

THE BROOKINGS INSTITUTION
Brookings Cafeteria Podcast
How we connect: Network revolutions from Gutenberg to Google
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(MUSIC)

DEWS: Welcome to the Brookings Cafeteria. The Podcast about ideas and the experts who have them. I'm Fred Dews.

How we connect defines who we are says former SCC Chair Tom Wheeler, the guest on today's episode. He is author of a new book published by the Brookings Institution Press titled, *From Gutenberg to Google: The History of our Future*. In which he brings to life the great network revolutions of our past to help us understand and deal with what is to come. You'll hear my colleague, Bill Finan's interview with him in just a moment.

Also, on today's episode, Metropolitan Policy Program Fellow, Joseph Parilla, shares his thoughts on Amazon's decision to discontinue plans to open a new headquarters in New York City and what this means for economic development incentives.

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And now, on with the interview. Here's Bill Finan, Director of the Brookings' Institution Press.

FINAN: Fred, thanks, and Tom, hello.

WHEELER: How you doing, Bill?

FINAN: Good. Good. Good to have you here today.

You're the former chair of the Federal Communications Commission. Before that,

you were a successful business, especially in the area of cable television. But you're also something else, a historian. How did that happen?

WHEELER: Oh, you know, Bill, I was lucky enough to grow up under the influence of a grandfather who was a great lover of history and who himself made some history. And it started with him teaching me about the Civil War.

Before I could drive, I had walked all the major battlefields of the Civil War eastern theater with him. And he made history come alive.

FINAN: Something that you do in this new book too. I think that the portrayals you give of Gutenberg, of a host of other people throughout the book, you feel like it's almost like you are there with them thinking through the problem. It's just a very, very vivid illustrations.

WHEELER: Well, you know, Bill, that's one of the challenges. It is a tragedy today how little people understand of history. And part of it I'm convinced is the way we teach history because we force students to memorize dates and dead people. Okay. And that's not what history is. History is a collection of stories that then lead to the next story. And that's what I was trying to do in from in *From Gutenberg to Google*.

FINAN: Yeah, and I'm a great believer in that. History is made up of people, and it's the people who make up the stories. And so, if you start pulling that apart and just get to the dates and the dead people, you're not going to get that story there.

Your first two books were focused on the 19th century. Your newest book takes us back to the 15th century and then into today and the future. It's about, as you write, history's three great network revolutions.

Before I ask you what those revolutions are, first what is a network revolution?

How would you define that?

WHEELER: SO, I think that how we connect defines who we are. That the essence of both human social interaction and economic activity are the networks that connect us.

So, I tried to look at what were the network revolutions that brought us to this point, and what does it suggest about how we deal with the ongoing network revolution.

FINAN: And you defined them into three. And those three are?

WHEELER: So, there are three technologies in two periods. The first is the 15th century, in the middle of the 15th century, when Johannes Gutenberg developed the moveable-type printing press. And it was the original information revolution. It unlocked the information that had been kept stored away in order to increase the power of a handful of people.

And then 400 years later, amidst the steam revolution, comes the steam locomotive. And the steam locomotive was the original high-speed network revolution because if you stop and think about it, from the being of time, man had been limited by geography and distance. You could go as far as animal muscle could take you, and then you had to stop. And all of a sudden, this inexhaustible iron horse, moving at what were unimaginable speeds, was the original death of distance.

But then immediately on the heels of that came the telegraph. And if the railroad was the death of distance, the telegraph was the end of time because it was the original electronic network. And it allowed information, again, for the first time in history, to be known simultaneously in multiple places. And taken together, those two created the Industrial Revolution and defined the 19th and 20th centuries.

FINAN: And then our third revolution.

WHEELER: And so, here we come today. And there are two threads that run throughout Gutenberg and Google. One is that the, “new technology,” that we are dealing with today really isn’t new. It’s a Darwinian evolution. You take the digital code for instance, that powers the internet and computers, and you peel back that onion, and it will take you back to concepts that were started by Gutenberg. And you go to the zeros and ones, the on and off of digital transmission, and it’s the same as the dots and dashes of the telegraph.

So, the first thread running through the book is how all of these technologies built on each other to bring us to today.

