

# DAY 2 KEYNOTE REMARKS

## SILICON FLATIRONS 2023 FLAGSHIP CONFERENCE: THE INTERNET'S MIDLIFE CRISIS\*

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Silicon Flatirons Center  
Boulder, Colorado  
February 6, 2023

I want to speak today about a hard problem: the challenge of getting industrial policy right, something I feel we spent a lot of time brooding about in the White House. I'd like to address that challenge in the context of this conference's theme—the midlife crisis of the internet—and not just because a traditional response to a mid-life crisis is to spend a lot of money on things. Rather, because with the Internet in its middle-age, we face the key question of re-boot, and how we can best rebalance an economic sector.

Let's begin with two facts. The United States is spending tens, in fact hundreds of billions of dollars and actively engaged in trying to steer the economy, in ways subtle and less so.<sup>1</sup> And it isn't just the United States doing so—we are speaking of the entire industrialized world, and especially the United States, China, and Europe. It is true in the White House we didn't quite use the word "industrial policy."<sup>2</sup> We called it "a new industrial strategy for the 21st century."<sup>3</sup> That's pretty close to industrial policy.

I'll quote Brian Deese, my old boss at the National Economic Council: "We need to show that smart public investment can help unleash innovation, unleash the capacity of our private sector, deliver strong, resilient, and inclusive growth. We must show that our

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\* This speech has been edited for publication.

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1. Press Release, White House, Fact Sheet: The President's Budget for Fiscal Year 2024 (Mar. 9, 2023), <https://www.whitehouse.gov/omb/briefing-room/2023/03/09/fact-sheet-the-presidents-budget-for-fiscal-year-2024/> [<https://perma.cc/XUT5-SK4Y>].

2. *Id.*

3. *Id.*

democratic system of government can serve working people in this country better than other forms of government.”<sup>4</sup>

There was once a very vigorous debate over whether the United States should pursue an industrial policy. It is a worthy debate, but I’m sorry to say that it is over. So, the question we need to be asking is less whether we should have an industrial policy, but what that policy should now look like.

Second, the internet by one count is 53 years old if you count it from the ARPANET; if you count from the adoption of the TCP/IP protocol in 1983, that would make it 40 years.<sup>5</sup> It’s hard actually to believe that 40 years – 20 years ago was the beginning of Silicon Flatirons. So, we’ve, kind of, been here for half of it academically.

Industrial policy, in my view, cannot be well informed without an awareness and understanding of long cycles in industrial development. In *The Master Switch* I described patterns seen in the information industries centered on disruptive technologies, like the telephone system, radio and so on.<sup>6</sup> It is important to realize that we tend similar patterns in what are considered “new industry[ies]” centered on innovative technologies.<sup>7</sup> There is, as I suggested in that book, a cycle, early stages of great uncertainty but enormous optimism, an open period of great flourishing and optimism and a lot of market entry and competition.<sup>8</sup> That was invariably followed by consolidation and the early stages of monopolization or dominance by an oligopoly.<sup>9</sup> That might remain somewhat dynamic for a while, but usually led to stagnation in the long term.

So, one key thing you’d like to know for any industry the Government might be investing in is what stage the industry is in its evolution—where it is on the cycle. And one of the things I was very interested, in and remain interested in, was the question of how you reboot the cycle. What do you do once you’ve reached something like the AT&T monopoly in its later years, which, as many of you know, the monopoly lasted 70 years.<sup>10</sup> How do you—how do you start knowing what can reopen consolidated industry?

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4. Brian Deese, Dir., Nat’l Econ. Council, Remarks at the Atlantic Council’s “Front Page” Special Event (June 23, 2021) (transcript available online at the Atlantic Council website), <https://www.atlanticcouncil.org/commentary/transcript/brian-deese-on-bidens-vision-for-a-twenty-first-century-american-industrial-strategy/> [<https://perma.cc/LEK2-92NU>].

