

## Heart vs. Model by Kai Neumann, 2008

*Only few areas where humans not have to estimate the development of economy, environment or society prior taking a decision. But how? Guessing? Trust your snap decisions? Rely on expert's knowledge? Or with the help of a computer model? What follows is a short comparison of these options and a presentation of a new possibility of computer-aided modeling. The result: Guessing, your snap decision and expert's knowledge can be combined and extended in easy to build qualitative models:*

There is no doubt: all that methods often work as they do often fail. First how they work:

Stock market games are won by laypersons, who just guess. The more complex and unpredictable a system is, the more likely guessing is appropriate.

'Snap decisions' or 'snap arguments' or 'intuitive decisions' or 'decisions from the heart' by using one's so called intuitive intelligence mean, that we perceive many vague information that we unconsciously form to some kind of feeling for the right decision. Theoretically having enough time and the right methods we would be able to consciously reflect on our criteria for the snap decision. [Gladwell]

Experts - to no surprise - know developments best if some situation from the past is occurring again.

Computer models finally give a feasible scenario if they represented reality well enough, if they included the crucial factors and if they estimated the factor's interplay correctly. They are generally better than any expert's knowledge or snap-decision if counterintuitive or nonlinear behavior had to be considered. [Sterman] Nevertheless yet only few experts know how to use these decision-support-systems.

The boundaries of each method:

Whether guessing works is simply stochastic and by this quite likely to fail.

Decisions from the heart or snap decisions are better than a guess if enough of the decisive information is perceived, of course, if it's well computed and if it's not counterintuitive.

Experts increasingly often fail with their estimation because of the global increase of complexity and dynamics. Developments come faster, are nonlinear and very often not to compare with the past. Just look at the weather or the development of new- and the vanishing of established enterprises.

Computer models are already used by some enterprises, by banks, by institutes etc.. There is even the so called world-model of the M.I.T. in Boston, that is famously used by the Club Of Rome and its publications of the 'Limits of Growth'. [Meadows, Randers, Mead-

ows] But there is definitely no computer model that can guarantee the correctness of its prediction of complex behavior:

And there never will be a model for this because that's what 'complex' by definition means. You can narrow a complex behavior, but you cannot calculate it. A weather-forecast, the stock-exchange, social trends, etc., are to be named complex. Actually everything that depends on human behavior is complex. [Gharajedaghi] It seemed to be unpredictable that SMS on mobile phones could become a trend or that the smoking ban could be established in so many European countries. It is difficult to grasp nonlinear developments, e.g. the earnings of 78 Mio. Dollar for a ringing tone within 2 weeks.

So there is no predictability for complex systems? Developments of the stock-exchange seem to be predictable as long as a current trend continues. Nevertheless it is extremely difficult to define the trend's end. Currently experts all over the world discuss whether there is a recession because of the burst of the subprime lending bubble in the US. To have the right guess in such a situation again depends on the right snap argument or the fitting model. On the other hand there are trends that themselves are very likely, e.g. the rise of renewable energy.

Computer models until recently were mathematical descriptions of the interrelations of factors. Some of them are black boxes, like neural networks, some are grey boxes, like agent based modeling, and others, like system dynamics, are white boxes, where the results of simulations could be fully reconstructed. Many of the approaches, like system dynamics, have a history of over 50 years. The critics always complained the wrong results of the simulations as if the exact behavior of complex systems was to be calculated. Today only few people still do not understand, that models are not descriptions of the reality but solely descriptions of one's reception of one possible reality. A model represents assumptions that can be varied and tested. The consequences that the simulation show are not for sure but to be seen as hints for further thinking. That's why computer models are the results of decision support systems, not decision systems.

