

RSACConference2015

San Francisco | April 20-24 | Moscone Center

SESSION ID: DSP-W01

MORE APT THAN YOU THINK: DATA PROTECTION AT MASSIVE SCALE

Davi Ottenheimer

Senior Director of Trust, EMC
@daviottenheimer

Wednesday, Apr 22nd 8:00 AM | West 3006

CHANGE

Challenge today's security thinking



**COMMODITY
PLATFORMS**

**AI ML
ANALYTICS**

**INFO-
SHARING**

"THINGS"

IT CAME FROM THE MARKET...





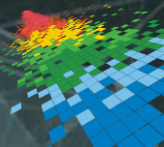
ESSENTIAL DATA NAVIGATION TOOLS

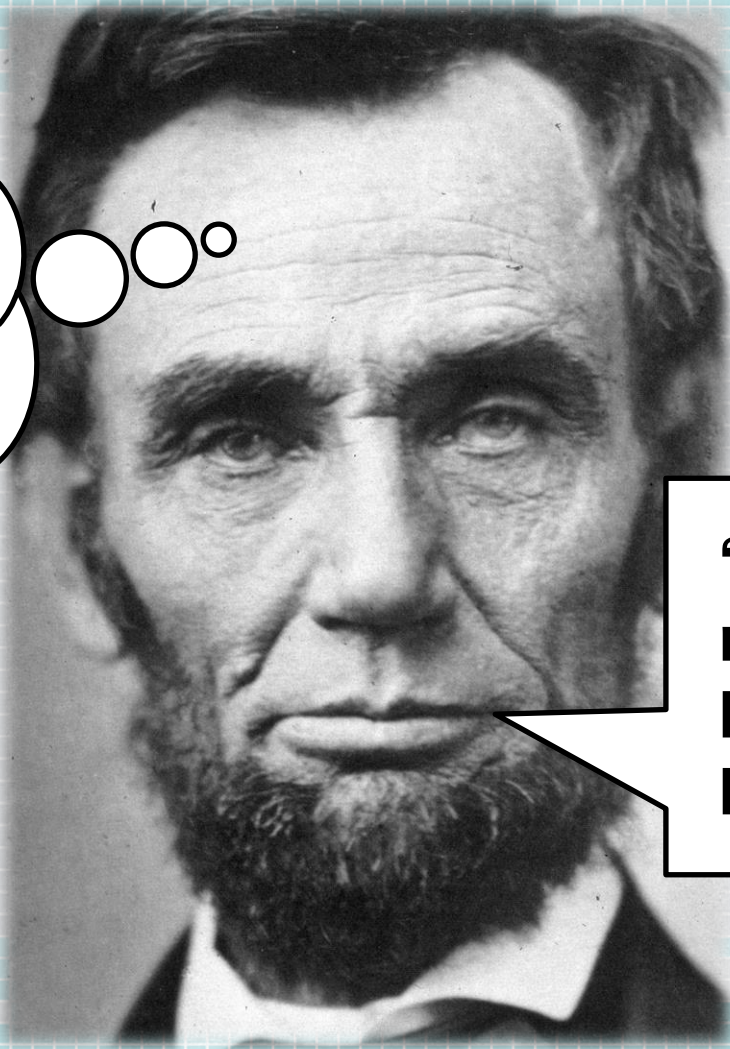
Philosophy

1. Ask Hard Questions
2. Use Correct Reason
3. Clarify Values
4. Find Foundations

History

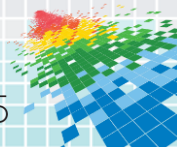
1. Identify Sources
2. Prepare/Process Information
3. Analyze to Improve Present Understanding

