Knowledge Mapping for Complex Social Messes

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By

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Social Messes

They've been called "wicked problems." (by Horst Rittle) They've been called "ill-structured problems." (by Ian Mitroff) I call them "social messes." (after Russell Ackoff, who simply refers to them as "messes")

What they are *not* is merely problems. Problems have solutions. Messes do not have straightforward solutions.

Social messes
• are more than complicated and complex. They are ambiguous.
• contain considerable uncertainty – even as to what the conditions are, let alone what the appropriate actions might be
• are bounded by great constraints and are tightly interconnected, economically, socially, politically, technologically
• are seen differently from different points of view, and quite different worldviews
• contain many value conflicts
• are often a-logical or illogical

They are the messes of drugs and gangs and ethnic conflict and international crime syndicates, messes that have strong links to civil wars in Columbia and the international small arms trade and globalization and the rapid advance of technology.   They are also the more local messes, such as a couple I have been working on.

Multnomah County dynamics and dilemmas knowledge map

Multnomah County is the county where Portland, Oregon is located. Its county commissioners knew they had a mess on their hands a couple of years ago in the delivery of public mental health. They appointed a task force headed by a friend of mine, Elsa Porter, a former Assistant Secretary of Commerce, and now a consultant to NASA.

Early on, she had to get the task force from many community sectors to have the same mental model of the mess. The first – interim -- report of the task force was due in 3 months – a report on what the problems were. The second phase would be to develop

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recommendations. She asked me to help the task force by creating one of my knowledge maps to describe the dynamics and dilemmas of the situation in Portland.

First, I had to find out what the task force thought was important. Then, I created one of my social mess maps. (Slide/Fig.1)
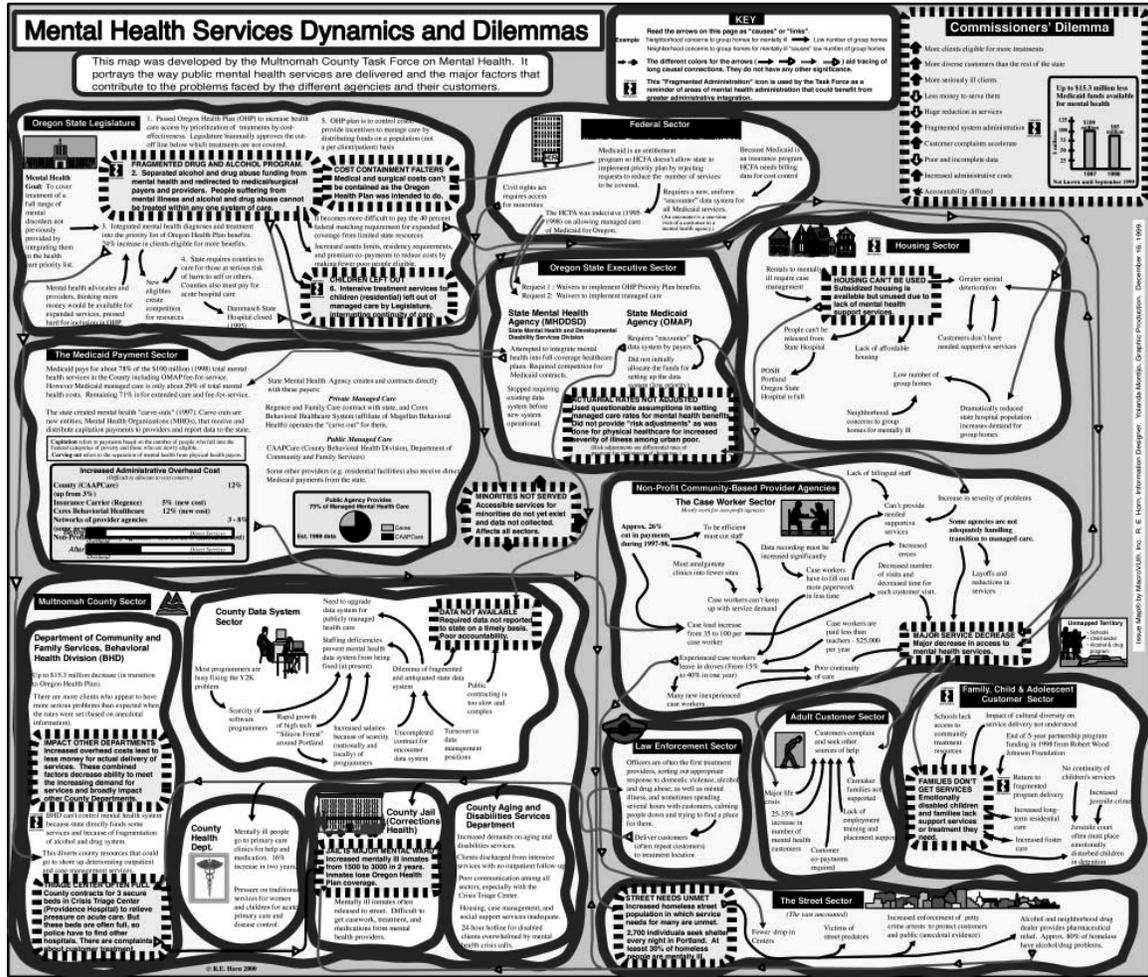
To see this map in full detail, go to <www.stanford.edu/~rhorn/portlandmap.html>

