

2007

Governance of Information in a Globalized Economy

GOVERNANCE AS GARDENING

A REPORT OF THE
2007 RUESCHLIKON CONFERENCE ON INFORMATION POLICY
BY KENNETH NEIL CUKIER

THE RUESCHLIKON CONFERENCES 
ON INFORMATION POLICY IN THE NEW ECONOMY

IN COOPERATION WITH

 **Swiss Re**
 **Centre for Global Dialogue**

THE GOVERNANCE OF INFORMATION IN A GLOBAL ECONOMY

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Published in the United States of America in 2007

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THE GOVERNANCE OF INFORMATION IN A GLOBAL ECONOMY

“Who owns information?” was the wise question that the late Anne Wells Branscomb asked in 1993. Today, almost fifteen years later, the matter is timelier than ever. Traditional information governance through national laws is being supplemented and at times supplanted by private sector rules and new hybrid forms of co-regulation. Yet, even within organizations the capacity of the organization’s leadership to set rules and enforce them from the top down is undergoing fundamental changes as new forms of organizing information creation and production are gaining ground. The result is a growing variety of governance agents and processes.

This dynamic was the focus of the 2007 Rueschlikon Conference on Information Policy held at the Swiss Re Center for Global Dialogue from June 7 to 9, 2007. Thirty participants – leading business strategists, regulators and academics from around the world – debated for three days the salient issues of information governance in a global economy. This was the seventh conference in the series that Professor Lewis M. Branscomb and I founded in 2001, and which we co-chaired for six years. While Lewis has now formally taken on the role of co-chair emeritus and I have taken over the chairmanship, I am relieved and thrilled to know that Lewis has been continuing to play a role in guiding and shaping our discussions.

We are fortunate that Kenn Cukier, the author of this report, has once again excelled in providing us with a compelling narrative weaving together the strands of the discussion. Through his pen our collective ideas really shine. We thank him for his superb efforts.

I especially thank our partner Swiss Re for invaluable substantive, organizational and financial contributions to make this conference happen. Over the course of the Rueschlikon conferences Lewis and I had the pleasure of working with Dr. Fritz Gutbrodt, who headed the Rueschlikon Center. As he is concluding his role at Swiss Re and transitioning to his new role at Credit Suisse, Lewis and I and the entire Rueschlikon Conference community thank him for his enduring and steadfast support of our joint endeavor over the years. We welcome Dr. Annabelle Hett, the new head of the Center, and look forward to working with her in the years to come.

Viktor Mayer-Schönberger

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October 2007

GOVERNANCE AS GARDENING

EXECUTIVE SUMMARY

The basis of the information society, of course, is information. But as the quantity of data that is generated by businesses and individuals explodes, finding a way to protect it, share it, or manage it is fast becoming the central problem of our day. The issue of “information governance” is made more complicated because people and firms are collaborating and sharing information more than ever before. The approach to regulating the flow of data in the past – establishing formal policies – no longer works well, because the idea of the organization is also in the process of changing.

Firms are becoming more decentralized and open in order to be more efficient and innovative. New “production networks” are emerging, as companies interweave their services together, largely over the Internet. Meanwhile, individuals around the world are self-organizing into ad hoc groups to cooperate and produce serious economic goods, such as open-source software. These groups emerge and dissipate on the fly, are wholly transnational and the information is exchanged at the speed of light. It raises new questions for governments and regulators.

Taken together, these trends make information governance in the global economy a tricky endeavor. To better understand these issues, around 30 experts from industry, government and academia met at the seventh annual Rueschlikon Conference on Information Policy, founded by Lewis M. Branscomb and Viktor Mayer-Schönberger of Harvard University’s John F. Kennedy School of Government. The event was hosted at the Swiss Re Center for Global Dialogue in Rueschlikon, Switzerland on June 7-9, 2007. The report that follows, written by the conference rapporteur, Kenneth Neil Cukier of *The Economist*, is a critical synthesis of the discussions. Five key themes emerged:

- **New organizational forms** – *Individuals and firms are collaborating in new ways, since the Internet links people together at low cost and makes possible types of cooperation that were previously not feasible.* Things like “peer-production” (where people provide discrete contributions to jointly accomplish some task, such as write an online encyclopedia) are becoming a major form of social behavior on the web. Companies also are adopting more open and decentralized practices in order to harness the benefits, and collaborating with partners, suppliers and occasional rivals.

- **Information is currency** – *The way these organizations form, how they operate and what they accomplish depends on information. It is both an input and an output.* Often the information is more valuable when it is shared than hoarded, so individuals and firms

need to interact with others more than before. Innovation and value is coming from re-structuring information in new ways, by developing “information about information,” or “metadata.” This lets organizations re-wire their networks more easily to do new things; and it means the capacity to continually learn and change is critical.

- **Rules are emergent** – *As this happens in a global context, it is unclear who should set the rules or how they would be enforced.* In the past states regulated domestically, and international accords were sought. But because technology advances quickly, states cannot keep up. So new, non-governmental mechanisms and institutions to govern information globally are taking shape. As online communities evolve, they establish their own norms and practices: the rules are emergent. Ironically, the rules are shaped by the community, but the properties of those communities are shaped by the rules.

- **Innovation doesn’t evolve, it jumps** – *Technology progresses steadily, but innovation is unpredictable – it disrupts the environment.* This undermines the efforts by the state to control what happens over the new platforms, because it usually presumes an earlier set of technical assumptions that no longer apply (such as copyright laws designed for a “consumption culture” in the age of a “creation culture”). In the past, technical change led to periods of temporary instability, and rules were created for the long, stable stretches. However, today the Internet is an infrastructure for continual experimentation, suggesting that society may face constant instability.

- **Governance as gardening** – *The result is that both the state and private sector must recognize that rules governing information need to be set based on ever-changing circumstances.* Rather than something that can be known at the outset, implemented and followed with minor adjustments, regulation must constantly evolve, adapting to a new environment. In this respect, we need to think of information governance as “gardening” rather than “engineering.” This is not new in nature, but novel in scope and pace, for which today’s agents, mechanisms and institutions are unprepared.

This report does not try to answer the problems posed by the governance of information in the global economy, but highlight how complicated the issues are. As more economic activity takes place over networks, and more work is disaggregated and performed from numerous places around the world, the matter will only grow in importance and complexity. Unless addressed it could easily create tensions among companies and countries that escalate into a trade war. By better understanding the subject, we may be better prepared to devise solutions.

HEARD AT RUESGLIKON 2007

“Predicting how the system will evolve and change is very difficult, so we need to think of governance as gardening, not engineering.”

Philip Evans, Boston Consulting Group

“The purpose of the firm is to accelerate capacity-building by working with others, thus learning faster actually trumps intellectual property.”

John Seely Brown, Deloitte Touche; former director Xerox PARC

“Why are you able to move faster? You only do the really important part of the problem.”

Lewis M. Branscomb, Harvard's Kennedy School of Government

“There is a co-existence that we are experiencing and driving, between open innovation peer-production, and invention with intellectual property protection.”

Harriet Pearson, IBM

“What we are seeing are emergent structures and behaviors, rather than institutions emerging through design.”

Siobhan O'Mahony, University of California Davis

“Government mechanisms need to deal with these things: a slow creep and then the periodic meteor hits and creates a shift.”

David Clark, MIT

“We think of regulation as a construct of government, but it also is of culture.”

Joseph Albadef, Oracle

“The state is not so much incompetent as conservative.”

Yochai Benkler, Harvard Law School

“Sometimes a single bad rule is better than no rules.”

William Kovacic, U.S. Federal Trade Commission

“If we move from hierarchical to non-hierarchical models, what do we do with those who do not want to move into a more risky, less predictable world?”

Viktor Mayer-Schönberger, Harvard's Kennedy School of Government

“Innovation is essentially the instantiation of creativity and liberty.”

Andrew McLaughlin, Google

“We’re discussing 21st century problems with 20th century vocabulary.”

Ron Burt, University of Chicago

GOVERNANCE AS GARDENING: THE GOVERNANCE OF INFORMATION IN A GLOBAL ECONOMY

It used to be easy to spot an organization: it had lots of people, a big brick building, a bank account and articles of incorporation. Whether the Pennsylvania Railroad or a non-profit group like the Rotary Club, it was a rather physical thing. And the information it created and passed around was largely tangible too: thick ledgers, memos, minutes of meetings and receipts. In such a world, regulation was easy and it was obvious who ought do the regulating.

But today this has changed. Organizations, tied together via computers and the Internet, are now sometimes virtual rather than physical things. Companies have employees spread around the world interacting in teams – information is their currency. Moreover, private individuals share photos, music and musings. They collaborate online to write software code or dictionary entries that have serious social and economic value. And these same technical tools have infected traditional companies, who find they need to adopt more open practices to work with partners, suppliers and customers.

As a result, the flows of information have increased exponentially since the days when “the organization” was delineated on org-charts and engraved into the archway of buildings. New production networks are forming based on the exchange of information. These information flows happen at massive volume, instantaneously, among huge numbers of people and crisscross the world. That has made regulation much harder and more uncertain. Who should regulate what? When? And how? Rules on things like privacy, data-security and intellectual property are largely national, while business processes are inherently global.

These issues served as the basis of discussions for the seventh annual Rueschlikon Conference on Information Policy, founded by Lewis M. Branscomb and Viktor Mayer-Schönberger of Harvard University’s John F. Kennedy School of Government. Around 30 experts from industry, government and academia met at the Swiss Re Center for Global Dialogue in Rueschlikon, Switzerland on June 7-9, 2007 to consider the governance of information in a global economy. To encourage frank dialogue, the proceedings were not for attribution unless speakers gave their consent. This report is meant as a critical synthesis of the discussion, and is offered to the technology-policy community as a way to promote a better understanding of the subject.

