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# Korean Dream Valley for foresight

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# Foresight and uncertainty

		Swartz, Wack	Reibnitz	Godet	TIA&CIA	IFS
Motive and role of the method		Organizing and challenging perceptions.	solving complex problems	description of futures states, internal flexibility	description of future states, internal flexibility	probability based analysis of alternative futures
Data		Qualitative	qualitative, process quantitative	qualitative, quantitative	quantitative computation	experts provide with variables, quantitative
	Uncertainty aspect	Attention towards probable trends, megatrends	Check once again	Check once again	Past as a starting point.	Large set of variables
Process features		Driver analysis, scenario stories	consistency analysis, consistent scenarios shaped by multiple drivers	Focus on drivers impact on structure, formal methods (MICMAC)	Cross-impact of variables, cause-effect descriptions, Mone Carlo simulation	A set of descriptors are listed, alternative states described and probabilities of each state assessed. Bayesian computation of cross-impact values.
	Uncertainty aspect	Uncertainties assessed, but non-probable/ non-likely drivers not included	disruptive events, wild cards used in the process	Excludes impossible combinations.	Areas (envelopes) of uncertainty defined	Alternative states defined. Probability based.
Reporting		All the scenarios are reported		Multiple states: scenario stories, based on combinations of consistent states.	Development trajectories	Probability report of each variable (range of variables),
	Uncertainty aspect	Uncertainty: No comments on probability		Non-likely combinations not included.	Impact of disruptive events assessed.	Focus on probability, non-probable solutions excluded.
Summary	Epistemological uncertainty	based on recognized drivers, uncertainty assessed	disruptive events, wild cards	focus on indirect impact of drivers, morphological analysis of potential states	Presents future as an extension of past,	not taken into consideration (based on known cause - effect relationships)
	Ontological uncertainty	None	wild cards	None	Stated, but not analyzed.	Not analyzed.
Source of information		Schwartz, Wack, Mietzinger-Rieger	Reibnitz, Mietzinger-Rieger	Godet, Bishop et al, Amar, Bradfield et al.	Bishop et al, Bishop et al.	Millet 2003, Bradfield et al, Bishop et al

# Three notions as a starting point

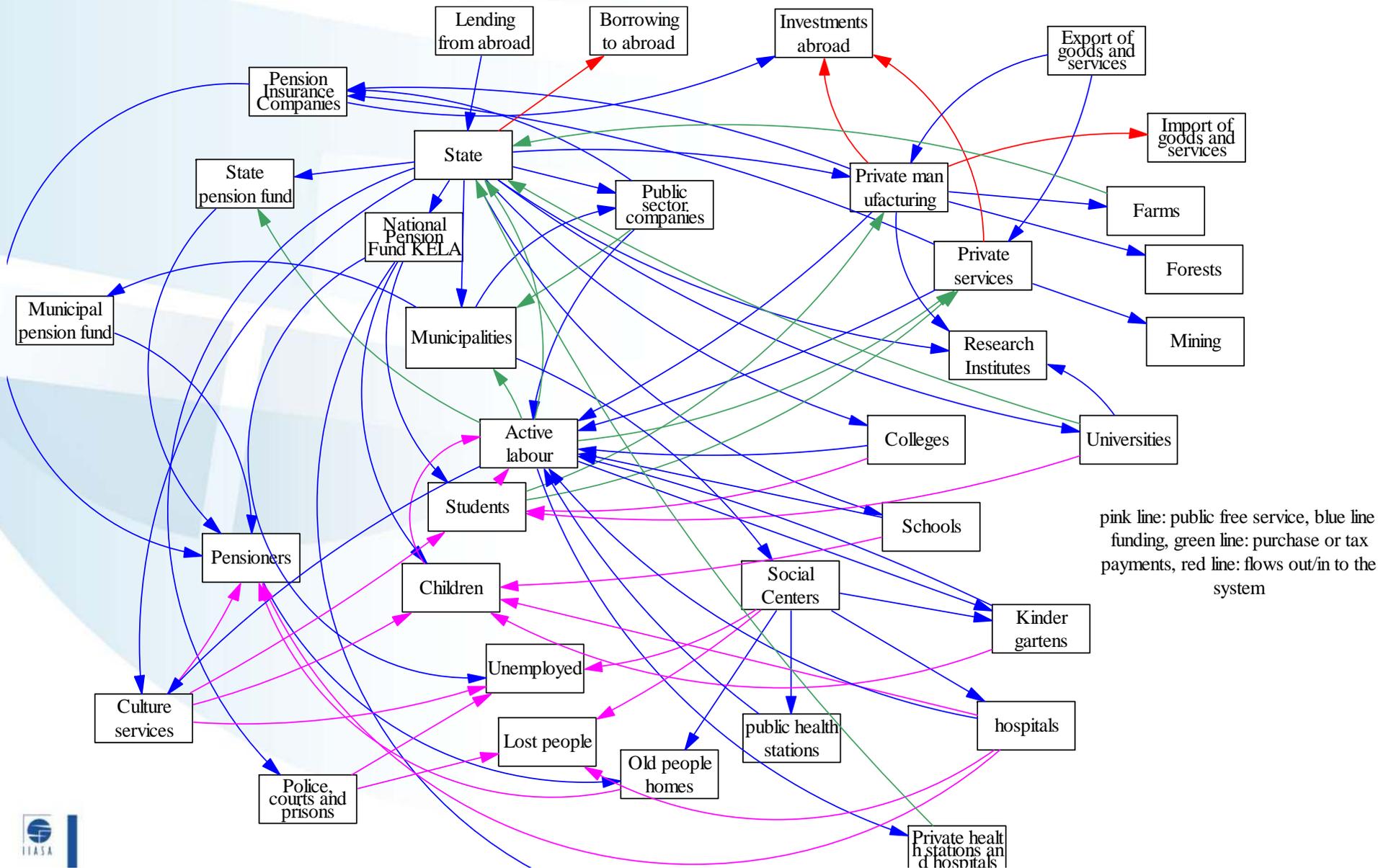
The word reality can never mean anything more than the mental model of the user of that word (Meadows 2004, p 132)