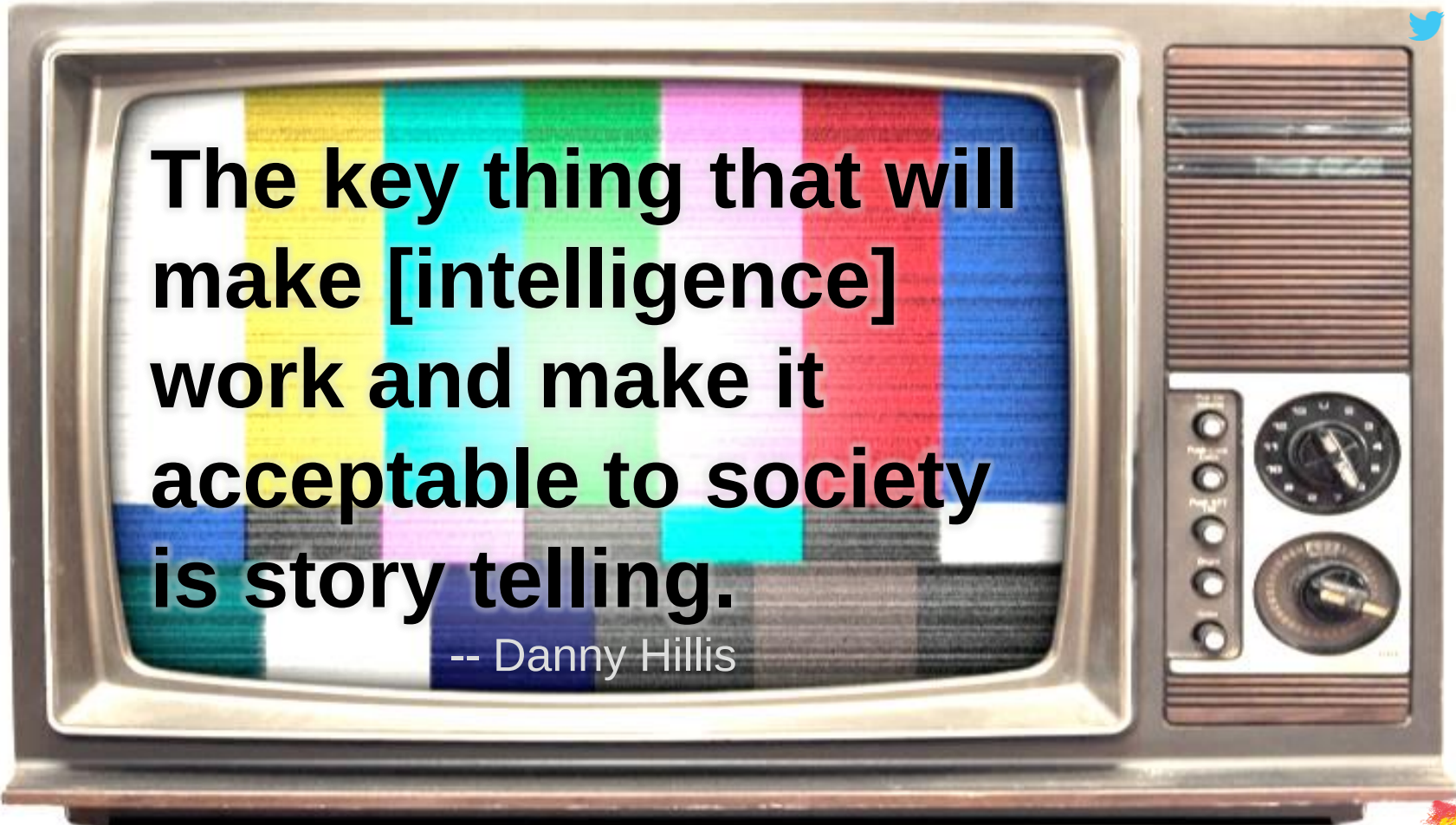




**HMMM, HOW
CAN WE
GET A LOT
MORE DATA
ON THAT
MAN?**

**“I don't like that
man. I'm going to
have to get to
know him better.”**





**The key thing that will
make [intelligence]
work and make it
acceptable to society
is story telling.**

-- Danny Hillis

112 MILLION FINGERPRINT FILES

1943 FBI*



* 2015 "long-suspected problems with subjective, pattern-based forensic techniques"

~80% US Population

183,950 CARS CHECKED IN 158 DAYS

1965 US CITY POLICE

INSTANT CRIME STATISTICS

The city of Chicago is a good example. From beat to boat all policemen have access to daily crime statistics including the plate numbers on all stolen cars. All files are immediately accessible from an IBM 1410 computer.

The computer also serves as a "home" for records on 90,000 persons and vehicles. Policemen in Chicago reportedly phone or radio questions to their private data bank at a rate of 1400 per day. The reply they receive (average 2 minutes) can mean a lot to a policeman—maybe his life. From such information patrolmen can categorize their suspect in a range that runs from "shoplifter" to "potential murderer."

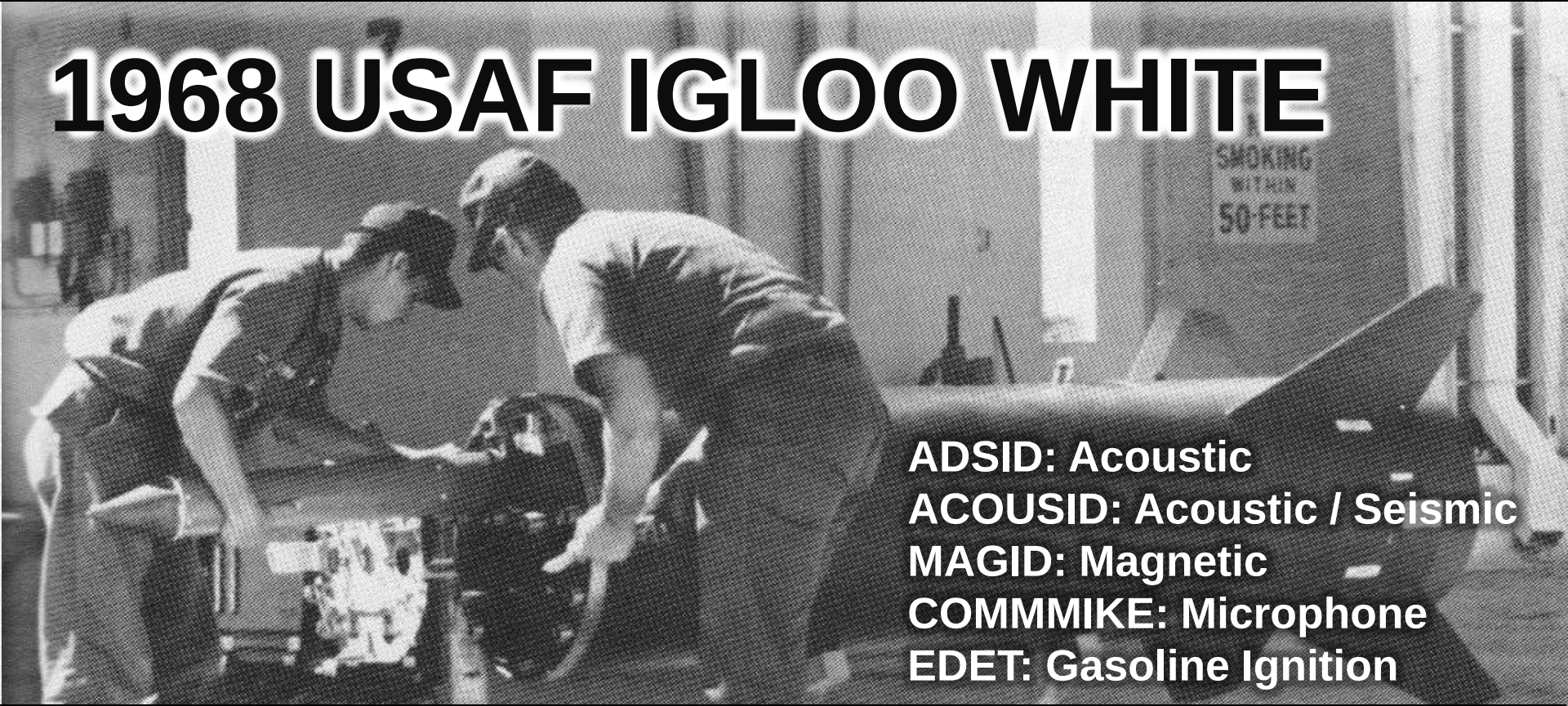
And Chicago isn't the only city that is adding computers to its recruiting list. The results of a recent experiment called "Operation Corral" conducted by the New York City Police Department are equally surprising. Using a Univac real-time computer, "Operation Corral" checked on 183,950 cars in 158 days. Of these, 2932 were either wanted in alarms for stolen cars or plates, or on warrants as scofflaws. A total of 165 people were arrested, many of whom turned out to be wanted on more serious charges ranging from narcotics violations to grand larceny.

