

The paradox of the “practice level” in collaborative design rationale

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Abstract

This paper traces experiences with the Compendium¹ methodology and software tool from its roots in IBIS mapping for software development to the present, focusing particularly on issues of adoption and uptake in various organizations. I then outline current research into the “practice level” of rationale mapping, particularly when performed “live” with groups of people in real time. Based on these, I provide some reflections about creativity and design rationale and a possible approach for inculcating these in the context of software engineering.

1. Background: Compendium from 1992 to the present

This section provides a first-person narrative history of the evolution of the Compendium approach from its roots in IBIS-based design rationale mapping in a software development group, to later expansion in many dimensions, including the explicit incorporation of creative thinking techniques.

1.1. First exposure

My involvement with design rationale and software engineering dates back to early 1992, when Jeff Conklin and others from Corporate Memory Systems, Inc., gave a workshop for members of the Expert Systems Lab at NYNEX Science & Technology, the R&D arm of the telephone company in the northeast USA.² CMSI were the developers of what was then called CM/1, a commercial IBIS groupware tool that had descended from the pioneering gIBIS work at MCC in the 1980s (Conklin & Burgess-Yakemovich, 1991).

¹ More information about Compendium can be found at www.compendiuminstitute.org. There are also informal essays on Compendium’s history, current work, and related topics at knowledgeart.blogspot.com.

² Now, three mergers later, Verizon.

In the two days of the workshop, we used CM/1 to construct argument maps of some of the key issues we were grappling with as an organization, particularly how we could best build on previous work in both software development and business process redesign. There were many perspectives about right ways to go forward, many opinions and disciplines contending with each other, not a few disagreements. Working closely with the CMSI team, groups of us in twos and threes worked to build maps that represented the positions we were taking, and then presenting the maps to the larger group. In some cases we experienced breakthroughs between people with apparently opposed positions, as we were able to identify “left-hand moves” – larger questions in which both our positions could appear as possible alternatives to be argued for or against, without needing to crush the opposing position with rhetoric.

We were struck with the power of the approach to open up our dialogue about the issues we were wrestling with. The fact that we were working within a software tool that let us create such representations, that could be revisited at other times, added to, worked on both in individual and in collective sessions over the network, seemed to hold out limitless potential, and we excitedly planned to work intensively “in the tool” over the coming months, developing our skills and exploring issues at the same time. Especially we were intrigued by the promise of escaping the “easel archeology” that plagued the months-long participatory design projects we were facilitating, where project teams had to search through stacks of paper to try to find the key ideas from earlier discussions and meetings. If we could use CM/1 to facilitate, capture, and manage such project team discussions, we could have searchable archives of ideas, proposals, and rationale to draw on without having to cart around, and rummage through, tattered collections of easel sheets.

1.2. Early days

Over the next few weeks, a small coterie of lab members did try to build out discussions and plans within CM/1, mostly working individually to build on others’ contributions in collective maps. Somehow, however, these never seemed to amount to what we expected. Some maps withered with few contributions, while others got very large very quickly, so large that it was difficult to find where to read or contribute. In some cases, long chains of “yes it is”-, “no it isn’t”-style pros and cons emerged as individuals argued back and forth. Few, if any, left-hand moves or coherent arguments or

rationale emerged in these collaborative, networked maps.

On the other hand, several of us started to use the software in small group sessions, usually in the context of small software or process redesign projects. These were more successful, especially when the groups paid close attention to what was being put on the screen. When the group worked together to ensure that each node and link were carefully crafted, matching the intended types (e.g. that a Question node really represented a single question and did not bundle in answers and arguments, and was not phrased in such a way as to only allow yes or no answers, etc.), the results were more generative and beneficial.

Fast-forward a few months. Despite the initial excitement, the collaborative networked use of CM/1 had died out. We did not get much take-up of the software in any form beyond a few people who had been at the original workshop. Several other members tried the approach with enthusiasm, especially in group meetings, only to give up quickly as the apparently simple act of capturing discussion in nodes and links proved not to be as easy as it looked. Most times we saw people quickly fall behind, and then give up altogether as the spoken discussion just did not seem to take a form that matched what could be represented in IBIS. Neophyte mappers did not know how to intervene in the conversation so as to try to get careful engagement in the maps. However, several of us still had the strong feeling that there was great potential there, if we could only find the right way to apply the approach. We continued to experiment in small groups and individually, recording discussions in meetings, occasionally trying our hand at live facilitation and collaborative capture of design rationale.