The report is divided into five main sections. Part one considers the changes taking place in how organizations operate, how they form and their impact. The second section looks at the role that information plays in these new organizational forms. Section three examines organizational structure, to note that the network determines the rules, which in turns shapes the network. Section four identifies different mechanisms that are emerging to govern information flows – they are “regulatory,” but not in the way that we are used to thinking about regulation (and we use a broad meaning of the term: formal rules within an organization or jurisdiction that constrain behavior). The final section considers the interplay of classic regulation on new organizational networks and suggests new ways to think about how enlightened governance might work. The report concludes that tensions are inherent between innovation (which requires variation, openness and change) and governance (which seeks certainty, delineations and adherence). Yet these tensions are capable of being managed, and need not stall the networked economy.

In this, the report analyzes the issue rather than recommends solutions. This represents a departure from previous Rueschlikon conferences. In the past, specific policy proposals tended to emerge from a general consensus among participants. Often this happened following a copious examination of the scholarship on the theme. However, the situation this year is different because the changes taking place in the nature of organizations are so new. This report therefore has a more modest goal: to introduce a major issue that is starting to take form, which deserves serious attention by industry, government and academia.

If a policy recommendation were to emerge from this year’s conference, it would be this: “Predicting how the system will evolve and change is very difficult, so we need to think of governance as gardening not engineering,” (in the words of one participant). That is to say, one’s responses must emerge based on constantly evolving circumstances, rather like tending a vegetable path, not something that is determined from the outset, such as designing a semiconductor or a suspension-bridge. The metaphor of gardening was swiftly seized and expanded upon by attendees – and so serves as a fitting title for this report.

Ultimately, the governance of information is changing from a state-based, territorial-bound mechanism that is welded to a hierarchical organizational structure, to a new system that depends both on non-state actors and decentralized, “networked” processes. The open interactions among people and firms

have led to more productivity and innovation. It is hard to imagine how today's global economy could function without these spontaneous, ad hoc relationships that wax and wane like phases of the moon.

As such, organizations are developing their own rules for how they handle information to serve their interests – a tricky thing in an environment where sharing information is increasingly a source of competitive advantage as well as a great vulnerability. And just as firms and groups of all forms are coming to grips with this, regulators are becoming aware of the issue and raising concerns. Are they not being “disintermediated” – or so they fear – like “old economy” companies of yore?

What is certain is that unless the matter is better understood on all sides, a clash is inevitable that could hold back the potential of the new networked economy. This report, then, is meant not as an answer to the challenges, but as a roadmap for how to think about them.

I. THE NEW ORGANIZATIONAL MAN

New forms of organizations are emerging, influencing how individuals interact and how businesses work

In 2001 two entrepreneurs in different European countries tried to launch a new venture together. Fresh from their success creating a peer-to-peer (P2P) file-sharing system called KaZaA, in which people could swap images, video and music (thus unleashing massive copyright infringement), they were dismayed by the high phone charges and poor performance of existing voice over Internet (VOIP) software.

“With programmers in Estonia and Friis in Copenhagen and me in Stockholm, we wanted to use VOIP to communicate. But it didn’t work. The existing technology was centralized. It replicated the traditional phone system in an Internet environment and did not work very well,” explained Niklas Zennström. So they decided to apply the same P2P concepts to a phone service. And thus Skype was born. In 2005 the company that Mr Zennström and Janus Friis founded was acquired by eBay for over \$2.6 billion.

Over time Skype let people not just talk for free, but exchange files, schedules and the like. The system relies on openness and sharing: the basic software is free, certain users serve as “supernodes” to route traffic, and the Internet provides the common platform. The company has enabled people and companies to communicate and collaborate in ways that were impossible, or at least prohibitively expensive, just a few years ago.

Skype is both an embodiment of, and catalyst for, the new forms of production networks that are emerging. It allows information to be exchanged in faster, less expensive ways, which increases productivity and efficiency. It has given rise to “virtual companies” that coordinate employees spread around the world. Fittingly, all this was established by a firm that was itself highly distributed. Skype is one of the tools that are creating new organizational forms.

Information is the lifeblood of these new organizations. Consider the case of the Austrian company NewLogic Technologies. The firm designs micro-processor chips for Bluetooth wireless communications. But it has a novel business model: it doesn’t make the chips. Instead, it develops the designs and licenses them to semiconductor foundries, who press them into silicon and

sell them. The “product” of the company and its “value” is entirely intangible, not physical.

Of course, information has been the backbone of business since the first drachma was exchanged at the agora – that is nothing new. What makes NewLogic’s business model interesting is that the firm doesn’t rely on intellectual property protection. It holds fewer than ten patents, mainly to motivate engineers or for defensive purposes, and never enforced against others. Where in the past, high-tech firms depended on government to protect their information flows, such as through patent law, NewLogic is emblematic of a different model that is emerging.

Speed-to-market is the decisive factor. “Knowledge in our business has two eyes, two ears – and also two legs!” says Hans-Peter Metzler, the president. “Time in this case is a friend and not just an enemy. It takes five to six years to go to scale. If the guy in the fab steals our design, it’s six years old, so I don’t care.”

“We give free downloads of the technology on the web. We have to create friends in the community; our clients are the engineers of the big companies. Our interest is to spread this thing like a virus,” he said. In 2005, Wipro, an Indian IT services company, acquired NewLogic. “They wanted to understand our business model and how to engage in a product business without producing something,” Mr. Metzler explained. In other words, the firm is a completely informational company; it produces knowledge and earns income from it in an untraditional way. How it controls the flow of information – by being open rather than closed – is critical. New logic, indeed.

On the surface, the two companies would seem to have very little in common. But looking deeper, both are virtual enterprises whose businesses are information. “A chipless chip company and phoneless phone company” in the words of Kevin Werbach of the University of Pennsylvania’s Wharton School. In the past, companies in the telecoms or semiconductor industries were measured by their physical assets: miles of fiber cables or factory output. Employees gathered in tall buildings. But today, firms like Skype and NewLogic show that companies can operate in a geographically distributed manner, and their “work” is how they manage information.

The 20th century economist Ronald Coase identified “transactions costs” to describe why a firm would handle something internally or turn to an outside

supplier. But in today's economy, as the amount of knowledge and its importance has increased while the cost of exchanging that information has plummeted, firms are able to go beyond their borders to be efficient and productive. The transaction costs associated with exchanging information are so low that what was once done internally to the firm can now be achieved outside it. Hence, trends like outsourcing business processes or writing free software are becoming mainstays of economic activity.

Importantly, this approach did not take shape by design. No omniscient being or slick CEO decided it was a sensible alternative and mandated it down the ranks. Instead it emerged organically through the interactions of people and companies. It also was a response to the problems they faced. In a situation where young firms lack capital, they tend to band together and cooperate to grow. Similarly, it was a response to their environment. The tools were available that made collaboration easier. "One input to future production is information," explains Ed Felten of Princeton University. "Its quantity is increasing exponentially and its price is decreasing exponentially, is basically zero."

The most significant place where these forms of cooperation are taking place are not in companies but among private individuals. It goes by names like "peer-production" or "social-production." The very titles of recent books on the theme evoke the trend: "Swarm Creativity"; "The Wisdom of Crowds"; "Democratizing Innovation"; "The Wealth of Networks" and "Wikinomics". *Wired* magazine coined the term "crowdsourcing." More generally, Andrew McLaughlin of Google calls it a transformation from a "consumption culture" to a "creation culture." The effects on the economy, not to mention politics and social justice, are extraordinary, believes Yochai Benkler of Harvard Law School (an examination of why appears in Section Three).

New forms of ad hoc collaboration are happening in many places. It is starting to become so much the norm that some people fail to see, or disremember, just how startling it is. For example, when Professor Benkler published an essay called "Sharing Nicely" about the importance of peer-production in 2004, *The Economist* gently suggested he over-egged the pudding. By 2006 when his book "The Wealth of Networks" appeared, *Time* magazine would publish "You" on the cover of its annual "Person of the Year" issue, cementing the idea of user-generated content and peer-production as a mainstay of society. Today, open-source software and Wikipedia do not

seem like quaint outliers of the networked economy, but simply the first places where social production is taking hold.

This is not to say that the new organizational forms will overtake classic approaches to production – far from it; only that it is becoming a mainstream feature of the networked economy. Yet for a “creation culture” to flourish, it requires new processes for information governance. Notably, it thrives with a far looser approach to intellectual property. In the new production networks that are emerging, information exchange is not a byproduct but an input. Greater openness leads to more efficiency and innovation, since it can tap into more resources and attract more ideas from outside the organization. How these groups govern themselves and the information they generate and share is critical to their success or failure. And just as individuals are collaborating in new ways – particularly in ways outside the marketplace – so too many companies are organizing themselves differently to take advantage of new approaches to information flows.

Strikingly, many companies are adopting these new organizational forms faster than regulators can react. That Skype might do so is understandable; it is easy to innovate as a start-up. But for a large company to experience these changes is more substantial. In the case of IBM, it is both undergoing and driving the changes. “Companies are moving from vertically-integrated to globally-integrated enterprises,” says Harriet Pearson of IBM. As an IT services firm working with major multinationals companies, it is well-placed to see the changes talking place. Yet as one of the world’s biggest companies itself, it is transforming how it operates too.

Like many executives at large companies these days, Ms, Pearson manages teams that are located on different continents. They collaborate in real-time (seeing who is online via instant messaging) and hand off work when one time-zone leaves the office and another begins the day. “The information we share is global,” she says. And her situation is hardly unique at IBM. “Multiply the number of work teams by thousands and you can see the data flows of that. Take that, and globalize it.”

Suddenly, information that once resided in a single server and was accessed by people in the same jurisdiction is scattered around the world. A small tweak by a colleague in Singapore might trigger the EU data-protection rules. “And that is only intra-firm, not eco-system wide,” she notes. Add the large number

of business partners around the world and the problem multiplies further. And with business-process outsourcing, the issue becomes trickier still.

