

# Opportunity for Innovation

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## Innovation?

I've attended many events aimed at [entrepreneurs](#) and innovators. As an investor I too want to know what the future will bring and where I can place my bets.

In the midst of today's economic malaise we need to avoid assuming that we can solve our problems simply with some more "innovation" and by buying more jobs. We need to look beyond just-so stories about how value is created. As Michael Mandel [wrote](#) in Business Week our faith in innovation may be misplaced. In 1997 I [wrote](#) about the market conditions that support hypergrowth. More recently Jonathan Zittrain has been writing about [generativity](#).

Clayton Christensen warned us in [The Innovator's Dilemma](#) that we can't predict the winners. To find our way out of this dilemma we need to step back and look at societal policy rather than just looking at individuals in isolation. We need to understand how systems evolve. Individuals may win or lose but the ecology thrives because the value we gain from a few powerful ideas is sufficient to benefit all. We need to focus on creating opportunity so that we can cycle through many possibilities to discover the one or two that change everything.

The Web is one example – a tool for sharing among physicists that turned out to be so much more. It is generative because it doesn't over-define the solution and thus doesn't narrow its appeal and can act as an enabler for unanticipated applications. This is a recurring theme-- specialized products seem better at first but general purpose tools win over the long run. This is the tension between an investor's goal of capturing value and societal need for all to have an opportunity to add value. Decoupling the value chain is a way of applying antitrust principles.

I've tried to understand the basis for the kind of hyper-growth we've associated with Moore's law. I've [written](#) that we create generative opportunity by decoupling markets. The process works most rapidly when individuals can work through ideas without having to make large all-or-nothing bets.

It's easy to understand the attraction of investing in innovation and job creation. We tend to overestimate the short term and underestimate the long term. Training for jobs produces an immediate benefit but education provides far larger long term benefits. After World War II we encouraged education instead of only training people for jobs. We also had a wealth of new technology available to all. Edu-

cation gives people the ability to take advantage of unanticipated opportunities (and create their own).

We've been fortunate enough to have opportunity for innovation, even if accidental. It helps to understand a few examples:

- Google's indirect funding model (advertising) has allowed it to make capabilities such as Google Maps available without having to capture all the value.
- Bell Labs – ATT was able to spend lavishly because it was guaranteed a return. Others were able to take advantage of the value created.
- IBM was forced to decouple its hardware from its software thus allowing us to discover that the hardware was far more valuable to society than the applications IBM designed them for.
- Container shipping decoupled the contents from the accidental properties of the transport path.

It's worth looking at the Internet in detail because it is a laboratory study in opportunity. It was designed to decouple the applications and services from the transport. It was a pragmatic consideration because the implementers didn't have control of the transport nor were they able to define the applications. The result of this constraint has been far more than anyone could have expected even though the actual implementation had pragmatic compromises.

The Internet made it possible for individuals to try out new ideas and move on without having to make big bets (AKA investments). Instead they could rapidly cycle through new possibilities. The process evolved rapidly because we could find value in whatever bits were available. Demand created supply thus creating new opportunities. Moreover the Internet is about our very ability to communicate and the resource – bits – is about an idea and not an expensive consumable.

In order to fully appreciate the Internet we need to go beyond its roots as in networking and recognize the importance of bits as the new currency. The ability to exchange fungible bits creates a new topology that allows us to focus on relationships with the meaning of the bits being defined by the interpretation and not by the network. This idea of a blank slate is a form of decoupling.

We can't take full advantage of this new opportunity unless we are literate in concepts such as information repre-

sentation and data. Too bad we naively force the Internet into the familiar story of telecom and miss the whole point. Telecommunications is a 19<sup>th</sup> century idea – one must rely on a third party to carry messages (such as telegrams) using their own infrastructure. We fund the industry by paying for each message. Telephone “message units” (or today’s cellular “minutes”) are a legacy of those days.

The conflict between the Internet’s focus on the relationships without concern about the path between and telecom’s complete focus on the path is not obvious. We look for proof by examples noticing only those applications that use existing connectivity without being aware of the applications that don’t exist because we can’t assume connectivity. Thus we don’t wonder why we can use IP for E911 and just accept the brittle emergency signaling we have.

We can see this problem when we think about telemedicine. Even if we add a communications chip to a glucose meter we can’t assume connectivity and thus require a cellular account for each device if we aren’t tethered to a location.

The skills required to negotiate the path and then fund it are very different from those associated with the societal value. You can’t simply try out the idea – you must place a big bet. And even then you can’t assume connectivity because the current funding model means you can’t extend the path yourself – that’s called stealing.

Perhaps some of this made sense in the days of analog signaling but now that we have fungible bits the very idea of owning a special infrastructure doesn’t make any sense. We don’t even have a consumable like electricity that must be metered.

Very simply we are unable to take advantage of the zero marginal cost of using our physical infrastructure and prohibited from creating solutions unless they benefit a third party that adds no value.

