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Integrated Q&Q systems analysis in policy relevant wicked problems

Leena Ilmola-Sheppard,
with Elena Rovenskaya and Matthias Wildemeers
Advanced Systems Analysis Program
DMDU Conference Nov 14th 2017
Oxford

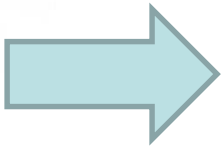
Research questions set by policy makers

- *How can w… Finnish population…*
- *How could… …ees more efficiently?*
- *How can w… …s of the asylum seekers?*
- *Is the Finn… …e refugee inflow, wha…*
- *When will the Finnish society collapse?*

Warren L4:
Unknown
Model,
Outcomes
Weights

From policy questions to research questions

- *How can we impact on the fear of the Finnish population?*
- *How could we control the flow of refugees more efficiently?*
- *How can we manage the expectations of the asylum seekers?*
- *Is the Finnish economy able to manage, what are the limits?*
- *When will the Finnish society collapse?*

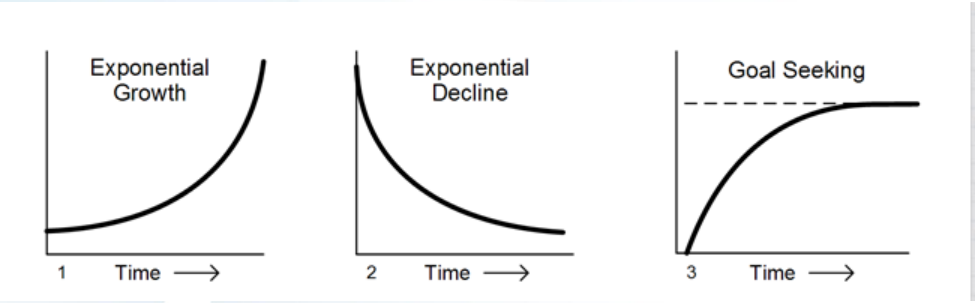


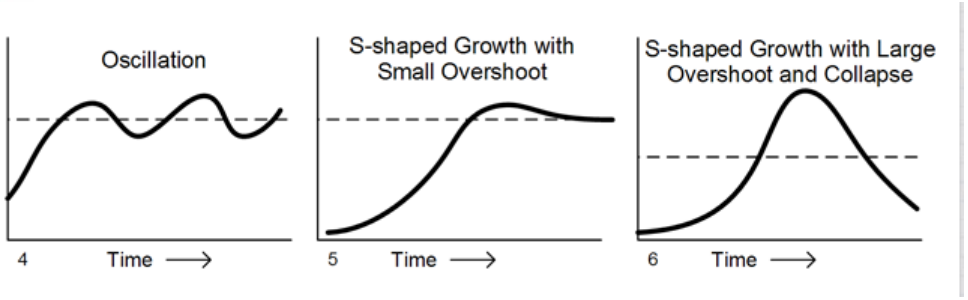
What is the system?
Which parts of the system are more important than other?
What defines the dynamics of the system?
Which components of the system are sensitive for policy impact?

Complexity as an immanent property of public policy planning

- A complex system (Cairney 2015):
  - **Cannot be explained by breaking it down into components due to their strong interdependency**
  - Non-linear dynamics, positive (amplifying) and negative (dampening) feedback loops
  - Sensitive to initial conditions
  - Emergence, local interactions define macro behavior
- Wicked => resisting to resolution
- Qualitative systems analysis
  - Participatory methods for exploration of a problem as part of a decision-making process (Checkland 1985, Coyle, 2000), but conduct simulations (Homer *et al*., 2001) as well
  - Suffer from the connotation of being ‘soft’ (Mingers 2011)

System performance patterns are defined by feedback loops





http://www.thwink.org/sustain/glossary/FeedbackLoop.htm

Case refugee system and Finland

How to analyze a wicked system without data?

Background

Objectives

- To build a systems description potential impacts of refugee phenomenon in the Finnish society
- To identify potential focus areas for efficient policy actions

Data collection

- Virtually (survey, map descriptions comments) and in workshops (systems components relationships and preliminary policy planning)

