

Chapter 10 Flow

Four grand pianos, their lids removed, are placed nose-to-nose, like the leaves of a flower, under sharp spotlights in the concourse of a railway station. Each of the four musicians plays from a double-width score that is half as wide as the piano itself. Every now and again, one of the players signals the transition to a new section by nodding his head backwards. Every hour or so, a new team of pianists takes over, in a kind of relay: the old shift keeps playing but, in sequence, one stands up, a pianist from the new shift takes her place. This happens four times until the new team is in place. *Canto Ostinato*, as the piece is called, has no prescribed end; it can go on for hours. Simeon ten Holt, its composer, describes it as a perpetual work-in-progress. "My own life has been largely determined by chance" he says "and as composer, I decline to indicate intensity, phrasing and so on, on the score. Too-rigid instructions are in conflict with the dynamics of the overall sound balance, and they frustrate the performers in formulating a staging of their own". The score of *Canto Ostinato* is laid out as a route for the performers to take, says ten Holt; they use so-called 'drift parts' at will, but its total length, and the number of repetitions of the various sections on which the composition is built, are undetermined.

Canto Ostinato is a metaphor of a new kind of design. Its composer, his incomplete score, the pianists, the railway station, the people present on the night - all these elements interact in subtle and complex ways. These interactions are difficult to describe to someone not present – and they would be impossible to orchestrate remotely; neither the pianists nor the audience know exactly what will happen next, so no complete score or blueprint is possible. But they do not fly blind: they understand the principles of the system and work with it: they follow the score, to a point; they interact with each other; and they interact with the situation. In a sense the situation is itself designed. The composer creates something akin to street theatre: he places an idea, a score, and people on the stage, but he does not furnish a finished script.

Designing in the space of flows

The Catalan economist Manuel Castells describes the modern world as a "space of flows" - flows of people, capital, information, technology - flows of images, sounds, and symbols. "Flows are not just one element of social organisation" says Castells, "they are the expression of the processes dominating our economic, social and symbolic life"¹. Flows sound soft and benign, but flows also wash things away. We have been taken aback by events, such as climate change, that we seem to have caused, but which were not our intention. Other changes have been the opposite of what we hoped and intended: these are the so-called rebound effects, such as increased traffic, or use of paper, that the internet has stimulated, not replaced.

One reason we feel helpless is because experts tell us we are. Economists describe as 'exogenous' - arising from outside society – the seismic forces, such as technology, that are changing the world. They are wrong. Technology has not come from "outside society"; on the contrary, we made it: technology is a consequence of human decisions and actions. These actions have been misguided, and based on assumptions that we are now beginning to question - but they were not an accident.

A redesign of this space of flows is a tall order. For Ezio Manzini, it's like changing the engines of an aircraft while it is still in flight. But it's not like jumping off a cliff. The precise behaviour of complex systems – including human ones – may not be as predictable as something mechanical like a steam engine, but we are beginning to understand the principles by which complex systems evolve.

Redesigning the space of flows will be quite different from the ways we have designed things for the last 2,000 years. It will be continuous, rather than episodic. It will focus on how things work, rather than (just) on what they look like. And it will entail a fundamental change in the relationship between the people who make things, and the people who use them.

So what are the principles for designing in the space of flows?

From blueprint and plan, to sense-and-respond

From high concept to deep context design

From top-down to seeding edge effects

From science fiction, to social fiction

From design as project, to design as utility

From designing for people, to designing with us

From blueprint and plan, to sense-and-respond

Traditional design thinking focuses on form and structure. Actions and inputs are described in a blueprint, or plan – and other people produce or implement it. This is a top-down, outside-in approach. It doesn't work well now because complex systems won't sit still while we redesign them. The key what economists call "adaptive advantage" within a volatile environment are dynamic capabilities. In a sense-and-respond kind of design, desired outcomes are described - but not the detailed means to get there. Sense and respond means being responsive to events in a context - such as a city, or a marketplace - and being able to respond quickly and appropriately when reality changes.