5. BARRY M. LEINER ET AL., INTERNET SOC’Y, BRIEF HISTORY OF THE INTERNET 4, 9 (1997).

6. See generally TIM WU, THE MASTER SWITCH: THE RISE AND FALL OF INFORMATION EMPIRES 4–8 (2010).

7. *Id.*

8. *Id.*

9. *Id.*

10. Matthew Stuart, *How AT&T Conquered All Forms of Communication After the Government Forced It to Break Up*, BUS. INSIDER (Mar. 5, 2018, 7:18 AM),

That strikes me as a good question—and a good place for industrial policy.

Today, it has become clear for some time now that why we may not have the AT&T monopoly, but the internet platform space has reached a level of sustained consolidation. It's been like that for some time. Ten or twenty years, many thought things would be different, that companies like Google, Facebook, Amazon and eBay were destined to be short-lived, to survive around 5, 10 years, but surely replaced and overcome, like AOL, Netscape, Myspace and others who came before. But that didn't happen, and they've stuck around and achieved dominance and entrenchment.

So, the question is this: what can shake things up in a productive way? And how can Government aid, as opposed to prevent, that happening? And most importantly, how can we prevent committing the most obvious mistakes of the past? It's a big topic.

Reading the history of investments in industrial policy leaves one with a sense of caution. There is a track record that many of us are familiar with of countries with big ideas, choosing or finding a company or an industry that they're sure is going to be the winner, investing a lot of money in it only to have it not go as planned.

A famous example of failed industrial policy in the tech industries are the European and Japanese computing industries over the '70s and '80s.<sup>11</sup> As many of you in this audience, or some of you in this audience at least, will know that the Europeans and Japanese bet big on firms like Bull, ICL, Olivetti, and NEC.<sup>12</sup>

These firms are not the world's dominant firms today. Indeed, they are not even important. Focusing on Japan, the Japanese made a strong bet in the late '70s or early '80s on something called the fifth generation of supercomputing.<sup>13</sup> Its economic planners at the Ministry of International Trade and Industry (MITI) were sure that supercomputing at the time was *the* future—based on the best analysis.<sup>14</sup> It was going to be the future. And everyone could see that whoever won the race to the supercomputer was going to win the future.

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<https://www.businessinsider.com/att-breakup-1982-directv-bell-system-2018-02>  
<https://perma.cc/3FK8-PVXY>].

11. See generally Hideki Uno, *Japan's Semiconductor Industrial Policy from the 1970s to Today*, CTR. FOR STRATEGIC & INT'L STUD. (Sept. 19, 2022), <https://www.csis.org/blogs/perspectives-innovation/japans-semiconductor-industrial-policy-1970s-today> [<https://perma.cc/MRJ6-GSTB>].

12. See *Road Kill on the Infobahn*, NEWSWEEK (Oct. 23, 1994, 8:00 PM), <https://www.newsweek.com/road-kill-infobahn-189472> [<https://perma.cc/K6FF-FX33>].

13. Uno, *supra* note 11.

14. See generally Yoshiaki Nakamura & Chihiro Watanabe, *Management and the Effect of MITI's R&D Project: Case Study from a Supercomputer Project*, 23 TECHNOVA-TION 221 (2003).

And they did, in fact, build a fairly impressive supercomputing technology, and supercomputers have become important again. But over the 1980s it turned out the personal computer, pioneered by tiny firms like Apple, was where the action had moved.<sup>15</sup> MITI didn't count on tiny firms like Apple becoming important. Japan tried to recover by investing hard in mobile phone technology, but in a manner tied to their telephone industry, not computing. That was successful for a while, but Japan missed the turn to smartphones. By the 2010s Japan had missed out on personal computers, the internet, and smartphones—three pretty big misses for a nation that was once challenging the United States for technological leadership.<sup>16</sup>

And if you study technology at all, it's full of surprises, as we all know. Who would have thought that these guys like Steve Wozniak and Steve Jobs, who in the '70s look like a bunch of weird looking hippie dudes, are going to actually build something that challenges companies like the French Bull or Italian Olivetti—and not to mention IBM and so forth.<sup>17</sup>

So, things can go wrong when you make these big bets. You can certainly bet on the wrong horse. And I'm skipping over the most catastrophic lessons of failed centralized planning, like China's bet on heavy industry in the great leap forward, a bad bet that ended up killing millions through famine.<sup>18</sup>

So, there is a lot of risk involved in making technological bets. On the other hand, there is a risk in not making *any* bets and just sitting things out. Sitting around, hoping that private markets will take care of everything can be risky too.