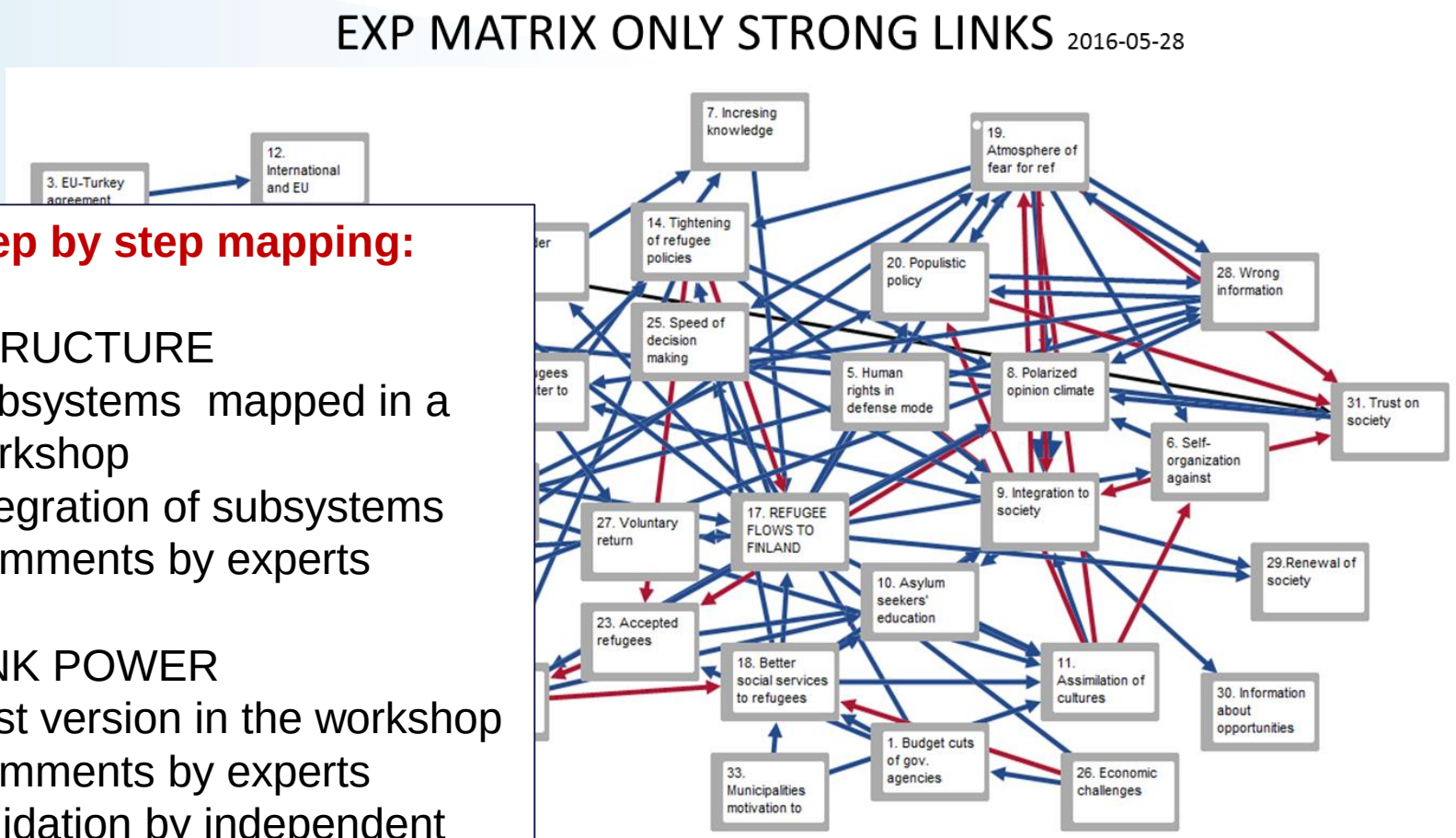
Method

- Qualitative systems map, that is analyzed both qualitatively and quantitatively
- Triangulation:
  - Expert Map produced by the governmen experts & Researcher Map that is based on available literature
  - Qualitative analysis & Quantitative systems analysis
  - Bayesian analysis

Process step by step

1. Challenge description (together)
2. Collection of the drivers of the refugee system (from experts, survey)
3. Causalities between system's components by experts
4. Quantitative analysis
5. Behavior in time
6. Potential policy focus choices

Systems map



Step by step mapping:

STRUCTURE
Subsystems mapped in a workshop
Integration of subsystems
Comments by experts

LINK POWER
First version in the workshop
Comments by experts
Validation by independent experts

Link matrix

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK
EXP MAP EDITS MAY 23																																				
COMPONENT IN ENGLISH	NR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		16	17	18	19	20	21	22	23	24	25	26		27	28	29	30	31	32	33
Budget cuts of gov. Agencies	1					5	1		3	-5	-5				5					-10	5	5	-5	5	-10		-10					-5		-5		-5
Tighter border formalities in EU- and Balkan countries.	2			5					5	-5			5		5				5		5			5	5	-5	-5	-1		5		5				
EU-Turkey agreement > refugee camps to Turkey	3					5	-5		-5	5	5		-10		-5	10			7	5	-5	-5		5		-10	5	-5			5	-5		-10		
Global mindset	4						-5	10		5		10		5		9			10	4					-5	10				5		5	5				
Human rights supporters are in a defence mode.	5		7				5		5	-10	-5	-5	5						5	-5					5		-5				5	-5		-5		-5
Self-organized activities against refugees.	6					5			10	-10		-5		5	5									5	-5									-10		-5
Increasing knowledge	7							5	5	1		5								5	-5				5	-5		5		10			5	5		5
Polarized opinion climate	8	5								-10				10											10	-5										
Integration to society	9		-5								10			5		7			-5		-10				5	-10	5	6				10	10	5	-5	5
Assylum seekers education	10	5					5			10		10		5		-5					-5			-5												
Assimilation of cultures	11		-5			-5	-10		-5	-10				3	-5					5	-10	-10		-5	-5	-5		-5				5		5		5
International agreements and EU systems are weakening.	12	5	-5							-5					5				5		5	5	5	5		5					5				5	
Wider contact network.	13				10			5		5								5								5				5					-5	
Tightening of the refugee policies	14								10	10					5			3	-10		-5	-5		5	-10					5		-5		-5	10	
No future	15		10			5								5					10		5	5		5		5						5		3		
																									3											
Fast reactions of migration to information.	16	5			5			10	5			1	5		5					5	5	10				-5				5	10		-5		5	
												-5																								
Refugee flows to Finland	17	5				10	5		10	-5	-5	10			10					-5	10	10	10	5	5					10	5	10		-5	10	
Better social services for refugees.	18	5					5			10	10	-10			10				10		-5		10			5		5				5				-5
Atmosphere of fear	19		5				10		10	-10		-5		5	10							10		5			-10	5		5	10	-5		-10		5
Populistic policy that changes all the time.	20	5	-1							-5					5			5			10										10	-5		-10		-5
Border control	21																		-5					5			5							5		5
Crime	22						5					-5							5		10										10			-5	-5	
Accepted refugees	23	5					5		5	-5		5				-10			5	-5	5	5				-5	5	5				5		-5	10	
Refugees try to enter to Finland	24		-5	-10			-5	5					5	10	10										5					10				5	-5	-5
Speed of the decision making process	25	-5	5				-5		-5	10			6	5	-5	5				5										5	-5			10	5	-5
Economic challenges	26	10	5	5				5	5		5		-10		5	6				-10		5			5		-5			-5				-5	-5	-5
Voluntary return	27																			5							5								-5	
Wrong information	28	1	5				5		10		-5	-5			5						10	10		5		10					5			-5	5	5
Renewal of society	29					5				-5		5																							5		
Info about opportunities	30																	5						-5	5							5				5
Ttrust on society	31	-5			5		-5		-10			5			-5					5				-5	5										-5	5
Illegal immigrants	32	5			5	5	5		10		-10									10	5			5							5				-5	
Municipalities motivation to accept																																				