To do things differently, we need to see them differently. To make future situations and flows intelligible, we need to develop an understanding and sensitivity to the morphology of systems, their dynamics, their 'intelligence' - how they work, and what stimulates them. This is

a challenge to the cognitive abilities of people and organisations. For Brian Arthur, of the Santa Fe Institute, the success of an organisation will increasingly be result of its ability to interpret, to see things differently, and to focus on principles of relationship, connection, communication, and interaction. Desired outcomes in service-and-flow contexts will themselves not be static. We have to imagine future flows, not future forms.

Viewing systems through what the Canadian educator Alain Findeli calls "the lens of complexity", we can reframe the design tasks that confront us. By understanding why a system is in one state, we can explore the kind of interventions that would nudge it to another more desirable one.

Designing as steering

Natural, human and industrial systems are all around us. They are not below, outside, or above us. We therefore need to understand and act in natural, industrial and cultural systems as a interacting whole. Designing in this context means steering more than shaping. From being the 'authors' of a finished work, we had better think of ourselves as facilitators whose job is to help people act more intelligently, in a more design-minded way, in the systems we all live in. Our best intentions – for economic success, social quality, or sustainability - will be frustrated until we evolve from designing *on* the world to designing *in* the world – acting in the bubble, not outside it.

This shift in emphasis from what things look like, to how they behave, is a big one for design. We need to think of rowing the boat, not just drawing it. Peter Bogh Andersen, who designs maritime instrumentation, compares interacting with dynamic environments to navigating a ship. "When I started teaching human-computer interaction in the 1980s," he recalls, "the ideal was that the user should be in control of the system. The system should not act unless the user asked it to do so. In process control, however, the situation is quite different. Here, physical processes are running independently of the user, whose task is partially to control them. The art of navigation is similar: it is to pit the controllable forces - rudder, propeller - against the uncontrollable ones - the sea and the wind - to achieve ones purpose". The computer game world is analogous, he says. "Process control and computer games share important features: in both cases there is a dramatic conflict between a protagonist (on a ship, it's the captain) and bad guys (which for the captain, are the wind and the sea) who are active, unpredictable and only indirectly controllable"².

Design problems in complex systems often change significantly during he course of their own solution. Difficult to learn and awkward to use, today's information systems can also change our activities in ways that we do not need or want. The problem lies in the software development process. Design changes the world within which people act and experience, and

this changes the requirements for further designs"³. In Japan designers describe incremental innovation as "the patter of tiny feet". Kyoshui Sakashita formerly design director, of Sharp, says teams designing complex systems proceed not by great leaps forward, but by 'thousands of tiny steps'- partial solutions, continually produced. In the development phase, the rapid prototyping approach involves the use of computer simulations and physical mock-ups – but it need never, in principle, stop. As John Carroll observes, many important consequences for people reveal themselves only through the course of extended use. The FileMaker Pro database in the Doors of Perception office is a case in point: it was first set up for us in 1993 - and has been changing more or less continuously ever since. The more we fiddle with it, the more we want to fiddle. Fiddling begets more fiddling. We could probably keep our FileMaker wizard, Jan Jaap Spreij, busy 100 hours a week – and we are only 10 people.

2 From high concept, to deep context

Hippocrates said 2,500 years ago, in *Airs, Waters, Places*, that, in order to understand the disorders in any subject, we must study its environment. "The greater part of the soul lies outside the body", said the sage; "treatment of the inner requires treatment of the outer". Peter Drucker, a modern business sage, teaches business people a similar lesson: "Innovation is a system's adjustment to its surroundings – and sometimes this is best accomplished by adjusting the surroundings"⁴. What Drucker describes innocuously as an "adjustment", others might judge to be cultural imperialism, or ecological devastation – but the basic point is clear enough: when designing in the space of flows, context is key.

We clumped mindlessly over contexts in large, heavy boots for much of the modern era. Any ecological system is richer when it is characterised by high diversity, but most of our design interventions have made contexts less diverse, not more. Sprawling suburbs, multi-lane highways, golf courses, airports and the like turn places into ecological deserts. Our speed culture is particularly damaging, laments Ezio Manzini, "Very large grids, very big global hubs, and the massive flows of people and matter in-between them, diminish everything else between that is not so large, and not so fast. We have to promote, facilitate the existence, and renew the idea, of the close and the slow"⁵.

