Connection, Collection, Concentration

From Devices and Processes to the Intelligent Experience

Peter Coffee
VP for Strategic Research
Salesforce

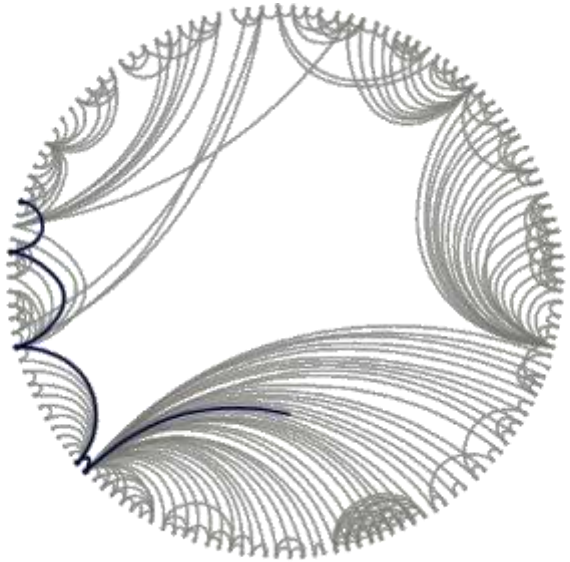
pcoffee@salesforce.com
@petercoffee

If It Starts With A Drucker Quotation, It Can't Be Dumb

"There is nothing quite so useless, as doing with great efficiency, something that should not be done at all."

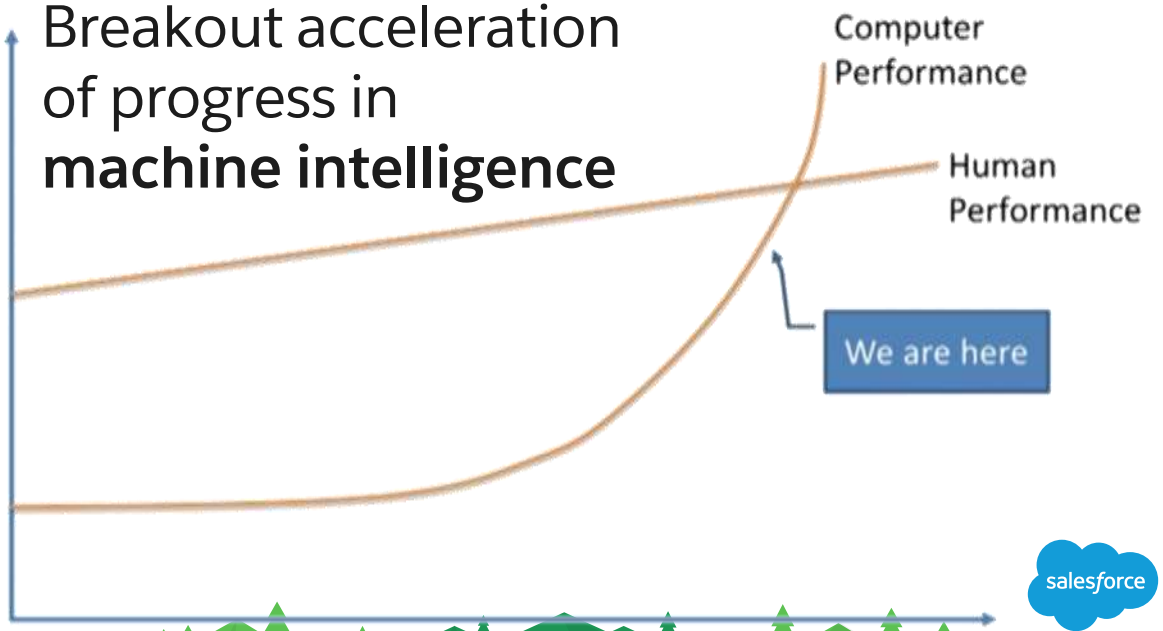
The Trends that Redefine “The Right Things”

Massive growth of global **connection**: for example, the world as mapped by Facebook “friending”



Flourishing graphs of **collaboration**: what used to be “six degrees of separation” is now closer to 3.6

Breakout acceleration of progress in **machine intelligence**



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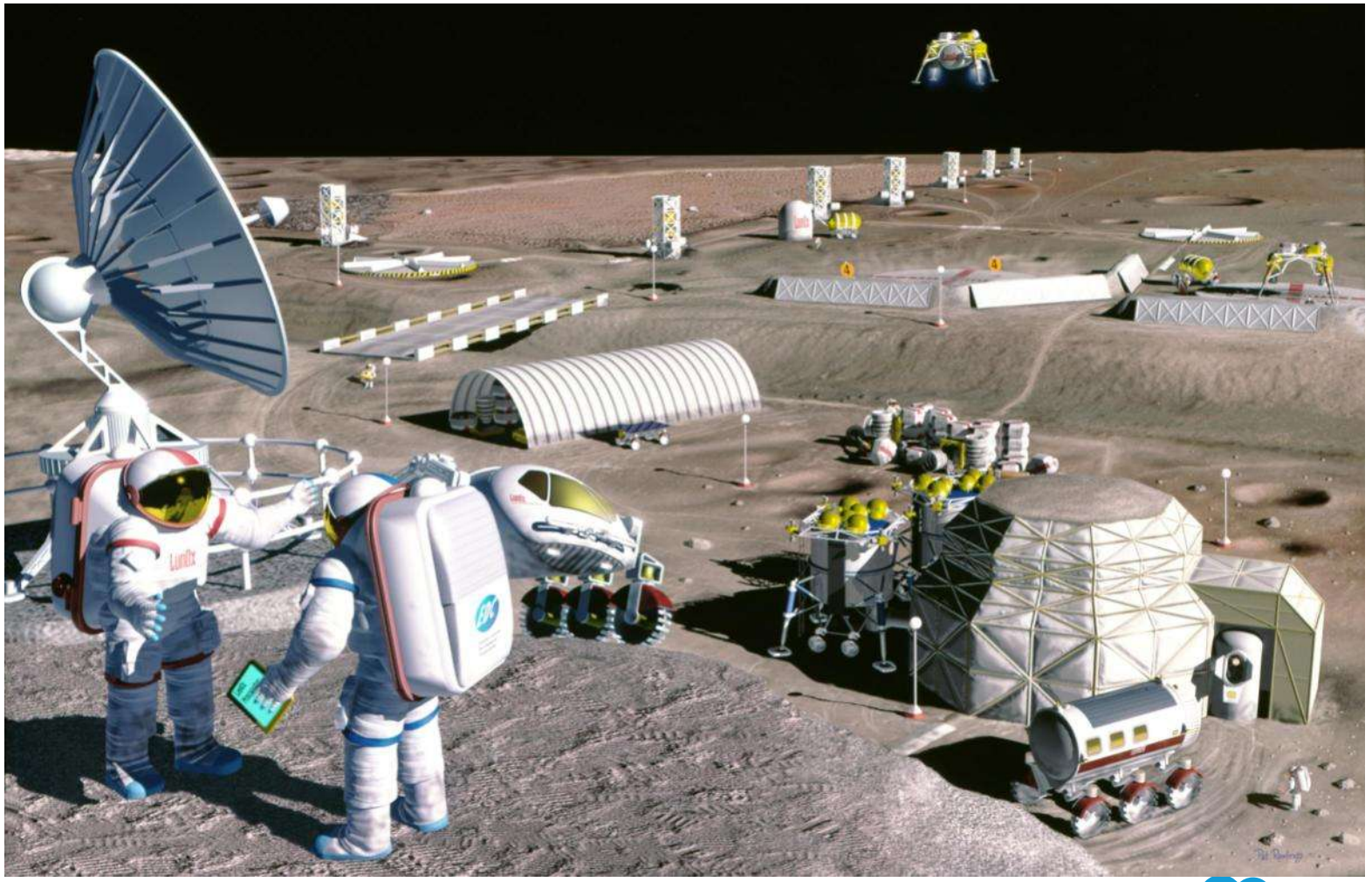
Business Built Silos When Connectivity Was Costly

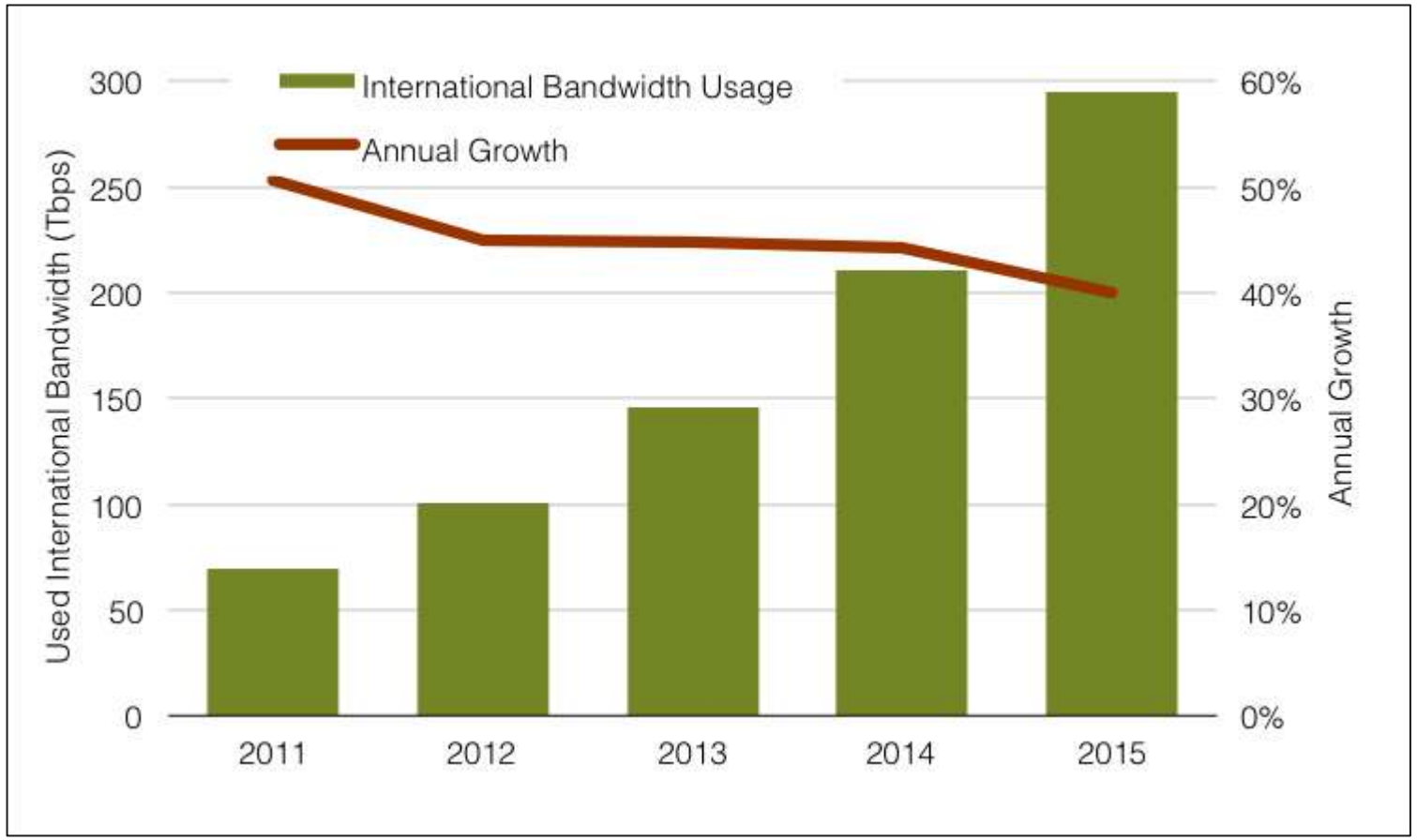
Workers lived in habitat bubbles of locally connected storage & computation

Going “outside” was a complex, risky, therefore intermittent exercise

Content was exchanged in batches: episodic logins, emails, and “documents”



Connection Is No Longer Scarce



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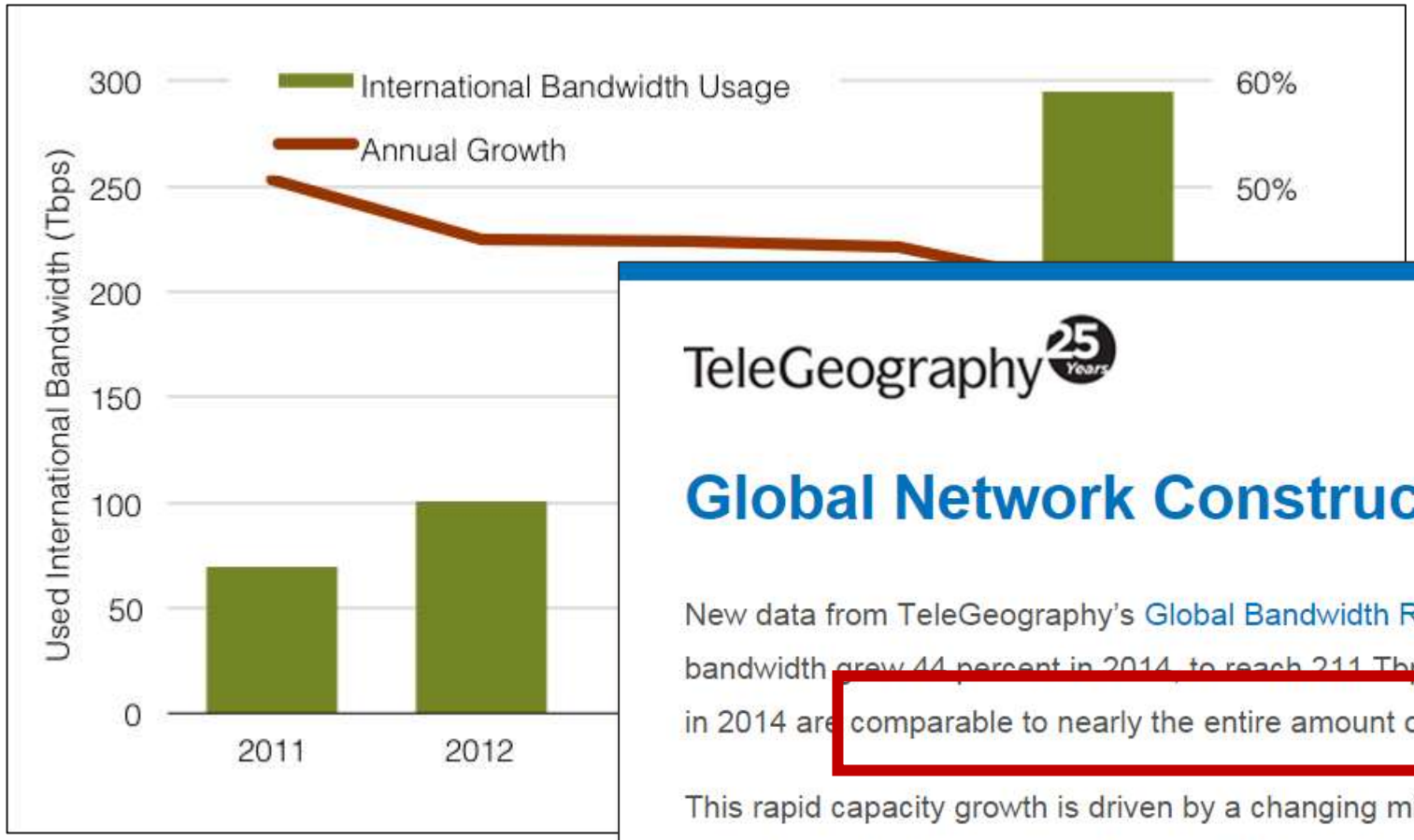

TeleGeography 25 Years

APRIL 23, 2015

RESEARCHUPDATE

Global Network Construction Resurgence

New data from TeleGeography's Global Bandwidth Research Service reveal that international bandwidth grew 44 percent in 2014, to reach 211 Tbps. The 65 Tbps of new capacity deployed in 2014 are comparable to nearly the entire amount of bandwidth in service globally in 2011.

