Completing Engelbart's Unfinished Revolution

Proposal to Stanford University's H-STAR / mediaX and Google, **DRAFT** December 2, 2016
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Motivation

To several of us in Knowledge Federation, Doug Engelbart is not only an iconic precursor but also a revered late friend. Of course we want to continue and complete the creative revolution he's begun. We feel we *owe* this to Doug.

Yet we must emphasize that **the intended consequences of the strategic initiative we are proposing are *much* larger** than the focus on a single person's work might suggest.

As we shall see, completing what has been called (at MIT, and at Stanford) the "Engelbart's unfinished revolution" means not only developing information technology in a new way,

but also our institutions. And on an even larger scale, it means using our creative power, our capacity to innovate, in a way that will benefit us dramatically more than it presently does. What Doug was pointing toward was a new direction in which our innovation-driven societal evolution needs to continue.

As if by a sleight of hand, by pursuing this direction we may transform even the global problems into assets – because in its context they will first demand, and then energize, the kind of developments that we might otherwise only *wish* to experience.

We propose to celebrate the approaching 50th anniversary of Doug's 1968 *demo* by making this new direction widely understood and vigorously pursued.

Following a series of exchanged emails, Martha Russell of mediaX and Keith Devlin of H-STAR expressed their interest in exploring this direction together. If Google too may find it worthy of consideration, we will propose to meet and discuss this strategy and concrete steps.

This proposal is partly motivated by the news that Larry Page is wanting to invest some of the resources of Google into making a difference in the world (see this Financial Times report). We show – and illustrate by a couple of anecdotes at the beginning of Appendix II – that Engelbart's unfinished revolution offers a revolutionary new approach to making a difference, which *can* make a difference. We invite Google to champion this approach.

The fact that this charitable engagement is closely aligned with Google's business mission and interests points to the possibility to create an exemplary 21st century company profile.

Summary

The expression "finger pointing to the Moon" will help us frame and understand what happened.

The technology that Doug has been celebrated for was intended to be only 'a finger' that points to 'the moon' – something *incomparably* larger and more beautiful than itself!

By taking a more careful look at this **revolution to be completed**, we too point to 'the moon' (the nature of Doug's intended revolution). We then explain **our proposal** for a strategic initiative to complete it. We conclude by outlining **our offer** – a portfolio of resources that we developed which, when combined with your resources, may provide what is needed for making a difference at a pivotal point in our civilization's evolution.

In **Appendix I** we survey the Knowledge Federation's resource portfolio.

In **Appendix II** we illustrate some of the core abstract ideas in this proposal, and the realities of *the frontier*, by telling *vignettes* – poignant real-life people and situation stories.

Overview

A Revolution To Be Completed

By inquiring **why Doug was not understood**, we find out that he was developing technology and a system of ideas to point to a whole new order of things (*the paradigm*) and help its emergence. Failing to see *the paradigm,* we tried to fit his technology and ideas into the *existing* order of things – and missed the point.

What Doug saw was that unlike paper, pen and print – the technologies that pretty much *determined* how we might communicate – the digital media interconnected by a network enable communication that is instant and direct. And furthermore – being configurable and programmable – this new technology enables us to implement virtually *any* manner of co-creating and sharing knowledge we might be able to imagine. Doug's technical innovations (both the ones he's been celebrated for such as the mouse, the windows and the hypertext, and those other ones that remained largely ignored such as the Open Hyperdocument System, the Dynamic Knowledge Repository and the Networked Improvement Community) were intended to point to entirely new systemic solutions in knowledge work; and at the same time serve as building blocks in an approach to knowledge where we are thinking and creating together, *concurrently* and in synchrony, like cells in a *collective mind*.

What remained to be done after Doug, the unfinished part of *the revolution*, was to develop (or as Doug would have said to *bootstrap*) a *new* core collective capability – to change our institutionalized, habitual ways in which we communicate and collaborate. And then also our institutions or more generally *systems,* which *embody* and hence reinforce and perpetuate the *old* ways of communicating and collaborating. His ambitious technical project brought Doug to an even larger and more central one, which we call *systemic innovation*. *Systemic innovation* is **a revolution in innovation** in a similar way in which the Industrial Revolution was a revolution, because in its course human work will become radically more effective and efficient – by being structured and organized radically better. *Systemic innovation* is **a solution to problems**, both those large global ones and those smaller ones that plague us personally – where we recreate institutions and other systems so that those problems don't even occur. Surprisingly perhaps, *systemic innovation* is also **a revolution in philosophy** (where by "philosophy" we mean philosophy's traditional function, to secure a solid foundation for "good knowledge" or for social creation of truth and meaning) – because it allows us to *construct* the social processes by which truth and meaning are created; and to continue reconstructing them, to reflect the state of the art in relevant disciplines, and of technology. *Systemic innovation* is **a revolution in business** – because it will require and invite a spectrum of new kinds of information, expertise, technology and activity.

In Doug's unfinished revolution we find a natural way to begin all those other revolutions – by reproducing a change scenario of the kind that has proven effective throughout history. Once again a technology has been created that enables human work to become radically more effective and efficient. When Doug's unfinished revolution has been completed, he may be credited for not only "The Mother of All Demos", but also for the mother of all revolutions.

History presents us a wealth of examples where an emerging paradigm and its pioneers struggled to overcome the resistance of the prevailing paradigm, within which there was no place for the changes they were striving to foster. This points to **our challenge and opportunity** – the challenge to put together and manifest sufficient parts of the new paradigm, and to mobilize sufficient resources so that the shift may take effect and scale; the opportunity to begin and streamline a sweeping revolutionary change by doing what has proven effective in the past – developing technical solutions that make human work radically more efficient and effective.

Our Proposal

We propose to take advantage of the combination of our resources, and of the 2018 celebration of Doug's demo, to begin a cascading sequence of paradigm shifts as outlined above (complete Engelbart's unfinished revolution). Concretely we propose to achieve the following specific goals.

Make Doug's Vision Known – celebrate the 50th anniversary by telling the real story, by "showing the moon". In addition to making the event truly thrilling, this will make it also transformative – it will give us a chance to engage creative people in a future-creation scenario, and instantiate and already manifest a *collective mind* in action.

Institutionalize Vision Creation – liberate our collective worldview from historical myths and various conscious and unconscious forms of manipulation, by making its creation a function of our *collective mind,* through which it will reflect rather than contradict the state of the art in academic disciplines and other forms of knowledge.

Institutionalize Systemic Innovation – the first thing that our liberated *collective mind* will not fail to notice is that our next large stage of progress leads through a reconstruction of our basic institutions. Let us not miss this opportunity. Let us complete *the revolution* by giving also the praxis of *systemic innovation* suitable institutional support.

We conclude by pointing to the analogy between the proposed strategy and a conventional marketing strategy. When we celebrate the 50th anniversary of the *demo* by 'telling the real story' (and hence informing the public about *the paradigm* and its uncommon potential), we at the same time create a new niche in the market where you – Stanford University's H-STAR / mediaX and Google – are already institutional leaders. We invite you to **make a**

difference and increase your lead by earnestly engaging in this strategic initiative and seeing it succeed.

Our Offer

To be able to continue *the revolution* by developing the resources that were still missing, we applied *systemic innovation* or *bootstrapping* to our own system – we organized ourselves in a new way, as the Knowledge Federation *transdiscipline*.

In **our network** – which is indeed a network of networks – we have been fortunate to gain access to experts and expertise of sufficient quality and breadth to be able to begin evolving the *praxis* of *systemic innovation.* The **technology and process prototypes** developed by our community most directly extend Doug's technical work; they offer technical building blocks and templates for organizing information and people in entirely new ways. Our **evangelizing prototypes** offer the kind of stories and insights that motivate and mobilize every new paradigm; and that later become part of the folklore. Our **system prototypes** show in what ways our basic institutions and ways of collaborating and communicating – in science, public informing, education, even religion... – might become entirely different; and what practical difference they might make. And also who might re-create them, and in what way. Our **institutionalization prototypes** show how *systemic innovation* and more generally the work on *the frontier* can be – or better said already *is* – organized and embedded in the existing institutional reality. Finally the **polyscopy prototype** offers us the capability we most urgently need – to turn our abundant knowledge into shared basic insights, which can orient us in new ways. To Engelbart's unfinished revolution *polyscopy* offers a way to found it academically.

A Revolution to Be Completed

Why Doug Was Not Understood

Doug was a visionary.

And visionaries are the people with an uncommon faculty of vision: Where the rest of us see only dots, or ignore them because they seem irrelevant, their minds are able to connect the dots and have them see what wants to or needs to emerge. While we look at them and wonder what in the world they might be doing, they spare no effort creating *new* dots, to contribute to this emergence. It might seem that they are just living in their own world. But in truth they are just living and working on *the frontier* where the next stage of our civilization's evolution is being crafted.

It is only from a historical distance that the true nature of a stage of our civilization's evolution can be understood and suitably named: the Renaissance, the Enlightenment, the

Industrial Revolution. While the new order is still taking shape, even a visionary can see only one of its parts, according to her or his specific area of interest and contribution.

We are reminded of the parable of the [blind men and the elephant](#). The men we are talking about are of course not blind, they are visionaries. But the result is similar because *the elephant* is invisible – he does not yet exist.

Add to this the fact that even the words suitable for describing or even naming *the elephant* are not yet in common use, and you may readily begin to see how *the elephant* could be (metaphorically speaking) in the midst of a room full of people, even in the midst of a large auditorium filled with knowledgeable and clever academics (a *big* animal in the midst of an auditorium – shouldn't this be a breath-taking sensation?) – without anyone seeing him or talking about him!

Being unable to see *the elephant,* Doug's contemporaries saw only the material things, the technology. When this technology fitted into the existing order of things, it was adopted and used and talked about. When it didn't, it was ignored.

This shaped "the revolution in the Valley" (see my blog post [The Information Age Coming of Age](#)).

This also shaped the intriguingly paradoxical and poetically moving story of Doug.

This explains, for instance, how Doug could receive a standing ovation from a filled Bing auditorium (at the "Douglas Engelbart's Unfinished Revolution" celebration of the 30th anniversary of The Demo, in 1998, excellently conducted by Paul Saffo) – and still end his life feeling he'd been misunderstood, and celebrated for wrong reasons.

> See [this short video](#) where Bill Daul, Doug's close friend, tells how a couple of times he even saw Doug cry, and say "I'm a complete failure", because, Bill explains, "people looked at the mouse, windows and menus and thought that that was the only thing he produced, while those were only tools to support a bigger vision".

The technical name for Doug's larger vision, our metaphorical elephant, is "paradigm".

When one is developing and proposing a paradigm, the technologies one is creating are only placeholders. They point to specific purposes within the paradigm; and to other technologies that can and need to be developed for those new purposes.

It was transparent to Doug that it was a paradigm he was wrestling with. When in the early 1990s he undertook to share his work and vision with the Silicon Valley developers and businesses, by offering (at Stanford University) the Bootstrap Seminar, after a brief introduction of his theme and of the people present he would proceed by talking about paradigms and related challenges and paradoxes. He would then ask the attendees to discuss in pairs paradigm-related challenges and opportunities as related to their own themes of interest. He would then continue with *another* talk about paradigms.

This didn't have the intended effect. To Doug's lifelong frustration, *the elephant* remained invisible!

What Doug Saw

What was that "bigger vision" that Doug saw but was unable to bring across and make happen?

Doug's key insight was what he called CoDIAK (for Concurrent Development, Integration and Application of Knowledge). We will be calling it the *collective mind paradigm,* or more simply *collective mind*. What Doug foresaw, already in 1951, was that the digital computer technology, when suitably developed and interconnected in a network, could enervate our organizations in entirely new ways, and enable *concurrent* and hence incomparably more efficient and effective patterns of creation and sharing of knowledge, compared to the ones that evolved based on the printed text as medium (see this concise overview of Doug's vision, which he shared in Byte in 1995).

To see that CoDIAK or *collective mind* points to changes that are beyond "collective intelligence" for which Doug is often credited, imagine an organism that is walking toward a wall. Imagine that the eyes of this organism see that, but that they try to communicate it to the brain by publishing academic articles.

It was Vannevar Bush who – with prerogatives of a leading scientific strategist – observed that technology could enable us to think and create together. Bush voiced the need for the *collective mind* approach in 1945, in his article "As We May Think". He, however, considered the microfilm as the likely candidate for an enabling technology. It was Doug's great insight that it would be the *digital computer technology,* connected in a network and equipped with suitable media, that would enable the *collective mind* re-evolution.