1.3. Incorporating model-based methodologies with IBIS

At the same time as the above was occurring, another thread in the lab was concerned with developing a model-based approach to system and business process design, influenced by traditional systems analysis methods a la Yourdon, the European knowledge modeling methodology called CommonKADS, and other approaches such as Soft Systems Methodology. As with our explorations of CM/1, there was a good deal of ferment about this as we looked for ways to reap the benefits of such structured approaches while contending with the cognitive overhead of having to work with such frameworks. At the same time, we were limited by the lack of availability of good software tools for such modeling, especially in the area of CommonKADS for which no

tools existed at that time. Coming out of this mix of influences, we'd developed a hybrid modeling framework called World Modeling (Sierhuis, 1996) which prescribed relationships between current state and future state, "implementation" and "essential" (abstract), and other sorts of models, and we were quite excited about its potential to organize the work of the project teams we were engaged with, if only we could find a good tool.

One day in early 1993, I was sitting in a meeting in Manhattan, listening to a group of people from New York Telephone debating approaches to redesigning their capital investment process. I had developed a good deal of facility with the software by this time and was easily able to keep up with the discussion, recording ideas and representing them in IBIS format as the discussion proceeded. As usual, the conversation was a mixture of ideas for process design, systems changes, resource issues, problems and opportunities, arguments and brainstorm. It suddenly occurred to me that CM/1 itself could be used as the tool for World Modeling. Beyond providing a way of mapping and managing IBIS, CM/1 had some very powerful hypertext features, including the ability to copy nodes from one map and paste them in another such that a true "transclusion" was made – the same object appearing in multiple places, changes made in one place would appear immediately in all the views that object appeared in, and you could right-click on the node to see a clickable list of all the "containing views" for that node. This was a key requirement for World Modeling – we needed to be able to show, for example, how a piece of data used in one business process was used in another, without losing the connection or identity of that piece of data. At the same time, we could get the benefit of IBIS argumentation and design rationale capture within the same tool – attaching rationale to model elements as we went, recording debates about how models should be constructed, and the like. We came up with ways to tag nodes with searchable annotations (e.g., identifying nodes as "tasks", "problems", "resources" and the like), and used CM/1's export/import capability to build templates of questions corresponding to different model types (e.g. organization models, process models, object models, etc.).

1.4. Conversational Modeling takes hold

We³ began experimenting with this approach and found (with growing excitement) that the approach seemed to hold together, and even to scale over weeks or months of working with a project team. Working “undercover” mostly at first, we applied the approach (which we named “Conversational Modeling”) in a variety of contexts, each time both meeting enthusiastic reception from the people we were working with, but also learning more about the best ways to represent and manage models, project management materials, and discussions without leaving the software. One of our early successes was working with a cross-functional team from Human Resources that needed to come up with a (at that time, innovative) single toll-free number for employees to use to access HR resources. We were not only able to use Conversational Modeling to help the group build collaborative representations of the different departments and functions that needed to be incorporated in the “Helpline”, simultaneously recording and working through issues and arguments in the shared display, but we were also surprised to find (based on their comments) that members of the group seemed to be listening to each other, and learning about each other’s work and concerns, with more attentiveness and concern than they had been able to do before. Perhaps this approach could not only be used for the more “rational” aspects of rationale, but for group development and mutual learning as well.

After some time and more successes, we went “public” and began offering this approach and toolset as an internal (and some external) consulting service, working ultimately in hundreds of sessions in dozens of project settings, small and large, over the next several years. We developed training classes to spread the competencies we’d developed more broadly within the company, training several dozen people in a number of two-day workshops.

Still, though, we did not see broader take up of this approach, at least in terms of others adopting the approach and becoming practitioners themselves. While client groups were quite happy to have us come in and be the practitioners for them, they did not show much interest in picking up the tools and practices themselves. In some cases we were able to train people who did apply the approach themselves on a single project, but never

³ “We” being Maarten Sierhuis and myself. Maarten has continued portions of this work in his role as research scientist at NASA Ames since 1998.

used it again once that project was complete. The many attendees of our training workshops, despite their initial enthusiasm, fell prey to the same pattern we'd seen in the beginning. They'd try the approach in a meeting or two, fall behind or otherwise get stuck, and give up. This experience seemed to be in accord with many of the reports in the 1996 Moran and Carroll book as well as other early work in hypertext and design rationale approaches, which emphasized the cognitive overhead involved in creating DR representations, seeming to despair that the difficulties could be overcome.