FINAN: And you make the point that all these network-driven changes, they’re redundant, not so much more so than revolutionary, but they were revolutionaries, let me it very clear and illustrate very clearly what each of them -- the redundancy is what you’re mentioning here, right?

WHEELER: Yeah, but the second thread is the one you just read.

FINAN: Okay.

WHEELER: And that is that when these earlier network revolutions were taking place, they were causing great social and economic upheaval in society.

And so, when we have the internet revolution, we should be surprised that we’re seeing that same kind of upheaval today.

And so, I believe that the story that is in *From Gutenberg to Google* tells us how we got here technically, tells us how others dealt with similar situations, and maybe hopefully helps inform us with how we can deal with today’s situation.

FINAN: And in terms of how others have dealt with these revolutions -- they were some of my favorite parts of the book as those stories you tell. And you write about each network revolution having its own generation of naysayers.

WHEELER: Right.

FINAN: Those who found nothing but regress or even evil in the new inventions that came about. And the book is filled with stories of these naysayers.

Can you tell us a couple of stories from the first two revolutions, Gutenberg and the telegraph and the railroad?

WHEELER: Well, of course, Gutenberg because he freed up information, he was a challenge to the establishment. And the Catholic church, which was the leading establishment at that point in time, first saw the printing press as a plus because all of a sudden, we could make sure that we had Bibles and hymnals out in even the smallest parishes because the costs were reduced dramatically.

But then oops, at the same point in time, the printing press was spreading Luther and other ideas challenging the status quo. And it's fascinating that the Bishop of Mainz -- Mainz Germany, was where Gutenberg had his shop. The Bishop of Mainz first came out and said oh, this is the greatest thing ever. And then a couple of years later had to regroup and say no, now we're going to start censoring what it can do because it's too much upheaval there.

Probably my favorite story though is the story of what Samuel F.B. Morris had to go through to get the federal funding for his first telegraph line. That on the floor of the House of Representatives, the bill to authorize -- get ready for this, \$30,000. Okay.

FINAN: What you said is about a million dollars today.

WHEELER: A million dollars today, yes.

FINAN: Yes, not a huge sum even.

WHEELER: But the bill to authorize the money to build the first telegraph line to Baltimore. The members of Congress could not understand the idea of sending messages by sparks. And they had this circus atmosphere that started on the House floor where they were proposing amendments to fund trials of mesmerism, which is hypnotism, to send messages.

But the most telling thing of all is that the final vote on the bill in the House of Representatives, it barely squeaked by. I think it was like 89 to 83. But what was significant, they were 70 members of Congress who abstained. They could not face telling their constituents that they have voted for \$30,000 for sparks over a wire to send messages. And so, they just said, I'm out of here. I'm not going to take part in this.

FINAN: Yeah, it was just too much. Just too far and beyond.

There are a lot of stories of what now to our minds is just ridiculousness. But then it's not too far away from what happened with Mark Zuckerberg in front of Congress recently when some of the senators were still not clear what this internet thing was and what this Facebook thing was too at that time.

The third revolution also has its naysayers and prophets of dooms. And you mentioned some of them that worry about brain cancer from cell phones and the dissolution of attention span because of internet reading. But it also has, today, a very large course of critics, and you are among them.

And one of the larger themes, the one is a reversal of centralization. And that sounds abstract the way I'm saying it. But in your book, you make it very concrete. You

write, “The networks of history commanded the user to come to them. Come to the book. Come to the railhead. Come to the telegraph or telephone. The wirelessly distributed force of a new network does just the opposite. Now users command the network to come to them wherever they may be.”

And yet, at the same time, you note that decentralized applications of the distributed networks have recentralized economic power around the aggregated application of user information created by the network. Can you explain what you mean by that and why that is such a major concern of yours?

WHEELER: Yeah, that’s a great question, Bill, because I wrote this book over multiple years. I had to kind of push pause when I went in to be chairman of the FCC. And early on, I was convinced that this was all about the distributed nature of the network, distributing economic activity. And then we see platforms like Google or Facebook or whatever that have harnessed a new kind of centralization. It used to be that economic activity was centralized at network transfer points.

How did Chicago become the nation’s second city? It was because the grain and the livestock coming in from the plains of the west had to transfer on the railroad to get to the eastern markets. And people set up millers and slaughterhouses and this sort of thing there. So, economic activity was always where a network activity took place.