No specific proposal, no decision, no action, no system can get a total grip on the situation. The implication is that using a 'systems approach' requires (Reynolds 2008)

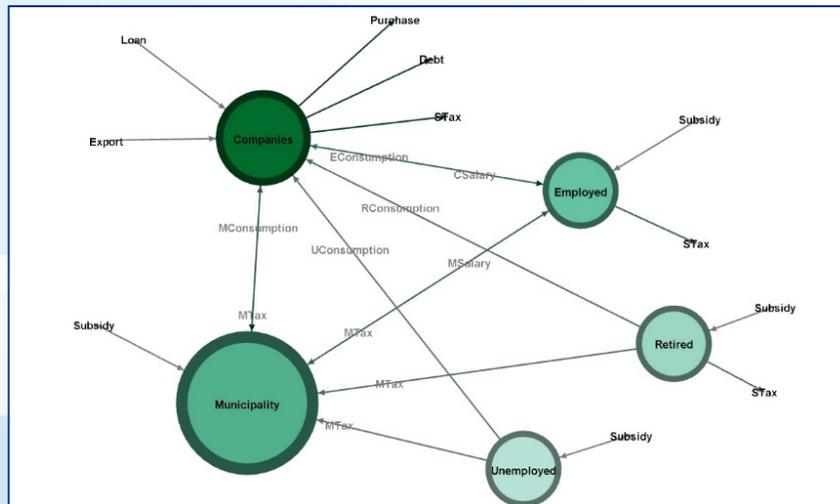
US

- i. to consider systematically what our systems maps or designs may leave out and
  - ii. to always examine them from multiple perspectives.
- In complex dynamic systems cause and effect are often distant in time and space This not only explains our neglect of feedback structure but also implies the fact that systems are often insensitive to the most intuitive policies. (Forrester 1971).