This rapid capacity growth is driven by a changing mix of global network operators. Private networks, particularly those of large content providers, account for a growing share of international bandwidth, even surpassing Internet bandwidth on the trans-Atlantic route last year. Consequently, network operation has become a core part of the business for some of the largest content providers.

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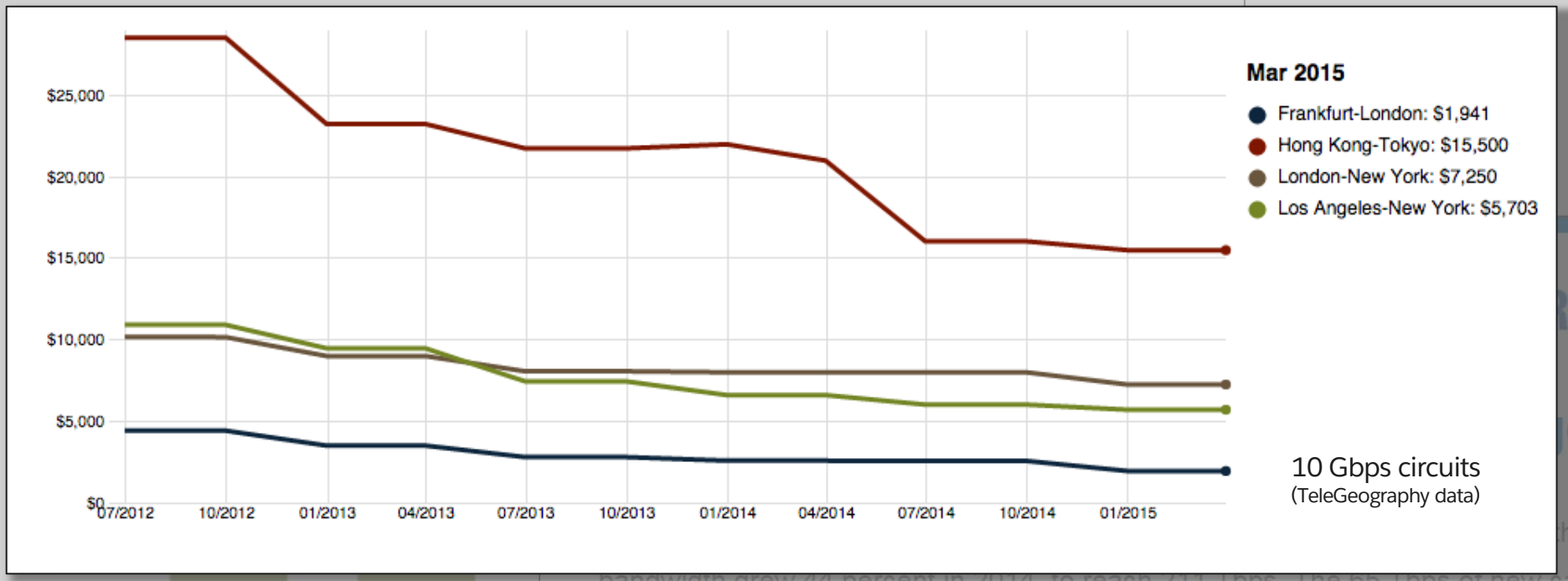
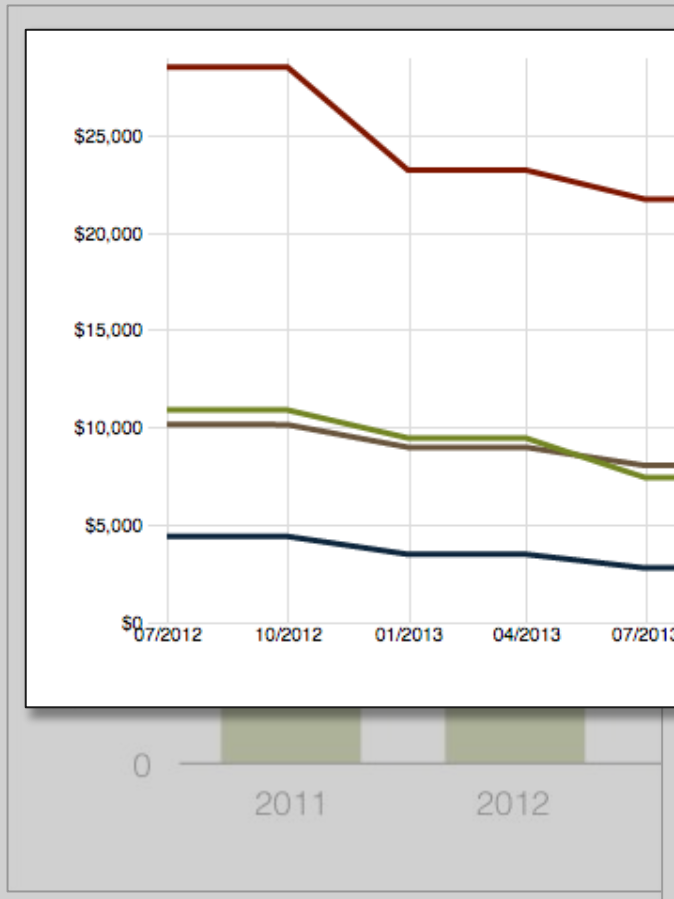
Connection Is No Longer Scarce



10 Gbps circuits
(TeleGeography data)



APRIL 23, 2015

RCHUPDATE

gence

hat international

bandwidth grew 40 percent in 2014, to reach 211 Tbps. The 46 Tbps of new capacity deployed in 2014 are comparable to nearly the entire amount of bandwidth in service globally in 2011.

This rapid capacity growth is driven by a changing mix of global network operators. Private networks, particularly those of large content providers, account for a growing share of international bandwidth, even surpassing Internet bandwidth on the trans-Atlantic route last year. Consequently, network operation has become a core part of the business for some of the largest content providers.

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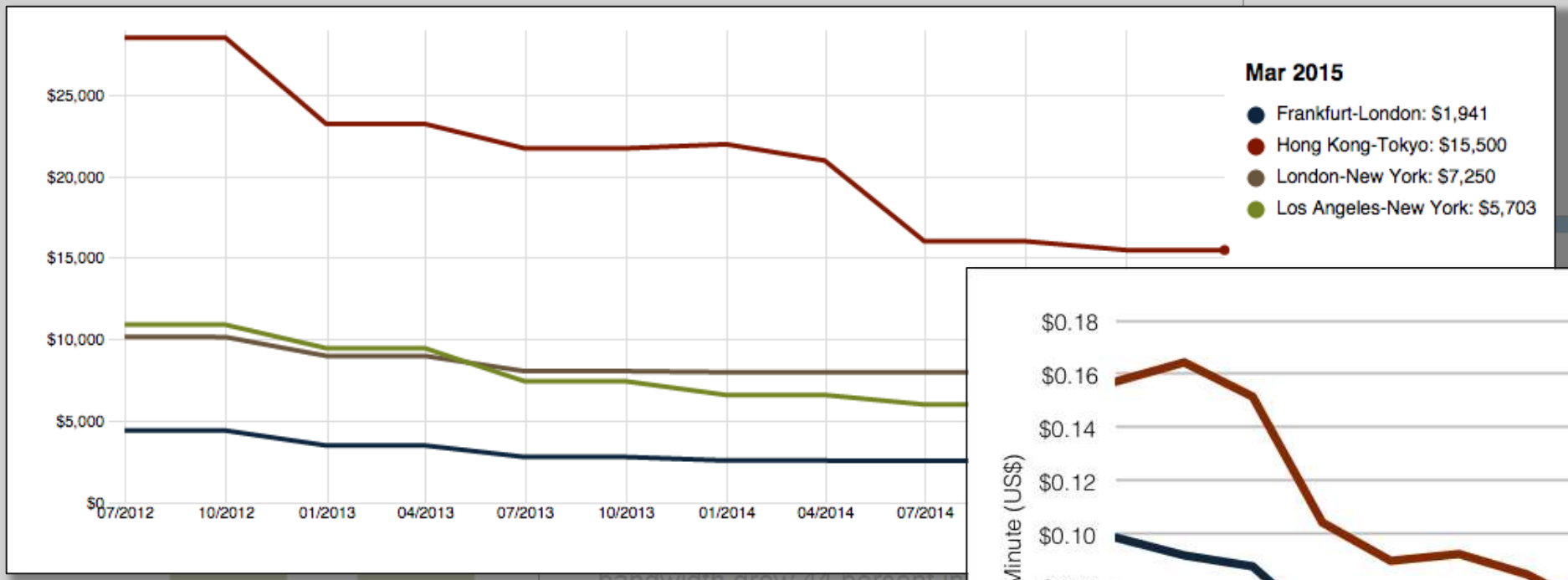
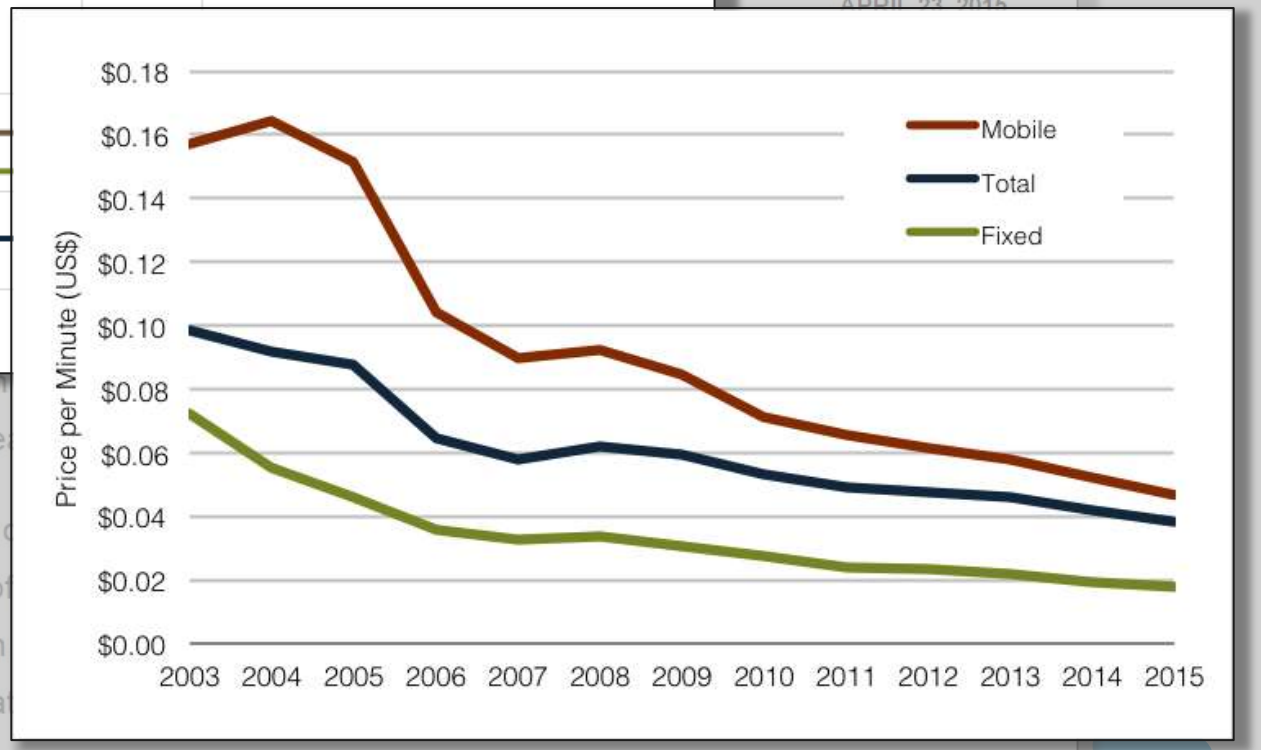
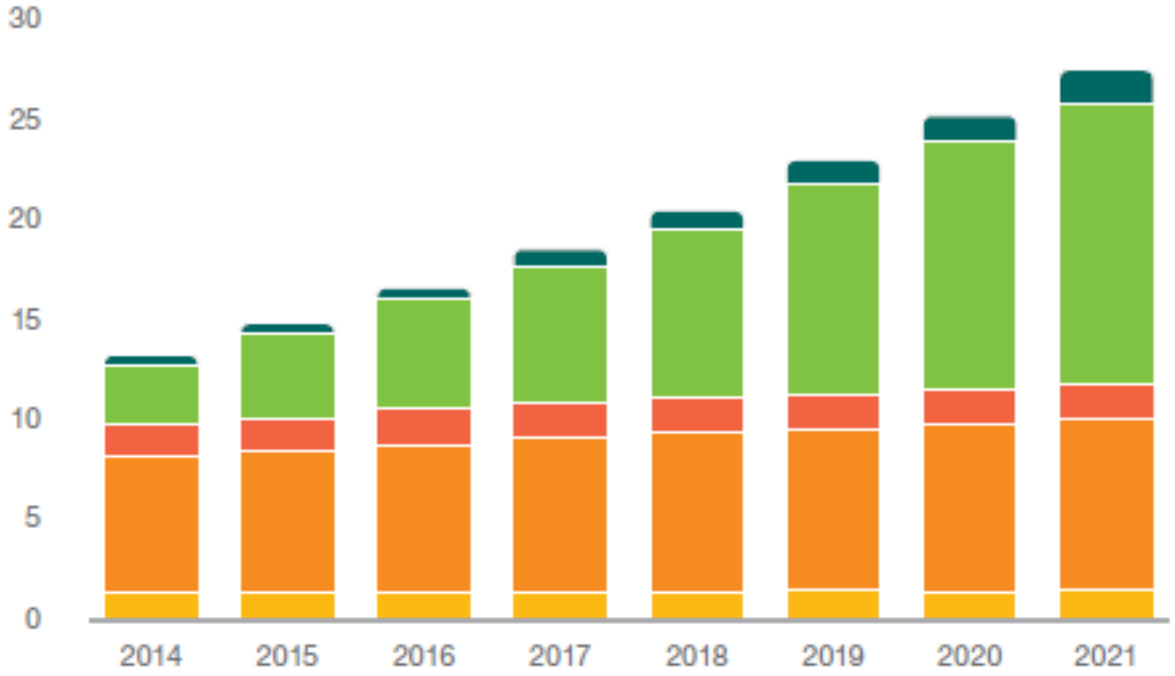




Connected devices (billions)



	15 billion	28 billion	CAGR 2015–2021
Cellular IoT	0.4	1.5	27%
Non-cellular IoT	4.2	14.2	22%
PC/laptop/tablet	1.7	1.8	1%
Mobile phones	7.1	8.6	3%
Fixed phones	1.3	1.4	0%
	2015	2021	