There are positive and defensive reasons for treading more lightly in the space of flows. The positive reason is that contexts contain value in the form of diversity – a key ingredient for evolutionary success. For some management writers, the effectiveness of modern organisations is a function of the speed with which they learned not only about changes in their core technologies, but also about shifts in their environments⁶. The defensive reason is that contexts have the capacity to change events, sometimes dramatically, in ways we might

not like. As Malcolm Gladwell so memorably explains in *The Tipping Point*, "little causes can have big effects. Ideas, trends and social behaviour spread through populations like epidemics. These epidemics are sensitive to the conditions and circumstances of the times and places in which they occur". An epidemic can be reversed, or can be "tipped" by tinkering with the smallest details of the immediate environment.

Context matters, says Gladwell, because specific and relatively small elements in the environment can serve as Tipping Points. Gladwell gives as examples of Tipping Points small things we can change, or fix – such as broken windows, cleaned up graffiti⁷. Small changes to inter-connecting sub-systems can make things better, and they can make things worse. Tom Bentley, in his book *Learning beyond the classroom*, emphasizes that although we each occupy a small point in time and place, it's important that we see the importance of our connections to the rest of the world, our place in deeper systems of order. "This way of thinking leads to a way of approaching the world which is "purposeful and ambitious, but also careful and humble, seeking to maintain and develop systems of increasing complexity so that they support people's needs and interests in appropriate, sophisticated ways"⁸. Designing in a complex world requires a holistic and delicate approach. Networks and systems in nature generally start out small and develop during a process of gradual growth. That's also how we should design man-made ones: act lightly, sense the feedback, act again.

Modern history is filled with the efforts of smart people to bring order and method to the design process. They mostly failed. Systematic design methods only work when the design problems are 'decomposed' into neat sub-elements. The trouble is decomposition, by eliminating the messiness and unpredictability of the real world, leads to oversimplification - and thereby distances any solution from its context of use. Henry Dreyfuss, in *Designing for people* (1952) emphasized getting the 'feel' of a design situation. John Carroll, in his book *Making Use*, reminds us that when he designed his first typewriter, Dreyfus spent ages interviewing secretaries and observing their use of existing machines. When he worked for the Veterans Administration, designing artificial limbs, he and his staff strapped them on. "Dreyfus wanted to present design as something tangible, sharable with clients and prospective users", Carroll recalls. "Designers and their clients need to *feel* the situations for which they are designing"⁹.

3 From top-down to edge-in

In biology they describe as 'the edge effect' the tendency for a greater variety and density of organisms to cluster in the boundaries between communities. In complexity theory, too, there is an 'edge of chaos' paradigm in which it is observed that that in a system containing perfect internal order, such as a crystal, there can be no further change. At the opposite extreme, in a

chaotic system such as boiling liquid, there is very little order to change. The system that will evolve most rapidly, explains E O Wilson, "must fall between, and more precisely on the edge, of chaos - possessing order, but with the parts connected loosely enough to be easily altered either singly or in small groups"¹⁰.

As in nature, so too in a networked economy, variety, density and interaction are success factors. But the way we organise things now, the potential benefits of edge effects are designed out, not in. Most of us live and work in sealed-off boxes: a company, a university, a profession. We work *within* communities, not between them. Stuck inside organisations which perpetuate divisions between domains, and which isolate knowledge from the contexts in which it is to be used, we become less competent at tackling complex and multi-dimensional social questions. If our connections to the edge are inadequate, we find it hard to figure out what people really need – and end up pushing products that they don't.

The idea of edge effects is hardly new. Ever since Aristotle, people have criticised the division between disciplines and professional communities. But the problem has now become acute. Specialisation may well have helped build industrial society - but it 's like grit in the wheels of the network society we're building now.

What to do about the edge effect is a design issue. To find out what's happening on the edge, we first need good *peripheral vision*. We need to spot opportunities at the juncture between industries, to imagine relationships and connections where none existed before.