http://archive.computerhistory.org/resources/text/Computer_Usage_Company/070910_download/computerusagecompany.computers_and_law_1967/computerusagecompany.computers_and_law_1967.pdf

"whatever the solution, it will be enhanced by computer usage"

20,000 SENSORS DROPPED INTO LAOS

1968 USAF IGLOO WHITE



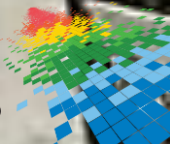
ADSID: Acoustic
ACOUSID: Acoustic / Seismic
MAGID: Magnetic
COMMMIKE: Microphone
EDET: Gasoline Ignition

Operational Cost \$1Billion/Year

**FAST
FORWARD
TO TODAY...**

MATH MODELS = IMPERFECT STORIES

01100010
01100001
01100010
01111001
01100010
01111001
01100010
01111001



MATH MODELS = IMPERFECT STORIES



01100010

01100010 01100001 01100001 01100010 01100001

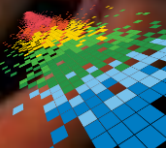
01100010 01111001 01100010 01100010 01111001

01100010 01111001 01100010

01100001 01100001

01100010 01100010

01111001 01111001



2015 DRONE PLATFORM FOR...

"I see now why they recommended *margarine* for error"

880M Hectares of Cropland

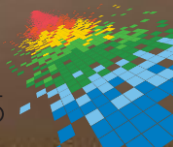
100K Mines & Quarries

300K Wind Turbines

4M Cell Towers

600K Bridges

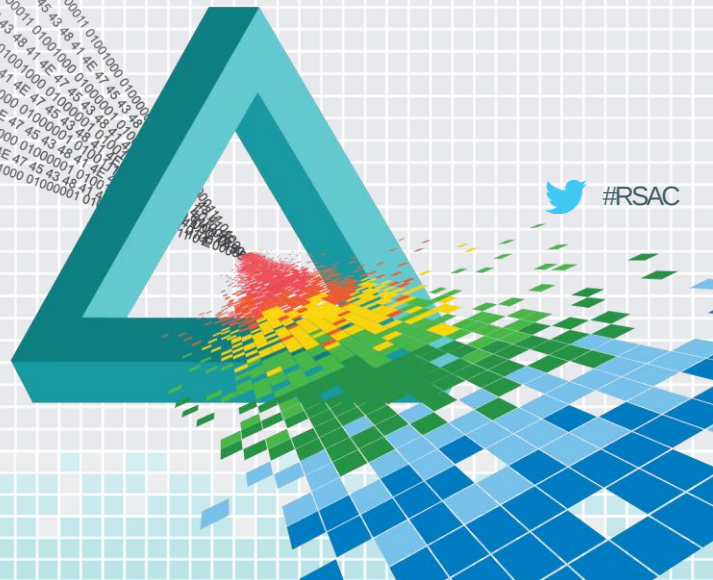
...



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ADVANCED PERSISTENT THINKING

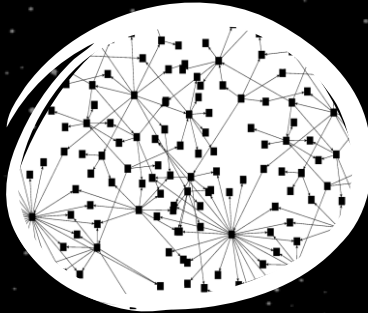




CONTEXT

Persuasion, Empathy,
Problem Solving,
Negotiation, Physical Skill

+



THREAT

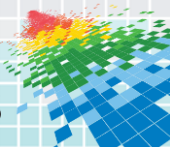
Familiarity, Change,
Persistence

+



CAPABILITY

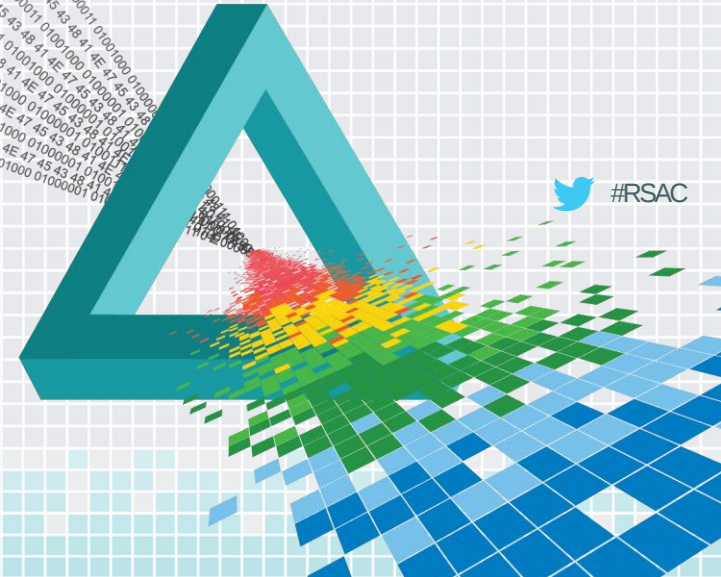
Volume, Velocity,
Variety,
Vulnerability



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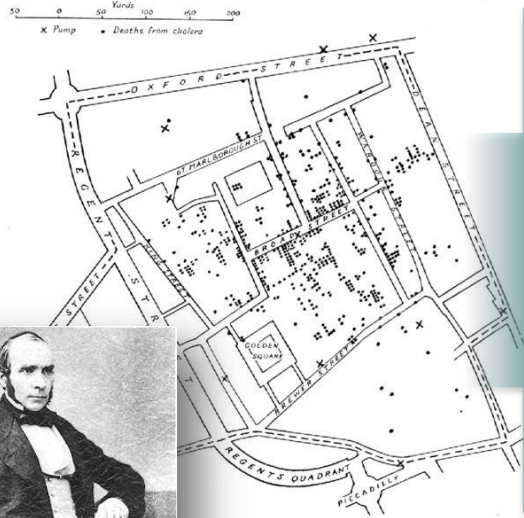
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ADVANCED PERSISTENT THINKING: HUNT AND GATHER “FIND IT!” STORY