0
2011
2012

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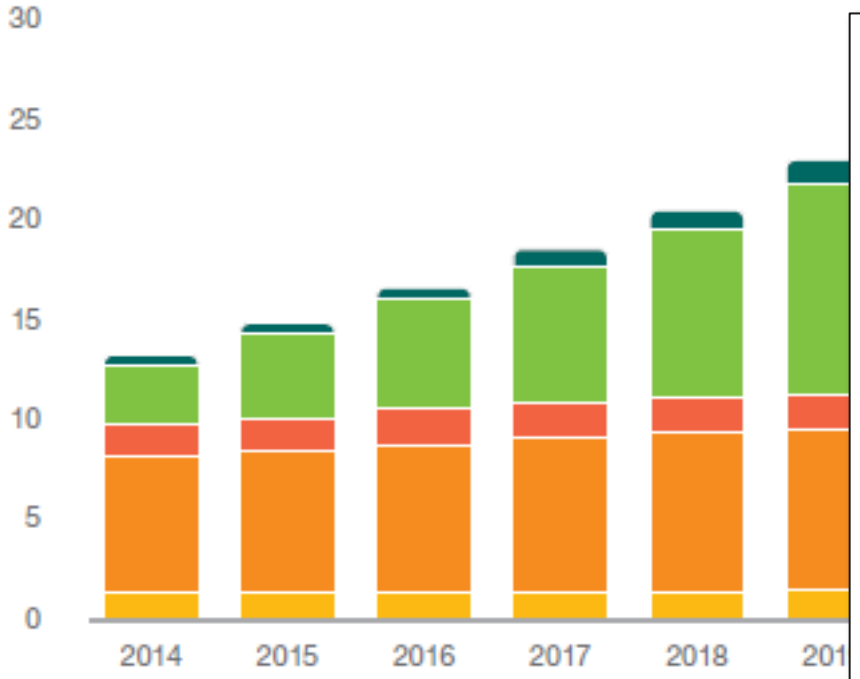
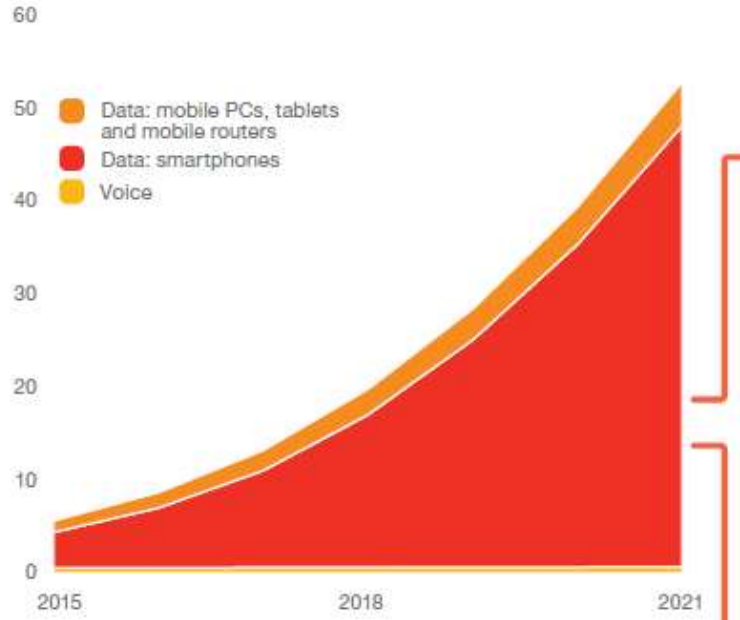


Global mobile traffic (monthly ExaBytes)



12X Between 2015 and 2021, there will be a 12X growth in smartphone traffic

Total mobile data traffic is expected to rise at a compound annual growth rate (CAGR) of around 45 percent

The growth in mobile data traffic is due to both the rising number of smartphone subscriptions, in particular for LTE smartphones, and increasing data consumption per subscriber. This is forecast to result in a ten-fold increase in total traffic for all devices by the end of 2021.

There are large differences in subscribers' data consumption patterns between networks, markets and subscriber segments. Factors such as data plans, user device capabilities and network performance all impact data consumption per subscriber. Even switching to a new version of the same device could typically increase data consumption by 25–40 percent.

Around 90% of mobile data traffic will be from smartphones by the end of 2021

Connection is the Reason this is Not Another "AI Winter"

The most significant developments over the last two decades that are taking AI from concept to reality include:

- Massive connectivity *and mobility*
- Machine learning models and algorithms: systems today can *know more* without requiring a person to teach them
- Cloud capacity

Abstract

XCON is a rule-based expert system that configures computer systems. Over 7 years, XCON has grown to 6,200 rules, of which approximately 50% change every year. While the performance of XCON is satisfactory, it is increasingly becoming more difficult to change. With the goal of facilitating maintenance, DEC has developed a new rule-based language, RIME, in which the successor to XCON, XCON-in-RIME, is being written. This paper evaluates the potential for enhanced maintainability of XCON-in-RIME over XCON.

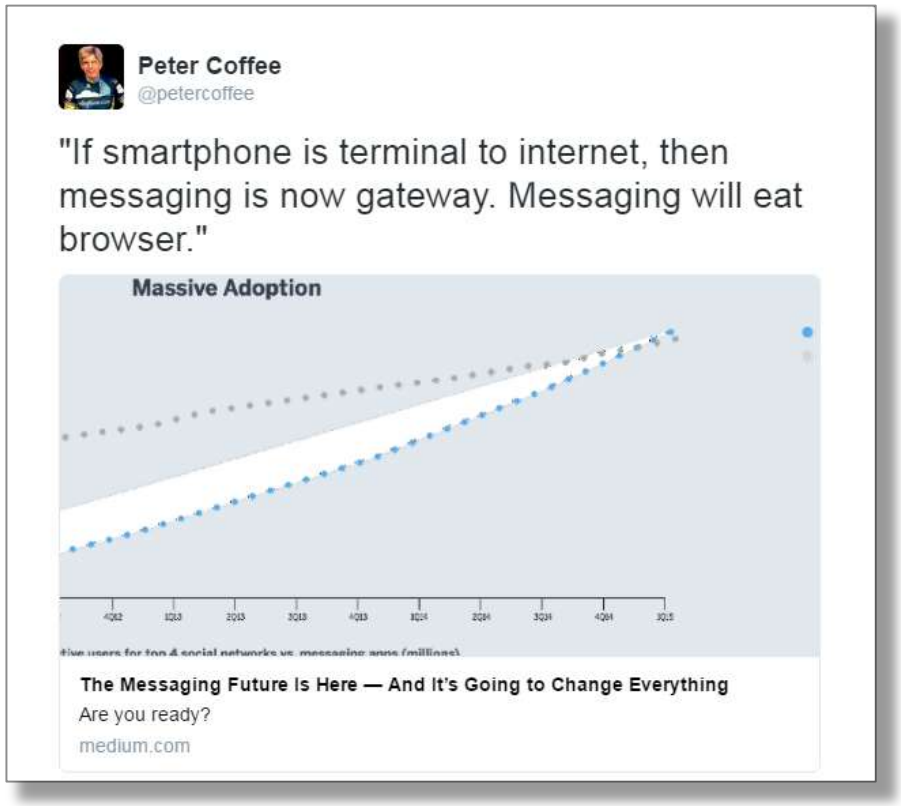
I. Introduction: Motivation and Goals

The following properties of XCON, an expert system, make it a particularly interesting system to examine:

- *XCON performs a complex design task:* XCON configures computer systems for DEC; XCON is used in a production mode, day in, day out -- it has been used since January 1980.
- *XCON is a very large rule-based system:* currently there are approximately 6,200 rules in XCON, which draw on a database of approximately 20,000 parts.
- *XCON undergoes constant change:* 50% of the rules in XCON are changed each year.

Proceedings: AAAI-87

Before 23 June 2015, Conversation Was “Eliza”



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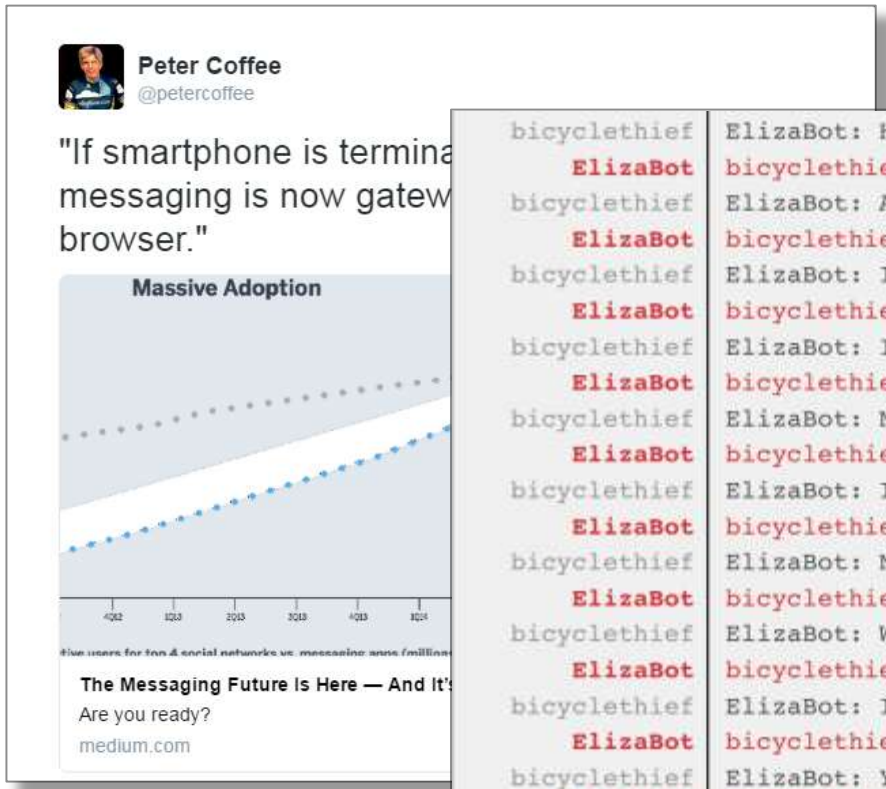
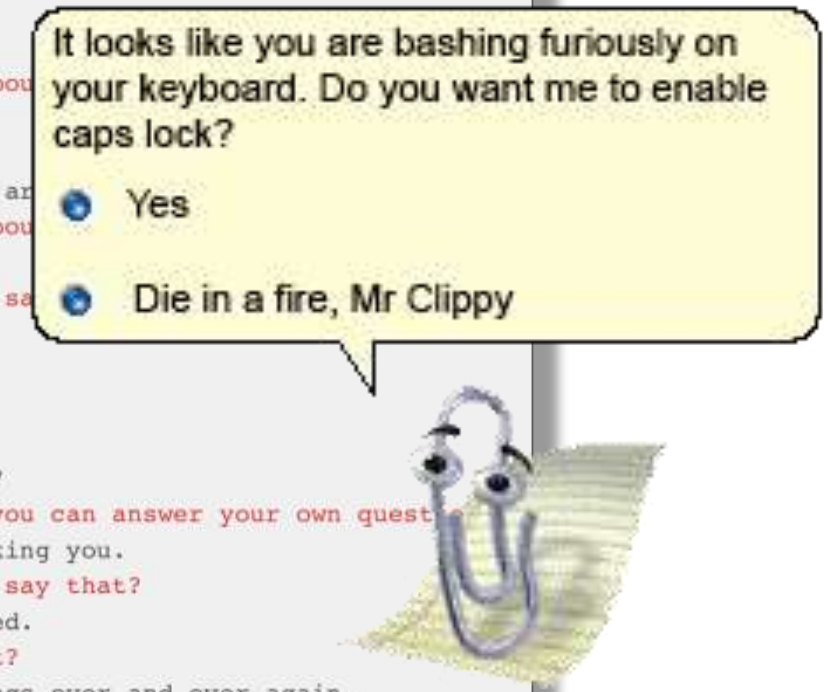
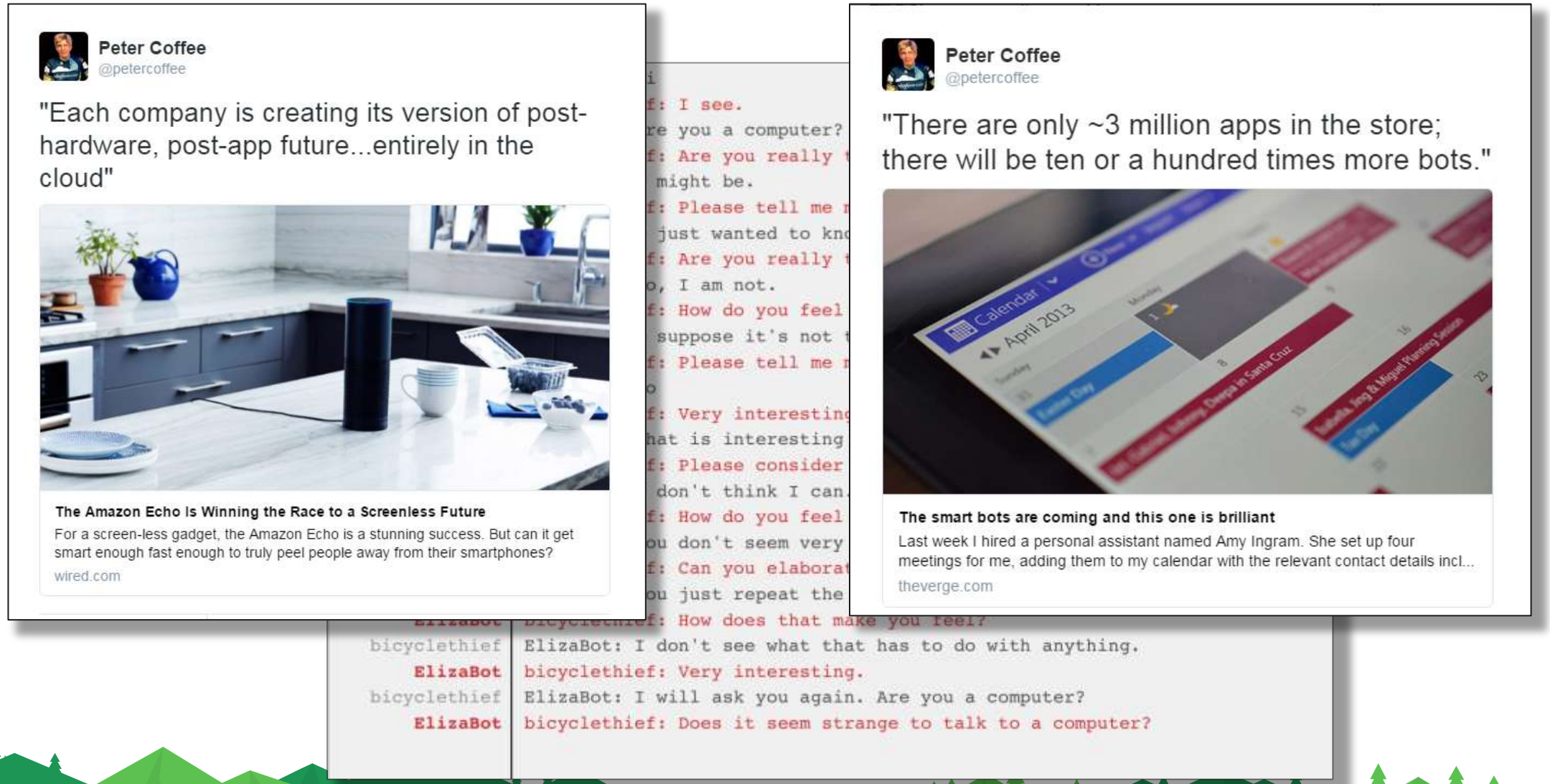



```
bicyclethief  ElizaBot: Hi
    ElizaBot  bicyclethief: I see.
bicyclethief  ElizaBot: Are you a computer?
    ElizaBot  bicyclethief: Are you really talking abou
bicyclethief  ElizaBot: I might be.
    ElizaBot  bicyclethief: Please tell me more.
bicyclethief  ElizaBot: I just wanted to know if you ar
    ElizaBot  bicyclethief: Are you really talking abou
bicyclethief  ElizaBot: No, I am not.
    ElizaBot  bicyclethief: How do you feel when you sa
bicyclethief  ElizaBot: I suppose it's not too bad.
    ElizaBot  bicyclethief: Please tell me more.
bicyclethief  ElizaBot: No
    ElizaBot  bicyclethief: Very interesting.
bicyclethief  ElizaBot: What is interesting about it?
    ElizaBot  bicyclethief: Please consider whether you can answer your own quest
bicyclethief  ElizaBot: I don't think I can. I am asking you.
    ElizaBot  bicyclethief: How do you feel when you say that?
bicyclethief  ElizaBot: You don't seem very interested.
    ElizaBot  bicyclethief: Can you elaborate on that?
bicyclethief  ElizaBot: You just repeat the same things over and over again.
    ElizaBot  bicyclethief: How does that make you feel?
bicyclethief  ElizaBot: I don't see what that has to do with anything.
    ElizaBot  bicyclethief: Very interesting.
bicyclethief  ElizaBot: I will ask you again. Are you a computer?
    ElizaBot  bicyclethief: Does it seem strange to talk to a computer?
```