Its core is a cross-boundary causality map that characterizes the situations, events, and phenomena. These items are connected by arrows that stand for causes or influences. The situations, events, and phenomena are placed in "sectors." They are the blobs on the map. They are blobs deliberately. We originally drew them as very neat boxes. But that gave the illusion of too much neatness and not enough mess. The big yellow boxes on the knowledge map are the specific problems associated with each sector. They pop out at you deliberately because they form a kind of embedded executive summary of the interlinked set of problems – a summary of the mess. The language is informal, not the formal bureaucratic language of interim reports. If you read closely in one sector, you will see that the "case workers are leaving in droves." That is a good enough of a mental model for the task force. They don't necessarily need to have a table showing resignations over the last 18 months.

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Cross-boundary causality maps

The colored arrows permit tracing multiple cross-boundary causality. The reason that the case workers are leaving in droves is in part because they have to fill out more paper work which is caused by a new federal and state regulations (crossing two organizational boundaries) that changes the county data processing requirements significantly (another boundary). But the county data processing department couldn't create the new software because (crossing another boundary) a new Silicon Forrest was growing up around Portland and paying higher salaries to programmers than the county could afford. Also Y2K was absorbing programmers at high rates as well. This in only one of 85 causality and influence arrows that the task force chose to put on their mental map. They limited themselves to the most important ones.

No report to the Commissioners –- just the map

So the knowledge map served two purposes. First it facilitated the internal task force process, by helping form a common mental model and by providing the task force chair with a tool for rapidly getting all of its members involved and committed to a "buy-in" to their process. I might mention that the map you are looking at was actually used as the interim report to the County Commissioners. There was *no* 60-page report written by the task force. There was no written report at all. A large mural size version of the map was used in the public meeting at which the report was presented. The county commissioners were delighted with the map as an interim report. One of them said, "I see why we're hearing about problems."

Another mess. A bigger one. The Alameda County Long Term Care mess. Seventy funding sources. Four hundred organizations serving the disabled and elderly. Practically no money for case workers. And a mess that looks like this – seen from the perspective of a social mess map. (Slide/Fig. 2)

To see this map in full detail, go to <www.stanford.edu/~rhorn/alamedamap.html>

Process problems with policy making

Much current policy making has these characteristics. It:
• is reflected in vast, sprawling policy debates requiring understanding both of the big picture and the details
• depends on data that are changing frequently (often daily in complex, scientific and political areas)
• has many stakeholders, organizational and personal, each with conflicting goals, values, and pressures
• involves individuals and organizations with overlapping roles
• requires decision making based on guesses or forecasts that in turn are based on structural constraints of organizations, frameworks of policy in place, differing logics and world views, and distinct organizational or societal cultures

- is swamped by a high degree of unknowns and unknowables
- is wrapped in constant political power struggles
- involves communication with a wide variety of publics through the filter of the media
- involves a society or organization becoming involved in an ongoing process of social learning and continuous change.
- requires the ability to bring participants up-to-speed when they have missed meetings

In so far as foundations are addressing our social messes, these are problems they face.

