

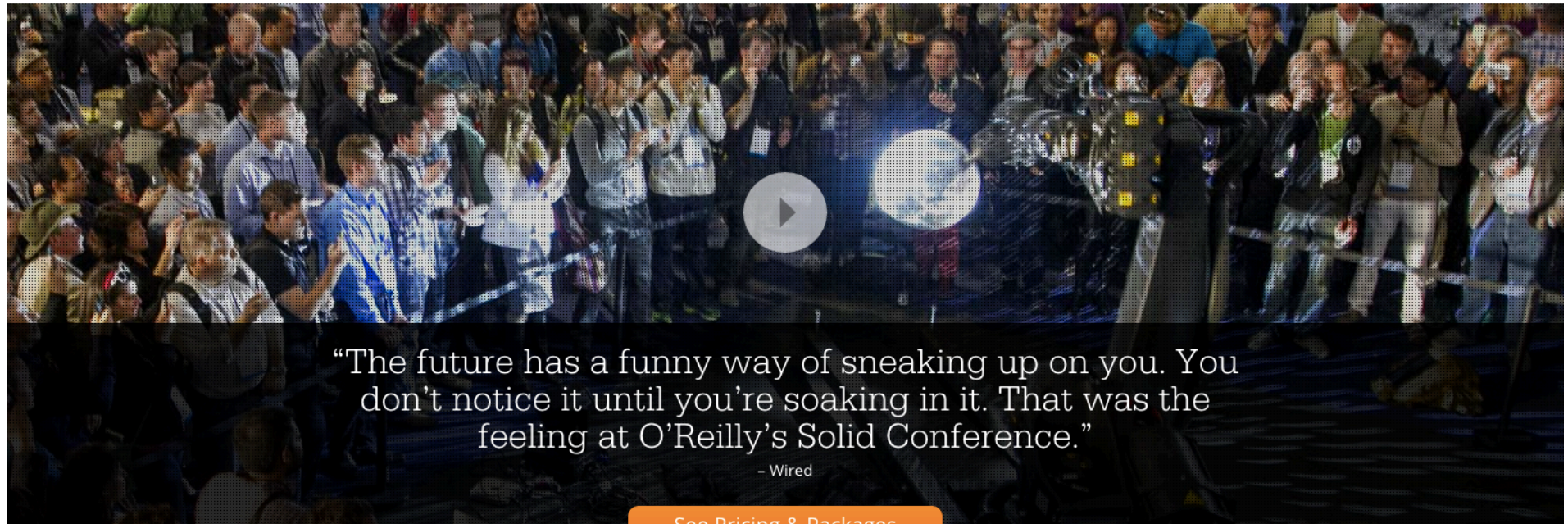
Software Above The Level of a Single Device: The implications

**Tim O'Reilly
Spark Summit
June 15, 2015**

Solid

Hardware, Software & the Internet of Things
June 23–25, 2015 • San Francisco, CA

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“The future has a funny way of sneaking up on you. You don’t notice it until you’re soaking in it. That was the feeling at O’Reilly’s Solid Conference.”

– Wired

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Aaron Levie @levie

23 Aug

Perspective: While Ballmer was CEO, Microsoft grew revenue by \$55B. Dell grew by \$31B, Oracle by \$27B, Intel by \$19B, IBM by \$16B.

Expand

CEO:

23 Aug

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23 Aug

Microsoft job posting anywhere on



Aaron Levie @levie

23 Aug

It's easy to assume things can only get better at Microsoft. It's a \$78 billion revenue company. They can almost only get worse.

Expand



Aaron Levie @levie

22 Aug

Uber is a \$3.5 billion lesson in building for how the world **should** work instead of optimizing for how the world **does** work.

Expand

“Uber is a [\$40] billion lesson in building for how the world **should** work instead of optimizing for how the world **does** work” - Aaron Levie of Box.net





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What Zipcar Got Right

- Customer self-service
- Real time availability information
- Payment via account presets
- Connected device to lock and unlock the car
- Trusting customers to refill gas and clean the car

Where They Didn't See Far Enough

- Fixed parking locations with return to same location

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Take the wheel.

[DRIVE WITH LYFT](#)[Meet the new Lyft >](#)

Need a ride? Take Lyft for a welcoming, affordable, and memorable ride. Request a ride in the Lyft app, and get picked up by a reliable community driver in minutes.