A new alternative to sophisticated mathematical or quantitative computer models are so called qualitative computer models. Such models gather one's snap decisions and help to improve a feeling for a complex system and even nonlinear developments. Here's an example:

The question in our example is, how the demographical change and the globalization effect on different regions of the world. First the interplay of the relevant factors will be simply visualized. Then the influences between two factors are weighted - that's in most cases a snap argument - as weak, middle or strong. With the software CONSIDEO MODELER it is not only weak, middle and strong but a percentage value. This allows to differentiate between several strong, middle or weak influences on one factor. [Neumann]

It is easily done and the result is a model, that show influence-chains (cause- and use-trees) and feedbackloops. Reenforcing and balancing feedbackloops characterize many crucial phenomena of reality, e.g. the development and the burst of a market bubble. The more buy, the higher the price, the even more buy expecting the price to rise further.

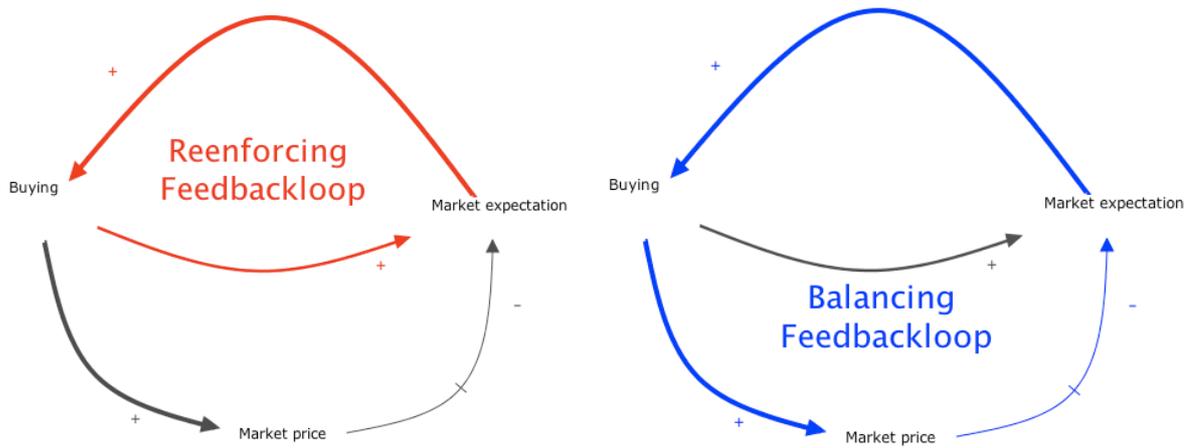


Figure: Identification of reinforcing and balancing feedbackloops

Our example model that asks for the impacts of globalization and demographical change contains 197 feedbackloops. To grasp the driving force of so many feedbackloops exceeds most people's intuitive intelligence. [Dörner]