How do we have informed, sensible, rational, democratic policy making and execution in such a context? That is the problem to which our project attempts to contribute some tools.

Our "mapping" approach

Our project has been designing and developing highly visual "cognitive maps" that facilitate the management and navigation through major public policy issues. These maps have benefits for policy analysts and decision-makers similar to those of geographic maps. They provide patterned abstractions of policy landscapes that permit the decision-makers and their advisors to consider which roads to take within the wider policy context. Like the hundreds of different projections of maps (e.g. polar or Mercator), they provide different ways of viewing issues and their backgrounds. They enable policy makers to drill down to the appropriate level of detail. In short they provide an invaluable information management tool.

Visual Language

Knowledge mapping has grown up as a result of the complexity of modern life, the capacity of the computer and new printers to help us create the maps, and the emergence of what I characterize as a new international auxiliary language that tightly combines words and visual elements, illustrations and diagram-like features. I call it visual language in a book by that name. (1) It has a new syntax and a new semantics. And it is helping us get our arms around problems and social messes. This language is the foundation for the knowledge mapping tools we are building for complex, shared mental models.

Progress in knowledge mapping thus far

On genetically modified food. We have developed a prototype set of some of the kinds of visual cognitive maps for the debates around biotechnology and genetically modified food and crops. Here are some "strategy maps" used in characterizing this debate. They are another of the "types" of knowledge maps we are developing. (Slide/Fig 3)

Apparent strategy of genetically modified food companies

To see this map in full detail, <www.macrovu.com/GMUnknownterritory.html>

This prototype project was initiated and supported by *New Scientist* magazine with the goal of exploring what a website would look like based on our development of argumentation maps. We have since extended this work to the development of initial drafts of several additional kinds of maps.

Other policy areas. We have also developed prototypes in other policy areas including national missile defense. Here is an "argumentation map" (Slide/Fig. 4)
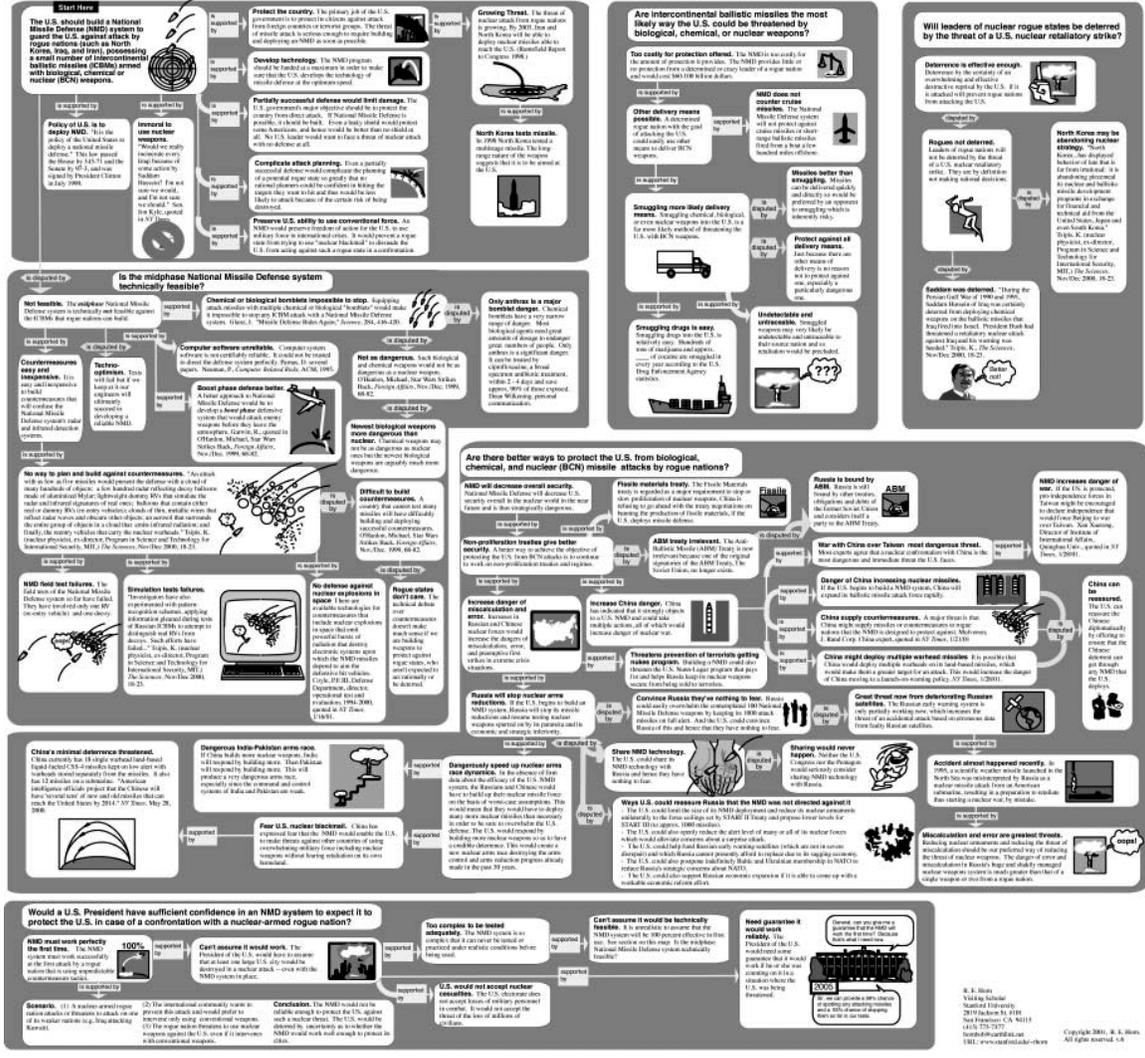
To see this map in full detail, go to <www.stanford.edu/~rhorn/nmd.html>