What did these services do differently?

“Building for the way the world should work”

Rethinking the entire workflow and user experience

- You can hail a car from anywhere
- You can see in real time where it is en route
- You can see the name and picture of the driver and the car, and the driver can see the same for you
- No need to go through the rigamarole of payment every time
- Passenger can call or message the driver if necessary
- Manage driver quality via passenger ratings

All the data driven services we've learned to build on the web are now coming to the physical world

SOFTWARE ENGINEER - REALTIME DATA INTELLIGENCE

- are familiar with either stats, signal processing, or machine learning algorithms.
- have deep production experience with large-scale data processing platforms, such as Hadoop or Spark.
- are familiar with interactive data visualization techniques.

- You will work with a team of talented engineers to build a highly scalable, fault tolerant, and responsive data infrastructure to meet Uber's most pressing data analytics needs. Your systems need to answer interesting questions in real time such as forecasting rider demand and traffic patterns in arbitrary geo locations,

But there's more than one way to do it

Let's talk for a moment about two approaches to data and workers

HARPER'S

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REPORT — From the March 2015 issue

The Spy Who Fired Me

The human costs of workplace monitoring

By [Esther Kaplan](#)

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Last March, Jim Cramer, the host of CNBC's *Mad Money*, devoted part of his show to a company called Cornerstone OnDemand. Cornerstone, Cramer shouted at the camera, is “a cloud-based-software-as-a-service play” in the “talent-management” field. Companies that use its platform can quickly assess an employee’s performance by analyzing his or her online interactions, including emails, instant messages, and Web use. “We’ve been managing people exactly the same way for the last hundred and fifty years,” Cornerstone’s CEO, Adam Miller, told Cramer. With the rise of the global workforce, the remote workforce, the smartphone and the tablet, it’s time to “manage people differently.” Clients include Virgin Media, Barclays, and Starwood Hotels.

THE CURRENT ISSUE

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on the Art of Sex • Trying Not to Kill
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JULY 2015

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By John Crowley

Surge Pricing

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the Washington
Post



These are systems made up of
computers and humans working together

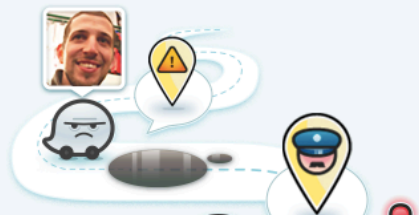
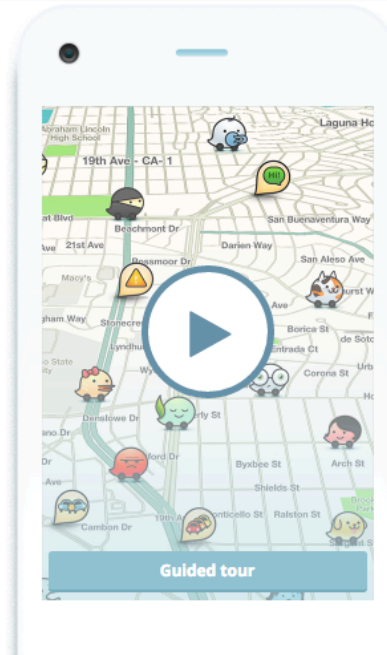
Use technology for human augmentation

Use humans for technology augmentation

Get the best route, every day, with real-time help from other drivers.

Waze is the world's largest community-based traffic and navigation app. Join other drivers in your area who share real-time traffic and road info, saving everyone time and gas money on their daily commute.

WAZE. OUTSMARTING TRAFFIC, TOGETHER.



Nothing can beat real people working together

Imagine millions of drivers out on the roads, working together towards a common goal: to outsmart traffic and get everyone the best route to work and back, every day.

lyft

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Make up to \$35/hr
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Enter your info, and then download the Lyft app to create your driver profile.

