Conceptual diagrams or conceptual diagramm*ing*? Creating diagrams as a tool for stakeholder collaboration

Synopsis

Conceptual diagrams can be a powerful way to represent complex situations. However, capturing and organising information is not the only end goal. The process of creating a conceptual diagram (conceptual diagramm*ing*) can also be a powerful way to collaborate, developing relationships of trust and enabling stakeholders to learn from each other. This article summarises PhD research into conceptual diagramming at the Integration and Application Network, within the University of Maryland Center for Environmental Science. It emphasises that communication tools are more than just an end product on a page, but represent a history of interactions among people.

Diagrams are things; diagramming is a process

Many of us within the IWC are familiar with conceptual diagrams that are created at the Integration and Application Network (IAN).[1] IAN is a science communication organisation within the University of Maryland Center for Environmental Science, USA. It has strong ties to Queensland (and UQ in particular), because its first leaders, Dr Bill Dennison and Dr Tim Carruthers, were both previous academic staff at UQ.[2] IAN's science communication services are used globally, with projects in the USA, Colombia, India, Samoa, Australia, and others.

In this article, I want to explore not diagrams themselves, but the process of creating diagrams—*diagramming*, rather than *diagrams*. I suggest that getting stakeholders to collaboratively create conceptual diagrams can build trusting relationships that are more resilient to destructive forms of conflict. In short, I argue that conceptual diagramming can be a powerful tool for collaboration.

As a side note: the content of this article comes from my PhD research (in progress). A large part of my thesis examines the potential for environmental report cards[3] to be used as tools for building stakeholder relationships. The report cards produced by IAN usually include conceptual diagrams, but they have other components too. In this article, I want to focus on conceptual diagrams.

What defines IAN's conceptual diagrams?

IAN's conceptual diagrams are designed to communicate environmental science, and they have a number of defining characteristics.[4] I highlight three of these here: the use of symbols, the emphasis on systems interactions, and the incorporation of a sense of physical space.

- **Symbol language:** By using pictorial symbols to represent concepts, IAN's conceptual diagrams appeal to visual learners, who reportedly make up 65 percent of the population.[5] Each symbol is quite compact, but can express quite complicated concepts. Thus, more concepts can fit onto a page if they are expressed as symbols, compared to expressing them in words. In this way, IAN's diagrams share commonalities with infographics, which are dense, visual representations of information.

- **Systems perspective:** The compactness of IAN's diagrams allow a broad, systemic view: it emphasises the *interactions* between components of a system, compared to text-based discussions, which can sometimes lead us to focus on the components in isolation. Of course, sometimes we need to focus on the individual components, but sometimes neglecting to see the system interactions would be like thinking that a bucket of disassembled bicycle parts is the same as a functioning bicycle. Because IAN's diagrams provide a systemic view, they can be seen as a type of 'rich picture'.[6] Rich pictures are part of the Soft

[1] http://ian.umces.edu

[2] http://ian.umces.edu/about/history/

[3] http://ian.umces.edu/ecocheck/report-cards/

[4] http://ian.umces.edu/learn/conceptual_diagrams/

[5] http://www.uab.edu/uasomume/fd2/visuals/page1.htm

[6] http://www.sswm.info/content/rich-pictures

Systems Methodology, [7] which is a process that involves using diagrams to organise 'messy' or 'wicked' situations.