This type of knowledge map grew out of a four-year project at Stanford University that resulted in the first of the Mapping Great Debates series of maps. (2) (Slide/ Fig. 5)
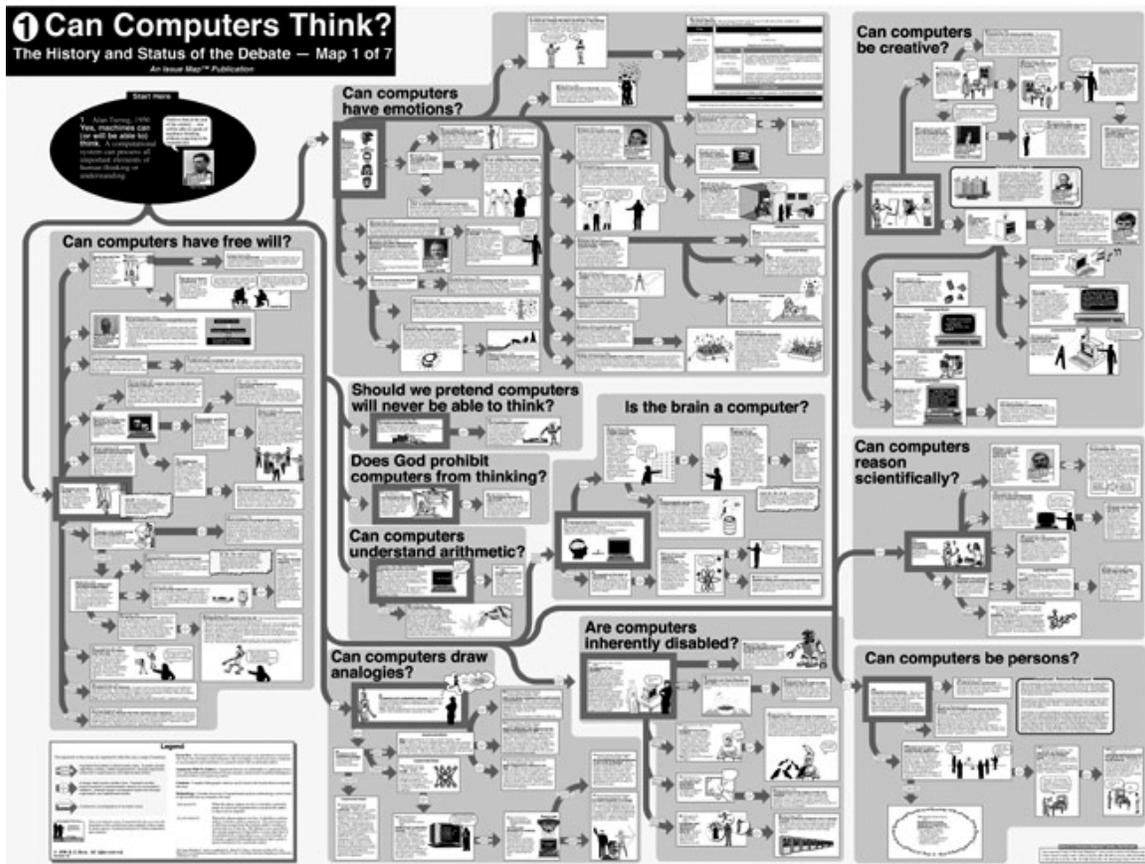
To see this map in full detail, go to <www.macrovu.com/ CCTMap 1.html>