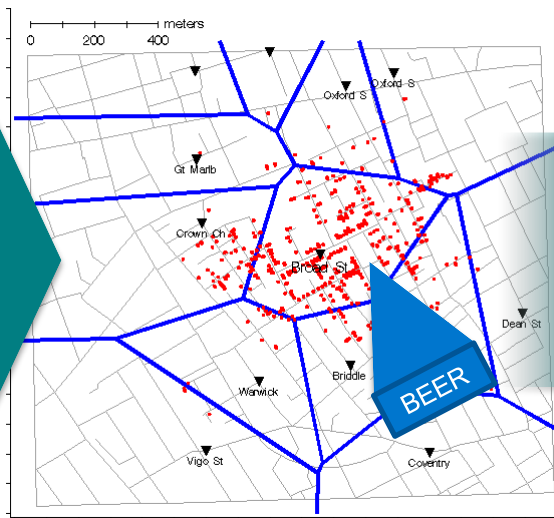


2012 RSAC: DATA BREACHES AND CHOLERA

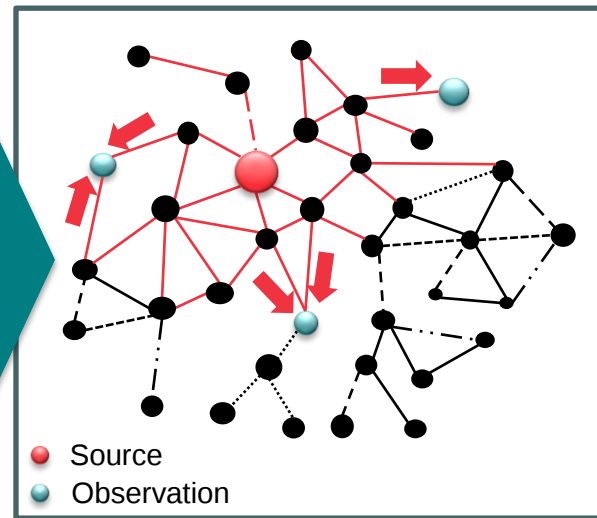
1854: London Ghost Map



1854: London Death Polygons

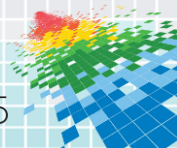


2012: Breach Investigations

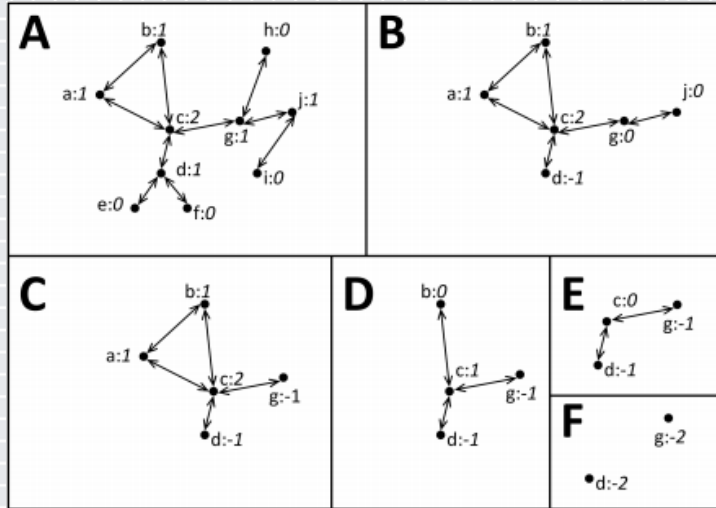


(2010 Rinderpest, 2013 AIDS)

Who was trusted to correctly attribute threat? **Who** was authorized to take action?

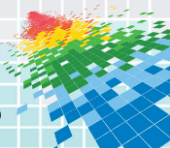


HUNT AND GATHER

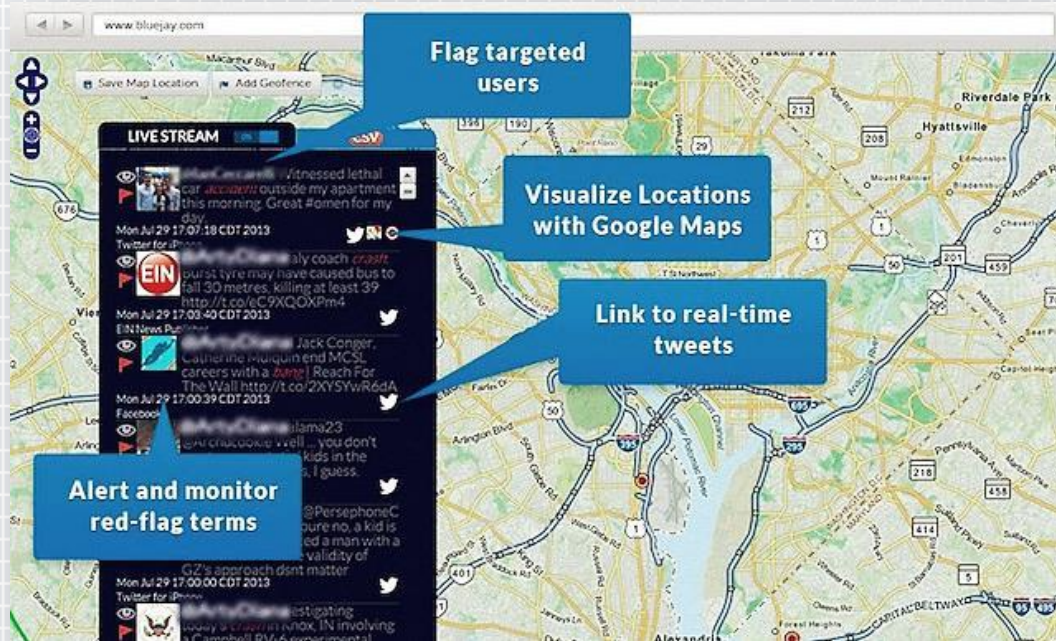


Found **seed set** in under 3.6 hours on Friendster social network consisting of 5.6m nodes and 28m edges

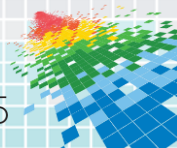
2013 US Army 'Viral' Marketing Tipping Model



HUNT AND GATHER



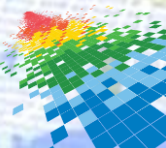
2013 US Police (From BlueToad to BlueJay)



A map of Santa Cruz, California, showing various streets and landmarks. Overlaid on the map are numerous red squares and colored dots (red, green, purple, yellow) representing predicted hotspots for crime. The text is overlaid on the right side of the map.

