STRATEGY IS SYSTEM TRANSFORMATION

Strategy is the application of forces to complex socio-technical systems to create and architect emergent order

Tony Salvador, Brandon Barnett & John Sherry

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READER'S GUIDE

This book outlines an approach to strategy we, the authors, call System Transformation. We make a case that current tools for strategic thinking are mostly based on the physicality of industry—the making and selling of actual, tangible things—and that our current era of digital technologies not only enables different sets of strategic tools, but requires their development. This book attempts to provide a system transformation framework for thinking about strategy in the digital age.

It is not our intention in this book to provide all the answers. Or even most of them. In concert with this digital era we're in, we don't think we should nor do we think that we can do it all ourselves. The problems and challenges are both complicated and, as you'll see in the book, complex. The answers we feel need to be similarly complicated and complex. That is, answers, solutions and tools will emerge as a result of many people thinking through these and related issues within framework we offer as well as modifying the framework. These are early days.

We not only invite broad participation, we strongly request it, and moreover, if we could, we'd require it. But we're not like that. Besides, it wouldn't work anyway. And that's the point.

We (Brandon, John & Tony) work at Intel Corporation. That said, we wish to be very clear that the contents of this book are our opinions and our opinions only. There are some moments in this book, as in the opening chapter, where we relate events from the past, in which case "we" will refer to at least one of the authors and one or more other researchers and should not be construed as representing Intel Corporation. There are other moments in this book when we, Brandon, John and Tony, refer to "we" as in "we, Intel". We will be very clear when that is the case. Otherwise, the reader should consider that we equals Brandon, John & Tony.

We find the tech industry—and any businesses that increasing rely on digital technologies—which are increasing daily, it seems—are at a transition point. As we present in the book, digitization fundamentally changes everything: how we will live, work, play, exist, thrive, collaborate, build, engage, discuss, make money, etc., etc. We must find ways to think strategically about entire systems of interaction and entire ways of exchanging value with each other because that's what digitization requires. Changes are not isolated to one, physical or organizational silo; digital bits can exist anywhere, anytime and forever and be subject to algorithmic engagement, manipulation, and discovery anywhere, anytime and forever. Now's the time to think differently about strategy in the digital age.

We'd like to acknowledge several of colleagues. First, we'd like to thank Genevieve Bell, Intel Senior Fellow, for supporting this research during a particularly formative time. Second, while we've had many conversations over the years with various colleagues, we'd especially like to acknowledge ken anderson, Maria Bezaitis and Muki Hansteen-Izora.

Enjoy!

Brandon, John & Tony
15 December 2015

INTRODUCTION

01

"Sven, Our Data Point"
Stockholm, Sweden, 1998

"Sven" wore black shorts and a black tee shirt and matching wrist guards. He was talking on his cell phone. He was tall–even for a Swede–because while he was already a tall guy, he was also standing on roller blades, in Stockholm, in Summer, on the main plaza. It was 1998. Sweden was one of the first countries where 80% of the population had cell phones; essentially, everyone who wanted one basically had one. (And they were cell phones then, too, not smart phones.)

Take a moment to think about the context. Some of you will remember 1998. Some of you will have to imagine what it was like. Laptops weren't yet broadly adopted. There wasn't any wifi. There were no tablets, no "phablets". Broadband was only recently becoming more pervasive, and then initially only for enthusiasts and for corporate workers. Anyone who had a phone had a landline and most people in the US did not have a cell phone at the time. Certainly, most kids didn't have them. And for people who did have cell phones, their choices were relatively limited and there was little variation in the contractual arrangements. In short, it's important to remember that to communicate, you had to be in a particular physical place, at a particular time—and so did the other person.

So, it was in this context that we (researchers) wanted to know: Does anything change when everyone has a cell phone? That is, when a communication system based on being in a place, at a time, attached to a physical cord is liberated from place, time and attachment—does the social system change, and if so, how?

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Of course, we had loads of prior, historical evidence to suggest that when communication capabilities become prevalent, that social change happens. For example, the pony express, the telegraph and the telephone were significant changes that impacted how we live and work. So, we had an inkling, but we also knew that things were different. The rate of adoption was quick—very, very quick—especially compared to prior technological adoption and even as compared to other countries at the time. The technology had differentiated quite quickly into different kinds of handsets, different business models and different modes of customer engagement. We also had an idea that it wasn't *just* a phone, that it was, in some ways, the combination of synchronous and asynchronous communications. And finally, that it was highly mobile mattered. A lot.

Sweden in June can be spectacular. The long night is pushed aside. The sun is bright and warm and its shine seemingly incessant. The shadows at dusk and dawn dance with the rods and cones in your retina—one can see how gnomes got a foothold here, hiding amidst the sparkly, shadowy twilights. And, at the time we were there it was clear and clean and the people were outside, strolling, even strutting: their gait steady, stately and smooth. We played a game—we could pick out the Americans easily: they bob when they walk—heads move up and down; the Swedes' gait is smooth, steady, silky. They had it "going on" and they knew it. They seemed to recognize the brief, intense wonder of this time of year and took every opportunity to expose themselves to the sun and to each other.

We noticed too, that they had their phones with them always—whether at work or at leisure. They fit those little devices seamlessly into their day. We shadowed a professional one day. She had a meeting some blocks away from her office. We left with time to arrive promptly at our destination. We'd already noted a penchant for promptness—it was important but understated that everyone deserved the respect of being on-time so as not to waste each other's time. On the way, however, our professional saw a shop, paused and stopped to run an errand in a store. She first called her appointment and said she would be 10 minutes late.

We discussed this point with her. We discussed it because the errand was personal in nature. She was reminded of the errand when she saw the store. It was efficient for her to stop and do it as the shop was on the way, but it was not in keeping with the standard of being "on time". What we learned, though, was interesting → the standard was less about adherence to "the clock" and more about maintaining shared expectations and meeting shared commitments. The implicit but relatively rigorous standard was to be "on time". However, the standard was more about expectations and commitments and our professional's quick call effectively reset the commitment by re-negotiating the expectations; essentially, she set a new time for the meeting. And it was accepted.

This is a specific example of a general pattern we saw: people set and reset expectations with much greater frequency continuously managing the uncertainty and serendipity of moving through their cities and towns while at work and at leisure. That is, they shed much of the appearance of adherence to "the clock" and rather, focused on the commitments and expectations they had with each other.

This is, perhaps, an easy example for you to understand—especially now that everyone has cell phones and being "in touch" is the new way to be "on time". We all "get it"; we feel it in our gut. We feel it because we've experienced it. But at that time, this was pretty new. It was an "interesting" finding. But it was unclear how and if it was a "relevant" finding.

Far more relevant, however, was that we (researchers) also concluded that "Sven" and his cell phone competed directly with the PC. Recall that at that time the PC was the computing platform of choice. A laptop was what everyone aspired to have. The cell phone, we argued was direct competition. The cell phone made it possible

for "Sven" literally to roll through Stockholm and still be in touch with his friends.

The PC, also at that time, had become not only a computational device, but a communications device through email, listservs, the world wide web, etc; the discussions at the time were about communications and computation. But the PC was still, first and foremost, a PC, with the emphasis on C.

Therefore, when we presented "Sven" as the embodiment of the "future of computing", and then we argued the cell phone was already competing with and was going to compete with the PC, this was not readily understood. It was an argument built on the notion of a complex adaptive system adapting to the introduction of a new capability and of new vectors along which competition can occur. If the cell phone can change the way a nation thinks about being "on time", then a cell phone can enable people to change the way they think about communications and computation as well.

As researchers, we argued that the cell phone would increasingly steal value from the PC. Specifically, we said that the cell phone would compete head-to-head with the PC. Because our "data point" was non-traditional, this was a tough argument to make—an argument usually made with the absence of large scale, aggregate survey data. A typical response: "That's ridiculous, a PC is a PC and a phone is a phone." We said: "Well, there's this thing called SMS." [SMS—texting on a telephone keyboard—was more prevalent out of the US than in the US at the time.] "What's SMS?" "Well, SMS is kinda like email. Short messages, sent asynchronously as text—like little emails. It's very handy. And we think it's just an indication that the phone will do more and more and slowly steal "value" away from the PC." Final response: "No. Phones are phones and PCs are PCs. People will use PCs for PC things and phones for phone things."

The problem we had—and it has remained a problem until very recently—was that we had no way to demonstrate our point in terms of large scale statistically valid and reliable data. "Sven" was our argument. For sure, we had some other "data points"—but our "data points" are stories about people, not data about usages.

Our "data points" were—and often still are—stories about people and their daily practices that we considered catalytic of Socio-Technical System Transformation.

Socio-technical system transformation—2ST—is a change catalyzed by technological innovation that causes a qualitatively significant transformation or change in the social, economic, business and political, processes, institutions and practices of our broad society.

Clearly, the PC catalyzed a massive 2ST. The cell phone did the same—we live on the planet very, very differently now than we did 10 or 15 years ago. Over the years, we researchers have continued to identify those social practices that we believe are catalytic of 2ST. And, frustratingly, until the last few years, we got about the same essential "No, you're wrong" response due to the limited capacity we had of representing our data.

Two things have changed. First, we have new tools that allow us to magnify the "Sven" kind of data we do get to provide broad, ecosystem views of possible futures catalyzed by "Sven". That is, if we believe "Sven's" are catalysts of broad 2ST, then we can now use various data analytic tools to "see" how these futures are emerging. So, this is super terrific, actually, because now we can assemble data about the future before the future arrives.

However, the second thing that's changed is that "trends" are no longer inevitable—nor can they even be treated as inevitable.

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Specifically three things contributed to an utter lack of inevitability:

1. *The digitization of all data*
2. *The reduced scarcity of resources: that is, the increased skills, diversity and variation of engineering capacity, technologies and business models*
3. *The globalized networks of people, businesses and institutions.*

That is, our world can now be described as vast overlapping networks of socio-technical complex adaptive systems for which an assumption of inevitability based on "data points" or even "trends" is increasingly likely to be a catastrophic error.

That is, it's increasingly senseless to "measure the market" with classic tools like surveys and statistics. Markets are dying, being replaced by systems. Systems, especially complex adaptive, socio-technical systems, are comprised of people and practices, but the behaviors of the systems, per se, are emergent, which specifically means the behavior of the system cannot be predicted based on understanding the components of the system, which means, that you have to "work in the system to work the system."

For example, many social movements have instigated and then consolidated transformations, at least in part, by working within the system itself and pushing at its boundaries. Technologies have also transformed business systems, not least of which is how the personal computer was used to transform office work and associated business processes.

The result is that there are fewer and fewer "Sven's". That is, given that we all are increasingly likely to be operating in a world of continuous adaptation, then it's important to recognize that there are many equally probable candidate catalysts (i.e., many Sven's) for socio-technical system transformation given any particular system.

The bottom-line is that there is less and less inevitability based on static market measures, and more and more emergence based on dynamic market measures. There are no a priori right answers, there are only catalytic probes and robust responses. But one thing is the same: there are loads of wrong answers.

Strategy, therefore, is a rigorous and robust process of managing the potential for emergent business relevance through targeted system transformation.

Strategy has its roots in war. War is a series of actions to beat the pants off the other guy. To do so, one thinks about multiple possible paths of action—but they are just that: paths of action in a relatively stable system. We know, it's weird: war as a stable system. But that's what it is: the game board is set, the conditions are relatively stable. There is relatively little that can be changed, per se. There's only superior execution.

Strategy isn't a goal (set against a market) under uncertainty, or a set of plans to achieve a (market) goal, or a set of actions taken to enact a plan. Strategy isn't a set of differentiated actions, products or even establishing a "position". That is, strategy isn't a thing; strategy isn't a noun.

Strategy is a verb. Strategy is the application of forces that when harnessed satisfactorily, drive "socio-technical system transformation". Strategy is the application of forces in an adaptive process for managing emergence to the advantage of the company to establish both strategic influence within an ecosystem such that other companies orient to it, as well as managing the ongoing emerging adaptation of the overall ecosystem in which the company finds itself.

Execution isn't strategy. Even a set of complicated actions with multiple contingencies isn't strategy—just a set of complicated actions with multiple contingencies. And complexity science tells us that that kind of system is relatively stable. Just because the actions are complicated—or because there are numerous contingencies doesn't make it anything more or less than a series of complicated actions.

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We all have however, for millennia, and for mostly good reasons, distinguished a simple series of actions, from a complicated series of actions and called the former "tactics" and the latter "strategy". However, if we (the authors) thinking now of complexity sciences as representing a paradigm shift in how we collectively understand markets, societies and ecosystems then there are at least two kinds of strategy: Type I and Type II.

Type I Strategy can be considered as a complicated series of contingent actions within a relatively stable system.

Type II Strategy can be considered as a coordinated series of simultaneous actions intended to transform an existing system or to create a new system.

This is a fundamental distinction because WHAT, HOW and WHEN you take whatever actions you're going to take will differ not only in time, but also in kind, in applied resources, in methods of analysis, in measurement of progress, etc.

This short book outlines the forces that comprise this new conceptualization of strategy in the context of socio-technical system transformation. We interlace the background information you need to understand this new perspective in the body of each chapter. The chapters are named for force or forces discussed primarily in that chapter. It's important, to note, however, that a complex adaptive system is a vibrant, almost living organism that is not best described reductively, part by part.

We start with one chapter that provides both our background assumptions and an example that will serve us in subsequent chapters.

WHY NOW

01

Go ahead and close your eyes for just a moment and a take a couple deep breaths. Breathe. Go ahead. You can do it.

Ready?

In just over 100 years, we've all gone from being unable to record anything, ever to being able to record everything, always. This is extraordinary and it should take your breath away. From nothing-ever to everything-always in a societal blink of an eye.

This change—and its implications—certainly counts among the most significant social changes to have occurred in the shortest amount of time in the history of the world, with the exception of war and conquest. We would compare the digitization of everything to the invention of money, the printing press, the telephone, radio, television, antibiotics, vaccines and even flight—all of which have happened in the last 100 years, give or take a few.

Most of us reading this have grown up with most of this technology and certainly with the expectation of having continuous technological improvements and developments. So, perhaps it's a little difficult to imagine what it was like to know people crippled by polio, disfigured (or dead) from measles, to have to be at the game to see it, or around the radio to hear it—and to not have instant replay; to get all your news of the world in print, to hear from friends and family only occasionally, to take a total of twelve photographs on vacation because film and developing were expensive, and to know how to read a map to get you to your destination. And so on.

But comparisons to other inventions isn't enough. We are not merely living with digital technology. We do not only work with digital technology. We don't even just play with digital technology. Saying we live *with* technology is like saying "we breathe *with* air". We don't breathe *with* air; we breathe air. We don't live *with* digital technology; we live digitally. We work digitally. We play digitally. Our stuff is digital. Our friendships are digital. Our news is digital. Our worship is digital. Our politics is digital. Our perspective is digital. Our health is digital. Our love is digital. We are living lives infused by everything digital in us, through us and around us.

And it's going to increase. We will wear digital; we will ingest digital; we will pass digital technologies through us. This increasingly thorough infusion of digital technologies iswhat it means to have entered the Digocene™ Era.

THE DIGOCENE

02

We are, essentially, no longer merely human beings; increasingly we are becoming hybrid human/super-human beings blending our physical and digital capacities making us increasingly sentient, smart, distributed, capable beings. Digitization–not consciousness, empathy, tool use, thumbs–or anything at all from the natural world–is what now separates us from the rest of the creatures on earth.

Digitization is also how we've made the world a very small place indeed. Digitization is how we stay in touch with our friends from life, collapsing the previously insurmountable dimensions of time and space. Digitization is how we find new friends, or, "friends". Digitization is how we can rally behind a cause and fight for justice at a rate previously unheard of.