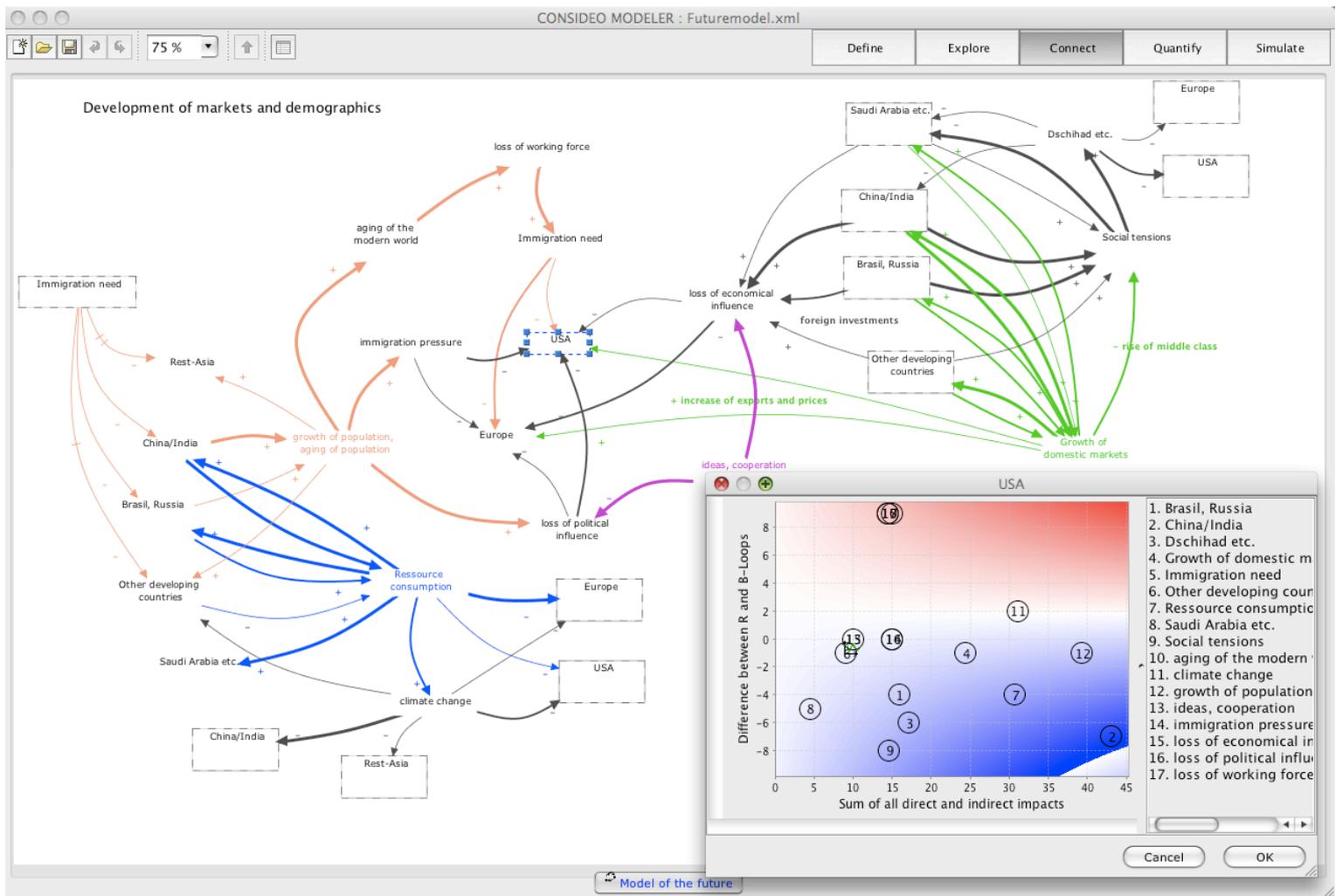


Figure: Cause-impact-model and impact-matrix in the freeware-edition of the CONSIDEO MODELER

The model shows that on Europe probably (!) the growing need for resources and the developments in India and China have a major impact - both for good as for bad with therefore comparable weak impacts in the long run. Less resources mean a growing need for alternative technologies that could be good for Europe. And a growing economy in other countries means a further rise in the need for Europe's export goods. The aging population has its immediate impact on it and in the long run also decisive is the need for immigrants to upheld the workforce of Europe's industries.

The snap arguments on how the factors influence each other can be altered directly in the properties of each connection or the cause-effect-matrix:

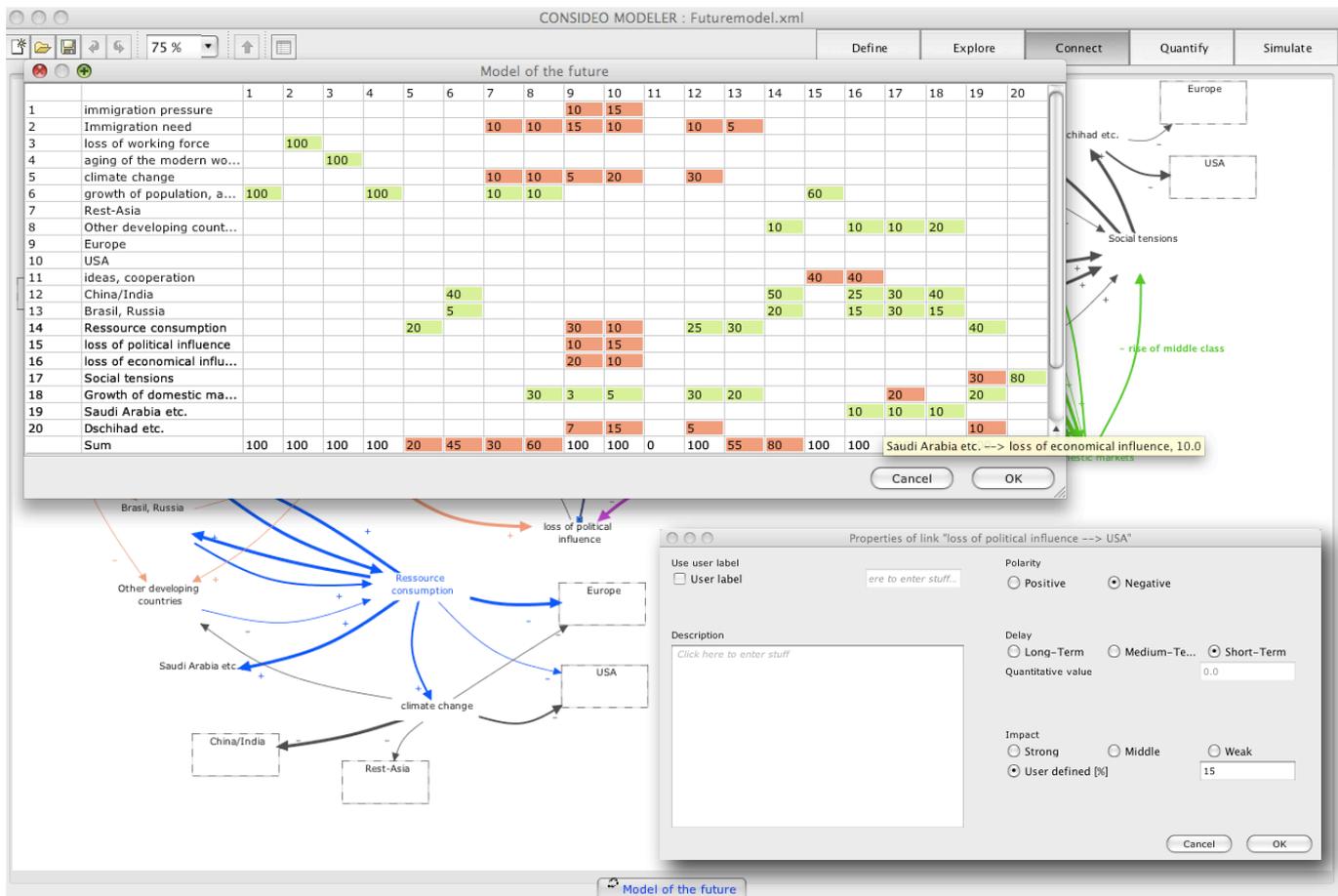


Figure: Cause-Effect-Matrix and weighting of connections between two factors in the MODELER

Those results many could have got by guessing as well as snap arguments - and of course with expert's knowledge, haven't they? The main benefit of the model now lays in the possibility of quick variation of assumptions, the ease of communication and the ways of working together on a shared model - so called mental modeling. The model can be elaborated adding hundreds of factors, details in subsystems and still show feedbackloops and cause- and use-trees. [Neumann]

The computer model thus fosters visual thinking [Buzan] and systems thinking, grasping nonlinear behavior beyond our intuition. In fact we are widening our intuition looking at the overall-picture our model provides. To conclude: In a qualitative model we include expert's knowledge, snap arguments and from time to time even guesses.