refugee from fi perspective | ref from fi pers numbers | final EXP matrix | NO | PAAKAMAARTELMAT | NONONO | NONONO

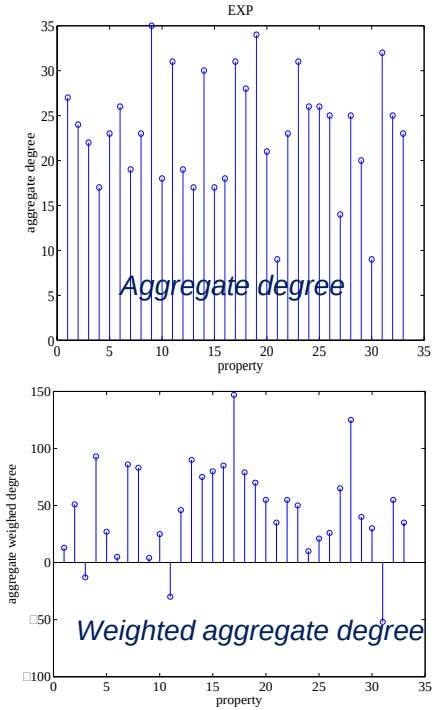
Question:
Which parts of the system are more important than others?

CENTRALITY:

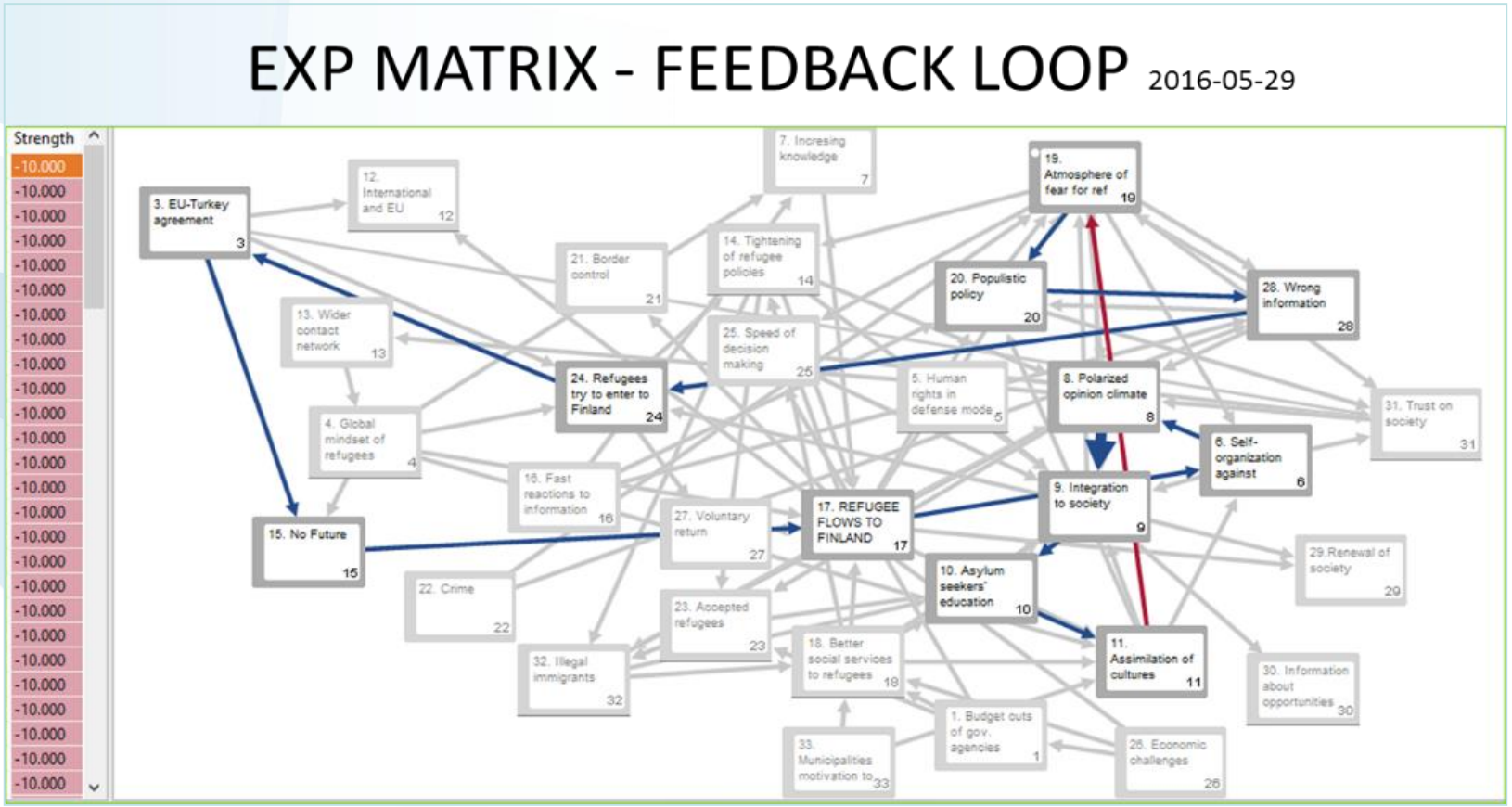
In-degree – number of incoming links
Out-degree – number of outgoing links