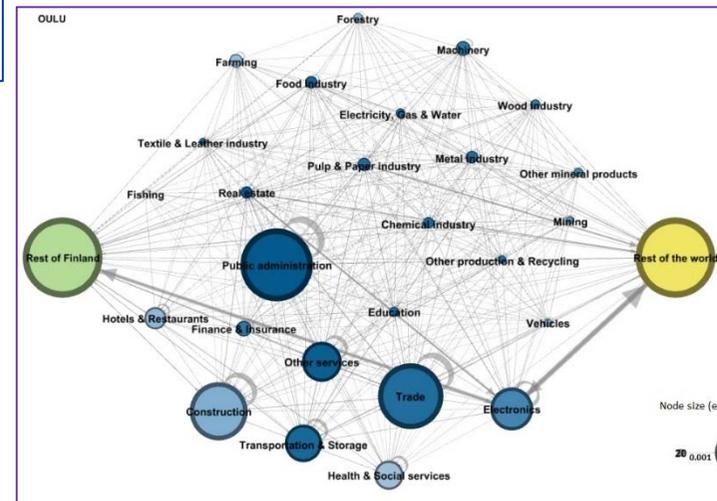
# Invest time in qualitative systems modeling



# Build stylized models



Systems dynamical modeling



Network models

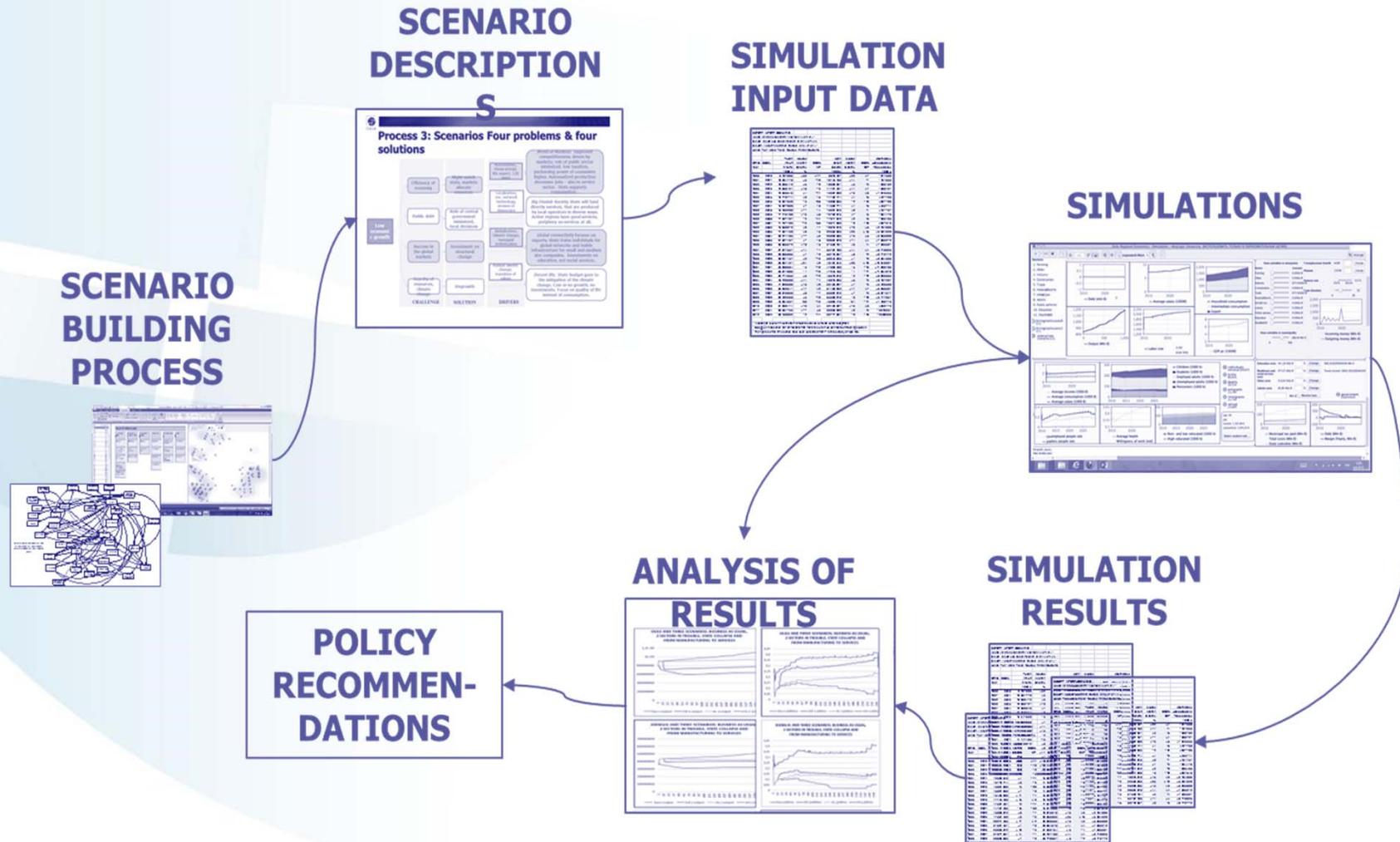
# Modeling of Complex Adaptive Systems

- CAS:
  - Open system, clear system boundaries
  - No central control,
  - Heterogenous agents
  - System level; emergent behavior
  - Adaptation by local optimization
  - Self-organization requires import of energy