Digitization has also lowered the bar to being easily and breezily mean to each other. Very mean, at times. Digitization has made it virtually impossible to hide. Ever. Anywhere. Perhaps the best thing a parent can do for their child is give them no digital footprint at all so they can make their own choices when they become aware.

Digitization is how we've upended the economics of business after business. Digitization is how the unnatural (supernatural?) interest in Twilight, Harry Potter and Lord of the Rings is sustained at pathological levels. Digitization is how police can watch you everywhere you go. Digitization is how the US Government can record everything about you all the time.

The Digocene Era challenges everything we know about living in, as, with and through society. It's changing our relationships. It's changing our practices. It's changing how we use social power, and how social power is used for and against us. It's changing how people abuse power and how we sanction authority. Digitization is changing how we seek justice. Digitization is changing how we manage people—and how we exploit others. It's challenging borders and boundaries of all sorts—from state boundaries to water sheds to political boundaries to market segments to school boundaries to religious boundaries. In some ways it's diminishing boundaries; in other ways digitization is enhancing boundaries. Digitization is changing how we create and manage wealth. Digital "things"—data—are in fact becoming a new asset class dwarfing all prior classes of assets, including natural resources.

This isn't about what you do with your smart phone, whether you text at dinner, whether you write letters anymore or whether you read books on paper or online—or whether you read at all. We just don't care about these trivialities mostly because it's been talked about and argued about again and again. More importantly, these are not the substantive issues. The changes to society are deeper, broader, pervasive and permanent. They involve issues of power, justice, government, industry, institution, community as well as the individual—at home and around an increasingly connected world.

The fact of the Digocene and its implications is precisely the reason that we (authors) believe strategy is now about system transformation. It's the reason we argue that strategy is a verb—a continuous set of actions in search of catalytic and formative events that create new forms of order.

EVERYTHING DIGITAL IS DATA

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When we (authors) say "everything is going digital", we mean "everything". Here's a short list: music, movies, letters, advertising, identity, friendships, conversations, genome, hotel rooms, maps, medical, education, work, legacy, therapy, games, money, politics, government, voting, journalism, photos, revolutions, justice, parking spaces, reputation, dating, credit, banking, knowledge and languages.

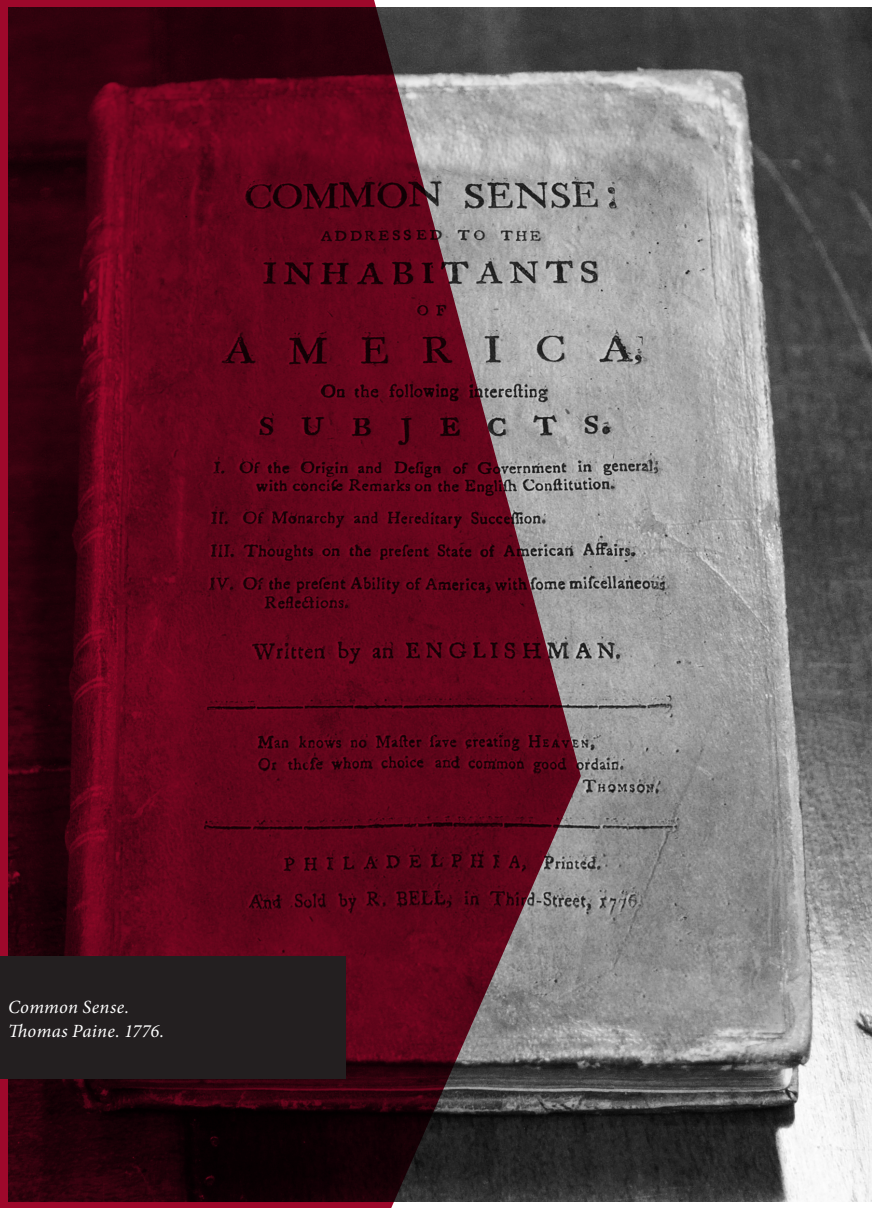
And more every day.

It's not just quantity, though. It's the nature of the "things" that are turning digital and what you can do with them. There are direct replacements of physical artifacts: like the digital version of an old book where bits simply replace paper. There are enhanced replacements of physical things: like e-books that come with spoken word, or the ability to click on a word and see the definition, or the ability to animate a chart of image in the body of a text. There are new artifacts, like cookies, viruses, recommendations, personal ads, algorithms, instant global networks of people with similar interests, etc. And there are new things you can do with the artifacts that you couldn't do before, like make new artifacts from the old ones, again and again; evaluating a song and a movie and a book at the same time, examining every book in the library of congress for a particular theme, and so on. And there are new qualities of artifacts—new things you can do with them: like instant, global access; contextual liberation; unnatural combination; non-rivalry, etc.

Taken together, these new digital artifacts are what everyone calls "data". Data are simply representations of meaning in digital form that can be inspected, analyzed, interrogated, combined, and measured in some way. "Big Data" really just refers to lots and lots of data with the implication that given a lot of data, the right analyst, with the right magical algorithms, can find interesting and relevant new meaning(s) that can be monetized or otherwise made relevant. For example, tracking searches in "Google" can identify the spread of the flu; or comparing weather patterns to TV usage can predict on demand movie sales; or collecting all sorts of environmental data from every asthma attack can help identify individual triggers for people. And so on.

CULTURAL VALUES IN FLUX

04



Common Sense.
Thomas Paine. 1776.

If all we had was "a lot of data", we'd not be writing this book. However, due having so much data, our behaviors as a society have changed. These changes also have forced our cultural values to adapt. This is important because it changes our consideration of the rights, privileges, obligations and responsibilities people have to each other and to society. These changes are what is driving and being driven by the Digocene era.

Let's dig in: Here's a partial list of cultural values in flux: accountability, transparency, science, ownership, literacy, work, making, play, conversation, communication, manufacturing, publishing, participation/ing, education, watching, commerce, corporations, governments, power, and capture.

The digitization and connecting of everything and everyone has unleashed forces on society that have only rarely been encountered in the past—if ever. Many things that were invisible to most people, have become visible; and much that was visible has become invisible. Digital technologies have unleashed the power of magnification, pervasiveness, isolation, and eliminated friction. These forces change how we live.

For example, the US Congress is polarized. This is not just a commonly held belief, but is demonstrably true. The question is: Why? One hypothesis is as follows. The US Congress was designed such that the individual members both represented their constituencies and were able to compromise with other members to achieve the best possible solution,

View the data on congressional polarization:

https://www.washingtonpost.com/news/wonk/wp/2015/04/23/a-stunning-visualization-of-our-divided-congress/

CULTURAL VALUES IN FLUX

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given conflicting desires with respect to their constituencies. It worked, in part, because the members were able to compromise, through conversation, bartering, etc., while ostensibly doing the best to represent the interests of their constituents. The system was designed explicitly to enable compromise.

Digitization did two things to change this. First, every vote became as "transparent" as every other vote and uniformly available to individuals in their absolute state, absent any context that might, for example, be associated with compromise. That is a local minimum (a less favorable vote) might have contributed to a greater local maximum (they got something better). But that information was lost in the absolute nature of the vote absent any context of compromise.

Second, every constituent potentially now has as loud a voice as any other constituent. There's nothing inherently bad with this. However, now any group of constituents, focused on any singular issue of paramount importance to them absent any sense of proportion can hold their members accountable loudly and in public for each and every vote independent of compromise or context. The upshot is that members can no longer compromise in the way the system was originally designed—a system obviously and clearly designed prior to digital technologies.

Polarization emerges from this system and is likely to stay unless there's some other kind of intervention that disrupts the equilibrium of the system or we change the original underlying design rules. However, changing the system would require operating within the system as it stands today to change it, and since polarization has emerged, it's going to be very difficult—potentially impossible—to restore. Perhaps you might not think this is such a big deal. Well, we think it's a big deal; and moreover, it affects us as both individuals (e.g., students, employees, veterans) as well as a society (e.g., gun laws, funding for education, etc.), in many cases with majorities of Americans feeling one way and Congress voting another.

Watch the video: Represent.Us "Corruption is Legal in America"

https://represent.us/action/theproblem-4/

That's one way to look at how digitization has changed the functioning of a system. Let's take another, simpler example of "publishing". Obviously, desktop publishing has become commonplace. But what's relevant isn't that people can write anything for anyone, but that anyone can "publish". In the abstract, publish means simply to prepare content for public distribution. Thomas Paine wrote "Common Sense" in 1775, but it was "published" by Benjamin Rush and Robert Bell, the printer, and it was published with special attention to anonymity due to its treasonous content. In the recent past, "to publish" has also taken on a meaning of "vetting", "preparation" and "responsibility", not only of the physical manuscript, but also for the content. Consider how text books are published today, or scientific papers in scholarly journals; the content is vetted, and vetted again, with the goal of being accurate and precise for the intended readers.

Today, with anyone being able to "publish" anything by merely posting it online which renders it available to the public, and with anyone able to read anything, what we have is a far wider range of accuracy and precision—both in the writing and in the reading. Digitization has, clearly, diluted the value of the publisher, but it's also diluted the *a priori* value of published content. The result is an

Your Vote Doesn't Count

Read the Article: "Testing Theories of American Politics: Elites, Interest Groups, and Average Citizens"

http://scholar.princeton.edu/sites/default/files/mgilens/files/gilens_and_page_2014_-testing_theories_of_american_politics.doc.pdf

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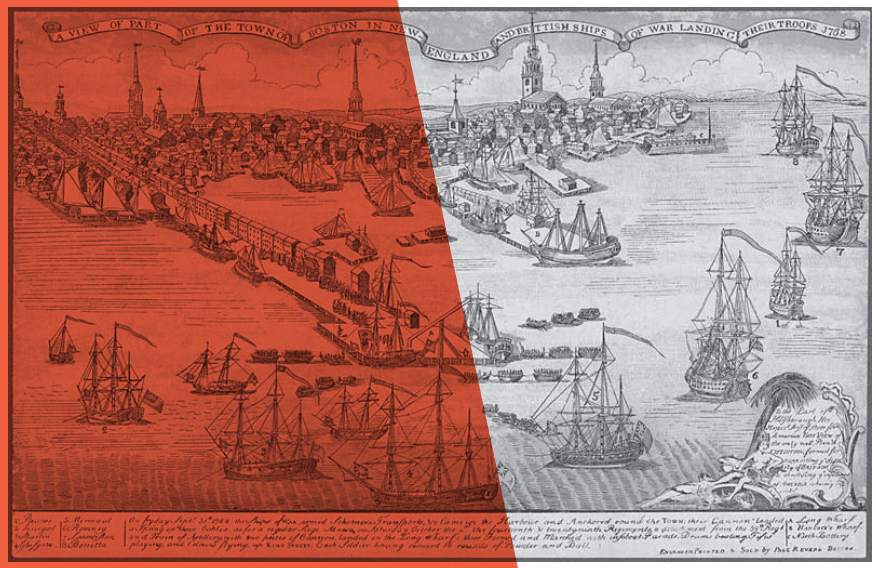
additional burden on the reader, an additional responsibility of the reader to not only comprehend the content, but also to adjudicate the basis, or foundational merits of the work distinguishing "good" work from "bullshit", something a good publisher would have done in the past.

The Lancet, a medical journal, published an article on the dangers of vaccination, which was later found to be fraudulent, and the journal retracted the article. The medical and scientific communities, per se, know how to take all that into account and ignore the original article. But the general population doesn't, and that single, decidedly fraudulent and erroneous article has provided fuel to a vocal monitory that has directly caused the re-introduction of nasty childhood diseases that had only recently been brought under control.

We chose these two examples US Congress and Publishing, because the changes to both institutions are subtle, non-intuitive and nearly invisible to the naked eye, and yet, they do very much change how we live and work, how we govern ourselves, how we make decisions about our safety and even how we think—or not think—as the case may be. Digitization has, directly and indirectly worked at fundamental levels in our socio-cultural systems to change our values.

NETWORKS

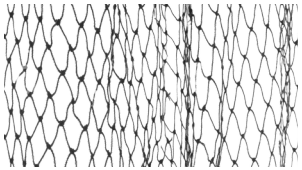
05



Harbor Networks,
East India Trading Company

The point of the prior section is either easily graspable or frustratingly elusive: technologies have broadly and pervasively enabled continuously available, and continuously fluctuating, networks of interacting people and data. But what does this mean? And how is it different than the past?

Though the word "network" is used in a variety of contexts, a "network" is, at its oot, a series of nodes and links. A fishing net is a simple example of a network: knots connected by lines; it's a simple, lattice network, four links per node. The pervasive infrastructure of servers and telephone switches and microwave towers (i.e., nodes) and their connections (i.e., the various forms of wired, e.g., copper and fiber, and wireless, e.g., microwave, and radio frequency (rf)) is the moral equivalent of a fishing net.



Network example: Fishing Net

In the past, we had more "chains", like "supply chains" or "trade routes" or even "manufacturing chains", like "the story of stuff" from the grain to your table or how goods moved around the world. What's new with networks in a digital world is the potential instant connectivity of every person to any other set of people, places or things on the planet in unforeseen configurations. And given that the "products" are often them-

*Visit: **http://storyofstuff.org/***

NETWORKS

selves in digital form, "chains" are a much too limiting conceptualization of how things happen, and so researchers like Reed and Metcalfe invented new "laws" for the power of networks, known cleverly and respectively as "Reed's Law" and "Metcalfe's Law", where the exponential value of networks is mathematically outlined.

You might consider your "professional network" to be a network, but it doesn't have to be. For example, you might consider the people in your "contact list" to be your "personal network"; but that's a limited view. What's more interesting is to understand not only who you know, but how they are all connected to each other and to others—something many people do implicitly; think about it more as a "clan" or a "family" and it's not just who you know, but their relationships to each other that also matters, and the implications of those relationships. Moreover, you might consider all these relationships differently if you simply overlaid a particular feature—like soccer, or like classical music. Now it's easier to see that your "network" is really a potential set of many different networks—some of which you may know, some you may not realize exist.

