

SYSTEMIC INNOVATION BY KNOWLEDGE FEDERATION

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ABSTRACT

Technologies have been created that can revolutionize knowledge work; but their potential to make us collectively more intelligent will be realized only when they become widely used to power radically different systemic patterns (in public informing, research, education, governance...). Knowledge Federation community self-organizes to facilitate such development.

INTRODUCTION

Since Douglas Engelbart envisioned computers enabling people to think and solve problems together, in early 1950s, enormous progress has been made on the technology side. But when technology is used to power the patterns of use developed around printed text, report the analysts, the result is exponential growth and cognitive overload (Lyman and Varian, 2000); and when technology is used inadvertently, claim the critics, the result could be no better than collective *shallowing* (Carr, 2010). How can we move away from habitual systemic patterns and use the technology to power more suitable ones (in public informing, research, education, governance...) – which will make us collectively intelligent?

In Knowledge Federation this question is not only rhetorical. Later this month (at the point of this writing) a group of journalists will convene with a group of knowledge media researchers, at a Knowledge Federation workshop titled “Co-Creating an Innovation Ecosystem for Good Journalism,” to ‘think outside the box’ and create a new systemic solution for public informing, by using recently developed technological components as building blocks (Knowledge Federation, 2011a). And this is only one in a series of projects that are being developed.

Welcoming the MIT initiative to create a community for collective intelligence, we offer our experiences so far, and open up a space for exchanging ideas about systemic innovation and real-world systemic change.

In the three sections that follow, we (1) explain knowledge federation as a specific process by which collective intelligence can be enacted; (2) describe Knowledge Federation as a community-and-project developing knowledge federation and bringing it into real-life knowledge work and (3) present an example showing how science and journalism may be combined together in a federated scheme. We conclude with some comments about the role this way of working may have in the academia, and about our future plans.

KNOWLEDGE FEDERATION AS A PROCESS

Beyond Wikipedia

The meaning of ‘knowledge federation’ can easily be understood with the help of a political metaphor: The political federation aims to resolve the conflict between the need for autonomy and the advantages of unity, and ideally turn it into synergy. Similar concerns exist in knowledge work. There too there is a need for authentic individual views, as well as for a shared, community view that can empower us to act. Specifically in an academic discipline (as Bourdieu pointed out for sociology, see Bourdieu, 1991), there is both a need for creative contention of opinions within the discipline, and for giving clear messages to the world (arguably the systemic role of the discipline).

If we think of conventional published articles as analogous to independent states, and of Wikipedia-style co-creation of a single version of truth as

analogous to a simple union, then ‘knowledge federation’ stands for the large span of creative possibilities that exist between those two extremes (Tanaka, 2008, Karabeg and Lachica, 2008).

Considered as a process, knowledge federation involves two kinds of activities: (1) organizing knowledge resources relevant to a subject and (2) creation of shared views or general insights they support together (which might then be used as building blocks to create even more general insights).

Hence knowledge federation is a common name for a class of knowledge-work activities and processes, which support collective intelligence.

An Information Model

We introduce the information that is the goal of knowledge federation by the following ideogram.

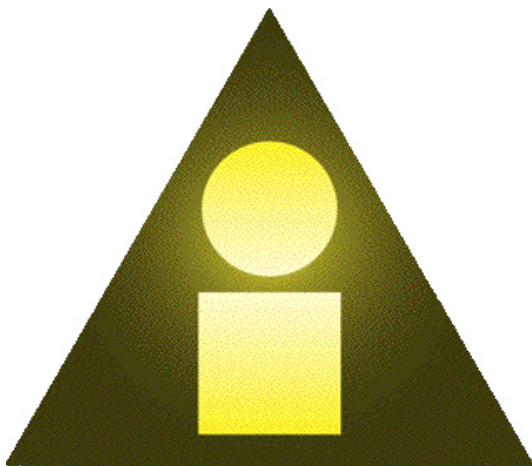


Figure 1: Polyscopic Information Ideogram depicts ‘good information,’ an objective of knowledge federation.