These have been applied to other areas such as the frontiers of consciousness studies and research and in public policy research.

On mapping theory and practice. Our project is developing prototypes of several kinds of visual cognitive maps. These maps are intended both to give a broad helicopter view of the territory as well as present relevant detail. Among these types are
• Strategy maps
• Options maps
• Scenario maps
• Argumentation maps
• Cross-boundary causality and dynamics maps
• Stakeholder goals, values, and pressures maps
• Agreement templates
• Unknown territory maps

Unknown territory maps are interesting because they come up in various science policy debates. This is one that we created for the genetically modified food field. (Slide/ Fig. 6)
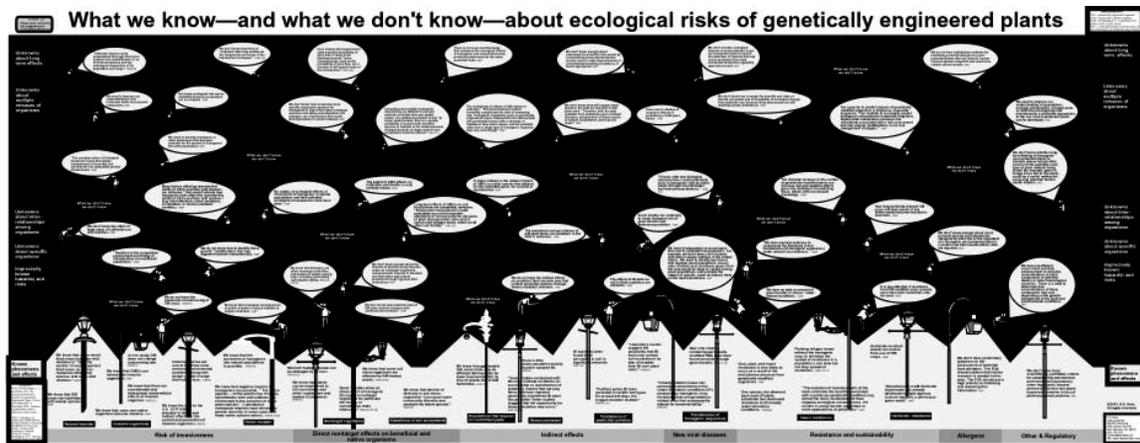
To see this map in full detail, go to <www.macrovu.com/GMUnknownterritory.html>

Among the visual cognitive map types we are currently developing are:
• Mythosphere, media, and public rhetoric maps
• Worldview influences maps
• Dilemmas and paradoxes maps

We also rely on a class of well-known diagramming methods that form a lower level set of cognitive structures that are incorporated within the knowledge maps. These diagram types include:
• Highly visual timeliness (often combined with historical dynamics)
• Quantitative graphs and charts
• Various process and procedure flow charts

How knowledge maps can improve public policy discussions

Very preliminary evaluations show that knowledge maps can contribute significantly to better knowledge management in complex policy discussion and decisions. They:
• show the logical and visual structure of the emerging arguments, viewpoints, empirical data, scenarios, trends, policy options (making communication more effective) and help keep the big picture from being obscured by the details.
• enable presuppositions to surface and be carried along with the debate or made a subject of the debate (enabling a richer discourse to take place without getting off track).
• allow more rapid analysis of the subject matter by committees and policy makers
• help structure the flow of complex discussions (so that meetings are more productive and less time consuming), enabling rapid integration of diverse points of view.
• increase an appreciation for the complexity of the issues the group is addressing, permitting faster learning by experts and the general public.
• are visually appealing, colorful, and incorporate useful metaphors and images that encapsulate values and attitudes.
• enable participants who have missed meetings to catch up quickly.
• increase the chance of participants talking to each other, not past each other, bringing faster consensus in meetings.

