Information Murals for Intelligence Analysis

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What are some of the problems of today for intelligence community analysts? They are increasingly global in scale and scope, cross-disciplines, and represent multiple points of view and different worldviews. These challenges are compounded by the extraordinary complexity and fragmentation of methods and disciplines. How to provide adequate context in integrated social, political, economic, and technological changes? How to understand the massive increase in actors, institutions, organizations, and persons, their interests, strategies, capabilities, intentions?

In difficult, messy public policy issues, most of the situations we have to deal with are multi-stakeholder (hence multi-viewpoint), multi-organizational, multi-government, multi-country, multi-year (even multi-generational), and, with all of this multi-ness, are deeply, and complexly, multi-interconnected. They represent what I call the "multi-multi" challenge. And all of them take place in a nobody-in-charge world. Often now, these challenges are called wicked problems, social messes, ill-structured problems, or simply messes? (Ackoff,1974. 1981; Rittel and Webber, 1973, Horn, 2004, 2007, 2017).

The characteristics of these social messes include: there is no single way to view the multi-multis; the values are disputed (or, indeed, in considerable conflict); there is great uncertainty about many aspects; risk is high, and also hard to calculate; the time horizon is often long; who "owns" parts of the mess is unclear; elements of the phenomenon are invisible; values are in dispute; and the decisions are urgent. And, like most of astronomy, we can't do experiments on messes, or if we think we can, there are no randomized samples and no control groups.

Can we see larger, complex context better than we used to? In social and behavioral issues? Yes. Our project has been synthesizing three approaches: (1) large-scale visualization in the form of information murals, (2) the development of methodological and display techniques to improve structuring of analysis and decision-making, and (3) the ability to display the results of these on massive computer-driven, and easily modifiable screens.

What's an example of this synthesis? In the context of the UK Agency for Radioactive Waste Management one can see the relevant history of the nuclear age, the current decision making environment and issues, and the agency's future plans

going out 12 thousand years. These are displayed by integrating several hundred small text chunks and as many visual icons and diagrammatic elements on a 5 x 15 foot information mural (Horn, 2004) (Information murals are sometimes called "contextoramas" or "knowledge maps" or "mess maps" or "big issue mapping".)

(For detailed PDF: http://bobhorn.us/assets/uc-nuclear-waste-historyfuture-what-is-2004_reduced.pdf

Why does this work? Humans are exceptionally good at panoramic viewing (we humans grew up on the savanna in Africa). We are good at scanning, seeing patterns and making new ones. Recently, huge, dynamically interactive, computer-driven screens and software have become available for the pattern-seeing of huge complex contexts. These visual displays facilitate many kinds of patterns, and multiple viewpoints. They permit hyper-linking in depth to relevant other relevant reports and documents. The displays permit easy and rapid modification by groups of analysts and decision-makers. Methodologies for analyzing and visually displaying multi-layered, multi-stage, multi-actor social and behavioral situations have been recently developed.

Can this knowledge-mapping be used in analyzing and communicating intelligence analysis problems? Yes. Some explorations have been started. For example a visual database (in five large panels) that might be used to write a National Intelligence Estimate for China was developed in 2007. Also drafts for Afghanistan and Columbia were done at the same time. Portrayals with unique perspectives have been created of nuclear deterrence theory during the Cold War. Early visualization depicting the argumentation about national missile defense in the early 2000s was investigated. Predicting the spread and dynamics of global pandemics for an international task force was also done at the time of the Avian Flu (Horn, 2005).

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Are there systematically different kinds of patterns or templates for seeing larger contexts? Yes. We call them "Platforms for Thought" One way of itemizing

them is as follows: 1. Initial problem exploration (when it is a social mess or wicked problem) 2. Conduct preliminary analysis (e.g. strategy maps, ideology maps, power clash maps, 3. Survey historical context, 4. Develop explicit theory & context 5. Arbitrarily deep detailed process analysis and modeling , 6. Map system dynamics Mapping 7. Detailed critical thinking with argumentation maps, 8 Interweave complex futures with scenarios, and backcasting, 9. Plan and monitor, 10. Investigate unknowns, 11. Organize big data (Quantitative and Qualitative 12. Analyze dilemmas, paradoxes, predicaments.

Is there a theory, a syntax, semantics, and pragmatics of this approach? Yes, See Horn, (1998) where the investigation was based on the assumption that *when they are working together*, it can be determined what words do best and what the visual elements (pictures and diagrammatic elements) do best. A comprehensive survey of this tight integration of words, image, and diagram elements has been done.

Has there been research on this? Yes, on many of the individual and visual aspects. Large group process in analysis and decision-making is just becoming possible with the availability of large computer-driven screens. This is a new area for group analysis and decision-making.

Have other Federal agencies been using this? Yes, for example, National Science Foundation in the Human Cognome discussions (Horn, 2002). NASA's research priorities (Horn, 2006), and the British Foreign Office and three other UK Departments (Horn, 2006) and the EU (Horn, 2016).

What are the potential benefits for this large-scale, intense visualization approach for intelligence analysis?

For individuals in the policy analysis and development process, info-murals: (1) highlight logical and visual patterns of emerging challenges, arguments, viewpoints, scenarios, trends, options, (2) keep the big picture from being obscured by details, (3) more easily enable assumptions, gaps, and limits to discovered, (4) facilitate creative responses to larger and more complex patterns and thought sequences.

While little formal experimentation has been done to date, for committee and task force meetings, use by various organizations, local, national, and international has found that info-murals may: (1) enhance codification and synthesis of common mental models for the whole group (2) move subsequent meetings along more rapidly, deeply, and smoothly, (3) enable absent participants to catch up quickly, (4) increase the chance of participants talking to, not past each other, (5) facilitate more rapid cross-disciplinary discussion of highly complex socio-technical issues, (6) help structure the flow of complex discussions

Research Needed

It is becoming apparent that research is needed to examine these aspects of

analyst's behavior in: (1) rendering concepts and relationships visually often reveals that vital data has been overlooked inadequately correlated, or never collected in the first place; (2) the degree to which large mural-size displays enable problem solvers to see both the detail and the big picture simultaneously, thereby potentially improving the evaluation of policy implications, consequences, and tradeoffs; (3) whether diverse groups, including remote groups, will be able to reach a working consensus faster using visual analytics to record meetings rather than (or in addition to) traditional text-based minutes, whether this visualization/ display methodologies are more effective than text in at least calling attention to, if not helping to resolve, cross-language ambiguities; (4) the degree to which visual representation of group processes and thinking regarding complex issues enables larger ideas (bigger thoughts) to be shared relatively easily with others outside the group; (5) Together with structured group processes, the degree to which visualizations can be a powerful a negotiation and consensus building tool; (6) and because all of the strategic info-murals are composed of hundreds of discrete chunks of text and visuals, inquire as to how they and their patterns may be modified for individual organizations, easily updated, and readily used in a variety of media.

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