Regulations over information that are national or regional suddenly seem parochial and ill-suited to the way firms conduct business. So companies need to set their own policies worldwide, sometimes deferring to certain jurisdictions – such as EU rules, even if imperfect for the circumstances – as a way to minimize risk. The technical tools to do this are embryonic (though constitute a growing commercial market) and new institutions and mechanisms are needed. Furthermore, information governance tools must interoperate among firms. “Who enforces it in a global context? We need to find a way to do this.” Ms. Pearson says.

This would be challenging enough, but at the same time as companies need to establish policies on information governance that apply throughout the firm (which would seem to call for centralized control), the structure of the organization is changing for efficiency’s sake to one that is decentralized. “Hierarchical control does not work any more,” noted Sachio Semmoto, the founder of numerous major Japanese telecoms ventures including KDDI, eAccess and eMobile. “Agility is more important than size,” he explained. In fact, sometimes a smaller size is advantageous, by permitting firms to specialize, observed Professor Branscomb. “Why are you able to move faster? You only do the really important part of the problem,” he said.

To be sure, a complete shift towards decentralization is far from happening, nor might it even be desirable. Mr. Zennström of Skype conceded that the co-founders are moving to a slightly more centralized and closed model with their new online television venture, Joost (a hybrid system whereby the logic is centralized but the file-transfer is P2P). Ms. Pearson of IBM referred to it as a “co-existence” between open-innovation, peer-production processes on one side and classic invention with intellectual property protections on the other. “It is the same with methods of organizing,” she says, “there is a place for hierarchy and a place not for it.”

What we ought to aim for are networks, institutions and mechanisms that find the right balance. Or, as Professor Benkler described it: “Closed enough to be effective; loose enough to be innovative.”

II. THE META METAMORPHOSE

Social ties are at the heart of the digital networks, where exchanging “information about information” is paramount

So what lies behind the decentralization of organizations? What forces are at work? Were it simply a matter of black-magic, there would be no way that companies or online groups could foster ad hoc collaboration other than by magic potions and prayer. But in recent years, based on the experience of online communities, open-source software projects, social-networking studies of companies and the like, a number of principles have emerged. They help explain the role of information flows in the nature of organizations.

“As we flatten the organization, we rely more on informal coordination,” explains Ron Burt of the University of Chicago Graduate School of Business. Relationships become vitally important and reputation is critical. Thus, information flows are a determining factor. What this points to is that the links are more important than the nodes, he explains. In other words, we all might do well to swallow a slice of humble pie: the attributes of individuals themselves are less significant than the structure of their relationships to others. The old saying “we are what we eat” needs to be refreshed: “we are who we meet.”

To understand how these sorts of social ties work in practice, consider the situation of investment bankers and their annual performance reviews. Investment banking is an industry in which 85% of the staff that people work with each year are new. In such circumstances, it might seem difficult to know how people perform; there is little information to go on. But in fact, just the opposite is true. Reputations follow people everywhere.

“They live like a swarm of gnats in a pond, in a world of chaos. But their reputations do not bounce around; it is stable year on year,” notes Professor Burt. “They are not reacting to human capital at all, but to the stories they hear from those doing the ratings,” he adds. In other words, gossip about people is more important than direct knowledge of working with them. “It’s not about the accuracy of the information, but how the information brings us together,” says Professor Burt. “It is not *your* reputation – the pronouns are wrong. It’s not about *you*,” he says. “You’re just the guy who takes a beating if things go wrong.”

This might be surprising – and a little disheartening. Shouldn't the empirical facts about a person be more important than hearsay? Perhaps. But it is not so shocking to see the “shortcuts” we all take, as anyone who has reviewed a job applicant or sat on a prize committee can attest. The prattle that is said about people matter a lot. Professor Burt's data represents a dual edged-sword: though gossip can hurt us, the network is also the decisive factor that helps us.

In studies of bankers' pay, bank analysts' peer-awards, and early promotion in business, one's network explained around 50%-65% of the variance, above other factors like job rank, age, sex and geography. Note that it did not account for these things outright but did explain the variance. This may be cause for optimism. Because in our lives many of the biggest things hinge on a narrow margin, the little extra that the network brings can be the determinant for success.

If social ties are so important, then it is critical to devise mechanisms and institutions for information to flow smoothly. Many of these things exist offline, from the annual performance reviews to the lunchroom canteen that brings all employees together. But these tools need to be recreated in an online setting. So things like eBay's reputation system emerges, as do websites like “Don't Date Him Girl” (at www.dontdatehimgirl.com). It is a way to create online the sort of information-exchange that happens in the real world all the time. But the technical tools to do this must be created. One variant of this sort of “regulatory” mechanism is TRUSTe, for web privacy. And the open-source software community has experimented with different “governance” forms to aid their processes. (These mechanisms are more fully considered in Section Four.)

Moreover, it points to one of the dominant trends in the current iteration of the Internet economy: information about information can be more valuable than the underlying information itself. For instance, eBay's reputation rankings are built up over time, based on the transaction history of users. The site's true service is not simply to put buyers and sellers in contact – any marketplace does that – but does so in a way that there is a degree of trust that the parties won't be defrauded. Likewise, Google scans the web for all the information on web sites – just as we could do ourselves if we had the time. It is not the source of any of the information itself. But by providing information about the information – what is most relevant to our query, second most relevant, third most, and so on – Google makes the Web usable.

The notion of information about information is called “meta-data”; that is, moving something up to a higher-level of structure or abstraction. (The Greek prefix “meta” means “after” or “beyond.”) Professor Mayer-Schönberger noted that it is a lens into understanding the power of many Internet companies such as Google, eBay, social-networking sites and the like. Metadata takes the flotsam and jetsam of online content and structures it so it is useful.

Philip Evans of the Boston Consulting Group points out that the “meta” concept underpins many areas in the networked economy, such as Amazon’s product referrals (“people who bought this book also bought...”), and digital-certificate authorities like VeriSign (which vouch for a website’s identity independent of whether it is trustworthy or not). Likewise, the online trust-seal TRUSTe represents metadata at work. The idea is becoming generalized as a foundation of new technology firms. As a cover-story of *Technology Review* magazine in January 2007 snappily put it: “Anything You Can Do, I Can Do Meta.”

The exchange of information also explains how organizations operate, and specifically, how innovation happens. Professor Burt presented two forms of leadership: Robert and James. Many Rueschlikon participants met them at the 2006 conference, but in fact we have known them all our lives since they exist in every organization, be it a multinational corporation or a church choir committee. They both have a similar number of relationships, but they differ in where they draw their contacts from.

James’s ties are all like him. He excels at driving variation out. He knows how things are done, and can hone it to perfection. On the other hand, Robert sees variation, diversity, novelty. He knows they do it differently – another way – somewhere else. He brings in variation, so there is “a higher risk of good ideas,” says Professor Burt. The Jameses and Roberts of the world are always ready to strangle one another, since their contributions are so diametrically opposed: optimization versus innovation. But the Roberts get higher performance reviews and higher salaries.

“The value-proposition now is people breaking out of their own silos,” explains Professor Burt. And the way to do that is through a loose, porous, distributed network. Thus “openness” in a corporate setting is an essential ingredient to success.

The smooth transfer of knowledge among business partners due to this spirit of openness is giving birth to new “process networks” or “creation networks,”

believes John Seely Brown, the co-chairman of a research center at Deloitte Touche, who previously directed the legendary IT lab Xerox PARC. By organizing the information flows in the right way, organizations “get the effect of scale but without mass or inertia.” He offers three examples: motorcycles built in China, supply-chain management in Asia and mobile phone production in Taiwan. In each case, the businesses became more competitive and productive through informational relationships outside of the firm rather than by crafting things within it.

Consider motorcycles. In the early 1990s, Honda, Suzuki and Yamaha moved their factories from Japan to Chongqing, in the Sichuan Province in south-central China, by partnering with state-owned enterprises. In the late 1990s one firm broke out of the state-system and became a private company. It chose to compete differently. Instead of developing the designs and foisting it on suppliers to build to order, it did the opposite: it brought firms together to negotiate what to build and how each piece would fit with the others.

Modularity makes the difference. A motorcycle has four principle parts that need only minimally to interact: the frame, the engine, the suspension and the fairing/cowling. Bringing the suppliers together enabled them to discuss how they could go about building each module. They would informally reach agreement on what each can do well or not do well, propose the designs and then fit it all together – a bottom-up process, not a top-down process. An eco-system. “This process produced a \$200 motorcycle whereas Honda’s costs \$700 – a big price savings. These people now supply 50% of the motorcycles in the world and took Honda’s position in Vietnam from 90% to 30% market share,” explained Dr. Brown. The key was that they “modularized” the architecture; the designs were collectively approved and subsystem suppliers recruited.

A second example is Li & Fung, the paragon of the “Asian trading house” that for generations has managed suppliers around the world, mainly in the apparel industry where margins are thin and so performance is critical. Dr. Brown refers to the firm as a “process orchestrator.” The label fits. “They own nothing; they do the logistics. They define and customize the production process,” Dr. Brown says. Li & Fung works with 10,000 suppliers in 48 countries to source materials and makers for clients. So a fabric from India that gets dyed in China, will go to Thailand to be embroidered (with sequins made in Korea and rhinestones from Brazil), and then return to China to be cut and sown into garments.

The firm adheres to a “30/30” principle: it guarantees that it will purchase at least 30% of the business from each supplier, but will not exceed 70%. This ensures that no one in the network is captive, and also that knowledge and learning permeates throughout the system. It is also an incentive for developing trust. And it requires that suppliers have to go outside the network in order to survive – and thus be in a position to bring in new ideas from the outside. The results are impressive. In terms of asset productivity, Li & Fung earns a 30%-50% return on equity. Regarding personnel productivity, it earned \$1 million per employee per year. And it scales elegantly: the firm took in \$11 billion in 2004.