This insight led to an avalanche of discovery. The technology and the core ideas that Doug created – both the ones he's been celebrated for, and the ones that have not yet found their place in our collective awareness and practice (such as the Open Hyperdocument System, the Dynamic Knowledge Repository and the Networked Improvement Community) – were developed as necessary components of a *collective mind*, in a similar sense as the engine, the transmission and the steering are the necessary components of an automobile.

The key to understanding Doug is to see that he was innovating on a much larger scale than we were accustomed to look – on the scale of the societal creation and sharing of knowledge, or of *the paradigm*, as a whole.
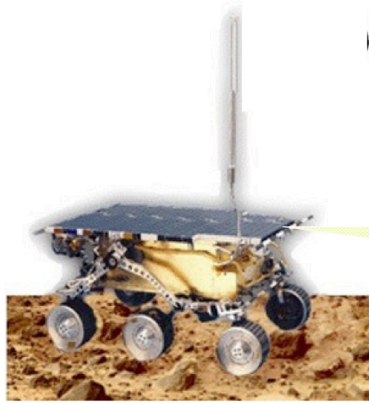
We ride a common economic-political vehicle

Traveling at an ever-accelerating pace through increasingly complex terrain.

Our headlights are much too dim and blurry

We have totally inadequate steering and braking controls.

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The second, *motivational* slide prepared for Doug's "A Call to Action" panel at Google in August 2007. This slide shows unequivocally that calling attention to – and enabling – large-scale *systemic innovation* was Doug's true intent. The slide was not shown during the event.

What Remained to Be Done

Imagine our global society as an organism that has, by some foible of nature, evolved and grown extremely fast and out of proportion. Imagine that this creature has a well-developed nervous system (Internet-connected digital media), which could give it necessary awareness, and help its organs coordinate their action. Imagine that the cells and the organs of this creature (people and their organizations) have not yet learned how to do that – and that this naturally results in risks to the creature and its environment.

Doug clearly saw that we had developed the *tool system* most successfully; and that what remained was to learn how to take advantage of it by changing the *human system* as well. And to then continue the concerted and synergistic co-evolution of those two systems.

This insight brought Doug to the brink of an even *much* larger vision and challenge, which we shall call *systemic innovation.* Howard Rheingold pointed to a significant part of this challenge in his MIT Technology Review obituary for Doug.

> Engelbart's failure to spread the less tangible parts of his vision stems from several circumstances. He was an engineer at heart, and engineers' utopian solutions don't always account for the complexities of human social institutions. He only added a social scientist to his lab just before it was shut down.

What's more, Engelbart's pitches of linked leaps in technology and organizational behaviors probably sounded as crazy to 1980s corporate managers as augmenting human intellect with machines did in the early 1960s. In the end, the way Silicon Valley companies work changed radically in recent decades not through established companies going through the kind of internal transformations Engelbart imagined, but by their being displaced by radical new startups.

We practice *systemic innovation* when we apply our capacity to induce creative change to basic societal institutions and other *socio–technical* systems. And more generally, when we innovate by optimizing with respect to systemic effects.

As we shall see, *systemic innovation* is so much at the core of the emerging paradigm, that we may as well visualize it as the trunk of *the elephant.*

Doug was not the only visionary working on the *systemic innovation* frontier. Around the time when Doug was beginning to work on his vision, others sharing a related vision began to gather and organize themselves within various branches of cybernetics and systems or complexity sciences (in what follows I will be referring to all of them as 'systems sciences'). The insight they shared with Doug – that we must learn to think and innovate in terms of systems – was what brought them together. Erich Jantsch, for instance, considered *systemic innovation* to be what distinguishes "rational creative action" in general – and in particular in policy (see [his article](#)).

To see why the *collective mind* and the *systemic innovation* are inseparable, and therefore best considered a single paradigm, notice that the former cannot be developed in practice without the latter, because only through *systemic innovation* can we physically change our collective mind. On the other hand, the *collective mind*-related insights, technologies and techniques might be exactly what we may need to ignite large-scale *systemic innovation*, because they not only enable but also *require* new institutional structures and ways of working.

In his 1962 seminal report "Augmenting Human Intellect – a Conceptual Framework", Doug contributed an original methodology for *systemic innovation*, which was based on his notion of "capability hierarchy". The ideas described in this report guided Doug's work throughout his career.

Doug also saw that the practice of *systemic innovation* required an unfamiliar way of working. While conventional innovation can be done by putting together technological components in a laboratory, *socio*-technical innovation requires the participation of the people in the system that is being recreated, because it is *their* interaction and way of working that is being changed.

Doug proposed a solution, which he called *bootstrapping.* The idea of *bootstrapping* is to *be* the positive feedback loop that enhances systemic change. *Bootstrapping* is practiced when the people developing a socio-technical system are at the same time this system's initial

user community. Or when the people wanting to ignite systemic change look for situations where this change is ready to take place or has already begun, and then help the change take effect and grow.

When in the late 1980s Doug and his daughter Christina undertook to make Doug's vision come true by creating an institute (today's Doug Engelbart Institute), this institute was initially called "Bootstrap Institute", and it was later renamed "Bootstrap Alliance". The institute offered the "Bootstrap Seminar" (at Stanford University) to spread the word about the challenges and the opportunities that reside in *bootstrapping,* and engage the participants accordingly. Clearly, Doug's intention was to *bootstrap,* with creative partners in the Silicon Valley and beyond, the *collective mind* re-evolution.

Doug did not succeed. Around the time when Doug's creative career was coming to an end, in 2008, "Bootstrap Dialogs" were filmed (at Stanford University) featuring Doug, Jeff Rulifson and Christina, to record Doug's message to the world. It was mostly Jeff and Christina who talked. And when the conversation would turn to Doug, he would invariably exclaim (something to the effect of) "Somebody should really *do* this!" We recommend to see this brief video clip, where Doug is talking about the challenge to embed *bootstrapping* in academic and other institutional practice, for illustration and inspiration. At the end of it, you will hear Doug express the challenge that was remaining:

> "So, how do you get it started? The term 'bootstrapping' came out of saying Well, who are the… what subset of your society would be most effective in making changes … And it would be important then to boost *their* capability early on."

As we shall see, Knowledge Federation continued Doug's work in exactly the way Doug was suggesting in that interview.

A Revolution in Innovation

To see why *systemic innovation* is a revolution or a *new paradigm* in innovation, think of our basic societal institutions as gigantic mechanisms, comprising people and technology. The purpose of those 'mechanisms' is to turn our daily work into socially useful effects.

Assume that a technology has just been created that can enable a *dramatic* increase of efficiency and effectiveness of those 'mechanisms'; and that the 'environmental conditions' in which those 'mechanisms' operate have changed so much that they now demand of them entirely new functions and capabilities; and that we have anyhow neglected to take a careful look at those 'mechanisms' for so long, so that they now leave astonishingly large opportunities for improvement (the Knowledge Federation's *prototypes* that are outlined below will show that these assumptions are warranted).

An opportunity is presenting itself – to make our daily work considerably more effective and efficient, perhaps just as much as what our ancestors achieved during the Industrial Revolution.

Should we then not consider *systemic innovation* as a frontier, perhaps even as *the* frontier, on which our capacity to innovate is ready to bring a revolutionary change?

And we have reached this solution by considering only the old, Industrial Revolution *criteria* for evaluating the results of innovation – effectiveness and efficiency!

The moment we take into consideration that those "systems in which we live and work" determine also the quality of our daily lives, and give a deciding tone and direction to our culture, we will begin to perceive *systemic innovation* as a *fundamental* issue – more fundamental than even innovation itself (as it has habitually been perceived)!

Consider, for example, the issue of democracy. "Let us control the money of a nation, and we care not who makes its laws" was said to be a maxim of the House of Rothschilds. And systems scientist Bela Banathy had this to say about our theme (in "Designing Social Systems in a Changing World"):

> "I have become increasingly convinced that [people] cannot give direction to their lives, they cannot forge their destiny, they cannot take charge of their future—unless they also develop competence to take part directly and authentically in the design of the systems in which they live and work, and reclaim their right to do so. This is what true empowerment is about."

Consider *any other* function of culture, and the conclusion will be similar. Consider even – the culture itself. Culture used to function and evolve largely through control over the media: If you wanted to perform at Carnegie Hall or teach at Stanford, you had to be *good*! Not so if you want to perform on Youtube. I am not saying that this is wrong, only that our traditional means of securing that the "good" culture prevails need to be reinvented, because the media have changed.

We may write a research article about this problem. But will that really make a difference?

Mac Luhan was profoundly right: Unless we find a way to not only render our messages to the world in the right medium, but also *inscribe* them in the very way in which a new medium delivers or fails to deliver our messages – they are as good as nonexistent!

To have impact, *insights must have a way to impact systems*.

But isn't that exactly what *systemic innovation* is all about?

I recently ventured the following conjecture (see the ending of [this blog post](#)):

> It seems safe to predict that the innovations or inventions that will mark this century's greatest improvements of the human condition will be of the socio-technical kind. We will discover new ways of doing education, public informing, science, finance, governance, religion... Just as during the last century we discovered that we could fly, talk at a distance, automate computation and have our clothes washed by a machine.

A Solution to Problems

In an evangelizing talk titled "Toward a Scientific Understanding and Treatment of Problems" (outlined in this blog post), I developed a parallel between scientific medicine and understanding and handling of problems in general. "When we see red spots appearing on our skin", I said, "we don't try to get rid of them by rubbing them off or painting them over; we base our understanding and treatment on the underlying anatomy and physiology."

Anthropologist and cyberneticist Mary Ann Bateson (daughter of two prominent cyberneticist, Gregory Bateson and Margaret Mead) has pointed out that we humans suffer from a faulty perception, which makes us see the direct causes and ignore the subtler indirect ones. This faulty perception could be *the* root cause of our problems – and in particular of our inability to use the power of the technology to our true benefit. By definition, *systemic innovation* is the remedy.

That *systemic innovation* is an informed person's approach to global issues has been pointed out by Erich Jantsch, who upon giving the opening keynote at the inaugural meeting of The Club of Rome (international think tank researching into "the future prospects of mankind") in 1968, lobbied with academic colleagues and administration at the MIT to *bootstrap* this key development. In his MIT report about the future of the university, which resulted from this effort, we find the following concise rendition of Jantsch's vision:

> "The task is nothing less than to build a new society and new institutions for it. With technology having become the most powerful change agent in our society, decisive battles will be won or lost by the measure of how seriously we take the challenge of restructuring the "joint systems" of society and technology […]."

But isn't this exactly the direction Doug was pointing to?

A Revolution in Philosophy

We used to consider it as self-evident that our main challenge is to find the *real* truth about reality; and that this is most solidly secured through logical argumentation. But the developments in science and philosophy proved us wrong. Here is what Einstein had to say about this theme (see his article; and also R. Oppenheimer's essay Uncommon Sense):

> During philosophy's childhood it was rather generally believed that it is possible to find everything which can be known by means of mere reflection. It was an illusion which anyone can easily understand if, for a moment, he dismisses what he has learned from later philosophy and from natural science […] Someone, indeed, might even raise the question whether, without something of this illusion, anything really

great can be achieved in the realm of philosophic thought -- but we do not wish to ask this question.

This more aristocratic illusion concerning the unlimited penetrative power of thought has as its counterpart the more plebeian illusion of naive realism, according to which things "are" as they are perceived by us through our senses. This illusion dominates the daily life of men and of animals; it is also the point of departure in all of the sciences, especially of the natural sciences.

An alternative Doug was pointing to (see his motivational slide that was shared above) is to consider information and knowledge work as a system within a system; and develop them as it may best serve their function within larger systems (see also the Polyscopy Prototype below).

A practical consequence is that the creation of the nuts and bolts of knowledge work – which was traditionally in the domain of philosophy – may extend itself toward *systemic innovation,* where it would be handled through *prototype* design and federation (see the Polyscopy Prototype).

A further consequence is that Doug's work and other related work at *the frontier* – which during Doug's lifetime struggled to find its place in the academia – may merit the prerogatives of *basic research* (see the Polyscopy Prototype)

A Revolution in Business

To see the realm of business opportunities that Engelbart's unfinished revolution may lead to*,* consider another historical icon, Henry Ford, and the associated revolutionary change, in which the automobile became a common means of transportation.

Think about the creation of wealth that resulted: Ford's revolution was not only an opportunity to make a fortune in automobile manufacturing, but also in oil, gas, automobile tires, automobile insurance, road construction… At least one half of the fortune ten companies around the middle of the last century were related to the automobile, with General Motors in the lead.

Ford's revolution – iconic for the Industrial Age – was mainly a result of his recreation *of the system of production* of automobiles.

Will not a recreation of the system of production *of information* unleash a similar cascade of revolutionary changes and multisectoral business opportunities, *in Information Age*? Could Doug Engelbart become an icon of that revolution?