- **Spatial underlay:** IAN's diagrams are used to represent environmental science, and accordingly they almost always represent the system in its physical context. Thus, a conceptual diagram depicting climate drivers in Chesapeake Bay will represent the physical geography of Chesapeake Bay (see Figure 1). This spatial component allows viewers to orientate themselves to the geographic context of the diagram.
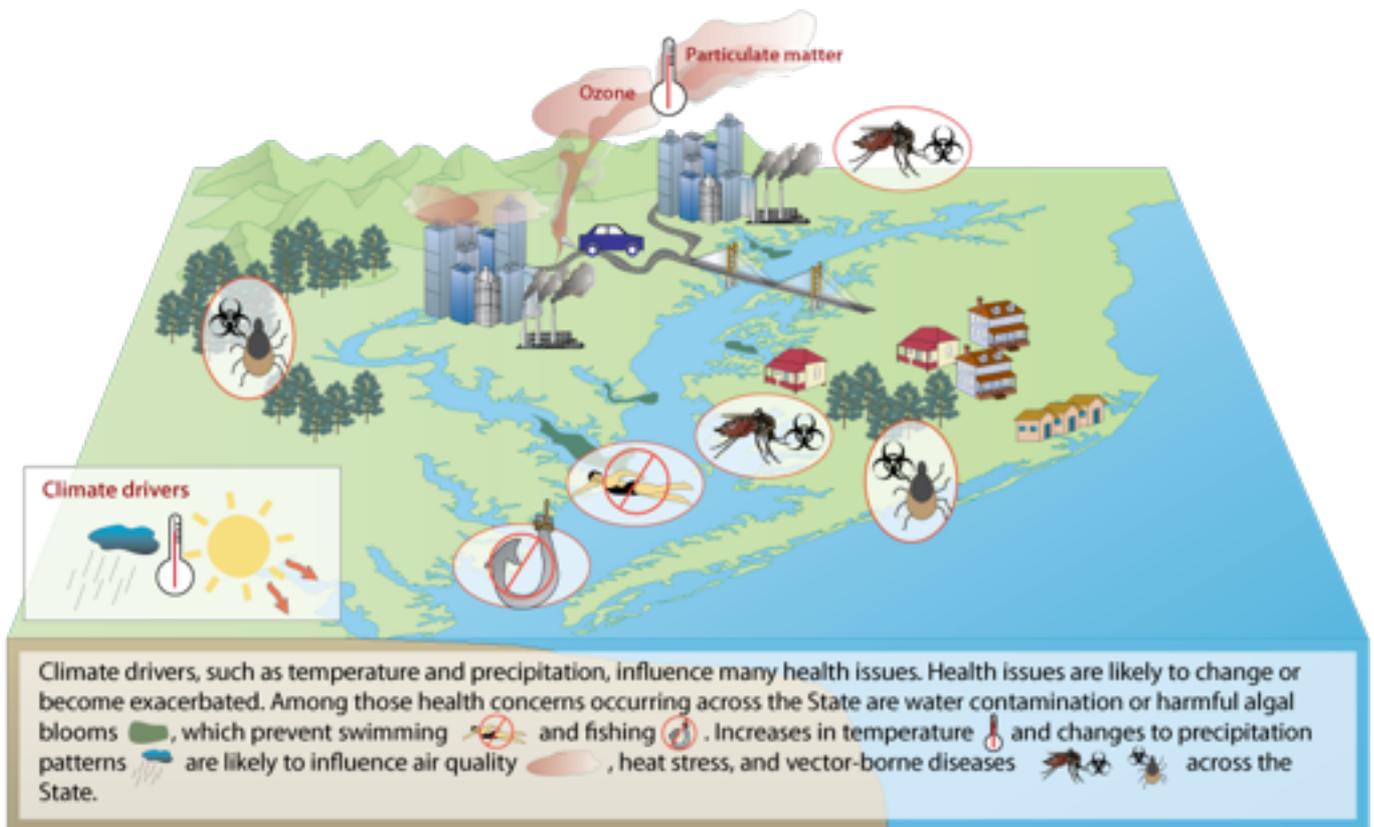

Climate drivers, such as temperature and precipitation, influence many health issues. Health issues are likely to change or become exacerbated. Among those health concerns occurring across the State are water contamination or harmful algal blooms ▬, which prevent swimming ⊘ and fishing ⊘. Increases in temperature 🌡 and changes to precipitation patterns ☁ are likely to influence air quality ▬, heat stress, and vector-borne diseases 🦟🕷 across the State.

Diagram courtesy of the Integration and Application Network (ian.umces.edu), University of Maryland Center for Enviromental Science. Source: Boesch, D.F. (editor). 2008. Comprehensive Strategy for Reducing Maryland's Vulnerability to Climate Change Phase II: Building societal, economic, and ecological resilience. Report of the Scientific and Technical Working Group of the Maryland Commission on Climate Change. University of Maryland Center for Environmental Science, Cambridge, Maryland. This report is a component of the Plan of Action of the Maryland Commission on Climate Change, submitted to the Governor and General Assembly pursuant to Executive Order 01.10.2007.07.