Aggregate degree:
In-degree+out-degree

Weighted degree:
Links strengths included to the calculation



Question:
What defines the dynamics of the system



Question: Which components of the system are sensitive for policy impact?

System dynamical modeling

We consider a network consisting of n nodes v_i that are marked with a certain value x_i. We further have a weighted adjacency matrix $C = [c_{ij}]$ that describes how changes of the node values x_i are generated by changes of the neighboring nodes. We consider here the scenario where changes $x(k)$ at time step k result in changes of the feature values at time step $k + 1$, but where $x(k)$ does not have a persistent effect further in the future. Let $u_j(k)$ denote the input (investment) in feature j at time k, then we can write

$$\Delta x_j(k+1) = \sum_i c_{ij} \Delta x_i(k) + u_j(k)$$

Two different analysis

I. Scenarios
   - Policy scenarios: How investment in Xi (border control) impacts on the other system components?
   - Development scenarios: If the component Xj (fear) is changing radically, what happens?

II. Which scenario has the biggest impact on component Xy?
   - How different scenarios such as investment in communications, investment in border control, increasing populist policy making or increase of the public sector budget cuts, impact on illegal immigration?

1. Step: Quantitative analysis and stimulation of scenarios will show what type of policies are efficient or not efficient.

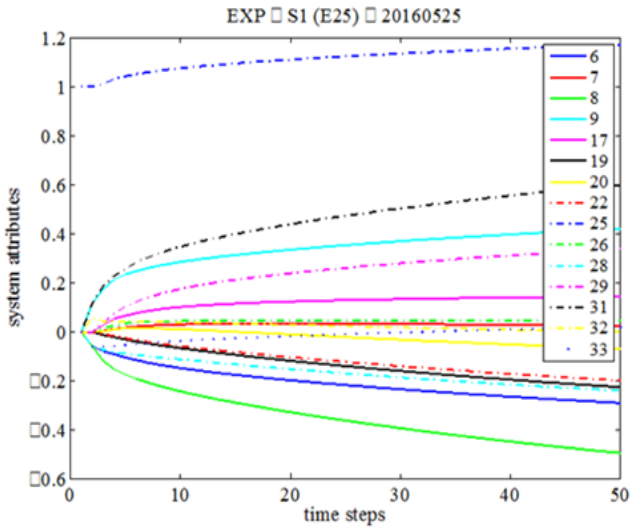
2. Step: Qualitative analysis reveal why those policies are efficient or not efficient.

One question

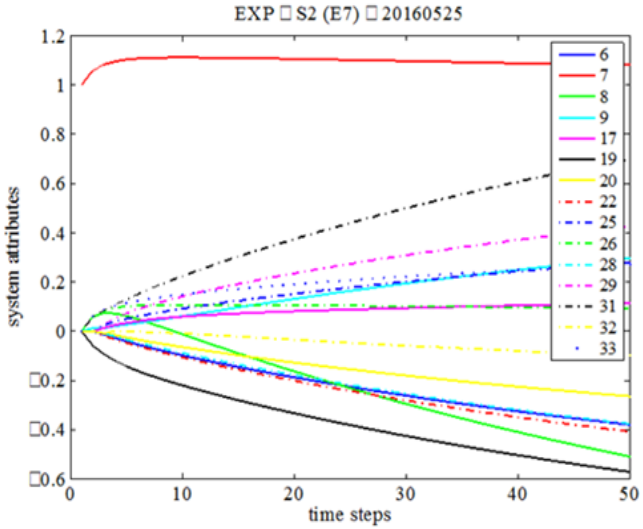
– **analysis process**

How to prevent increase of fear?