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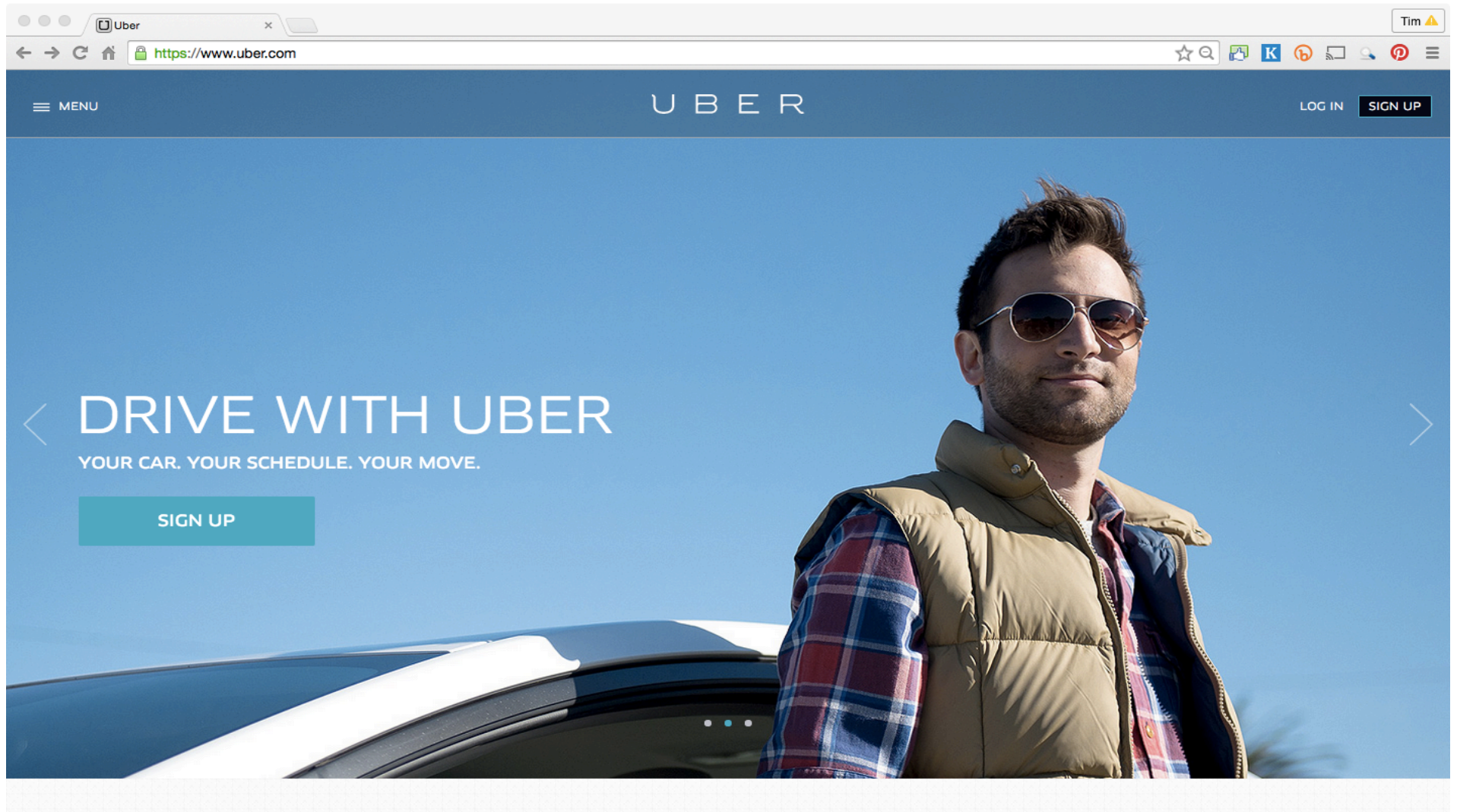
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Already applied? [Check the status of your application here.](#)

You, Dylan Field and 245 other friends use Lyft.





The Internet of Things and Humans

Uber/Lyft are a Human-Machine Symbiosis

- People + new kinds of smart machines = the ability to rethink an entire industry
- We're no longer just building software, we're building new business processes and workflows in the real world