1.5. Developing the software

In the course of this work, we quickly began to identify desired enhancements for the software, mostly to do with greater ability to access and manage the underlying database itself as well as to be able to create richer representations. However, CMSI felt that their core market was in IBIS mapping and did not want to extend the software (by then renamed "QuestMap") in those directions. Despite the limitations, though, we were able to support some very large projects with the existing software coupled with our approach. These included both small group and multi-team business process analysis and design projects, as well as small software development teams that we were members of. One of these, that built a forecasting tool, used the approach to manage all of its work over a couple of years, growing a large repository of models and issue tracking with both clients and developers, capturing a great deal of rationale along the way.

To help connect the work we did in QuestMap with material developed in other applications and settings, we developed small "glueware" extensions to get around QuestMap's limitations, particularly in the areas of importing and exporting content from applications like Microsoft Office and Visio. These helper tools only took us so far, so in 1998 we decided to begin developing our own software tool that would combine QuestMap's features with the capabilities and enhancements we wanted to see. Around the same time we dropped the "Conversational Modeling" name (which we liked, but few others did) for our approach in favor of the friendlier term "Compendium." This became the name of both our approach in general and the software in particular.

1.6. Creativity takes center stage

As we were puzzling about this paradox of having a powerful, successful, flexible technique that we could not convince many others to take on for themselves, a further major influence came into the picture. In 1998 and 1999 we began several collaborations

with outside groups. One of these was with the New Lenses on Learning research group at the Center for Creative Leadership (CCL), connected by one of our executive internal clients who also served on an advisory board at CCL. This group, particularly our primary contacts Chuck Palus and David Horth, shared a similar interest in “putting something in the middle”, using image-rich visual artifacts in group dialogues to foster creative thinking and exploration of complex challenges. Their use of manual and paper techniques and ours of software-based issue maps seemed more complementary than opposed, and we began looking at ways to combine our approaches. An early development was adding the capability to display digital photos and images to Compendium, so that the evocative images in CCL’s Visual Explorer toolkit⁴ (then existing only on paper) could be loaded into our software and manipulated, adding to the discussion, model, rationale, and issue maps we were already working with. We experimented with different ways to use our combined approaches in the experiential workshops that CCL conducted in different organizations.

The other chief collaboration that began at that time was with Simon Buckingham Shum of the Knowledge Media Institute at the Open University in the UK. Simon’s long background and deep research interest in IBIS, QOC, and related tools and approaches led to a highly generative research collaboration, both exploring the approaches we had developed to date and expanding them in new directions. Taken together, the KMi and CCL collaborations held out the promise of integrating creative exploration, issue mapping, model-based design, rationale capture, and meeting facilitation together in one tool. The potential seemed (and still seems) enormous.

1.7. Difficulties in diffusing the practices

Despite these exciting developments and collaborations, however, we still faced difficulty –sometimes even active resistance – in attracting new practitioners, whether within what was by now Bell Atlantic, within CCL, or in other organizations. Demand for us to provide Compendium services continued to increase, but the phenomenon of potential practitioners trying it once then giving up, or rejecting it outright, did not abate.⁵ Within the IT and client organizations of Bell Atlantic, two of the main objections were either that (especially for the software engineers and developers who were our main

⁴ See cclve.blogspot.com.

⁵ To meet the internal demand within Bell Atlantic, we ultimately had to hire an outside firm and train their consultants in Compendium techniques.

training clientele) the tool was not a true object modeling, database, or “collaboration” tool (why would we use that when we can use Lotus Notes, or Visio, or Access, or ...), or that we were asking technical people to act as facilitators and communicators, which pushed them beyond their comfort zone. At the same time, within CCL which had many talented and capable facilitators, the approach appeared “too technical”, too difficult or foreign, too hyper-rational. People accustomed to free-form discussion capture on flipcharts and whiteboards did not like the idea of constraining their representations to what Compendium could provide. And, as always, for both constituencies, capturing and representing complex issues in the software, in front of a group of people watching one’s every move, choosing node and link types and performing complex operations on the fly, trying to keep up with fast-moving conversation, just seemed too hard for people to do.