In the Polyscopic Information Ideogram (Figure 1), the triangle in the background represents a mountain, and metaphorically a multiplicity of viewpoints of which some are general or ‘high-level’ while others are more specific or ‘low-level;’ the square represents an organized (according to the way of looking or ‘side’) multiplicity of views; the circle represents a main point, a ‘big picture’ or a ‘mountain-top view.’ By placing the circle on top of the square it is suggested that ‘good information’ (represented by the ‘i’) provides a high-level insight, founded upon a careful, many-sided analysis.

Among various high-level views that might be possible, of a particular value are the so-called *gestalts*, which interpret a situation and point at a

suitable course of action. “Our car has a flat tire” is a textbook example of a *gestalt*. In knowledge federation ‘having a right *gestalt*’ is offered as an operational definition of ‘being informed.’

KNOWLEDGE FEDERATION AS A PROJECT

Historical Introduction

Knowledge Federation was created by a group of knowledge media researchers developing technical solutions for knowledge organization and for collective sensemaking. At the end of our first meeting (at Inter-University Centre Dubrovnik, in October 2008), we realized that if our technologies and systemic ideas were to be put to use and have the sort of impact that they can and need to have, we would need to broaden our community and organize ourselves in a different way.

The second Knowledge Federation workshop (at Inter-University Centre Dubrovnik, in October 2010), titled “Self-Organizing Collective Mind,” brought together a heterogeneous community, or ‘a federation of knowledge workers and other stakeholders’ representing a suitable combination of backgrounds (Knowledge Federation Wiki, 2011b). At the beginning of the workshop we were asked to consider ourselves not as professionals pursuing a career in a certain discipline or business, but as elements in a collective, and at the limit global mind, and to self-organize as it might suit that role. During the three days of the workshop we began working on systemic solutions for journalism, science and education.

Subsequent self-organization of the Knowledge Federation community led to an organizational structure capable of doing systemic innovation, as explained below. At the third Knowledge Federation workshop (at Stanford University, in July 2011), we were able to submit that IT innovation was ready to expand in scale to systemic innovation, and introduce (the organizational structure exemplified by) Knowledge Federation as an enabler of such development (Karabeg, 2011).

Method and Organization

When we think about extending the conventional paradigm in IT innovation (hardware design, computer programming) to large socio-technical systems, an obvious difficulty is that those systems involve large numbers of people, hence they cannot be in the conventional sense designed or programmed (Erickson, 2009). We resolve this difficulty by consistently using self-organization, or what Douglas Engelbart called ‘bootstrapping’ (anticipated in Engelbart, 1962): Knowledge Federation community co-creates systemic solutions by using itself as a

sandbox. In bootstrapping, the human and the technical parts of the system co-evolve together.

Knowledge Federation has self-organized as a federation of projects, each game-changing in its own domain. Together, those projects form the mechanics of Knowledge Federation as a general or generic ‘game-changing game’ (Karabeg, 2011).

A KNOWLEDGE FEDERATION PROTOTYPE

Tesla and the Nature of Creativity (TNC) Prototype

The TNC prototype shows how academic research and journalism may be combined together in a federated scheme, capable of providing reliable high-level insights and specifically *gestalts*. It also shows how existing technologies may be combined as Lego blocks to create innovative systemic solutions for any specific area of knowledge work (more suitable technology can of course be developed once the real needs are understood).

The TNC prototype has three phases, each of which has multiple steps.

The Use Case

As technical prototypes tend to, the TNC prototype too begins with a use case; the story here, however, is not made up but real.

Its main protagonist is this article’s second author, Dejan Raković, who is a quantum physicist and Professor at the University of Belgrade. In his research Raković reached an insight that has potential to shift paradigms in disciplines distant from his own, and in general culture.