The Mother of All Revolutions

I should perhaps apologize for this bombastic title; I deleted it, but it came back. The reason is that I wanted to highlight a core motivational point in this proposal.

There has been a growing concern about the course our civilization has taken. The interest in "systemic leverage points" – courses of action that may be powerful enough to change that course – naturally follows. Here we have an unusually strong candidate.

"Changing the world" (if we interpret that as "changing the institutions"or the systems) has never been easier – it has just been enabled by a technology!

Earlier, to work together we needed to come together physically under the same roof. Or at least send physical documents to each other. This of course vastly confined the spectrum of possibilities of what an institution or an organization may be like – to what we have today. But this confinement has been removed. The technology has made "the systems in which we live and work" if not fluid, then at least malleable. We can now mold them in almost any way we like! The business people were the first to understand this. They did not hesitate to make the money and the production of goods fluid (as programmable electronic transactions; and as configurable "value chains").

We now have a radical alternative to trying to wrestle the business into a "sustainable economy". We have a change scenario of the kind that has proven to be effective throughout history. Once again a technology enables human work to become radically more effective and efficient. What remains is to find a suitable way to turn this technological opportunity into good business.

Donella Meadows gave us a way to orient our quest for a leverage point, by pointing, famously, to "power to transcend paradigms" as *the* most impactful way to intervene into systems (make a difference, see [the Wikipedia article](#)). As we shall see next, we have all but lost that power. The substance of our proposal is a strategy to reclaim it.

Our Challenge and Opportunity

Just as Ford's revolution in transportation, Doug's revolution too comes with a threshold. It is only when sufficient resources were aligned (automobile manufacturing, roads, oil...) that the shift to the automobile as common means of transportation could take place. Shift to *systemic innovation* in knowledge production and sharing too will require that activities in a number of domains be aligned.

Paradigms have this challenging "everything or nothing" nature. Gas stations are not a business opportunity unless the automobiles are also there and vice versa. The most reasonable or even *necessary* changes are rejected when they are out of sync with the prevailing order of things.

There is, however, a more subtle challenge, which has been hindering the completion of Doug's unfinished revolution. To see it, let us for a moment go all the way back to the very beginning of his revolution – to Vannevar Bush's 1945 call for organizing our knowledge and our knowledge work as a *collective mind* ("as we may think"). Why haven't we done that?

Don't we most urgently need solid ways to turn our massive knowledge resources into something that is simple and coherent enough to orient us in the changing world?

Actually we don't (or more accurately we feel and *believe* we don't)! The reason is that we have found an alternative. We have adapted to the growing complexities of our world by simply learning our social roles and playing in them competitively. The purpose we attribute to our work and our institutions is not their systemic one, but to provide us sufficiently stable "game boards" for our "life and career games"; or what Anthony Giddens called "ontological security".

> "The threat to personal meaninglessness is ordinarily held at bay because routinised activities, in combination with basic trust, sustain ontological security. Potentially disturbing existential questions are defused by the controlled nature of day-to-day activities within internally referential systems.
>
> Mastery, in other words, substitutes for morality; to be able to control one's life circumstances, colonise the future with some degree of success and live within the parameters of internally referential systems can, in many circumstances, allow the social and natural framework of things to seem a secure grounding for life activities." (Anthony Giddens: Modernity and Self-Identity)

Similarly, we have adapted to the impenetrable jungle of documents by simply ignoring them – and absorbing a "functional" set of basic rule-of-thumb beliefs from our environment, as one would learn the rules of a game (see the Homo Ludens *prototype* in Appendix I).

The nature of our "social construction of reality" and its relationship with power have been sufficiently understood in the humanities and the sciences during the past century (insights by Luckmann and Berger, Bourdieu, Damasio, Bauman, Chakhotin and Edelman come to mind). Those scientific insights have, however, (needless to say) *not* influenced our basic beliefs, which legitimize our basic institutions. In flagrant contradiction to those insights, we continue to accept as granted the myth of rational or "free" choice – that if we all just "freely" stand for whatever may appear to us as desirable in all walks of life, the magic of "the market" or some other "invisible hand" will secure that our institutions, our systems and our world at large will adjust themselves to an ideal condition that is best for all.

With us the people socialized in this way, systemic change – however reasonable and necessary it may have become – is not going to be easy.

I am, however, not telling you all this to complain or to discourage you, but to point to a *most wonderful* opportunity, and to invite you to realize it together.

In the shadow of the just mentioned large challenges, a *spectacularly* large opportunity for positive change has matured: Our basic worldview, and our basic systems, even our own very way of being – have grown so much out of sync with what we know, and with the condition our world is in, that we really just need to point to it, and to an alternative, to

ignite a genuine, deep and sweeping societal and cultural paradigm shift – analogous in nature and similar in consequences as the change from the Middle Ages to Modernity.

What adds to the exquisite and unprecedented beauty of our impending revolution is that it revolutionizes also the method: We are not going to "take arms against a sea of troubles"; we shall not even bother to win arguments; we shall simply "design a better alternative" (to use Buckminster Fuller's phrase) to an obsolete social construction of reality – and in that way empower *our knowledge* to inform our actions and direct our evolution, and ultimately change our world.

We may summarize our challenge-and-opportunity as follows:

> During the past century we have harnessed the power of the rivers and the wind, the atom and the sun... In this century we are facing the challenge of harnessing what has become *the largest* power on Earth – the power of our socialization, which now determines how all those other powers will be used.

Our Proposal

We propose to *bootstrap* the completion of Engelbart's unfinished revolution by

- *Evangelizing* it – making known the true character and the potential benefits of his vision
- *Institutionalizing* it – developing (equivalents of) suitable departments, disciplines, institute, funding..., so that the relevant skills can be learned, developed further and practiced in a sustainable way.

We propose to achieve that by taking advantage of the 50th anniversary of Doug's demo and applying our combined resources toward the following specific goals.

Make Doug's Vision Known

Let us *not* celebrate the 50th anniversary of the demo by focusing on the technology alone (which, as we have seen, made Doug cry). Let us celebrate it by telling the *real* story. By making *the elephant* visible!

The 50th anniversary of The Demo will then be vibrant and exciting. It will be a breath-taking sensation!

The anniversary will no longer be about the innovation's past, but about it's future.

Let us engage creative people in creating unforgettable events; let us engage our audiences into a dialog – through which a *collective mind* will already be creating and realizing its new vision.

Innovative ways of collaborative vision creation, including physical and online dialogs, will allow us to use this opportunity to not only advertise and demonstrate the *collective mind* paradigm, but to also already *develop it* in actual practice.

Institutionalize Engelbart's Revolution at Stanford University

By *institutionalizing* an activity we mean providing it sufficient funding and organizational scaffolding so that it may function sustainably and scale to its potential.

The Engelbart's unfinished revolution will not be completed unless we secure it proper *institutionalization*. Doug's life-long struggle to secure an institutional home and stable funding for his project is notorious. So are the struggles of Erich Jantsch and other workers on *the frontier.* The experience has shown that the existing academic and business order of things does *not* support paradigm shifting knowledge work – however necessary and beneficial it might be.

The misperception of Doug as a technology developer deprived him also from the recognition that *his contribution is a fundamental and consistent system of ideas*, and hence an *academic* contribution (see the comments under Polyscopy Prototype below).

Without knowing the internal structure and dynamics of Stanford University, I can imagine a similar section within the H-STAR / mediaX organization as the Triple Helix is today. By bringing in suitable aspects of knowledge media R&D and *systemic innovation* praxis, this section will most naturally synergize with the current H-STAR / mediaX organization and work.

Institutionalizing Engelbart's revolution at Stanford University will furthermore be a suitable gesture to honor and celebrate Doug.

This will also legitimize the work on *the frontier* internationally. It will give a signal to other universities to proceed similarly.

Institutionalize Knowledge Federation

By *knowledge federation* we mean simply the workings of a well-functioning *collective mind* – by which sensory signals are turned into nerve impulses; nerve impulses are turned into units of meaning; the units of meaning are combined together into higher units of meaning; to units of meaning correct priorities are assigned; when appropriate, suitable action of the muscles is initiated. (This is not a definition, I am obviously improvising on the spot.)

Since the conventional discipline is obviously not a suitable institution for developing the *knowledge federation praxis,* we have developed the Knowledge Federation *transdiscipline* as a more suitable *prototype.*

Our present offer to you may be understood by analogy of conventional acquisitions by Google. We are offering you, H-STAR / mediaX and Google, to acquire us, Knowledge Federation – in a specific, uncommon sense of this word, which I will now describe.

There is no property sale intended, not even of the intellectual kind. A bit in the spirit of Rodin's "Burghers of Calais", the sculpture that adorns the main entrance to Stanford campus, we are offering you what we have developed with no strings attached. The common good that is expected to result is too large for small things to matter. I offer also to donate my sabbatical year in 2018, by spending it with you and facilitating this transfer.

The ownership we are proposing to transfer in this transaction is, however, the ownership in a most genuine sense – we are inviting you to assume the ownership of the *vision* we have undertaken to fulfill. And with it, of the resources we have developed for doing that.

In other respects, what we are proposing will quite closely resemble conventional acquisitions by Google. We feel we have achieved what was possible by working within a small, entrepreneurial system. Or as an "academic guerilla" as I sometimes joke. Perhaps even the absence of institutional funding has been helpful, by self-selecting the people who were truly dedicated to the cause. The critical task that now remains, however, is scaling – and scaling requires the resources that you have and we don't.

An entrepreneurial "garage-style" undertaking has done its job. If what's been done should scale to its potential, powerful actors must step in and do *their* share.

As we see it, the Engelbart's unfinished revolution is not ours to complete. It is the task for our generation. By offering you the resource portfolio we have created, we are offering you to share also the thrill of a historical opportunity.

We invite you to collaborate with us on *these* premises.

By collaborating in this way, we will also begin to *bootstrap* the spirit that completing Engelbart's revolution might require.

Institutionalize Systemic Innovation

As we have seen, *institutionalizing systemic innovation* is what really completes *the revolution.*

There are several reasons why I don't consider Knowledge Federation to be a suitable institutional *prototype* for *systemic innovation.* One of them is that *systemic innovation* as *praxis* – and in particular as an emerging academic field – must grow out of the field of the systems sciences, where the knowledge about systems (how to understand them and talk about them, what they should be like, how to intervene into systems) has been cultivated for more than a half-century.

We have therefore been fortunate to establish a close working relationship with the systems scientists, and solidly embed *systemic innovation* in their midst through the CET SIG

and the ITBA LASI (see the Institutional Prototypes below). This, however, is only a seed, and a beginning.

I anticipate that the actual institutional form that will be suitable for *systemic innovation* is a system of innovation laboratories distributed internationally, and all learning from each other. The same anticipation seems to be shared by both Alexander Laszlo (the past ISSS president who now holds the torch of *systemic innovation* in the systems community) and Ockie Bosch (the current ISSS president). Both of these prominent systems scientists (each in his own way) are developing the *evolutionary learning laboratories* infrastructure, which builds upon Bela Banathy's key notion of *evolutionary learning.*

A network of *evolutionary learning laboratorie*s corresponds accurately enough to what Doug called a *networked improvement community* (NIC). So the *networked improvement community* is yet another one of Doug's ideas whose time has come.

Another reason why Knowledge Federation–like *transdiscipline* will not be a suitable way to institutionalize *systemic innovation* is that we need lots of small and semi-autonomous unit, *bootstrapping* systemic innovation in a variety of ways and in a variety of geographical areas and application domains.

We therefore propose to institutionalize *systemic innovation* by developing an international *networked improvement community* of *evolutionary learning labs*, all developing revolutionary ideas in their own way, as suitable in their local circumstances – and all learning from one another.

A suitable form of funding will need to be found. I anticipate some form of sponsoring or donorship, combined with acquisitions of technical solutions when they prove their value in practice.

Make a Difference and Increase Your Lead

You will have no difficulty understanding why we are addressing this appeal to you. You – Stanford University's H-STAR / mediaX and Google – are the leading institutional protagonists on *the frontier* where Engelbart's unfinished revolution is being completed. And as leaders, you have the prerogative to complete revolutions. Smaller players will not have the resources. They will not even dare.

As leaders, you are *already* pushing the boundaries and working for change.