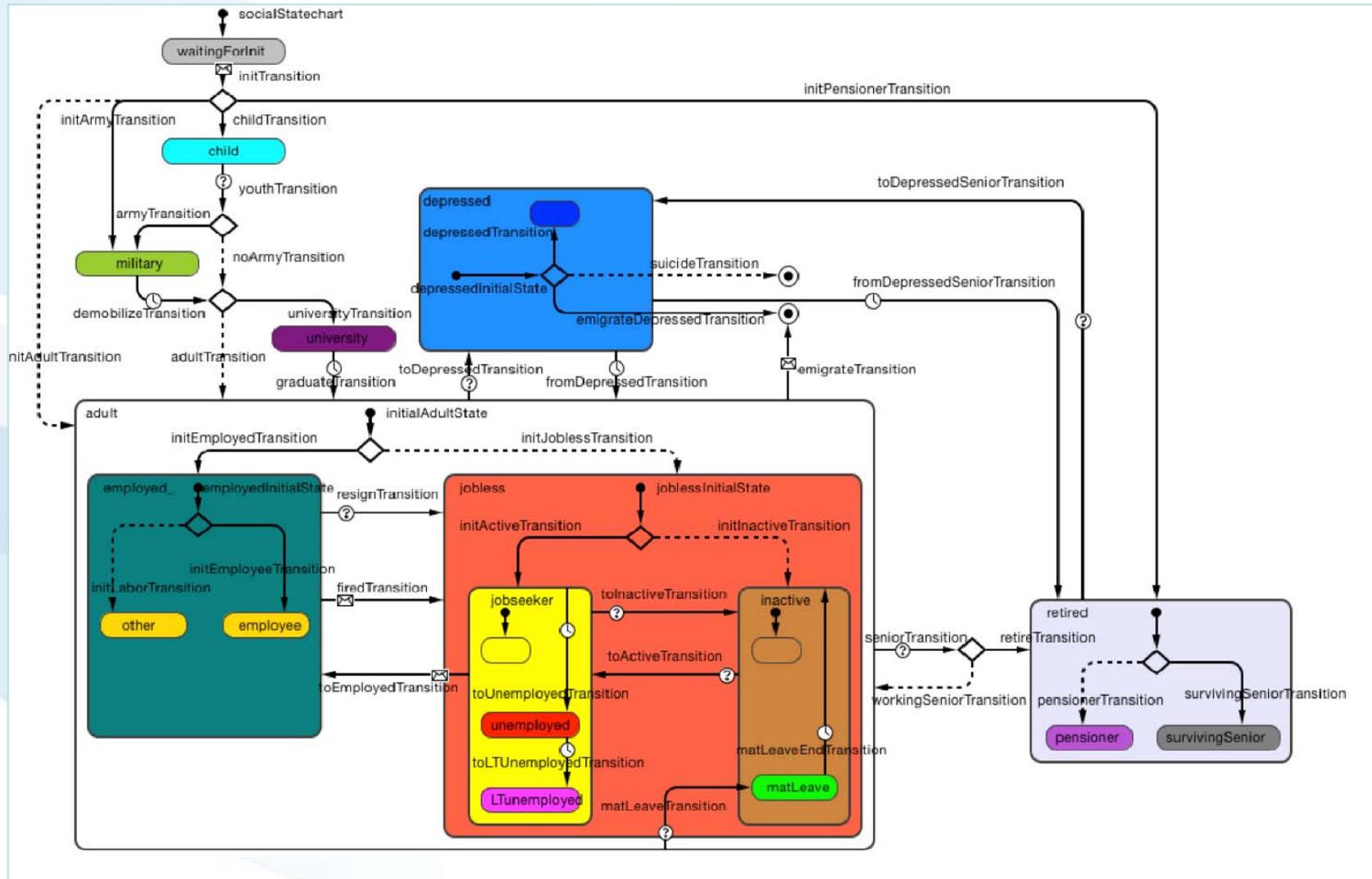
# Four uses four type of questions

- Scenario as a path
  - If X scenario happens what is the impact and when it will happen?
  - If xyz is the scenario, how it could develop (back casting)?
- Shock and its impact
  - If this shock happens who will be hurt most?
  - When is the impact at its most severe?
- Policy testing
  - What kinds of policies would produce a desired outcomes
  - What is the impact of timing of the policy
- Stochastic simulation runs
  - Behavior patterns
- For transitions?

# ABM is not only about simulation



# Behavior rules change in time



# Social Mood expectations for the future

Consumer Behavior	Pos	Neg	Theory support for behavior
Education activity	More people go to uni	Less people go to uni	Sipsma, Heather L., et al. "The impact of future expectations on adolescent sexual risk behavior." <i>Journal of youth and adolescence</i> 44.1 (2015): 170-183. Raynor, Kathleen. "Book Review: Determined to Succeed? Performance versus Choice in Educational Attainment." <i>Teaching Sociology</i> 43.1 (2015): 70-72.
Job seeking	People are more active for search of a job	Less active	Stephens Jr, Melvin. "Job loss expectations, realizations, and household consumption behavior." <i>Review of Economics and statistics</i> 86.1 (2004): 253-269. Berlew, David E., and Douglas T. Hall. "The socialization of managers: Effects of expectations on performance." <i>Administrative Science Quarterly</i> (1966): 207-223.
Length of unemployment	Re. above		Deegan, Matthew P., et al. "Positive Expectations Encourage Generalization From a Positive Intergroup Interaction to Outgroup Attitudes." <i>Personality and Social Psychology Bulletin</i> 41.1 (2015): 52-65.
Marriage	More prone for marriage	Less prone for marriage	Harknett, Kristen, and Arielle Kuperberg. "Education, labor markets and the retreat from marriage." <i>Social forces</i> 90.1 (2011): 41-63.
Getting children	More children	Less children	Sobotka, Tomáš, Vegard Skirbekk, and Dimiter Philipov. "Economic recession and fertility in the developed world." <i>Population and development review</i> 37.2 (2011): 267-306.
Consumption	Higher consumption rate	Higher saving rate	Carroll, Christopher D., and Jiri Slacalek. "Sticky expectations and consumption dynamics." <i>Johns Hopkins University</i> (2006). Kurz, Mordecai, et al. <i>Monetary Policy with Diverse Private Expectations</i> . No. def022. Università Cattolica del Sacro Cuore, Dipartimenti e Istituti di Scienze Economiche (DISCE), 2015. Stillwagon, Josh R. "Testing the expectations hypothesis with survey forecasts: The impacts of consumer sentiment and the zero lower bound in an I (2) CVAR." <i>Journal of International Financial Markets, Institutions and Money</i> 35 (2015): 85-101. Bachmann, Rüdiger, Tim O. Berg, and Eric R. Sims. "Inflation Expectations and Readiness to Spend: Cross-Sectional Evidence." <i>American Economic Journal: Economic Policy</i> 7.1 (2015): 1-35. Abraham, Rebecca, and Charles W. Harrington. "Consumption Patterns in the Aftermath of the Financial Crisis: The Case of Baby Boomers." <i>Modern Economy</i> 6.02 (2015): 245. Black, Angela, David G. McMillan, and Fiona J. McMillan. "Cointegration between stock prices, dividends, output

### The Dream Valley Model

Version: 4.0 alpha  
 Region: Korea  
 Scenario: 0  
 Scaling factor: 1:10000

Show historical data (use for validation)