1. How the S1 or the S2 policy impacts on key components of our system?



S1: Investment into application processing speed (E25)



S2: Investment into communications (E7)

EXP MATRIISIN AVAINMUUTTUJAT	
6	Self-organized violence
7	Knowledge
8	Polarized opinions
9	Integration to society
17	Refugee flows to Finland
19	Fear
20	Populist politics
22	Crime
25	Speed of application processing
26	Economic challenges
28	Wrong information
29	Renewal of society
31	Trust society
32	Illegal refugees
33	Motivation of municipal authorities

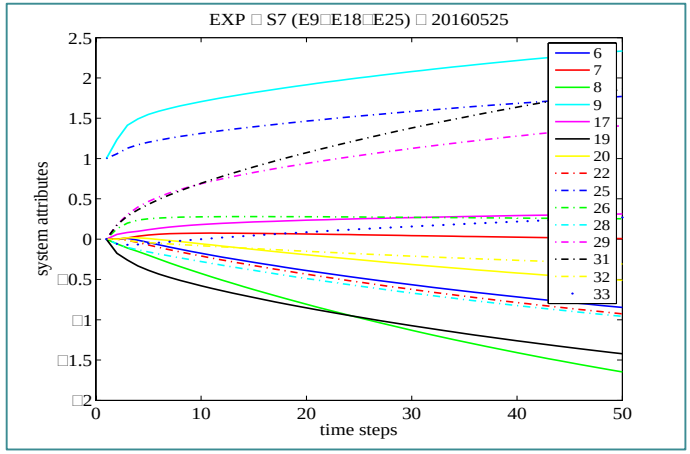
2. Anomalies
Collaboration of authorities

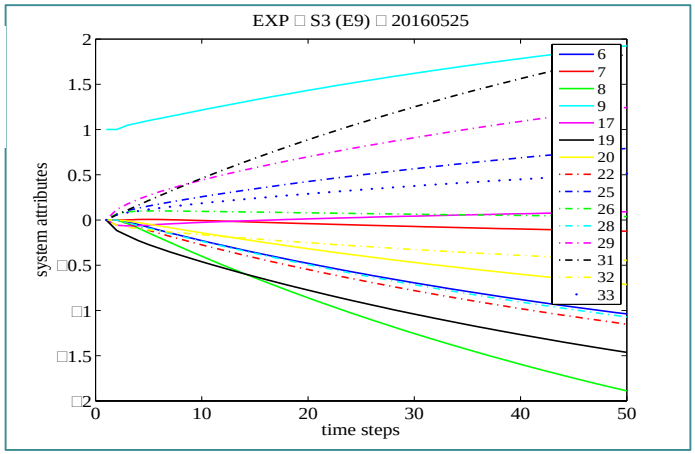
- This is an efficient way to decrease fear, polarized debate and increase renewal of society, because via indirect impact decreases populist politics and number of immigrants is increasing

- But as seen in S3, impact is even stronger if only in one of the areas, integration to society (E9) is invested

S7:Improvement of authority cooperation by investing in screening process, sote and integration VAR E25, VAR E18 and VAR E9

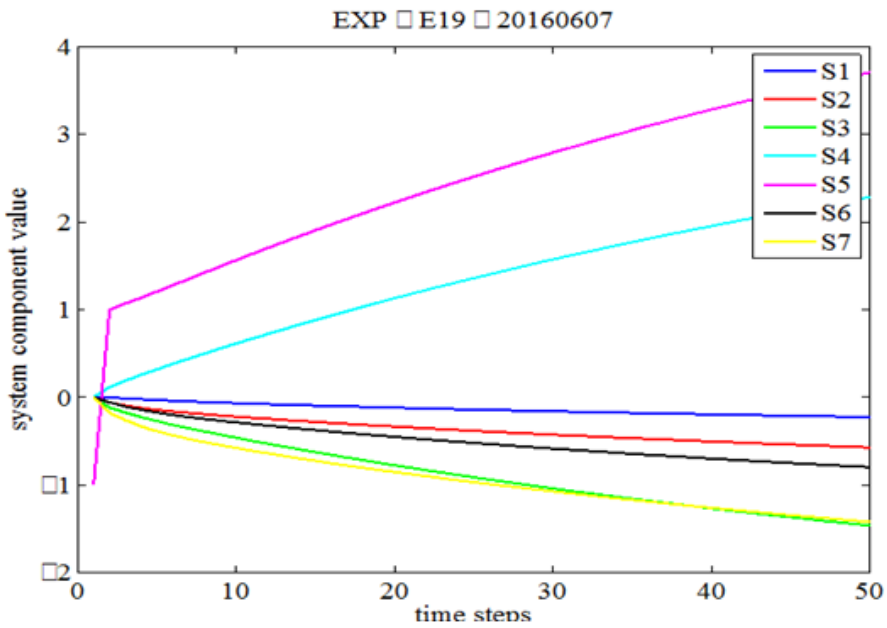
S3: Investment in integration to society E9





Explanation: efficiency of screening process and improvement of social services are causing some negative indirect impact by increasing populist policy making and fear

