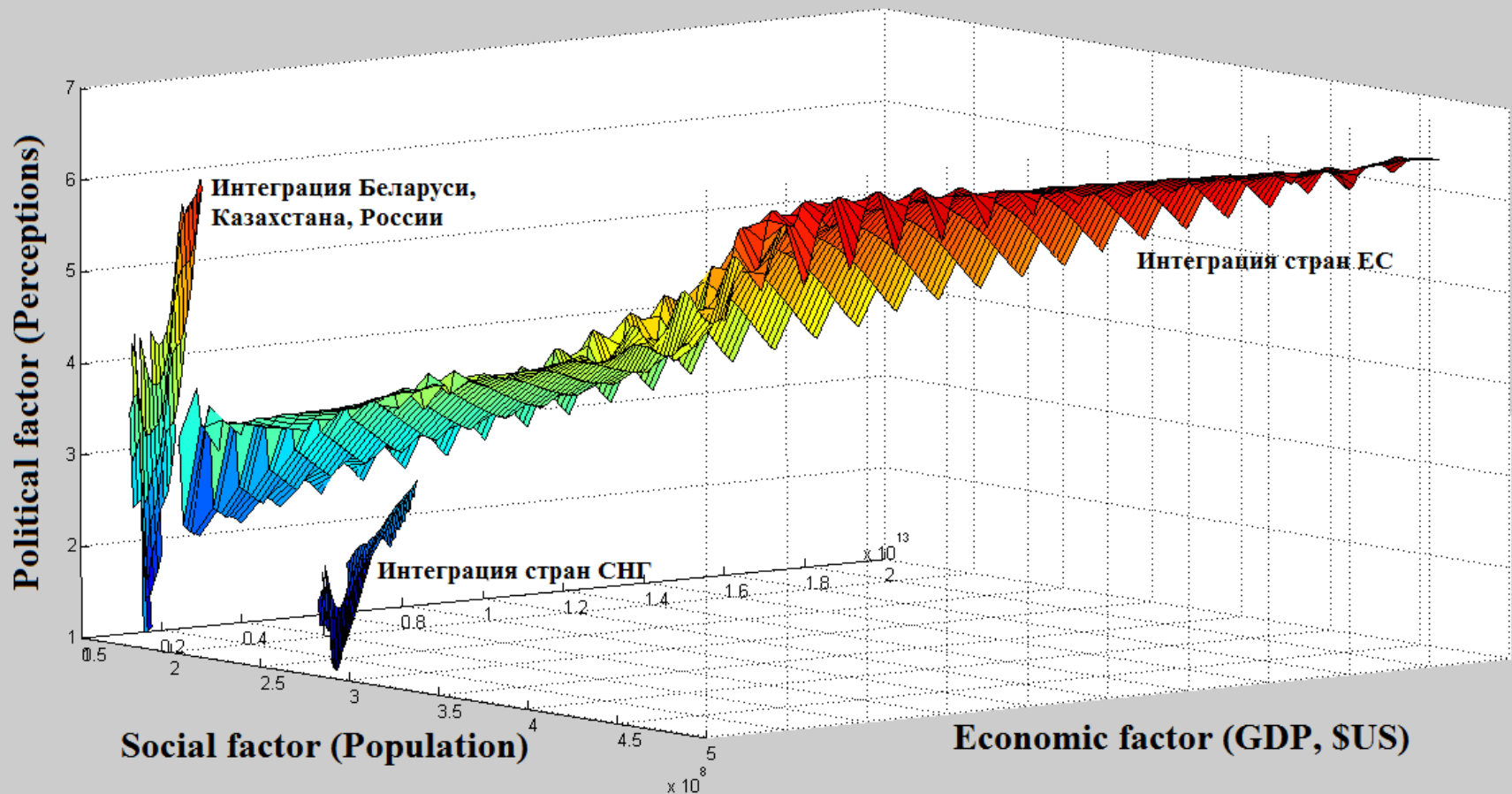
Data space of events of the CIS (1991-2013)