And as leaders, you are positioned to draw the largest benefit from a breakthrough on *the frontier.*

Residing at a hallmark of academic excellence, at Stanford University you have access to extraordinarily gifted young people, and to the state of the art in academic achievement. Both will be essential for founding and unfolding *the revolution.*

As the Stanford University's interdisciplinary research institute focusing on people and technology, " researching innovative ways for people to collaborate, communicate, and interact with the information, products, and industries of tomorrow", at H-STAR you are positioned in the very midst of *the frontier.* The role of mediaX being to (as we would say) *federate* the knowledge from the humanities into the larger world, you have already transcended the institutional boundaries and connecting researchers and businesses into a global network. As we hinted above, once the technical people have done their job of physically constructing the *collective mind* (through collaboration with other relevant experts and stakeholders of course), the thinking that this *collective mind* will be doing will largely be in the domain of the humanities – because it is *there* that we will have the largest and most important changes in our collective awareness .

It is similarly obvious that *the revolution* is taking place exactly where Google has its niche. While immense improvements have been reached in Google search (I for one enjoy "asking Google" in plain English all manner of questions, and the answers are usually precise and to the point), there are clear limits to how much can be achieved without organizing *the knowledge workers* and *the knowledge itself* in completely new ways – as Vannevar Bush demanded that we do already in 1945. This is especially true when we recognize the need for collaborative tools and processes that will *condense* heterogeneous pieces of information to a meaningful general idea or a direction-setting insight (see [this transcript](#) of my five-minute talk at TMRA 2007 "Knowledge = Mountain"; and the Polyscopy *prototype* below).

Immense opportunities for improving not only the accessibility and usefulness of knowledge, but also for developing and marketing new technical tools, will open up when "the human system" too can be changed. We are reminded of the Google Wave as a most reasonable attempt to depart from the rigid patterns of communication that emerged based on paper and ink – but which had to be abandoned because "the human system" would not follow. The very medium we are using here – the Google docs – I consider to be an embryo of a growing set of new collaborative knowledge work technologies, which will enable the development of new social processes, which will in a most wonderful way complement and synergize with the activities in which Google is already in the lead.

Furthermore, at Google you own the resources and specifically the media that are needed for completing Engelbart's unfinished revolution. YouTube, with the increasingly visible "Talks at Google" channel, and also Google plus – are well positioned to take over some of the role that the mainstream media have had in informing – or misinforming – the public.

And finally, as I have repeatedly pointed out, Stanford University has consistently served as an outpost for Doug to bring out his ideas to the world. To hosting the "Engelbart's Unfinished Revolution" conferences in 1998 and 2008, we may add hosting the Doug Engelbart digital archives (see [the site](#)), and the world premiere of The Demo musical (see [this report](#)).

Similarly, in 2007 Google has given his channel to Doug in 2007, to make his appeal for continuing *the revolution* to the world – *and* to Google. And in 2013, Google also hosted the Engelbart's Unfinished Revolution – Program for the Future Challenge event in 2013. Peter Norvig, Google's research director, was an active participant in both events. Google has also sponsored and hosted other events created by people in our community, such as Frode Hegland's "Future of Text".

When we are now inviting you to engage with us in *bootstrapping* the *completion* of Engelbart's unfinished revolution, we are only inviting you to do what you are *already* doing – through the strategy of a concerted paradigm shift on *the frontier*, and by aiming at a *much* higher impact.

Yes, we owe this to Doug.

But this is also a business strategy.

Looking from the conventional business angle, we are proposing to implement what has been called the Two-Step Marketing strategy (see my article [Information for Conscious Choice](#)). In Step One, we bring people to a metaphorical mountain top, from where the advantages of a new direction become obvious. *Then* we provide means to follow this new direction.

This strategy naturally requires an event, an icon, and a story. All this is provided most suitably by the Engelbart history – and *augmented* of course by other elements of our portfolio.

Every penny invested in this promotion is likely to return a dollar's worth of new market share. And as the Henry Ford analogy might suggest, even quite a bit more.

Our Offer

We (Knowledge Federation) offer a portfolio of resources we have assembled or developed, which may be instrumental in implementing the above strategy.

We call those resources *prototypes* because they are at the same time

- Models, ready to be copied or improved, which show how certain challenges in completing Engelbart's revolution might be handled
- Interventions, embedded in reality and acting upon reality in order to transform it
- Experiments, showing how design ideas meet reality, and what may need to be improved

In this section, we illustrate our resource portfolio by highlighting only three resources in each category. Our categorization will be somewhat arbitrary, since most of the resources belong to several categories. In Appendix I we provide a more thorough survey.

We begin by introducing Knowledge Federation.

Knowledge Federation

Knowledge Federation was created in 2008, at the first of our now traditional biennial workshops at the [Inter University Center Dubrovnik](), by a small group of international knowledge media researchers and developers. We readily saw that the technology being developed by our colleagues and ourselves was ready to change the way information was created and used, and the structure and the connectedness of our institutions. And that what was still lacking was an institution that could *bootstrap* such change.

We also saw the connection between Doug's work and ours. In 2009 I spent my sabbatical in Doug's vicinity, visited Doug (whom I had met in Oslo in 2004), and dedicated to him the prospectus article I was completing for the first Knowledge Federation Workshop proceedings (see my blog post [Doug Engelbart and the Information Age]() for a description of this first meeting; and [Information Age Coming of Age]() for a glimpse of what followed).

At its second workshop titled "Self-Organizing Collective Mind", in 2010, Knowledge Federation began to self-organize as it may suit the *bootstrapping* task it has undertaken, i.e. as a *transdiscipline* (see Knowledge Federation Prototype below). We also developed a suitable way of working, which implements *bootstrapping.* At our third workshop, at Stanford University in 2011, which was staged within the Triple Helix IX international conference, we were able to point to *systemic innovation* as an emerging frontier; and to Knowledge Federation as a *prototype* institutional enabler of *systemic innovation* (see [our workshop abstract]() – it is listed as number seven; and my contributed article [Knowledge Federation – An Enabler of Systemic Innovation]()).

From that point on – as we promised at our Stanford University workshop (see [this blog post]()) – we have been operating as a 'tailor shop' for customizing institutions and professions to contemporary needs. We began just a few months later, in Barcelona, by working on journalism or public informing (see the Innovation Ecosystem for Good Journalism Barcelona 2011 *prototype* in Appendix I).

Our Network

A community people who are dedicated to the cause and have a necessary combination of skills is a core component of any revolution; Engelbart's revolution in knowledge work is of course not an exception.

We have been fortunate to assemble a rich and diverse network of communities, covering state-of-the-art expertise of diverse, suitable kinds.

Our network is a network of enthusiasts who – having become close friends – like to work together and spend time with each other. Hence we also have a community *culture* that may scale and make a difference.

Knowledge Federation being a *transdiscipline* or a *federation*, most of our members come together around projects as needed, while keeping the identity of their discipline or organization and continuing to work within it.

Initiated by Mei Lin Fung in 2008, the **Program for the Future** community gathered Doug's collaborators and friends, and non-local inspired enthusiasts, for the purpose of continuing *the revolution.* Through joint events, Knowledge Federation and Program for the Future have all but merged together, and we now use those two brands interchangeably, as it may suit the occasion. We have for example used the Program for the Future brand at our launch of Doug Engelbart's Unfinished Revolution – Program for the Future Challenge at Google in Mountain View, on the occasion of the 45th anniversary of The Demo (see [the announcement](#)).

Program for the future provides us

- The continuity of Engelbart's revolution, by including the people who have been engaged in it together with Doug
- People dedicated to Doug's cause

International Society for the Systems Sciences (ISSS) is the oldest and largest organization of systems scientists (initiated at Stanford University in 1954). It is not difficult to anticipate (and we shall elaborate on that while presenting the ITBA LASI and SIL institutionalization *prototype* below) that a combination of systems science and Engelbart-style knowledge media R&D will compose the core background for *systemic innovation,* and have potential to be an 'explosive mix' that will help it expand and scale.

Our association with the ISSS has, however, still another purpose. When in July 2013 – only two weeks after Doug passed away – Alexander Laszlo as the 57th ISSS president initiated a self-organization toward collective intelligence in this community, it was not difficult for us to recognize in it the *bootstrapping* opportunity that Doug had been searching for. We are now systemically embedded in the ISSS community through the Curating Emergence for Thrivability SIG (chapter, of sub-community), which Alexander developed over the years and in 2015 invited me to co-chair with him ("curating emergence" roughly corresponds to *bootstrapping*).

The ISSS provides us

- Arguably *the* community where *bootstrapping* the *collective mind* re-evolution and *systemic innovation* may need to begin – and where it has already begun
- Knowledge about systems, which needs to inform *systemic innovation*

Global Sensemaking is the global community of about 300 researchers, developers and practitioners, developing *collective mind* tools and processes. Here too the ties are tightly woven together: The founders of Global Sensemaking, David Price and Simon Buckingham Shum, have participated in Knowledge Federation events; and the Knowledge Federation founders have been active in Global Sensemaking. This community is presently inactive, but prepared to become a discipline or *transdiscipline* once suitable infrastructure and support have been secured.

Global Sensemaking provides us

- State-of-the-art experts and expertise for developing the *praxis* of *collective mind systemic innovation.*

Technology and Process Prototypes

The technology and process *prototypes* developed in Knowledge Federation network continue Doug's work most directly, by providing technical building blocks and organizational templates for completing his revolution.

Here we find answers to such basic questions as

- If we would continue Doug's work on developing tools and practices for the *collective mind* re-evolution with *today's* technology, what would they be like?
- What new capabilities, collective *and* individual, might they be able to augment or enable?

Meme Media is a methodology and a sequence of technologies (developed by Professor Yuzuru Tanaka and his laboratory at the University of Hokaido) that enable combining information resources with suitable tools and services for real-time analysis and visual presentation (see [this invitation](#) to the Second Webble World Summit, which Yuzuru and his team organized this year in Erfurt, Germany). The meme media technology enables combining information resources with suitable tools and services for real-time analysis and visual presentation. A number of applications have been developed, including big data scientific research (making data *truly* intelligent, by adding a variety of tools for data access and analysis), risk management (in a variety of situations ranging from environmental catastrophes to surgery).

In the context of *the paradigm,* the *meme media* implement on the Web the function that was served by Doug's Open Hyperdocument System – enabling interoperable components to be combined at will, and create innovative systemic solutions for knowledge work.

Yuzuru Tanaka and Doug Engelbart conversing in Doug's home, in Spring 2013. (Courtesy Yuzuru Tanaka)

The Meme Media provide us

- Technology that enables free and creative recombination of online resources to produce innovative systemic solutions in knowledge work
- A way to speed up the evolution of culture – by allowing for free and creative recombination of *memes*

TopicQuests is a methodology and platform developed by Jack Park and his team. The platform instantiates a complete *prototype* of *collective mind* knowledge work, by building upon Doug's Dynamic Knowledge Repository idea (see it illustrated in [this brief video](#)).

TopicQuests provide

- Tools and practices enabling people to think and create together
- A methodology for organizing knowledge online

Co-founded by Peter Baldwin and David Price, **Debategraph** is the leading collective intelligence platform and initiative (visit [the platform](#) and see how it introduces itself). With institutional partners such as the CNN, the White House and the UK Prime Minister's office

and numerous expert teams, Debategraph is spearheading the *collective mind* re-evolution globally.

Debategraph provides us

- Technical tools and processes for collective understanding of issues and organization of ideas and documents
- A wealth of experience in engaging communities in *collective mind* work

Evangelizing Prototypes

Our *evangelizing prototypes* offer the iconic anecdotes and details that serve to illustrate an emerging paradigm and point to its naturalness or necessity (we are reminded of the witch trials; and of Galileo whispering "*eppur si muove*").

Our *evangelizing prototype* portfolio will show that

- It is practically impossible to over-*evangelize*; a variety of extravagantly large claims ("scientific approach to problems", "make a fortune in business", "make *the* largest contribution to knowledge"...) have been tested with suitable audiences
- Together they compose a case for a new paradigm that is as strong as the case for the Heliocentric system and other historical paradigms

Furthermore, these *prototypes* provide a spectrum of approaches for pointing to *the elephant* by demonstrating *the necessity* of his existence.

Introduced at the 59th conference of the International Society for the Systems Sciences in Berlin in 2015, the **Wiener's Paradox and The Lighthouse** provide an emblematic snapshot of the situation in the sciences before the paradigm shift (see [this abstract](#)).