Human-Computer Symbiosis

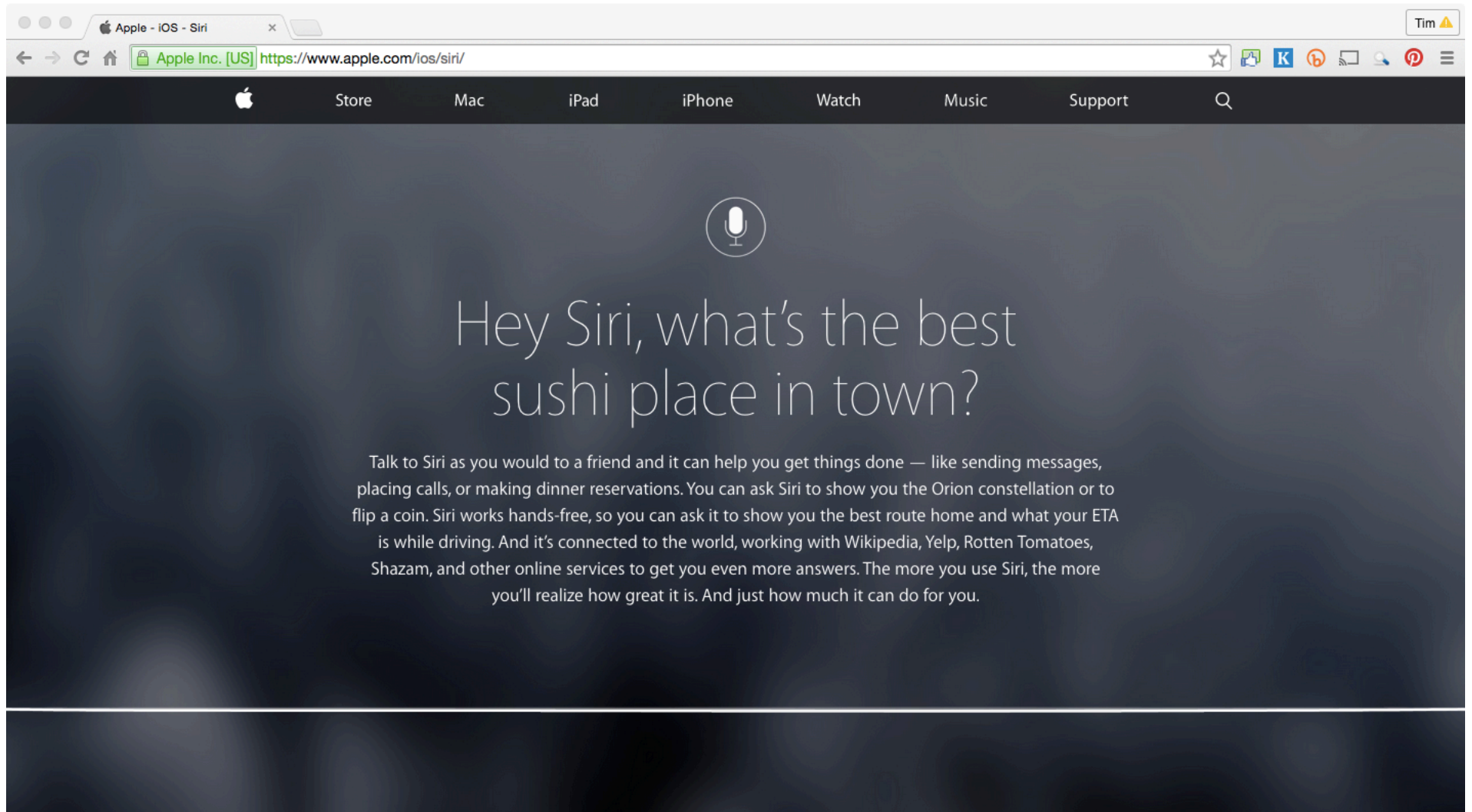
“The hope is that, in not too many years, human brains and computing machines will be coupled together very tightly, and that the resulting partnership will think as no human brain has ever thought and process data in a way not approached by the information-handling machines we know today.”

-[Licklider, J.C.R.](#), "Man-Computer Symbiosis", IRE Transactions on Human Factors in Electronics, vol. HFE-1, 4-11, Mar 1960. [Eprint](#)

Say Hello to Watson

Cognitive computing enables a new partnership between people and computers that enhances and scales human expertise.