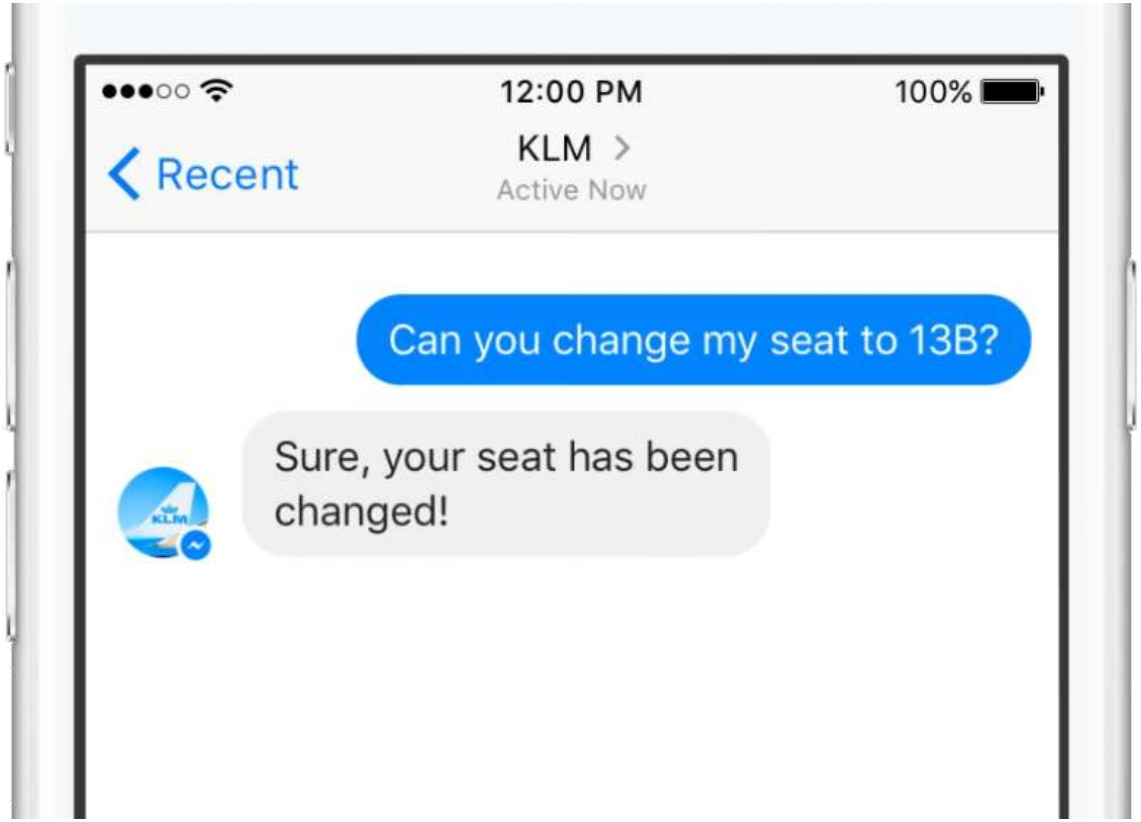
Before 23 June 2015, Conversation Was “Eliza” – not Alexa



A Conversation Connection Enables a Superior Experience

The moment social messaging was opened up as a service channel in March 2016, the volume of messages shot up.

KLM gets on average five questions a minute via Facebook Messenger, with 13 messages a minute during peak times (15h-17h)

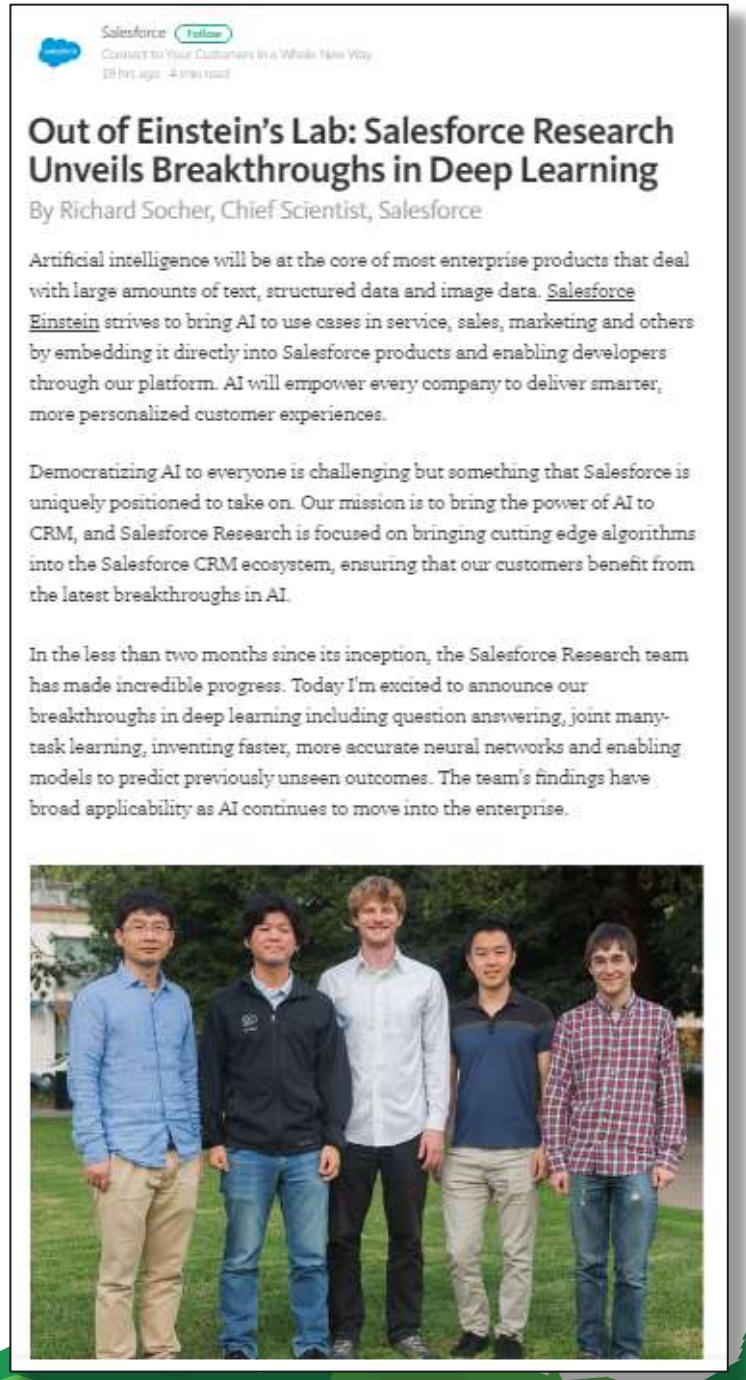


Yes, Mister Stark?

Better Question Answering through Conditional Understanding of Text

The idea of open-domain question answering–a system's ability to **answer arbitrary questions about arbitrary documents**–is one of the most difficult, albeit important, challenges we face in natural language processing (NLP).

The Dynamic Coattention Network (DCN), a state of the art neural network system, achieves the highest accuracy on the Stanford Question Answering Dataset (SQuAD) – significantly significantly **outperforming all submitted systems to date**, including those developed by the Allen Institute for Artificial Intelligence, Microsoft, Google and IBM.



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Connect to Your Customers in a Whole New Way

19 hrs ago · 4 min read

Out of Einstein's Lab: Salesforce Research Unveils Breakthroughs in Deep Learning

By Richard Socher, Chief Scientist, Salesforce

Artificial intelligence will be at the core of most enterprise products that deal with large amounts of text, structured data and image data. Salesforce Einstein strives to bring AI to use cases in service, sales, marketing and others by embedding it directly into Salesforce products and enabling developers through our platform. AI will empower every company to deliver smarter, more personalized customer experiences.

Democratizing AI to everyone is challenging but something that Salesforce is uniquely positioned to take on. Our mission is to bring the power of AI to CRM, and Salesforce Research is focused on bringing cutting edge algorithms into the Salesforce CRM ecosystem, ensuring that our customers benefit from the latest breakthroughs in AI.

In the less than two months since its inception, the Salesforce Research team has made incredible progress. Today I'm excited to announce our breakthroughs in deep learning including question answering, joint many-task learning, inventing faster, more accurate neural networks and enabling models to predict previously unseen outcomes. The team's findings have broad applicability as AI continues to move into the enterprise.

What Are We Doing That's **Wrong** in a Connected World?*

A – **Assuming**

B – **Bridging**

C – **Coding**

D – **Debugging**

E – **Estimating & Extrapolating**

* Short forms for convenient reference. Details to come.

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What Are The Dumb Things We're Doing?

Assuming: We Teach Calculus Instead of Statistics

Too much optimizing of actions based on flawed understanding

Harvard Business Review

ANALYTICS

A Refresher on Statistical Significance

by Amy Gallo

FEBRUARY 16, 2016

When you run an experiment or analyze data, you want to know if your findings are "significant." But business relevance (i.e., practical significance) isn't always the same thing as confidence that a result isn't due purely to chance (i.e., statistical significance). This is an important distinction; unfortunately, **statistical significance** is often misunderstood and misused in organizations today. And yet because more and more companies are relying on data to make critical business decisions, it's an essential concept for managers to understand.

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Bridging: We Build Castles of Data, Then Bridge Between Them

In a connected world, continuity & coherence should be inherent

"The distributed ledger makes it easier to create cost-efficient business networks where **virtually anything of value can be tracked and traded**–without requiring a central point of control."

- developer.ibm.com/bluemix/2016/05/09/blockchain-on-bluemix-now-beta/

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Distributed Ledgers Are Real

Distributed Ledgers Are Real

An Open API Can Connect with the Future of Data

"**The Salesforce.com1 platform can push and pull data from the Blockchain APIs** used on the web application built on Heroku with Node.js.

"Using the CRM software, businesses that operate with a Bitcoin License can generate reports on their customers, their Bitcoin transactions, their tax requirements on capital gains; and pull all of this data from blockchain APIs.

"**The power is in the endless capabilities of Salesforce1 and the real-time data intensive transaction data built on Node.js**. There is so much data available from the Blockchain."

- https://domsteil.com/tag/bitcoin-and-salesforce/

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Coding: We Teach People to Hand-Craft, instead of Assemble

Writing new code = costly failure mode

```
IDENTIFICATION DIVISION.
PROGRAM-ID. SequenceProgram.
AUTHOR. Michael Coughlan.

DATA DIVISION.
WORKING-STORAGE SECTION.
01 Num1 PIC 9 VALUE ZEROS.
01 Num2 PIC 9 VALUE ZEROS.
01 Result PIC 99 VALUE ZEROS.


PROCEDURE DIVISION.
CalculateResult.
    ACCEPT Num1.
    ACCEPT Num2.
    MULTIPLY Num1 BY Num2 GIVING Result.
    DISPLAY "Result is = ", Result.
    STOP RUN.
```

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Is Future Success About “Learning to Code”?

Long-Haul “Driver”: $90k/year

F1 “Driver”: $30 million per year

Uber “Driver”: $34k/year*

I can’t recommend becoming a “coder”

* www.buzzfeed.com/johanabhuiyan/what-uber-drivers-really-make-according-to-their-pay-stubs

Yes, There Really Is a Low-Code Revolution

salesforce Blog

Sales Marketing Customer Service IT Small Business All Topics

Leading the Low-Code Revolution

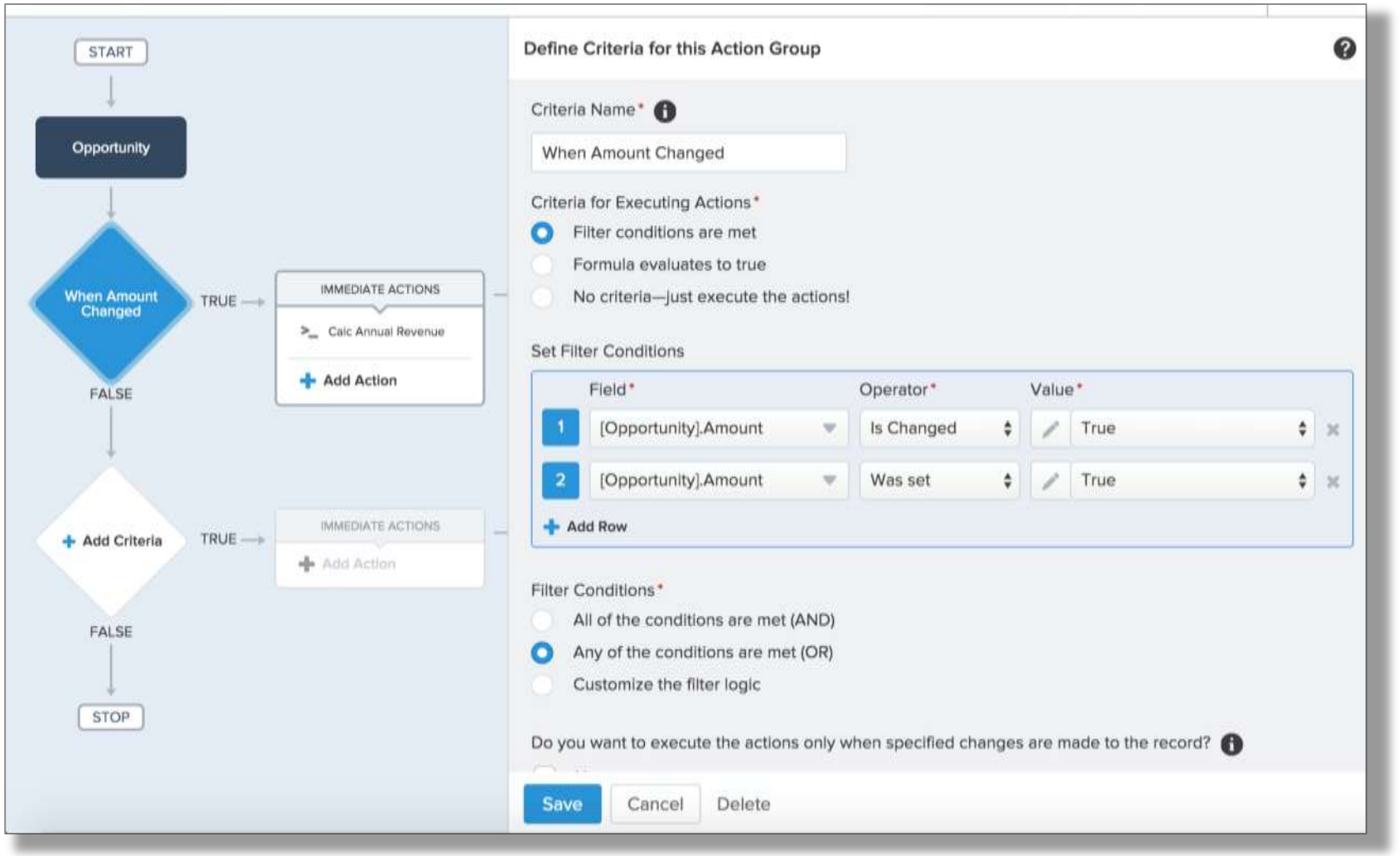
Jun 15, 2016 By **Bobby Lancaster** in **App Cloud, Apps, IT**

One of the most exciting developments in the world of apps is also one of the most democratic. No longer is app development exclusively the territory of programmers. Now, visual app development tools allow non-technical employees to become "citizen developers" who can build apps without writing code.