The anecdote zooms in on the moment of inception of the systems sciences, and the last chapter of Norbert Wiener's seminal book "Cybernetics" (published in 1948). Wiener makes a case for the new discipline in two points:

- We cannot rely on the survival of the fittest ("the market") to evolve and regulate our systems (Wiener points to research in game theory and to common experience to support this insight); we must secure our systems suitable structure, by relying on studies of the relationship of system structure and behavior in natural and artificial systems; and by developing suitable theory
- Our present systems are dysfunctional, because they have no "feedback loop" that would turn key scientific insights into public awareness and policy (Wiener makes this point by quoting Vannevar Bush, and pointing to the fact that the key insight mentioned in the first bullet point above had not been communicated to the public; i.e. that the belief in "the market" persisted in spite of scientific and experiential counter-evidence)

This anecdote allows us to highlight several paradoxes that call for a new paradigm

- In spite of thousands of academic articles that have been published by the systems community, Wiener's two insights are *still* not part of our public awareness and policy; yet the public awareness of those insights must be in place *before* the public can be ready to make use of the invaluable results of the systems sciences
- In spite of his insight that the "feedback loop" (our society's conventional way of connecting scientific insights with public awareness and policy) was broken, Wiener himself – and the systems scientists that followed – committed *their* insights to that same feedback loop

Notice that the Wiener's paradox is naturally dissolved through *bootstrapping* – instead of relying on the inherited system of communication, the systems community must recreate their own system by adapting it to their own specific social role.

By painting the image of a researcher and a discipline who owned an insight that could have changed the course of our civilization – but thwarted their own impact by adopting the conventional-academic disciplinary model and article publishing – the Wiener's paradox points to uncommonly large achievement and contribution opportunities that are reachable through *systemic innovation*.

Make a Career Wish was an approach we followed at the start of The Game-Changing Game (a generic, practical method for changing real-life systems, see the description under Institutionalization Prototypes below), where a number of achievement and contribution opportunities are offered to choose from. How can a single line of approach offer so disparate and so large opportunities that include both "make a fortune in business" and "solve global problems"? Zooming in on one of them, how to make *the largest* contribution to human knowledge that the player is able to imagine, will provide a clue.

Make a Career Wish *prototype* illustrates

- Enormous (bordering with fantasy) and ubiquitous opportunities for achievement and contribution that can be made available through *systemic innovation*
- The largest contributions to human knowledge (incomparably larger than by contributing knowledge) can be achieved through *systemic innovation* in knowledge work

Thrivability Strategy is a book manuscript in the making, where *systemic innovation* is shown to be a strategy for global shift from reportedly "unsustainable" to potentially "thrivable" is described. In a brief first chapter it is shown (by citing and combining research) why *systemic innovation* has become *necessary* for the continuation of our civilization. The story then develops by telling anecdotes about the historical dance of two key components of *systemic innovation* – knowledge media R&D (initially represented by Doug), and systems R&D (initially represented by Erich Jantsch), and about their recent amalgamation (as told also here).

To Doug's unfinished revolution Thrivability Strategy offers

- Historical genesis of key insights and systemic developments
- Positive feedback – by not only living but also telling the story of the genesis of *systemic innovation*, we augment the effects of the efforts of Doug and others

System Prototypes

System prototypes offer another natural way to make *the elephant* visible – by materializing its parts.

They showing how academic communication, public informing, education and other institutions including even religion may be revolutionized within the *collective mind* paradigm.

These *prototypes* offer building blocks for a society and culture where our institutions and other systems are no longer instruments of power, but of empowerment and liberation.

Tesla and the Nature of Creativity 2015 is an instance and a showcase of *collective mind* re-evolution in practice (see it described in [this blog post](#)). A result of a researcher (about the existence and the nature of two distinct kinds of human creativity), with an uncommonly large potential social impact, but written in an inaccessible academic language (of quantum physics) – is *federated* i.e. (1) rendered accessible by transforming the research article into a multimedia object with metaphorical – visual models, explanatory interviews with the author etc.; (2) made publicly known through a high-profile public event; (3) linked with other results and and ideas and woven into a network of meaning, by using the Debategraph platform and a suitably orchestrated online public dialog.

This *prototype* brings about the following novelties

- A *federation* scheme for research
- Insight that the *direct creativity* (as represented by Nikola Tesla, who left us a description of his own creative process), which is also the *visionary* creativity, is so different from the more usual *indirect creativity,* that it requires a different kind of practice and education
- A methodology for social creation of truth and worldview – informed by insights from quantum physics and other relevant fields, and enabled by new technology

Innovation Ecosystem for Good Journalism Barcelona 2011 is a *prototype* of a public informing as it might suit our contemporary needs and conditions (see [this Knowledge Federation Wiki article](#)).

This *prototype* shows

- What journalism may need to be like to empower systemic understanding and handling of issues and social-systemic change

- How the public, journalists, academic experts and communication artists can collaborate on the creation of news, while being linked together in a *federation* scheme
- How a real-life system, such as journalism, might be re-created by a suitably formed *transdiscipline* (or "innovation ecosystem")

Collaborology is an educational prototype (see this flyer, designed by Fredrik Eive Refsli) that shows how

- The *collective mind* approach may change education
- A new *transdisciplinary* body of knowledge, on a theme of urgent contemporary interest, may be created and shared internationally
- A number of technical problems in flexible education (how to organize the curriculum, the exams, co-create and organize the learning resources by learner teams and globally distributed instructors) can be resolved with the help of a variant of Doug's DKR called *domain map*
- By *federating* knowledge resources, economies of scale can be created to enable the use of immersive environments and other contemporary technology in education

Institutionalization Prototypes

The *prototypes* highlighted here answer to the second core element of our proposed strategic initiative – to *institutionalize* the continuation of Doug's revolution, provide it institutional scaffolding and financial support, so that it may sustainably continue and scale to its potential.

- Not only Doug, but also Eric Jantsch and other pioneers on *the frontier* struggled to fit into the existing academic and wider institutional reality. What sort of institutions would be suitable for supporting the work of future Dougs and Erics (continuing Engelbart's revolution)?
- At our universities (with some notable exceptions, see below) we have no degree programs and practically no courses where *systemic innovation* (as Jantsch and Engelbart envisioned it, and as we are presenting it here) can be studied. And if we did – what courses would they teach? What sort of expertise would they provide? How would this expertise be put together?

We here provide *prototype* answers.

ITBA LASI and SIL. The Leadership and Systemic Innovation (LASI) Ph.D. program is presently operational at the Buenos Aires Institute of Technology (ITBA); their Systemic Innovation Lab (SIL) is under construction.

If we for a moment imagine that the *evangelizing* part of our proposal has been successfully completed, that a tsunami of demand for *systemic innovation* is rising up, then the mentioned two *prototypes* provide answers to the following key questions:

- (LASI) What sort of expertise is necessary if we should cater to this demand in a solid i.e. *academic* way?
- (SIL) What team, and in what way, will be suitable for doing research, development and consulting (finding practical solutions) in *systemic innovation*?

Part of the answer follows logically from what has been said, so let me highlight it here.

We have seen that *the capacity to 'liquify' our institutions and other socio-technical systems and enable their radical reconfiguration* is reaching us from the knowledge media R&D (the essence of Engelbart's unfinished revolution). The obstacle that remains to be overcome is to depart from the socialized habit – and *envision* and then implement completely new institutions or systems.

But if we should stop re-implementing our habitual systems in new technology, we will need to resort to *the* alternative – our understanding of the relationship between system structure and behavior.

It is exactly for that reason – to inform our understanding of systems and work with systems – that the systems sciences have been called into existence.

Furthermore, *the insight that the way to the solution of our problems leads through systemic change or innovation* is reaching us from the systems sciences. And that to be sustainable, our systems will need to be conceived and structured based on entirely different principles than what we are applying today.

So those two together, one enabling and the other demanding and informing systemic re-evolution – with suitable *evangelizing*, of course – will, I conjecture, already be sufficient for raising 'the tsunami'.

This *prototype* is invaluable also as an experiment, and as an intervention. The first-generation students have been selected among professionals who are already leaders in Argentinian institutions, including the academic ones. Through them we are *already* bringing *systemic innovation* into Argentinian systemic reality; from them we are receiving invaluable feedback to improve our program.

Both above *prototypes* are the creation of systems scientist Alexander Laszlo and his team (Alexander is the director of the LASI Ph.D. program). Both are also a result of collaboration with knowledge media R&D through Knowledge Federation (I am an instructor and International Advisory Board member in the Ph.D. program; this year I had the honor to give an inauguration keynote – which I began by talking about Doug).

Knowledge Federation *transdiscipline*. A moment of thought will suffice to see why the conventional academic discipline – which has evolved as a way to divide and conquer the task of mapping the detailed mechanisms of nature – will not be suitable when the task is to "connect the dots". But what sort of institution *is* suitable?
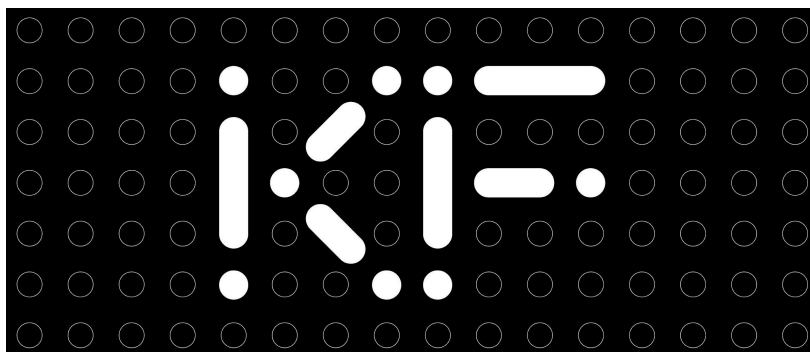
The Knowledge Federation's logo visually suggests that our mission is to "connect the dots" (design by Fredrik Eive Refsli)

We answered the above question proactively, through *bootstrapping* or self-organization. The result is a new institutional form which we have called the *transdiscipline* – of which Knowledge Federation is an evolving *prototype.* Our core challenge is to allow knowledge to transcend the boundaries of institutions and "areas of interest" and cross-fertilize and have real impact. And by "real impact" we mean the impact on collective awareness, policy and – when needed – social-systemic evolution.

Knowledge Federation defines itself as "*transdiscipline* for *knowledge federation*". *Knowledge federation* is our keyword for all the various processes and capabilities, both known and unknown, that a *collective mind* should own. The *transdiscipline* is a new type of institution in knowledge work that complements the traditional discipline. As a discipline does in its own domain of interest, a *transdiscipline* develops and mains knowledge resources, provides education and an institutional home to researchers, organizes events etc.

As a *transdiscipline prototype,* Knowledge Federation shows

- How a transdisciplinary body of knowledge on a essential contemporary theme may be created, maintained and communicated through *federation* from and to existing fields of interest
- How relevant input from participating disciplines and stakeholder groups may be *federated* into real-life systemic solutions, by creating a systemic *prototype* around a systemic design challenge (such as public informing, or scientific communication)and a *transdiscipline* (a specific, task-dedicated instance of it) around this *prototype*, ,the mission update it continuously , and in that way *federate* relevant insights, or technical innovation, from the participating disciplines and other stakeholders.

The Game-Changing Game and The Club of Zagreb. The Game-Changing Game is a generic way to change systems, completed at the Knowledge Federation's workshop in Palo Alto in July 2012. Bill and Roberta English participated in this workshop. Doug shared with

us a lunch and heard and commented a presentation (see report in my blog post "[Information Age Coming of Age](#)").

This *prototype* was subsequently presented at the Bay Area Future Salon, and later published as an article in the proceedings of European Academy for Design (see [this blog report](#)).

In October 2012, prior to our regular biennial workshop in Dubrovnik, we initiated The Club of Zagreb, a *prototype* re-design of The Club of Rome, implementing The Game-Changing Game strategy. Mei Lin and Jack flew into Zagreb from California, Yuzuru Tanaka from Japan, David Price joined us from England, Sasha and Sinisha Rudan from Serbia... Locally this was a collaboration with two excellence organizations of students: The Creativity (Lab) and the eSTUDENT, both co-created by Prof. Mislav Omazic.

As *prototypes,* The Game-Changing Game and The Club of Zagreb

- Institutionalize a way of handling global issues where the established "Z-players" contribute to change by empowering the "A-players" (students, or entrepreneurs, or anyone who is in a life phase where change is natural) to 'play their career game' by changing rather than merely learning their profession
- Deliver a variant of the *bootstrapping* message – that we don't resolve our challenges by only understanding them deeper and informing the policy makers and the public; we must also "be the systems we want to see in the world" (see the ending of Appendix II) and (most importantly) empower the young people to create new systems through their own lives and careers.

Polyscopy Prototype

Polyscopy is the umbrella brand for my offerings on *the frontier*, produced thrugh collaboration with Fredrik Eive Refsli as designer.