3. How sensitive the 'Fear' component is to the different scenarios?

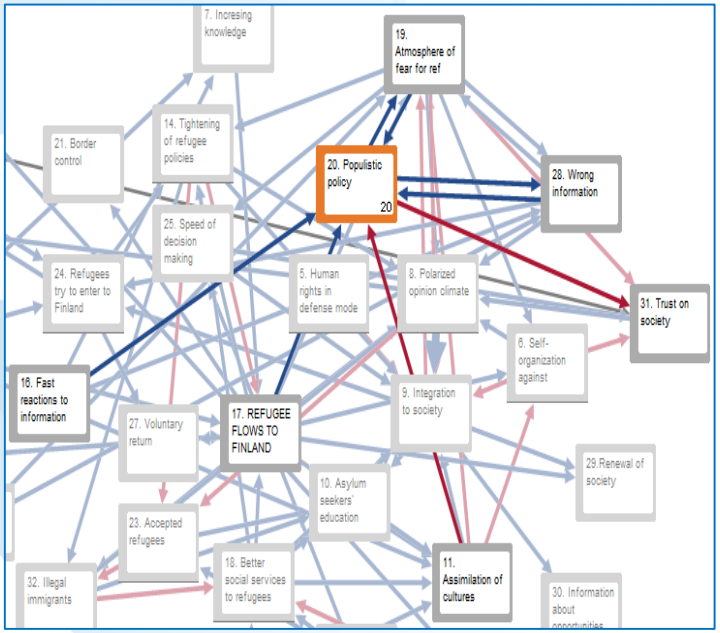


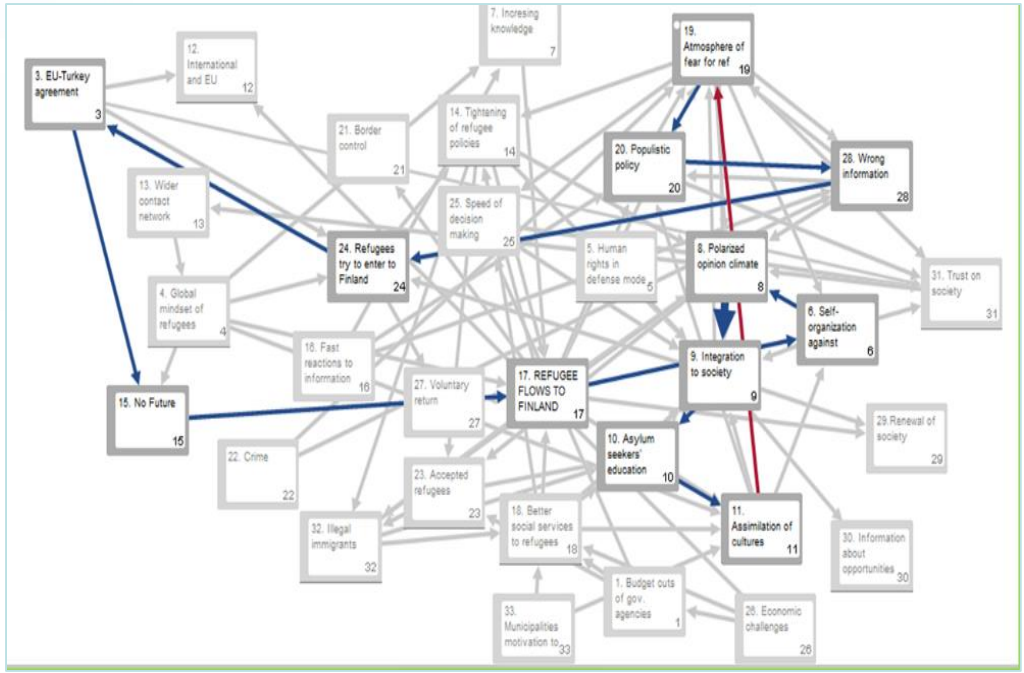
SCENARIOS

S1 Investment into efficiency of the application processing
S2 Investment into communications
S3 Investment into integration
S4 Populist policy making is increasing
S5 Fear increases
S6 Decrease of fear by communications and improvement of application process
S7 Investment into authority collaboration

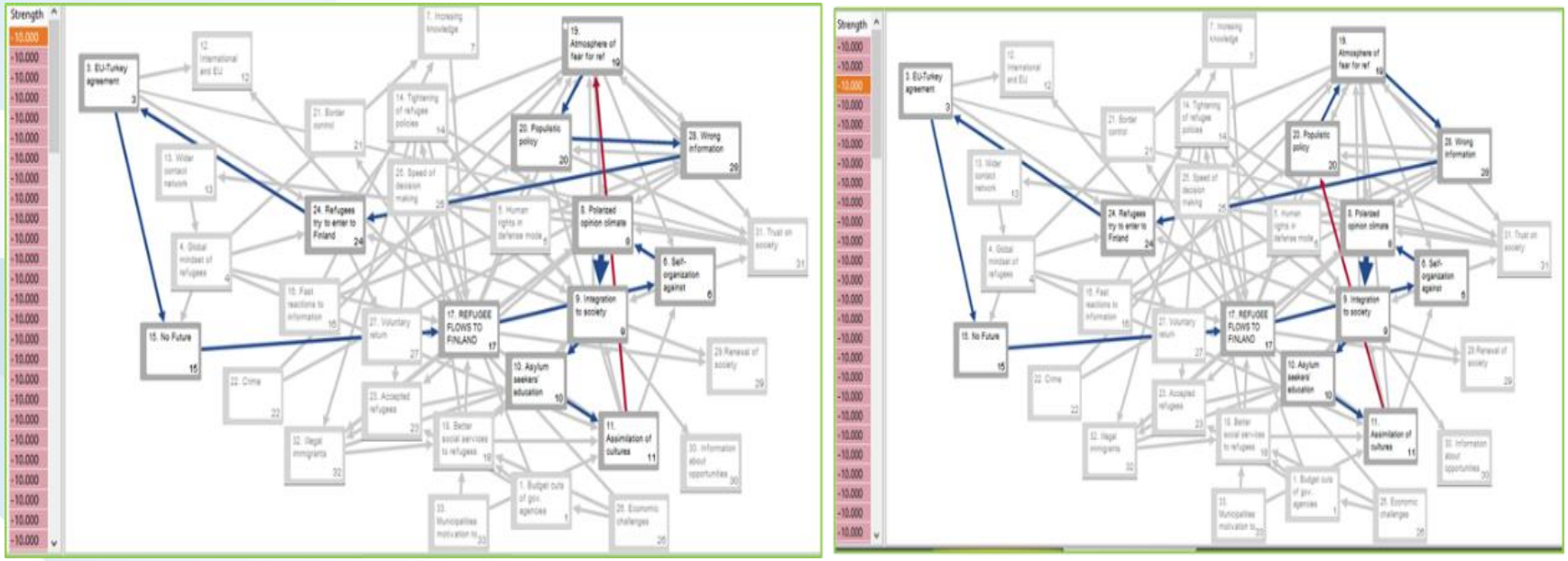
Scenarios S1…S9 impact on Fear (E19)