Above all we need to look in new places for inspiration, because most solutions will involve new alliances and new connections. We need to cultivate the habit of looking for the people, places, organisations, projects and ideas that do not appear on the radar screens used by our captains up there on the bridge. Edge cities, and the boundary zones between them, are always good places to look. So, too, are places that specialise in exchange - hubs, entrepôts, ports like Hong Kong, Singapore, Hanseatic cities, Venice and Genoa, Amsterdam. Places whose lifeblood flows through a rich a web of connections are a batter bet than places that think of themselves as centres. This applies to countries and regions, too.

The edge effect applies to cultures as well as geography. The first major industry, textiles, owed a great deal to the transfer of knowledge from India. in biotechnology today, a lot of innovation comes from genes in plants. Of the roughly 265,000 plant species that we know exist, probably 40,000 have medicinal or nutritional applications for humans - yet only 1,100 have been thoroughly studied. It makes sense to learn from others, too. Ethnoecology is the study of indigenous ways of using local resources; for example, forest-dwelling peoples classify and use 99 percent of the rich biological diversity, whereas entire forests are devastated by western interests to exploit less than two percent of the available species".

Susantha Goonatilake describes as "civilizational knowledge" such cultural constructs as metaphors, the pregnant mother to scientific innovation¹¹.

"Theories in science often originate in metaphors" says Goonatilake; "a vast soup of metaphors and theoretical constructs exists in the Asian world. These vary from sophisticated debates on the nature of ontology and epistemology, to discussions in psychology, the nature of mind, mathematics and medicine. Such an infusion would help enlarge our scientific horizons". The potential is huge. During the last hundred years, probably two thousand catalogues of known South Asian manuscripts have been compiled. Each catalogue gives about two hundred manuscripts, so, one is talking of about 400,000 manuscripts. Others have estimated that South Asian manuscripts amount to some 500 million. "The Renaissance, the Scientific Revolution, the Enlightenment and the great discoveries in the 19th and 20th centuries were the result of recombining, not just discovering, ideas. The rediscovery of Asian thought, is a second renaissance in the cultural history of the West, with the potential to be equally important as the rediscovery of Greek thought in the European renaissance"¹².

We need to become hunter-gatherers of ideas and tools: how have other societies lived in the past? how do societies live in other parts of the world today? has this question been answered somewhere else already?

Designers are constrained by the myth that everything they do has to be a unique and creative act. Rather than expect to design everything from scratch, we should search far-and-wide for tried-and tested solutions that others have already created. Kevin Gavagham who set up Britain's first internet bank, FirstDirect, says that wherever possible, we need to re-use and re-combine actors, ideas and organizations¹³. The capacity to think across boundaries, to spot opportunities at the juncture of two or more industries, to draw relevant analogies from seemingly unrelated industries, is as valuable as deep experience of a single sector. "Sow the seeds of change at the margins" says business writer Julian Birkenshaw, "that's where they will do best. Go for multiple actions at the fringes. Let direction arise"¹⁴

When edge people, edge ideas, and edge organisations are brought together, something interesting and valuable usually happens. We need to connect with actors from different economic and knowledge domains. We need to re-combine relationships - among people, ideas and organisations. We need to search out and exploit scientific, natural and cultural knowledge that is usually ignored - whether it be mimicing biology, or learning from travelling storytellers in India. Putting old knowledge into a new context creates new knowledge. We need to become hunter gatherers of models, processes, and ways of living. Becoming a global company once meant penetrating markets around the world.

The challenge is to innovate by learning *from* the world. For Yves Doz, a professor at Insead in France, competitive advantage in future will come from discovering, accessing, mobilizing and leveraging knowledge from many locations around the world. "Most multinationals fail to harvest the most precious resources - ideas and innovation - from the far-flung regions in which they operate" says Doz¹⁵. In an economic world dealing in knowledge, the secret of success is the combination of different types of expertise in a productive manner. For Nobel Laureate Murray Gell Mann, innovation is an 'emergent phenomenon' that happens when a person or organisation fosters interaction between different kinds of people, and disparate forms of knowledge. When you connect edge people, edge ideas, and edge organisations together, something interesting and valuable usually happens. In this writer's work as a conference organiser and advisor, this approach certainly seems to work. Re-combining relationships - among people, ideas and organisations – does seem to foster innovation. One way to react quickly is by adopting a *plug and play* approach - the capacity to re-combine and re-configure modular processes components into different forms.