On the fundamental side, *polyscopy* complements Engelbart's approach to *the frontier* by

- Asking and answering the question "What should information and knowledge work be like to best serve our society's needs?"
- Developing an approach to knowledge that *liberates us* from our institutionalized worldviews, which we have been socialized to consider as "the reality"

The departure points were

- Werner Heisenberg's insight that "the rigid and narrow frame" that the 19th century science created was damaging to culture; and that modern science disproved that frame (in Physics and Philosophy, see [this excerpt](#))
- Max Weber's closely related "iron cage" concept, and related insights

Polyscopy allows for free creation of points of view or *scopes*, both the detailed ones, and those overarching or *high-level* ones. It enables us to look and see in new ways. And instead

of throwing away whatever fails to fit into our conventional worldview – use it to create competing new *gestalts.*

Polyscopy is a complete *prototype* of a paradigm in creation and use of information, developed as a collection of a number of smaller *prototypes*. It shows how information that responds to our new and persisting needs may be developed and put to use by combining state-of-the-art insights (for ex. insights into the nature of communication) and new technology. *Polyscopy prototypes* cover a full spectrum of issues ranging from epistemology and methodology, to institutionalization and deployment strategy. The results of my Knowledge Federation-related work are of course included.

In particular, *polyscopy* includes (as signature value proposition) provisions for condensing heterogeneous and often fundamental (to a discipline) insights into an overarching general view or *gestalt*. This general or so-called *high-level view* then provides relevance and context for presenting the *low-level views* that have been employed in deriving it.

Think of the workings of our present *collective mind* an attempt to create and present to us a single, 'flat', and allegedly "objective" image of the world, where proportions tend to be lost. Unable to orient ourselves in this way, we cope by oversimplifying – by learning 'the rules' and 'playing' competitively, and by reducing the complexity of issues and systems to likes and dislikes and direct causality.

If we should create a '3D worldview' that can orient us meaningfully – what should information and knowledge work be like?

Polyscopy Platform (this name is tentative) is being developed to

- "Augment our collective capability" that is at present centrally important – the capability to "connect the dots", i.e. to put together the most valuable insights we own and condense the resulting picture to a *gestalt* or a "mountain-top view", with the help of which the nature of our situation and what needs to be done can be collectively seen and comprehended (visit [this blog post](#) and scroll down to "Changing the Course") .
- Co-create and showcase "an evolving roadmap of an impending Renaissance-like change" (visit [this blog post](#) and scroll to "Changing the Course")
- Develop whole hierarchy of structuring primitives (roughly analogous to book chapters, index etc.): *insight, vignette, thread, pattern, aspect* and *gestalt.*

Polyscopy prototype is being designed by a *transdiscipline.* At the time of this writing, Fredrik is at the Systemic Design 5 conference in Canada, reporting on *polyscopy* and putting the *transdiscipline* together.
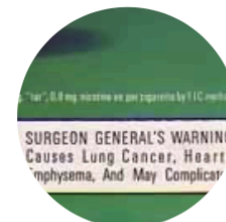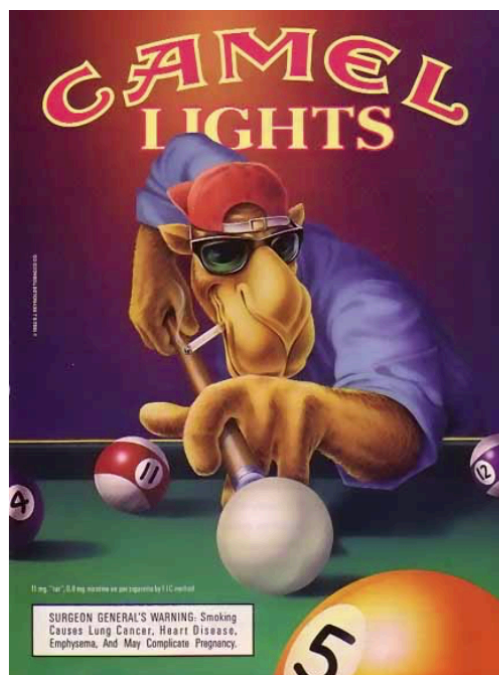
While "official culture" has been focused on "the square" (metaphorically represented by the Surgeon General's warning), our culture has been dominated by suggestive and colorful imagery. A goal of *polyscopy* is to create information that synthesizes and synergizes those two forms of communication. (Design by Fredrik Eive Refsli)

Square Meets Circle is the name of the book Fredrik and I are writing together. It is also a suitable name for the *prototype* he and I *compose* together – pointing out

- how science and communication design can and need to collaborate; the above picture (a slide that Fredrik prepared for our presentation of "Wiener's Paradox – We Can Dissolve It Together" at ISSS59, Berlin) motivates this interest

Polyscopic Modeling *methodology prototype*

- Offers a way to embed the work on *the frontier* academically, by giving it a rigorous foundation (see my article [Design Epistemology](#))
- Complements Doug's approach to *the frontier*, by first asking "In what way should *information* be different, to better serve our society?" And then answering this question by developing practical ways by which more suitable information can be created (see [the introduction](#) to my book manuscript *Informing* Must Be *Designed*).

Appendix I: Knowledge Federation's Resource Portfolio

Knowledge Federation has offered an institutional home to the workers on *the frontier.* It is conceived as a *prototype* institution where contemporary Erich Jantsch, Doug Engelbart and other visionary pioneers can collaborate and make a difference.

Knowledge Federation resources are mostly *prototypes* – systemic models already embedded in reality and acting upon reality aiming to transform it; and at the same time serving as research models, created to embody design ideas and experiment with them, ready to be copied, improved or recreated.

Knowledge Federation's Network

As mentioned, Knowledge Federation is a *federation* of communities, initiatives and people. Most of the members of our network occasionally come together around projects, while keeping the identity of their institutions and disciplines.

Program for the Future is a community of pioneers on *the frontier* continuing Doug's work, initiated by Mei Lin Fung in 2008 (see the corresponding entry in Our Offer section above).

Mei Lin needs to be credited for her irreplaceable role of the catalyst in developing our network or communities. It was Mei Lin Fung who in 2008, at the occasion of the 40th anniversary of The Demo, initiated the Program for the Future conference and community, the goal of which was to make sure that the usual focus on celebrating Doug's past achievements is complemented by continuing and completing the unfinished part of his work and vision.

International Society for the Systems Sciences (ISSS) is the oldest and largest organization of systems scientists, (see the corresponding entry in Our Offer section above) in which we are systemically embedded through the Curating Emergence for Thrivability SIG (chapter, of sub-community), which Alexander Laszlo developed and in 2015 invited me to co-chair with him ("curating emergence" roughly corresponds to *bootstrapping*).

Global Sensemaking is the global community of about 300 researchers and developers of *collective mind* tools and practices , initiated by David Price and Simon Buckingham Shum in 2008 (see the corresponding entry in Our Offer section above).

Inter University Center Dubrovnik is an international institution and network whose members include the leading global universities – indeed a *knowledge federation* institution in its own right (see [this description](#)). Part of the center's mission is to organize interuniversity conferences and courses. Located next to a park and the Adriatic Sea, only a 5-minute walk away from the historical Dubrovnik Old City center, the IUC has been an invaluable catalyst of our creative and social processes. Other elements of our infrastructure – Villa Doda, the Sesame restaurant and the Servantesses of Mercy Monastery – completed an extraordinarily fertile ground for our regular biennial meetings. (Knowledge Federation organizes also events in other locations.)

Gamified Education CS is a multiproject educational enterprise in Moscow, Russia, led by Andrey Komissarov. Prodigiously creative, Andrey's many projects include an educational games-based private elementary school. Our collaboration is at this moment focused on co-designing The Game-Changing Game.

Metaversity is an innovative inter-university initiative in Russia, spearheading capability-based education (see this program's website).

Iris AI is an ambitious young startup, spearheading the *collective mind*-style re-evolution in the sciences from the AI side (see this TEDx talk by Anita Schjøll Brede, one of the four cofounders).

There are also several relationships in early phases of development:

World Dignity University, **World Academy** and

Cyprus Neuroscience & Technology Institute and **Future Worlds Center**; Yiannis Laouris, see his biography; systemic innovation, democracy and dialog. Hope to soon be working on reinventing democracy together.

Last not least, we mention, for illustration, only four of our many non-institutional members (although affiliated with projects and institutions, they participate in our conversations and events as individuals)

Mila Popović, **Stanley Gould**, **Karl Habenstreit**, **Joshua Cubista** (...)

Technology and Process Prototypes

The technology and process *prototypes* developed in Knowledge Federation network continue Doug's work most directly, by providing technical building blocks and organizational templates for *the revolution*. They answer such questions as – What sort of new technologies and processes may be created to enable the developments of *the frontier*?

Meme Media is a methodology and a sequence of technologies for knowledge creation and sharing, and for knowledge media innovation, developed by Professor Yuzuru Tanaka and his laboratory at the University of Hokkaido, Japan (see the corresponding entry in Our Offer section above).

Professor Tanaka has been the pioneer of Knowledge Media R&D in Japan. At this year's Knowledge Federation workshop in Dubrovnik he was telling us how he visited Doug around 1990, and (as Doug later confessed) freed him of his apprehension towards the Japanese that lingered since the war. Yuzuru was the first to organize an international Knowledge Federation conference, three years before we decided to adopt this keyword as the name for our initiative.

TopicQuests is a methodology and platform for collective intelligence, developed by Jack Park and his team – an extension of Doug's key technical idea of the Dynamic Knowledge Repository (see it explained in [this brief video](#)).

Jack was an AI researcher at SRI, until he met Doug who promptly convinced him that it would be the *collective* intelligence that would truly make a difference. Jack stroke a match to ignite the Knowledge Federation initiative, at the 2007 Topic Maps Research and Applications Conference in Leipzig, Germany.

DebateGraph is the leading collective intelligence platform and team, spearheading the *collective mind* re-evolution globally (visit [the platform](#)).

Sam Hahn's Porfolio - Sam Hahn has been one of the leaders in the Program for the Future, *and* in Knowledge Federation, focusing especially on building a portfolio of resources, similar in spirit to the one presented here. See him introduce Doug and present his portfolio at Knowledge Federation Workshop 2012 in Dubrovnik (in the three videos linked from [The Community of Impact website](#)).

Liquid Information and Author are rich interaction environments inspired by Doug's work, designed by Frode Hegland

The Perspective Project, **Insight Maker** and **Kumu** are tools developed by Gene Bellinger and his team (see [this introduction](#). "The Perspectives Project surfaces noteworthy relationships and their implications, to provoke thought, foster deeper understanding, create insights, and enable more effective action". Perspectives are developed using *[Kumu](#)* and *[Insight Maker](#)*.

FI@World is an enterprise, (structured and/or unstructured) DMaaS (Data Management as a Service) infrastructure that provides simple, secure, scalable, collaborative capability between people, processes and applications. It brings together internal/external systems (including IoT, BYOD) and is an underlying capability (rather than a limited vertical) that enables:

- Highly confidential collaboration and integration of selected information for unification and insight, while keeping all Endusers updated in realtime as their data evolves
- Simple mapping of any security setup/policy (regardless of country or company), which provides provable, consistent access control/auditing and data integrity -regardless of its source - standardising access control and auditing
- The data owner to control data provenance, including: who has access to the data and what type of access is authorised (e.g. read, update, etc.)
- Realtime inbuilt data auditing for compliance (including risk)

CollaboFramework is an early *prototype* of what we consider to be *the* enabling technology for *systemic innovation.* It is envisioned as a collection of "Lego blocks-like technologies",

which can be combined together as desired, to connect and organize people in new ways, and enable new patterns of collaboration (see it in action in [The Eight Vignettes](#) blog post).

Domain Map and Value Matrix are objects for systemic innovation or 'boundary objects,' enabling communication between two communities of interest — systemic innovation and technology design. To a systemic innovation community, these objects provide suitable building blocks, or 'affordances' that enable the creation of suitable knowledge work 'ecology' (where practices such as knowledge federation are made easy and rewarded). To technology developers they provide a clear requirements specification.objects for changing the flow toward *collective mind* re-evolution (for links to more detailed information see [this KF Wiki page](#)).

Evangelizing Prototypes

It is because this emerging paradigm (which we propose to *bootstrap* by completing Engelbart's unfinished revolution) is so overdue, that we now have a most wonderful wealth of *evangelizing* material to work with. The history of Doug, as we have seen, is an example. But there are also a variety of other anecdotes and approaches. The following are some snapshots.

Wiener's Paradox is our way to point to some very large (perhaps even too large to be seen) anomalies in our conventional paradigm of communication (see the corresponding entry in Our Offer section above).

When presenting the Wiener's paradox at the 59th conference of the International Society for the Systems Sciences in Berlin in 2015, our intention was to make a case for the *collective mind* re-evolution by showing that in spite of (or perhaps *because* of?) thousands of academic articles published within this community, the community's key point, voiced by one of its founding fathers already in 1948, has not yet become part of our public awareness.