Part of Raković’s research has been a transdisciplinary study of the creative processes of the genius inventor Nikola Tesla. What attracted Raković to this theme was that (as he realized) understanding its phenomenology required insights from quantum physics. Tesla namely had an ability, documented in his biographical notes (Tesla, 2006), to conceive complex electro-mechanical machinery in his mind, not by putting them together piece by piece, but rather, as it were—directly. Raković’s result was a model explaining the phenomenology of this, as he called it, ‘direct creativity,’ by using certain recent insights from quantum physics (Raković, 2009 and 2010).

Although he had already authored more than 200 research articles and 35 books, Raković realized that conventional publishing will not be sufficient; if his

result should have the impact it can and needs to have, it would need to be federated.

Phase I: Idea Extraction

The substance of Raković’s article – his model of direct creativity – is written in the language of quantum physics, and is therefore not accessible to non-specialist readers.

The first step in federation was to extract from Raković’s article, and from his other articles and references and experience, a simple visual diagram showing how direct creativity might work and how it might be controlled and used – expressed in terms of widely accessible, rather than quantum-physics metaphors.

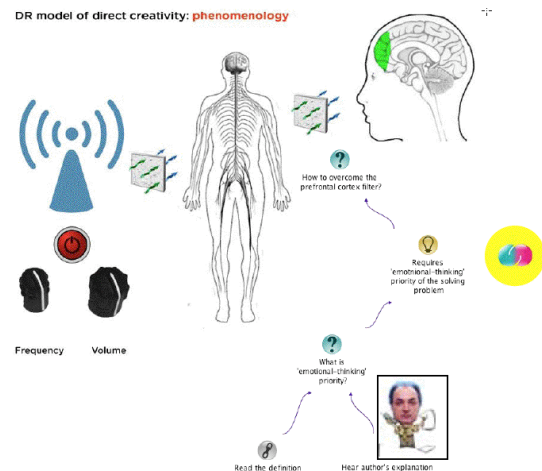


Figure 2: Raković’s model of direct creativity expressed in terms of accessible metaphors, and augmented by a dialog map, media material and navigational buttons.

In the second step we used the Compendium dialog mapping tool (Buckingham Shum, 2008) and the Acrobat Professional to add a navigation structure, linking the above model, the article and other media material as needed, such as recorded interviews with the author, to provide additional explanation. Links were added from the model to corresponding points in the article.

Hence this second step turned the research article into a multimedia object, which made the main high-level insights accessible to general public, and also made it possible for an expert to verify the high-level model.

The third step of the idea extraction phase was to extract the main ideas from the article, which will in the second phase be made available for further

federation online. For this purpose we used an online idea mapping and sensemaking tool called Cohere (Buckingham Shum, 2008). As a final step in the first phase, we linked those ideas with other media material such as author’s explanations, and with the corresponding points in the article, in a similar way as we did in Step Two.

Phase II: Crowdsourcing Insights

In the second phase of federation, which we called ‘crowdsourcing insights,’ the ideas selected from the article, and their relationships, were subjected to public federation, by using the Cohere platform. The role of general public was performed or simulated by Knowledge Federation members.

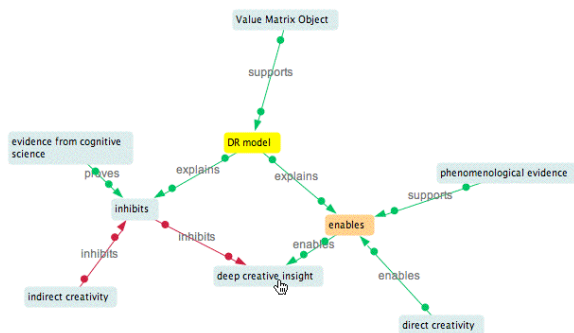


Figure 3: Creativity window, where ideas related to creativity are inter-related and elaborated.