Well now, network activity happens, what the technologists call at the edge of the network in routers that are sending the zeros and ones on their path. Yet, my original thought was that we would be able to trace how economic activity followed it out. And indeed, it has. It’s created all kinds of opportunities for individual workers, for artisans selling their goods.

But it has also created an opportunity for algorithms to take control of the network and your and my use of the network and to have a new kind of nonphysical centralization. It used to be physical centralized networks where you moved a boxcar or a phone call. Now, you have nonphysical centralization done by algorithms operating on a distributed network.

FINAN: You mentioned Facebook specifically as one of those examples of centralized editing and drawing that information in and then the economic powerhouse as a result.

WHEELER: So, I am a great fan of what Mark Zuckerberg has done, but I think that there are needs in the internet revolution to behave in a manner similar to how we behaved in the Industrial Revolution. And that is to put guardrails on the exercise of economic activity.

Let me give you an example.

FINAN: Okay.

WHEELER: So, many of the stories I talk about in *From Gutenberg to Google*, talk about how as industrialization enabled by the networks swept the 19th and early 20th century, the rules that society had established for governing agrarian mercantilism, didn't work anymore. And we needed to come up with new rules because nobody had repealed the law of human nature or of economic incentive for those who controlled the means of production to do it to their advantage rather than others. And so, we came up with antitrust laws, consumer protection laws, worker protection laws, and on and on. And it was those kinds of guardrails on the instincts of capitalism that enabled the Industrial Revolution to flourish.

We now get to the internet revolution. And we find that the rules that were adequate for the Industrial Revolution also don't work anymore. And so, the challenge of today is how are we going to come up with new structures of how we think about appropriate behavior in the marketplace.

FINAN: A couple of things that you mentioned that got my interest especially, were the idea of public interest algorithms. That was something far beyond say the guardrails of the 19th century like antitrust, which has come up as an issue as an idea for Facebook and Google. What is a public interest algorithm?

WHEELER: So, this is an idea that – the credit actually goes, and I give it in the book to a friend of mine, (inaudible) who was the young man who organized the Arab Spring in Egypt that overthrew the Mubarak government. And he and I had the privilege of being fellows together at Harvard last year. And we were kicking around this idea that when you pick up a copy of the Washington Post in the morning, you see the editorial decisions that the Washington Post has made.

FINAN: Right. Yes.

WHEELER: It's very clear. And there are third-party groups that will assess that and say well, this paper tilts left, this paper tilts right, etc. You don't have that on Facebook or YouTube or any of these other because the decision making, the editorial activity, is in an algorithm, in a black box algorithm. And we shouldn't get into the algorithm. That's Facebook or YouTube's secret sauce.

But if there was a public interest API, which is an application programming interface. It is how two programs work together. It is how, for instance, when you make a request on Uber, they use Google Maps. Okay. How can we allow third parties to see

the information that is going into Facebook's algorithm and the information that is going out so that they can make the same kind of judgements that a person looking at the front page of the Washington Post makes? Right now, that's all locked up.

And so, we think there ought to be open public interest algorithm that allows anybody to hook up to that so they can understand what's going in and what's coming out because there are editorial decisions that are being made. We don't know what they're being made on, and we don't know who they're being made for.

And if we had that information, then there could be some -- well, you need to understand that this message came from a Russian bot or whatever.

FINAN: You also poise hope in Web 3.0. And what is that and why that hope?

WHEELER: So, all the networks thus far have been about transporting things from A to B. I don't care whether it's a railroad or a telephone or today's web. And you're in your car, and you bring up Google Maps. And it is a one-to-one transmission activity from Google over the airwaves to your car.

Web 3.0 of which 5G, fifth generation wireless will be a key part is not just a transportation activity, it is an orchestration activity because what our new network is, is nothing more than a collection of microprocessors hung together talking to each other.

And so, those microprocessors are capable of making decisions, which is a humanizing term but making decisions in the network.

An example, what are autonomous vehicles? Autonomous vehicles are thousands of inputs being juggled instantaneously in order to produce a new product, i.e., your car doesn't hit the other car.

FINAN: True. Yes. Yes.