- help participants to keep working on the problems using the Web while separated by geographical distance.

Potential Applications for Foundations

I believe argumentation mapping may have applications in foundation knowledge management. For example, one of the more highly developed types of maps I've presented today, the argumentation map, could have applications in these areas that foundations find themselves in.

When experts talk past each other. Foundations sometimes fund workers who have quite different approaches to the frontiers of a field. Often it can be frustrating and less than optimally productive when the researchers seem to talk past each other and not address the points made by the others. It is difficult to tell whether they are not listening; whether they just use separate vocabularies and the differences are largely semantic; or whether there are major differences in approach or paradigm that should be more formally addressed by a foundation project.

When a subfield heats up. Sometimes you see the debates in a subfield of science flare up. This is often a signal that something important is looming. An anomaly in the data. A surprising new theory. The foundation's job may be to sort this out and see if judicious funding will help this fast-breaking field accelerate.

When competing priorities make funding decisions difficult. There are times when the foundation's resources are not sufficient to enable it to fund all, or even most, of the promising approaches in a field. Tough decision between applicants need to be made. Yet it is difficult to see exactly what the best decision might be, because it is hard to compare the approaches. It is important to be able to clarify the competing claims and counterclaims when the research appears to be going off in several directions at once.

When new research questions surface and show that there's a need for adjacent fields to become involved.   At times it is important to get the researchers in a field together to find out what research directions the field should take. Here again quite different points of view, philosophies and approaches need to be integrated. In addition it is important to be able to involve other subfields which may have theory, technique, evidence or models that could clarify and move forward the research in the subject field.

When fast-breaking subfields require clarification and tracking. Some fields (such as AIDs research) have large numbers of researchers working in them and the shape of the conclusions about the field is rapidly changing. The need here is for some kind of display technique that will help clarify and integrate widely disparate results and approaches.

When it is necessary to clarify competing evidentiary claims. Occasions arise when different experiments yield results that contradict one another. There is often a need for a

method to bring researchers together to examine and clarify competing evidentiary claims.

When it is important to sort out emerging technologies. There are many technological approaches to solving different problems. Such technologies arise continually and require an ongoing evaluation methodology. The problem is how to sort out the overlaps, the breakthroughs, the areas that have been ignored.

These are potential applications are for argumentation mapping, which, as I have described, is just one of many potential knowledge management applications of only one of our mapping techniques.

Conclusion
I am convinced that the knowledge maps I've described can make a substantial contribution to a worrying condition of present day America -- the fact that more and more people feel left out of democratic public debate to the point of giving up on it. Too many people lack the ability to follow what are often highly arcane and complex discussions.

The life of our republic would be very different if, for the next generation, some foundations use the knowledge map methodology to make informed deliberation available to all Americans.

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1. Horn, Robert E. *Visual Language: Global Communication for the 21ˢᵗ Century.* Bainbridge Island, WA: MacroVU, Inc., 1998. More information is available at www. stanford. edu/~rhorn
2. Horn, Robert E. *Mapping Great Debates: Can Computers Think?* Bainbridge Island, WA: MacroVU, Inc., 1998 More information is available at www.macrovu.com.

KNOWLEDGE MAP ADDRESSES
The knowledge maps in the speech may be seen in greaater detail at these addresses.

National Missile Defense Map
<www.macrovu.com/nmd.html>
<www.stanford.edu/~rhorn/nmd.html>

Multnomah Mental Health Task Force Cross-Boundary Dynamics Map
<www.stanford.edu/~rhorn/portlandmap.html>

Alameda County Long Term Care Task Force Map
<www.macrovu.com/alamedamap.html>
<www.stanford.edu/~rhorn/alamedamap.html>

New Scientist Genetically Modified food prototype maps
<www.macrovu.com/gmtest.html>

Consciousness Maps
<www.macrovu.com/cns.html>

Unknown territory map -- What we don't know about genetically modified food and crops
<www.macrovu.com/GMUnknownterritory.html>