That's how the Administration feels about semiconductors—the United States, as many of you know, has essentially outsourced all its fabrication, most of it to Taiwan.<sup>19</sup> Taiwan is, to state the obvious, extremely close to mainland China. And you don't have to

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15. *Timeline of Computer History*, COMP. HIST. MUSEUM, <https://www.computerhistory.org/timeline/computers/> [<https://perma.cc/L9TQ-7PU9>].

16. Hiroko Tabuchi, *Why Japan's Cellphones Haven't Gone Global*, N.Y. TIMES (July 19, 2009), <https://www.nytimes.com/2009/07/20/technology/20cell.html> [<https://perma.cc/7NDL-VD3J>].

17. See Michael Schrage, *IBM Wins Dominance in European Computer Market*, WASH. POST (Feb. 17, 1985), <https://www.washingtonpost.com/archive/business/1985/02/17/ibm-wins-dominance-in-european-computer-market/bdcb9e21-8107-4dad-88d7-713f2709a8d8/> [<https://perma.cc/RB8N-YBEQ>].

18. Xin Meng et. al, *The Institutional Causes of China's Great Famine, 1959-1961*, 82 REV. ECON. STUD. 1568, 1573 (2015).

19. Yen Nee Lee, *2 Charts Show How Much the World Depends on Taiwan for Semiconductors*, CNBC (Mar. 15, 2021, 8:37 PM), <https://www.cnbc.com/2021/03/16/2-charts-show-how-much-the-world-depends-on-taiwan-for-semiconductors.html> [<https://perma.cc/J9MM-YFW4>].

be a military strategic genius to notice that it's a strategic vulnerability to be entirely dependent on Taiwanese chips.

The fear here is that the contest for the future may be about a few high-impact contests. Maybe AI is one of them, maybe quantum computing, 6G or whatever, maybe something else. Who knows? And if you, sort of, sit on the sidelines, twiddle your thumbs, there's a risk of being like China in the 18th and 19th century, an era where the nation began as the world's greatest power, stayed on the sidelines, technologically, and missed out on modern navies, armies and so forth and by the late 19th century had become a very subservient power—falling behind not just the European powers but Japan as well. I think that's one of the things that now motivates China: a sense that its lack of an aggressive industrial policy was a huge disadvantage to the Chinese empire in earlier times.

The fact that there are dangers both in action and inaction is what makes this a hard problem. And as I've already made clear, I think our best course is to reflect hard on what has worked and what has failed and see what we can take from that. In particular, in the United States, we should study carefully the periods in the '60s through '80s during which the seeds for much of our current technological world were planted.

So, one thing we invested in was the Apollo moon mission, which was obviously a success—at least in terms of landing on the moon and beating the Soviet Union there. Sometimes that's held up as an example of what should be done—that we need to return to an age when this country has the vision to make it to the moon. The Apollo mission cost about [USD \$280] billion in today's dollars, and as NASA has always hastened to point out, led to spin-offs like Velcro, freeze-dried foods and Teflon.<sup>20</sup>

Landing on the moon was obviously pretty cool. Velcro is pretty cool. But in terms of long-term impact Apollo pales when compared with another government-funded project from the same era—the internet. The amount spent on ARPANET and NSFNet was a grand total of USD \$124 million.<sup>21</sup> So less than the budget of a random federal agency for one year was the whole thing. The return on that investment—I don't know how you would measure it in terms of total economic value, but it must be hundreds of billions, if not trillions of dollars. So that one worked out. And I think there's something learned even from those two examples to begin with.

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20. *The True Cost of the Apollo Program: Inflation-Adjusted Figures*, APOLLO 11 SPACE, <https://apollo11space.com/the-true-cost-of-the-apollo-program-inflation-adjusted-figures/> [https://perma.cc/WR39-5Y68].