I’ve oversimplified things a bit – today’s Internet is a prototype and current protocols need some work in order to fully realize the potential of simple connectivity.

Instead of focusing on the future we’re firmly locked into the past. We can’t shake the “telecom story” because it’s in our nature to hold onto a story as long as we aren’t forced to change. The Internet is such a powerful idea that it easily implements existing telecom services as minor applications. It looks like Telecom so we react by redoubling our effort to get more telecom instead of opportunity. In asking for more “broadband” we are moving rapidly into the past and treating the Internet as nothing more than another television channel.

The problem is that as with any transition, if we look at each element of the system in isolation, we find ourselves tied down by our “givens”. The fungibility of bits reduces the carriers to [dumb pipes](#) which undermines their revenue model. But instead of recognizing this as forcing issue that can lead to recycling telecom as infrastructure (just as we did in converting private pikes to public highways), we are trying to keep a nonviable business alive.

## Healthcare as an Anchor Application

Putting aside the problems with exchanging bits, we can focus on information representation itself. Healthcare provides a practical example as we can look at the problem of medical information. Hospitals are full of fax machines and paper works. Even when the data is digital you often find it converted to faux X-Rays.

The data exchange that does exist is in the realm of big data systems. Electronic prescriptions are funded by drug companies monetizing the data and a state goal of computerized medical records is data mining for evidence-based medicine.

If history is any indicator the mixed incentives and focus on large projects are very problematic. If we are to learn from the Internet we can recognize that standards evolve from practice rather than being prescriptive. We should be creating generative opportunity by understanding how to use information.

Medical records can be encoded and stored locally and then we can evolve protocols for exchanging and sharing the information. Going even further our bodies are the ultimate medical records. Why not treat external records as annotation with information such as warnings about allergies? We need to balance the focus on “big data” with a focus on individuals and the opportunity to try out new ideas.

While each market has its own characteristics we need to understand the problem of sharing and using information so that we can benefit from cross-fertilization across many fields.

It does seem strange that the “life sciences” were (and maybe still are) considered the next “Internet”. The dynamics are very different especially with the need for big investments that take a long term to pan out. Perhaps the motivation was jobs -- if you get a big company in town you create jobs. The very inefficiencies of the field create a need for many technicians and that is good news – for a while. But it has limited generative value.

**An Opportunity:** Ambient connectivity for healthcare.

Massachusetts is well-positioned to take advantage of new opportunities in healthcare and connectivity. Boston, with its Medical Area, has a wealth of medical talent and technical talent. We also have abundant physical infrastructure in existing copper and fiber.

We don't need to build new infrastructure – we just need to shift the funding model so that we can assume ambient connectivity – with and without wires.

**The payoff is large and immediate.** It's not just about money but about the quality of life. The ability to keep people connected means better treatment, preventative medicine rather than just emergencies and gives the patients mobility since they don't have to be home to be "jacked in". Webcams are now mundane. They aren't a substitute for in-person contact but they can assist in deciding whether in-person is necessary. Peer support and social connections are facilitated by readily available connectivity – it's not just about phone calls.

Unlike today's E-911 system we don't have to limit ourselves to emergencies and don't have to rely on a single connection to a single local dispatch point.

## Ambient Connectivity

Once we can assume connectivity we can start taking advantage of the opportunities. It's not just about high value applications like education, commerce and entertainment. It's about basic infrastructure. We won't discover the real value until we've had a chance to experience ambient connectivity.

Remember that Twitter once seemed trivial and mundane and now it is at heart of major world events – because it didn't prejudge the applications and didn't attempt to capture the value.

The city itself should make an effort to take advantage of ambient connectivity for city functions. Today the police run a special fiber just to transmit bits from a listening post on top of a building – with ambient connectivity such applications don't need a special infrastructure. This means that deploying new gear doesn't require making special arrangements and allocating new funds each time. Even a trivial application like reporting when trashcans are full becomes is doable.

The importance of generative opportunity is evident when we look at problems like rebuilding our infrastructure. If we follow the traditional practice of paying for more of the same the costs are overwhelming. We need to get ahead of the process and understand how to generate opportunity.

The availability of ambient connectivity combined with Massachusetts' expertise in health care can set an example for how to get ahead of crises-driven policy.

## Creating Opportunity

Perhaps the most difficult concept is the need **to invert our usual "procurement" model of problem solving** – we can't dictate the solutions but instead need to create (generative) opportunity and then accept the solutions that arise.

We can only dictate solutions for the short term but we're rewarded for short term thinking. This makes it doubly difficult to "sell" the idea that we need to create opportunity. Not only is the reward deferred but we can't say what it will be.

Fortunately the Internet has provided us with a dramatic example of how much value we can realize by creating such opportunity. The process can operate very quickly as I've shown with the health-care example. We just need to understand the process to realize near-term gains.

The question is whether we can accept as small amount of uncertainty to reap very large benefits.