Save modeling results to .xls

Select rnd person    Select rnd sector

#### Population

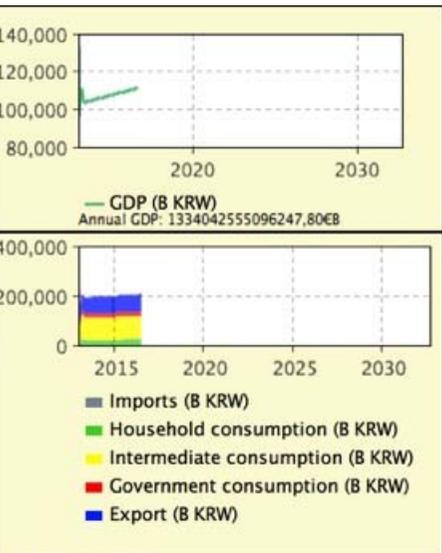
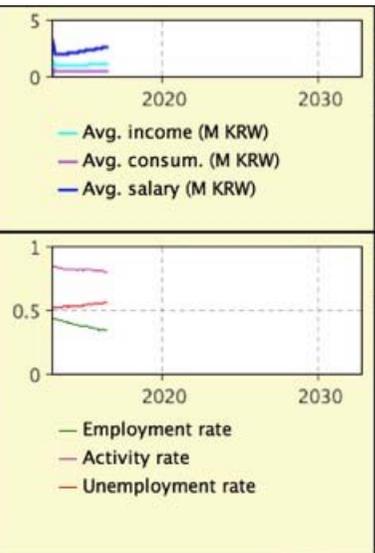
#### Vital statistics

Individual 4487

age: 19  
 consumption: 132.67 k KRW  
 income: 300.00 k KRW  
 job: Student

employable (2137)    inhabitants Individual (5264)