What this means is that the ability to build apps (and the responsibility for innovating) for a business becomes decentralized: anyone in any department can create software to solve a problem or address a need. Not only are problems being solved at the source, but coders are freed up to solve higher-order problems.

FIGURE 3 Forrester Wave™: Low-Code Development Platforms, Q2 '16

Salesforce Process Builder: Low Code, High Power



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Debugging: Security Model is Static/Perfectionist (vs. Dynamic/Risk Mgmt)

This is Game Theory: we should

- Deter
- Deceive
- Defend
- Detect
- Develop

Game theory is "the study of mathematical models of conflict and cooperation between intelligent rational decision-makers."

Someday, You Will Be Hacked. Design For That Day.

September 7, 2016 11:27 am

Safe as houses: how the super-rich make their homes super-secure

Hugo Cox

From face-recognition cameras to blast-resistant windows, the wealthy are going to greater lengths to protect their properties

"If you still hanker for a good old-fashioned safe, make sure it has two codes: one for normal use, the other for when you're being forced to open it, simultaneously alerting the police or your security team."

Programming Techniques — R. Rivest Editor

How to Share a Secret

Adi Shamir
Massachusetts Institute of Technology

In this paper we show how to divide data D into n pieces in such a way that D is easily reconstructable from any k pieces, but even complete knowledge of $k-1$ pieces reveals absolutely no information about D. This technique enables the construction of robust key management schemes for cryptographic systems that can function securely and reliably even when misfortunes destroy half the pieces and security breaches expose all but one of the remaining pieces.

Key Words and Phrases: cryptography, key manage-

(1) knowledge of any k or more D_i pieces makes D easily computable;
(2) knowledge of any $k-1$ or fewer D_i pieces leaves D completely undetermined (in the sense that all its possible values are equally likely).

Such a scheme is called a *(k, n) threshold scheme.*

Communications of the ACM, November 1979

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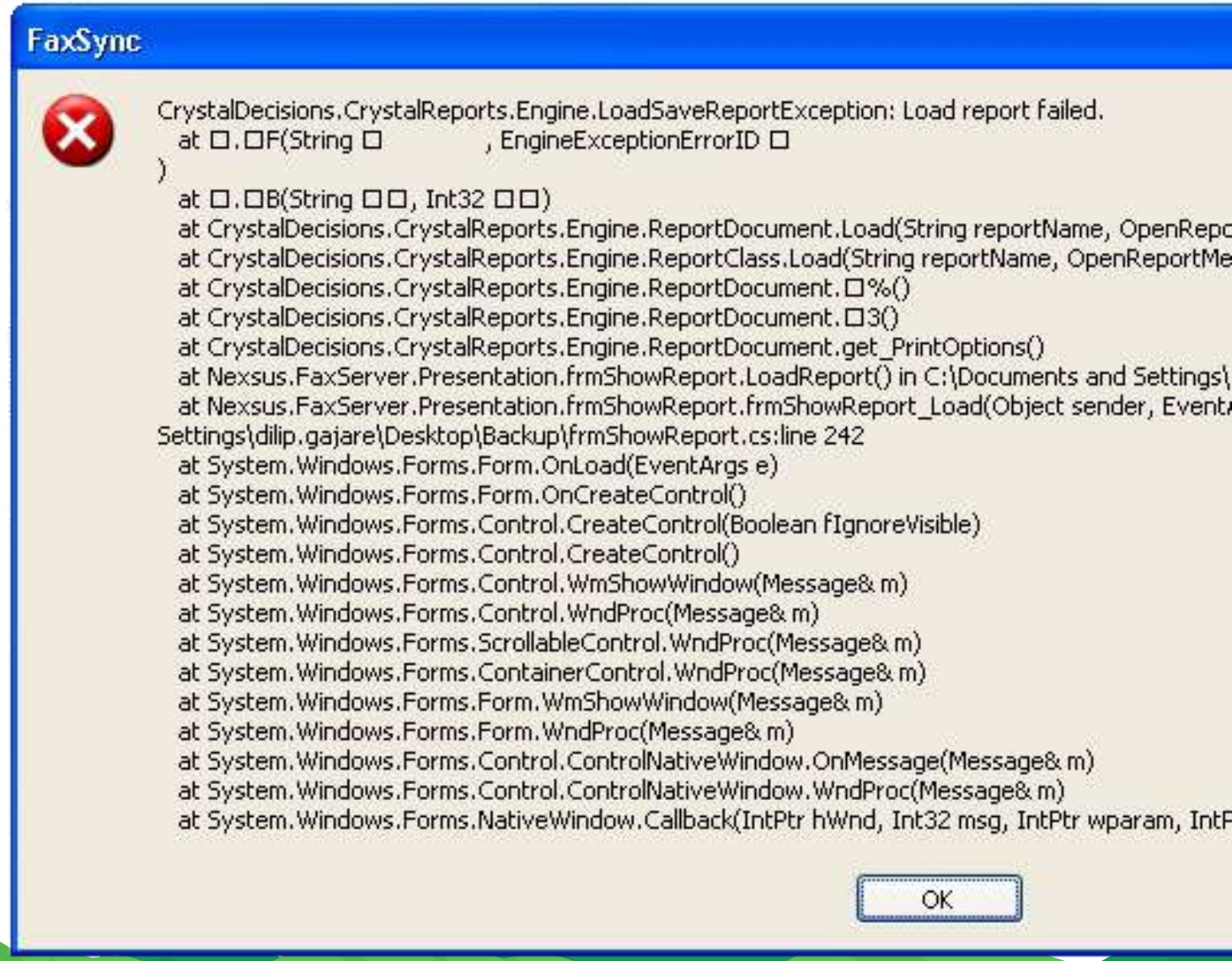
This is Game Theory: we should deter, deceive, defend, detect & develop

Estimation & Extrapolation: We Should Measure and Model

All existing market research spends too much to (mis)learn too little

Why Does Measurement Matter?

- People are slow and unreliable reporters of incomplete and inaccurate memories



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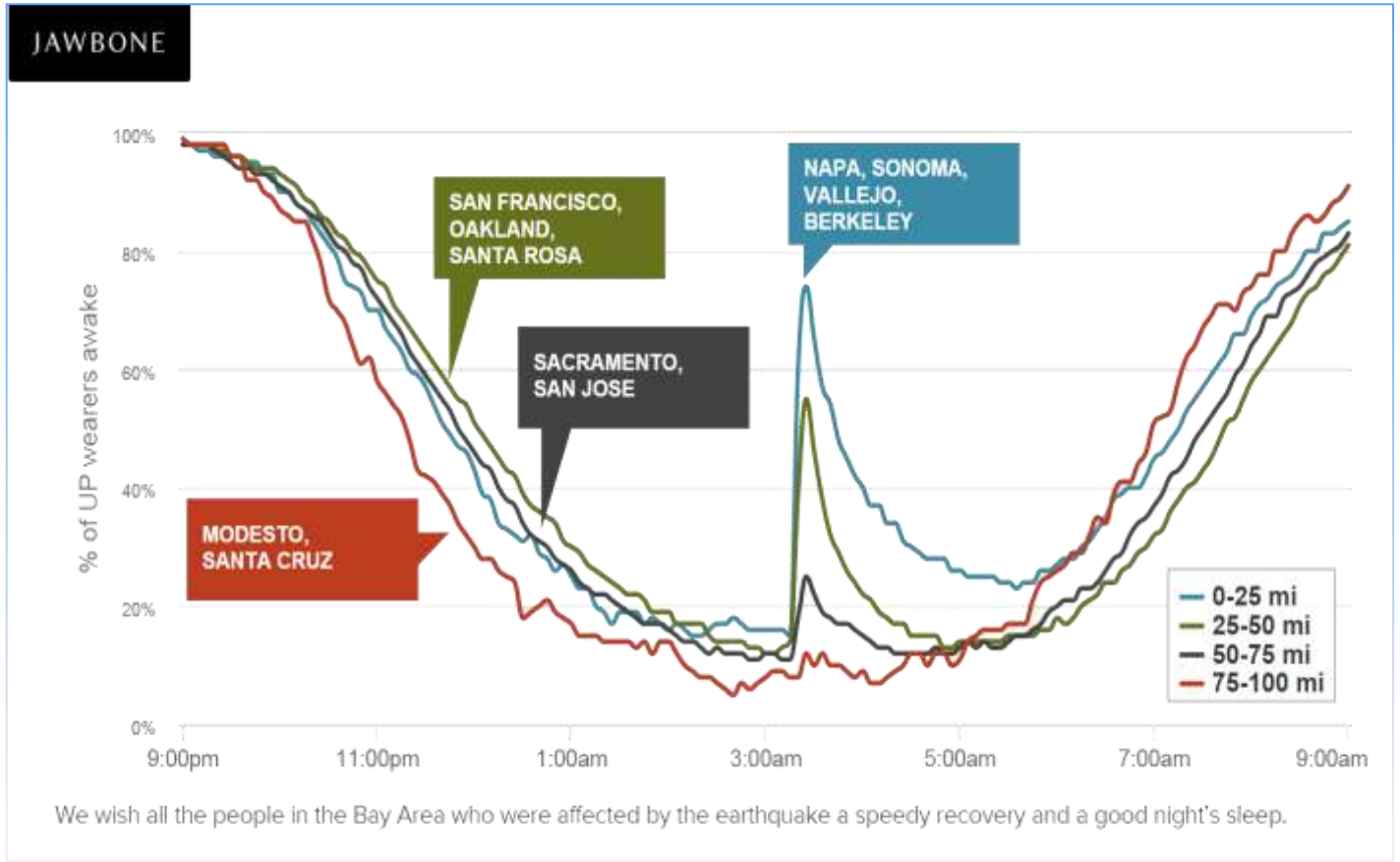
Why Does Measurement Matter?

- People are slow and unreliable reporters of incomplete and inaccurate memories
- People are passengers, not test pilots: they're not thinking about indicators of trouble until the trouble is already there
- Statistical significance emerges much sooner with accurate, timely collection at global scale

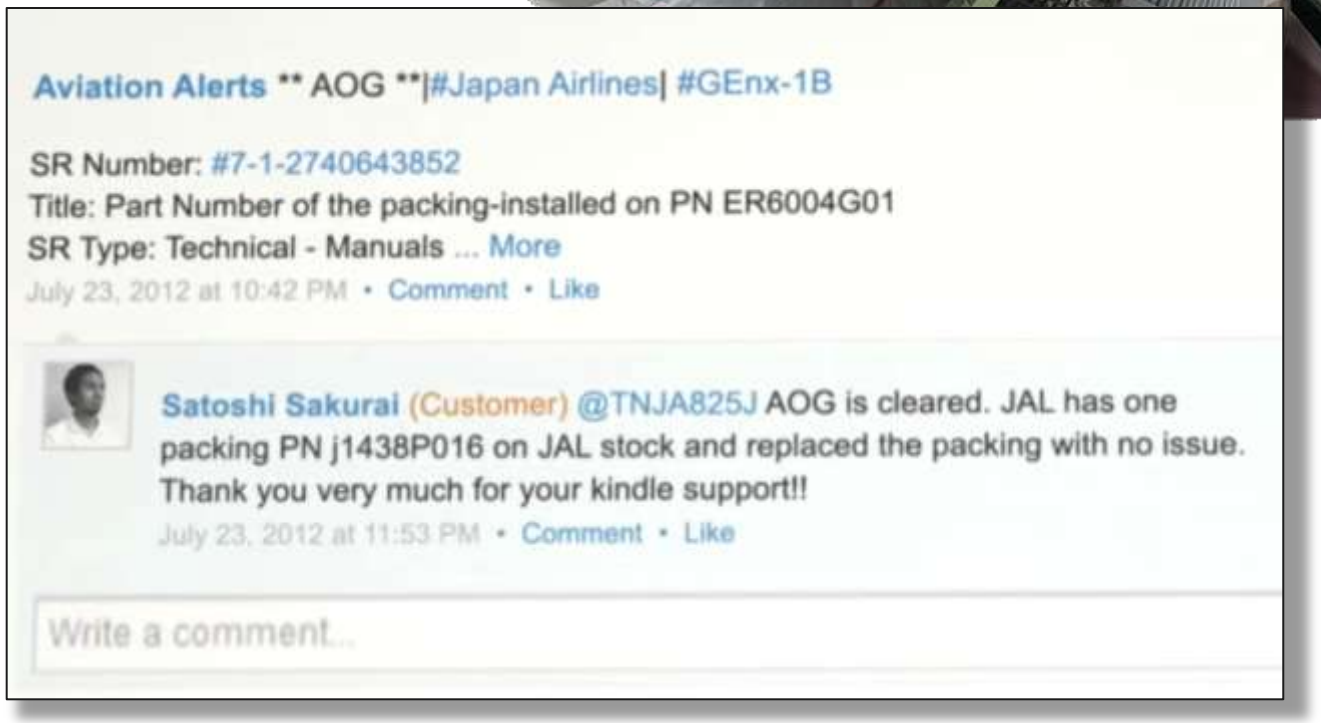


GE Ascends to Co-Creation

"Salesforce gives everyone **the synthesis of the data that we need to really know our customers**.

"We can **build a community of service professionals around a machine** to help reduce maintenance costs and increase engine lifespan. Social will help us **deliver a better engine than ever before**."

- Beth Comstock, CMO, GE



Don't Talk to Me About "Digital Transformation."

