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007 to the Rescue – Cognitive Fit of Operations Research and Agent-based Decision Support

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ABSTRACT

Adoption rates of traditional Operations Research (OR) based decision support systems (DSS) suffer from perceived complexity of the underlying model and its detrimental effect on user-friendliness. The mental effort required to understand abstract models can hinder adoption. This barrier may seem even greater to people with low analytic capabilities. Unfortunately it is often this user group that could benefit the most from using OR based DSS. Agent based approaches on the other hand typically model negotiations between real-world counterparts. Extending cognitive fit theory we argue that presenting DSS in an agent based fashion allows for a closer match between the model presented on screen and the mental model of the user. We tested the impact of DSS presentation on perceived usefulness in a lab experiment (n=118). Our data suggests that an agent presentation outperforms an OR based DSS for perceived usefulness for low analytic users.

Keywords: cognitive fit, agent technology, decision support systems for transport problems

Representation of DSS approaches during execution	
	
<p>Orders, trucks and negotiation belong to natural environment of transport problems => no need to stretch mental model for low analytics</p>	<p>Columns and column generation represent transferring transport problem to a more abstract level => difficult for low analytics</p>

<p>Perceived characteristics of decision support systems: The decision support system that I just used ...: ... provided results that I can trust ... gave me reliable results ... made me hesitate using it ... made me confident using it ... could deal well with lots of data ... had a decision making process similar to my decision making process*** ... has an algorithm that is easy to understand ... has an adequate algorithm for the problem *** only indicator explaining variance in perceived usefulness</p>	<p>Results: high analytics: no difference low analytics: perceived usefulness of DSS can be increased by having a presentation that links to the mental model of low analytics</p>
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Future research:

From “give me the problem, I give you the solution” to “together we are strong”

In real time / RFID context, humans outperform computers in diagnosis skills.

What is the most adequate behavioral pattern describing human decision making in a real time context?
What is best HCI allow for human input regarding uncertainty for real time problems?
(Intended result: use unique human skills and increase adoption rates of DSS.)