“The societal benefits of a pervasive Internet of Things will outweigh any privacy costs.”
“The societal benefits of a pervasive Internet of Things will outweigh any privacy costs.”
The World of Waste

- **Life**: 5-8,000 people in the U.S. die each year in car crashes due to drowsy driving.\(^a\)
- **Energy**: 35% of residential energy in U.S. is wasted.\(^b\)
- **Water**: the average U.S. household’s leaks account for more than 10,000 gallons of water wasted every year (270 loads of laundry).\(^c\)

\(^a\)http://www.nhtsa.gov/Driving+Safety/Drowsy+Driving
\(^b\)https://flowcharts.llnl.gov/content/assets/images/energy/us/Energy_US_2015.png
\(^c\)https://www3.epa.gov/watersense/pubs/fixleak.html
DROUGHT

GOV. JERRY BROWN ORDERS MANDATORY WATER RESTRICTION IN CALIFORNIA

For the first time in California history, Gov. Jerry Brown issued a mandatory restriction to reduce water usage by 25 percent across the state. (NASA)

By ABC7.com staff

Wednesday, April 01, 2015

LOS ANGELES (KABC) -- Gov. Jerry Brown issued mandatory water restrictions for the first time in California history.

Brown's executive order will require the state water board to implement reductions in cities and towns to cut water use by 25 percent.
“when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind”

Lord Kelvin
Scientifically observing the natural world has been tremendously beneficial to society.
Scientifically observing our lives will be tremendously beneficial to society.

How are we wasting energy?
How can we save water?
When is a driver unsafe?
Question

An individual has been described by a neighbor as follows:

“David is very shy and withdrawn, invariably helpful but with little interest in people or in the world of reality. A meek and tidy soul, he has a need for order and structure, and a passion for detail.”

Is David more likely to be a librarian or a farmer?
An individual has been described by a neighbor as follows:

“David is very shy and withdrawn, invariably helpful but with little interest in people or in the world of reality. A meek and tidy soul, he has a need for order and structure, and a passion for detail.”

Is David more likely to be a librarian or a farmer?

About 33,000 male librarians: http://blog.oup.com/2011/06/librarian-census/
About 2.2m male farmers: https://www.agcensus.usda.gov/Publications/2012/Online_Resources/Highlights/Farm_Demographics/
People have poor statistical intuition.

Researchers have studied attendees at statistics conferences and found they do not do significantly better than undergraduates.
Programmable Thermostats

Table 1
Summary of thermostat behavior and energy savings studies [68].

<table>
<thead>
<tr>
<th>Organization</th>
<th>Investigators</th>
<th>Location &amp; year</th>
<th>Sample size</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern California Edison</td>
<td>Paul Reeves, Jeff Hirsch, Carlos Halad</td>
<td>CA 2004</td>
<td>N/A</td>
<td>Energy savings depend on behavior and can be + or −</td>
</tr>
<tr>
<td>Energy Center of Wisconsin</td>
<td>Monica Nevius, Scott Pigg</td>
<td>WI 1999</td>
<td>299 Homes</td>
<td>No significant savings. PT’s don’t change behavior.</td>
</tr>
<tr>
<td>Connecticut Natural Gas Corporation</td>
<td>David Cross, David Judd</td>
<td>CN 1996</td>
<td>100 Homes</td>
<td>PT’s cause no significant behavior change.</td>
</tr>
<tr>
<td>BPA/PNNL</td>
<td>Craig Conner</td>
<td>NW 2001</td>
<td>150 Homes</td>
<td>No significant behavior change/savings.</td>
</tr>
<tr>
<td>Florida Solar Energy Center</td>
<td>Danny Parker</td>
<td>FL 2000</td>
<td>150 Homes</td>
<td>No savings, some increases.</td>
</tr>
</tbody>
</table>

Nest Thermostat

- **One Oregon study**
  - Homes averaged 12% savings of electricity used for heating after installing the Nest. (These numbers have been adjusted for weather.)
  - More than 60% of the participants found their homes "somewhat more comfortable" or "much more comfortable" while using the Nest thermostat.

- **Two Indiana studies**
  - For heating, the Nest showed 5-13% energy savings compared to baseline homes
  - For cooling, the Nest showed 13-16% energy savings compared to baseline homes

Prevents driver fatigue.

Long journeys without rest stops carry a high risk of fatigue. Drivers are often unaware of this, which is why Mercedes-Benz has developed ATTENTION ASSIST.

ATTENTION ASSIST employs sensors to analyze driver behaviour and recognizes changes in driving style due to tiredness. The driver is then reminded to take a break.
Personal Health
Scientifically observing our lives will be tremendously beneficial to society.

But (IoT) machines will have to help us.
“The societal benefits of a pervasive Internet of Things will outweigh any privacy costs.”
The Privacy Cost
The Privacy Cost
Companies with value care

Apple’s ‘Differential Privacy’ Is About Collecting Your Data---But Not Your Data

ANDY GREENBERG  SECURITY  06.13.16  7:02 PM

APPLE’S ‘DIFFERENTIAL PRIVACY’ IS ABOUT COLLECTING YOUR DATA—BUT NOT YOUR DATA
Governments not special

Apple vows to resist FBI demand to crack iPhone linked to San Bernardino attacks

Apple CEO Tim Cook released a statement arguing against the FBI’s recent order to hack into the San Bernardino shooter’s iPhone 5c. See why he and Apple are refusing to do so. (Jhaan Elker/The Washington Post)
Android 6.0 Marshmallow makes full-disk encryption mandatory for most new devices

By Joel Hruska on October 20, 2015 at 7:30 am | 21 Comments

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More police officers have been charged in civilian killings in 2015 than at any time in the last decade

After Ohio prosecutors on Monday announced no criminal charges for the officers involved in 12-year-old Tamir Rice's killing, the conversation now turns to what many are describing as a miscarriage of justice in the matter.

Pointed questions remain — about Cuyahoga County prosecutor Tim McGinty's handling of the case, about the first-hand accounts of Timothy Loehmann — the Cleveland police officer who fatally shot Rice in November.

Former police officer Michael Slager walks to the defense table bond hearing, in Charleston, South Carolina, September 10, 2015.

REUTERS/Randall Hill
A Bright Future

• Science, driven by data, will let us understand our lives, with tremendous societal benefit.
  ▶ Conserve natural resources.
  ▶ Save lives.
  ▶ Improve our health and well-being.

• The Internet of Things will provide this data.

• We need machine help to understand and use it.

• Value does not need to sell your privacy: use the IoT for value, not convenience or a fad.

• Companies with a long view are on our side.
Thank you
“Those who want skill to use those evidences they have of probabilities … may be easily misled to assent to positions that are not probable.”

Locke