4 From science fiction to social fiction

There are different ways to think about the future. The first and most common way is to extrapolate from now. But designers and engineers have not been much good at predicting the needs their inventions would meet - let alone the unexpected impacts they would have. A lot of us in the design world pride ourselves as being future thinkers, but decline to take responsibility for the consequences of our actions.

Innovation is not a neutral activity. A lot of innovation agendas are driven by technological determinism; they often disguise creepy social agendas, too. "From *The Matrix* to *Enemy of the State*, successful descriptions of the future have an ability to draw us towards them, to command us to make them flesh" complains the English writer Harry Kunzru; "The effect of futurist fictions, projections and predictions is to fuel our desire for a technology boom"¹⁶.

Overblown research agenda, such as Europe's Information Societies Technology programme (IST), probably hog too much public money for technology projects - but at least they are subject to democratic control. Hollywood's hymns of praise to the machine do more damage, because they paint reactionary social futures as inevitable, and dress them up as progress. The worst culprits are those apologists of the new economy who, wearing liberal and countercultural hats, eulogise decentralisation, nonlinear causality, and the impossibility of control – but fail to explain why these trends are so wonderful when centralised power, extreme social inequality, and ecological devastation, are increasing in the world.

A better innovation approach is to switch attention from science -dominated futures to *social fictions* in which imagined new contexts enrich an otherwise familiar world. Design scenarios are powerful innovation tools because they make a possible future familiar, and therefore

desirable. People will generally try something only if it is recognisable or immediately useful for some specific task. It should fit in culturally and behaviourally. Design scenarios also enable the *participation* of potential users. One of the most important ways to foster product acceptance is to invite the participation of users in conceiving and shaping what they want. The sharper the vision of the future - and in particular, the more the vision is co-created by citizens - the more likely it is that developers will be able to find a way to make it happen. A familiar example: President Kennedy commitment in 1960 to put a man on the moon in 10 years. Only with this vision firmly in mind was it possible to develop the many technologies needed for this extraordinary scientific and organisational feat. Extrapolating from the capabilities available at the time in 1960 would almost certainly not have led to the same outcome.

Envisioning and analyzing scenarios of human activity can help us to understand and to create appropriate artefacts to support human activity. Ezio Manzini describes this as the difference between disabling and enabling solutions. Nine-out-of-ten people would rather talk to a person when searching for advice on the internet -so put a person at the other end of the line *Enabling* solutions create conditions, and infrastructures, which enable users to participate in the process of creating new products and new business models. This leads to a constant process of osmosis between companies and consumers, where the latter become the best market sensors positioned to provide feedback and re-orientate the system using a constant learning process. It is in such a way that a system becomes really intelligent¹⁷.

Traditional textbook approaches manage the complexity of the design process via abstraction, treating design problems as if they were composites of puzzles. Scenario-based design uses concretization. Scenarios have become pervasive in the design of computer systems and software, says John Carroll, because a scenario is a concrete story about use. Scenarios are a vocabulary for coordinating the central tasks of system development-- understanding people's needs, envisioning new activities and technologies, designing effective systems and software, and drawing general lessons from systems as they are developed and used. "Instead of designing software by listing requirements, functions, and code modules, the designer focuses first on the activities that need to be supported and then allows descriptions of those activities to drive everything else"¹⁸. The scenario process is highly interactive, intense, and collaborative: the experience can be transformational for participants aspiring to think - and design - out-of-the-box.

One valuable outcome can be an *opportunity map* that sets the agenda, and prioritise the desired social and economic outcomes that need to be designed. Questions, on such maps, are more powerful than answers. The more engaging the question, the easier it will be to get people to work on it. The medium used to make the map is less important than the fact that it

sets priorities. When a question is selected for attention, the next step is to describe a desired outcome, the future situation. That's where you're heading. As we have seen, extrapolating from today's situation often limits creativity, so a better approach is *back-casting* - from then, to now, imagining future situations and thinking back. A big picture example might be a world which has already achieved a Factor 20 ecological balance: the starter question would be: "how would we organise things so that 90 per cent of food is now eaten within 50km of where it is produced? This question is posed to designers who use their planning skills to make the story coherent, and their presentational skills to make it look persuasive. The group as whole is asked to think across boundaries, look for opportunities at the juncture between industries, and to imagine relationships and connections where none existed before.