We envision the life of ideas, and their further federation online, to continue within certain specific contexts, which we called ‘windows’ (in our prototype they were implemented by using the ‘group’ mechanism in Cohere). The window shown in Figure 3 provides a framework to creativity-related interests. Here Raković’s creativity model is represented by an idea (labeled ‘DR model’), and then connected with other related ideas through public federation. The resulting network of ideas shows that there are two kinds of creative processes, one of which (‘direct creativity’) enables, while the other one (‘indirect creativity’) disables the ‘deep creative insight.’

The ‘DR model’ idea has a ‘Value Matrix Object’ associated with it. If there were a significant objection to the model, this would be recorded in the corresponding Value Matrix Object, and the conclusions based on the model would be suspended until the objection is cleared.

During the actual (or more accurately *simulated*) federation, no objections were raised. On the contrary, the community members found supporting

evidence – in phenomenology of the creative process as reported by historical exceptionally creative people, and in recent results in cognitive science. Corresponding ideas, and associated resources, were connected with Raković’s model.

When ideas develop a life online, and become linked with other ideas, at any point an overarching ‘big-picture view’ or *gestalt* can emerge. In our present case a community member, we will call him Jack, looked at the developments in the Creativity window and began connecting the dots together in a new way, thinking “wait a minute, but this means that...” A new *gestalt* was born: “A breakthrough in handling creativity is possible.”

What Jack realized was that having thought of creativity only in classical terms, we (as society or culture) have failed to provide institutional or systemic support for exactly the kind of creativity that can make the largest positive difference to a risk-laden society – namely the ‘direct’ or the ‘Tesla’ kind. Jack decides to create a special window, where this particular *gestalt* and its consequences may be worked with and developed further. As the case was in the previous step, this *gestalt* too gets linked with other ideas and acquires visibility, and credibility.

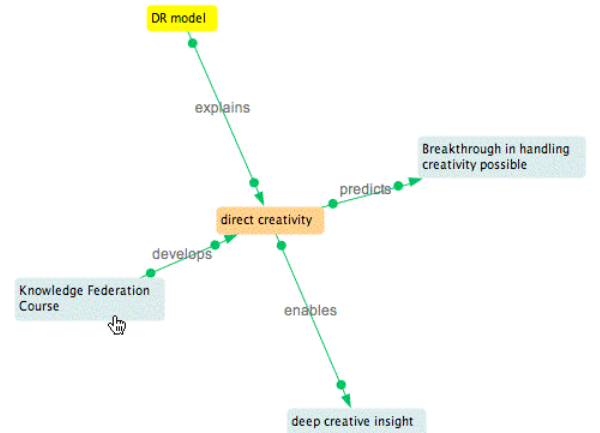


Figure 4: Knowledge Federation (a community of interest) window, where the products of federation that are potentially relevant to this community are placed.

In a federated organization of knowledge work, communities of interest can be members of Federation. Part of the responsibility that the Federation has towards its members is to bring to their attention relevant (to them) ideas and insights that have emerged. Our example features one such community, which happens to be Knowledge Federation itself. This community receives in its window some of the potentially relevant ideas,

including the new *gestalt*, the DR model and the ideas ‘direct creativity’ and ‘deep creative insight’ (Figure 4). The Knowledge Federation community realizes that these insights can be useful in one of its projects, where a systemic model for education is being developed. Why not use those new insights and develop an educational model that supports deep creativity and enables deep creative insight? The idea ‘Knowledge Federation Course’ in this window becomes linked with ‘direct creativity’.

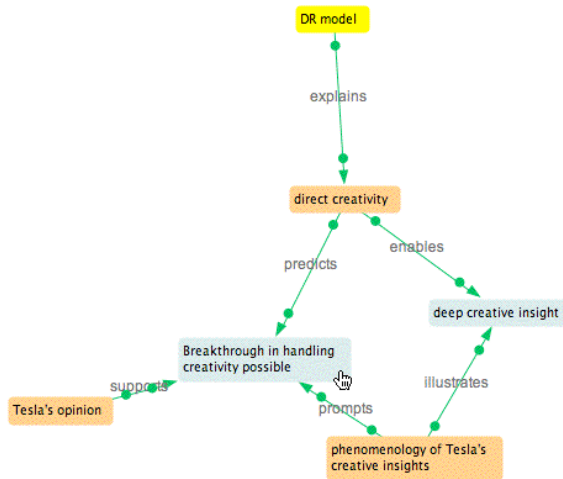


Figure 5: Knowledge Federation Media Channel, where relevant ideas along with suitable media material are made available to journalists and other media workers.

