



United States of America  
**Federal Trade Commission**

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**The Internet of Everything: Data, Networks & Opportunities**

**Maureen K. Ohlhausen**  
**Commissioner, U.S. Federal Trade Commission<sup>1</sup>**

**U.S. Chamber of Commerce Foundation and**  
**U.S. Chamber's Center for Advanced Technology & Innovation**  
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Thank you to the U.S. Chamber of Commerce and its Center for Advanced Technology & Innovation for inviting me to kick off today's program on the Internet of Everything. The U.S. Chamber is truly *the* Washington presence for those large, medium, and small engines of prosperity, American businesses, which innovate every day to bring new products, improved services, and better outcomes to their customers. The result is a dynamic economy that promises - and delivers - increased prosperity and opportunity.

I know this optimistic view isn't in favor in some quarters. But even if optimism is out of fashion, it remains true that today the average American enjoys one of the richest lives in all of history. On every metric of well-being, humankind has had an incredible past 200 years. Up until 1800, the worldwide average per-person daily consumption was approximately \$3 modern-day dollars.<sup>2</sup> But starting in the early to mid-1800s, something changed: As Alfred North

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<sup>1</sup> The views expressed in these remarks are my own and do not necessarily reflect the views of the Federal Trade Commission or any other Commissioner. I would like to thank my attorney advisor Neil Chilson for his contributions to this speech.

<sup>2</sup> DEIRDRE N. MCCLOSKEY, *BOURGEOIS DIGNITY: WHY ECONOMICS CAN'T EXPLAIN THE MODERN WORLD* 1-2, (2010).

Whitehead said, and I am paraphrasing, around that time people invented inventing.<sup>3</sup> Today, average daily consumption is nearly \$33 dollars, and in developed countries is well over \$100.<sup>4</sup> Of course, this growth isn't uniform across the world, but the overwhelming majority of the world's population is far better off today than were its ancestors 200 years ago. What economist Don Boudreaux calls the Hockey Stick of Human Prosperity is a direct result of free market institutions that incentivize and reward innovation and meaningful work, as well as societal attitudes that respect and value entrepreneurship and business.<sup>5</sup>

### **The massive benefits of the Internet of Everything**

We're here today to talk about one technology that – if we preserve those institutions and societal attitudes I just mentioned – has the potential to greatly extend the upward trajectory of the hockey stick of human prosperity. That technology is, of course, the Internet, connected to and connecting everything. This “Internet of Everything” promises substantial benefits to consumers in every economic situation and to businesses of all sizes.

Several organizations have attempted to estimate the potential benefits of the Internet of Everything. A recent study by McKinsey Global Institute gives perspective. That study estimates that IoT will have an economic impact of between \$3.9 trillion and \$11.1 trillion dollars *per year* by 2025.<sup>6</sup> Even the low-end estimate is approximately the size of the German economy today.<sup>7</sup>

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<sup>3</sup> MATT RIDLEY, *THE RATIONAL OPTIMIST* 255 (2010) (quoting ALFRED NORTH WHITEHEAD, *SCIENCE AND THE MODERN WORLD* 96 (1925)).

<sup>4</sup> MCCLOSKEY, 2.

<sup>5</sup> Don Boudreaux, *The Hockey Stick of Human Prosperity (Everyday Economics 1/7)*, YOUTUBE, June 24, 2014, <https://www.youtube.com/watch?v=t9FSnvtcEbg>.

<sup>6</sup> McKinsey Global Institute, *The Internet of Things: Mapping the Value Beyond the Hype*, at 36 (June 2015) [hereinafter *McKinsey Report*].

<sup>7</sup> List of countries by GDP (nominal), WIKIPEDIA, [https://en.wikipedia.org/wiki/List\\_of\\_countries\\_by\\_GDP\\_%28nominal%29](https://en.wikipedia.org/wiki/List_of_countries_by_GDP_%28nominal%29) (last visited Sept. 22, 2015).