Sweet spots occur at the intersection between latent social needs, open systems, smart consumers and smart companies. That's when real value is created. New services will constantly evolve. The best companies are focusing on the innovation of new services, and new business models, rather than on new technology per se.

Design methods on their own are never enough. Someone also has to provide an aesthetic stimulus - to throw ideas into the ring - in order to provoke genuinely fresh thinking. Social critics and artists are good candidates for this role. Avant garde media artists, in particular, have been acting and reflecting on issues of networks, the body, identity, and collaboration. Many of their ideas are exciting and insightful in a way that methods-driven solutions are not. Design can be a useful mediator in breaking down the isolation from each other of artists, computer scientists and users, and in promoting the fruitful interaction between them that may just yield the new concepts and applications that are needed to fulfil the promise of the new technologies.

5 From design as project, to design as utility

Our business models in design also have to change. In the past design was about the form and function of things. These features were limited in space and time, and could be delivered in a fixed form, such as a blueprint. In today's ultra-networked world, it makes more sense to think of design as a process which defines a system's rules rather than its outcomes. Stand-alone products – fridges, cars, cookers, televisions – will still be needed to deliver value, but the real action takes place among the organizations developing new services and infrastructures.

In the logistics and manufacturing, the elements of a light economy are already being prepared – although their designers are not always aware of the fact. Demand-responsive services, and dynamic resource allocation, are transforming the ways matter, energy, money and people are flowing through the system. The idea of a self-contained design project – of

"signing off" when a design is finished - makes no sense in situations whose systems don't stop changing. A project-based business model in design is like a water company that delivers a bucket of water to your door, and pronounces its mission accomplished. Interaction designer Alan Cooper is scornful of this flawed development model. "It's harder than you think to squander millions of dollars, but a flawed software development process is a tool well-suited to the task" he quips. "Most software products don't have a description; all they have is a shopping list of features. (But) a shopping bag filled with flour, eggs, milk and sugar is not the same thing as a cake"¹⁹. Designing *with*, rather than *for*, people raises further questions about current business models. who pays whom, for what, when 'consumers' add value to a system by being part of its development?

Design today is better thought of as a utility than a manufacturing process. It is hard to specify a system in advance; its ultimate objective and approach have to be discovered, not specified. "System design is a complex process, period" says John Carroll. "The novelty and complexity of technical issues is compounded by interactions among these issues, and with the particular skills and backgrounds of team members. Managing such processes is not just a matter of control and coordination: management means finding ways to share a vision of the system among all the team members as it evolves"²⁰.

I don't know how design as a utility should be paid for, or by whom - but the demand is clear enough, so new business models will surely emerge. One imagines a design economy will emerge that is based on service contracts such as those already used by big management consultancy firms.

6: From designing for, to designing with

John Carroll observes of design problems in information technology that they "often change significantly during the course of their own solution. Design changes the world within which people act and experience, and this changes the requirements for further designs". Anyone using a system - responding to it, interacting with it, feeding back into it - changes it. Carroll tells the story of project in a library prompted by congestion around a laser printer at a particular location. The implicit assumption at the start was that a particular physical arrangement of four terminals, a controller, and a printer, needed to be changed. At a certain moment, the discovery-based design process *changed the question*: the librarian re-cast the situation in terms of information access by the system's many users. At this point a completely new scenario - of remote printing distributed around the campus, became the project's focus. Such mid-course corrections are inevitable because, as Carroll explains, "the description of the current situation in the world that needs fixing is typically incomplete, inaccurate or irrelevant". People are too often described and thought of by designers as

users, or consumers, when we really need to think of them as *actors*. Complex Technical Systems – be they physical, or virtual, or both - are shaped, continuously, by all the people who use them.