Figure 1. An example of an IAN conceptual diagram: climate drivers in Chesapeake Bay. *Source: Jane Thomas, Integration and Application Network, University of Maryland Center for Environmental Science (http://ian.umces.edu/imagelibrary/displayimage-search-0-7468.html).*

Diagramming as a collaborative process

These defining characteristics are likely a key factor in IAN's success as a science communication organisation. However, we should recognise that these diagrams are created and exist within a socio-political context. As integrated water managers, we acknowledge that how publications are created, and who created them, can be critical factors in the impact they have. Indeed, such acknowledgement is one of the premises of collaborative planning, which emphasises that stakeholder participation in policy-making can enhance the policy outcome as well as enable stakeholders to learn from and build trust with each other. In my research, I asked how the *process* of creating conceptual diagrams (and the report cards that include them) might influence their impact.

My research led me to IAN headquarters in Maryland, USA, where I spent 8 months as a participant–observer, investigating how IAN carried out the process of creating report cards. I observed six workshops across two main projects (Long Island Sound[8] and Arkansas & Red Rivers[9]), and a handful of other projects as well. I also interviewed 10 participants across the two main projects.

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[7] http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.395.556&rep=rep1&type=pdf

[8] http://ian.umces.edu/blog/2014/10/28/long-island-sound-report-card/

[9] http://ian.umces.edu/blog/2014/05/20/arkansas-and-red-rivers-workshop-in-tulsa-oklahoma/

What I observed was a collaborative process in which workshop participants contributed their own perspectives to the diagram. Typically, the IAN facilitator would start with a sketch outline of the physical geography of the area, and invite participants to describe what is happening within that area. Figure 2 shows one such sketch of Long Island Sound. The outline at the top is a birds-eye view of the Sound, while the four boxes represent cross-sections of the Sound. The facilitator started out by drawing the black outlines; everything in colour was drawn by the facilitator under instruction from workshop participations.
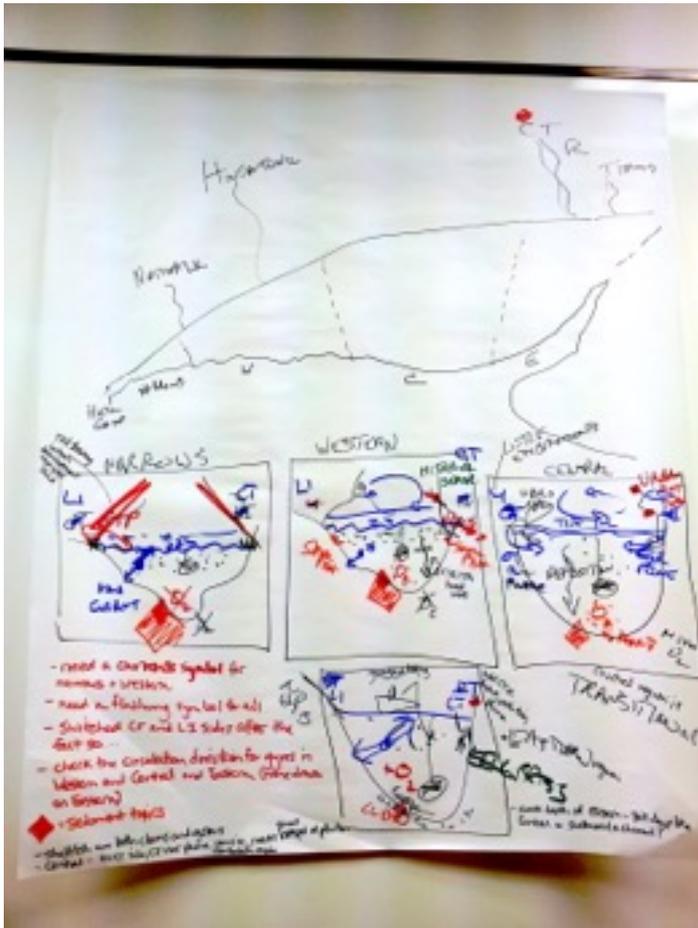

Figure 2. Collaboratively sketching a conceptual diagram at a workshop for the Long Island Sound report card. March 2014. *Photo: Anthony Kung.*

These workshops were impressive episodes of live-sketching, but I found that this collaboration was a result of a more extensive process involving many steps. In this article I present only some of the main observations I made, which I present as a series of tips for a conceptual diagramming facilitator. They are:

- **Be intimately familiar with the subject matter.** The ability to live-sketch participants' input depends on the facilitator understanding what is being said, and being able to ask intelligent questions to elicit further detail. Participants may not immediately be able articulate information in ways that can be easily drawn. Remember that written communication dominates most people's formal education, so facilitators need to ask questions like, 'Where does this happen?', 'Is it seasonal?', 'What happens next?', 'I know there is an underwater ridge here—what happens to sea grass there?'