“We're not telling you how to do police work. We're just telling you the **best locations for you to be at** any given time of the day.”

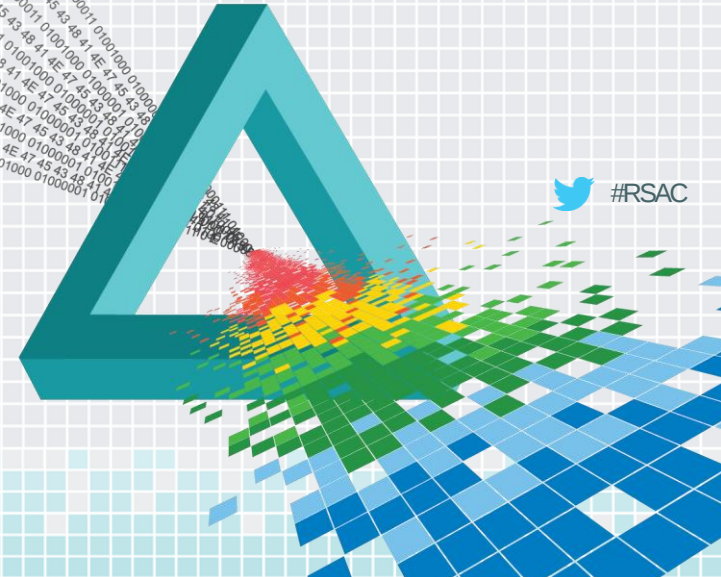
-- Deputy Chief on Predictive Policing



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ADVANCED PERSISTENT THINKING: AGRICULTURALISM “SURVIVE” STORY



The Humanitarian Data Exchange

WHERE YOUR DATA COMES TO LIFE

FIND DATA



e.g. Colombia or Ebola

Choose Location



1,580

DATASETS

243

LOCATIONS

207

SOURCES

2015 PHONE METADATA AS PROXY

Food Security and Poverty Indicator

FOOD ITEM (VARIABLE) CORRELATION RANGE

Vitamin-rich vegetables (carrot, orange, sweet potato), rice, wheat, bread, sugar, meat [0.7–0.8]

Eggs, oil, milk, butter, organ meat [0.5–0.6]

Sorghum, ground nuts, seeds, fish, fruits, cooking banana, green leafy vegetables, beans, peas, maize, white roots, tubers, pumpkin, squash, cassava [0.0–0.4]

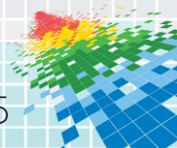
White sweet potato -0.4



Privacy Caveat: “Food items cultivated for personal consumption like cassava and beans show no relation with airtime purchases.”

Before: 3-5 Year Intelligence Delay

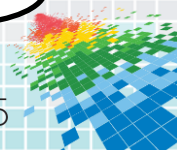
After: Real-Time Human Safety Trend Warning



2013 STORY-DRIVEN VIDEO SUMMARY



Real-Time Story Telling

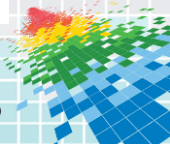
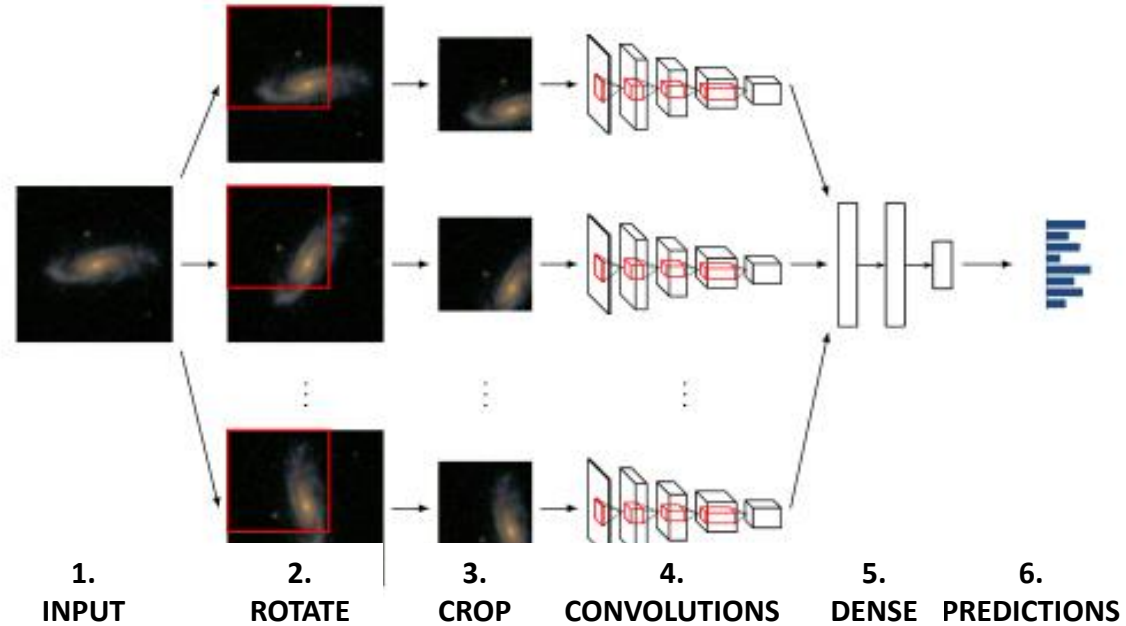


2015 DEEP CONVOLUTIONAL NEURAL NETS

Galaxy Morphology Prediction

1. Increased Compute Power Capability
2. **Human-Enhanced** Training Set Quality

Dieleman, Willett & Dambre <http://arxiv.org/abs/1503.07077>



**HUMAN
ENHANCED?**

2013 UNICEF DIGITAL MAPS

flickr

Sign Up

Explore

Create

Upload



Sign In



Voices of Youth Urgency Rank Testers

UNICEF GIS

PRIORITIZE ISSUES AND REDUCE DISASTER RISK

15
Photos

397
Views

View all albums

Photos

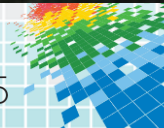


Deforestation in Kakolo township of Kitwe, Zambia - Brighton K.