1.8. Continued evolution

Time moved on. The original team of Compendium practitioners and developers mostly moved on to new responsibilities or left, and various mergers and reorganizations left the effort without executive sponsorship within what was now Verizon. We were able to license the software development to KMi and Simon was successful in continuing the development, funding a full-time programmer who significantly expanded the tool’s capabilities over the next several years. We continued to find new applications and approaches to complement the existing ones, and formed an international group of interested people that we called the Compendium Institute, holding annual workshops and creating a website and Yahoo-based discussion group.⁶ Verizon granted permission for the Open University to distribute the software,⁷ and eventually the program code, freely. As the number of downloads grew, new applications for Compendium were developed by others outside the core group, with exciting work being done in public policy exploration, e-Government, e-Learning, and many other areas. Within the core group itself, innovation and exploration continued, reaching into areas such as collaborative e-Science combining software-based input with on-the-fly group mapping, personnel rescue support, mapping the Iraq debate, and many other areas. At the time of this writing (June 2008), the Compendium community, approach, and software continue to grow and evolve in ways both satisfying and, often, surprising to its originators.

⁶ The group numbers 1,141 members at the time of this writing.

⁷ There have been more than 40,000 downloads of the software since free distribution started in 2003.

But what of the ostensible core practice itself? The ability for practitioners to craft expressive hypermedia knowledge maps on the fly, with groups of people, inviting their engagement, reaching into analysis, modeling, dialogue mapping, creative exploration, and rationale capture as necessary and appropriate? Growth in this area is still somewhere between slow and nonexistent. In 2003, I turned my attention to a set of research questions that felt key to understanding the practice itself, and, eventually, to finding better ways to support the training of new practitioners. I describe this research in the next section.

2. Current research

My current research⁸ looks at the “practice level” of design rationale -- the “wielding” of DR tools in service to groups of people in collaborative, real-time settings. Rather than evaluating the tools or methods themselves, I take them as a given and focus on the human activity of creating the representations, especially on the skills needed and obstacles encountered in keeping DR artifacts coherent, engaging, and useful.

More than ever before, society must deal with complex, "wicked" problems, where there are competing definitions of the nature of the issues. When they engage with such problems, people have divergent interests, ways of talking and listening, and modes of expression; there are urgent considerations and constraints on different levels, and information is found, manipulated, and exchanged in different media and representational forms. Communication tools and methods are required that can support people's ability to look at such issues from diverse points of view, over time, from multiple perspectives, make connections between ideas and arguments, and share them in various ways. This requires construction of clear, expressive, and coherent textual, visual, and aural representations, in addition to verbal speech. Ideally, events where groups of people create and work with these artifacts together would be characterized by flow, synergy, expressiveness, articulate dialogue, careful listening, and reflection, aided by collaboratively created representations that evolve in response to the unfolding conversation.

One family of artifacts that holds the potential to serve these needs is hypermedia

⁸ Conducted in the doctoral program at the Knowledge Media Institute, Open University, under the supervision of Simon Buckingham Shum as well as Marian Petre (Open University) and Mark Aakhus (Rutgers University).

knowledge maps, which can comprise many different representational forms and kinds of connections between ideas. One of the chief places such artifacts can and should be used are in real-time meetings of people, both face-to-face and online, where participants create and add to maps of ideas and connections as part of the way they talk about the issues they are confronting. I use the term "participatory hypermedia construction" to refer to use of this medium in meetings, especially when participants are directly engaged in the creation and modification of knowledge maps on the fly.

Unfortunately, over the more than twenty years since software tools allowing the creation of participatory hypermedia artifacts started to become widely available, many research efforts and practical experiences have found it difficult to realize their potential. Keeping complex, interconnected hypermedia artifacts clear and coherent in real time has proven to require a high level of skill, so much so that the medium has been dismissed by many as unworkable or unnatural. However, small groups of researchers and practitioners continue to believe that the potential can be realized, that tools and methods will be developed that can transcend the limitations of other media used for discussion and issue exploration.

My research aims to move beyond both utopian claims and premature dismissals of participatory hypermedia by treating the medium itself as a given -- as an established form of practice that can be evaluated, interrogated, and considered from such viewpoints as aesthetics and ethics, just like other, more established forms of media practice are. By doing so, I hope to highlight areas where incremental improvements in training, tools, and methods can aid aspiring practitioners to enhance their effectiveness in helping people get value from the medium.

I take the approach of looking closely at what does and doesn't work in actual participatory hypermedia construction sessions. I examine how practitioners of different skills and styles try (and sometimes fail) to keep the hypermedia artifacts useful, coherent, and engaging, especially in the moment-to-moment flow of events where actual practice unfolds.