That's a lot of FitBits! Or not, actually. The McKinsey report estimates that although consumer applications such as fitness monitors and self-driving cars get a lot of attention, the business-to-business applications will generate up to 70% of the total benefits from IoT. These developments likely include optimized factory and hospital operations, healthier and safer worksites, and improved logistics and navigation.<sup>8</sup> Consumers will benefit greatly from B2B improvements as the products and services they purchase become more customized, higher quality, safer, and less expensive.

IoT offers big benefits to both large and small companies, to incumbent companies and new entrepreneurs alike. I know that 96% of the U.S. Chambers' members have fewer than 100 employees.<sup>9</sup> Many – and likely all – of these businesses will benefit from IoT, directly or indirectly. Smaller businesses are often quite nimble and can pivot to embrace a technology when capital costs are not too high. For example, consider the mobile payment solution Square, which allows a small company to take payment using credit or debit cards on a smartphone. This app allows small vendors to offer a convenient payment method that previously required a large capital investment. IoT also offers huge opportunities for entrepreneurship and increased competition, as traditional business models are disrupted by more and new competitors.<sup>10</sup> Furthermore, as IoT reduces the transaction costs required to match supply and demand, it may become relatively more efficient to be a highly specialized small business than a large, less-focused business.<sup>11</sup> In sum, the opportunities for small business are vast.

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<sup>8</sup> *McKinsey Report* at i.

<sup>9</sup> Thomas J. Donohue, *Statement of the U.S. Chamber of Commerce on Congress and U.S. Tariff Policy*, at i (Apr. 21, 2015).

<sup>10</sup> World Economic Forum, *Industrial Internet of Things: Unleashing the Potential of Connected Products and Services*, at 11 (Jan. 2015) [hereinafter *IIoT*].

<sup>11</sup> See, e.g., Irving Wladawsky-Berger, "The Rise of the On-Demand Economy," Mar. 13, 2015, <http://blogs.wsj.com/cio/2015/03/13/the-rise-of-the-on-demand-economy/>.

Even though consumer applications will not be the largest slice of the benefits of the Internet of Everything, these applications remain significant in absolute economic terms and in their impact on individual lives. McKinsey estimates a benefit of \$170 billion to 1.6 trillion annually by 2025 just from IoT applications dedicated to monitoring and treating illness or improving wellness.<sup>12</sup> Conservative estimates indicate that IoT applications could reduce the cost of care for chronic disease by 10 to 15 percent.<sup>13</sup> This includes savings from avoiding crises - such as a heart attack triggered by not complying with a drug regimen - that are not only expensive, but also emotionally and physically distressing to patients.

These benefits will be spread across the globe. Experts anticipate that emerging economies will be able to “leapfrog” to IoT solutions (similar to their leapfrog to wireless communications) as they build out infrastructure in the near future. One estimate suggests that emerging economies will receive about 50% of the total benefits of Internet of Everything technologies.<sup>14</sup>

### **The Internet of Everything will be disruptive**

These massive benefits will go hand in hand with rapid and disruptive changes. The World Economic Forum found that 88% of incumbent organizations worry about business model disruption from IoT technology.<sup>15</sup> Companies that offer products (say, car dealers) already compete in a real sense with companies offering services (ride-sharing companies such as Uber or Lyft). And ultimately they will compete with companies selling outcomes (a daily self-organizing commute service, for example). Such disruption is a direct result of IoT technologies

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<sup>12</sup> *McKinsey Report* at 37.

<sup>13</sup> *Id.* at 41.

<sup>14</sup> *Id.*

<sup>15</sup> *IHOT* at 7.

making it easier to match supply and demand, allowing more fluid and just-in-time arrangements.