Sectors:	Change	Details	Government subsidies and purchases (B KRW)	Export (B KRW)	Output struct.
0 Growing of Crops	0.00	Na%	0.00	45.5	7.8%
1 Farming of Animals	0.00	Na%	0.00	1.4	0.2%
2 Forestry	0.00	Na%	0.00	1.1	0.2%
3 Fishing	0.00	Na%	0.00	0.2	0.0%
4 Services incidental to Agriculture	0.00	Na%	0.00	0.0	0.0%
5 Mining of Coal, Crude Petroleum and Natural Gas	0.00	Na%	0.00	25.3	4.4%
6 Mining of Metal Ores/Non-metallic Minerals	0.00	Na%	0.00	564.8	9.7%
7 Manufacture of Food Products	0.00	Na%	0.00	2019.4	35.1%
8 Manufacture of Beverages	0.00	Na%	0.00	297.3	5.1%
9 Manufacture of Tobacco Products	0.00	Na%	0.00	1.4	0.0%
10 Manufacture of Textiles, Except Apparel	0.00	Na%	0.00	1.4	0.0%
11 Tanning and Dressing of Leather, Manufacture of L...	0.00	Na%	0.00	1.4	0.0%
12 Manufacture of Wood Products of Wood and Cork; Ex...	0.00	Na%	0.00	1.4	0.0%
13 Manufacture of Pulp, Paper and Paper Products	0.00	Na%	0.00	1.4	0.0%
14 Printing and Reproduction of Recorded Media	0.00	Na%	0.00	1.4	0.0%
15 Manufacture of Coke, hard-coal and lignite fuel br...	0.00	Na%	0.00	1.4	0.0%
16 Manufacture of chemicals and chemical products exc...	0.00	Na%	0.00	1.4	0.0%
17 Manufacture of Synthetic Rubber	0.00	Na%	0.00	1.4	0.0%
18 Manufacture of Man-Made Fibers	0.00	Na%	0.00	1.4	0.0%
19 Manufacture of Pharmaceuticals, Medicinal Chemical...	0.00	Na%	0.00	1.4	0.0%
20 Manufacture of Fertilizers and Nitrogen Compounds	0.00	Na%	0.00	1.4	0.0%
21 Manufacture of Other Chemical Products	0.00	Na%	0.00	1.4	0.0%
22 Manufacture of Synthetic Resin and Other Plastic M...	0.00	Na%	0.00	1.4	0.0%
23 Manufacture of Rubber Products	0.00	Na%	0.00	1.4	0.0%
24 Manufacture of Glass and Glass Products	0.00	Na%	0.00	1.4	0.0%
25 Manufacture of Other Non-metallic Mineral Products	0.00	Na%	0.00	1.4	0.0%
26 Manufacture of Basic Iron and Steel	0.00	Na%	0.00	1.4	0.0%
27 Manufacture of Rolled, Drawn and Folded Products o...	0.00	Na%	0.00	1.4	0.0%
28 Manufacture of Basic Precious and Non-ferrous Metals	0.00	Na%	0.00	1.4	0.0%
29 Cast of Metals	0.00	Na%	0.00	1.4	0.0%
30 Manufacture of Fabricated Metal Products, Except M...	0.00	Na%	0.00	1.4	0.0%
31 Manufacture of general Purpose Machinery	0.00	Na%	0.00	1.4	0.0%
32 Manufacture of Special-Purpose Machinery	0.00	Na%	0.00	1.4	0.0%
33 Manufacture of electrical equipment	0.00	Na%	0.00	1.4	0.0%
34 Manufacture of semiconductor	0.00	Na%	0.00	1.4	0.0%
35 Manufacture of Display Boards	0.00	Na%	0.00	1.4	0.0%
36 Manufacture of Other Electronic Components	0.00	Na%	0.00	1.4	0.0%
37 Manufacture of Computers and Peripheral Equipment	0.00	Na%	0.00	1.4	0.0%
38 Manufacture of telecommunication and Broadcasting ...	0.00	Na%	0.00	1.4	0.0%