21. Larry Press, *Seeding Networks: The Federal Role*, 39 COMM'NS ASS'N FOR COMPUTING MACH. 11, 15 (1996) (noting that the total cost was less than \$127 million; calculations reveal a number close to \$124 million).

The Apollo moon mission, obviously, landed on the moon and led to Velcro. But as a government program it was very directed, very specific, and created a lot of single use technology that really hasn't been ever used again. We don't have our own individual space rockets as a spinoff of Apollo. As an investment it was single use and not very broad or foundational and not an input into a lot of other industries.

In contrast, the funding of the Internet was much more general as opposed to specific. It was broader—a network of networks. It was, I would say, foundational. And over the long-term its success lay in creating an ecosystem as opposed to a firm or an industry.

Here is a third aspect of industrial policy from the '70s and '80s that I regard as critical. During that period, despite heavy investment in computing by European and Japanese rivals, we did not decide that IBM and AT&T were going to have a free ride and have all the love and support of the federal government.<sup>22</sup> Obviously, they did get a lot of government contracts. But they also had the Justice Department hunting them down and trying to break them into pieces. And that ended up being an important part of U.S. industrial policy during this period.

In fact, the Justice Department did break AT&T into pieces in the height of this period of competition with Japan. In the midst of competition with European computing, the Justice Department sued to break up IBM as well, in 1969.<sup>23</sup>

Both of these moves were the opposite of a traditional “national champion” centered industrial policy. Think of it: You're going to take the most valuable and one of most advanced tech companies on Earth and break it up? Yes.

But the consequences of this form of industrial policy were also profound. When it comes to IBM, the Justice Department unbundled software and hardware right at the beginning of the 1970s.<sup>24</sup> In antitrust terms, they ended the tying of hardware and software. And in retrospect that may be one of the most consequential things the Justice Department and the United States ever did for the tech industries—because it effectively created a software industry and opened that industry to newcomers.

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22. *Chapter 7 - Data Communications: Market Order 1973-1979*, HIST. COMP. COMM'NS, <https://historyofcomputercommunications.info/section/7.2/the-justice-department-ibm-and-at&t/> [<https://perma.cc/NG82-U2AY>].

23. See *generally* Memorandum of the U.S. Department of Justice, *United States v. International Business Machines Corp.: United States' Memorandum on the 1969 Case* (Oct. 5, 1995), <https://www.justice.gov/atr/case-document/united-states-memorandum-1969-case> [<https://perma.cc/4EBZ-A3Z6>].

24. *IBM and Microsoft: Antitrust Then and Now*, CNET (Jan. 2, 2002, 4:43 PM), <https://www.cnet.com/tech/tech-industry/ibm-and-microsoft-antitrust-then-and-now/> [<https://perma.cc/5LPS-JGBD>].

We don't have a counterfactual, and it is surely possible that software would have become its own industry in some more organic manner. But it certainly would have happened less quickly. And quickening the development of a software industry, by removing IBM's control of it, is a great example of successful industrial policy.

Meanwhile, in the '70s, the FCC took action to protect the companies operating over AT&T lines from AT&T.<sup>25</sup> These were called the "Computer Inquiries," leading later to net neutrality ideas.<sup>26</sup> That was also its own form of industrial policy as well. In a sense, I don't know if subsidy's the right word, but certainly support or the nurturing or the giving of space for an industry on top of the phone lines. It was those protections, coupled with the investments in the Internet itself, that formed the government's contribution to the Internet revolution.

So, these are important success stories in U.S. industrial policy in the tech industries. And I'm saying—let's do more things like that. Here are my criteria—good or bad—for industrial policy. Three points:

First, industrial policy should be aimed at creating an ecosystem, not aiding specific companies or an existing industry. That means thinking hard about companies that don't exist now or exist in nascent or cottage form.

Second, subsidies ideally should go to foundational technologies. That is, technologies that are inputs into a broad range of other economic activities, like broadband electricity or the internet, as opposed to sort of the end product the consumer gets.