This innovation can, and will, be unnerving or unsettling. By its very nature, innovation *changes* things. Change is uncomfortable. That is why, as long as there has been innovation, there have been detractors and doomsayers. William Petty, the economist and doctor, said, “When a new invention is first propounded, in the beginning every man objects and the poor inventor runs the gauntlet of all petulant wits.”<sup>16</sup> And he was talking in 1679! Pessimism about innovation sells newspapers and books. It also has a surprising intellectual caché. “The man who despairs when others hope is admired by a large class of persons as a sage,” said John Stuart Mill.<sup>17</sup>

But if the past 200 years of innovation have any lesson, it is this: society has repeatedly and quickly integrated and greatly benefited from innovation. The somber doomsday “sages” – from the Luddites in 19<sup>th</sup> century England to critics of credit card technology in the 1970s – have been wrong about the general effects of innovation. The many benefits have far outweighed the few costs. I am quite optimistic that the disruption of the Internet of Everything will continue the trend and greatly promote our prosperity.

### **Preserving an environment of innovation in Internet of Everything**

Although I am optimistic about history repeating itself here, history doesn’t happen on its own. There are things we can do to help maximize the benefits of IoT to consumers. In particular, as a regulator, there are four principles or actions I believe will help preserve an environment of innovation for the Internet of Everything.

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<sup>16</sup> See Matt Ridley, “Neophobia v. Innovation,” CATO Unbound, (Oct. 13, 2010) (quoting William Petty, *A Treatise of Taxes and Contributions* 53 (1662)), <http://www.cato-unbound.org/2010/10/13/matt-ridley/neophobia-vs-innovation>.

<sup>17</sup> RIDLEY, *supra* note 5, 279 (quoting Speech by John Stuart Mill to the London Debating Society on ‘perfectibility’ (May 2, 1828)).

***Tell the story of innovation.*** The first thing we can do is promote an accurate understanding of the dramatic benefits of innovation even in the face of constant skepticism. Psychologists tell us that people are often pessimistic about society overall even though they are generally optimistic about their own prospects. For many reasons, media and politics often feed this pessimism. But the truth is that we live in remarkable times, the beneficiaries of a 200-plus year period of innovation that shows no signs of stopping. I am proud to use opportunities like this one to spread knowledge about this grand history, in which many of the Chamber's members have played a role.

***Apply regulatory humility.*** This history, discussed only briefly above, has different lessons for different constituents. For regulators, it counsels the second of my four principles: approach new technologies and new business models with regulatory humility. Regulatory humility is my name for recognizing the inherent limitations of regulation and acting according to those limits.<sup>18</sup> As Hayek's work shows, regulators face a fundamental knowledge problem that limits the effective reach of regulation. A regulator must acquire knowledge about the present state and future trends of the industry being regulated. The more prescriptive the regulation, and the more complex the industry, the more detailed knowledge the regulator must collect. But, regulators simply cannot gather all the information relevant to every problem. Such information is widely distributed and therefore very expensive to collect. Even when a regulator manages to collect information, it quickly becomes out of date as a regulated industry continues to evolve.<sup>19</sup> Obsolete data is a particular concern for regulators of fast-changing technological fields like the Internet of Things.

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<sup>18</sup> See Maureen K. Ohlhausen, *The Procrustean Problem with Prescriptive Regulation*, 23 COMMLAW CONSPECTUS 1 (2014), available at <https://www.ftc.gov/public-statements/2014/12/procrustean-problem-prescriptive-regulation-commlaw-conspectus-journal>.

<sup>19</sup> Friedrich A. Hayek, *The Use of Knowledge in Society*, 35 AMERICAN ECONOMIC REVIEW 519-30 (1945).

This knowledge problem means that centralized problem solving cannot make full use of the available knowledge about a problem. Therefore, centralized regulation generally offers worse solutions when compared to distributed or emergent constraints such as social norms.

***Focus on addressing real consumer harm.*** Regulatory humility is all well and good, but while doomsday scenarios about innovation are wrong, consumers are sometimes harmed. What then? My third principle for regulators is to focus on identifying and addressing *real*, not speculative, consumer harm.