A similar situation exists for mobile phones in Taiwan and China among original design manufacturer (ODM) firms. The product is highly technical, innovation happens fast, and there are many different parts which each requires specialization. To build a phone, half a dozen ecosystems must come together, and they have to time their innovations in parallel.

These three examples of “process networks” share a number of characteristics that underscore how new information flows grease the gears of modern business. First, there is a loose coupling between the nodes or players. Second, the rapport is relational, not transactional. Third, trust is developed and grows over time. Fourth, there is ever-changing specialization for distinct contributions. Lastly, although cooperation is at the core, there is a form of competition in the form of “productive friction” among parties.

So what enables friction to become productive besides trust? One thing is the ability to mobilize people quickly. Next are clear targets, performance metrics and a focus on concrete action points. Also, the experience of interacting with each other; relationships.

The result is that a shift is taking place from “stocks” to “flows,” says Dr. Brown. Think of it like stored energy versus released energy. For example, patents are stocks; knowledge is a flow. Or, in Professor Burt’s example of performance reviews, “job rank” is a stock, and “gossip” is a flow. Just as a principle underlying the banking system is the “multiplier effect” – a single dollar saved actually loops through the economy a dozen times – a similar sort of “multiplier effect” is happening with knowledge. What is forming is a “dynacoscism,” a term coined by Dr. Brown and his colleagues John Hagel and Lang Davison to describe an ever-changing system where the flow of knowledge accelerates learning.

This strikes to the heart of what is the purpose of “The Firm.” Coase’s companies epitomized mid-20th century capitalism. In fact, as a professor at the University of Chicago, he did his research in the environment that surrounded him, the Midwest, talking to farming companies and manufacturers. The service sectors where information plays a big role like Wall Street, Madison Avenue and Times Square, were not as omnipresent as railroad cars and grain elevators. Information and transaction costs are important for all types of businesses, but they are applied differently depending on the sector. Were Coase to investigate “information-rich” industries of the 21st century, from biotechnology to software development, he might be compelled to enrich his argument to account for the flow of ideas.

This is because today, the virtual company means that information is not just a byproduct of the business but possibly where most of its value resides. The organizational form that a company adopts affects its success. “The purpose of the firm is to accelerate capacity-building by working with others,” explains Dr Brown, “thus learning faster actually trumps intellectual property.” But for all these good things to accrue, the right “governance” structure needs to be in place.

III. STANDING ON THE SHOULDERS OF LILLIPUTIANS

The network's design affects what happens atop it and vice-versa; rules are emergent but values are at stake

To appreciate the changes that the Internet hath wrought, consider the plight and promise of Mr. McLaughlin of Google. “As a teenager, I couldn’t share things with a world audience, get on TV, on radio or in the newspapers. Now I can,” he gushes. Yet it is not vainglory that inspires him, but what the technology can mean for the everyman. As much as 57% of teenagers in the US have created something and posted it online, according to a study in 2005 by the Pew Internet & American Life Project. Content creation and sharing, Mr. McLaughlin notes “is now the default for anyone with a computer.”

On an individual level, the changes are impressive. But when aggregated, something special starts to happen. Consider the area of supercomputing. In the past, it was the purview of large companies and governments. The machines were big and costly. Yet in recent years, many PC owners have downloaded software to process data when the computer is otherwise idle, to do tasks like look for extraterrestrial life in the universe or decode the SARS virus. Combined, these surplus cycles amount to more processing power than the world’s most advanced supercomputers developed by IBM or NEC. By themselves, the contributions mean so little they are not worth remunerating – so they are given away as a gift. But amalgamated, it is massive. However, it works provided that the mechanism to share the capacity easily exists.

A second example is media broadcasting. To run a television or radio station in the past required owning a broadcast license. This, in turn, assuredly required lawyers and lobbyists to secure. Added to this was a need for pricy transmitters to beam the signal. Thus, the high costs associated with obtaining the license and equipment essentially guaranteed that stations would be commercial concerns rather than non-profit activities. And as a result, the access to communicate ideas to a large swath of the public was the reserve of a few, wealthy individuals: station owners. In other words, the state of the technology determined the economic model, which in turn determined political discourse. But the information revolution taking place changes all this. Inexpensive computers and Internet bandwidth have become the common platform by which individuals can broadcast ideas to others at low cost – with the same potential reach as corporate radio and television stations.

“The most advanced tools in the most advanced economies are almost all distributed; the practical capacity to act is now located around the world by billions of people,” enthuses Professor Benkler. But platforms and tools are necessary to make this sharing possible. As such, attention turns to how to construct these “cooperation platforms” for people to be motivated, committed and capable of communicating. Moreover, many of the rules that cover information flows and organizational structure may need to be revised. For instance, intellectual property laws beg to be reformed for an environment where information can be created, sent and shared at far less cost. Today’s rules presume the cost is high and that the teenage Andrew McLaughlins of the world are passive recipients of information rather than generators and processors of it.

Yet once provided the platform and tools to dramatically simplify cooperation, many of the economic, social and legal presumptions change. Collaboration among individuals outside of the “market” (ie, financially motivated and remunerated) for certain things can be the norm rather than the exception. “A whole class of actions move from being at the periphery of the economy to the very core of the economy,” Professor Benkler says. “In the past, people lived in structures optimized for rational selfish actors that constrained the capacity of people to organize in cooperative networks. What we’re seeing now are people developing structures that allow them to collaborate.”

So once the tools and the rules come together, collaboration and economic production may emerge. The motivations that bring people to form such coalitions may be different yet they are able to interact for a common purpose, explains Joi Ito, a new media guru (whose activities include entrepreneur, venture capitalist, chairman of Creative Commons, board member of ICANN and “guild custodian” of the World of Warcraft guild “We Know”). “Everyone has their own particular goal, but no one is optimizing the whole organization,” he says. Moreover, the “community” is becoming an asset in itself, with its own value. But getting these new kinds of collaborations to flourish is not easy.

For instance, in 2000 an entrepreneur in Florida named Jimmy Wales tried to create an online encyclopedia written by Internet users. All they needed to do was write an entry and it would be emailed to experts who agreed to vet it and, if all looked fine, would permit it to be posted. After a year, only two dozen entries were online. Dismayed, he and a partner, Larry Sanger, decided to change tack and use “wiki” software, which simplified the process of contributing and

enabled entries to be enriched and edited easily. As for the rules, Messrs Wales and Sanger decided to throw out the cumbersome organizational structure and let the contributors police themselves. Together, the new tools and lax rules created a holy mess. But such openness paid off. After 15 days the site had 600 articles; six months later it had 6,000; by year's end it totaled 20,000 articles in a plethora of languages. Wikipedia was born.

One of the most important facets of the new collaboration that is taking place is that the contributors do it for love, not money. They enjoy the activity. In most instances, save for major open-source software projects, no one pays them to “work” and “create.” Mr. Ondrejka of Linden Lab's Second Life referred to the phenomenon as “innovation as fun.” Dr. Brown noted that the idea that productivity and play can be intertwined is crucial: after all, the term “recreation” is etymologically “re-creation.” But what is essential is that both the tools and rules need to foster coordination and collaboration.

Getting the structure of the organization right is especially difficult because the governance system is emergent: it evolves from the circumstances in which it exists. Moreover, as it takes form, the network itself is fluid, like Heraclites's stream. “The way we create the game determines the shape of the network and the network determines how we play the game – it is a feedback loop,” explains Mr. Evans of BCG. “The topology of the network is an output as well as a determinant.”

As a result, the network “wiring” is important (how people are connected). But so is the organization's capacity to “re-wire” (the flexibility to change these ties). Virtual networks have the luxury of being able to change more easily than physical networks, just as metadata can transform more fluidly than the underlying information. What happens over networks is influenced by the structure that the networks take, just as content follows form.

To understand how, consider basic network theory, with two game-playing strategies. One is to connect to people like yourself, called “homophily.” The other is to connect to the most connected people, called “preferential attachment.” Homophilial networks have clusters without hubs – everyone is intertwined with someone, but no one centrally connects most of them. Meanwhile, preferentially-attached networks have hubs without clusters – everyone is connected via a few dominant people. From this come power-law structures: a rigorous winner-take-all hierarchy, such as the popularity of websites, blogs

and even transactions among players in Second Life, the online virtual world (or “metaverse”).

Thus, for example, at the turn of the century AT&T would emerge as the dominant force in communications by being able to link more people together (a preferentially-attached network). In contrast, building a data-network among a handful of university computer-lab administrators in the early 1970s entails many interconnections but no dominant entities (a homophilial network). The benefit of the homophilial network is that information passes easily because it is comprised of like-minded people, such as the best and the brightest surrounding John F. Kennedy; the potential drawback is groupthink (as the young president found out). Meanwhile, the preferentially-attached network is egalitarian in opportunity but elitist in outcome. The asymmetry is like capitalism itself: all have a chance to dominate but in practice very few do. There are a paucity of hubs and a plethora of spokes.

However, when these two forms of networks combine, the structure changes: it becomes modular. Because it exhibits both clusters and hubs, it is integrated as well as separable. So it is possible to cleave off certain parts into stand-alone units that can be reintegrated easily into the whole. Thus, different groups can meet in a tea house in southern China and negotiate how to build one part of a motorcycle, and later fit them together with parts by other suppliers (as Dr. Brown described it). Or, Taiwanese tech firms can specialize in different areas yet it can all be brought together in a single product.

Modularity helps explain the rise of openness in business, and vice versa. The two are emergent, as both an input and a determinant. Viewed in this way, the process by which open-source software is created does not seem such a mystery. Professor Benkler and others have written about how it is possible because, among other things, the transaction costs of contributions are low. What makes this so is the software code’s modularity.