What's interesting to us here is that digital technologies that comprise the internet, have created the foundation for not only an incalculable number of socio-technical networks, but that "network" is now less a "description" of a set of nodes and links, but a "force" that can be used to make something, or change something, or fight something, etc. A "network", therefore, is merely a force for doing work. The network is the arrangement of people, practices and places that can be configured for a purpose. And given that nearly any person at any time can now create spontaneous "networks" means any one can use network forces to make change.

MARKETS V. ECOSYSTEMS & NETWORKS

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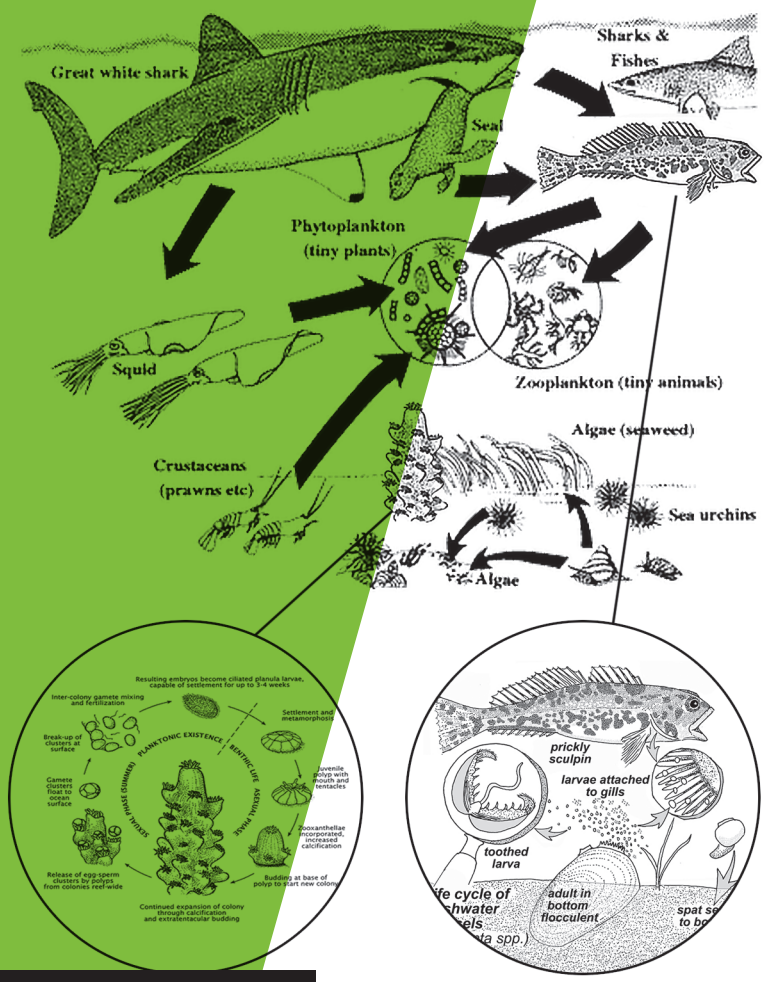

Oceanic Ecosystem Life Cycle

Most of us reading this text are comfortable with "markets", which we define as relatively stable systems of exchange, mostly in the form of "chains" from producer to consumer. We've had "markets" for thousands of years, but only in the last century did we really start to "measure" them with various instruments like surveys and polls and focus groups from which we make inferences with statistical and other analytic tools.

Each of these tools and techniques makes certain assumptions about the markets they are measuring. For example, there are the standard expectations of validity—that you're measuring what you actually think you're measuring as well as reliability—that you're measuring it accurately. There's an expectation that from the time you choose to measure some aspect of the market to the time you take action as a result of that measurement that the market has been stable enough such that the measurement and your subsequent actions matter.

We propose that these assumptions no longer hold entirely true, due in large part to the effects of networks enabled by digital technology, which is changing the underlying meaning of "market" as chains of value exchange as well as changing the underlying stability of particular markets, which we propose are much more volatile and subject to perturbation than our current tools and techniques account for. The result is that we need to develop tools and metrics for understanding ecosystems, or networks of value exchange.

Consider the shift being like the shift from Newtonian/Mechanical physics to Einsteinian/Quantum physics. In many cases, Newtonian

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physics is perfectly adequate to account for worldly phenomena. However, in some cases, it falls short and we need new tools, new explanations.

We're at that stage. We find statistical measures such as the mean and median and derived measures such as market "segments" to be of increasingly limited validity (they're not measuring what you think they're measuring) with respect to certain networks, especially those impacted by or comprised of digital technologies. That is, rather than stability, we expect change. Rather than descriptive market segments, we expect active network engagements and rather than market share, we expect network influence and influence of networks.

Rather than a position in the market in terms of sequestering or locking up some physical asset, like Vanderbilt locked up the railroads or Rockefeller locked up oil production, in a digital world we look for measures of agility and movement within and among networks of activities; we look for measures of robustness—or the ability to adapt in concert with movements within and across networks. Rather than stasis, we expect flow; rather than nouns, we expect verb—and ways to measure them.

We are looking therefore, for metrics of dynamic strategic influence across networks of ongoing activity. Measures of strategic influence would be such things as relevance and number of vectors of competitive advantage, number of networks of common competitive advantage, measures of centrality with respect to how other network participants—not necessarily customers or competitors—are orienting their work, the strength of one's position in the ecosystem of networks—that is, how robustly does one participate with and respond to ongoing adaptations of activity across networks.

That is, we (authors) see markets as systems in relatively continuous transformation. It feels volatile and haphazard because we are applying old measures of description and stasis to new network systems of better characterized by fluidity and flow.

The bottom line is that we want to start asking questions like: what industry foundations (social/ecosystem/economic/technology) are shifting or can be shifted? How are shifts transforming industry structure and/or what levers might catalyze a desired transformation—which is one that offers competitive advantage in concert with network activity? What is the current and potential landscape of experiences and business opportunities that would promote advantageous participation in the network? Can stakeholders be organized and mobilized around a new 'performance' control point? Can companies integrate capabilities into solutions/platforms that provide best in class 'performance' along these new vectors?

These questions prompt new kinds of tools like those we group under the heading of "foundation dynamics", such as: cultural analysis, economic adaptation, business model flow, and technology analysis. We also have sets of "structural dynamics" tools, such as "network structure and flow" capabilities, network catalytics, and network centrality analyses.

We also have techniques to engage people in various networks through participation. Such as creating smoke & mirrors sites, external/open innovation activities, making use of "lean startup" sprints, building experience prototypes, launching system transformation catalysts, creating stakeholder probes (DevKits), and working with/accelerating viable business. Taken individually, these are all interesting tools. Taken together, they represent recognition of dynamic networks rather than stable markets as the object of study and engagement.

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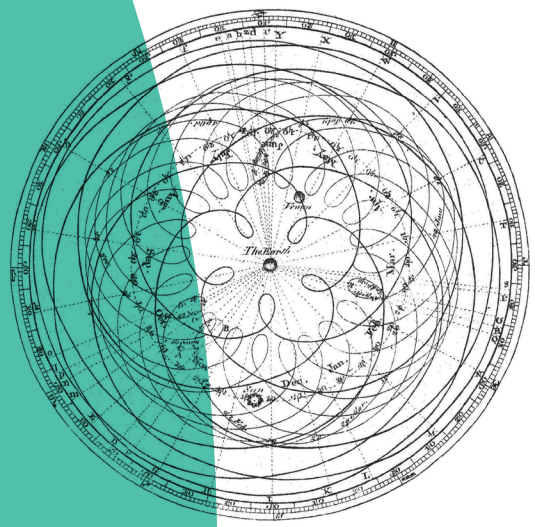

Fig. 1

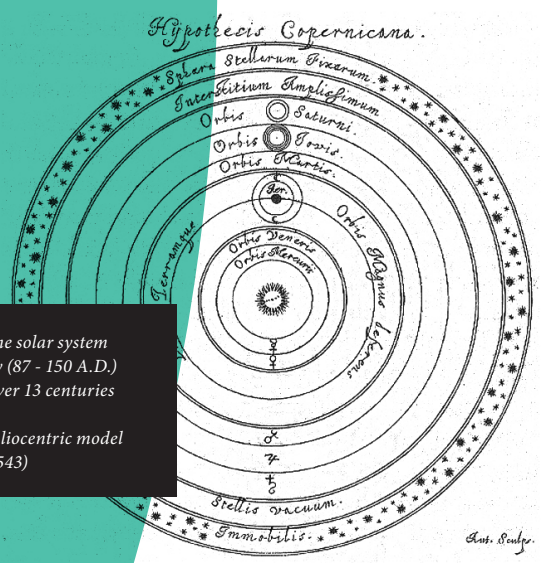

Fig. 2

Fig. 1. The model of the solar system developed by Ptolemy (87 - 150 A.D.) accepted theory for over 13 centuries

Fig. 2. Copernicus' heliocentric model of the solar system (1543)

For this work, we find extraordinarily useful many of the attributes of research in the physical sciences like physics, chemistry and biology. In these areas, things like the search for "laws", the structures, the ways of thinking, the ways of engaging, experimenting, probing and re-thinking one's assumptions in the face of data all guide us to a much more rigorous and yet flexible understanding of markets and ecosystems. That is, rather than descriptively measuring something and then concluding: "it is like this", the research tools from these sciences suggest that things are not always as they are measured.

From this perspective, it should not surprise the reader to know that we take many of our cues in this book from the physical sciences. That said, we absolutely do not suggest that markets and ecosystems are reducible to “laws” and “formula”. Rather, we suggest that the current state of the social systems that are markets and ecosystems are appropriately subject to much more rigorous, thoughtful and fluid interpretations than is currently practiced.

Give us a few pages to provide some background.

Suppose we were to say the following: We think we can all agree that our business environment is more complex and chaotic today and changing very quickly. It’s a decent statement, seems clear enough,

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and it's probably the case that most readers would agree in general to the statement.

The problem with this statement and others like it is that they evoke a sense of depth by tying to scientific terms (complex, chaotic) that are revolutionary in their own fields. Left as general statements—as heuristics—they don't actually give us frameworks or tools with which to analyze current competitive environments nor new opportunity spaces. Quite the opposite, they allow us to throw up our hands and throw in the towel saying: 'Oh well, if things are really that complex and chaotic, no real sense trying to be rigorous here, let's just do stuff! Take action! Just start a company! Faster! Velocity! And so on.

1854 Broad Street Cholera Outbreak

Visit: ***https://en.wikipedia.org/wiki/1854_Broad_Street_cholera_outbreak***

It's compelling and comforting to abdicate rigor in the face doing something according to some heuristics that feel good. But it's not particularly useful. It took John Snow quite a bit of rigorous work to isolate cholera to a leaky sewer pipe near a well in Soho, London in 1854, rather than to continue finding better ways to avoid bad humors and odors. A little observation revealed that the old ways weren't working, and that he needed to discover news ways. And so he used new tools. The map to the left is the first known epidemiological study of the locus of infection. Old problem with new framing requires new tools.

We work with markets, ecosystems and other kinds of social systems comprised of people, not germs. We can nevertheless apply scientific thinking and models such as complexity sciences in specific and meaningful ways. Science can change our point of view about our assumptions by challenging our beliefs with data. Science can peel back layers of understanding to reveal deeper and more foundational truths—like Snow's cholera work. Sometimes this scientific truth is a more complete understanding of phenomena that results in increasingly predictive laws at new scales (both large and small) and sometimes (since beginning of 20th century) scientific truth manifests in the opposite direction and puts limits on knowledge and gives us tools to deal with the uncertainty. Let's look at these in more detail.

Sir Isaac Newton (1642–1726) is renowned for 'discovering' gravity when an apple fell on his head. His theories and three laws published in 1687 in the Philosophiæ Naturalis Principia Mathematica ("Mathematical Principles of Natural Philosophy") quantified the effects of force (including gravity) on physical bodies and the subsequent laws of motion, laying a foundation for scientists for the next three hundred years. These theories successfully described virtually all observable phenomena including planetary motion, accelerating bodies, and the precession of Earth's axis. Scientists could rely on these models to hold true for any circumstance they could imagine.

But Newton's theories also limited our world view about reality. Given Newton's Laws were believed to define reality at a foundational level, we are not compelled or even capable of thinking of systems outside its rules. When Max Planck investigated the radiation from a black body, he could not explain his results with Newton-era theories. He described the phenomenon mathematically by adding a fudge factor; a constant that allowed a mathematical expression to fit the observed results. Planck expected he would decrease this constant to smaller and smaller amounts eventually making it zero to remove it all together. But what he found was a limit to how small the constant could go and still reflect reality. He found, to borrow a phrase from the movies: "a glitch in the matrix", which was, for him,

a hint of a potentially deeper and more thorough underlying reality.

Over the next few decades, other pioneers such as Niels Bohr, Werner Heisenberg, Albert Einstein, Erwin Schrödinger, Max Born, John von Neumann, Paul Dirac, Enrico Fermi, Wolfgang Pauli, and David Hilbert created a new description of the observable world—quantum mechanics. Quantum mechanics describes not just black body radiation, but also the structure and properties of subatomic particles, the color of the stars, and the operation of computers.

Note that quantum mechanics does not render Newtonian mechanics obsolete. At most physical scales relevant to people (inches, feet, kilograms, etc.), Newton's laws still hold and describe observable phenomena. It's only under special circumstances or at very small scales that quantum mechanics dominates what we see. That said, quantum mechanics is foundational to Newtonian mechanics; the latter is derived from the former.

Rigorous scientific inquiry has a way of revealing significant yet hidden forces or factors that potentially influence our lives. In taking careful account of the energy released from a material in an excited energy state (such as a gas that has absorbed light energy), Einstein realized that the sum of energy going into heat and spontaneous emission of light did not account for all the energy absorbed. Conservation of energy is a foundation of even quantum mechanics and so he used the science to hypothesize a hidden mechanism of energy release—stimulated emission of radiation. This phenomenon—the emission of a photon of light resulting from the close interaction with another photon, and at the same frequency, direction, and phase of the stimulating photon—was demonstrated in the 1950s and is the foundation for the laser (light amplification by stimulated emission) that enables DVD players, minimally invasive surgery, light shows, and internet communications.

Using a similar thought process, dark matter was hypothesized to have significant gravitational effect on the known universe. Being unseen by modern methods—dark matter does not absorb or reflect light—its presence was discovered by looking at the expanding universe and realizing there must be something accounting for the gravitational forces beyond visible matter. In fact, most theories place the amount of dark matter in the universe at ~85% of all matter, meaning the majority of the gravitational force influencing the structure and dynamics of our universe are not visible to our eye or our current instruments.

By observing reality and re-framing problems, we create a space for a different comprehension of reality as we know it, and we open a new set of possibilities—a new possibility space—for us to understand, explore and exploit. It also suggests there are other known systems that describe the universe. By analogy, this kind of understanding of foundational forces that underlie the description of the environment that we can easily observe encourages us to think how other systems—like markets—might take different forms.

The lesson here is that sometimes we are trained or capable of seeing that which is visible to us, and we therefore assume there is nothing else to observe when in fact the majority of influence comes from something unseen. It is only by looking outside our immediate system that we get a view expansive enough to reveal the most significant influences. Granted, the additional gravity imposed on us here on Earth by dark matter may not affect or lives in meaningful ways, but on the time scale of the universe, it determines whether the universe expands forever or collapses under its own weight in the Big Crunch. Understanding foundational forces can reveal these factors that have great impact upon our businesses.