Let us also remark, for the purpose of this *evangelizing*, that the issue that Wiener raised (the nature of our institutional evolution), is *centrally* important for the future of our civilization.

And that in the absence of a system for *federating* insights such as the one that Wiener was wanting to contribute, his insight remained only an opinion among so many others. A competing opinion, and indeed the *opposite* one (that we can *only* trust 'the market') was voiced, famously, by Ronald Reagan. Reagan was of course not like Wiener, a brilliant MIT mathematician and humanist, who got his Ph.D. from Harvard when he was only 17. He was a media artist and a politician. But he had *so* much more visibility in the media that his opinion easily prevailed. And so it has remained until this day.

Make a Career Wish and Largest Contribution to Knowledge stands here for an approach to *evangelizing the frontier* we followed at the start of The Game-Changing Game

(see the corresponding entry in Our Offer section above), where a number of achievement and contribution opportunities are offered to choose from. How can a single line of approach offer so disparate and so large opportunities that include both "make a fortune in business" and "solve global problems"? Zooming in on one of those opportunities, "make a large contribution to human knowledge", will give us a clue. The explanation, or indeed the argument, combines a *vignette* and a thought experiment (the details are provided at the beginning of [this prospectus article](#) in the proceedings of the first Knowledge Federation workshop in 2008, and further dramatized in [this evangelizing talk](#) I presented at Trinity College Dublin in 2009). The *vignette* describes the situation in the post-war sociology, where five-fold growth was accompanied with fragmentation into a number of geographical, epistemological and thematic groups and subspecialties, which lost contact with one another. In an attempt (coordinated with his American colleague Coleman) to put sociology back together, Pierre Bourdieu observed that "the largest contribution to knowledge in sociology" would be the result of a *different social organization* of sociologists. Could this observation hold even *more* obviously and more dramatically when we replace "sociology" with "society"?

A way to answer this question is offered through a thought experiment. The audience is asked to imagine the entire global creation and use of information as a system or an algorithm. And to imagine doing something with this 'algorithm' and thereby increasing its effectiveness or efficiency by 5%. How large contribution to human knowledge would this be? Unlike any data or insight or result one might be able to contribute, this *systemic* improvement would augment the effects of the work of *all* people creating or using knowledge – past, present and future – by 5%!

With the help of the above *vignette* it is argued that the range of possible improvements to 'the algorithm' is *vastly* larger than 5%.

Thrivability Strategy is a book manuscript draft (see the [Introduction](#)), where a strategy for global shift from reportedly "unsustainable" to potentially "thrivable" is described (see the corresponding entry in Our Offer section above). The manuscript draft is written in the voice of my blog – by telling *vignettes.*

It takes only a brief (first) chapter to show, by pointing to research (through people stories), that *systemic innovation* has become *necessary* for our civilization to become viable or "sustainable". The second chapter tells the stories of historical visionaries, including who saw that, and in what way exactly *systemic innovation* may need to be developed. By telling *vignettes* about the work and vision of Doug Engelbart (a knowledge media developer) and Erich Jantsch (a systems scientist and environmentalist) –each needed the other's public presence and visibility to achieve their own, but who never met or collaborated in spite of living and working geographically close to each other – the historical dance of their respective fields of interests is dramatized.

This sets the stage for the third chapter, where the story becomes, relative to our subject at hand, most interesting: Less than two weeks after Doug passed away, his lifelong wish to have the *collective mind* re-evolution *bootstrapped* in "a subset of our society that could be most effective in making changes" came true! As the President of the International Society for the Systems Sciences, Alexander Laszlo initiated the *collective mind*–style re-evolution in this academic community. At the 57th ISSS conference in Haiphong, Vietnam, where this *bootstrapping* was taking place, Doug's name was often heard. The story continues by telling about the collaboration between the knowledge media R&D and the systems R&D that we initiated there – with which you are now becoming familiar.

In Chapter Four it is explained why *systemic innovation* may lead to global thriving. This is done by pointing to some very (and I mean *very*) large resources that this course of action can make available.

Telling our own story is an integral part of our strategy, as it provides us a way to amplify the effects of all other strategic moves we are making.

The Story of Doug has proven to be an excellent way to evangelize *the paradigm,* in a number of occasions. Already Alan Kay's well-known remark "What will the Silicon Valley do when they run out of Doug's ideas?", combined with Doug's half-joking assessment (given to Sam Hahn in an interview, see this short video recollection) that only "3.6%" of his ideas *had* been implemented, gave us a way to point to the possibility of a much larger "revolution in The Valley" than what we've witnessed so far. And to suggest to international milieus that are merely hoping to *copy* the Silicon Valley example that there is a more ambitious alternative – which is also more likely to succeed.

Eight Vignettes to Evangelize a Paradigm is a collection of *vignettes*, each of which alone should be sufficient to demonstrate the naturalness, if not the necessity, of the *collective mind* re-evolution. An example is the *vignette* with which I began one of my two Triple Helix IX presentations, which I called "Knowledge Work Has a Flat Tire" (see this *vignette*). By focusing on an instance of climate change-related media reporting, a conclusion is drawn that publishing more facts and opinions in our present systemic conditions would be rather like pressing the gas pedal in a car that has a flat tire; *a structural problem must be taken care of first*, before we may effectively and safely continue.

The occasion where those eight *vignettes* were told together for the first time is also significant – they were used as a motivational pitch in a workshop whose purpose was to ignite a *collective mind* re-evolution in an emerging academic community (Digital Humanities in the North; see this blog post, where a half-hour audio recording of the eight vignettes is also provided).

Knowledge = Mountain is a five-minute talk I gave at the Topic Maps Research and Applications conference in Leipzig in 2007 (see the transcript)*.* The point made is that the development of topic maps (and of semantic web and other related technologies and

practices) will not give us a complete solution to the problem of cognitive overload, because a new *kind* of knowledge, and of knowledge work,   are needed.

The Polyscopy platform (see below) is being developed to augment the related collective capabilities*.*

Toward a Scientific Understanding and Handling of Problems, which I presented through Skype to the international workshop "Information Technology and Journalism", points to *systemic innovation* as *the* informed or scientific way of understanding and handling problems, both societal and personal. The argument is developed by exploring the analogy between our society and its ills, and the human body and scientific medicine (see this blog post). Our core societal systems are visited one by one, and their "anatomy and physiology" is examined to point to causes of dysfunction and vast possibilities for improvement.

It is interesting to observe here that *systemic innovation* points to *the frontier* approach to politics and policy, and democracy, which is beyond the traditional "us vs. them" approaches, including even the newer "1% vs. 99%" approach. Improving or recreating the systems in which we live and work is a course of action that will benefit *everyone* – and on which all of us are invited to collaborate.

Ode to Self-Organization – Part One is a fictional story, told from a point in distant future, about how our present sustainability-related challenges were resolved through *systemic innovation* (see this blog post). The story begins by a researcher asking "What happened with all the time we have saved by creating machines? We seem to be *more* busy and stressed that our ancestors have been!" And finding out that a pathological social-systemic evolution took it all!

System Prototypes

We have now come to another key part of our strategy for making *the elephant* visible – by materializing its parts. What might academic communication, or public informing, or education, or our other institutions including even religion – look like if we developed them consciously and creatively, by taking advantage of our technology and of all we have learned about communication? What practical difference might this make?

Tesla and the Nature of Creativity 2015 (see the blog post A Collective Mind – Part One) is an instance and a showcase of *collective mind* re-evolution in practice*.* A result of a researcher – with uncommonly large potential social impact, but written in an inaccessible academic language, of quantum physics – is *federated* i.e. (1) rendered accessible by transforming the research article into a multimedia object with metaphorical – visual models, explanatory interviews with the author etc.; (2) made publicly known through a high-profile public event; (3) linked with other results and and ideas and woven into a

network of meaning, by using the Debategraph platform and a suitably orchestrated online public dialog.

The *meaning* of this research result is also relevant to our theme: University of Belgrade quantum physicist (internationally known for his research in physics of materials) Professor Dejan Raković showed that there is a commonly ignored *kind* of creativity, which he called *direct creativity*, which is excellently represented by Nikola Tesla who described his creative processes himself. And that *direct creativity* can be modeled and explained, and hence restored to our worldview, by appealing to the paradigm of quantum physics. What is significant for us is that it is exactly this *direct creativity* that enables *visionary* insights – 'seeing through' a complex system or design, through a leap of intuition. What Dejan showed was that the *direct creativity* requires an entirely *different creative process*, and arguably also different *education* than the more common *indirect creativity*, where we are putting things and ideas together piece by piece.

"Part One" in the title of the just mentioned blog post, where this *prototype* is described, is a private joke that warrants an explanation. You might wonder – What might Part Two possibly talk about, that hasn't been covered in this extensively long document? It turns out that there is yet *another* "intriguing long-standing scientific open problem – whose practical relevance cannot be overstated" whose resolution is woven in this *prototype.* This second open problem – which will be covered in Part Two – is to "reconstruct the social creation of truth and meaning" in way that is consistent with the 20th century scientific insights. A proper explanation will require a whole other long blog post (which I intend to write before our next workshop in Belgrade in June 2017). Let me here only point again to Werner Heisenberg's important book. In "Physics and Philosophy", this visionary scientist(who got his Nobel Prize when he was barely 30, for "the creation of quantum mechanics") described how the 19th century science developed a narrow and rigid framework for understanding reality, which was damaging to culture; and how *disproving* this framework might have been the most important contribution of quantum physics (read [this page-and-a-half excerpt](#)). Dejan Rakovic and I began our collaboration when we found out (in a long, late-night conversation in the garden of Villa Doda in Dubrovnik, during the second Knowledge Federation workshop in 2010) that we were both working on the same core issue – of repairing and broadening the foundation – in complementary ways: He by applying the quantum physics paradigm to model and explain the phenomena that have been ignored owing to the "narrow framework"; I by developing the foundations bottom up – by starting from an epistemology (see the Polyscopy *prototype* below). Truly energizing is the possibility to create a radical, 21st century alternative to the age-old *philosophical* and mythological or ad-hoc approaches to this most central theme, by applying the usual Knowledge Federation methodology (see below) – namely by developing a systemic *prototype* (the one at hand, TNC 2015 will serve us well for a start) and a *transdiscipline* around it to *federate* relevant insights and to update it continuously! This gives us an opportunity to develop the (more collectively creative) *dialogical* approach to science, as

David Bohm and David Peat (other two celebre physicists) envisioned in "Science , Order and Creativity" (see it on Goodreads).

We let this *prototype* gently point to an even larger opportunity, for a *cultural* renewal – in which our worldview *and* our culture are allowed to evolve rapidly further, owing to a *systemic* intervention into the very foundations of our worldview, and the way it is created. This *cultural* renewal may well turn out to be *the* key task on *the frontier,* as Aurelio Peccei (the co-founder and first president of The Club of Rome) claimed, among others.

Barcelona Innovation Ecosystem for Good Journalism 2011 is a *prototype* of a public informing that can empower systemic understanding and handling of issues and systemic change. The public, journalists, academic experts and communication artists are linked together in a *federation* scheme. This *prototype* also shows how a real-life system, such as journalism, might be re-created or re-evolved by a suitably formed *transdiscipline* (or "innovation ecosystem", see this report). This *prototype* implements the recommendation that Doug gave in his keynote at the 4th Innovation Journalism Conference (at Stanford University, see this excerpt).

Collaborology is an educational prototype, showing how the *collective mind* approach may change education (see this invitation flyer and this description). By *federating* knowledge resources, economies of scale are changed to enable the use of immersive environments and other contemporary technology in education. A variant of Doug's Dynamic Knowledge Repository called the Domain Map resolves a number of technical problems in flexible education such as how to organize the curriculum, the exams, and the co-creation of learning resources by learner teams and globally distributed instructors.

What might result from systemic innovation? What might, say, journalism be like, if developed in the *collective mind* style? Who, and in what way, could develop a journalism model? How could it be put into practice?

Those are some of the questions answered while – and by – developing this *systemic innovation prototype* portfolio.

The Community of Impact is a systemic *prototype* that addresses another core issue – how to align the change makers and change-making initiatives so that they synergize with one another, and together complete the systemic change they are aiming at.

The Lighthouse *prototype* enables a community of researchers (it is developed for the International Society for the Systems Sciences) to synthesize, present and communicate to public their essential insights (see this abstract).

The Garden of Liberation is a *prototype* redesign of the institution of religion (this *prototype* is under construction). In the traditional societies, religion has been a factor holding the society together. But in our emerging global society, the traditional religions have shown the tendency to play a dividing and disruptive role. A way to a trans-traditional 21st century religion was shown by Ajahn Buddhadasa, an enlightened Thai monk who

recovered the Buddha's original teaching and found it different from what the traditions were teaching.