- **Work out *who* is in the room (and what happens when you forget someone).** Conceptual diagrams communicate information, and when they are included in a report, they become part of the message of that report. The legitimacy of that message in part depends on how comprehensive the conceptual diagram is. It may be necessary to undertake extensive stakeholder analysis prior to a workshop. This stakeholder analysis might include a 'listening tour'[10] – effectively a preliminary set of workshops to determine who ought to be invited to the main workshops. In one of the IAN projects I observed, a group of stakeholders were mistakenly omitted from a key workshop. IAN held a supplementary workshop to capture those stakeholders' input.

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[10] http://ian.umces.edu/blog/2014/03/25/long-island-sound-listening-tour-to-initiate-environmental-report-cards-part-1/

- **Prepare to draw, but it's OK to draw messily.** In the workshops I observed, facilitators seemed to be able to draw rough maps very quickly. I do not know whether they specifically practiced drawing maps of the area beforehand, or whether this ability arose from a general ability to draw. In any event, it is probably the product of some deliberate practice. On the other hand, IAN staff emphasise that the diagrams should not be neat or beautiful—as Figure 2 shows, often they are very messy in draft stage. A facilitator's messiness can encourage participants to feel comfortable drawing, allowing everyone to focus on the substance of the diagram, and not its prettiness.

- **Getting participants into a drawing mindset.** IAN facilitators sometimes begin a workshop by playing a game called 'Conceptionary'[11] to encourage participants to think in pictures rather than in words.

- **Show fast progress (overnight/ next week/ few months).** In 2-day report card workshops, IAN facilitators work overnight in order to present a computer-designed draft of Day 1's progress on the morning of Day 2. This is a very rough draft that documents a conceptual diagram in progress, among other elements of the report card. Within a week of the workshop, a summary newsletter of the workshop is distributed. Depending on the complexity of the report card, the final version is delivered within a year, and often about 6 months after the workshop. The purpose of presenting rough drafts is two-fold: first, it preserves momentum and interest among stakeholders, and second, it allows stakeholders to correct mistakes or contribute further before the final version is published.

- **Plan the launch.** During workshops, one question IAN facilitators ask participants is *when* the report card should be launched, and *who* should be invited. This approach demonstrates sensitivity to the socio-political context of the document to be published. A report card might be launched at another, related event, enabling cross-promotion. Or, it might be better to hold a separate launch, being careful to avoid a clash.

- **Have fun.** Collaboration is a social process, and IAN workshops usually make time for relaxed socialising. This might be lunch or dinner, or even opportunistic moments for goofing off. In one workshop held in Oklahoma, Dr Bill Dennison co-opted a handful of workshop participants to sing a version of the song, *Oklahoma*, with the lyrics modified to suit the workshop. Time for fun is usually a good investment.

Conclusion

In this article, I have provided a vignette of how I observed IAN's conceptual diagramming practice as a collaborative process. Of course, these observations are not limited to conceptual diagramming, and may apply to other collaborative communication tools like participatory mapping,[12] photo voice,[13] and Lego Serious Play.[14]

More generally, communication tools like conceptual diagrams do not exist in a vacuum. Rather, they are *products* of social and political processes, and they go on to shape the social and political contexts. Fortunately, facilitators have some ability to manage those contexts, and I hope that these observations help facilitators to do so.

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[11] http://ian.umces.edu/blog/2011/01/13/conceptionary-in-action-learning-through-play/

[12] http://www.publicengagement.ac.uk/do-it/techniquesapproaches/participatory-mapping

[13] http://ctb.ku.edu/en/table-of-contents/assessment/assessing-community-needs-and-resources/photovoice/main

[14] http://www.lego.com/en-us/seriousplay/the-method