4. Why populist policy making has such a role?





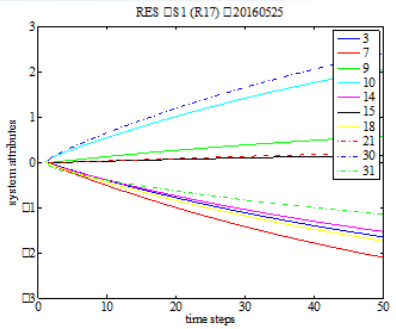
5. How can we manipulate the system so that the ‘Fear’ does not increase?

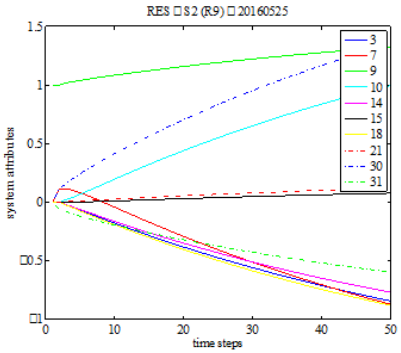


Assimilation of cultures is the only component of these feed back loops that is able to decrease fear both directly and indirectly.

Is this systems map 'the right one'?

RES Matrix

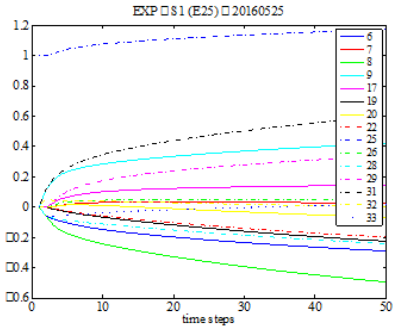


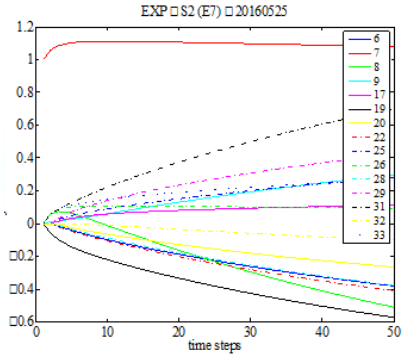


S1: The decision makers decide to invest in the efficiency of the applications processing.

S2:
…. Investment in communications

EXP Matrix





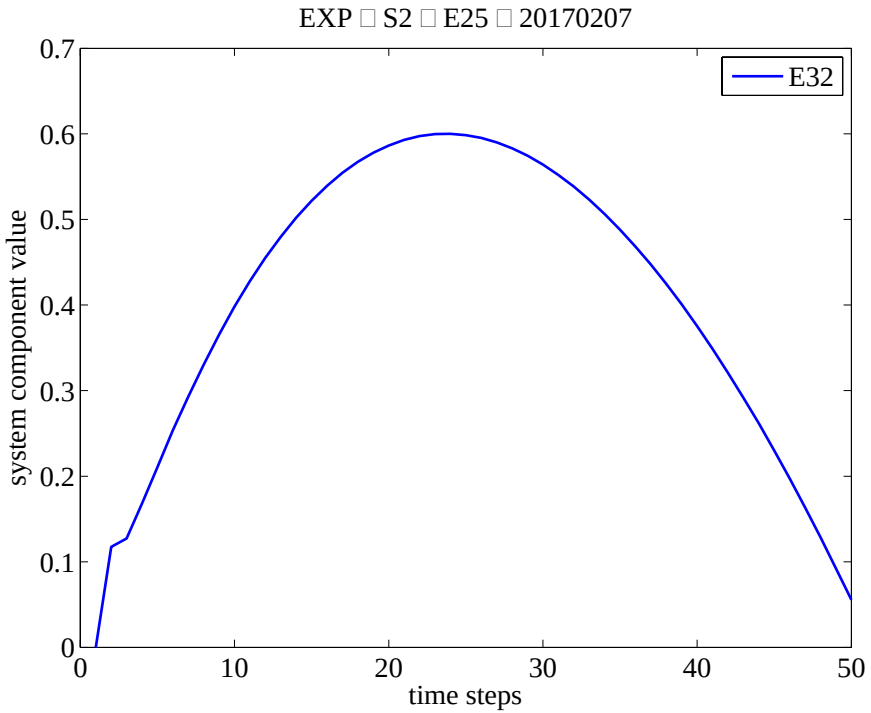
Two different systems representations produced by different groups