There's a big difference between listening to your customer, and following your customer. "Listening is good" says Alan Cooper; "it implies applying your own filter to what you have heard. Following is bad. It implies merely doing what your customers tell you to do". Some well-known products have become so horrendously complicated that it takes months of training to do even the simplest tasks. Cooper calls this the "customer-driven death spiral". John Chris Jones, one of the pioneers of user-centered design in the 1970s, cautions that [design participation is unlikely to make much difference until the nature of designing is itself changed - by transferring *responsibility* from designers to makers and users.

A new sense of responsibility is evident in the Open Source movement where a new collaborative approach, uniquely adapted to the Internet, has enabled the development high-quality products. Initially developed in the software world, the collaborative approach of Open Source is now being applied more widely. Biologists have embraced open source methods in genomics and informatics, building massive databases to genetically sequence *E. coli*, yeast. NASA has adopted open source principles as part of its Mars mission, calling on volunteer "clickworkers" to identify millions of craters and help draw a map of the Red Planet. More than 75,000 collaborative software projects are listed at Sourceforge.net, a website for the open source community which 800,000 registered users. Sourceforge is part of the Open Source Development Network whose web sites deliver more than 160 million page views and reach 9 million unique visitors per month. Projects listed on Sourceforge range from Communications (*9559 projects*) and games (*8847 projects*) to sociology (*212 projects*) and religion (*166*)²¹.

A Canadian writer, Felix Stalder, calls this collaborative gathering and analysis of information "Open Source Intelligence". Its principles include: peer review, reputation- rather than sanctions-based authority, the free sharing of products, and flexible levels of involvement and responsibility²². And for Thomas Goetz in *Wired*, "open source is doing for mass innovation what the assembly line did for mass production. Get ready for the era when collaboration replaces the corporation". Goetz tells the story of how an intravenous saline drip, for use in cholera outbreaks, was redesigned by a group called Design That Matters. The team needed more medical expertise, so it turned to ThinkCycle, a Web-based industrial-design project that brings together engineers, designers, academics, and professionals from a variety of disciplines. Physicians and engineers pitched in - vetting designs and recommending new paths. Suggestions that emerged from ThinkCycle's collaborative approach led to an ingenious new IV system that costs about \$1.25 to manufacture, against the \$2,000 of previous solutions. "Open source harnesses the distributive powers of the Internet, parcels

the work out to thousands, and uses their piecework to build a better whole" says Goetz; "it works like an ant colony, where the collective intelligence of the network supersedes any single contributor²³.

Our world is fast being suffused with software, and the Open Source approach is a revolution in the way software is designed. "The free sharing of information has nothing to do with altruism or a specific anti-authoritarian social vision" says Felix Stalder; " It is motivated by the fact that in a complex collaborative process, new creations are built on previous creations and provide inspiration for future ones. The ability to freely use and refine those previous creations increases the possibilities for future creativity". Lawrence Lessig calls this an "innovation commons," and cites its existence as one of the major reasons why the Internet as a whole developed so rapidly and innovatively. The hurdle to participating in a project is extremely low. Valuable contributions can be as small as a single, one-time effort - a bug report, a penetrating comment in a discussion²⁴.

Yochai Benkler, a law professor at New York University, calls this new mode of production in the digitally-networked environment *commons-based peer production*. Its central characteristic is that groups of individuals successfully collaborate on large-scale projects following a diverse cluster of motivational drives and social signals - rather than market prices or managerial commands. Collaborative design means finding ways to share a vision of a system among all the actors and stakeholders as it evolves.

We can learn a lot in this context from the most advanced software designers, who call themselves 'extreme programmers'. Extreme programmers have come to value individuals, and interactions among them, over abstract processes and tools. These principles are the basis of a new movement in software called The Agile Alliance. The Agile Alliance is not anti-methodology but, as their website explains, they want to restore credibility to the word methodology. "We want to restore a balance. We embrace modelling, but not in order to file some diagram in a dusty corporate repository. We embrace documentation, but not hundreds of pages of never-maintained and rarely used tomes. We plan, but recognize the limits of planning in a turbulent environment". The Agile Alliance Manifesto for Agile Software Development describes better ways of developing software by doing it and helping others do it. "Through this work" says the manifesto, "we have come to value individuals and interactions over processes and tools, working software over comprehensive documentation, customer collaboration over contract negotiation, and responding to change over following a plan".