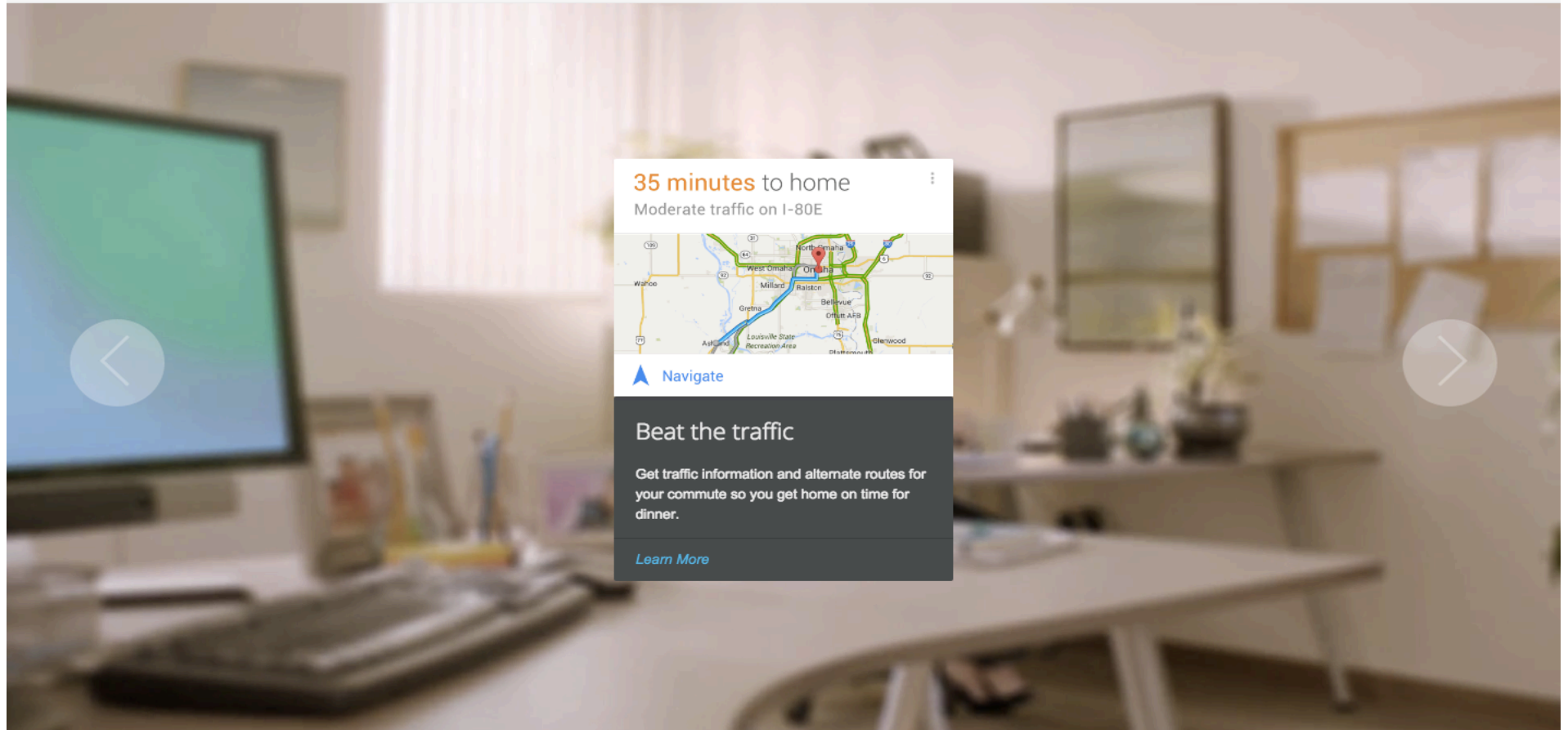
 **Watch the video**



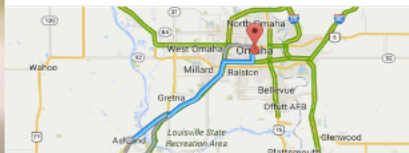
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35 minutes to home
Moderate traffic on I-80E

