Opinion Makers Section

Modern MCDA software: requirements and opportunities

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Keywords : design, agile life cycle, rich web applications, cloud

1. Introduction

Complexity, credibility and change: here are three issues we face in modern decision-making problems. These issues are far to be independent, and the mix is rather explosive. Therefore, the supporting software for the decision process needs special features. Why is that so explosive? What are the new requirements? Are there new opportunities? Let's drill.

Software is a major productivity enhancer for organizations. But nowadays in software, **change** is the only constant. Still, software only changes because business requirements and technology evolves on a growing rate. Merges and acquisitions, law enforcements, stock market and electronic components price variations are both constraints and opportunities. So evolution is an entropic but also a developing factor. It's just a fact.

According to Murphy's laws, modern organizations and business processes' **complexity** would grow until it exceeds the capability of the decision maker who must manage it. Therefore, the latter needs trusted expert evaluators and consultants. In the space-time continuum, the **credibility** of the whole process is based on previous success (karma) and on the credibility of the components: people, process, data and software. The person's qualifications and track record are solid arguments in the application for her role, as a decision maker or evaluator. The way decision results are computed must be transparent, explicit, consensual and reproducible. Data has to be genuine, measurable, reliable, safe and certified. And software itself has to match these constraints. Ultimately, interactions with data, process, people and software providers must be secured by trusted third parties. Trusted third parties need also to be secured, the same way, recursively.

The structure of the global decision process appears to be characterized by fractal properties and Möbius-like functions that can be either decomposed or recomposed at different granularity levels. But at the global level nobody's seems to be in charge. This whole situation is a

complex problem and if we are consistent with our earlier observations, we must conclude there is no hope to deal with it. Just like the Wikipedia project seems to be in the early days. But wait a minute. Wikipedia is a smart software that implements such a complex distributed editing decision process who brilliantly succeeded. So what contradicts our rationale? A bunch of must-have software requirements described below.

2. Modern MCDA software requirements

Rich user interaction. As Wikipedia deals with text based resources, MCDA software deals with typed, complex data like alternatives, criteria, performance evaluations, discrimination thresholds, organized either as individual data or as aggregates (i.e. collections, trees, matrix, graphs, and so on). Data and process complexity can be represented as object-oriented structures with sates and behavior. The interaction with people must be supported by rich graphic user interfaces, including inputs from, keyboard, mouse and touch screens. The productivity depends on ergonomics. Data input and change must be done with little effort from the user. The user interface should be flexible and customizable. Third party components and data must be accepted, as mash-ups of charts and maps (when integrating GIS and MCDA).

Distributed architecture. Just as Wikipedia is available from any connected computer or mobile terminal, modern MCDA software needs to follow the users, either experts or decision makers, in their business journey. This requires a distributed architecture, including collaborative, multiple platforms and asynchronous support, interconnected service delegation. And the best location and solution seams to be the *cloud*: generous, low cost and elastic, taking advantages of open data and open process initiatives.

Agile application life-cycle development. As Wikipedia, modern MCDA software needs to deliver new ideas as fast (as wiki) as they appear, whether it is about data, structure, presentation, formulas, process or code. The technical requirements go far beyond text editing but this is definitely a must-have. The agile movement embraces change and reconciles reactivity and quality. It disrupts the classical application life-cycle management by emphasizing frequent releases of emergent value driven features, through user stories, implemented in incremental iterations. Server-side scripting technologies (python, javascript, ruby, etc.) allow process and formula customization without the shortcuts of the classical development cycle: edit-compile-stop the server-redeploy-restart and -test. Design-time and runtime can eventually be merged.

Full traceability. Ultimately, Wikipedia would never grow without the collaborative features that allow contributors to trace and discuss changes, even when they do not work in the same room at the same time, or even when they don’t know each other. Modern MCDA software needs full traceability, including: historisation and versioning, logging and audit traces, time machine for data, structures and programs, to undo and redo

changes, record and replay scenarios with different parameters. It also needs the ability to create, compare and merge development branches, in order to simulate and experiment different hypothesis, and assess change impacts. Traceability is fundamental in detecting changes and making effective the whole process.

3. Conclusion

Integrating all these features will definitely reconcile complexity, credibility, and change. The decision process' reproducibility may be guaranteed. When a previously trusted major witness appears to be eventually unreliable, the change impact and the rehabilitation of the accused data, structure, process or people may be fully restored within minutes. The fractal structure of the global decision process, harassed by undirected decisions, top-down and bottom-up decision flows and crossfires, waterfall propagations, ripple effects, and rebounds may become stable and trustworthy.

As a community we may eventually become the decision makers of our own destiny.

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