Finally, science tells us what is unknowable and how to deal with it. For example, the words 'chaos', 'complexity', and 'entropy' are bandied-about to mean 'so disordered as to be confusing', 'really hard to understand,' and 'a decline to disorder'. While these popular definitions get a point across, they are wrong, and besides being

wrong, their use, in this general sense, lacks a scientific rigor that is helpful when thinking about systems in general.

'Chaos' refers to a system that is not deterministic (its outcome is not predictable; or another way, the same 'inputs' will produce different 'outputs') no matter how much information is known about it. It says more about the properties of a system than the state of the system right now—confusing or not. A classic example of a chaotic system is the double pendulum. The point of a swinging normal single pendulum traces a regular and repeatable pattern of position over time: back and forth, back and forth. One could measure ones heartbeat by it (as allegedly Galileo did). A double pendulum, a second pendulum arm attached to the point of a single pendulum, is chaotic. The path it traces is not regular, repeatable, or even knowable, despite its physical properties being very well known. The path is so sensitive to small and subtle conditions—position of release, air currents, small vibrations—that its path cannot be predicted for more than a few swings. We simply cannot know or predict the path. Market research tools and marketing approaches assume determinism in our current markets and emerging ecosystems. We find it increasingly useful to think ecosystems and markets are increasingly chaotic per this definition—not just confusing, but that outcomes are unknowable given actions we take.

'Complex,' scientifically speaking, also refers to a system property. In a complex system, the parts of the system interact in ways that aren't always predictable. This is different than a complicated system, which may have many elements configured in a sophisticated way, but which behaves predictably. An automobile is complicated—one can disassemble the pieces and put them back together and get the same result. Likewise, if one removes one piece of the car, the result is predictable (take out the fuel injector and the car won't start). On the other hand, a food web is a complex system. Remove a part of the system, say a food source, and the implications are not known a priori. The effects will ripple through the system over time as the system readjusts. An interesting property of complex adaptive systems, is that under certain conditions, order can emerge from them, though we cannot predict what order. We find it increasingly useful to consider our current markets and ecosystems as complex adaptive systems, such that our tools and techniques for understanding them, working with them and engaging in them require progressive catalysis and search for emerging order.

'Entropy', the third of our concepts, can indeed suggest a decline to disorder. This is because entropy, through a statistical thermodynamics lens, is a measurement of the number of possible states in a system. (To be specific, entropy is proportional to the log of the density of states of the system.) Whoa! This means that as a system becomes exposed to outside forces and conditions, the number of ways it can change or evolve increases. Put it this way, when you send your kids to high school, there are only so many ways they can get in trouble (more than you'd like, for sure). Ah ha—but when you send them to college, there are a lot more ways they can get into trouble, hence, you either worry more—or less, depending on the kind of parent you are. We find it increasingly useful to think about our current markets and ecosystems precisely as comprising expanding possibility states.

These rigorous definitions of scientific principles become useful when attempting to understand the current systems in which our businesses operate. They teach us to look for more foundational truths about the forces and conditions that shape our business ecosystem, and that perhaps the most influential factors are not contemplated by our traditional strategy and marketing frameworks and tools. Rather than general comments on the uncertainty of the future, of risks and opportunities, they acknowledge uncertainty and importantly they give us a framework to both quantify and manage growth from a systematic viewpoint.

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In summary, we find many current markets and ecosystems best described as increasing zones of possibility (way more outcomes than you might imagine), that behave chaotically (the outcomes are unknown in advance) within the context of complex adaptive systems (whose outcomes can be catalyzed and searched for rather than measured and discovered a priori).

If this sounds unlike any marketing or market research you studied in business school, you're right—it's not like that at all. We fundamentally assert that the old techniques are increasingly less relevant to entire sections of global trade. For sure, as with Newtonian physics, some of the more traditional stuff probably works just fine for things like soap and cream cheese and ketchup and perhaps even cars—at least to some extent. But not for technology products, and certainly not for digital technology products—products that rely on bits. Maybe this is why Warrant Buffett famously doesn't understand high tech—maybe he subconsciously detected something fundamentally different—if he did, he was right. If it was just a hunch, well, he is sort of famous for hunches, isn't he.

We can wrap all this up in a sentence: There's been an essential shift in the dynamics of technology and technology-based markets and ecosystems from one of prolonged stability with punctuated moment of volatility to one of relatively prolonged volatility with punctuated moments of stability. It all comes together with this. The digitization of everything, cultural values in flux, the shift from markets to ecosystems and the application of complexity sciences. It's not any one of these things—rather it's all of them together that makes the difference. It's all of them together that suggests the need for a new approach to systematically engage industries and create new value.

We call that approach System Transformation.

PUNCTUATED STABILITY

08

Alexander Calder Mobile

As a species, we are rather occupied with the future: for one thing, we know—and we know that we know—that the future (likely) exists. Indeed, most of us, most of the time, generally laugh at (if we're not crying for) people who predict that the end of all things is nigh—especially when people give all their worldly possessions to one man in preparation thereof.

Maybe it's not that surprising, really. There are many things we can predict with a high degree of certainty. For example, we contend that we can be just as practically accurate forecasting the weather as our local weather forecasters if we simply assert that tomorrow will be just like today. Or, perhaps more plainly: we know morning will come after night, that I am very likely to have a coffee in that morning (at about 5:30am), that my car will start, I will drive to work at about 6:10am, etc. The thing is, I can also likely predict the same things one, two, three—even possibly 5—years out with a rising but still fairly low degree of uncertainty. The same patterns are true of many things—that I'll be living in Portland, that I'll not be dead, etc. I recognize that not everyone can make the same predictions or the same predictions with the same degrees of uncertainty.

Regardless, everyone has personal, practical, psychological experience with not only predicting the future but taking action with respect to those predictions. We can do all this, because for the most part, most of the time, the systems we have in place for our daily lives are relatively stable. The same sense of "the future" therefore also extends to things like: certain foods being in the grocery store when you need them, certain brands being present, school years starting and stopping, holiday celebrations—and everything that

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goes with them—occurring with regularity, etc. And it extends to our sense of what it means to run a business.

Businesses, up until recently, ran along this same, very practical, very defensible and very human all around practical sensibility that we can predict the future with relatively low degrees of uncertainty. We've developed all sorts of tools, measures, metrics, plans, processes and theories for how business runs in the context of enough stability such that all those tools and processes allows us sufficient information to predict the future such that we can plan the future state of our businesses. That is, the industry and factors that influence the behavior and performance of the industry will be stable enough that tools and processes will be sufficient to set expectation of your business's performance within tolerances. That is, there's that very human measure of predictability. And everything works fine. Until it doesn't.

Andy Grove referred to this phenomenon as "strategic inflection points", the point at which the industry is changing around your business such that you need to adapt with it and where all the standard business tools become less valuable and our ability to predict the future diminishes. The "inflection point" unfolds under a period of time after which, a new period of relative stability ensues and things are "back to normal".

But what is stability?

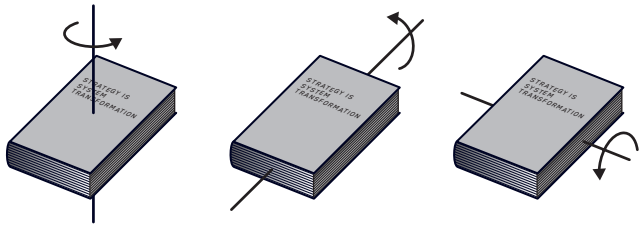
To understand the nature of stability, try this. Grab an object—a rectangular solid—such as a book or block of wood. Make sure it's not breakable because you're going to throw it. If you choose a book, you might want to put a rubber band around it so the pages don't flap open.

Note the object has three primary axes of rotation through its center—one for each pair of parallel sides. You should also note that this is a rectangular solid, so there is a short, medium, and long axis relatively speaking: through the book front to back, through the book side to side and through the book top to bottom respectively.

Now, toss the object a few feet in the air so that it rotates around the shortest axis. Give it enough torque so that it spins at least a few times as it arcs. Catch it before it hits the ground. Notice how nicely it spins. Smooth up and down and smooth around the axis with no unexpected or erratic motions.

Now try it around the longest axis. You might notice a slight drift in the spinning object's orientation, but overall it spins nicely. Again, no unexpected or erratic motions.

Finally, try it around the medium axis. Make sure it spins at least a few times in the air. Notice anything different? Notice that is flips around an axis you didn't intend? Try it again. Try it a thousand times. It does not spin smoothly like the first two. It doesn't even spin along all the same axes of rotation each time. It is nearly impossible to spin it such that this instability doesn't happen.



Before you did the experiment, would you have sensed any difference among any of the axes? And if you were told spinning along one axis would be unstable, would you have selected the middle distance axis? The "predictable unpredictability" of the middle axis spin was not intuitive to me at all—nor is it to most people. The phenomenon has to do with spinning around the middle axis being

highly sensitive to very small components of spin—called perturbations—around the other axes to which it is coupled through the solid. Furthermore, the irregularity of the spin is, actually, predictably unpredictable when you work out the math; that is, the math—to those who can understand it—not only demonstrates and predicts the unpredictable spin, but the math also predicts the predictable spins along the long and short axes of rotation.

Bottom line: the block sits on a table stably, and spins stably around 2 axes, but is unstable when spinning around the middle axis. Even for something as simple and everyday as a book or block of wood our intuition about its response to a simple change such as spinning around an axis fails us. This very simple system—three moments of inertia coupled in a rectangular solid—we can see that stability is situational and conditional.

Our markets for the prior 100 years or so have been relatively stable. In the Digocene, we in the tech industry are increasingly spinning around that third, middle axis—our businesses are predictably unpredictable. That is, the situation and the conditions do not lend themselves to predicable outcomes → and in fact, they specifically lend themselves to unpredictable outcomes.

If markets are increasingly predictably unpredictable, then by definition we must do our work differently than we have in the past. We cannot, by definition, use the same tools of uncertainty reduction and expect the same kinds of outcomes. We do not want to belabor the point, but we also don't want to pass it by too lightly; this is a very hard point to get across. We, as humans and as business people have a very strong desire—indeed a strong capital imperative—to do everything we can to secure a future that we not only can predict, but whose emergence we can control.

Moreover, our intuition about stable systems is pretty good—most of the time, systems are stable enough that we can predict what will happen within some tolerable amount of uncertainty. And our intuition is backed up by science which does a great job of quantifying stable systems and qualifying when a system will become unstable (or change to a new state of stability). In stable systems, things do change, but they change predictably and linearly—or even nonlinearly, but the functions that describe the changes are well articulated and precise. So we have a double whammy: intuition and science combine to thwart our sensibility about when systems aren't stable—that is, when they're predictably unpredictable.

It's no fault of ours that we can't anticipate how a system might change. Like the example above, even knowing that spinning the book around the medium axis is unstable does not allow us to predict what will happen precisely. We know the book will flip around another axis, but we don't know exactly when or how many times, etc. This unpredictability is amplified in complex adaptive systems, when the elements of the system are interdependent in ways that changes are amplified in the system. In a food web, removing or introducing a single species can unbalance the entire system.

Given our contention of the shift from prolonged stability with punctuated volatility (an inflection point) to prolonged volatility with punctuated stability, understanding dynamic forces rather than stability is far more useful for running a business. And doing this requires developing new tools, new measure, new processes, new kinds of planning and new forms of engagement.

In the common language—English vernacular—"entropy" is often cited as a measure of disorder, as in: "My god, son, your room is progressing toward maximum entropy." But that's not really right. Entropy is better understood as a measure of the total number of possibilities available in the total system given that order has not yet formed. When order starts forming, the total number of possibility states begins declining. Put another way: a bunch of companies doing their own thing form an "ecosystem" with lots of possibility spaces—a messy room. As markets (systems of exchange) form, the number of

other possible markets decreases, decreasing the total possibility space.

We contend that with digital technologies fundamentally transforming business, we are for the foreseeable future in a state of increased and increasing entropy—that is, more possibility states—as new markets form around emerging control points. This would be just another "inflection point" if it weren't for a major difference: the process is now continuous. Digitization has reduced the frictions (lower the energy) in the system such that order can form and reform with relative ease. Thus, the while the total entropy (possibility states) may actually decrease for a short time as a "market" forms, it's a temporary situation—for even as one market forms, others are emerging. What we need are measures and early indicators of "order formation".

Perturbation theory gives us some insight into the kinds of measures we might consider. The idea here is that there's a (presumably) unsolvable problem whose solution can be approximated by simply adding a little extra math to an equation. It seems to me kind of like cheating. But it gets you closer, it can calve off the parts that are solvable, perhaps, leaving the unsolvable parts to contend with. Consider a market or an ecosystem around Personal Data. Figuring out the next market is an unsolvable problem. But breaking it down and making a few suppositions as to possible futures isn't an intractable effort.

The question then is what are reasonable measures? We might, for example, identify clusters of companies doing work in a particular area—and take measurement of the cluster itself. Perhaps revenues or capital investment or volume of products sold. The important concept here is that it's in clusters. Then we might not only compare clusters, but monitor them very carefully and look for discontinuities—sudden bursts of or declines in some metric, something that indicates impending order (or doom).

We might also imagine scenarios in which certain clusters begin to form ordered markets and what they might look like. By examining the companies and their connections to one another, we should be able to hypothesize actual capabilities a people might actually pay for. And we might monitor those particular clusters. Essentially, by forming "clusters"—based on either the network itself or on the ethnographic work—or even on a hunch—we are essentially "adding a little perturbation" to help us "solve" an unsolvable problem. In short, we're not measuring what "is", but what "may yet come to pass" and hoping to capture a moment just before or perhaps just after "proto-order" forms as a moment of maximum return.

Another way to look the ecosystem is to try and get a handle on positive feedback loops within the network of interest. For example. We might extract a measure like this: Companies get a capital infusion. What we want to then look at is the knock on effects that follow any one particular infusion. For example, we should be able to look at and compare the acceleration of capital infusion (in terms of dollars and/or deals) as over time and as a proportion of the initial infusion. (Nearly every measure needs to take a base-rate, i.e., a denominator, into account.)

Another way to examine order formation is to look at the downside, that is, the failure of a node, cluster or hypothesized control point. For example, rather than examine a cluster for its growth elements, like those described above, one might consider its "death" elements, that is, the reverse of the above. Understanding a node or cluster in terms of its decline might be indicative of dissolution of proto-order. For example, presuming a metric that looks at positive feedback, a slowing of positive feedback might be just as indicative of order formation (or dissolution) as chasing after those companies with the most positive numbers. Another way to use a measure like this is to look for where they are occurring throughout your network. Declines may suggest things like consolidation (so look for "survivors") or

competitive vectors or "jobs" that are no longer useful, thereby reducing the number of total possibilities.

Taking this idea a step further, one might be able to look on the network itself with the hypothetical lens of what would prevent any order from forming. In engineering terms, it's the moral equivalent of designing-in the point at which the system fails. To explain: when we look at one of these networks, we imagine order will form and our task is to figure out how, when, where, etc. However, suppose our task was to try and prove the negative—that order won't form. If we imagine a particular experience someone might pay for that requires a particular cluster of nodes, a very good question might be what is the "weak link" in the cluster? That is, where will the experience fail? This is another way of understanding the total probability of emergence.

And finally, if we start putting these measures together, we can begin to get an idea—a measure—of the overall robustness of a particular ecosystem with respect to the potential for order formation—that is, for markets to form. This would enable a company to compare ecosystems to ecosystems a) internally within the ecosystem itself, b) across ecosystems and c) with respect to corporate interests.