>> SAME CONCLUSIONS

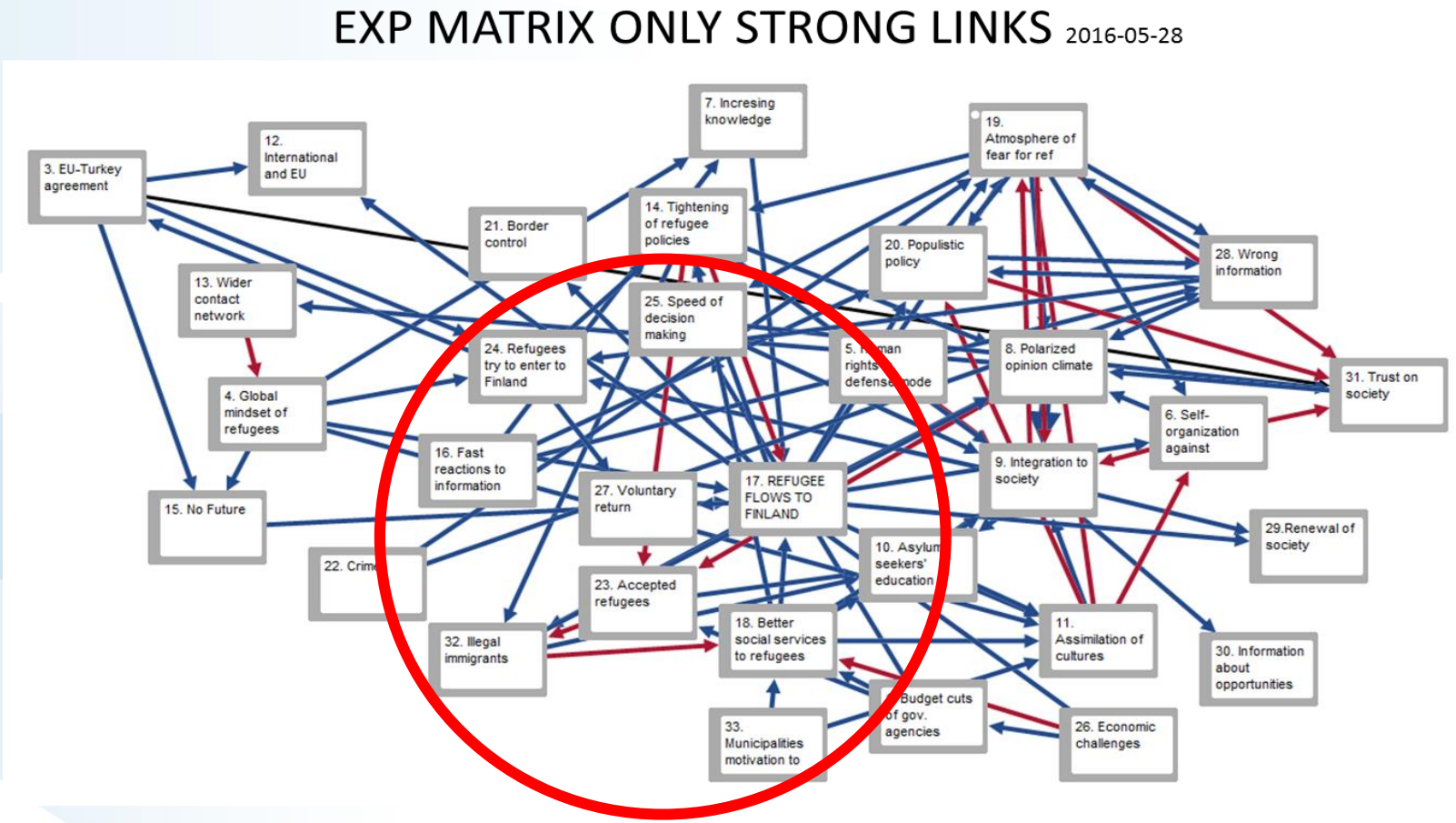
What a heck?

If speed of decision making (E25)is doubled - what is the impact on Illegal immigration (E32)

>> Very strange
>> Long term impact?????



What a heck?


EXP MATRIX ONLY STRONG LINKS 2016-05-28
7. Incresing knowledge
19. Atmosphere of fear for ref
12. International and EU
3. EU-Turkey agreement
14. Tightening of refugee policies
21. Border control
20. Populistic policy
28. Wrong information
13. Wider contact network
25. Speed of decision making
24. Refugees try to enter to Finland
8. Polarized opinion climate
31. Trust on society
4. Global mindset of refugees
6. Self-organization against
16. Fast reactions to information
9. Integration to society
17. REFUGEE FLOWS TO FINLAND
27. Voluntary return
15. No Future
29.Renewal of society
23. Accepted refugees
18. Better social services to refugees
11. Assimilation of cultures
32. Illegal immigrants
30. Information about opportunities
33. Municipalities motivation to
26. Economic challenges

Conclusions

- We can decrease fear by investing in improved
  - Acculturation
  - Education for refugees
  - Decrease of the amount of refuge inflow
- BUT SIMULTANEOUSLY ERODE TRUST IN INSTITUTIONS
- Quality: rigorous?
  - Research layout quality
  - Process quality
  - Results quality
  - Recommendations quality

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ilmola@iiasa.ac.at

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