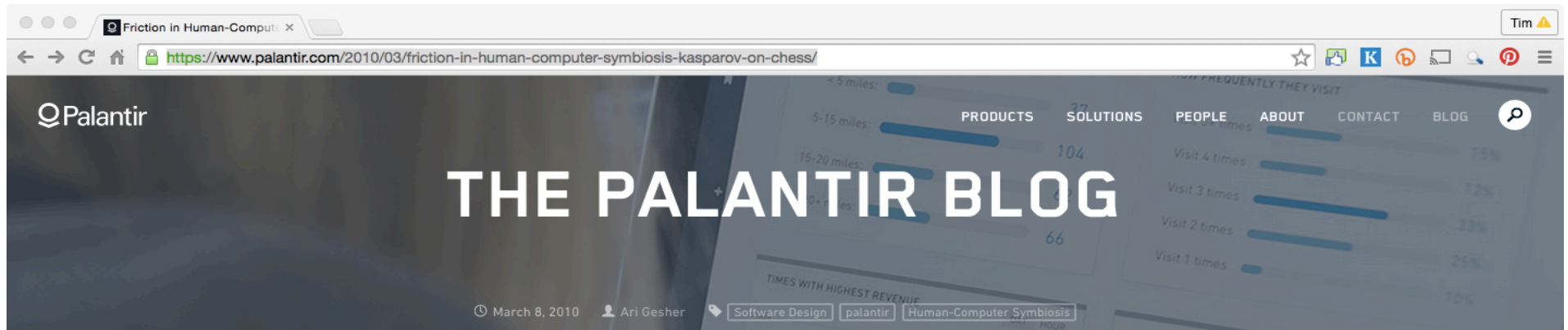


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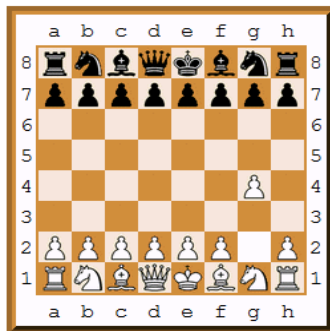
Beat the traffic

Get traffic information and alternate routes for your commute so you get home on time for dinner.

[Learn More](#)



FRICION IN HUMAN-COMPUTER SYMBIOSIS: KASPAROV ON CHESS



As we build our [platforms](#) and [applications](#) following a human-computer symbiosis approach, we keep an ear to the ground for interesting examples that illuminate new techniques or validate our approach in some empirical way.

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ONE TERM TO DOMINATE THEM ALL: FRICTION-OF-INTERFACE

Does this simple approximation hold up? It does not. The team that won the [PAL/CSS Freestyle Tournament in 2005](#) was composed of two amateur chess players that were able to best a computer-assisted Grandmaster.

How did they accomplish this feat? It was not through superior compute power. Instead, they did so by more effectively feeding insights to their three chess engines. They played so well that a large number of people actually assumed that it was actually Kasparov himself playing:

Many speculated that it might be Garry Kasparov, who was the initiator of this kind of computer assisted chess matches. When we asked him Kasparov confirmed that was not the case. But he reminded us that it doesn't really matter. The guiding principle of Freestyle Chess: anything is allowed. "Even if they were assisted by the devil, that would probably be covered by the rules," he joked. "Only the moves they played count."

What does this mean for our simple equation? Well, it looks it's missing a term, one we'll call f , that describes the efficiency or **friction** of the interface between human and computer.

Quoting Kasparov again:

Weak human + machine + better process was superior to a strong computer alone and, more remarkably, superior to a strong human + machine + inferior process.

The implication being that the equation actually looks like this:

We are redesigning how people and computers work together!

Measure and Respond



“What I learned from Google is to only invest in things that close the loop.”

- Chris Sacca

Software “above the level of a
single device”

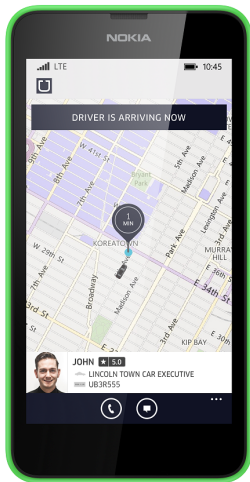


“Why be distracted into looking backwards by the commodity cloners of open source?...There is a new frontier, where software "collectives" are being built with ad hoc protocols and with clustered devices. Robotics and automation of all sorts is exposing a demand for sophisticated new ways of thinking....Useful software written above the level of the single device will command high margins for a long time to come.”