WHEELER: It's estimated that an autonomous vehicle produces three thousand times the amount of data that you or I do in a single day today. And so, the network orchestrates that data. So, we've moved from a network that transports to a network that orchestrates.

FINAN: Tom, it's been an interesting conversation. The book is interesting. I have to say it's a very serious book, but for a Brookings' book, it's entertaining. It's a fun read too. That's a hard thing to say about a Brookings' book often, so I'm very proud that we're publishing this book. Thanks for coming by today to talk to us about it.

WHEELER: Bill, thank you.

(MUSIC)

DEWS: And now, Metro Lens, featuring Joseph Parilla on Amazon's decision to back out of plans to build a new headquarters in New York City.

PARILLA: Hi this is Joseph Parilla, Fellow here at the Brookings Metropolitan Policy Program, last week Amazon abruptly cancelled its plans to building a corporate headquarters in New York City, determining they did not have the political support necessary to move forward. Now I've been closely watching the Amazon search closely since it began in September 2017 in the context of my research on local and regional economic development. And when I heard Amazon was leaving New York I was honestly shocked, not that I did not know that the backlash had been brewing among some members of the City Council, organized labor, and among progressive activists in New York. That was readily apparent in two heated City Council meetings in December and January, when City Officials who brokered the deal were grilled on the multimillion-dollar incentives package and the expected community benefit, and Amazon execs

were pushed to defend the company's stances on organized labor, anti-trust, and local hiring. The anger and distrust among these groups was palpable during these hearings. But overall polls also suggested that local New Yorkers supported Amazon's arrival, tax incentives and all. 2,500 good paying jobs, even for a strong economy, is hard to turn down. But New York did, and in the end, I think there are two key lessons here, one on policy and one on process. From a policy perspective, it's clear that local and state economic development needs to continue its evolution. Few economists conclude that the city and states competition is an effective use of taxpayer money, as total U.S. welfare remains unchanged regardless of which state a business like Amazon decides to locate. Now, to be fair, in a case like New York, city and state policymakers didn't create new discretionary incentives, but rather matched incentives already on the books to Amazon's expected job creation counts. It just ballooned the package to over three million dollars because Amazon was creating so many jobs. Now it would have been hard to pull these incentives back, even as everyone involved in the process knew that Amazon was picking places based on their workforce quality, not on the size of the incentives. And given this, it probably would have made more sense to put taxpayer money behind more investments in education and training, an approach that Virginia took, which is where Amazon is also investing a headquarters, rather than relying on the tax code to subsidize job creation. And then the second lesson is around process. For the city's part, they tried to activate civic leaders through advisory committees focused on workforce and neighborhood infrastructure. They did this in December after Amazon announced they were coming to New York. But the elected officials most staunchly opposed to Amazon refused to participate in those committees to hash out the details of

how the company would engage on job training, housing, and other community engagement issues. Part of this was of course local and political posturing, but it was also clear that Amazon underestimated the power of a vocal minority and miscalculated how much it needed to engage with those audiences to make HQ2 a success. So, in the end, this is a win for national debates on incentives, which are occurring and are long overdue, but a loss for New York. In particular, this was a missed opportunity to help connect a more diverse pipeline of New Yorkers to the city's growing tech economy, with HQ2 providing a unique platform to engage community colleges, digital training providers, the city, and a major company like Amazon in this endeavor. Now New York will continue to train its residents for the jobs of the future of course but doing so in this process could have made HQ2 a powerful and notable case study for the nation, rather than a cautionary tale. You can find more of our coverage of Amazon at [brookings.edu](https://www.brookings.edu).
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DEWS: The Brookings Cafeteria Podcast is the product of an amazing team of colleagues including audio engineer and producer Gaston Reboredo with assistance from Mark Hoelscher. The producers are Chris McKenna and Brennan Hoban. Bill Finan, the Director of the Brookings Institution Press, does the book interviews. Jessica Pavone and Eric Abalahin provide design and web support. Our intern this semester is Quinn Lukas. Finally, my thanks to Camilo Ramirez and Emily Horne for their guidance and support. The Brookings Cafeteria is brought to you by the Brookings Podcast Network, which also produces Dollar and Sense, the Brookings Trade Podcast, Intersections, 5 on 45, and the events podcasts.

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Until next time, I'm Fred Dews.