For example, when the code to what became the Firefox browser was first released to the developer community in March 1998 it sat almost untouched because it was tightly integrated; a change in one file required a tweak to many others. By re-architecting the code so that it was more modular, the number of ancillary files that needed to be modified fell from 17% to 3%, according to data Mr Evans presented at the 2006 Rueschlikon conference on innovative entrepreneurship. At this year’s event, Mr Evans produced network maps and statistical charts that demonstrated the modular collaboration patterns of Linux

kernel programmers, showing the relationships to be both highly distributed and tightly clustered.

What are the characteristics of the environment that produces this type of organization? Many factors are at play. There is an increasing irrelevance of “distance” and “bandwidth” constraints, and openness means a general absence (or at least reduction) in the number of possible “choke points” that hinder development. Furthermore, when information is the chief unit of production, there is a focus on transaction costs rather than the “transformation costs” that characterize physical objects. Moreover, there is a special importance of “option value,” that is, the number of possible choices to handle situations of uncertainty. Furthermore, there is a shift in the unit of “agency” from the organization per se, to the individuals that comprise it.

As the walls of the firm break down, and it begins to meld with the environment it is in, some unique things begin to take shape. There is a merger of “strategy” (that exists outside the firm) and “organization” (that happens within it). The two ideas become somewhat the same thing now, because they both set the rules for autonomous agents. Inter-organizational networks start to become similar to intra-organizational networks, and “brokerage,” the ability to govern information flows, is paramount. As Professor Benkler put it: “The authority to act moves to where the capacity to act resides. This entails new threats, new models of coordination and the permeability of the boundary of the firm for what is inside and outside.”

This decentralization means less control, but also greater efficiency. In such a situation, collaboration and competition can exist simultaneously. (It is familiar to those in the networked ecosystem of Silicon Valley, where firms have long described their business relationships as “coompetition,” and respectfully considered their business partners to be “frenemies.”) At the same time, the concept of “power” and “organization” cannot be presumed, nor can the boundaries of the team, organization, or jurisdiction. “We engage with each other with a set of rules and what emerges is a set of collective behavior, and it is shaped and constricted by the network,” Mr. Evans says.

How governance emerges in this environment is striking. On the surface, it simply appears that people cooperate and collaborate in new ways. Looking deeper, however, the modularity of the network has a lot to do with it. But this modularity did not happen by accident. It was designed into the system

from the outset. A prime mover was at play in the architecture of the Internet; a ghost in the machine. The result is that the network is “re-wireable.” It is virtual rather than physical, after all, so changes are more easy to make. Yet more importantly, it was built with modularity in mind, and thus is inherently adaptable. Just as the idea of metadata suggests that there are alternative ways to view the same underlying information, so too the idea of a re-wireable network means that regulation can be emergent from within the group.

The place where this sort of emergent regulation is best seen is in the history of Internet governance. For instance, the rules for the Internet’s infrastructure coordination were handled for decades from within the “Internet community” of academic researchers, small Internet service providers and IT companies. They addressed problems as they arose, rather than dictated rules in advance. Ultimately, there was no formal authority; the Internet was built on a spirit of cooperation and trust. Different mechanisms of “governance” emerged – intermediaries such as the IAB, IANA and the Internet Society, and in the past decade, ICANN. Yet it was the design of the network, and the values it enshrined, that let this emergent regulation flourish.

The most distinctive feature of the Internet is its decentralized and distributed nature. This is due to the specific engineering decisions of its founders. As a platform, the Internet was designed so that it could exercise as little control as possible, by dint of its “end-to-end” (E2E) architecture. The E2E principle refers to the idea that nodes on the Internet can communicate with each other in as autonomous and direct a manner as possible, rather than having to pass through a central control point that might dictate the terms (be as a censor or toll booth). As a platform, the Internet allows for the free-flow of information, just as Dr. Burt’s investment bankers easily exchange gossip, Professor Benkler’s open-source adherents smoothly collaborate, Dr. Brown’s motorcycle-part suppliers integrate innovations in teahouses in China and Mr. Evan’s modular network permits rules to emerge.

The E2E principle was articulated in the early 1980s by David Clark of MIT. At the Rueschlikon Conference, Dr. Clark posited what “responsibility” the architecture of the network ought to have regarding governance, if any at all? What role should the infrastructure play, from technical to organizational – and who should run these support infrastructures? It is probably impossible to say what the mechanisms and agents are, Dr. Clark submitted, considering

that new mechanisms and agents constantly emerge, as the network's infrastructure and usage undergo continual change.

"The Internet, as a coherent entity, does not exist," Dr. Clark stated. By this, he meant the Internet is not a discrete, homogenous entity – there are no "rules" enshrined behind glass cases or cops to arrest transgressors. As a result, when problems arise such as spam, identity-theft or hacking, there is little "the Internet" itself can do about it. It is up to the end-nodes – the PCs or office-routers that are connected to the network – to take corrective steps, such as employing spam filter software and the like. This is due to the E2E design. "The platform nature of this technology allows recombination at all layers," Dr. Clark said. By pushing out control from the core to the end points, the "constraints" of communicating via the Internet is essentially opt-in, and there is "peer-production of the experience and the context," not just the information that rides atop the network.

What this may lead to are self-governing online communities. "If you had a system of mutual opt-in, that would be an interesting alternative to mandatory regimes, so long as there was information symmetry," said Dr. Clark. Indeed, the idea of bypassing "traditional sovereigns" as a more effective way to govern information flows (specifically spam, privacy and network security) found early advocates in "The Accountable Net: Peer Production of Internet Governance" by David R. Johnson, Susan P. Crawford and John G. Palfrey Jr. For the moment, however, states are not willing to hand the responsibility to others, since it seems an admission of impotence.

On a technical level, tussles over control are inevitable. One should allow for that. "But you can tilt the playing field," Dr. Clark explained, by designing the "platform" approach into the very infrastructure. So where there may be a point of control, such as "deep-packet inspection" by routers, that examine the contents of traffic flows, the end-points can fight back with "deep-packet encryption" that scrambles the contents so only the sender and recipient can read it.

Thus, governance is both harder and easier. It is harder because there is no centralization. Yet it is easier in that there can be governance mechanisms at different competing platforms or layers of the system. In other words, if you cannot solve spam at the physical transport layer (say, through routers identifying spam-originating IP addresses) then you can try to do it at the application layer

(via anti-spam software on a PC). The result of maintaining the E2E principle, then, is that there is “platform thinking” at all layers. There is little “central” control – but lots of minor points of control in the hands of the users themselves. As an old computer science adage goes: “there is no problem we cannot solve with a layer of indirection.”

Dr. Clark’s “layer of indirection” is akin to the theme of “metadata” (that was discussed in the previous section). Likewise, Dr. Clark believes that in the future, the fights will be at higher levels than the base-line infrastructure itself. Not just “who will control your identity?” but the metadata as well: “Who will control (knowledge of) your reputation? Who will control (knowledge of) your location?” The problem with an environment in which the network and the rules are emergent is that new tensions can arise all the time from any quarter.

Issues such as these cannot be answered easily, because they raise complicated questions of normative values, explained Urs Gasser of the University of St. Gallen in Switzerland. So even when we try to develop as neutral a platform as possible, and permit self-determination in the governance mechanisms, we are still stuck with rule-making, politics and tradeoffs. How to mediate these requires balancing the interests of stakeholders.

IV. THE GAME OF THE RULES

New mechanisms to govern information are emerging – “regulation,” of sorts

The Czech novelist Milan Kundera often refers to the “terminal paradox” of life. We are forced to make decisions that effect what course our lives take, never knowing whether they are the best ones or not – and by the time we find out, our lives are over, so the whole thing was meaningless, or at least a bit absurd. Likewise, there is a paradox behind the governance of information: rather than learn the rules and play the game, we need to play the game to learn the rules.

This flies in the face of how we operate, be it as children in a playground or companies in the marketplace. Normally, the rules are set in advance and we agree to act within them. This provides a degree of certainty. Instead, society is thrown into a tempest-tossed sea, in which both the game and the rules are constantly changing. Individuals can usually adapt to such circumstances. But it is very hard for businesses to operate and react. Still, with new forms of operational structures, firms are learning to – as IBM’s experience attests. Far harder, though, is for governments, the institutions that traditionally regulate information, to adapt.

One way they have done so is steal a page from the private-sector’s play-book and to “outsource” part of the problem. One of the most prominent trends in regulation has been the rise of non-state mechanisms, explained William Kovacic, a commissioner at the U.S. Federal Trade Commission (FTC). “We talk about the decentralization of private decision-making; that’s nothing compared to the decentralization of public decision-making taking place at the same time,” he noted. “Public institutions delegate to private bodies what they otherwise would do on their own – not just compliment, but substitute.” These non-state actors include professional societies, trade associations, academic bodies, consumer groups, hybrid organizations such as the Organization for Economist Cooperation and Development (OECD), and others.

The “governance” functions include things like establishing norms, monitoring their compliance, punishing violators, resolving disputes, educating the public and industry as well as providing evaluations of the compliance and sanctions. Two examples of joint state and non-state cooperation include technical standard-setting bodies and self-regulatory agencies. For instance,

bar associations oversee who may practice law as a professional society outside government. For advertising standards, many countries have review boards that deal with complaints and can sanction firms that violate the rules.

Among the reasons for the expanded role of non-state mechanisms is the fragmentation of policy issues within jurisdictions and across jurisdictions, as well as the limited resources of public agencies to respond in a timely manner. Indeed, the turf battles among government authorities are a part of the problem. On the “public policy archipelago,” Mr. Kovacic says, “instead of welcoming other institutions, the natives come with sticks and chase you away. The biggest battles I fight are with other public bodies than with the private sector.”