Practical implementation of STA



Data space of events of the EU (1963-2013), the CIS (1991-2013),
Russia-Belarus-Kazakhstan (1991-2013)



Advantages and disadvantages of STA



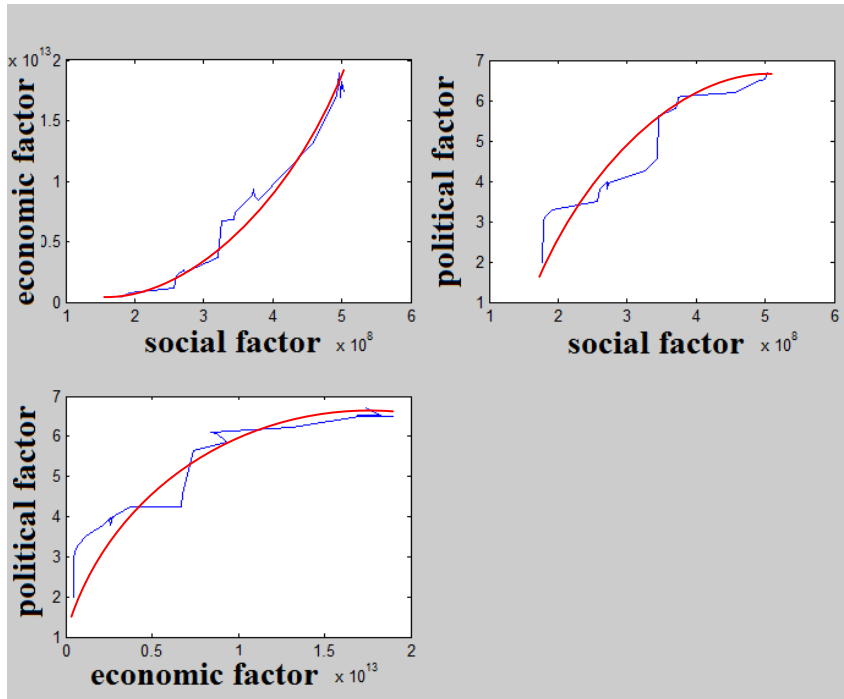
Advantages of STA:

- *Multidimensional analysis* of linearly independent variables with ability to separate each of them to linearly independent set of other variables
- *Principle of continuity:* circle of analysis of states and processes
- *Openness:* elimination of closed system assumption
- *Visualization:* shift away from 2 dimensional graphs, tables and diagrams

Disadvantages of STA:

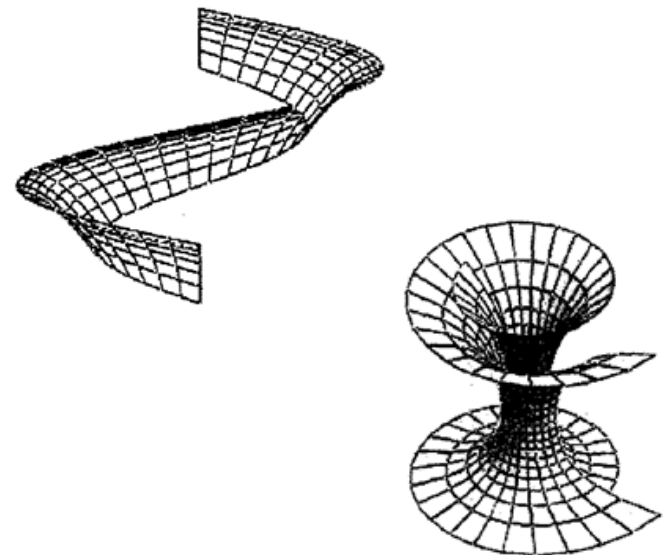
- *Complexity of search for relevant information and data*
- *Computational complexity*

Questions to think about



Projection of development pathway for integration processes within countries of the EU in the data space of events

Development pathway of the multiple global connections system in the data space of events might be described by equation of *hyperbolic spiral*. Each turn of this hyperbolic spiral forms circle of MGCS within macro-tendency of MGCS development.



Литература



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**Thank You
for Your attention!**