A measure of the robustness of the ecosystem would also give an indication of the kind of company that is needed to engage in that ecosystem. That is, one would want a company with appropriate corporate operational processes and structures that match the robustness of the ecosystem. In prior work, we suggest for example, that the "velocity" of the organization needs to match the "velocity" of the market in which its operating. A mismatch would suggest the inability to engage coherently and cohesively thus creating a poor resonance with the market.

This is hard stuff. We humans like things that "are" and that are stable; we don't like forces; and we don't like dynamics. We don't like flow; we don't like verbs. We are, almost stupidly, continuously amazed at soccer players and hockey players who "go to where the ball/puck is going to be" and not where it is. In hockey, a game (that if you watch hockey) you've seen a gazillion times, when a player "skates to the puck's future location" we are amazed. And it's only a puck. Or a soccer ball. And we're only talking about fractions of a second into the future. And we've seen it before. And we're amazed—ah-mazed—that the athletes could put together such plays in real time.

So now, imagine it's not a rink. But an entire business ecosystem like Personal Data. You don't know where the puck is going to be. You don't even know if it's a rink and/or how many pucks there are. You can't optimize. It's unpredictable. And predictably so.

We know it's not easy to accept, though. The human, cognitive tendency is to intellectually acknowledge something and then ignore it. In this case, we might intellectually acknowledge that markets aren't what they once were and that our processes and tools are essentially not only useless, but possibly debilitating, but then ignore all that and work even and ever harder to collect more "data" to try and predict the unpredictable. Our need to know clearly exceeds our ability to know.

In summary, it's important to accept this fact. It's important to internalize that the tools and processes you know increasingly less useful. Then you can accept the fact that you can't optimize for the "chaotic spin" for the simple reason that you can't.

However hard that is, with a little effort once you accept that fact, completely new arenas of exploration are available for consideration. Seeking new revenues in a period of prolonged volatility is no longer an exercise in "knowing the user" and "measuring the market" but rather one of imaging possible orders and taking the pulse of the dynamic forces at work in the ecosystem.

And that might be the most fun sentence I've written in a while.

WORKING EXAMPLE: PERSONAL DATA ECONOMY 09

Working Example:
Personal Data Economy
Vibrant Data

Some definitions: An economy is an exchange system of production, distribution and consumption. An exchange, Geog Simmel asserts, is when all parties to a transaction each give up something in the hope of getting something better. Producers made things, distributors distribute things and consumers consume things, each party having a role and each party being paid one way or another through the supply chain for their labor and value-add. Economics also used to be bound to physical location–that is, for the most part, production, distribution and consumption was geographically very local indeed, that is, within walking distance or similar human scale distances.

Of course, today, the global economy is just that: global—it's not bound to geography other than that it's bound to planet earth—and even that may be changing with Space X and companies like that. Moreover, as we've discussed, the economy is increasingly based on digital bits rather than physical things, with all the attendant implications discussed—which, while missed by the majority of people, have not been missed by key tech industry players.

Large data-centric companies were clever to recognize the value of data early in the Digocene transformation. The result is that they've acquired an increasingly valuable asset and an asset that increasingly accrues value with every added data point and, unlike oil—to which data has been too often analogized—data does not lose value with use, but rather accrues even more value. Data is absolutely not the new oil.

WORKING EXAMPLE: PERSONAL DATA ECONOMY

But it absolutely is a new asset class, and one concentrated in relatively very few locations.

In our ethnographic work we researchers noted two key facts. First, Regular people were increasingly aware of data concentration and that "their data" is "out there" where they can't get it. People—not all, not even many, but some/enough—who cared, who understood even a little about technology and the industry started seeing this data concentration effect. Second, people were both the producers and consumers of data. But unlike in prior economies, they were not active participants in the transaction; they didn't recognize the currency, value or impact of the transactions they were unintentionally making. That is, people were increasingly aware that data about them is out there, that other people are making (a lot of) money on it, they don't necessarily like it and they don't know what to do about it—or if there's anything they can do.

It's important to note that ethnographic work is not the same as "market" work. There was not a prevailing majority of the population who understood where their data was going. In fact, it was—and remains—a very small proportion of people. But the fact that this knowledge is hidden—or at least unknown—doesn't make it irrelevant. In fact, the knowledge of these hidden patterns is even more relevant when one realizes the exploitation associated with it, because that's what exploitation is: extraordinary advantage gained through establishment of gross power and information asymmetries. Just because one doesn't know one is being exploited, doesn't mean one isn't being exploited.

Another way to think about this would be to imagine a "personal data economy" that is more about personal, individual data, and an economy based on the individual's ability to provide controlled circulation of their personal data in context and to monetize it for themselves. Put another way, to paraphrase—and with apologies to JFK—the question is: ask not what your data can do for algorithms, but rather what algorithms can do for your data.

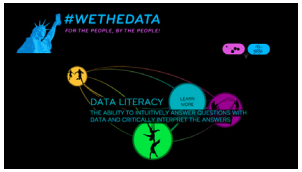
Such a shift would be substantial; indeed, it would be of "Copernican" or "Einsteinian" proportions. And you might ask why even entertain it. We not only entertain it, we find such a shift would be a broad value to the industry as a whole and to individuals both individually and collectively: It would engender greater participation, greater economic activity, less inequality and a greater need for more broadly distributed computation.

At the root of this analysis, we synthesized a plausible view of the future—something we call plausible fictions—based on a deep analysis of ethnographic data precisely looking at shifting cultural values that if mobilized will underwrite or undergird everyday behaviors to push markets in this desired direction. This notion of "personal data economy" is the example we will use through the rest of the book as we first ask the question, "How plausible is this fiction, that is, how plausible is this potential future, or, what is its option value?" We'll also need to look for whether there's evidence from the industry that there's even a possibility for this shift to occur, and if so, what evidence, and if so, where are the emerging areas of strategic value. We'll need to then identify what it would take to enable such a system transformation, that is, what are the catalytic entry points. Finally, we need to create value; we need to "do something". The question becomes what do you do that's efficient, effective and that accounts for the emergent activity in this ongoing, active, vibrant ecosystem.

To more fully understand the personal data economy, we suggest the links to the left:

This vision video explores a plausible fiction in which the value of personal data flow back to individuals and communities. The video hints at the new system that must be in place to achieve the vision.

Visit: ***https://vimeo.com/149691224***



WeTheData is a site created to spark an open dialogue about personal data in order to map the landscape of necessary factors, values, and risks.

Visit: ***http://wethedata.org***

10

SEVEN QUESTIONS TO ASK OF SOCIO-TECHNICAL SYSTEMS

In this section, we dig in a bit as to what we mean by "socio-technical systems" and how we use social science to understand them.

We contend it's far more useful to think of people as part of socio-technical systems rather than as markets. Here's the difference: Markets are characterized by exchange—by each party of a transaction giving up something in the hope of getting something better. Characterizing a market, therefore, is simply characterizing the system of exchange: who's buying what, where, how, when and why. It looks like this: "Who's buying [my product], where are they buying it, how are they buying it, when are they buying it and if we're lucky, we know why they're buying it." All the questions are from the point of view of the product.

On the other hand, thinking about people (and products) as part of a socio-technical system, means characterizing the system as a whole, and the ways in which people and other system components work together to foster or inhibit some behavior. The example of Personal Data, in the prior chapter, is useful here. Rather than asking about "my product", we ask questions about things like "what's an average day like?", or, "How do you keep up with what's going on in the world—or do you?", etc. Understanding the system allows us to take multiple perspectives and broadens not only our understanding, but it also—in the right hands—identifies the underlying values and forces that guide, manage, maintain and degrade the system.

Our work focuses on understanding the system rather than the market. Understanding a "market" is essentially understanding the "things as they are now", as described above. Understanding a system, however, offers insight into the dynamics and forces that herald tomorrow. Given our contention of the shift from prolonged stability with punctuated volatility to prolonged volatility to punctuated stability, understanding dynamic forces is far more useful than understanding the static now.

To do this work, we rely deeply on methods and knowledge from the social sciences—especially anthropology, sociology, psychology and economics. And, among all of these, ethnographic praxis, rises to the top as the standard bearer of this work. Ethnographic praxis refers to the writing of culture. It hails from cultural anthropology, as you might imagine, and it's been incredibly useful in the characterization of socio-technical systems. The most popular method that you might have heard of is the "participant-observation" technique, where the observer/researcher is also engaged with the person/people in the study in whatever it is they are doing. This is not a book on ethnographic practice. However, it's important to note that we use ethnographic practice to characterize socio-technical systems. That is, you cannot—and absolutely should not—use market research techniques, like surveys and focus groups—to characterize socio-technical systems.

There are seven attributes that we must consider to define any socio-technical system. Our colleague, John Sherry is responsible for compiling this list of questions and their meaning—a list that we've been using for years. These are listed on the following page →

10 SEVEN QUESTIONS TO ASK OF SOCIO-TECHNICAL SYSTEMS

1. *What system do we want to change/impact?*
2. *Who are the participants in the system?*
3. *What counts as a resource?*
4. *What are the practices and how do they align?*
5. *Where is power and how does it operate?*
6. *What happened in the past and why?*
7. *How does change happen?*

These are described below in detail. We occasionally refer back to the Personal Data example for illustrative purposes.

QUESTION 1:

What is the system we want to change or create?

Since our goal is changing systems, we start by figuring out what system we want to change. It's a deceptively difficult question. The world we inhabit consists of systems within systems. System boundaries are blurry; systems overlap, or even compete. It is very easy to become confused. We need to be as explicit as possible which system we're talking about, and what level we're focusing on.

In our example, we defined what we thought a "personal data system" would be, based on the ethnographic work we did. We used that definition as a "lens" by which to evaluate the ecosystem of companies that has something to do with personal data, one way or another. That is, we identified nearly 800 companies, associated with each other in a particular way with respect to the types of technologies they were working on.

That was, for us, the overall manifestation of "personal data" system. But it was really the definition that defined the system. Essentially, the personal data system is the system in which individuals can participate in the global internet economy controlling the circulation of their data and exchanging it for value on their terms.

It's instructive to consider the difference between this characterization of "the system" and how a business strategist might characterize the system, e.g., with any of innumerable frameworks, like Michael Porter's Five Forces Model, or Robert Burgelman's Diamond Model, etc. These frameworks are great for considering very specific actions within very constrained environments where all else is assumed to hold steady, and the only "levers" in contention are one of the "five forces", etc.

Thus, this question is never formally and finally answered forever and anon. Our characterization of the system is a definition of action and of aspiration for how we identify what we think the system should/could/might viably be. There is no "known" or "inevitable" future. There are, however, forces, values, movements, indignities, power structures, that can catalyze forming order out of disorder. One of our colleagues, Maria Bezaitis, calls these future potential states "plausible fictions". Personal Data, as we've defined it, is the name we've given to the plausible fiction of a system that says people can control the circulation and exchange of their data in context. The notion embodied by "Sven", where cell phones take on increasingly diverse roles in context (and thereby compete with PCs for value) is another.

QUESTION 2:

Who are the participants in the system?

When we ask "Who?" our interest is not limited to who might interact with a new product or service. Rather, it extends to everyone in a system and how they relate to one another. We are interested in people's diversity of purposes, roles, identities, capabilities and motivations, and most importantly how these all combine to create interdependencies and constraints. Asking "Who?" means exploring who might benefit from a new idea, and who might bear the costs, (not just financial but also physical or cognitive effort, use of time, or any disadvantage, etc.). The point is that this is unlike characterizing a market where we speak to the customer, or perhaps even to the end-user. But when you characterize the a system, you need to characterize the interacting people and their relationships.

Participants define themselves in terms of their place in a system and their definitions can change. As behavioral economists and psychologists have repeatedly demonstrated, we are not the static, monolithic, rational actors economists once theorized, but rather subject both to divergent tendencies in our own brains and to the influences of others we relate to in the multiple systems we inhabit. We're parts of industries, companies, schools, societies, families, teams, etc. And there's overlap, for sure. But rather than study just the "customer", e.g., the Mom or the Dad, we like to characterize and understand their relationships with the "kids" and "their parents" and their "cousins" and whoever else is considered "family" in terms of roles, rights, privileges, obligations, etc.

Of course this tells us who it is we need to take into account within the system of study if we're going to think about system change. Far too often, as the innumerable examples in the anthropological and development literature demonstrate, people imagine "new ways of doing thing" without taking all the people into account that need to be taken into account to make the "new way" work well. As a quick, humorous, but pointed example, in one place we worked years ago in the mountains of Ecuador, we noted small, blue and white painted cinderblock buildings standing next to considerably more run-down and dilapidated looking homes. Turns out a well-meaning, but clueless agency thought the inhabitants needed outhouses since they had no indoor bathrooms. The agency "dropped in" these lovely cinderblock "outhouses", which were immediately used as storage sheds for gardening tools. They didn't even think to ask.

QUESTION 3:

What counts as a resource? There's a term within the innovation community called "frugal innovation", which refers essentially to very cleverly narrowing the functions of some new thing to the minimum required to be effective, and then driving out all the cost from design to delivery by all means possible. Much of this kind of work started in India, but in a slightly different way. For example, one day, while near some sugar cane fields, a little truck was rockin' on down the road. It looked as if the only thing left was the engine and the chassis. But it made a distinct thwap, thwap, thwap sound as it rolled by. Turns out, the truck was just a chassis. And the engine, when it's not an engine, was a 2-stroke water pump (for pumping water from the bottom of a well).

The machine is an engine and a water-pump, albeit not simultaneously. That is, the engine is a resource with some flexibility of purpose. It's also a scarce resource. It's easier to build a chassis designed to accept a 2-stroke water-pump engine, than it is to buy and maintain two separate engines.

For our point here, most readers of this little book would not know to consider a water-pump as a resource for transportation. But to those people, it is. And that's the point: what are the available resources from the point of view of the participants? What counts as value? What counts as scarce? More interestingly, and perhaps importantly, what must be a resource and what can't or shouldn't be a resource?

Also, when we have an idea for a product—that is, a new resource to add to the mix—we need to ask how it might fit in. What will it require of people? What other resources (capital, infrastructure, tools, knowledge, rules and procedures, organizing structures, etc.) must be in place for a product to succeed? There is no substitute for local knowledge of the sort that ethnographic and design research provide in this regard. One can never predict what participants on the ground recognize (or use unconsciously) as a resource.

Some years ago, Intel introduced the "Community PC" in villages in India. As part of that product team, we (Salvador & other researchers) had done a lot of work to understand the local needs. The product team designed a computer with all those needs addressed. In the end, as designers, and even with the work we did, we missed the mark. On the one hand, it was fantastic and cost less than the sum of all the components needed for this particular application in rural India. But it was designed so well, it offered no chance to fix or replace broken parts. Parts are a resource; the ability to fix parts is a resource. The total cost of all the components is and was less than our system if you had previously used, or secondhand parts. Moreover, given the availability of parts, they had back-ups in the event of failure—and there are always failures. We had fundamentally missed a key attribute of what is and isn't a resource in that local environment. We didn't ask: what will make this fail. And in the end, our otherwise well researched product failed. Lesson learned.

QUESTION 4:

What are the practices and how do they align?

The point of a system is to take action, therefore, it's vital in characterizing a system to understand people's interactions and alignments. How do my actions affect yours, and vice versa? Adam Smith's recognition (centuries ago) of the "invisible hand" by which free exchange leads to an ordered distribution of wealth is one of the best known general examples. Understanding the actual practices, behaviors and actions people take is something anthropologists and designers have done for years. It is not a trivial task. For example, ask a person to describe what job they want done and you will most often get a blank stare. Ask them about their daily routine or activities and you will get an abstract account that doesn't include all the little work-arounds, adjustments and routine activities that most of us would not deem worth mentioning. There are ways to get at this information, for sure. And that's handy, because these details are key not just for design, but for the very persistence of complex systems, as researchers have shown.