It is noteworthy, in the context of *the frontier,* that the key insight that The Buddha discovered, and Buddhadasa rediscovered, points to the possibility to transcend the narrowly conceived self-interest as "the glue" that now holds together our societal structures and steers their evolution (see [The Garden of Liberation](#) blog post).

Institutionalization Prototypes

We have now come to the core challenge of our *bootstrapping* exercise: In what way should we organize or *institutionalize* the work on completing Doug's revolution? The *prototypes* presented here will provide us a head start for tackling this challenge.

ITBA LASI and SIL (See the corresponding entry under "Our Offer" above)

CET SIG ("Curating Emergence for Thrivability" Systemic Inquiry Group of the International Society for the Systems Sciences, and the "Leadership and Systemic Innovation" Ph.D. course at the Buenos Aires Institute of Technology). Both *prototypes*, which embed *systemic innovation* and *bootstrapping* within the system of the systems sciences, are the creation of systems scientist Alexander Laszlo. Both are also a result of collaboration with knowledge media R&D through Knowledge Federation (I am a co-chair of the former with alexander, and an instructor and International Advisory Board member in the latter).

For a good reason Knowledge Federation not a *transdiscipline* for *systemic innovation* – although *systemic innovation* is the core challenge that remained after Doug: While *systemic innovation* is clearly a *transdisciplinary* field, it most naturally belongs within the system of the systems sciences, where the knowledge about systems – how to understand them and talk about them, what they should be like, how we may intervene into them – has been in development for more than a half-century. *Federation* – our primary challenge – obliges us to give voice to the relevant sources, instead of improvising on our own.

Here also belongs Doug's key question "So, how do you get it started?" and his quest for the "subset of our society that would be most effective in making changes". There are several reasons why the academic organization of systems scientists is a likely answer:

- An academic community of systemic thinkers is the one that is most likely to embrace systemic innovation in their own midst; and as we have seen, to a certain degree the ISSS community *has* already embraced it (see Appendix II)
- Systems scientists own the triggering message – that innovation, and even our very thinking, should be systemic – which when suitably communicated to the public (as a result of this *bootstrapping*) will naturally help *systemic innovation* spread and scale
- Systemic thinking needs to be *built into* the workings of our various *collective minds*
- Systems science must inform the design of our systems

Knowledge Federation *transdiscipline* is both

- An academic institution, analogous to chemistry and physics, whose task is to perform for *knowledge federation* the functions that a conventional discipline will perform related to its subject – develop and organize relevant knowledge resources, provide education, be an institutional home to researchers etc., and
- A *prototype* of a knowledge-work system, the *transdiscipline,* which is suitable for *federating* knowledge

(See the corresponding entry in Our Offer section above.)

The Game-Changing Game and The Club of Zagreb (see the corresponding entry in Our Offer section above). The Game-Changing Game is a generic way to change systems, where the young (in spirit, or in phase of life) people (A-players) are empowered (by established or resourceful patrons or Z-players) to change systems by "playing their life and career games" by changing rather than learning their professions (see the corresponding entry in Our Offer section above).

The Club of Zagreb is a *prototype* re-design of The Club of Rome, implementing The Game-Changing Game strategy.

Douglas Engelbart's Unfinished Revolution – Program for the Future is a PhD seminar I have been teaching at the University of Oslo for the past three years (see [the course page](#)). This seminar has provided an opportunity to research Doug's work and history thoroughly, and to produce lecture and other materials that will be of value in the proposed collaboration.

Polyscopy Prototype

Polyscopy *prototype* is a model of a complete *paradigm* – of an information creation and sharing that is capable of condensing heterogeneous or multidisciplinary results and insights into basic shared insights, which empower us to act in accordance with our situation, and in unison (see the corresponding entry in Our Offer section above).

Polyscopy Platform (this name is tentative) is being developed to "augment our collective capability" that is at present centrally important – the capability to "connect the dots" (see the corresponding entry in Our Offer section above).

Polyscopic Modeling *methodology* offers a way to embed the work on *the frontier* academically, by giving it a rigorous foundation (see the corresponding entry in Our Offer section above).

Square Meets Circle is the name of the book Fredrik and I are writing together; but it is also a suitable name for the *prototype* he and I compose together – pointing out how science and communication design (or "the arts") can and need to collaborate (see the corresponding entry in Our Offer section above).

Convenience Paradox is an exemplar of *polyscopic information* – where it is shown how heterogeneous insights (emanating from the sciences and from the world traditions) can be combined to compose guidelines for an informed pursuit of happiness.

Homo Ludens is a *polyscopic* framing of our contemporary cultural entanglement, explaining why we may be biologically equipped to be *homo sapiens*, and culturally devolve to become *homo ludens.* Recent multidisciplinary insights are combined to show that *socialization* can inhibit various forms of awareness. In this way we were able to divide the *homo sapiens* from the *homo ludens* more surgically than Johan Huizinga (the author of the Homo Ludens classic) could in his age.

Appendix II: News from the Trenches

We illustrate the realities of *the frontier* by telling *vignettes* – real-life stories that highlight important insights.

Several years ago Bill Gates visited Oslo. As a celebrity humanitarian millionaire, he got quite a bit of attention in Norwegian media.

In a prime-time TV news show, first Gates told the journalists about his plan to eradicate the problems that plague the humanity, one at a time. His current focus was on malaria.

Then Jens Stoltenberg, who was then the Prime Minister of Norway (he is now the Secretary General of NATO), spoke and said (I am quoting from memory): "Norway has become a rich country. We too want to do good in the world. But we haven't really done the thinking, in what way to do this. Bill has done the thinking. And Bill is a smart guy! So we are going to invest together with Bill, into *his* fond!

The humanitarian initiative of Bill and Melinda Gates merits of course every praise and honor. But we may also observe that their focus on problems and solutions is *not* systemic.

We let the main hero of our story explain what that means, and point to an alternative. The following excerpt (where Doug is remembering how – in 1951, upon having decided to orient his career in a way that would "maximize its benefits to the mankind" – he pondered in what way to direct his efforts) is taken from a series of interviews conducted with Doug (at Stanford University, in 1986):

I remembered reading about the people that would go in and lick malaria in an area, and then the population would grow so fast and the people didn't take care of the ecology, and so pretty soon they were starving again, because they not only couldn't feed themselves, but the soil was eroding so fast that the productivity of the land was going to go down. So it's a case that the side effects didn't produce what you thought the direct benefits would. I began to realize it's a very complex world. [...] Someplace along there, I just had this flash that, hey, what that really says is that the complexity of a lot of the problems and the means for solving them are just getting to be too much. The time available for solving a lot of the problems is getting shorter and shorter. So the urgency goes up. So then I put it together that the product of these two factors, complexity and urgency, are the measure for human organizations or institutions. The complexity/urgency factor had transcended what humans can cope with. It suddenly flashed that if you could do something to improve human capability to deal with that, then you'd really contribute something basic. That just resonated. Then it unfolded rapidly. I think it was just within an hour that I had the image of sitting at a big CRT screen with all kinds of symbols, new and different symbols, not restricted to our old ones. The computer could be manipulating, and you could be operating all kinds of things to drive the computer. The engineering was easy to do; you could harness any kind of a lever or knob, or buttons, or switches, you wanted to, and the computer could sense them, and do something with it.

In the Spring of 2014 I told the above Bill Gates *vignette* in the closing, plenary session of the European Meetings on Cybernetics and Systems Research in Vienna, titled "Civilisation at the crossroads – Response and Responsibility of the Systems Sciences". Since I was organizing and chairing a workshop, I was entitled to a five-minute report, and I began it by telling that story.

As always, the purpose of my workshop and of my story was to draw attention to the need for – and facilitate the development of – *collective mind* self-organization in the systems community (which Alexander Laszlo initiated in 2013 as the ISSS president, and which Knowledge Federation was actively supporting). I told the above *vignette* to highlight that in spite of all the great work that had been done in the systems sciences, the single main message – which needed to be communicated from the systems community to make the public aware of the very relevance of their work – has not yet reached even the "smart guys", Bill Gates and Jens Stoltenberg.

"In recent decades, owing to the changes and trends in the global economy", I commented "some people have become almost instantly wealthy. Now that substantial funds are in the

hands of some smart and entrepreneurial people, the opportunity is open to invest creatively into making a *real* difference in the world, through *systemic* action. Systemic action must, however, begin in our own midst – we must configure our communication differently, so that we may provide the necessary guiding light."

I was also able to point to the good news – that Ockie Bosch, a prominent member of the systems community (Ockie is presently the ISSS President) had just received a grant from the Gates Foundation to help women in Africa to a better life through a systemic dialog and intervention.

As I mentioned above, I am now embedded in the ISSS infrastructure as a co-chair of the Curating Emergence for Thrivability SIG, which Alexander Laszlo developed and recently invited me to lead together.

At the recent, 60th ISSS conference in Boulder, Colorado, we organized two workshops and a two-day article presentation and discussion track. One of them introduced The Lighthouse – the project to develop a *collective mind* communication infrastructure that will provide "the guiding light" (see this abstract). The workshop Collaboration for Impact (see the abstract) will illustrate the nature of our interaction with the ISSS community. This brief paragraph will be relevant as an illustration of the *bootstrapping* work, so let me echo it here:

> We cordially invite you to join us in a collaborative action workshop. By collaborating on three strategically chosen social systemic *prototypes*, we will develop a way of working which allows systemic insights to bear *directly* upon technological innovation, and social systemic change.

(Notice that we are proposing to develop "a way of working". Notice the highlighted word *directly*; it points to our key value proposition – to secure the impact of systems science research insights by rendering them *in technology* and *in social-systemic designs* directly – instead of having them confined to academic publications.)

During the conference I had the exquisite pleasure to lodge in the mountain-ridge house (overlooking a state park) of the current ISSS president, and have the incoming president as my next-door neighbor. Each day we would share a half-hour ride to and from the University of Colorado campus, and breakfast, dinner and coffee-house conversations. We talked about all sorts of themes. But whenever we touched upon *the elephant*, the conversation would instantly move on to something more familiar.

So I am no longer invisible in the systems community.

But *the elephant* still is!

Here is how I introduced Alexander Laszlo to Annette Grathoff (evolutionary biologist and systems scientist, who was then just stepping into our team to collaborate on The Lighthouse) during a lunch break at the 2015 ISSS conference in Berlin.

Alexander was *born* into evolutionary systems science. When his father Ervin (a reputed systems scientist himself, twice the ISSS president, member of The Club of Rome and the founder of The Club of Budapest) first took him into his arms, he whispered "general evolution theory" into his ear. Margaret Mead and Erich Jantsch held them in their arms when he was a baby...

Since Ervin already wrote "Choice: Evolution or Extinction", Alexander naturally chose – evolution. He became an evolutionary systems scientist, who distinguishes himself by facilitating the evolution of the very system by which the systems scientist are doing their job.

Having adopted the academic systems science as his own career line, Alexander studied under leading systems scientists, and collaborated with others.

Being endowed with an uncommonly fast mind, Alexander was able to take in the essence of much of what had been understood in the systems community as systems thinking. He concluded that there the core challenge that remained – systems *doing* (or as he might prefer to phrase it, systems *being*)!

At the EMCSR Vienna I noticed the serendipity in the T-shirts Alexander and I were wearing. Being tuned to the importance of *evangelizing,* I proposed a photo session.

The slogan I was wearing, "Be the systems you want to see in the world", was Alexander's. He made it the motto of the the 2013 ISSS conference in Haiphong, Vietnam, where he initiated the *collective mind* self-organization in the ISSS community as the society's president. The motto stuck, and was reused at the EMCSR in Vienna the following year.

Alexander Laszlo and the author of this proposal at EMCSR Vienna, 2014 "Civilisation at the Crossroads –
Response and Responsibility of the Systems Sciences". (Photo by Valeria Delgado)

I end this proposal with the above photo, which ideographically expresses its main point.

You might recognize in this slogan the main challenge of Engelbart's unfinished revolution –
to *bootstrap* the systemic change, to enact it with our own bodies.

You may recognize in it Bela Banathy's call to add to our compendium of human rights, and
to our understanding of democracy, the most urgently needed people's capacity "to take
part directly and authentically in the design of the systems in which they live and work".

You may recognize in it the *design epistemology* – the founding principle of my own work on
the frontier.

Bootstrapping systemic change *is* indeed "the powerful idea whose time has come".

We invite you to *bootstrap* with us systemic solutions that will enable the completion of
Engelbart's revolution.