7 From spot to hub

In the transition from designing for people, to designing with people, institutions are a bigger obstacle than technology. Variety, density and continuous interaction may be success factors if you are a bacterium - but if one is running a business, a school, a research organisation, or a city, too much change wears you out. As any manager knows, you don't create a team just by locking a bunch of (probably incompatible) people together in a room. Getting teams actually to function effectively is another, much harder, matter.

Simply put, coordination is "the act of working together". Easily defined - harder to achieve. An interdisciplinary research area called coordination theory tries to understand what makes coordination work by drawing on such fields as computer science, organisation theory, operations research, economics, linguistics, and psychology. Coordination theory is beginning to help organisations address practical problems: "how can overall goals be subdivided into actions?"; "how can resources be allocated among different activities?" "what computer and communication tools could enable people to work together more effectively?"²⁵. The fact remains that we have not yet witnessed institutional innovation for the network age on the same scale as drove the industrial revolution. As John Seely Brown and Paul Duguid have noted, "...the incredible creative energies of the nineteenth century are evident less in industry, science or the arts than in new kinds of social institution that developed. Among these are the modern research university, the private research laboratory, the public library, the post office, the limited liability company, the modern business organisation, the modern government department, the union"²⁶.

In this historical context, the excited attention given recently "Social Network Analysis" is overdone, if not naive. At a conference on Computer Supported Collaborative Work, I heard someone say that "the field of communities is still quite new". That is simply nonsense. The importance of community may be new in computer science research – but, outside this academic enclave, philosophers and writers have reflected on the nature of people and their relationships in communities, for hundreds of years. If there is one lesson that stands out, it is that building trust takes time – a lesson that science seems to have rediscovered: the best social networks evolve slowly. According to Ilya Prigogine, the father of complexity theory, "if changes in one small area are too quickly communicated across a system as a whole, they would tend to be dampened out. New and dissenting ideas need time to accumulate evidence and argument"²⁷.

Flow conclusion

"What do I see when I think of History? I see the dance of the Big and the Small". Eugenio Barba, who runs the Odin Theatre in Denmark, describes our situation beautifully. There are

moments during this dance when we are swept along, he says, and others when we ourselves influence the course of time. "Small Histories are not merely portions of the Big one" says Barba; "Children who build a small dam on the margins of the current of a great river, who make a tiny pool in which to bathe and splash around, do not play in the rushing current, yet neither are they separated from the water flowing in the centre of the river. They create, along its banks, small inlets and unexpected habitats, thus passing to the future the marks of their difference"²⁸.

We've allowed too long in the idea that the world is 'out of control' – be it our cities, the economy, or technology. We've filled the world with complex systems and technologies - on top of the natural ones that were already here, and social/cultural systems ones that evolved over thousands of years – and these systems are indeed hard to understand, let alone shape, or re-direct. By their nature invisible, we have lacked mental models to make sense of the bigger picture.

But we're people, not ants. We have a culture, and language, and the ability to understand and share knowledge about abstract phenomena. Ants don't have that. Neither do they have a tool, design, with which to shape them. We do. The dance of the big and the small entails a new kind of design. It involves a new relationship between subject and object. It involves a commitment to think about the consequences of design actions before we take them. It is a state of mind - design mindfulness - that values place, time, and cultural difference.

This book will have done its job if it provokes you think about small design steps you might take - and right now. This book is about now-ism, not futurism. It's about here, and it's about now. Design a way to monitor the natural and industrial systems around you, and make them knowable to you and your colleagues. Design a way to close loops in the flows of matter and energy in your immediate surroundings. Design things to be closer together, in webs rather than in drawn-out chains. Design connections between you and new actors, knowledge, and disciplines. Design a new way to collaborate, and do projects. Design new questions, be critical of the status quo, can also be designed.

We are all designers now.

end

Flow. ("In the bubble." J.A. Thackara. Amsterdam 27 Feb 2004)

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