- Dave Stutz, On Leaving Microsoft, February 2003

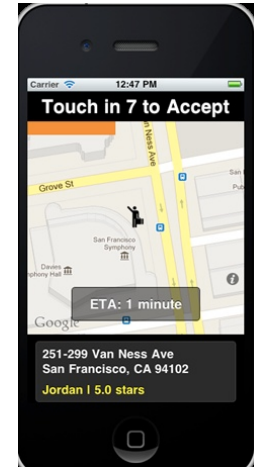
<http://www.synthesist.net/writing/onleavingms.html>

Data Above the Level of a Single Device



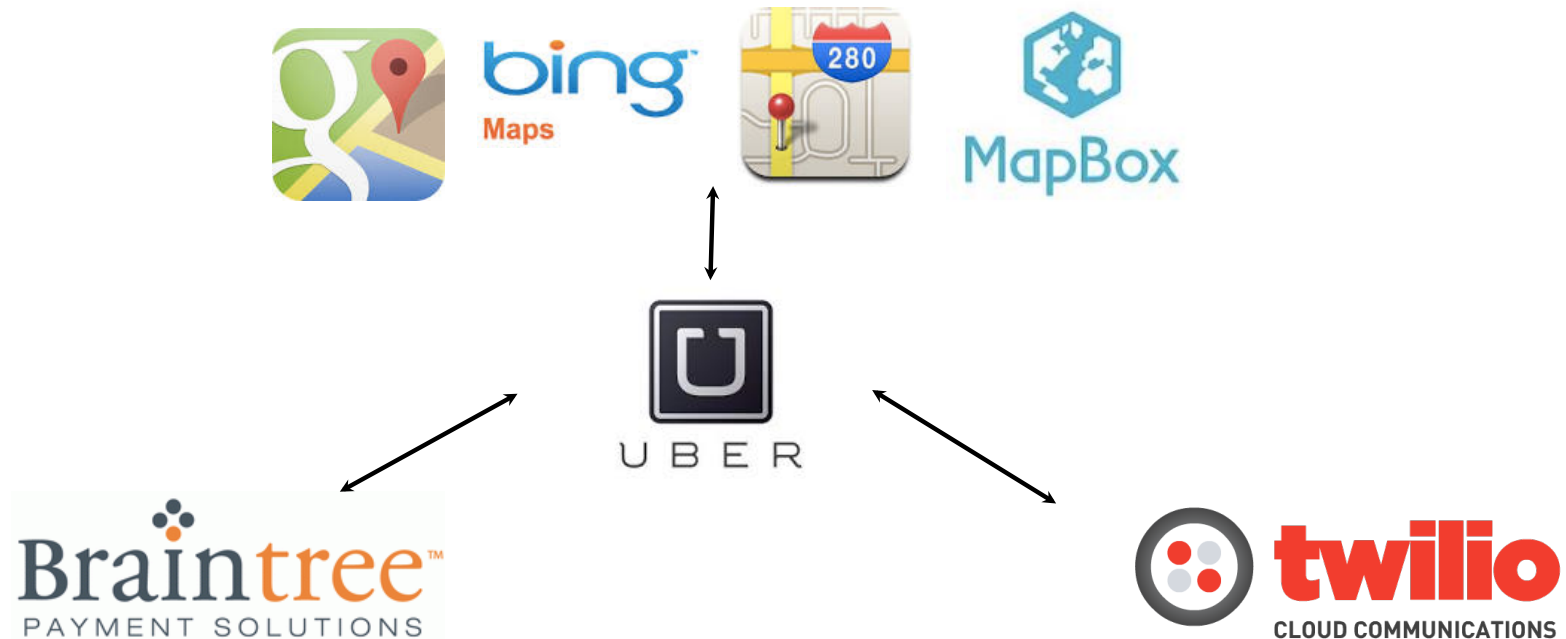
Passenger

- Real-time location tracking
- Dispatch
- Trip tracking
- Names and faces
- Payment
- Dynamic Pricing
- Reputation



Driver

Many of these data services are not run by Uber





Computer Vision APIs enable you to build the most compelling app experience to present the media in its best form

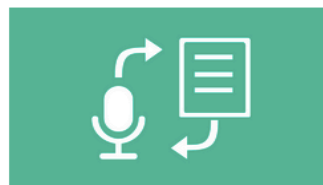
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Face APIs

BETA

See your users with Face Detection and Recognition



Speech APIs

BETA

Communicate with your users with speech recognition and synthesis powered by Bing



Computer Vision APIs

BETA

Understand images and generate thumbnails



Language Understanding Intelligent Service (LUIS)

Invite only

Understand natural language commands tailored to your application

**What kind of data infrastructure
will that require?**

Solving new kinds of problems

Work on stuff that matters