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# Hal Varian on how the Web challenges managers

**Google's chief economist says executives in wired organizations need a sharper understanding of how technology empowers innovation.**

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More than ten years into the widespread business adoption of the Web, some managers still fail to grasp the economic implications of cheap and ubiquitous information on and about their business. **Hal Varian, professor of information sciences, business, and economics at the University of California at Berkeley, says it's imperative for managers to gain a keener understanding of the potential for technology to reconfigure their industries. Varian, currently serving as Google's chief economist, compares the current period to previous times of industrialization when new technologies combined to create ever more complex and valuable systems—and thus reshaped the economy.**

Varian spoke with McKinsey's James Manyika, a director in the San Francisco office, in Napa, California, in October 2008. Watch the video or read the transcript of his comments below.



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Google's chief economist on how technology empowers innovation.

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## **On flexible innovation**

**We're in the middle of a period that I refer to as a period of**

“combinatorial innovation.” So if you look historically, you’ll find periods in history where there would be the availability of a different component parts that innovators could combine or recombine to create new inventions. In the 1800s, it was interchangeable parts. In 1920, it was electronics. In the 1970s, it was integrated circuits.

Now what we see is a period where you have Internet components, where you have software, protocols, languages, and capabilities to combine these component parts in ways that create totally new innovations. The great thing about the current period is that component parts are all bits. That means you never run out of them. You can reproduce them, you can duplicate them, you can spread them around the world, and you can have thousands and tens of thousands of innovators combining or recombining the same component parts to create new innovation. So there’s no shortage. There are no inventory delays. It’s a situation where the components are available for everyone, and so we get this tremendous burst of innovation that we’re seeing.

### On corporations and work

The question is, “What are other periods where we saw technology influence the way organizations work?” One nice example comes from the works of Alfred Chandler, where he describes how the telegraph and the railroad had a big impact on the development of the modern corporation. And this was a synergistic operation: one, you had to have a large organization to manage these technologies, and two, you had to have the communications and transportation infrastructure to enable the management at a distance.

So I think now, with what we’re seeing with mobility, we’re going to have a totally different concept of what it means to go to work. The work goes to you, and you’re able to deal with your work at any time and any place, using the infrastructure that’s now become available.

At the base, there’s the innovation infrastructure making better, faster, cheaper networks. There’s the improvement in the human–computer interface because the big challenge in mobile communication has always been dealing with this—quite limited—interface. But then, the kinds of innovations I think will arise on top of that will be innovations in how work is done. And that’s going to be one of the most exciting aspects, in my opinion.

If you look at the beginning of the 20th century, we saw the rise of mass production. Henry Ford and the entire team were down on the factory floor raising this, lowering that, speeding up the assembly line, changing the way things were built, and were able to extract far more efficiencies than were available before. I think the same thing is happening now with digital technology. When we’re all networked, we all have access to the same documents, to the same capabilities, to this common infrastructure, and we can improve the way work—intellectual work, knowledge

work—flows through the organization. And again, in my opinion, that will lead to a **substantial advantage in terms of productivity.**

### **On free goods and value**

Back in the early days of the Web, every document had at the bottom, “Copyright 1997. Do not redistribute.” Now every document has at the bottom, “Copyright 2008. Click here to send to your friends.” So there’s already been a big revolution in how we view intellectual property. So it’s not so much the question of what’s owned or what’s not owned. It’s a question of how can you leverage the assets you have to realize the most value.

I think that **the availability of these very inexpensive platforms you’re creating, in disseminating content, means that it’s become intensely competitive.** The content is as valuable as it ever was, it’s just the competition that’s pushed the prices down to something that approximates zero. So it’s not something that the content producers necessarily embrace, but it’s something they’re forced into by the nature of the technological change.

**In these models, there is typically a revenue-generating component somewhere in the value chain. And most commonly today we’re seeing it on the advertising side.** To look at this from a historical perspective, it’s really not so new. If you look at the 1920s, the technological question in the ’20s was, “How can we build a business model around broadcast radio?” And nobody really had a good idea. And back in the mid-1990s we asked, “How can we build a business model around the Internet?” And the preferred model at the time was a micropayments system. That never happened, for some reasons, but what did happen instead is we moved into the advertising model, and the advertising’s model been phenomenally successful.

We have to look at today’s economy and say, “What is it that’s really scarce in the Internet economy?” And the answer is *attention*.

[Psychologist] Herb Simon recognized this many years ago. He said, “A wealth of information creates a poverty of attention.” So **being able to capture someone’s attention at the right time is a very valuable asset. And Google really has built an entire business around this, because we’re capturing your attention when you’re doing a search for something you’re interested in.** That’s the ideal time to show you an advertisement for a product that may be related or complimentary to what your search is all about.