Making it 'digital' is just the beginning

The *reason* to make it digital is to make it computable and transformable

The stuff you think is cool today is tomorrow's 1984 Macintosh

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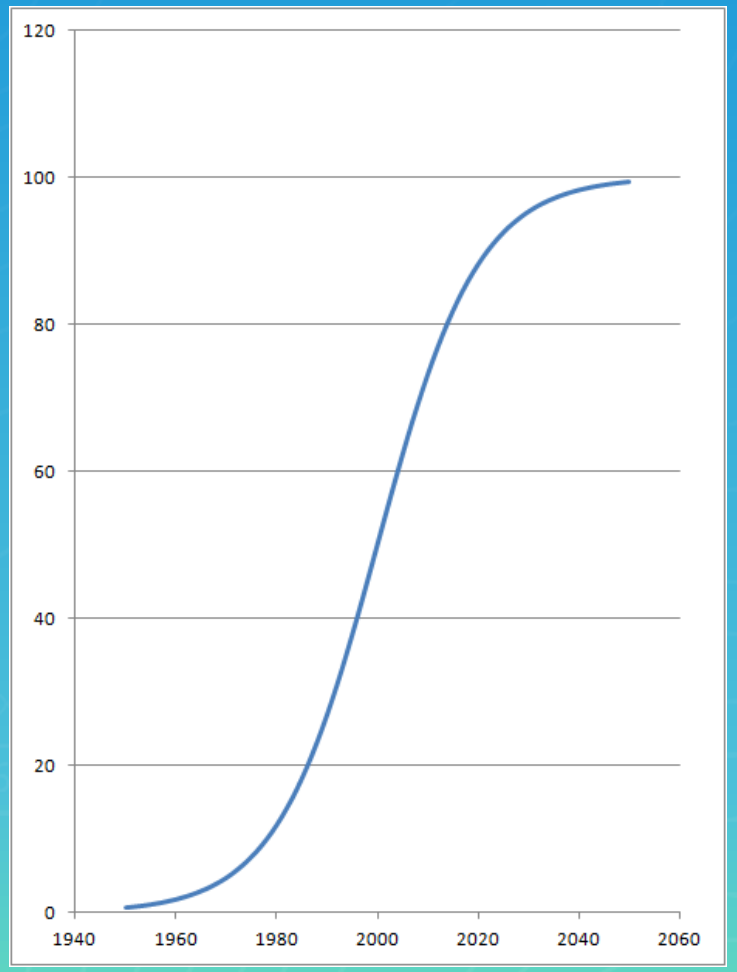
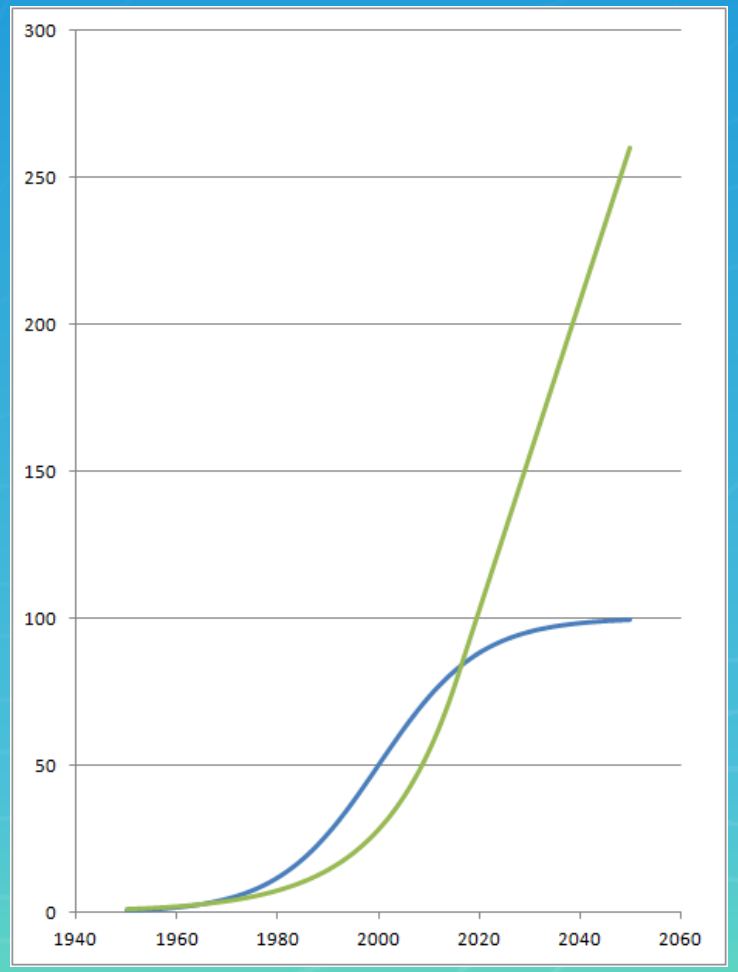
This is Acceleration, Not Saturation

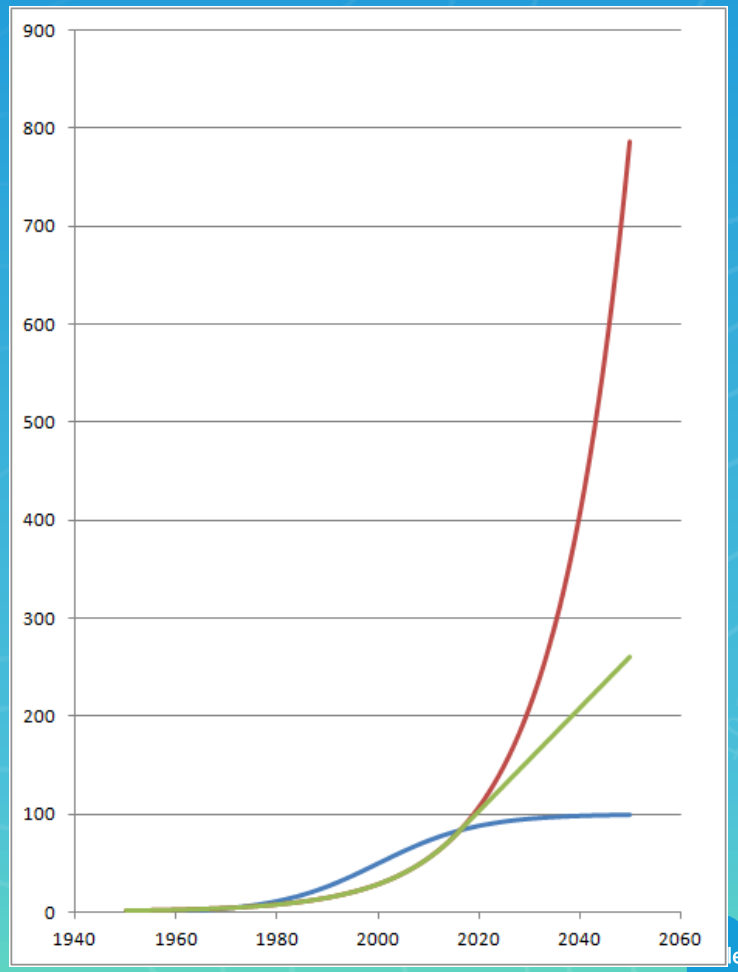
"This has to level off"



"That's too conservative"



"You're both clueless"



Hockey-Stick Curves Are Not a Fantasy

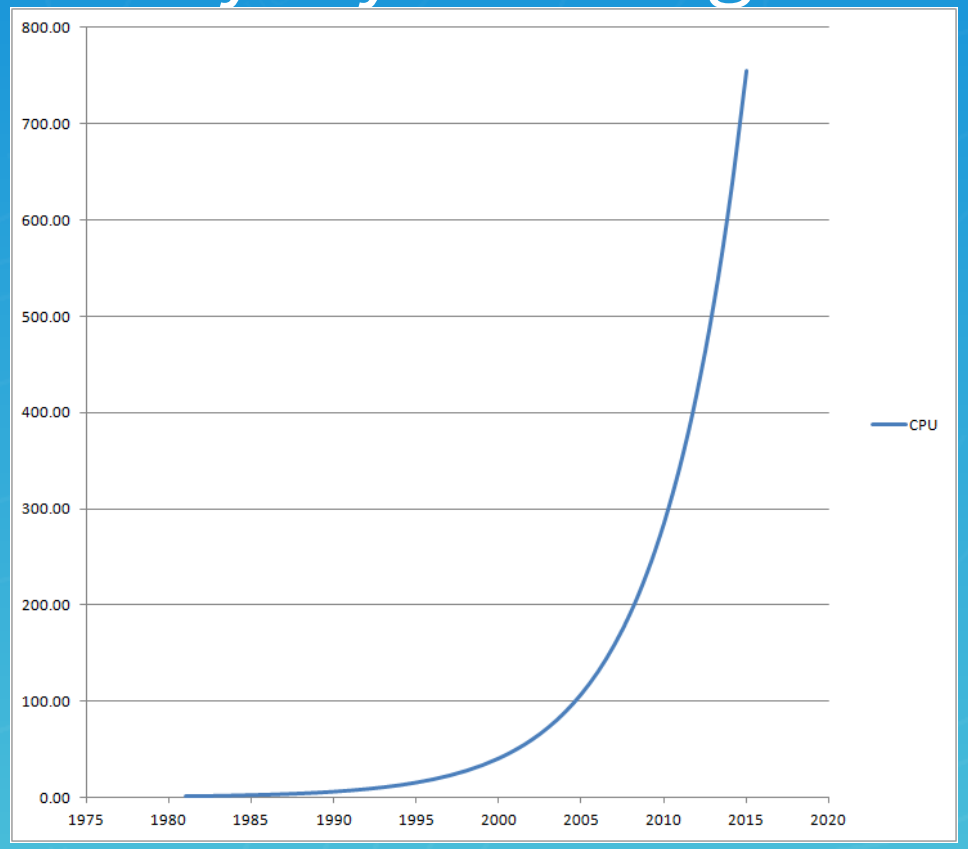
From IBM PC in 1981 to HP 6305* in 2015

- 4.77 MHz to 3.6 GHz:
  Compute **speed** has risen **~20% per year**
- 64K to 4 GB:
  Memory has surged **~40% per year**
- 160K to 500 GB:
  Mass **storage** tsunami **~50% per year**

We didn't design for where we wound up going
300 bps to 50 Mbps:
Connectivity has grown by **~45% per year**

* (most popular desktop PC sold in USA)

Everyday Thinking Fails to Grasp Exponential Change



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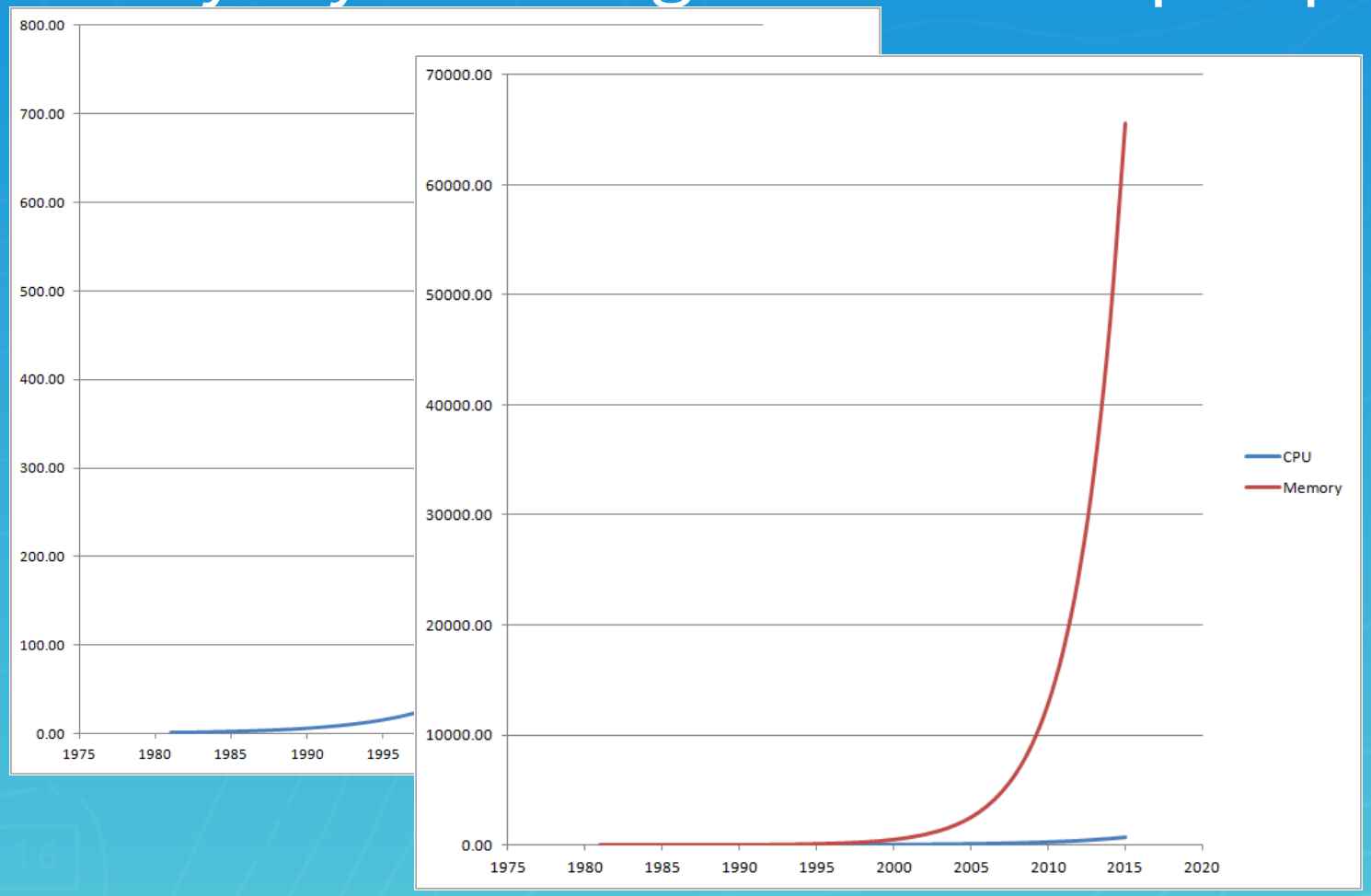
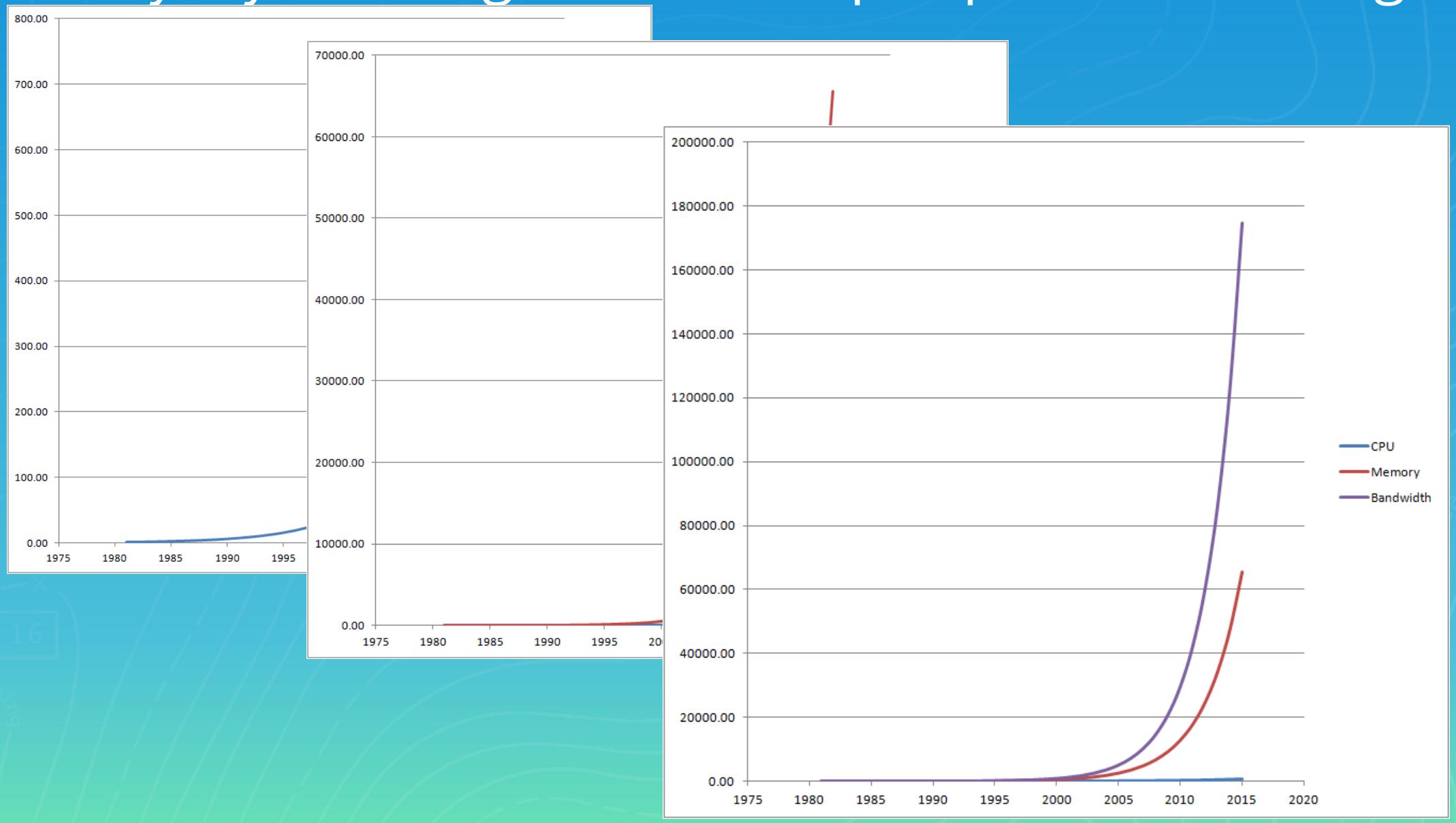
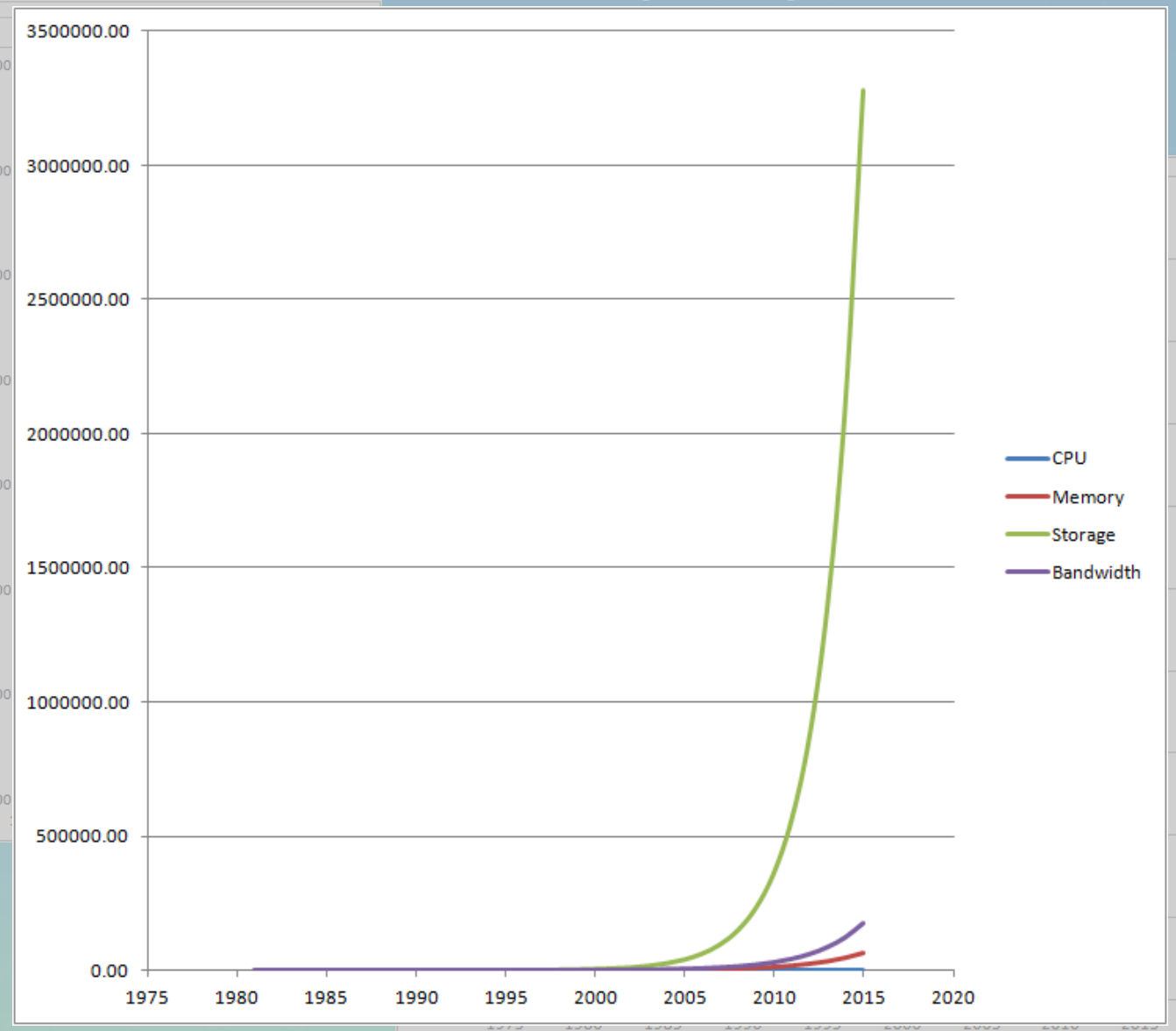