Understanding actions requires understanding their intricacies with respect to both the people and other actions. How are physical activities aligned in time in space? How do information sharing activities—transcription, translation, propagation, and feedback—enable teams to complete complex and distributed information processing tasks? How do novices learn to see and think like experts? How are diverse motivations aligned to ensure that a common-property resource such as a forest or fishery or a well-truck-engine is preserved.

All of these are different flavors of the same basic question: how do we enable the alignments that in turn create emergent systems? When we understand how practices align we are on our way to understanding how a system arises and sustains itself. That is what smart researchers do with tools such as agent-based models. When we begin to propose new practices, and/or new ways of aligning them, we are on our way to imagining new systems. Strategy is about imagining new systems and it follows that understanding actions and their alignments are at the heart of what we mean by strategy as system transformation.

QUESTION 5:

Where is power and how does it operate?

Power is perhaps the most abstract concept to understand, and yet, everyone understands power intuitively when they experience it whether at work or, perhaps at a government institution, like a courthouse or even the Department of Motor Vehicles. When you were younger and took your driving test, the DMV representative had the power and the authority to deny you a license preventing you from driving.

So, let's have a couple of crisp definitions: power is the ability of people and structures to influence your behavior. The DMV representative has the power to deny you the privilege of driving; a bully exercises power when he takes your lunch money. Authority is the socially sanctioned use of power. The bully does not have the authority to take your lunch money, but the DMV representative does have the authority (as well as the power) to deny your license as determined by all the myriad rules we've set up in society to invest her/him with that power and authority.

The DMV example is particularly useful to think about because it quickly unfolds into a rather complicated chain of aligned practices that involve state constitutions, voting, law making, rule making, agencies, appointed individuals, employees of the state, enforcement officers, test makers, record keepers, insurance agents, and so on, ultimately including the individual driver. Each of these—as well as other entities—comprise the "driving system" that can be revealed simply by tugging on the thread that is the driver taking his or her driving test.

Throughout this system, of course, is heaps of power and authority that you might not even recognize until or if you try to take some action that is unsanctioned. For example, try being a little "creative" during the driving test or when you're getting your photo taken and you'll find very quickly what power feels like. Going through security at the airport is another visceral expression of power and authority. You can't even make certain jokes without potentially incurring the wrath of the system.

But power and authority also work in more subtle ways such that people with power resist change that might threaten that power in any way. In fact, we humans fear loss so much more than we hope for gains that we'd rather keep things as they are at some satisfactory level rather than take a risk to achieve something better. And so, for example, you get the phenomenon of the "young entrepreneur", the young person who has, essentially, nothing to lose, who takes a "risk" to do something innovative—they have everything to gain, including power.

The ability to choose your action to manipulate the environment on your own behalf is called agency. Having agency means you get to decide what you want to do, for example, to decide whether you want to wear that goofy hat or not for your driver's license photo regardless of what the DMV representative thinks. People like having agency; it gives them a sense of control, a feeling of efficacy. Job satisfaction is, for example, closely linked to the sense of control you have in your day. In human systems, agency has blossomed into power, refracted, magnified and distributed in ways that social scientists are still trying to keep up with. To ignore power means to risk a good idea being rejected by vested interests. But, more important than that, understanding power may point out opportunities for empowerment. No doubt there are situations where power can be leveraged as a solution as well. The key is to be explicit about power in all its forms—not just in obvious hierarchies but also embodied in norms, structures, daily rituals in hallways or conference rooms, and even technologies. Understanding power is key to understanding human social systems.

SEVEN QUESTIONS TO ASK OF SOCIO-TECHNICAL SYSTEMS

QUESTION 6:

What happened in the past, and why?

Asking what happened may simply mean understanding what's already been tried, and why it's failed or succeeded. It seems easy, but it's hugely helpful and rarely done. As with understanding power, there's also a deeper sense to this question. Taking a historical perspective means taking the trouble to understand how the structures, tools and practices that comprise our systems came to be there and what keeps them there. That is, understanding why they are there matters. This helps us be much more realistic when we propose changing things.

And it also helps us to understand how to think about changing things. For example, when Salvador was in a product group, that team once ran a pilot study in a classroom in Egypt with our Classmate PC computers. The team set it all up, provided training, and so on. Teachers and students were enthusiastic: "yes, yes, we get it, love it! Thanks very much!" And they then proceeded not to use them. Parents were irritated. Teachers were irritated. When we investigated why the pilot never really took off, we found out that we might have had better luck had we spoken even informally with Suzanne Mubarak—the then president's wife who was involved with education in Egypt. Power, even if not authority, resided at least in part with her, and few seemed willing to change the system without her agreement. That is, it was possible that change was is driven top down—possibly through her and not, as the team had then imagined, bottom up, through teachers with agency.

QUESTION 7:

How does change happen now?

Most of the foregoing questions provide us a way of identifying leverage points in systems. But we also need to understand how tinkering with a leverage point might result in a system change. Here are a few factors—a few ways to understand how change and/or transformation is catalyzed.

Surpluses and shortages drive adaptation and even change. Firms and species benefit by reinvesting surplus resources in various ways. Clayton Christensen suggests disruption happens when a state of oversupply exists in a certain basis of competition within an industry. Yochai Benkler has shown how surplus labor (along with other factors) has made open source, Web 2.0 and other forms of "social production" possible. Conversely, shortages can lead to decay or change in the nature of interactions, causing systems to disintegrate, or causing systems to become cleverly efficient, like our well-pump/truck motor example.

Most complex systems are robust—their networks are wired such that they experience very few cataclysmic changes (extinction events, massive cultural trend, transformation of an industry). However, when surpluses or shortages reach a critical point, or when other factors align, a small change can ripple through a system in a major way in accordance with power laws (exponential change rather than linear) or phase changes (one way of doing things yields to another with little connection from one to the other; this is often characterized as "leap-frogging"). These don't happen often, when the possibility is there, e.g., sometimes following a natural (or human-made) disaster, it can be a very useful way to catalyze change.

Actual human dialogue can also catalyze change. People are remarkably good at talking about possibilities. Machines still aren't very good at imagining future possibilities, at combining ideas that seem unrelated to create something new. Machines aren't good at creativity in context. People are. Or at least they can be. Dialogue is the "stuff" of culture—expression of ideas, images, or pieces of technology out there in our environment, enabling humans to compare and imagine how things might be different. This happens mostly out of the control of firms, which is why so many products wind up being used in unexpected ways.

These are just hints to suggest that understanding the dynamics of change is essential for innovators to understand how their ideas might, or might not, affect a given system.

SEVEN QUESTIONS TO ASK OF SOCIO-TECHNICAL SYSTEMS

SUMMARY

Our goal is to better map the poorly charted waters of system transformation. We (Brandon & Tony) feel system transformation should be a standard part of new business formation. And the start is characterizing the complete socio-technical system of interest. For teams with a disruptive technology on their hands, or groups facing bewildering changes in the competitive landscape, the questions above provide a grounding that enables us to understand where the catalyst points are and how to address them. Programmatically and organizationally, it requires a commitment to change—organizations need to enable the right teams to do this work, including anthropologists, designers, business analysts, and engineers. Simply retrofitting market research won't do. Once assembled, teams will need better tools to visualize the emergent consequences of design decisions, product line choices or other business decisions. Our ongoing work is to further develop the tools of agent-based models and other simulation tools to be up to the task. These tools are an area of basic research that needs to be explored. The remainder of this work looks at the tools we're using today.

SEARCH

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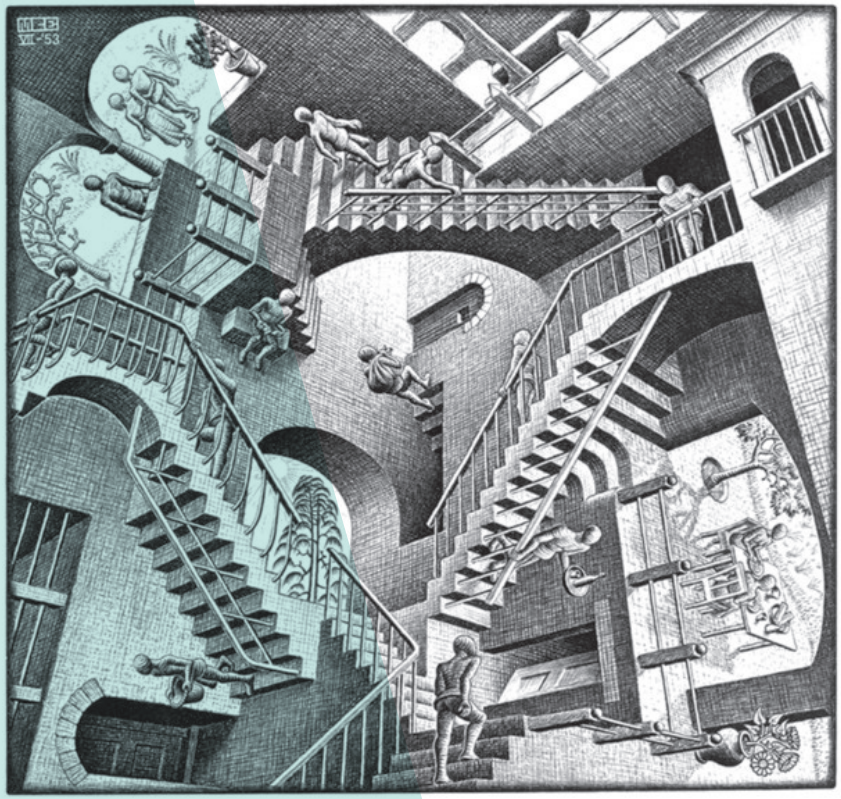

M.C. Escher
Relativity, 1953
Lithograph

Where are your keys? You were sure you put your keys down on the counter. Did the kids move them? The cat? All you know is that the keys aren't there now. And you need them to go to work.

Think about how you felt the first time when you reached for the keys and they weren't there. And then, how you felt when you looked around the counter, perhaps onto another counter, then you started retracing your steps. Perhaps you called out to your spouse or kids—"Hey—anyone know where my keys are?" You started muttering to yourself. Anxiety rising as time ticks away, the traffic is building, you have a meeting to get to. You check your purse. Your pockets. You go upstairs to the bath, perhaps you went there first when you got in the house last night. You curse the cat.

That's one kind of "searching". You're "looking for your keys." You're looking for something small, something you knew was there. Something that's not where you thought it was, but something you know exists.

There's lots of other kinds of searching. You might be looking for a restaurant in a city. It's reasonable to expect cities to have restaurants; all you need to do is figure out where they are located and get there. Perhaps you're looking for one that meets some criterion: it's nearby, offers a certain cuisine, or a certain price range. Or perhaps, you need it to meet several criteria: it's nearby and offers a certain cuisine and a certain price range. Etc.

There's also the kind of search when you don't know what you're looking for. John Snow, in 1754, was looking for what caused a Cholera epidemic in London's Soho neighborhood. He knew only that people got cholera around that area. But he didn't know what cholera was, how it was transmitted, how it could be resolved. He had to not only look for something, but he had also to figure out what it was he was

looking for, and whether it was an "it" or a lot of "its" or whether even it was an "it" at all—given that at the time, a prevalent explanation of disease was "bad humours"—odors.

Then there's the idea of looking for something that might not even exist at all. SETI—the Search for Extraterrestrial Intelligence—life on other planets—is one such thing. We earthlings are spending a fair amount of time and effort looking for something that might be merely a product of our imagination. Then again, we also look for Sasquatch, Yeti and Nessie.

We're not interested in these kinds of searches. We are, however, interested, in a specific kind of search where we're searching for something that isn't there now and that has some probability of eventually emerging, that is, of "becoming there", though we don't know what it is, we don't know where it will emerge, we don't know when it will emerge and we don't know how it will emerge. All we know is that something of its kind will emerge eventually. Somewhere. Probably nearby. Or, at least not too far away.

Imagine a landscape. Perhaps it's out your window. Or front door. Perhaps it's rolling hills or a forest floor. Now imagine an ant. Or your dog. Or yourself. Doesn't matter. And your ant or your dog or you start to walk across the landscape. As you walk, we learn not only about you, where you're going, etc., but also about the landscape itself, about its contours—its ups and downs, dips and valleys. Like a pioneer crossing the country—you don't know what's ahead of you before you get there.

So, that's one way to learn about and search the landscape. Another way is to get up high, for example, and have a look around. This gives you an idea of all that you can see. But what if you're searching for things that either can't be seen—because they're invisible—or for things that can only be seen under certain conditions, like at night or at twilight. For example, it's common knowledge that gnomes can only be seen in the twilight.

Or what about relationships. As you gaze over the landscape, it's not immediately clear the relationships people and things have with each other is it? You don't know that someone living in the northwest of the landscape is besties with someone in the southeast. You don't know whose mother is whose or who belongs to what family, clan, or neighborhood. More importantly for us, you don't know all the tacit relationships that might form—who's buying from whom, who's trading with whom. You also don't know who's got more or less influence than others, or who's got something or who's got nothing.

Overtime, you start to see patterns. For example, people start to congregate in the mornings down by the wharf. First, there's a few people buying and selling fish on the pier. Then a few more. Then someone opens their fish warehouse and a few people come in selling bread and baked goods. Maybe some coffee. Eventually, the warehouse guy expands, gets more vendors, more rents and a thriving market forms. The warehouse guy has a platform and has established a "control point" because many other vendors are coming to him to get space to sell their stuff. So the market gets established. Networks of relationships form, intrinsically intertwined with the physical landscape—transport, location to the fish, cost of moving goods across the city, etc.

Here's a couple of points that matter: First, at what point did it become clear that the market would form right where it was? Initially, there was no market (in our example). Just a landscape with people and things. Eventually, however, a market formed. Had you predicted the market would form right where it did, perhaps you would have made a good offer to the warehouse guy for his wharf location—it would have a been a good investment. Or, if you'd known or thought for a moment that a market was going to form at all, you might have located nearby, made a good offer to the fish mongers to sell their fish a little further down the docks nearer to your location, where you were planning on establishing the market. However, you

didn't see it coming—largely because you didn't know about this "market" concept.

But now you do. You've seen one. Maybe there's the possibility of others. Maybe there's the possibility of variations on the theme. Our "wharf market" initially developed because of its location near the water where fish are freshest. And then it developed other benefits. Let's call these other benefits *bases of competition*. There are many: there's still location, there are lots of vendors, transport networks, established intra and inter-vendor relationships and business arrangements (formal and informal), there's the physical infrastructure of the market itself. Etc.

There's some good money in markets and you think you should get into the "market" business. What you need to do, of course, is think about how to compete with the "wharf market". You can do that, of course. It's not easy, but it's not conceptually hard. You just have to find ways to compete with the "wharf". Different location near a new and upcoming neighborhood, different kinds of vendors—perhaps more upscale or more downscale. Perhaps it's different kind of food, or just "not fish", or maybe it's vegetarian, or it's a night market rather than a morning market with cocktails and music and evening foods you'd want to nibble on or bring home. It's a lot of work. But it's conceptually not hard—after all, our "wharf guy" has already done the work to establish the concept of "market".

What you're looking for, of course, is the *next big thing*. You want to identify the next "market" platform/control point and you want to corral the strategic influence for yourself. Your challenge is how to search for that next big thing that doesn't exist yet. That's the real challenge of this chapter.