EMC²

<http://unicefstories.org/2013/11/14/voices-of-youth-takes-digital-mapping-to-the-next-level/>
<https://www.flickr.com/photos/unicefgis/sets/7215763616633326/>

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HUMAN “INFO SHARING” FOR SURVIVAL

430 BCE Athens (20% die)
Thucydides : “those who survive are immune”

910 CE Baghdad
Rhazes: “Transmitted from person-to-person. Theory of acquired immunity”

1022 CE China
Buddhist Monk
variola

1717 Istanbul (60% infected, 20% die)

Lady Mary, a British secular writer, observes “*ancient Turk practice*” of variolation – inoculates 6yr-old son with smallpox matter

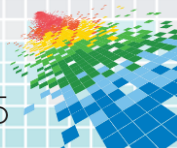
1721 English royal family tests variolation on prisoners and orphans

1765 London Medical Society paper “Cow pox and ability to prevent smallpox”

1774 English farmer Jesty tests cow pox vaccination on wife and sons

1796 English Dr. Jenner observes rural customs, tests on gardener’s son

1840 Britain bans variolation



DR. JENNER'S VACCINE STORY (PROOF)

A = Smallpox Infection (30% chance of death)

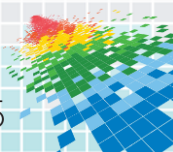
B = Variolation (1-2% chance of death)

C = Cow pox Infection

V = Vaccine (Immunity to A)



- ◆ Theory: $C = V$ (Given C better than B, B better than A)
- ◆ Test: $C = V$ if B after C has no signs of A
- ◆ Result: $V =$ (or better than) C



INTELLIGENCE TRADE-OFF

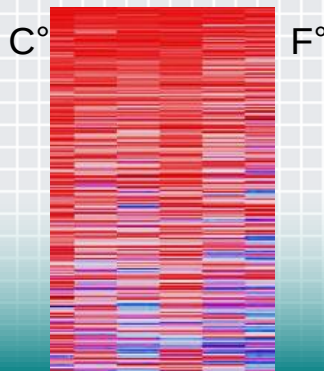
BINARY



RANKED



MEANING



0 POINT

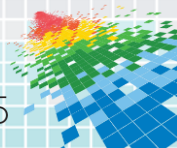


EXACT



**FREEDOM
(ERRORS)**

INTELLIGENCE

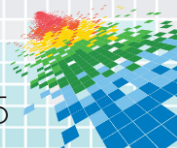


LESSONS FROM IMPERFECT INTELLIGENCE...

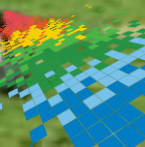
(THREATS)



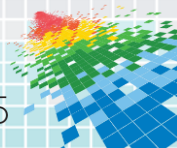
CONTEXT: OVERTRAINING



...they saw him coming on their radar screens but thought he was probably a flock of geese.



CONTEXT: NUANCE





Matt Roller

@rolldiggity

New Parent Idea:

1. Take pictures of you pulling baby out of spacecraft in forest.
2. Hide pictures in attic for kid to find when he's 10.



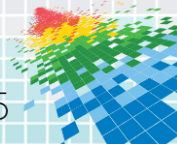
RETWEETS

13,652

FAVORITES

7,580

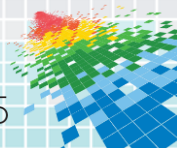
10:09 AM - 9 Apr 2013





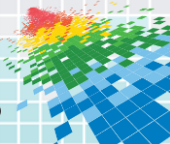
2015 April Fools Joke

400K shares traded in 5 min ... heaviest minute of trading volume since Feb 12th first minute of trading

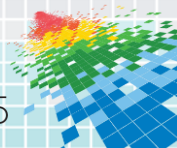


**I smile when
I'm faced with
a very absurd
situation,
when I can't
prevent my
own emotions.**

– Benigno Aquino
Philippines President



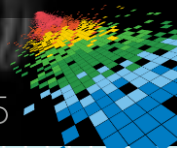
CONTEXT: PROBLEM SOLVING



US officials 'aren't competent to accurately interpret tattoos.'

— J. Boerman, Expert Witness on Gangs

The Biometric Center of Excellence is seeking...any current databases containing tattoo/symbol images, their possible meanings... (Aug 2012 FBI RFI)



RIGHT
OR
WRONG?

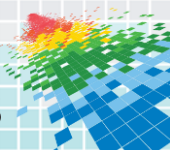
Age Range	i	Age 26 - 27
Gender	i	Female
Ethnicity Based on Surname	i	American
Education	i	Completed College
College Graduate	i	True
Marital Status	i	Married
Presence of Children	i	Children Present
Number of Children	i	2 Children
Children's Age	i	14 Years old, 17 Years old
Children's Gender by Age	i	Unknown Gender 11 - 15, Unknown Gender 16 - 17

“...a 26-year-old mother of two teenagers...is just about biologically impossible”

Wrong



CONTEXT: EMPATHY

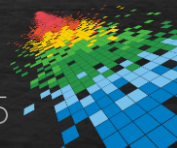


REAL EPISTOMOLOGICAL DANGER



**“...technology built for counter-terrorism
used against human language, because
that’s where intentions are shown...**

...get people before they act”

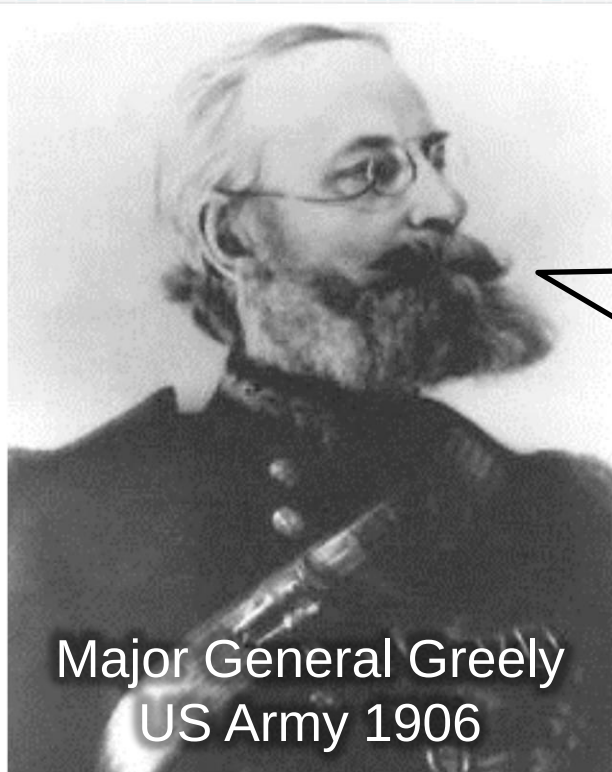


The Scripps-McRae Press Association has had the first and best news of the Earthquake from the outset.