Nevertheless the use of computer models crucially depends on the ease of use of the software. Until recently only few experts were able to model and then only few managers and politicians understood those models. The effect: short sighted decisions everywhere. No consideration of feedbackloops, poor communication etc.. Just look at your newspaper and you will find examples for unseen cause-impact relations in politics, business and society on almost every page.

The software CONSIDEO MODELER is the result of an international EU-project named 'decision-support' [<http://www.bsrinterreg.net/programm/project.php?id=10260>]. The aim of the project was to ease the methods and tools for decision support to allow decision takers themselves to use them collaboratively. With the MODELER already many consultants, trainers and managers successfully model their everyday planning and decisions. Most start a model from scratch though many reuse, share and merge their models with others. It is as easy to use as mind-mapping software, used in meetings and moderation as well as a tool to reflect on complex projects, technology and organizations. Analyzing models often means new knowledge is generated right from the connection of existing knowledge. [Senge] The CONSIDEO MODELER also includes brainstorming on an electronic meta-plan wall. And the qualitative model can be fully quantified to a sophisticated system dynamics model with data integration of Excel- or SQL-sources. There are also the CONSIDEO OLAP-MODELER, visually connecting to data-cubes for development scenarios, and the CONSIDEO PROCESS MODELER, to calculate the critical chain and the constraints in parallel processes and projects. [Goldratt] Many bigger companies started using the MODELER, too. [[www.consideo.com](http://www.consideo.com)]

Nevertheless modeling is something we have to get used to. It is comparable to mind mapping that also took a while to spread - now having according to wikipedia about 250 million users world wide. The mayor obstacle is the fact that many first-users think their arguing and their ability of a quick decision is interrupted by the use of a software. To many it's not only the extra time that seems to be needed - though studies on mind mapping [[www.mindmanager.com](http://www.mindmanager.com)] proof the benefit and spare of time it provides - but the unusual visual thinking and the use of the right hemisphere of their brain. The benefits of visual thinking are undoubted though. It's therefore an often occurring experience that for example engineers, asked to discuss the planned changes of the design of a machine on a model, in the beginning are very sceptic if not resistant to the method and after at most an hour they experience the benefit of seeing more, discussing better and having effective ideas. They just have to start using the MODELER to foster visual thinking.