39 Manufacture of Home Electronic Appliances	0.00	Na%	0.00	1.4	0.0%
40 Manufacture of Medical, Precision and Optical Inst...	0.00	Na%	0.00	1.4	0.0%
41 Manufacture of Motor Vehicles, Trailers and Semitr...	0.00	Na%	0.00	1.4	0.0%
42 Building of Ships and Boats	0.00	Na%	0.00	1.4	0.0%
43 Manufacture of Other Transport Equipment	0.00	Na%	0.00	1.4	0.0%
44 Other Manufacturing n.e.c.	0.00	Na%	0.00	1.4	0.0%
45 Production, Collection and Distribution of Electr...	0.00	Na%	0.00	1.4	0.0%
46 Gas, steam, and hot water supply	0.00	Na%	0.00	1.4	0.0%
47 Water Supply	0.00	Na%	0.00	1.4	0.0%
48 Sewage and Wastewater Treatment Services	46.31	0.0%	0.00	0.4	0.0%
49 Human Waste Treatment Services	3.60	0.0%	0.00	1.6	0.0%
50 Building Construction	0.00	Na%	0.00	28.4	0.5%
51 Heavy Construction	0.00	Na%	0.00	1836.0	32.1%
52 Wholesale and retail trade	0.00	Na%	0.00	2649.4	46.1%
53 Land Transport	0.00	Na%	0.00	937.1	16.3%
54 Air Transport	0.00	Na%	0.00	147.4	2.6%
55 Storage and support activities for transportation	0.00	Na%	0.00	703.3	12.3%
56 Accommodation and food service activities	147.97	0.0%	0.00	68.7	1.2%
57 Telecommunications	0.00	Na%	0.00	152.9	2.7%
58 Broadcasting	0.00	Na%	0.00	30.4	0.5%
59 Information service activities	0.00	Na%	0.00	22.6	0.4%
60 Computer programming, consultancy and related acti...	0.00	Na%	0.00	188.8	3.3%
61 Publishing activities	0.00	Na%	0.00	289.9	5.0%
62 Motion picture, video and television programme pro...	0.00	Na%	0.00	61.1	1.1%
63 Financial Institutions, Except Insurance and Pensi...	0.00	Na%	0.00	117.4	2.1%
64 Insurance and Pension Funding	0.00	Na%	0.00	47.3	0.8%
65 Activities Auxiliary to Financial Service and Insu...	0.00	Na%	0.00	188.8	3.3%
66 Residential Property Management	0.00	Na%	0.00	289.9	5.0%
67 Real Estate Activities with Own or Leased Property	0.00	Na%	0.00	61.1	1.1%
68 Renting and leasing, except real estate	0.00	Na%	0.00	117.4	2.1%
69 Research and Development	0.00	Na%	0.00	47.3	0.8%
70 Professional Services	0.00	Na%	0.00	117.4	2.1%
71 Architectural, Engineering and Other Scientific Te...	0.00	Na%	0.00	61.1	1.1%
72 Business Facilities Support Management Services	0.00	Na%	0.00	117.4	2.1%
73 Public Administration and Defence; Compulsory Soc...	8423.76	0.0%	0.00	311.7	5.4%
74 Education	165.01	0.0%	0.00	61.1	1.1%
75 Human Health	4017.38	0.0%	0.00	117.4	2.1%
76 Social Work Activities	510.44	0.0%	0.00	61.1	1.1%
77 Creative, Arts and Recreation Related Services	25.55	0.0%	0.00	117.4	2.1%
78 Sports activities and amusement activities	0.00	Na%	0.00	117.4	2.1%
79 Membership Organizations	0.00	Na%	0.00	117.4	2.1%
80 Maintenance and Repair Services	0.00	Na%	0.00	117.4	2.1%
81					