I focus on the activity of shaping the maps during live sessions, especially at the moments where there is some kind of discontinuity or anomaly, observing how practitioners and participants respond and recover from breaches in the expected flow of

events. I'm particularly interested in the individual and collaborative improvisation and sensemaking that occur at such moments, and at the ways these intersect, highlighting the types of skills and moves that, either by their presence or their absence, make the difference in advancing the sessions toward their intended outcomes.

I am interested in how the human experience of both practitioners and participants culminates in what happens at their shared interface -- the representations they create with the software. This requires developing a descriptive language that does justice to the complexity of the phenomenon, incorporating and extending HCI and CSCW frameworks in areas such as the nature of expertise, the role of human sensemaking around information visualizations, the intelligibility of representations, and the construction of narrative coherence over multimedia repositories. Creation of representations in a collaborative environment also draws on work in design rationale, concept mapping, hypermedia, reflective practice, and participatory design. Key research questions include:

- What is the nature of the skills required to construct graphical knowledge representations in real-time, participatory settings?
- What are the kinds of choices practitioners face, especially at sensemaking moments in the course of conducting sessions?
- How does the context of the service being provided affect the choices a practitioner makes?
- What are the differences between novice and expert practitioners of such forms?

To date this research has proceeded in two rounds. I first studied video recordings of expert practitioners using the Compendium hypermedia tool. Analyzing these videos using a grounded theory approach (Strauss & Corbin, 1990) took much of the first year of doctoral work. More recently I've conducted experiments where teams of mostly novice practitioners planned and carried out a facilitated session for their peers on the theme of space travel. I am currently engaged in analyzing this second stream of video data.

For both rounds, my analysis focuses on the choices made by the subjects in their preparation period (what they were trying to achieve, how they organized the base

materials using the software, their intended flow of events, the roles they assigned, the software aspects they intended to leverage) and in their enacting of these during group sessions.

In constructing an explanatory conceptual framework to encompass the observations from the video analysis, I have found support in a number of research strands exploring the aesthetic and ethical dimensions of practitioner choice, as well as the recent stream of HCI research using concepts of "experience" to reframe the nature of design and tool use. For example, McCarthy & Wright (2004) propose that an individual's "felt experience", as well as Dewey and Bakhtin's ideas of aesthetics, narrative, and subjectivity, provide a richer and more generative account of design moves and choices than available from cognitivist or social constructionist approaches. Bruner's work in narrative theory emphasizes the role of "breaches in the canonicity" of expected events, and the meanings of various kinds of repair attempted by an event's protagonists (1990). Schön's "reflective practicums" (1987) provide an understanding of how techniques such as the "ladder of reflection" can help students develop the artistry of their practice as well as expand their repertoire of choices and moves. Studies of improvisation in professional practice (Sawyer, 2004; Hanley & Fenton, 2007), provide insight into the nature of spontaneous, skilled response to unexpected events. Drawing on these as well as work in fields such as group support systems, transformative mediation (Bush & Folger, 1994), aesthetic practice (Orr, 2003) and others, I have created a preliminary descriptive model that can be used to analyze instances of practice from these perspectives.

I believe this research will produce both practical and theoretical contributions. On the conceptual level, it will apply and extend the "technology as experience" framework (McCarthy & Wright, 2004), applying Dewey's concepts of artistry and aesthetics (2005) to knowledge media. My empirical work using experiments and grounded theory analysis will show to what extent these concepts can be useful in understanding situated experience with sensemaking support tools. I will extend Schön's concepts of experiential learning and reflective practice into the education and development of participatory hypermedia practitioners. On the practical level, this research will identify needed software support for fluid practice, particularly in hypermedia tools. The conceptual framework should prove of use to understanding professional practice in other forms of sensemaking support in addition to those employing hypermedia.

This section has described my current research, aimed at developing a clearer understanding of the practice level in creating knowledge mapping representations with groups. In the following section, I provide some reflections on the connections between creativity and “working” design rationale with groups, informed by the Compendium experience as well as this research.

3. Creativity and design rationale

Whenever I think of surfacing design rationale as an intentional activity -- something that people engaged in some effort decide to do (or have to do), I think of Piet Mondrian's approach to painting in his later years. During this time, he departed from the naturalistic and impressionist (and more derivative, less original) work of his youth (see Figure 1) and produced the highly abstract geometric paintings (see Figure 2) most associated with his name.