As the final step in this second phase of federation, the new *gestalt* is placed into the Knowledge Federation Media Channel, along with the associated anecdotal and media material, including interesting facts about Tesla, or about Dejan Raković and his work – and made available to journalists (Figure 5).

In this way journalism has become part of a federation scheme, or metaphorically a ‘tip of an iceberg,’ a visible part of a much larger knowledge-work ecosystem, which identifies, verifies, elaborates and prepares potentially relevant material. A synergy between the journalists and other knowledge workers is established, allowing everyone to contribute to the creation of publicly shared, reliable and relevant *gestalts* – or in other words *good* information.

Phase III: Changing the Collective Mind

The third and final phase of the federation, “changing the public mind,” employed a technique called Key Point Dialog to bring a direction-changing new *gestalt* to public awareness, and expose it to further tests. The Key Point Dialog (Key Point Dialog Wiki, 2011) builds upon the dialogue technique developed

by physicist David Bohm, by adding online and conventional media work and elements of a therapy technique called Intervention.

CONCLUDING REMARKS

Design Epistemology

In addition to its potential to improve the knowledge work practice, knowledge federation also has a fundamental-academic side.

The popular notion that science is discovering an objective description of ‘the mechanism of reality’ having been discredited by certain key developments in 20th century science (Heisenberg, 1958), we consider it as good practice to specify an epistemology (understood broadly as ‘assumptions that underlie knowledge work’) explicitly. Knowledge federation is consistently developed upon what we are calling *design epistemology* (Karabeg, 2005).

When we base our work on *design epistemology*, we no longer consider ourselves as objective observers of reality; we consider ourselves – and we also become – active participants and creators. The *design epistemology* determines our priorities: A designer developing a mechanical clock, for example, who has created the mechanism but not the hands, would naturally create the hands as the next step, because the rest will be of no use without them. In a similar way, when we apply the *design epistemology* to knowledge work, we look for the natural next thing that needs to be done.

We observe that we have been vastly efficient in producing documents, opinions, information technology, media material... What is now lacking is a socio-technical system that will (1) organize the produced resources in a meaningful way and (2) turn data and opinions into simple, reliable and widely shared insights about key issues. “Knowledge federation” is the name we have given to this goal.

Interestingly, under *design epistemology*, the work done in Knowledge Federation, as well as the work done in the Collective Intelligence Community, become ‘basic research.’

‘The Game-Changing Game’ Revisited

Looking still more broadly, beyond knowledge work and at contemporary condition at large, we find that the urgent issues tend to be systemic; and we look for natural leverage points.

We find an abundance of them in knowledge work: journalism, education, governance, science... At the

recent Knowledge Federation workshop at QIM 2011 Conference in Belgrade, the focus was on the foundations for knowledge work. Better public informing can empower democracy; better education can revitalize culture. In Knowledge Federation we consciously aim to discover and develop possibilities for positive systemic change.

Under *design epistemology*, also this ‘game-changing game’ can be considered as ‘basic research.’

Course ‘Systemic Innovation for Collective Creativity’

A leverage point for systemic change is education. Within the Knowledge Federation Course project we are developing a prototype of a federated university course, where the learning resources are co-created by international experts and students, and used by learners worldwide. A variant of this course will be offered for the first time in October 2012 through the Inter-University Centre Dubrovnik. Its working title is “Systemic Innovation for Collective Creativity.” We offer to co-create this course with the Collective Intelligence community. If his health allows, Douglas Engelbart will be present and ‘pass the torch’ to the students.

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