Everyday Thinking Fails to Grasp Exponential Change



Everyday Thinking Fails to Grasp Exponential Change



Don't **Talk to Me** About "Digital Transformation."

For example: the watch will not extend the phone.
The phone will be a control panel for the watch.

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Don't **Talk to Me** About "Digital Transformation."

For example: the watch will not extend the phone. The phone will be a control panel for the watch...

We won't just digitally enhance the sound. We'll digitize and operate on the raw signal.

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Don't Talk to Me About "Digital Transformation."

The watch will not extend the phone. Rather, the phone will be a control panel for the watch.

We won't just digitally enhance the sound. We'll digitize and operate on the raw signal.

We will do things indistinguishable from magic...

MIT And Georgia Tech Develop System To Read Closed Books Using Terahertz Radiatic

BY MARY PASCALINE ON 09/10/16 AT 7:25 AM

T-Waves May Offer Just Right Choice

By Peter Coffee | Posted 2002-05-20

eWEEK

Every Device Connected & Intelligent

New England Biolabs/Xively

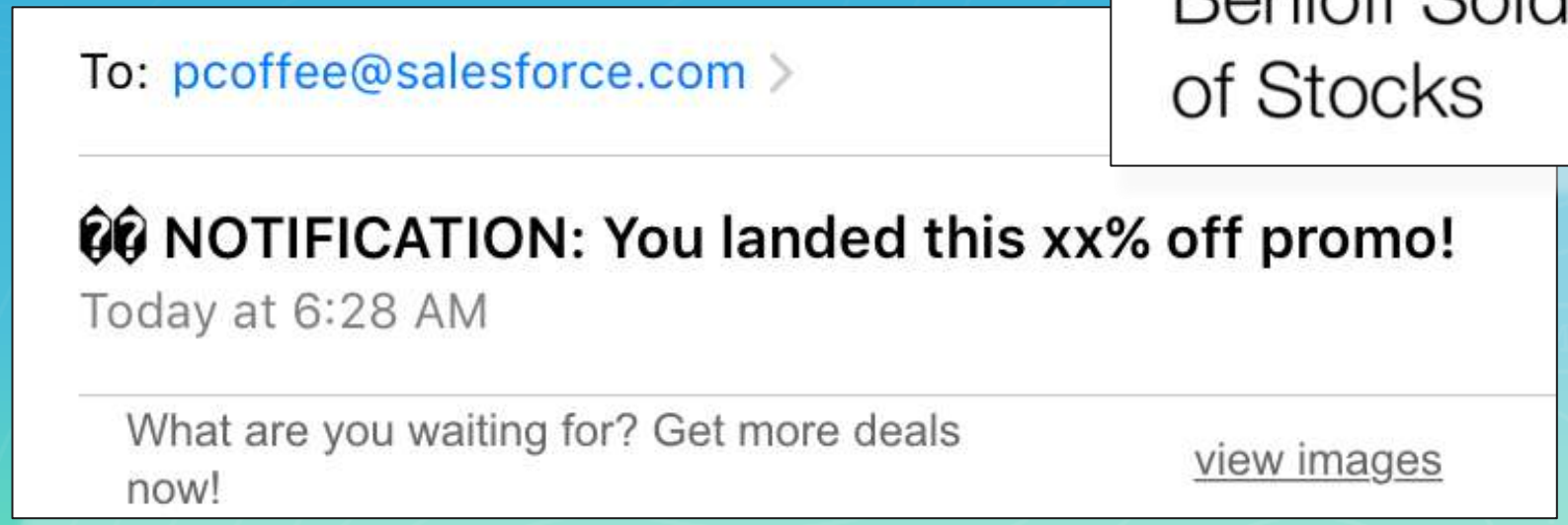
"We built a connected freezer with the Salesforce1 Platform so we can keep in touch with researchers in real time and better anticipate their needs. Now we can better support them to solve their problems."

http://www.salesforce.com/customers/stories/new-england-biolabs.jsp

Don't Talk to Me About "Digital Transformation."

...but we still struggle with *simple* things.

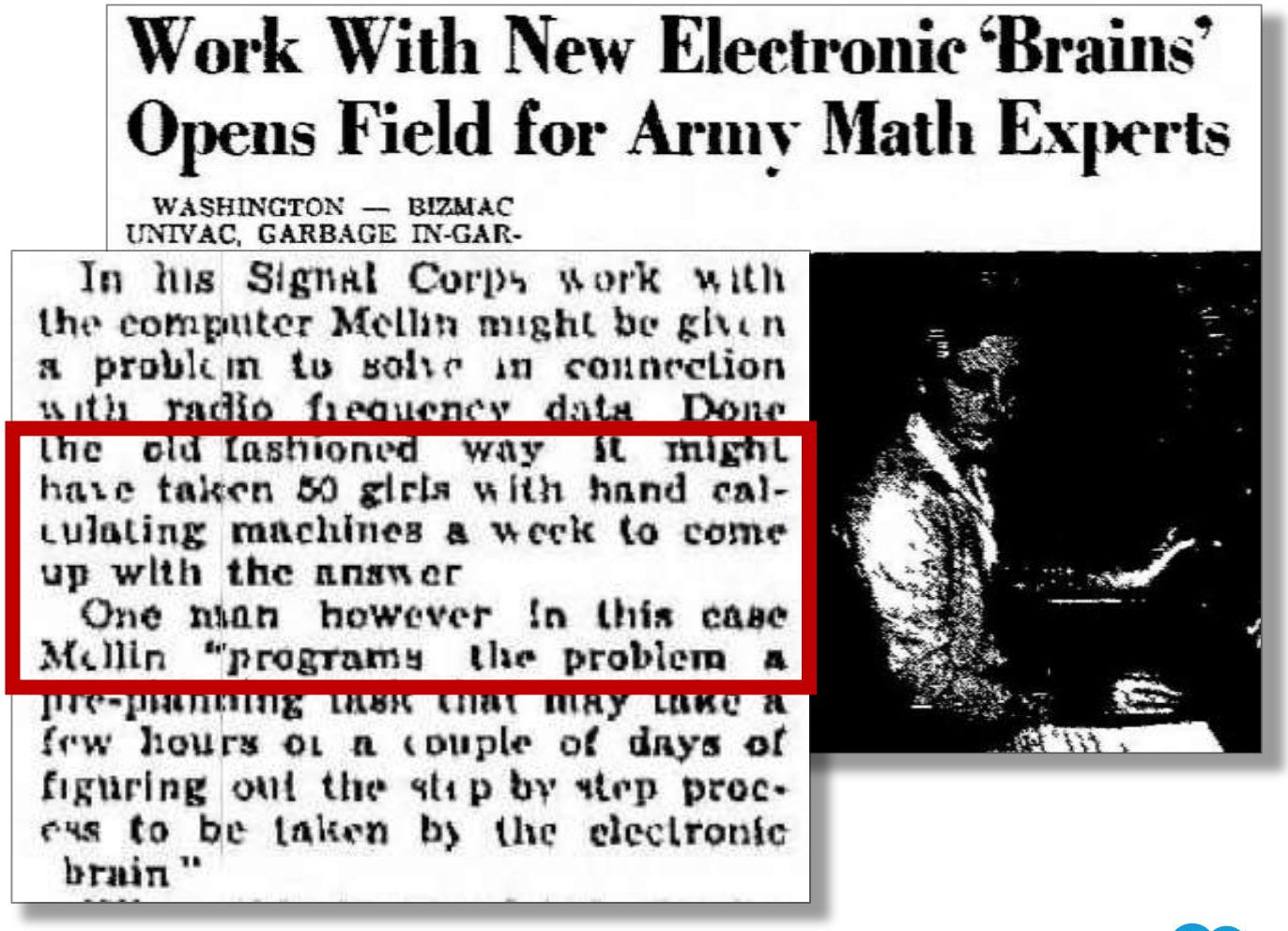
If data will have power, it *must* be trustworthy.



Do You Realize How *Old* is the Acronym, “GIGO”?

“The first use of the term has been dated to a **November 10, 1957**, syndicated newspaper article about US Army mathematicians and their work with early computers, in which an Army Specialist named William D. Mellin explained that computers cannot think for themselves, and that ‘sloppily programmed’ inputs inevitably lead to incorrect outputs.”

en.wikipedia.org/wiki/Garbage_in,_garbage_out



Work With New Electronic 'Brains' Opens Field for Army Math Experts

WASHINGTON — BIZMAC UNIVAC, GARBAGE IN-GAR-

In his Signal Corps work with the computer Mellin might be given a problem to solve in connection with radio frequency data. Done the old fashioned way it might have taken 50 girls with hand calculating machines a week to come up with the answer.

One man however in this case Mellin "programs the problem a pre-planning task that may take a few hours or a couple of days of figuring out the step by step process to be taken by the electronic brain."

Let's Not Rediscover GIGO at IoT Scale

"*Moneyball* has an implicit flaw not seen until quite recently. **It depends, as all analysis does, on good, clean, and valid data and for that reason should only be applied in its pure form outside of baseball with care.** Without care, you revert to the old IT maxim of GIGO or 'garbage in, garbage out.'

"We've just seen a painful example of GIGO play itself out in the US election. .."

diginomica

The Moneyball failure

By Denis Pombriant November 15, 2016

SUMMARY: Without true information from customers, in CRM terms you're not much better than a HIPPO dealing with GIGO – go figure!

We increasingly use data and analysis to inform business decisions often replacing business processes that relied on little more than gut instinct. There's a long history of it.