Imagine our landscape now as a system. And imagine it's relatively stable. Nothing new comes along. But there's change—people grow old, neighborhoods change, etc. Markets come and go. We have good techniques for thinking about establishing (perhaps re-establishing) control points across a landscape for things we know about. Focus groups, surveys, market sizing and segmentation, etc., are all useful techniques for understanding the current landscape because we already know what we're searching for (a new competitor to "wharf market"), or perhaps because you are the "wharf market" guy and you want to expand to another part of the city—you just have to choose where (i.e., you're an incumbent in a known, stable market). These searches are from a point of knowledge and power. They are incremental.

It's a tad (ok, a lot) more difficult if we don't know exactly what we're looking for—because it hasn't been thought up yet, or if what we think we are looking for isn't exactly right, or if there are "hints" of something new—but we don't know how to read them yet. The Lean Start-Up folks have tackled this. You choose a point on the landscape and start to explore whether the forces necessary to form a business (e.g., a new kind of "wharf market") exist—you establish an "MVP"—a minimum viable product. You determine if there is interest, are there complementing endeavors, do partnerships form, are MOUs signed, etc. Based on the results of their "probes", they determine if it's worth continuing or whether they should evolve (adapt the product) or scrap it and choose a new direction and test again.

This process is very much like a mathematical search of a contoured landscape to establish its shape and to determine, where are the maximum points and minimum points. MVP/market tests are "contour probes". You choose a point on the value/business model curve and see if the market forces establish the point near a maximum or optimal point or not. Your response reflects knowledge of the shape of the contour.

This was a revolutionary step for startups. Think about it: prior too "lean start-up", the assumption for new companies (or established companies with new products) was that "they had a good idea and the job was merely to execute on that idea. But now the assumption

is pretty much the opposite. The assumption is: "I have a crappy idea, but I think I can toss something out there, see what happens and adapt quickly to develop a good idea while forming a market around it. It was and is a new approach that required new mindset and new tools and, essentially, provided an efficient algorithm with fast feedback loops to trace a path on a contour.

Both the more traditional as well as the lean start-up methods are searching for single points on a curve. That is, they are searching along a single path to establish a new equilibrium point to establish a new market (systems of exchange) that balances supply and demand. You choose a point through a best guess, explore small changes in various directions, and choose new point at location closer to goal. And then repeat tracing out a path along the contour.

However, the underlying conditions where these approaches worked—"wharf market" development and "lean start-up"—are evolving. No longer is the landscape either small enough or stable enough for "point searches". Or, rather, we (the authors) suspect that probability of discovering and/or catalyzing "a new market" in any single point on the landscape is continuously diminishing as digitization increases. That is, the landscape is overall experiencing increased flux, or volatility making the establishment of or the emergence of any single market a decreasing probability over the shifting landscape. This is what we (again, the authors) mean by a shift from relatively long periods of stability with punctuated volatility to relatively long periods of volatility with punctuated stability.

It's useful to consider that large companies theoretically have advantages over start-ups and smaller companies in this regard in that they have the resources to explore/search various parts of the landscape simultaneously. That is, large companies can map more than a single path along the contours of the landscape across various areas of the landscape. The benefit, of course, of a parallel search process is efficiency and overall time to determine whether a new market will emerge in a particular domain.

But even large companies don't have endless resources. So the questions then become how to characterize a landscape, where to search within it and then how to search in each location (as each location may require different search "tactics" even of the overall "multi-simultaneous search strategy" is the same.

CHARACTERIZING THE LANDSCAPE

Here's a bit of where our landscape search metaphor breaks down. If you are an ant, dog or human, you can only see so far. But if you're a bird, you can see a much wider area of the landscape. But as digital technologies become increasingly both prevalent and fundamental to the global lived experience, more and more of the landscape is characterized less and less by the physical and visible constraints and characteristics—wharf, fish, bread, transportation, vicinity, etc.—and more and more characterized by invisible relationships, networks, connections. Digitization liberates us from the tyranny of the physical with respect to market emergence. Thus, to get a "view of the landscape"—so we know where to search for emergence—we have to develop and/or use new techniques that give s insight into the characterization of the "invisible landscape of the digital world".

For example, one such new technique is an ecosystem map. Now, you might think we would call them "landscape" maps. But we don't. And there's a reason. An ecosystem represents a set of networked relationships within a particular theme, or with a common foundation. That is, there are "binding forces" that organize an ecosystem such that there's a functional coherence to the network as a whole and its structure in particular. A landscape is just that—a view of an area that encompasses all of its parts—some of those parts are distinct from other parts, but they are all physically "present". An ecosystem is more tightly bound by sets of beneficial relationships.

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Visit: ***https://vimeo.com/59856148***

#WETHEDATA

FOR THE PEOPLE, BY THE PEOPLE!

Visit: ***http://wethedata.org/about/how-was-this-done/***

This link shows how we were able to construct the first ever "crowd-sourced complex network structure" of a possible future state and what it would take to catalyze creation of that state.

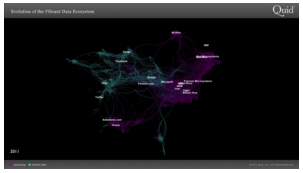
And since the digital world is not physically bound, a first step is to re-frame the notion of "landscape" in terms of a set of dynamic relationships. Hence: ecosystem map.

Let's use our example of "personal data". At the time we did that work, there wasn't the notion of personal data in circulation for the benefit of the data creator/owner, e.g., you. There was only the notion of "big data" in limited circulation by relatively few big companies. However, our ethnographic work, as explained earlier, suggested that "personal data" may be at the base of a "market" that could emerge assuming appropriate conditions. The question to us was: are there any indications of a "personal data economy ecosystem" and if so, what are they?

We (Brandon, Tony and several other researchers) worked with a company called Quid whose access to a set of databases and whose development of certain semantic and natural language processing algorithms allows for the possibility of seeing an ecosystem of "personal data" *before there's a market* for personal data. In this case, and because of the ethnographic characterization, we provided the working definition of "personal data economy". Quid then used their algorithms to extract companies who are related to each other by the kinds of technologies they are working on as related to personal data. These companies and their relationships are then sorted into a force-directed network that becomes a proxy for an "ecosystem" of related companies working on personal data and the substrate from which a market for personal data might arrive. That dynamic network is rendered here.

This map itself shows a few things. First, there are 769 "personal data companies" (blue dots) while on the right, there are traditional "compute" companies (purple dots). Of the 769, you can see certain elements of the emerging structure of the ecosystem. There seem to be some "points of ecosystem influence" forming, e.g., around Amazon, facebook, google. There also appear to be some very distinct clusters, like the upper portion (security) and the lower right (healthcare). Also, you can see new clusters forming, like "data cleaning" in the upper left, among others.

The next step is then to explore the ecosystem map and determine where to search for potential emergence. The map is comprised of companies (dots). Each company (dot) can be clicked on and explored for what it is, what it does, etc. So we can explore individual companies, company relationships and clusters of relationships across the ecosystem. We can decide, for example, to focus on one area or to explore several areas simultaneously. We can choose to consciously eliminate some areas as well.



Visit: ***https://vimeo.com/149691225***

This link shows the evolution of the computing ecosystem as new companies that deliver value through data (blue dots) are created.

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More specifically, within any area on which we plan to focus, can choose to monitor, invest, partner, release a technology or product, do an "advertising probe", basically, anything we can think of in an effort to increase our knowledge of the probability of market emergence and then decide when, where and how to "participate" in said emergence.

There are a few salient points that bear highlighting. First, by definition, the ecosystem map represents the maximum extent of the possibility space that we can know. Presumably, as various algorithm technologies improve, databases become more complete, or the ability to translate more languages (to account for more databases in other countries), etc., we can increasingly expect the possibility space for each ecosystem to expand.

Second, because we are looking for the potential emergence of something that certainly doesn't exist now, and may never become manifest, there is no "automatic" answer. That is, we are working together with the algorithms to craft the best possible ecosystem based on the inputs from the ethnographic research. Therefore, it can always improve, change, be edited. And yet, even in this relatively rudimentary state, it's much more complete than any list can be.

Third, the ecosystem doesn't tell you what you should do. It merely provides indicators, clues and other hints as to more relevant and pointed questions to ask within the search task to focus resources specifically commensurate with the opportunity.

Finally, fourth, re-running the map with the exact parameters as those that define this one (or any one) is easy—the click of a button. Therefore, it's possible to observe/watch/monitor changes over any particular time frame—like daily, weekly or monthly. One could use the network like a "dashboard", watching for, looking for changes indicative of emergence. In this way, we can begin to get measures of dynamism and volatility, how the contours of the network are changing, relative positioning of companies and/or technologies in the network, and whether there are investments or actions so significant as to determine intent to catalyze emergence. All of these provide indicators or signals of change in the context of the possibility space, giving shape to the contours and giving us a glimpse into the underlying currents that animate the ecosystem. With a bit more effort, that is, coding to bring certain elements of the databases into relief, we can also see different vectors of competition emerge and companies align to them (or not). This is important, because the only thing we know about emergence is that it's predictably unpredictable, so 'search' becomes a search for signals of change, signals we can decide, or choose,

In all these examples. The network itself becomes the object of study that captures the possibility space from whence emergence happens. And because of its relative completeness, and because the network represents an ecosystem that is both a) otherwise invisible and b) arguably valuable/real due to the ethnographic research, it means that subsequent business planning processes, such as strategy formation, decision quality, information gathering, etc., can be approached with more precision in the context of a much more complete.

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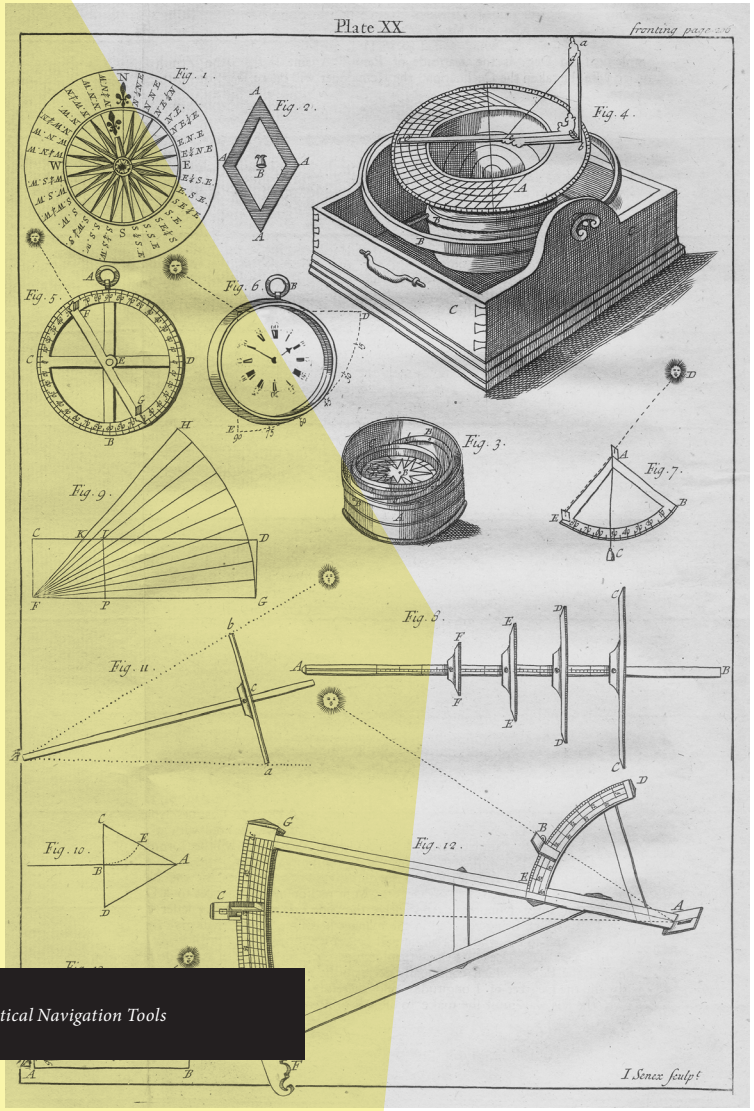

Nautical Navigation Tools

We're postulating that business ecosystems especially with respect to digital technologies are far more dynamic and far less stable than in past non-digital industrial ecosystems. A few data points: Professor Deborah Strumsky reports that US patent applications for new inventions based on combinations of prior inventions disproportionately exceed fundamentally new inventions; thus, technologies are increasingly "fungible" or "combinable" to create something new. Businesses remain on the Fortune 100 list for less time than ever—ten years today v. ninety years in 1930. Companies are investing more in intangible assets, like brand, than in tangible assets, like factories. Automation of labor is increasingly replacing human labor at a steady rate currently outstripping new job growth for those displaced or for new employees entering the market. Jobs are increasingly "gig-work" or "freelance" as compared to "corporate" with a concomitant rise in shared workspaces, networking, etc.

Taken together, it makes for a greater proportion of unstable and less stable systems where the rules are less clear, where surprises occur with unsurprising frequency and where previously unknown (to you) participants can enter the market at any time with a credible presence, product, service or technology.

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And yet, for the last century and more, we've worked hard to develop a set of tools, techniques, heuristics and metrics to measure markets assuming relatively stable systems. Of course, sometimes things happen and our best efforts went astray. But most of the time these tools, techniques, heuristics and metrics worked sufficiently well to provide enough information to make decisions. The boom in information technology has enabled some industries to measure so much about their markets that they have, arguably, reached peak fitness with respect to physical, stable infrastructure. For example, Walmart's famous supply chain innovations are probably at or at least near their apogee in terms of efficiency and effectiveness, with gains—barring the miraculous—being incremental at best.

But digital products, services, and assets are exactly that: miraculous. As we've discussed, they possess a variety of attributes incomparable to or at least opposite to physical assets, including non-rivalry, instant transmission, cross-category fungibility, analytical readiness, etc. Moreover, unlike "natural resources", e.g., oil, they are not only renewable, but actual use in addition to standard refinement increases the value of the asset: the more it's used the more it's worth and the more potential it has to create future value. Because of these attributes, how these assets actually will be used to create value is not easily foreseen, which leads to increasingly unstable ecosystems.

But we have few ways to characterize such dynamic systems in ways to help think through risk, competitiveness, market potential, etc. That is, we have no ways to understand emergence; we have few ways to measure emerging order from unstable systems if only because we've really never asked this question (or related questions) before now.

For example, let's characterize the broad tech industry as a landscape of both stable and unstable systems. Stable systems have "already-emerged" or are already existing, ongoing systems of exchange (i.e., markets) that, theoretically and practically, can be measured—meaningfully by the traditional tools and techniques we all use. But, there's also soooo much going on in the tech industry that's really just a bunch of activity and that's not part of any stable system. Lots of entrepreneurs fall into this category. They have an idea, some funding (catalyst/energy), and some production, and maybe even a sale or two; but they're aren't "run-rate"; they aren't "predictable"; they aren't stable.

If we wanted to make a distinction, perhaps we could find a metric that goes something like this: the likelihood that Company A will still be in existence in x, y and z months. That is, a company like Intel might have a "high stability coefficient" because its likelihood of being in existence 3, 9 and 27 months out is pretty high, whereas a relatively new start-up might have a "low stability coefficient". The trick, of course, is to figure out how to derive the "stability coefficient" meaningfully. Moreover, given the fact that the ecosystem is unstable, it is likely necessary to continuously re-validate any "stability coefficient" because its inputs will evolve with each measuring. It's very Heisenbergian. It's important also to understand the degree of confidence you have in the stability of the ecosystem as compared to the stability of the measurements themselves.