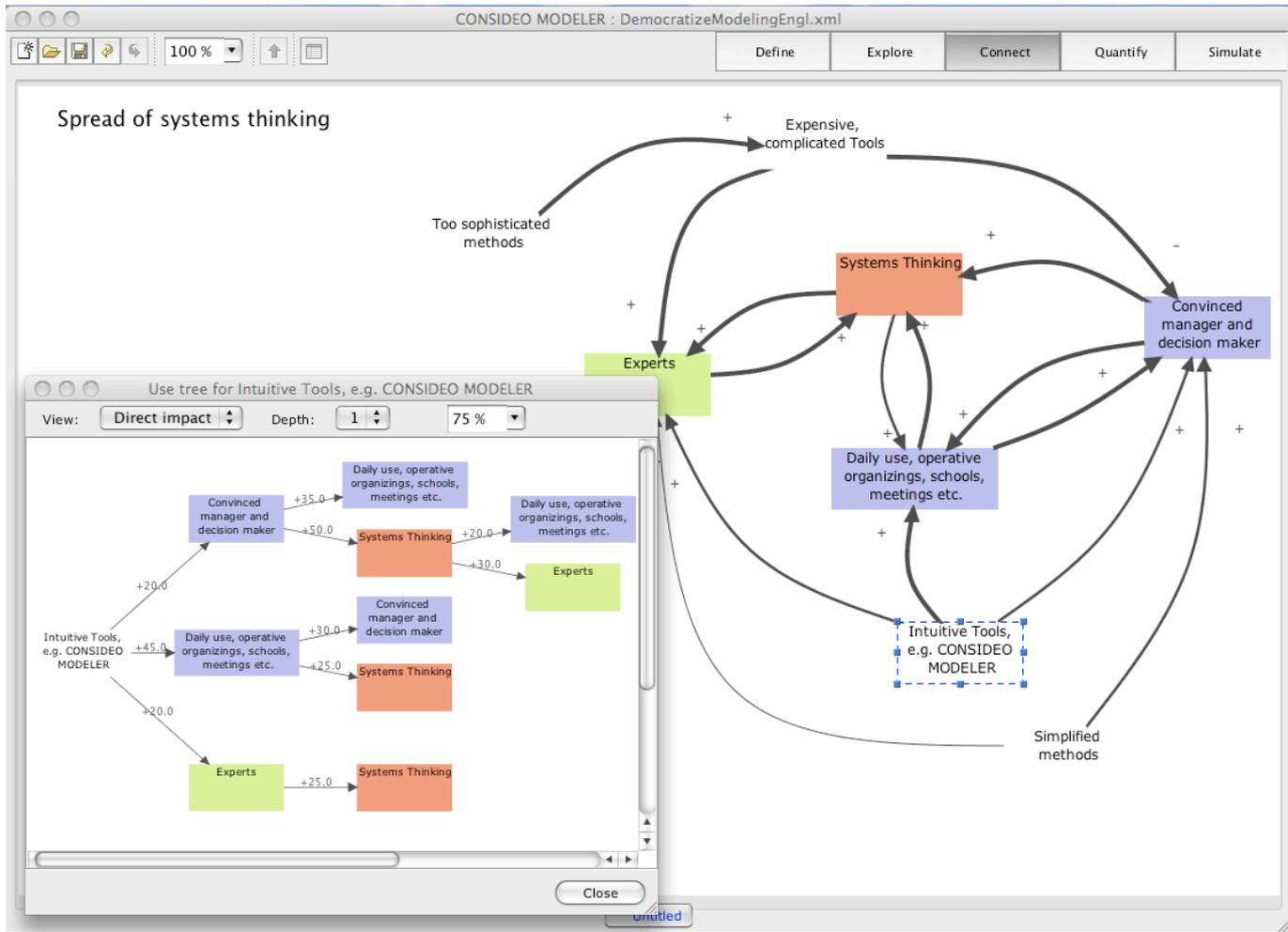


Figure: Spread of Systems Thinking depending on the ease of use of the methods and the tools

In the future we will have to consider even more factors and faster developments - no matter if we have to deal with markets, technology or organizations. Systems thinking therefore is according to renowned studies the crucial competence for managers and politicians alike. [http://www.business-at-school.de/dyn/15066.php] Therefore many schools already use the CONSIDEO MODELER to teach pupils systems thinking and many trainers and consultants work as multipliers to spread the visualization with the MODELER and by this systems thinking in companies and politics.

Further information:

www.consideo.com

Decision Support Project: http://www.bsrinterreg.net/programm/project.php?id=10260

J.D. Sterman, "Business Dynamics", 2006

Jamshid Gharajedaghi, "Systems Thinking", 2005

Edward Yourdon, "Death March", 2003

Tony Buzan, "Harnessing the Parabrain", 1977

Peter M. Senge, "The Fifth Discipline", 2006

Dietrich Dörner, "The Logic of Failure: Recognizing and Avoiding Error in Complex Situations", 1997

Donella Meadows, Jorgen Randers, Dennis Meadows, "Limits to Growth", 2004

Kai Neumann, "CONSIDEO MODELER: As easy as mind mapping - systems thinking, system dynamics and simulation", 2008

Malcolm Gladwell, "Blink: The power of thinking without thinking", 2006

E. Goldratt, "The Goal", 1997, and "Critical Chain", 2004

Only in German:

Studie zu Schlüsselkompetenzen der Zukunft:  
<http://www.business-at-school.de/dyn/15066.php>

Kai Neumann: "Modelst Du schon - oder tappst Du noch im Dunkeln?", 2007

Weitere Veröffentlichungen: <http://www.ilsa.de/ilsaGER/Information.html>