### **On workers and managers**

I keep saying the sexy job in the next ten years will be statisticians. People think I’m joking, but who would’ve guessed that computer engineers would’ve been the sexy job of the 1990s? The ability to take data—to be able to understand it, to process it, to extract value from it, to visualize it, to communicate it—that’s going to be a hugely important

skill in the next decades, not only at the professional level but even at the educational level for elementary school kids, for high school kids, for college kids. Because now we really do have essentially free and ubiquitous data. So **the complimentary scarce factor is the ability to understand that data and extract value from it.**

I think statisticians are part of it, but it's just a part. **You also want to be able to visualize the data, communicate the data, and utilize it effectively. But I do think those skills—of being able to access, understand, and communicate the insights you get from data analysis—are going to be extremely important. Managers need to be able to access and understand the data themselves.**

You always have this problem of being surrounded by “yes men” and people who want to predigest everything for you. In the old organization, you had to have this whole army of people digesting information to be able to feed it to the decision maker at the top. But that's not the way it works anymore: **the information can be available across the ranks, to everyone in the organization.** And what you need to ensure is that people have access to the data they need to make their day-to-day decisions. And this can be done much more easily than it could be done in the past. And **it really empowers the knowledge workers to work more effectively.**

#### **On computer monitoring and risks**

One of the really interesting phenomena that's been going on in the last 20 years is what I call **“computer-mediated transactions.”** So now, **in the middle of almost every transaction from person to person or organization to organization, there's a computer. And the computer can monitor that transaction, record the information, collect the data, and assure that the transaction is carried out the way it was intended to be carried out. So one of the subtle implications of this is you can now write contracts and make contracts enforceable that simply weren't enforceable before.**

Let me give you an example. Suppose you go rent a car and they say, “Hey, we'll give you \$10 off if you don't go over the speed limit.” Well, that might sound like a good deal, but what's to keep you from going over the speed limit? Well, the answer is now they've got a transponder in the trunk and it will monitor your behavior and charge you accordingly. And the same thing happens with semitrucks: virtually every semi on the road today has a computer in it. And that computer improves the logistics. It monitors the performance of the driver and it helps things get to the consumer more quickly. So there are a lot of capabilities of that sort that allow you to contract on terms that were just not available to you before.

[At the same time,] you get a new technology in and people are excited about the positive sides of it. Then you see there are also some negative aspects. And you'll have a regulatory infrastructure that arises to deal with those. I think everybody is very excited about the intended aspects of this **technology—the fact that you can personalize, the fact that you**

can monitor, the fact that you can provide products that are more closely suited to a consumer's interests and needs. What people are worried about are the unintended consequences, the downsides, the negative sides, the security, the identity theft, the possibility of extortion or embarrassment. These are the problems: not what people *want* to do but what *could happen* if these technologies weren't appropriately managed.

### On reshaping industries

We're obviously going to see enormous change in the traditional marketing industry. You look at TV, you look at print, you look at radio and other media of that sort. On the Internet, we've learned to measure advertising effectiveness, and the challenge now is to move those same effectiveness measures over to the offline media.

That can be done. I think we're going to see vast improvements in how those industries function in the future. And in general, if we look at service industries—well, everybody I think is in agreement that we're going to see lots of efficiency improvements in services, because we do have this network capability. We have the technological infrastructure. We can improve communication flows. The second beneficiaries of that will be with service industries who've already seen a lot of advances in manufacturing productivity. And the tough nut is the one we're working on cracking now.

What I actually work on to a large extent is a current feeding of the auction model that we have at Google. As you know, all of our ads are sold by auction. That's a relatively novel pricing mechanism in the ad world. And there're a lot of intricacies that involve how you manage that. We'd like to extend that model to the offline world: to radio, TV, print, and other media. It's a model that was enabled by the Internet. It's not something you could've done without that information technology there. And it's a great model for all sorts of resource allocation issues.

I think the people who originally designed the model way back in 2001 had a very, very useful insight. They recognized that the content provider has impressions to sell. So you've got some space in your TV show. You've got some space on your page. You've got some space that's available to put an ad. But what the advertiser wants to pay for is clicks or conversions or visits. So they don't really care how many impressions they show. Normally, what they care about is getting people into their store and, ultimately, getting people to purchase. So you have to build a system that allows the publisher to sell impressions but the advertiser to buy clicks. And I think we've managed to accomplish that in a nice, elegant way. 