Another way to think about the emergence is to think about the entropy of the system. There are lots of ways to think about "entropy". A colloquial way is to think about it as a measure of "disorder", like, a messy room. But that's not so helpful here. A better way is to think about entropy as the number of possible states the system can assume. A maximally unstable system has, by definition, high entropy. But once order starts to form, the system loses some of its entropy. For example, this means that once markets form, other markets are less likely to form, fewer possibility states, and therefore, lower entropy.

So the measure we're looking for here is the density of the possibility states—that is, given a particular ecosystem and all its parts (participants, technologies, etc) what's the sum probability of any number of combinations of those parts forming a market? Consider

our personal data ecosystem. Companies in that ecosystem are related to each other by technology affinity, as we discussed before. Given that not every company is connected to every other company, the question becomes what's the probability that order will form in any given subset of that ecosystem? Is there a way to ascribe differential probabilities to different subsets? And is there a way to identify the most probable number of emergent formations?

Another way to think about an ecosystem is to consider the density of markets already within it. Our personal data ecosystem, as presented, represents the tech affinities as the definition of the links among the companies. However, if we change the definition of the links to "companies that are buying and selling with each other, then we'll see markets. We could overlay existing markets (trading relationships among companies) over the personal data ecosystem and derive a measure that looks at things like: companies in the ecosystem and not in markets. We can also look at companies in both markets and as well as differentially embedded in the ecosystem—that is companies that straddle both stable and unstable portions of the ecosystem.

Of course, we can also look at how companies have relationships across ecosystems, that is, a kind of "exogenous" or "exosystem" coefficient. A company can easily be part of, say, a personal data ecosystem as well as an "emergent platform" ecosystem, or some such. This begs another measure: the "degree of exogeneity". There may be a relationship between the degree of exogeneity and the probability of that company becoming part of a newly emergent market. This seems to be an open question. On the one hand, a company has tech affinity within a large number of ecosystems has a prima facie argument for suggesting there's an increased probability of being part of emergent order. On the other hand, such a set of relationships might be a distraction, and order never forms with/around them.

Another way to think about ecosystem volatility is to think about the pace of market formation (emergence). Are markets forming within the ecosystems? What is the rate of new entrants? What is the rate of dissolution? What's the longevity of markets that do form—both in absolute and as a proportion of size (e.g., number of companies, number of connections, etc.)? We should be able to look not only forwards in time, but using the datasets, look backward in time to look at market formation—like astronomers essentially look backwards in time to see star formation.

The notion of velocity is important. We believe it's a mistake to simply do things faster. Rather, what's important is to note something more subtle: the pace at which Ron Adner's concept of a minimum viable ecosystem can form for a given business, product or service. Going faster, per se, is simpleminded. Going faster assumes a stable and constant basis of competition, that speed matters in the market, and that others can't and won't keep up.

The question then turns not to your own individual pace, but the overall "metabolism" or "temperature" of the emergent system. How well can the system absorb "investment" and how efficiently and at pace can it convert those investments into meaningful value. This adds to the concept of the minimum viable ecosystem—in that it's not just the companies and their connections, but also the ability of that "ecosystem" to metabolize—to grow. The MVE will only grow as fast as its slowest moving member or most catabolic part; therefore, another metric is to understand the metabolic rate not only of the total potential emerging market but also of its parts.

This is similar to, but different than, say, having multiple sources of parts for your product. Rather, it's the system's ability to react or respond to some form of new incursion or crisis (i.e., a presumptive change in the basis or bases of competition). We call this "robustness".

A measure of "robustness" is more than just the standard measure of the difficulty of entering a market. Other measures of market entry difficulty assume a certain limited horizon of possibility for delivering value along a particular vector of value. That is, if you had a

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patent for x, and x delivers y value, one assumption is there's precisely one way—x—to deliver y value. Thus, competition is limited either to replacing y—making it moot—or partnering and licensing, etc., with the company that produces x. However, that assumption is increasingly under duress. As mentioned previously, there are fewer "fundamental" patents and more "combination" patents—suggesting lots of ways of delivering value—if not of "y", per se, of something awfully close to y, or even of c, something totally different and equally or more fun!

Traditional measures of how difficult it is to enter a market become much less of an issue in a digital space. Much more of an issue is the ability to maintain homeostasis in the face of competitive pressure. And that requires a robust ecosystem, which means that the individual companies in the ecosystem much match their "velocity" to that of the ecosystem. They can, perhaps, lag and lead by a little, but they can't be too far out of whack.

Many large, valuable systems have been challenged by newer, smaller systems. The former are simply not robust enough to counter the change in the bases of competition at pace which emerge from the more nascent, nimble and necessarily robust systems. The fact that large companies don't remain on the Fortune 100 list as long as they used to is less a metric of corporate stability and more a metric of robustness—or lack of robustness to adapt appropriately to changing bases of competition. In summary, we need new, system level metrics.

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Founding Fathers
Picasso
Punk Rock Movement

We now turn to the issue of taking action. There's an incessant amount of discussion about "doing things". Younger people admonish older people to talk less, do more. And to the extent that talking replaces necessary action, that talking is simply dithering or procrastinating or represents sloth, then of course, they have a point. On the other hand, to the extent that talking is thinking about what actions to take, this poses a different set of questions with respect to risk, resources, effort, expected outcomes, etc.

Look at the images to the left. Punk rock, Picasso and the Founders of the United States. Each of these catalyzed significant change. For our purposes, the key question is to decide actions that systematically catalyze change by exploring the possibility space with the intention to catalyze market formation. When entrepreneurs "launch a product", one of two things is happening. Either they are closely in tune with the relevant ecosystem and have (likely implicit) clarity with respect to how their product will fare or they are simply giving it a shot and seeing what happens without clear-headed purpose. These are the actions that result from "talk less, do more".

Lean start-up methods of "market probes" assume a certain degree of underlying knowledge of the ecosystem such that there's some probability of the product fitting within the existing or emerging order. The minimum viable product is, therefore, an experiment, a market probe, to further refine or refute the viability of the product. This is a reasonable and rational way to "do something" rather than "talk about something".

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The emergence of Lean Startup mirrors the friction reduction of the Digocene. It's just so much easier to release many different kinds of products, e.g., software products, to test and evaluate them in the "real market" rather than attempting to measure the market to infer acceptance. Another way to look at this is that it's simply a question of risk and resources. If the resources to empirically test the product's potential are lower than the resources to infer the product's potential, then it makes sense to do that, thereby increasing face validity of the "market test" and deriving direct feedback from the potential market. Lean startup methods, as discussed, represent a shift in method and in the kind of analysis one does to determine further investment. But this remains largely a linear, albeit adaptive, process with a single goal to establish a product/market fit.

We're arguing here to make use of "lean startup" methods especially as related to direct, empirical market experiments while expanding the set of reasons for conducting market probes in the context of system transformation. For example, consider the example of a catalyst. In everyday speech, a catalyst is something that "kicks something off", that "instigates" something. A host a dinner party raising a question about the upcoming election can be said to "instigate" or "catalyze" (or provoke!) a conversation. But this is not how we mean the term. And the difference matters.

In physical, chemical and biological systems a catalyst has a very specific role: it facilitates a reaction by lowering the energy required for a reaction to occur among other parts of the system without itself being consumed or changed in the process. A catalyst makes a reaction occur where it otherwise might not have, or speeds otherwise slower reactions, or makes reactions that would otherwise be weaker grow stronger. In our context, a catalyst can shift vectors of competition, can enable some companies to work more closely together and can facilitate emphasis on or even adherence to certain socio-cultural values with greater ease. Let's explore what these mean.

Ideally, a lean startup product assumes a market. That is, a lean startup—or indeed any product launch—assumes that there are customers who will give money in exchange for the product and further, that that market was "ready" and "waiting" for that product to be available. Further, it assumes the product has sufficient value to the customer such that it can sustain a certain price. The purpose of the minimum viable product is simply to test the validity of that assumption. If customers buy it, great! If they don't, the question asked is: Why? And there's a determination made to either remedy the product and try again or to end the experiment. Prior to the ability to simply release products as market tests, there were hosts of market researchers and similar folks working to estimate the potential of a particular product and working out all the details to maximize that potential. It tool time, money and, yes, a lot of talking. Hence the current reproach: less talk, more walk.

When thinking about a catalyzing an ecosystem, the product released is secondary to the ecosystem exploration. Large companies may not be thinking about a particular point product. Rather, they may be thinking about forming new order from within the volatile ecosystem. The challenge is that there are so many possible combinations of companies, product and technologies that would be perfectly reasonable that their emergence cannot be predicted a priori. Rather, the goal is to understand the propensity of different kinds of order to form and therefore, where to put our investments. Thus, catalytic probes are designed specifically to explore the relative probability of market formation from amidst a stew of possibilities. The prize isn't a mere product, but rather a platform—and even more: a series of platforms that maintains centrality within a vigorous system of exchange (a market).

Thus, a market catalyst can be many things. Absolutely it is the case that a product—a la lean startup—can be a catalyst if it is so used that way. For example, releasing a quick, easy product to encrypt

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your email may be a catalytic probe to determine the range of responses to "encryption" as well as whether people will pay for the product as a product.

However, suppose the real value was in establishing an overall market for encrypted data exchange throughout the tech industry. Then releasing an email encryption add-on is at best one of a set of catalysts which together would be designed to determine the probability of such a market formation, the probable location of control points and the actual path of market formation.

Therefore, a catalyst might be enabling a partnership agreement between two companies that otherwise had not been talking to each other. Or a catalyst might be a specific bit of technology provided to a set of companies that solve a particular problem important to them but perhaps beyond their capacity to resolve and that reduce the friction in them working together. A catalyst can also be a "demonstration" product that allows for or permits or makes relevant a particular value previously hidden. For example, a product like "Yelp" but that allows people to rate their interactions with police (for example, the app: Five-O) can highlight cultural values like transparency and accountability.

In a way, we're shooting for engineering an ordered ecosystem without ordering the ecosystem, per se. One can't hope to control something that has so much uncontrolled variability. However, one can hope to understand increasing probability of order formation. Catalysts can lower frictions for companies to work together creating new bases of competition around which a market can form. Thus, a "market probe product" that tests its own relevance can have a primary purpose to determine the propensity for shifting bases of competition and be an indicator for further investment not only in that product, but within the ecosystem to strengthen primacy around that particular competitive vector.

Do you remember the book/movie Money Ball? Essentially, the point was to shift emphasis from selecting players for hitting home runs to focusing on base hits you increase the probability of winning games. And winning games gets you to the playoffs. This is an imperfect analogy, but too often industry looks for the proverbial "home run", the "next big thing". But what's more valuable is to work toward identifying the "next big market" or "next big platform". And since markets can emerge with a vanishingly limited predictive capacity, the only way to be "on top of market formation" is to actively participate in that emergence first through catalytic first and subsequently with actual participation through increasing business and technical investments.

Let's consider a specific example. In our work on personal data, we recognized that shifting from markets defined by (enabled by) open, freely accessible data to markets enabled by personally controlled personal data circulation is a significant system transformation, not merely a "new product" into an existing market. Thus, our first task was to understand the ecosystem in some detail. Thus, we developed a technique that enabled us to form the first crowd-sourced complex network structure. As discussed earlier, this is available at ***www.wethedata.org***. The best way to get a quick overview is the 3 minute video here:

Visit: ***https://vimeo.com/72511709***

In the end, what we found are the four points in the ecosystem that, if appropriately catalyzed we believe have the highest potential to transform the system. In each of these four nodes, there's a wide range of actions one can take. But this is the search space—these areas—and not the others—are the

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areas in which to make catalytic investments. The question is what specific actions to take in what areas in what order for what purpose to evaluate the minimum viable ecosystem.

For example, one can imagine a minimum viable ecosystem comprised of related "catalytic actions" in each of the four nodes, or within one node, or across two or three only depending on the hypothesized minimum viable ecosystem. The decision to catalyze a new ecosystem therefore, is a decision to engage with coordinated, simultaneous actions to test the probability of ecosystem formation given the presumed friction reduction that enables the ecosystem to form. Ideally, you'd be able to test multiple MVE's simultaneously—which would be awesome.

Think about it, if you can establish how order will form—that is, how to catalyze system transform an ecosystem along new bases of competition, it's not only that you'd have first mover advantage, but you'd create the possibility for there to be a first mover—and you can either be it, or invest in it or participate in some other way.

And so, we have here arrived at the crux of this small book. Everything has built to this point. So it bears repeating: The idea of imagining system transformations based on changing cultural values is envisioned as hypothetical minimum viable ecosystems evaluated by a series of coordinated, simultaneous actions specifically designed to catalyze market formation. The impact is then measured, and subsequent investment decisions are made.

Take this in the other direction: Catalysis is where you take action. But, as should be clear, it's not just about taking action. It's taking specific, pointed, coordinated, simultaneous action with the purpose of establishing the viability of a minimum viable ecosystem that reflects the underlying shifts in underlying cultural values. Either way, catalysis—the actions taken—matter. And it matters to think carefully, that is, systemically, about them.

Strategy = System Transformation™

In this video, the pieces are woven together: shifting strategic thinking to systems and networks, understanding the current system, and testing hypotheses for system transformation in the data economy.

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Strategy is System Transformation. Strategy is the application of forces with the explicit intention to transform existing or create new systems (or maintain the existing system if that is advantageous). Everything else is action in response to events within an extant, relatively stable system.

We identified the impact of digital technologies on how we think about and enact strategy. We recognized the shift from prolonged stability with punctuated volatility to a world of prolonged volatility with punctuated stability. We recognized that cultural values are in flux, that how people think about what's meaningful to them is shifting driven in large part by a shift from scarcity to plenty—from limited physicality to unlimited digitality.

As a result, we've also recognized the shift from strategy as a complicated series of contingent actions—the 'Newtonian' model of strategy—to a coordinated set of simultaneous actions—the new 'Einsteinian' model that comports with the dynamism of ecosystem volatility. We've borrowed some initial structures from both physical as well as the social sciences that begin to suggest new metrics and new ways to engage.

It appears highly likely that we are in the midst of a classic (Kuhnian) paradigm shift with respect to how we understand socio-cultural phenomena such as markets and strategy. If this is the case, the question for us is whether and under what conditions this "new way" of understanding and characterizing the world offers competitive advantage in the marketplace.

Deduction is increasingly seen as less relevant/interesting/explanatory for large scale socio-cultural phenomena. That is, the hypothetical-deductive model of knowledge creation—form a theory, test theory, expect both explanatory and predictive power is less powerful/useful in a world better understood through a lens of complexity, where properties are emergent and non-predictable. In practical terms: more depth, less breadth.

Thus, the old tools are less and less useful and we need new tools, new metrics, new ways of understanding complexity, flows, movements and volatility. We need ways to understand networks, how to search them and how to catalyze emergence. We've explored a few of these ideas, and we've shown a few of these tools.

Mostly, we've attempted to demonstrate a new approach to strategy and strategic thinking that imagines there are not right answers, but rather answers that catalyze and form order from the chaos of the ecosystem, crafting markets that have variable half-lives, before chaos again descends. Our world can be increasingly best described as vast overlapping networks of socio-technical complex adaptive systems comprised of individuals, institutions, corporations and governments.

We've been through paradigm shifts before. The earth used to be both flat and the center of the universe. We used to measure money in gold and giant kula rings. We used to imagine that "bad humours" caused disease. We know these things are no longer as useful as they were. We need to re-think how we imagine our world (as did the founders, Picasso and punk rockers), how we create and re-create our institutions, corporations and governments in the context of globally connected, broadly interconnected, essentially volatile complex socio-technical systems.