Consider the case of privacy. The U.S. does not have a “privacy law” *per se* (for which many critics are quick to wag a finger). Yet the reality is more complicated. The U.S. has many laws that cover privacy, applying to specific industries (like telecoms, healthcare or financial services), age-groups (such as minors) and geographies and circumstances (as when personal data is exposed and state-law requires firms to notify individuals). Meanwhile, the European Union has a data-protection directive in force since 1998; the rules are clear. But there are few major EU enforcement precedents – and no cases of enforcement through liability claims by individual citizens, as the directive anticipated – while there is a plethora of national and state sanctions in the US. In such an erratic environment, it is easy to see why both companies and countries might be willing to defer to some sort of private-sector arrangement, with the sanction of government always ready in the wings.

Delegating such important tasks requires careful handling – good governance of the system is paramount. The processes must have legitimacy, obtained through being accountable, transparent and open (to avoid collusion among parties or exclusion of outsiders). Furthermore, as more public-private sector regulatory collaborations take form, there needs to be a shift in the allocation of public resources to promote self-regulatory mechanisms, and in particular, to focus on the all-important evaluation process of such mechanisms. A three-step process is called for, concludes Mr. Kovacic. First, what is needed are decentralized regulatory experiments to provide examples of possible approaches to take. Second, it is critical to identify the superior techniques and encourage their acceptance by public authorities. Third, there must be a way for firms or individuals to easily opt-in.

Establishing these private sector-based regulatory intermediaries is vital. Three main forms have emerged for information governance. One type are independent groups like TRUSTe, that crop up to provide in an online setting the same sort of institutional mechanisms that already exist offline. A second type of intermediary are hybrid public-private sector groups such as the Asia-Pacific Economic Cooperation forum (APEC) that develop standards of practice. A third are technical solutions provided by IT vendors. Together, they suggest that the issues confronted by information governance can be tackled from many directions, not just one. Yet managing these new regulatory intermediaries is anything but easy, as a look at each of the three forms suggests.

In the case of TRUSTe, it is an online “trustmark” that denotes responsible privacy practices by businesses and provides confidence to consumers. Now in its 10th year, the group provides a seal-of-approval to web sites that agree to adhere to certain privacy standards, such as not passing on personal information to third parties without the individuals’ consent. In addition to benefiting industry and users, this also helps governments. This is because a non-governmental organization like TRUSTe can respond better to changes in the market and technology than can government bureaucracies, explained Fran Maier, the executive director of TRUSTe.

As a mutual-benefit association with a public-interest mission operating like a business in the heart of Silicon Valley, keeping the organization humming is a challenge. Because it is not a charity, TRUSTe cannot obtain foundation funding; since it is not a commercial firm, it cannot get private equity. And it is not a typical industry association: its certification and compliance activities require capital-intensive technology, something most industry associations don’t need.

Yet the central difficulty is that TRUSTe has no inherent “standing.” Joining is voluntary, so the value of the seal is symbolic at best. The organization sees itself as “encouraging right behavior as a complement to legislation.” But when things go amiss, government is the backstop. For example, in 2006 one of its trustmark recipients, Freeipods.com, sold users’ personal information after promising not to – but it was the New York attorney general’s action, not TRUSTe’s, that had the real bite.

The hybrid industry-governmental approach of the sort that Mr. Kovacic identified is also promising. For instance, APEC’s Privacy Subgroup is the seat

of some of the most advanced thinking in how alternatives to traditional regulation can be applied to global data flows. APEC is a forum of 21 countries and territories that account for 60% of the world's gross domestic product, with strong representation by the business community. It is understandable why the group might be ahead of other intergovernmental bodies in addressing information governance. The Asia region is facing the concerns first, by being the epicenter of outsourcing activities. One of the biggest risks that could thwart the development of the valuable sector is mistrust in the handling of information, whether personal data, intellectual property, IT security and the like.

The organization adopted the APEC Privacy Framework in November 2004, which provides companies and countries with a set of general principles. They include establishing privacy protections, preventing unnecessary barriers to information flows, enabling multinational businesses to implement uniform approaches to the collection, use and processing of data, and supporting national and international efforts to enforce privacy protection. (In a sign of its importance, no one less than the US Secretary of State Colin Powell warned ministers at the time that differing standards could create confusion in the market and impede the information flows that are vital for global business.) However, despite the promising activity, APEC's work is fundamentally limited: it entails only one region and provides overly general guidance with no legal protection if things go wrong. In this, APEC's work may be more a sign of the embryonic nature of the issue than a solution.

The third approach to governing information via an intermediary involves technical tools. Here, the private sector is awakening and trying to supply the market with an unmet need. Large companies are calling on their biggest IT vendors to create products to manage information flows, but these tools take time to develop – and over time, need to interoperate with the technologies established by rival vendors. This is particularly important since the new organizational approaches of big firms in favor of openness means that they need to interact with other companies in deeper ways than ever.

For example, university researchers in America put forward a protocol to govern information flows in “A Roadmap for Comprehensive Online Privacy Policy Management” in the summer of 2007. It follows on earlier technical initiatives at IBM, whose very names are richly emblematic of the issues involved: EPAL (Enterprise Privacy Authorization Language) and REALM (Regulations Expressed As Logical Models). The latter, IBM describes as

“a metamodel and method for modeling regulations” such as complying with securities and accounting regulations, privacy rules, IT security standards and the like. In other words, it lets companies establish, review and enforce regulations, be them governmental or of their own design. And the way they can do this is by going “meta” – that is, establishing a layer of indirection; creating “rules for the rules.”

Some government officials might be alarmed to learn that IT firms are creating software that assume the role that states performed in the past. But it should not be such a surprise. “Code is law,” instructed Larry Lessig a decade ago in the book “Code and Other Laws of Cyberspace.” By this he meant that the features that software developers build into programs can restrict or ensure information flows, just as governments do in the real world through regulation. Yet in this instance, instead of it being a worry that firms are supplanting states, it might be reassuring that companies are thinking ahead of governments about how to best manage information flows within and outside their firm. It is a positive step even if it is taken primarily out of self-interest, in order to minimize the risks to their businesses from the potential mishandling of information.

For the moment, the interplay between traditional and new regulatory mechanisms are experiencing a difficult co-existence. Some governments, like China, insist on using their conventional tools of controlling information flows, through firewalls, censorship, judicial intimidation and the like. Mr. McLaughlin of Google provided a laundry list of countries that willingly interrupt the data flows depending on the values they strive to uphold: Germany, Austria and France block Nazi content; the US and UK police copyright infringement; Thailand shuts out YouTube for insulting the monarch and Turkey blocks it for demeaning its modern founder. The countries enjoy only limited success yet occasionally do a bit of damage in the process.

Still, all states are seeing a need to manage information via new intermediaries, explains Fritz Gutbrodt of Swiss Re, who since the conference has joined Credit Suisse. “Governments have to ‘log on’ to those platforms. What will the ‘avatar’ of the US or the EU or China look like when they ‘log on’ to that?,” he asked. Mike Nelson of IBM noted a shift away from regulation through a formal and exclusive process (such as governments and telecom carriers at the International Telecommunication Union determining standards for the phone system) to a myriad of more informal and inclusive self-regulatory processes

(such as open-source software projects or Internet standards developed by the Internet Engineering Task Force.)

When firms make ersatz regulatory judgments it may be a bit frightening, since it seems to entail a dilution of state power. But when private individuals make these decisions that apply to the rest of us, it may seem scarier still. The open-source software community is the archetypal example of lone coders clicking away behind their keyboards making information-governance rules that override governments. Without a corporate structure to bring a modicum of accountability, they seem like renegade cowboys on the cyber frontier. But this view is both idealized and erroneous. Many open-source contributors actually work for mainstream IT vendors. Furthermore, many open-source projects have codified their practices and formalized their organizational forms. How this works underscores the way in which community-based organizations are maturing, to meet the needs of the “open” environment of information-exchange among contributors, as well as the more “closed” world of traditional business and law.

There is a “triadic” structure of roles for groups in the open-source world, explained Siobhan O’Mahony of the Graduate School of Management at the University of California at Davis, involving community-managed software projects, non-profit foundations and commercial firms. On one end of the spectrum are the open-source projects. They let developers write the software, while maintaining individual autonomy and “hacker” norms. They develop their own governance procedures, elect representatives and so forth. They even assign limited rights to foundations to document their procedures or entrust their intellectual property.

Meanwhile, on the other end of the spectrum, are companies. They can hire or support individual contributors, donate resources and assign copyright to foundations (once these formally exist). Also, firms can research market and customer needs, supply complementary software, hardware and support services, and can distribute the open-source software either by bundling it for free or selling it. It is a complementary relationship and mutually beneficial.

Between these two groups – the community and the firm – a third institution has emerged: the non-profit foundation. Professor O’Mahony refers to them as “boundary organizations.” As a trusted intermediary, it can serve both sides well. For the firms, the foundations provide companies with a voice on

projects, and broker agreements with companies. For the developer community, the foundations hold assets for the open-source managed projects, protect individuals from liability, and represent the project for marketing purposes.

One example of this is the Eclipse software project. It was begun in 2001 by IBM to create an open-source software-development platform that works with different programming languages and operating systems. Prior to establishing the Eclipse Foundation in February 2004, participation increased at a steady but modest rate, according to data that Professor O'Mahony presented. But once the foundation was created, the number of contributors shot up five-fold in the subsequent 18 months, because the "eco-system" around the project had greater certainty on how things would progress. With just the right amount of governance in place, firms could comfortably incorporate Eclipse software into their product-development plans and make customer commitments.

Formalizing the ad hoc groups while retaining the benefits of their informality, in other words, is the key issue. Decentralization and self-governance are important components of this. The emergent properties of the network that creates a feedback-loop between how the network looks and the use that it is put towards is another. Curiously, when these virtual, organizational networks try to govern their operations, they begin to subtly embrace the classic hierarchical structures that they had seemed so keen to toss aside. They turn towards foundations that are formally incorporated and recognized in law; they establish a senior leadership to make decisions.