At the FTC, this focus is part of our statute. Congress charged us in Section 5 of the FTC Act with preventing deceptive or unfair acts and practices.<sup>20</sup> Deceptive acts violate Section 5 only if they are material – that is, if they actually harm consumers. And practices are only unfair if there is a substantial harm that consumers cannot avoid and that outweighs any benefits to consumers or competition.<sup>21</sup> In both cases, the law concerns itself with addressing actual consumer harms. Likewise the FTC carefully evaluates consumer welfare (or, its corollary, consumer harm) when it exercises its antitrust authority.

Not only does the law require the FTC to focus on consumer harm, such a focus is also good policy. Agencies have limited resources. We should generally spend those resources to stop existing or extremely likely harms, rather than trying to prevent speculative or insubstantial harms.

By focusing its enforcement on practices that are actually harming or likely to harm consumers, the FTC has generally limited forays into speculative harms. We have thereby

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<sup>20</sup> See 15 U.S.C. § 45(a)(1).

<sup>21</sup> See FED. TRADE COMM’N, FTC POLICY STATEMENT ON DECEPTION (1983), available at <http://www.ftc.gov/ftc-policy-statement-on-deception>; FED. TRADE COMM’N, FTC POLICY STATEMENT ON UNFAIRNESS (1980), available at <http://www.ftc.gov/ftc-policy-statement-on-unfairness>.

generally preserved our resources for clearly harmful violations. I believe this self-restraint has been important to the FTC's success in stopping consumer harms without disrupting innovation.

Focusing on real, rather than speculative consumer harm, is crucial to maximizing the consumer benefits of IoT. Unfortunately, recent FTC pronouncements on IoT are a mixed bag in this regard.

For example, the FTC's staff report on the Internet of Things appropriately rejected calls for IoT-specific legislation as premature given the lack of any evidence of harms unique to IoT.<sup>22</sup> The report also properly emphasized the importance of data security in IoT devices, because some unsecure IoT devices have actually resulted in consumer harm.<sup>23</sup>

On the other hand, the IoT report urged "data minimization."<sup>24</sup> Without examining costs or benefits, the report encouraged companies to delete valuable data that could have many unanticipated beneficial uses. The report proposed this practice out of concern over largely hypothetical future harms. This "precautionary principle," as Adam Thierer might call it, preemptively cuts off innovation.<sup>25</sup> I therefore dissented from that recommendation in the staff report.<sup>26</sup>

Unfortunately, we have another recent example of the FTC failing to focus on addressing real consumer harm in its case against Nomi Technologies. Nomi is a start-up that analyzes, aggregates, and reports data about consumer traffic to its retail merchant clients. For example,

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<sup>22</sup> FED. TRADE COMM'N, INTERNET OF THINGS: PRIVACY & SECURITY IN A CONNECTED WORLD 48-49 (2015), available at <https://www.ftc.gov/reports/federal-trade-commission-staff-report-november-2013-workshop-entitled-internet-things>.

<sup>23</sup> *Id.* 27-33.

<sup>24</sup> *Id.* 33-39.

<sup>25</sup> See Adam Thierer, Problems with Precautionary Principle-Minded Tech Regulation & a Federal Robotics Commission (Sept. 22, 2014), <http://techliberation.com/2014/09/22/problems-with-precautionaryprinciple-minded-tech-regulation-a-federal-robotics-commission/>.

<sup>26</sup> Internet of Things Workshop Report, Separate Statement of Commissioner Ohlhausen, at 2 (Jan. 27, 2015), available at <https://www.ftc.gov/public-statements/2015/01/separate-statement-commissioner-maureen-k-ohlhausen-regarding-internet>.