Figure 1. A naturalistic Mondrian painting from his early career.⁹

⁹ 'View from the Dunes with Beach and Piers, Domburg', oil and pencil on cardboard painting by Mondrian, 1909, Museum of Modern Art, (New York City). Image found online at http://en.wikipedia.org/wiki/Image:%27View_from_the_Dunes_with_Beach_and_Piers%2C_Domburg%27%2C_oil_and_pencil_on_cardboard_painting_by_Mondrian%2C_1909%2C_Museum_of_Modern_Art%2C_%28New_York_City%29.jpg

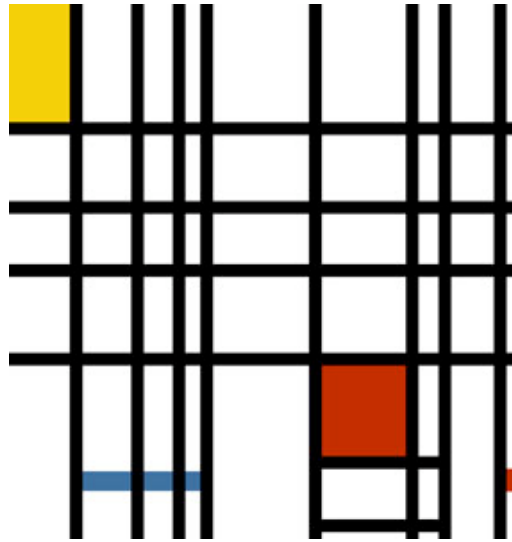


Figure 2: An example abstract Mondrian painting.¹⁰

One might think (as many in his day did) that he was betraying beauty, nature, and emotion by going in such an abstract direction. But for Mondrian it was the opposite. Each of his paintings in this vein was a fresh attempt to go as far as he could in the depiction of cosmic tensions and balances. Each mattered to him in a deeply personal way. Each was a unique foray into a depth of expression where nothing was given and everything had to be struggled for to bring into being without collapsing into imbalance and irrelevance. The depictions and the act of depicting were inseparable. We get to look at the seemingly effortless result, but there are storms behind the polished surfaces. Bringing about these perfected abstractions required emotion, expression, struggle, inspiration, failure and recovery -- in short, creativity.

Similarly, what drew me to IBIS and QuestMap in the early days, and has been a central thread in Compendium's evolution, was the paradox that trying to depict and express complex issues within a simple, restricted representational palette -- a few node and link types tied to a simple rhetorical model -- could actually give rise to a deeply engaged, provocative and generative discussion between the people involved, as well as a representation that was laden with nuance and expressiveness, if you knew how to look at it and understand something of how it had been created.

¹⁰ Piet Mondrian, *Composition with Yellow, Blue, and Red*, 1921, oil on canvas, 72.5 x 69 cm, Tate Gallery. London. Found online at http://en.wikipedia.org/wiki/Image:Mondrian_CompRYB.jpg

Just the act of using Compendium to surface DR, or using a design rationale approach of any kind, does not guarantee any degree of creativity. No tool or approach on its own will. In *Art as Experience*, Dewey (2005) writes about the depth of engagement with a chosen medium as a central generator of artistry. When one cares about the nuances and subtleties, struggles to bring something coherent into being within the strictures of that medium, creativity is both emergent and a by-product, unless lack of time, energy, or other constraints get in the way. People are naturally creative and will act creatively unless impeded (though unfortunately too many situations, processes, attitudes, etc. do indeed restrict or suppress our natural creativity).

The work that our collaborators at the Center for Creative Leadership have done with designing workshops that help business people unleash their creativity in the encounter with complex problems (Palus & Horth, 1996) addresses this principle. Many of the activities in the workshops are counter-intuitive when one thinks about creativity. One is an exercise taken from Edwards' *Drawing from the Right Side of the Brain* (1999). In this, one has to reproduce a Picasso line drawing by turning it upside down, covering all but a couple of millimeters with a sheet of paper, and drawing the few uncovered lines that one sees, trying as hard as one can to get their spatial relationships to each other just right, then uncovering another couple of millimeters and doing the same. When I did this, it was a difficult struggle indeed. My drawing abilities are roughly where they were in kindergarten, and it took much longer to finish the exercise than the other people in the workshop. I had to look extremely hard and labor, sweat, and despair (literally) over getting those lines to behave and put down what I really saw, not what my more rational brain was telling me to do. But yet, at the end I looked at what I had done and it was (if not exactly Picasso-quality) so far superior to anything I had drawn as long as I can remember.