One attendee remarked in a conversation following a session that a major IT company has looked into the question of how to create some sort of simple, legal recognition for these community-based projects. The problem is that the current system regards an organization – which it presumes to be either a firm or non-profit group – as something meant to endure in perpetuity. The idea that such groupings might best be manifest as entities that regularly spring up and dissipate like cloud formations is beyond its ken. Yet major companies increasingly rely on the output of these groups.

So the question becomes what might be the equivalent of "Delaware incorporation" for virtual groups; that is, a thin veneer of institutionalization to give them some degree of legal standing. It should be inexpensive and easy; perhaps a self-registration process. Government supports the legal recognition of traditional firms in countless ways: as more organizations become disparate,

temporary collaborations, and they contribute more to the economy, perhaps it is incumbent on the state to support these new organizational forms as well. What is certain, however, is that as these ad hoc collaborations continue, so will calls for their regulation.

V. PRIVATE FACES IN PUBLIC PLACES

New types of regulation for new organizational forms are proving hard to manage

The epitome of an organization built entirely around information flows is Second Life. It exists only on computer hard-drives and data links. So it should be no surprise that it privileges the ephemeral to the tangible. "Territory is not as important any more," says Mr. Ondrejka of Linden Lab, the creator of the virtual world. More than ten million people have signed up (though less than one million have active accounts). It must contend with around 20 million "hostile scripts" at any one time. It has attracted mainstream companies; even the Reuters news agency has a bureau there. And more than \$8 million worth of "Linden dollars" are traded on a currency-exchange each day.

Measured against the physical world, the ethereal place is more substantial than some states. It has a larger simulated territory than Singapore. Its gross domestic product in 2007 surpassed Grenada's. Indeed, Mr. Ondrejka has traveled to places like Singapore with the message that one way small countries can grow in a confined space is to harness their large diaspora and go virtual. Just as countries represent an organizational structure through which economic activity passes in the real world (by dint of geography and favorable laws), it can similarly serve as the locus for information flows and transactions online. As more economic activity is virtual, be it software development, business processing, consulting or media content, shifting the role of states to govern information just as they police physical networks like highways makes sense. Yet despite Second Life's impressive rankings compared to real countries, rather than earn a seat at the United Nations, it is coming under the wrath of regulators. "When your living room is on the Internet, it is not a private space any more," says Mr. Ondrejka.

The problem is compounded on an international level. Because the Internet is inherently a global medium, it means that Internet companies must obey more than a hundred different national jurisdictions. For small, innovative start-ups, this makes life hard. At the Rueschlikon Conference, it led to one of a number of spirited exchanges, in this instance, between Mr. Ondrejka and Mr. McLaughlin of Google:

Mr. Ondrejka: "Uncertainty in the legal environment is a barrier to innovation."

Mr. McLaughlin: “Why do you care about any other country than the US? You can chose what jurisdiction you operate in, and where your employees are based.... Why?”

Mr. Ondrejka: “Well, 70%-plus of our customers are not in US, a large percentage of our revenue is from outside of the US, and many of our developers are outside the US – because you hired all of them in San Francisco! So in theory, we could say, ‘Yes, we’re just a US company’. But if the only way to play the game is to stay in the US and not move, that is an impediment.”

Mr. McLaughlin: “You avail yourself of those benefits; then you have to obey those laws. I’m not sympathetic to the grumbling.”

Professor Mayer-Schönberger diplomatically entered the fray to find common ground. “Cory, there is no question that heterogeneity creates friction and significant transaction costs for a company,” he explained. But on societal level, the diversity of rules in different jurisdictions leads to a natural experiment in which the sensible ones succeed eventually while less reasonable ones are shed, he said. Such was the case with small towns tucked into the valleys of the Alps, as well as the success of the Italian city-states in the 13th to 15th centuries, as discussed in Jared Diamond’s book “Guns, Germs and Steel”. “We are better off having that regulatory heterogeneity,” Professor Mayer-Schönberger concluded, “but this comes at a cost.”

Part of the regulatory heterogeneity is due to organizations creating their own rules. David Petraitis of Swiss Re identified how self-regulation works in a variety of settings. For instance, accounting standards grew out of the financial sector based on changing needs. The drawback is that there are multiple standards, it is sometimes seen as financial imperialism, and it has led governments to think they could legislate on the matter, which leads to overzealous things like the Sarbanes-Oxley Act of 2002. Indeed, government is often waiting in the wings, be it with ICANN (where the US government can exercise control), fraud on eBay (where the police are called in) or Linux (where courts have been forced to review the code for alleged copyright infringement).

This leads to the question of how far community initiatives can go on their own, outside traditional governance structures. “Is it really self-regulation or co-regulation?,” asked Thomas Hoeren of the Westfälische Wilhelms-Universität in Münster, Germany. Indeed, the idea of industry regulation supported by conventional laws is the direction things are headed. Still, maintaining government

as a benign force behind the scenes is surely different than having them steam-open envelopes. The very threat of government activity leads companies to seriously monitor their behavior to prevent awakening regulatory wrath. As Professor Branscomb put it: “A lot of corporate activity is motivated by not wanting government – so the virtue of government is that they are always there.” Thus, self-policing mechanisms work when there is an enforcer in the background.

As is the Rueschlikon tradition, attendees could not resist but to belly-ache about regulation. Yet after spleens were vented, rational minds remained. A delicate balance and diversity of approaches are needed, participants agreed. “People say that governments shouldn’t touch the Internet – that’s a dream,” stated Bernard Benhamou of the Institute of Political Science in Paris. “Obviously states are clumsy when acting on the global Internet – but let’s not make them blind,” he added. Andrew Wyckoff of the Organization for Economic Cooperation and Development urged participants to feel some urgency about devising alternative regulatory structures so as to avoid possible over-reactions by governments, who feel the need to respond to political pressure. Paul Schwartz of University of California Berkeley’s School of Law looked favorably on the new governance institutions such as reputational services. The strength is that one can test different approaches and devise laws to support the best policies that emerge.

Attendees strove to find an image to help understand the idea of enabling competition among rival self-regulatory approaches for virtual organizations, even as the organization itself is something fluid. One analogy was borrowed from the natural sciences: the interplay between Charles Darwin’s and Jean Baptiste Lamarck’s theory of evolution, as well as the more recent concept of “punctuated equilibrium.” Darwin of course said that species adapt over time based on new circumstances; those that do not, fail to survive. Lamarck, who predated Darwin (and is mainly discredited as a scientist), suggested that life forms continually come into existence, and as they evolve, become more complex and more “perfect.”

Meanwhile, the idea of punctuated equilibrium says that evolution is not a steady progression at all, as those theories suggest. Instead, it is rather stable and unchanging, until a major event takes place that radically disrupts things, and then species change all of a sudden. (Punctuated equilibrium has its parallel in technology via Thomas Kuhn’s seminal 1962 book “The Structure of

Scientific Revolution,” which argued that knowledge progresses by “paradigm shifts” – long stretches of conformist thinking that is suddenly overthrown by a new world view.)

Related to regulation and technology, these evolutionary theories seem to fit with how industry interacts with governance. Public policy presumes that there is a correct way for regulation to take place, and policies are continually being improved through minor tweaks to reach that ideal state – the Lamarckian view. However, this is a totally misguided goal because, although things hold steady for a while, technical innovation constantly changes the landscape of what needs to be regulated – that is, punctuated equilibrium.

The problem comes when these two concepts clash: when government presumes things are evolving orderly, yet technology is pulling the rug out from under everything. This is because regulations take far longer to adapt to a new environment, compared to the speed in which technical innovations disturb the landscape. This can be seen in everything from copyright law designed for player-pianos being applied to digital downloads, to privacy rules intended for a bilateral relationship of company and customer being called in to play in the Web 2.0 era when scores of different providers come together on the fly to create a single service.

“Government mechanisms need to deal with these things: a slow creep and then the periodic meteor hits and creates a shift,” said Dr. Clark of MIT. Or, as Dr. Brown described it, past infrastructures like roads or electricity had short periods of rampant innovation and then things settled down; technology jumped from one stable state to another. The issue now is that innovation is a constant: “we transition from one unstable state to another – there’s no stability.” The governance of information needs to presume systems without stability.

The idea of uncertainty and sudden change prompted some attendees to make references to the concept of “black swans”, the title of a recent book. “History does not crawl, it jumps,” writes Nassim Nicholas Taleb in “The Black Swan: The Impact of the Highly Improbable.” The term has long been used to explain the limits of inductive reasoning, that is, using past observances to predict future events. It comes from an old British expression “all swans are white” that was used to connote the certainty of scientific truth. At the turn of the 18th century explorers discovered black swans (*cygnus atratus*) in Australia,

which forced scientists to revise their views not just about how such a creature could exist, but their very method of reasoning. The observation of a million white swans does not justify the statement “all swans are white,” explained the empirical philosopher David Hume in the 1700s.

Today, the concept is used to suggest that the belief that the world is orderly and predictable is really just a narrative we construct to provide a sense of stability to life. Instead, the world is governed by randomness and punctuated by inexplicable events, be it 9/11 or the Google co-founders striking it filthy rich while countless others do not. Thus, rather than the steady predictability of the Gaussian “bell-curve” distribution, much of the world actually follows the dramatic “powerlaw” distribution of exceedingly rare but high-consequence events. Phenomena are unforeseeable and grossly unequal (such as a tiny handful of “winners” and a massive sea of “losers”).

In relation to regulation, the idea is damning to classic, bureaucratic structures. This is because if there is no way of knowing that a black swan may not exist in a world seemingly only of white ones – which would utterly nullify our knowledge of swans – then the implication is that we cannot really trust ourselves to learn from the past. What our experience tells us is fundamentally flawed, since it can never account accurately for the randomness which characterizes how the world really works.