Nomi might help its clients understand how long the average customer spends in the men's department or a checkout line. Nomi's technology aggregates this data by receiving and storing hashed versions of the publicly broadcast MAC addresses of consumer smartphones. As a third party contractor collecting no personally identifiable information, Nomi had no legal obligation to offer consumers the ability to opt out. Yet, since the service started, Nomi offered all consumers a global opt out on its website, which it honored. The problem was that Nomi's privacy policy also pledged to allow consumers to opt out at any retailer using Nomi's technology. However, none of Nomi's retail clients offered consumers the opportunity to opt out. Thus, Nomi's privacy policy was partly inaccurate.

The majority of Commissioners supported a complaint that alleged that Nomi's inaccurate privacy policy was deceptive and a settlement that imposed a 20-year compliance order on the company.<sup>27</sup>

I dissented from the complaint and settlement in this case.<sup>28</sup> The evidence suggested that there was no consumer harm. Consumers who wanted to opt out used the functioning global opt out, and thus Nomi's partially inaccurate statement likely harmed no consumers. By bringing this case, the majority applied a de facto strict liability approach to a young company that had actually tried to offer privacy protections above and beyond its legal obligation.

As the U.S. Chamber's helpful comments on the Nomi settlement pointed out, the FTC shouldn't have brought a costly enforcement action against a start-up company that did not harm consumers. I share your concern that the FTC's action "may dissuade [small businesses] from

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<sup>27</sup> In the Matter of Nomi Technologies, Inc., FTC File No. 132-3251, Compl. (Apr. 23, 2015), *available at* <https://www.ftc.gov/system/files/documents/cases/150902nomitechcmt.pdf>; Order (Sept. 3, 2015), *available at* <https://www.ftc.gov/system/files/documents/cases/150902nomitechdo.pdf>.

<sup>28</sup> See In the Matter of Nomi Technologies, Inc., FTC File No. 132-3251, Dissenting Statement of Commissioner Ohlhausen (Aug. 28, 2015), *available at* [https://www.ftc.gov/system/files/documents/public\\_statements/799571/150828nomitechmkostatement.pdf](https://www.ftc.gov/system/files/documents/public_statements/799571/150828nomitechmkostatement.pdf); Dissenting Statement of Commissioner Ohlhausen (Apr. 23, 2015), *available at* [https://www.ftc.gov/system/files/documents/public\\_statements/638361/150423nomiohlhausenstatement.pdf](https://www.ftc.gov/system/files/documents/public_statements/638361/150423nomiohlhausenstatement.pdf).

voluntary adoption of consumer privacy practices and stifle entrepreneurship and innovation in technology.”<sup>29</sup> Indeed, this decision discourages companies from doing any more than the bare minimum on privacy. I believe such disincentives will ultimately leave consumers worse off.

***Use Appropriate Tools.*** The final way that regulators can spur innovation in the IoT is to use appropriate tools to solve issues that do emerge. The tools an agency uses can make a large difference in the agency’s effectiveness. For fast changing technologies like IoT, agencies need tools that are nimble, transparent, and incremental.

Often, we equate regulation with large, APA-style rulemakings. Such *ex ante* rulemaking sets out rules, often industry wide in scope, to prevent future harms. For the reasons discussed above, including the knowledge problem, regulators struggle to construct effective rules and to update such rules in a timely manner. And such prescriptive *ex ante* regulations can hinder innovation. For example, if an innovative new project or service does not easily fit in a particular statutory or regulatory box, the innovator may be uncertain about how to comply with the law. Such legal uncertainty exacerbates the already risky effort to develop something new, which discourages innovation.

A good example of a nimble, transparent, and incremental regulatory tool is the FTC’s case-by-case enforcement process, which is quite different than APA rulemaking.<sup>30</sup> Although the Commission does have rulemaking authority, the vast majority of our actions are *ex post* case-by-case enforcement of our general Section 5 authority. This incremental approach, which we have been using for nearly 100 years, has significant benefits. Consistent with Hayek’s thesis about the knowledge problem, addressing only a specific case at hand requires far less

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<sup>29</sup> In the Matter of Nomi Technologies, Inc., FTC File No. 132-3251, Comments of U.S. Chamber of Commerce, at 1 (May 22, 2015), available at <https://www.ftc.gov/policy/public-comments/2015/05/22/comment-00005>.