PRICE ONE CENT.

Frisko Transformed From a City of Joy to a Place of Death

HUNDREDS DIED

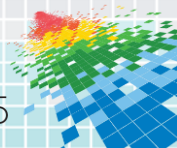


Major General Greely
US Army 1906

Balderdash!

I say official SF
number dead is

498



“Come on, let us shoot...”

US Apache helicopter
July 12, 2007



Killed:
Reuters photographer Namir Noor-Eldeen and driver Saeed Chmagh...

<http://www.reuters.com/article/2010/04/06/us-iraq-usa-journalists-idUSTRE6344FW20100406>

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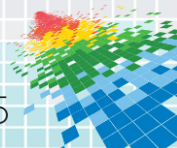
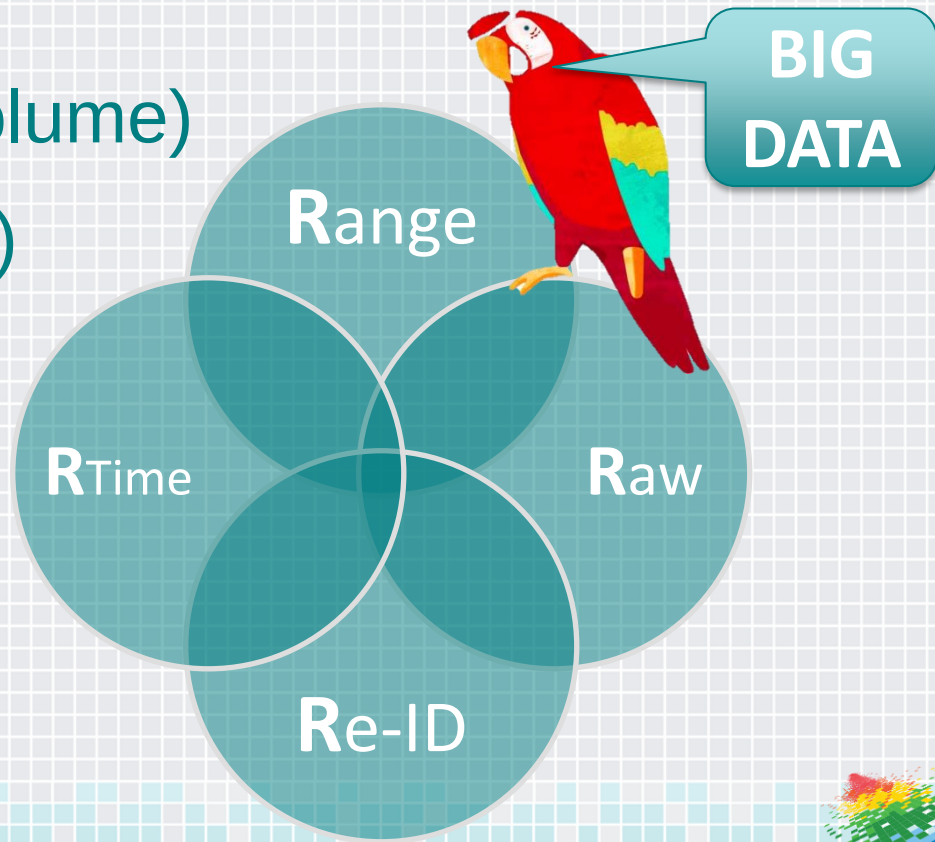
GIVEN CONTEXT AND THREAT... WHAT CAPABILITIES EXIST?



 #RSAC

THE RRRRs of “MASSIVE SCALE”

1. **R**ange of Sources (Volume)
2. **R**aw Formats (Variety)
3. **R**ead-Time (Velocity)
4. **R**e-ID (Vulnerability)



MASSIVE SCALE = “DATA LAKE”

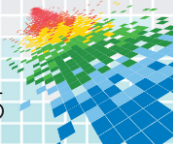
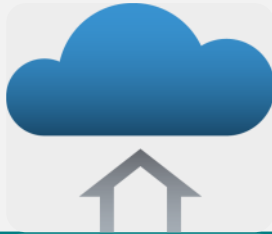
INGEST

STORE

ANALYZE

SURFACE

ACT



DATA CONTINUITY METHODOLOGY

Easily Identified

Routine Treatment

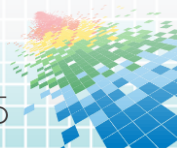
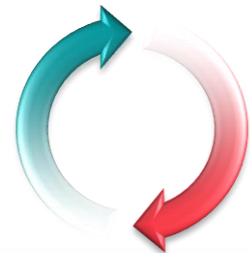
Minimum Judgment

Identify Sick ASAP

Steadily Adequate Records

Evaluate Daily Sick

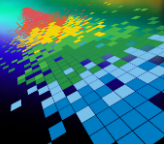
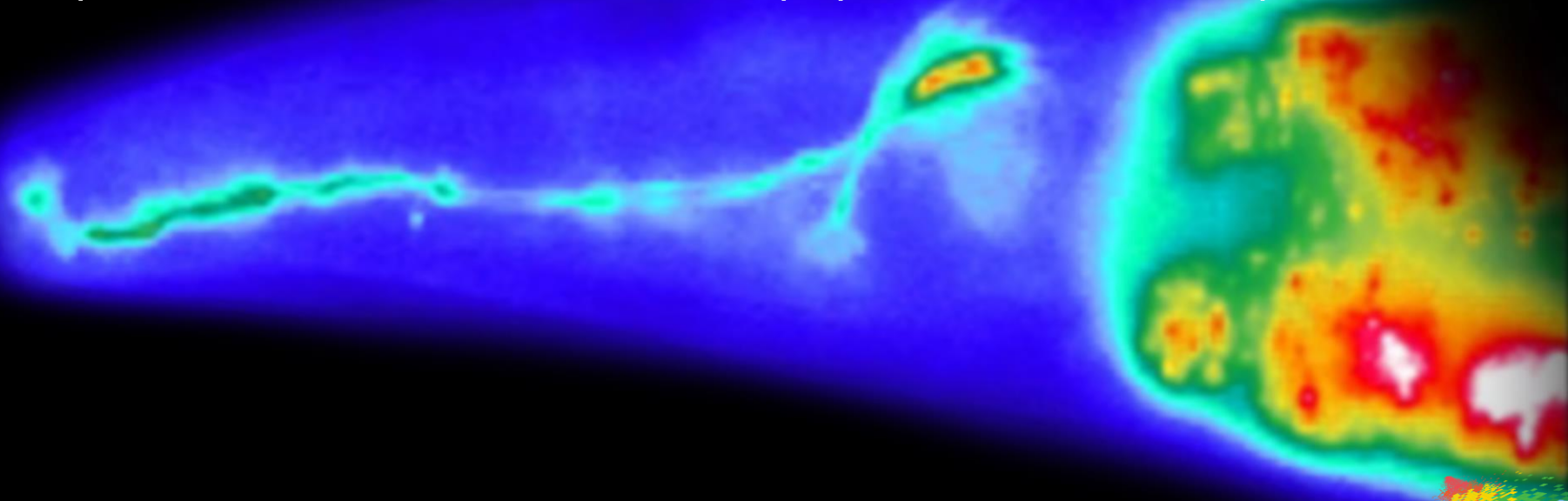
Adapt Until Noted Improvement