So for information flows and governance, how can we presume to apply rules to something that is not static but always changing; not uniform but unpredictable? The idea of black swans would suggest that technology does not evolve steadily as Moore’s law suggests; rather it is dotted by unexpected advances and novel ideas that invalidate the previous approaches. Innovative disruption and creative destruction is at work. Thus, for example, the computer “revolution” was not about improving vacuum tubes but doing something different: putting an integrated circuit on a chip and calling it a processor. Likewise, the Internet “revolution” was not a result of making circuit-switching work better, but changing the whole system design altogether. In such an environment, how can regulation be applied?

“Predicting how the system will evolve and change is very difficult, so we need to think of governance as gardening not engineering,” explained Mr. Evans of BCG on the afternoon of the last day of the conference. The metaphor struck a chord with attendees, as if an “ah-ha” moment was reached. “Our

view of the world – the economy, organizations, regulations, et cetera – needs to be ‘reconstructed’ as a game played by agents in a network,” Mr. Evans noted. Rule-sets ought be defined at the lowest feasible level of granularity, and recognize that significant emergent properties exist, he said.

The gardening image was picked up by others. Professor Branscomb noted that when innovation blossoms, it is usually unanticipated; “We didn’t plant any of those!” At the same time, people regard variation differently: “Some see weeds; others see something nice; some plants die, some flower,” Professor Branscomb said. But diversity is better than the alternative, noted Professor O’Mahony. “A garden with many different flowers is better than a monoculture,” she said. Joseph Alhadeff of Oracle noted that “the danger of coming up with a finite list of normative values is, who decides what weeding gets done?” Instead, the problem is that there are “lots of little plots, but no über-gardeners,” he said.

The only disagreement to these ideas came from Richard Rosecrance of Harvard University’s Kennedy School of Government. “Gardening? I think it may be Jurassic Park!” he exclaimed. In his view, states are poised to merge in the 21st century in the same way as global companies did in the 20th century. The need to achieve scale relative to rivals push them in this direction. Thus, the European Union formed in part as a reaction to the postwar power of the US and the USSR. And today regional blocks are commonplace, from ASEAN in Asia to NAFTA in North America and the like. “If we don’t get some amalgamation of power, some coming together of the major units, this is not going to go forward,” he said. “Unless the military and political problems are solved, none of the Internet problems are going to be solved.”

That said, even if states become more potent and actually merge to obtain scale, these new supranational entities may still prefer to defer to outside intermediaries to police the private-sector’s information flows. It may be more efficient to do so. As it is, small states have a hard time regulating online behavior; there is little reason to believe that larger, more cumbersome ones will want more direct control when they can delegate it to sanctioned intermediaries.

Either way, it puts an onus on industry to establish global policies on information governance. But it won’t be easy. “We have incomplete knowledge of how the whole ecosystem is working. This will become a bigger not a smaller

data gap as we move forward,” said Chris Marsden of RAND Europe, who since the conference has joined the law faculty at the University of Essex.

“The danger we keep falling back in to is to think two unrelated things. The first is that government regulation is an exogenous shock that comes down and damages the system, so the meta-task is to build a wall to prevent government from messing it up. That looks at things too narrowly,” explained Professor Werbach. “The opposite view is for the flow to go back the other way, and see governance as one of the things that come out of these emergent productive systems, even if it is something temporarily harmful. But it can be productive for resilient growth going forward. The governance mechanism has a lot to learn.”

CONCLUSION:

THE NEW INDUSTRIAL STATE V. INFORMATION RULES

A clash is looming among classic firms, new organizational forms, traditional regulation and alternative governance systems

In 1998 Microsoft introduced a product called “Passport.” It was an online-authentication system that automatically signed-in users to different websites. Yet the name itself was richly evocative of the way the private sector now takes on roles that were previously the purview of government – in this case, identity. It even spurred the creation of a rival system, also revealingly named. It was called the Liberty Alliance, and was backed by Sun Microsystems and more than 30 other companies. The governance of information became a commercial competition among big IT vendors, not states. The idea of freedom and control were implicitly at stake.

As it happens, Passport floundered. So in another telling twist that is suggestive of the tenor of the times, in August 2007 Microsoft opened up the system (now called “Windows Live ID Web Authentication”) to third-party developers. Adopting an open approach – and losing a degree of control – may be what it takes to get the technology adopted. The story of Microsoft’s digital ID system encapsulates many of the themes of this year’s Rueschlikon conference. State power is being usurped by technology and the private sector, yet more open ways of operating are imperative.

As more political, social and economic activity takes place over networks, the greater the importance that information flows are as liquid as possible. In the past, governing information was handled by the state, or at least, rights were enforced by national power. But in the modern global business environment, typified by a transnational network that operates at the speed of light, the power of states has waned as the influence of the private sector has grown. Companies thus can set information governance rules. Yet just as this is happening, the role of the firm itself is changing: organizations are now becoming more efficient by being more decentralized and open.

In the past, people feared “The New Industrial State” whereby the economy and thus society was dominated by huge corporations (enshrined in the title of the 1967 book by the economist John Kenneth Gailbrath). Yet today, the very opposite seems to have occurred: small start-up firms are serving as a critical foundation for the economy. A certain degree of economic production is even

taking place through non-market entities: ad hoc, self-organizing communities that appear and atrophy like mushrooms after a rain. It is a world in which “Information Rules” (to borrow the title of a book by Carl Shapiro and Hal Varian). Searching costs, transaction costs, production costs and distribution cost are all extremely low, making collaboration easier than ever. Indeed, the industrial giants of yesteryear resembled the communications network of the era, the telephone system: highly centralized and vertically organized. Likewise, the scrappy start-ups of today are distributed and open, akin to the Internet that they rely on. And even big companies are re-organizing themselves to adopt some of those decentralized, open practices.

But fostering the right environment for this to flourish requires overcoming new problems. Innovation leads to instability, which governments tend to abhor. “Regulators see structural holes and they eliminate it. But all value comes from the structural holes – different ideas mixing with each other,” explained Professor Burt. The unpredictability sometimes presents itself as a dual-edged sword. “Uncertainty means Wikipedia, but also critical information infrastructure attacks,” noted Dr. Clark. But this should not deter society, explained Professor Rosecrance: “The capital markets are all about risk – the object is not to eliminate uncertainty but to embrace and live with it,” he said.

It is the social and political dimensions of instability that pose the toughest challenges. “If we move from hierarchical to non-hierarchical models, what do we do with those who do not want to move into a more risky, less predictable world?” asked Professor Mayer-Schönberger. “We need to ask whether as a society do we want to cover some of that risk?” he said. Mr. McLaughlin echoed the idea: “What does this mean, a faster society, but a less predictable one? We need to re-think how our social safety-nets are set up. Let firms engage in creative chaos, but also protect the things we value in society.” Professor Benkler put a personal point on it: “Human beings are central – I feel I make mistakes thinking about government all the time.”

There was a consensus among Rueschlikon attendees that the problems were not intractable. In an informal poll of participants, 11 people said they felt more optimistic about the situation than they did at the start of the conference, 4 people felt less optimistic (that is, more pessimistic) and 10 people said they left feeling roughly the same. But there was also a sentiment that the issues were not yet ripe to devise ways to remedy the problems.

As Rick Murray of Swiss Re explained: “It is too early to begin the design process, since the innovations we’re dealing with are not mature enough to deal with the optimal design.” In this, he said the best course of action might be inactivity, since it at least upholds the Hippocratic oath of “first, do no harm.” Professor Branscomb concurred: “Individual governments are not competent, and a collection of governments would probably be worse. But the possible need for something in the future is substantial – an extensively multinational institution,” he said.

For the moment, we’re stuck with the natural experiment of messy reality, foisting upon us a diverse set of institutions and practices. Through their rivalry, new ways of treating information governance are emerging. This, for now, may be optimal. “I take exception to the notion that the ideal world is a homogenized one in which we all have an agreed set of rules,” said Professor Mayer-Schönberger. “Homogeneity drives out experimentation and diversity of our regulatory levers; it impairs the ability of a company to be creative,” he said.

It remains an open question what a new information-governance ecosystem would look like, and on what procedural, organizational and infrastructural foundations it would rest. This is because the relationship between the mechanisms of governance and agents of governance is impossible to pin down, since new mechanisms and alternative agents are continually emerging. It is not even clear what role the infrastructure ought to play in this, be it the technical infrastructure, organizational infrastructure and process infrastructure – or who should run these support infrastructures. In other words, we are left with more questions than answers.

The relationship between information governance and the state is not a new problem but a very old one. It dates at least as far back as the first tax census, when Caesar Augustus ordered everyone in the Roman empire to register at their town of birth (forcing Joseph and a pregnant Mary to leave Nazareth for Bethlehem). It remains a vexing matter. A few years ago, one European bank overhauled its document-management processes when it realized that it was spending a fortune collecting more than one ton of paper forms from its branches nationwide each day. Comparatively speaking, today’s computers and telecoms have made things much easier. But they have also made certain things far harder too.

“It is more complicated than I thought,” admitted Dr. Brown at the end of the conference. “I love the gardening metaphor. It works when the elements of the garden are driven by a Gaussian distribution. But the reality is that low transaction costs means production is taking place with no capital investment. But in other ways the capital investment is going to be exponentially large. So now it is turning into a power-law distribution: there are some people with infinitely large things at stake, and lots of people with little things to gain and lose,” he said.

What is clear is that the Internet represents a new infrastructure whose underlying property is experimentation; thus, continuous instability must be presumed. Just as the modular network was a surprising combination of both clusters and hubs, so too the new organizational forms and production networks aggregate to scale as well as decentralize into tiny, atomized collaborations. Amid such great opportunity, the successes will be tremendous, but failure the commonest feature. Regulation is harder than ever since uncertainty and change is the only sure thing. As Dr. Brown concluded: “So we realize the governance mechanisms are designed for a Gaussian world and we’re entering into a world driven by black swans that may really be black.”

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