<sup>30</sup> See Maureen K. Ohlhausen, *The FCC’s Knowledge Problem: How to Protect Consumers Online*, 67 FED. COMM. L.J. 203, 212-213 (2015), available at [http://www.fclj.org/wp-content/uploads/2015/09/67.2.2\\_Ohlhausen.pdf](http://www.fclj.org/wp-content/uploads/2015/09/67.2.2_Ohlhausen.pdf).

information than, for example, an industry-wide rulemaking to address similar issues. This reduces the knowledge problem. Furthermore, this *ex post* enforcement requires particular facts on the ground and a specifically alleged harm, and it generally only directly applies to the party to the enforcement action. Thus, an incremental approach better limits the potential unintended consequences of a regulatory action.

Perhaps somewhat paradoxically, incremental approaches are particularly well-suited to dealing with fast-developing areas of technology. Even small distortions in such fast-moving industries can quickly divert the industry from its previous trajectory. A case-by-case approach allows the regulatory body to address bad actors without derailing an entire industry, and it enables the law to evolve alongside the technology in a much more organic fashion.

Of course, a case-by-case approach can still discourage innovation if the agency brings the wrong cases, as shown by the Nomi case I discussed earlier. Even still, the negative effects of a wrongly decided case are likely to be smaller than a wrongly decided, industry-wide rulemaking.

Another nimble, transparent and incremental tool that is well suited to regulation in fast changing industries is self-regulation, with agency enforcement as a backstop. Compared to traditional government regulation, self-regulation has the potential to be more prompt, flexible, and responsive when business models or technologies change. Self-regulatory frameworks are easier to reconfigure than legislative or regulatory systems. When self-regulatory organizations have obtained the support of member firms, the resulting self-regulation is likely to match market realities. Finally, a regulatory backstop that holds companies to the promises they make under a self-regulatory framework – like the FTC’s deception authority does – ensures that companies take seriously their responsibilities under a such a framework.

Different industries in the IoT space are adopting privacy and data security principles through self-regulatory efforts. For example, in November of last year, the Auto Alliance and Global Automakers (which together represent nearly every major automaker) issued a set of Privacy Principles.<sup>31</sup> These principles will guide automakers as they incorporate IoT technology into their products. Participating Members will implement the Principles as appropriate to the demands of their business and legal environment. But all the Participating Members pledged to follow specific fundamental principles, including transparency, choice, data security, and accountability, among others.

I expect other IoT industries to adopt similar self-regulatory efforts in the near future.

### **Conclusion**

I am what author Matt Ridley would call “a rational optimist” when I think about the future of an Internet connected to everything.<sup>32</sup> Over the past two centuries, humankind has proven its ability to transform innovation into widespread prosperity. Fueled by supportive social attitudes and free market institutions, businesses have been the engines of this prosperity. Regulators who don’t want to stall these engines of innovation should remember the long history of beneficial innovation, remain humble about what they can know and accomplish, focus on addressing real consumer harm, and apply tools appropriate to the harms that do arise. These four principles will help to maximize IoT’s promise to continue innovation’s upward trajectory of prosperity.

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<sup>31</sup> See Alliance of Automobile Manufacturers, Inc and Association of Global Automakers, Inc., *Consumer Privacy Protection Principles: Privacy Principles for Vehicle Technologies and Services* (Nov. 12, 2014), available at <http://www.autoalliance.org/index.cfm?objectid=CC629950-6A96-11E4-866D000C296BA163>.

<sup>32</sup> See generally RIDLEY, *supra* note 5.