### Decision maker toolbox

Unemployment benefit (KRW) 669,600  Change

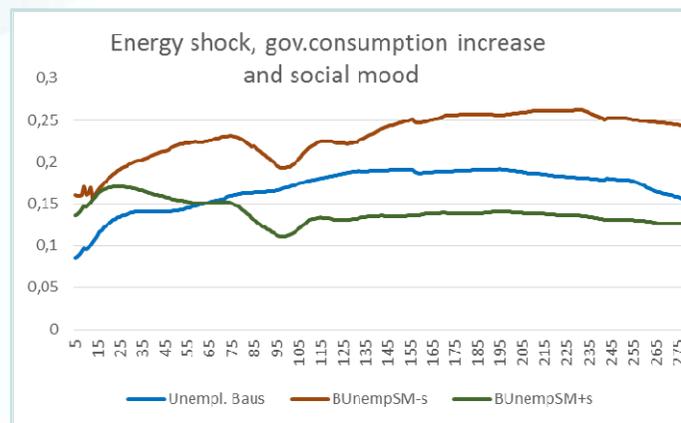
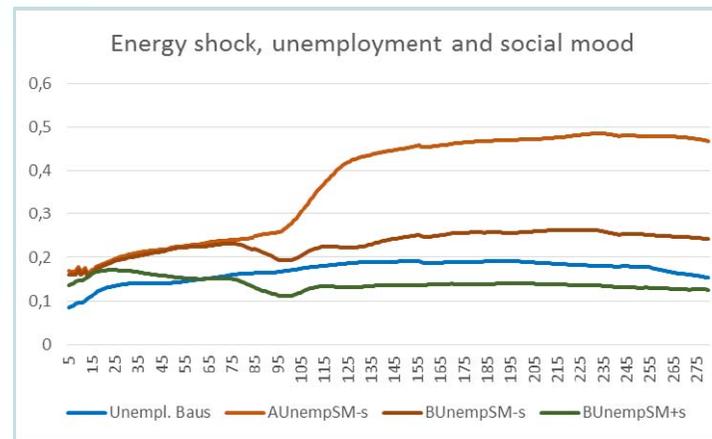
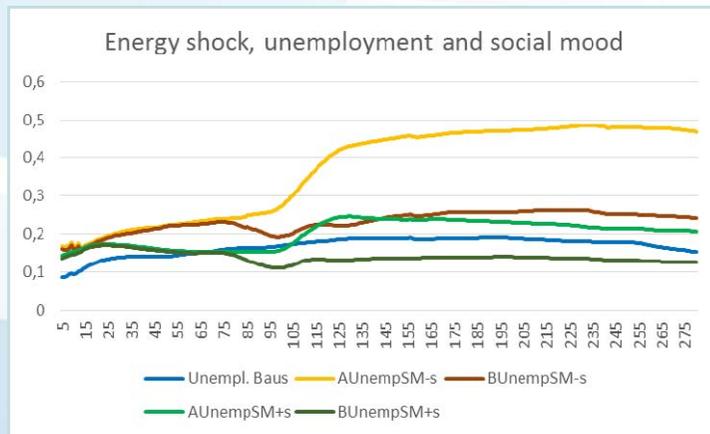
Pension (KRW) 700,000  Change

Interest rate  0.0% 50.0% 5.0%

Loan duration (years)  0 30 10

Retirement age (years)  50 90

# 20150521 energy shock & government consumption



# Why **not** to use ABM

- Mostly slow and resource intensive
- Data requirements
- Not suitable for forecasting
- Not good for assessment of incremental changes
- Agents are controlled centrally
- Validation requirements of users are high
- Slow to run

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