Third, money should be time-limited—not forever, not the opening of a tap. The goal is an intervention, not a permanent support program. Of course, it has to last long enough to attract real investments. A decade isn't a bad approximation.

Let me finish by ranking some of the federal government recent investments by these criteria. In example number one, we invested in a tech industry that was started here and was once one of the most innovative in the world but has become technologically stagnant and is well beyond middle age. We gave the airline industry USD \$56 billion during the COVID crisis.<sup>27</sup>

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25. Wu, *supra* note 6, at 187-89.

26. See generally Preserving the Open Internet, Report and Order, 25 FCC Rcd. 17905 (Nov 20, 2010) (generally tracing the link between the Computer Inquiries and the Commission's first decision to implement "net neutrality" rules); see also Tim Wu, *How the FCC's Net Neutrality Plan Breaks with 50 Years of History*, WIRED (Dec. 6, 2017, 7:00 AM), <https://www.wired.com/story/how-the-fccs-net-neutrality-plan-breaks-with-50-years-of-history/> ("[the computer inquiry rules] are therefore fairly described as the "first" net neutrality rules, or the direct ancestor of today's net neutrality rules.").

27. Leslie Josephs, *Airline CEOs Explain Flight Cancellations to Congress After Taking \$54 Billion in Taxpayer Aid*, CNBC (Dec. 15, 2021, 10:37 AM),

That grant might be justified in part as a means of preventing unemployment. But it's hard to see it as a wise industrial policy. First, it was focused on about four companies. As far as I can tell, they made exactly no innovations in response to that infusion of money. And, in fact, there's a lot of trouble seeing what actually happened to that money.

It also violated the rule against being time-limited in the following sense. The airline industry is now confident, if it wasn't already, that if it's in real trouble, another USD \$50 billion will be waiting for it. So, it has a permanent support program, and can return to not saving money or pursuing the same policies it has before, which amounted to a massive amount of stock buybacks, debt financing and decreasing levels of consumer service to save costs.

We've done better with the broadband project, which is currently being overseen by Alan Davidson of the NTIA.<sup>28</sup> USD \$65 billion for broadband.<sup>29</sup> Now, to be fair, the ecosystem already exists. But as infrastructure it is a more foundational technology. But it's easy to see that's their foundation, bring more people in and so forth.

Finally, the CHIPS bill, also not bad.<sup>30</sup> Not perfect by my criteria, but nothing is. But somewhat broad, as semiconductors are obviously an input into a huge number of industries, not an end product. That's still ongoing. The challenge there is going to be to create an ecosystem as opposed to give the money to, let's say, Intel.

This is an ongoing project. I think people need to think more about it. I think we need a broader sense of what counts industrial policy, including some of the rules. So, we should be thinking about what kind of industrial policies help shake up the Internet industries and associated technologies.

And try, if not only to ensure their success, to make sure that they are not put down by government or existing industry. And if we do right, maybe we can, by spending money, shake off a little bit of middle age.

Thank you very much.

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<https://www.cnbc.com/2021/12/15/airline-ceos-face-senate-panel-over-flight-cancellations-after-taking-54-billion-in-taxpayer-aid.html> [<https://perma.cc/QS2Z-UDJZ>].

28. See generally Diana Goovaerts, *Congress Grills NTIA Chief About Broadband Funding Rules*, FIERCE TELECOM (June 9, 2022, 5:11 PM), <https://www.fiercetelecom.com/telecom/congress-grills-ntia-chief-about-broadband-funding-rules> [<https://perma.cc/5VXS-RYGR>].

29. See Press Release, White House, Fact Sheet: The Bipartisan Infrastructure Deal (Nov. 6, 2021), <https://www.whitehouse.gov/briefing-room/statements-releases/2021/11/06/fact-sheet-the-bipartisan-infrastructure-deal/> [<https://perma.cc/5G6K-4TL4>].

30. See generally CHIPS and Science Act of 2022, Pub. L. No. 117-167, 136 Stat. 1366.