Palus and Horth (1996) write about what they call “aesthetic competencies” not just in these kinds of exercises, but in what can be brought to bear in such seemingly “rational” and so often abstracted settings as leadership in the business world. These include “slowing down the looking” and “paying attention” (which they call the “master competency”), taking the time to see what is really in front of you, which might require a slower, more arduous, seemingly counter-intuitive approach to understanding one’s problem situation than the normal, expedient methods most of us employ.

It is in this light that I think of creativity and design rationale. It is not that "doing design rationale" in and of itself will either generate or impede creativity. Rather, if a group enters into the process of having to think carefully about the pros and cons of different alternatives, capture them coherently, craft their representation into something that they or others will be able to make sense of later, and does this with mindfulness and engagement, it can indeed generate and shake loose creativity. If it is done in such a way as to over-rationalize the process or impede creativity on other levels, it will be resented and probably collapse (as much of the DR research has said, in effect: it was too hard, took too long, and got in our way, so we dropped it). But doing DR can be a way to slow down the looking and pay attention to what is really being said and done. In our work with QuestMap and then Compendium over the years, we have experienced, many times, that slow and careful engagement with working a problem through the limited representational palette can yield creativity, emotional engagement, and communication, even in an ostensibly hyper-rational environment such as a telephone company business process analysis session or software design meeting.

It all depends on how the people involve engage with the tools and practices and each other, and why and how the activity of DR is performed. What are the conditions that will allow collaborative creativity to emerge, without bogging the group process down or (for that matter) burying individual voices and creative expression in a morass of "social" sameness? To my mind using tools and methods with groups is a matter of how effective, artistic, creative, etc. whoever is applying and organizing the approach can be with the situation, constraints, and people. Done effectively, even the force-fitting of rationale surfacing into a "free-flowing" design discussion can unleash creativity and imagination in the people engaged in the effort, getting people to "think different" and look at their situation through a different set of lenses. Done ineffectively, it can impede or smother creativity as so many normal methods, interventions, and attitudes do.

I have found Dissanayake's (1988) evolutionary biobehavioral approach to human art-making to be of value here. She writes about not only what humans have done with art in the last 10,000 years, but what they have done in the last 10 million. She asks why art-making has been a central feature of every human society since deep pre-history, and what that means for an understanding of art and creativity as an essential human trait. This gives a perspective on where art and creativity could lie in an activity like surfacing

design rationale that is lacking from many other viewpoints. Schön (1983, 1987) is helpful here as well.

4. Summary and future work

In this paper I have traced the history of Compendium from its beginnings as an extension of IBIS mapping and QuestMap, to its current manifestation as a methodology, open source software tool, and growing international community. I identified the paradox that, despite many successes and much excitement, the primary mode of practice that we intended has been slow to gain adoption and has even faced resistance from prospective practitioners that might have been expected to embrace it. I described how I turned my attention from evangelizing for such adoption to studying the practices themselves, particularly the sensemaking, narrative, and improvisational dimensions involved in creating representations of rationale on the fly with groups of people. Finally, in light of the concerns of the present workshop, I reflected on ways in which the act of intentionally surfacing and representing design rationale can unleash creativity in the groups engaged in such activities.

As a by-product of my current research, I've developed a protocol for collaborative facilitation of hypermedia knowledge mapping sessions. Inspired by CCL exercises in experiential learning such as collaborative collage-making, the protocol is designed to get people working together creating expressive artifacts in the medium without needing "training." Teams of three to four people are given the task of devising a knowledge mapping exercise that they then facilitate with a large group of participants. I provide a database of images and example exercises that participants can use, or extend, if they choose. In contrast to the Compendium training sessions of old, which provided theory and exercises intended to enable practitioners to step into facilitative roles with groups, these sessions don't require learning concepts or painstaking practice in skill development. Rather, participants jump right in and start using the software. The sessions have been very successful in terms of getting people engaged in building maps and engaging others in the maps' further creation and modification, without requiring prior knowledge. I believe such an approach could be followed in the context of software engineering, holding similar sessions with software developers to "scaffold" the intentional creation of design rationale and the concomitant release of creativity that can accompany it. I will look for an opportunity to try this in the coming months.

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