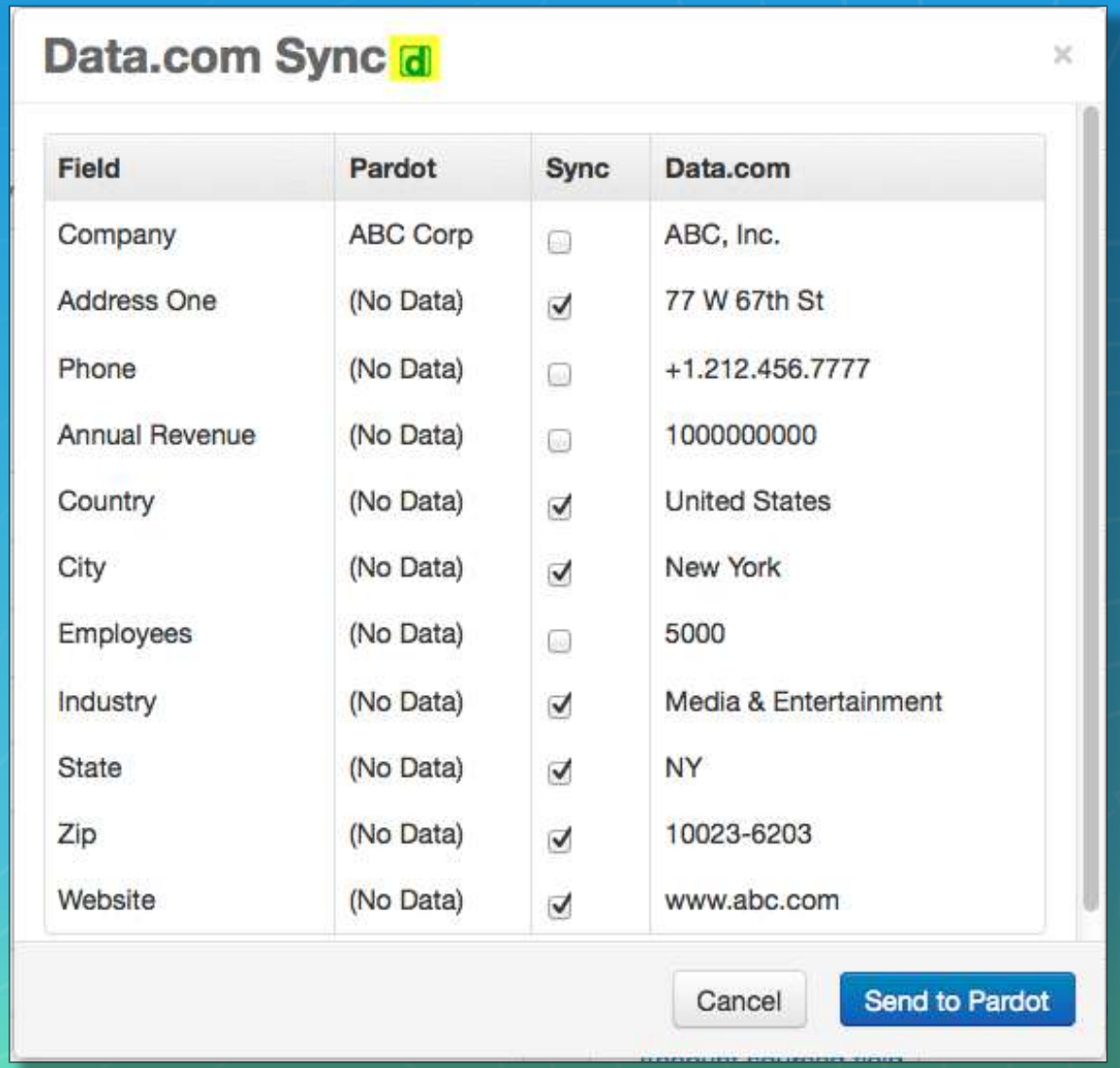
Using one's gut is far from perfect, but for almost forever, that's all we had. It's one of the reasons that middle-aged men with grey hair have historically populated the executive suite. In the last few years, a derivative idea, the HIPPO, has been trending. It simply means the "highest paid person's opinion" and it reinforces the concept that big decisions have tended to be made on that person's gut instinct.

Data Quality Must Be Part of Platform Performance

“ Data.com helps CenturyLink prioritize account records to update based on market segment and cleans the data so **contact info is accurate, complete and current.** Over half of their records have been updated so far – and the number grows daily.

“‘Data.com **arms our acquisition hunters with clean data to locate new leads and opportunities**,’ adds John Serdinsky, Director of Sales Effectiveness. “Data.com enables us to solve a number of problems with one investment.”

CenturyLink



Even Clean Data May Not Tell the Whole Truth...

“I'm sorry. My responses are limited. You must ask the right questions.”

(RED) HIV/AIDS Outlook

Indicator
All

Year
All

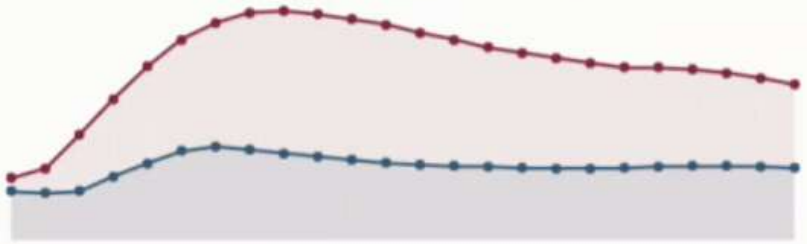
The Global Fund

UNAIDS

25M
People with HIV

13M
Children with HIV

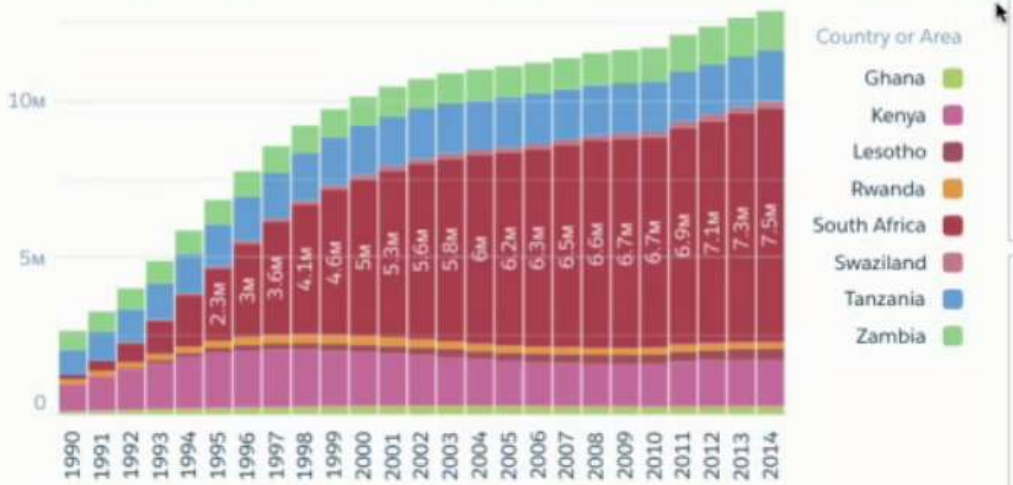
Statistics for (RED) Supported Countries
Ratio of Male vs Female HIV Prevalance



42
% Female HIV Informed

49
% Male HIV Informed

(RED) Grants and HIV/AIDS-Affected Population Trends



Lives Saved Due to ART

New HIV Infections Estimates

ART Coverage (% people with HIV)	ART Coverage (% pregnant wome...
46	70

Outreach Programs

- Basic Care and Support f...
- Community Outreach Pr...
- Counseling and Testing
- People Receiving Care
- People Receiving Treatm...
- People currently on ART
- Training for Health Work...

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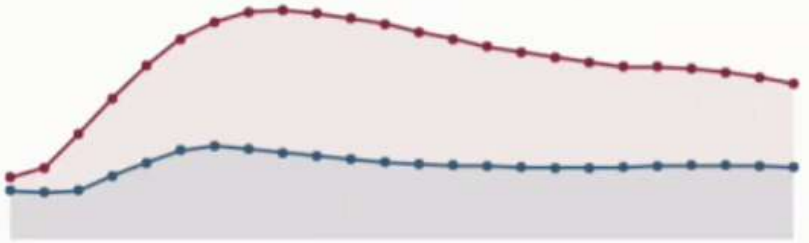

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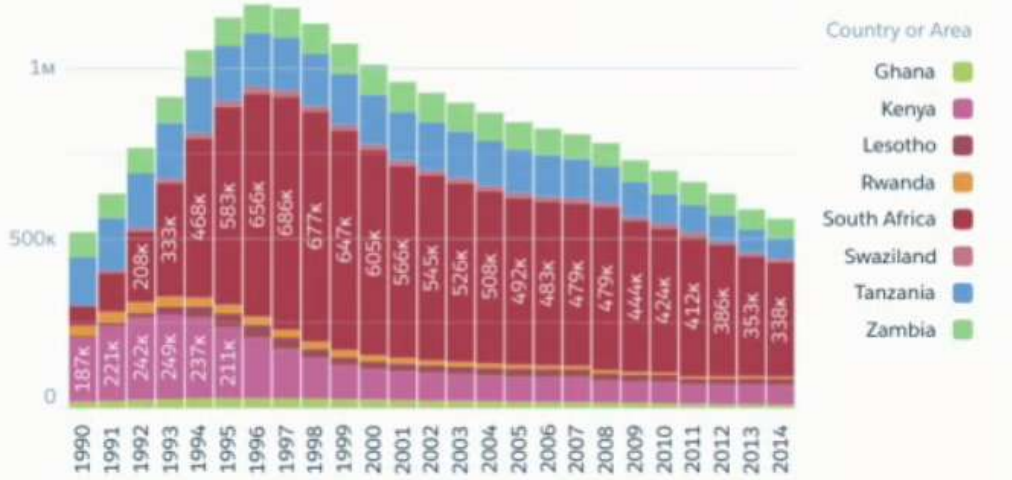

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People Receiving Care
People Receiving Treatm...
People currently on ART
Training for Health Work...

So You Want to Be a Data Scientist

This Is *Not* an Utterly New Field of Expertise

"How do you become a data scientist? By behaving like a scientist while studying data."

Scientists Need to Have Good Lab Technique

Hiring typically seeks 5+ years of Java, Scala, Python, R, MapReduce etc.

Key traits? "Compulsive, with **propulsive laziness**, **irritable determination** and **insensitivity to pain**"

Don't Do This If You Need to Feel Popular

"I found a substitution effect in DoD research spending, instead of a multiplier effect: it was not what they wanted to hear" – Annie Flippo, edmunds.com

There are Speed Bumps on the Way to Intelligent Business

Mobile data will grow at **53%** **CAGR[1]** between 2015 and 2020

Data proliferation

32% of data is scattered across multiple systems[2]

Data fragmentation

58% of O&G co.'s changing practices w/ mobile apps; **33% merely automating processes.**[3]

Data stagnation

Demand for data scientists in 2018 will exceed talent pool by **300,000**[4]

Data skills shortage

1. www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/vni-hyperconnectivity-wp.html
2. nucleusresearch.com/forget-big-data-time-focus-real-data/
3. www.redhat.com/files/resources/mo-red-hat-mobile-survey-012016.pdf
4. techcrunch.com/2015/12/31/how-to-stem-the-global-shortage-of-data-scientists/

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Salesforce Is Focused on “AI First” Leadership

Massive collection

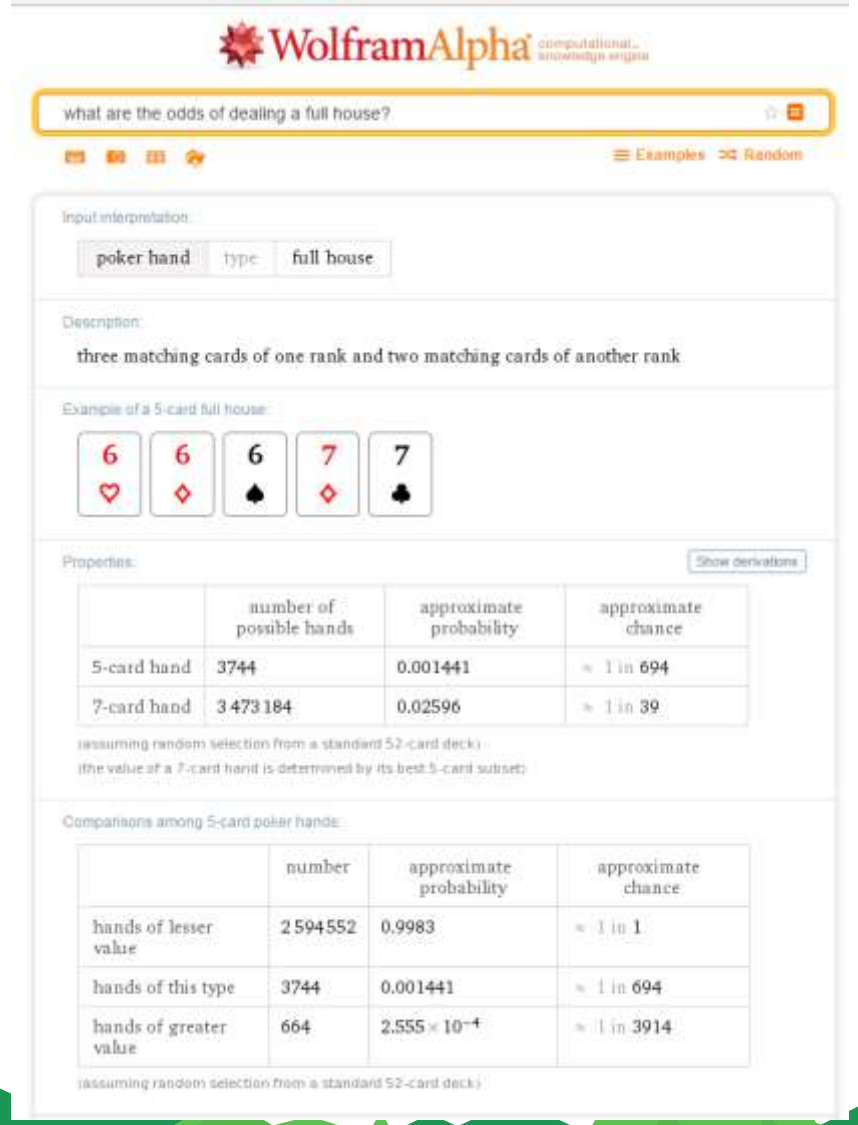
No-Code integration

Process abstraction

Machine learning

What Will People Still Get Paid to Do?

What Will People Still Get Paid to Do?



What's *Not* Being Surpassed by Technology?

ADAPTED FROM: Institute for the Future, Future Work Skills 2020, 2011

Transdisciplinarity: "We can no longer rely on just bringing together groups of specialists to solve our most complex problems"

Computational Thinking: "To understand the meaning, the trends and patterns of what the data is telling us becomes paramount." – Institute for the Future

Sensemaking: "When you ask creative people how they did something, they feel a little guilty because they didn't really do it, they just saw something" – Steve Jobs

Social Intelligence: "Influence and relationship-building will now come from asking the right questions, not necessarily having all the answers" – John Hagel

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If I End With *Three* Druckers, This Must Have Been Smart

"There is nothing quite so useless,
as doing with great efficiency,
something that should
not be done at all."

"If you want something new,
you have to stop doing
something old."

"Management is doing things right;
leadership is doing
the right things."

What Are The Dumb Things We're Doing?

A – **Assuming & Optimizing** instead of **Assessing and Adapting**

B – **Bridging Isolations** instead of **Chaining Collaborations**

C – **Coding** instead of **Composing**

D – **Debugging Brittleness** instead of **Gaming for Resilience**

E – **Estimating & Extrapolating** instead of **Measuring & Modeling**

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Thank You

Peter Coffee
VP for Strategic Research

pcoffee@salesforce.com
@petercoffee
in/petercoffee

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