ERM IoT SURVIVAL (Ringworm Neuron Circuit)

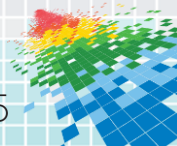
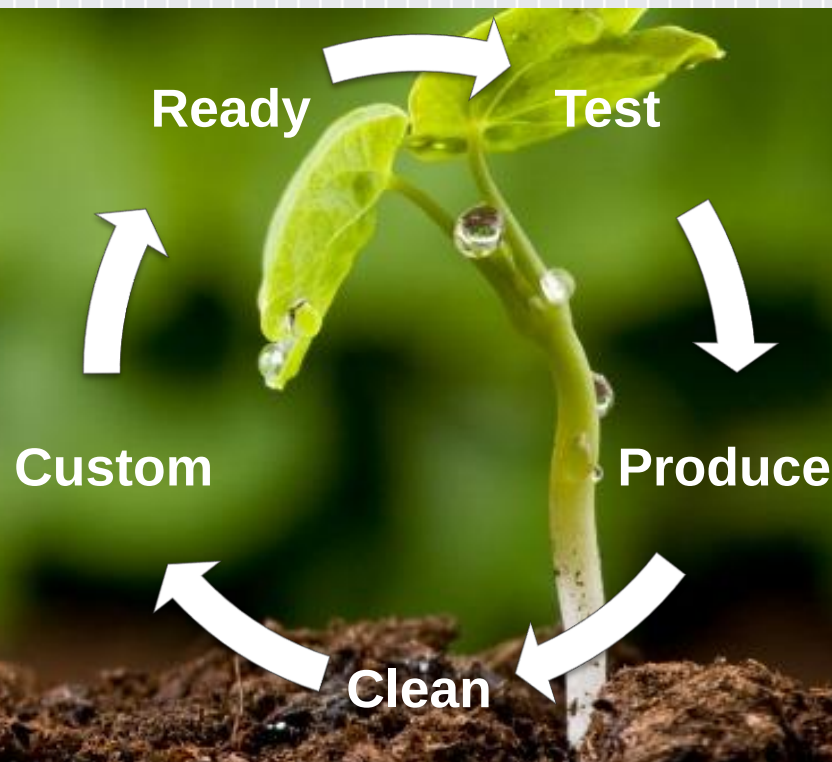
If large food decrease, release dopamine

If dopamine released, take more risks (expand search for food)

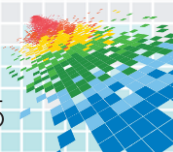
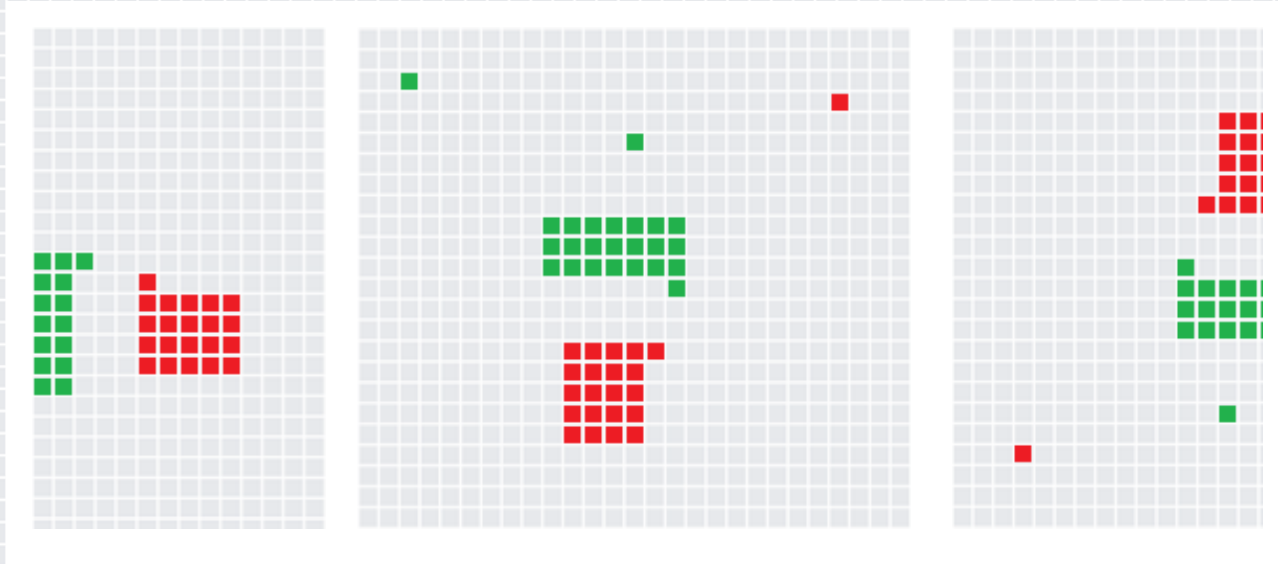


ISEA SYSTEMS SURVIVAL PLATFORM

“Service Compost”

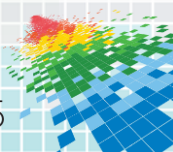
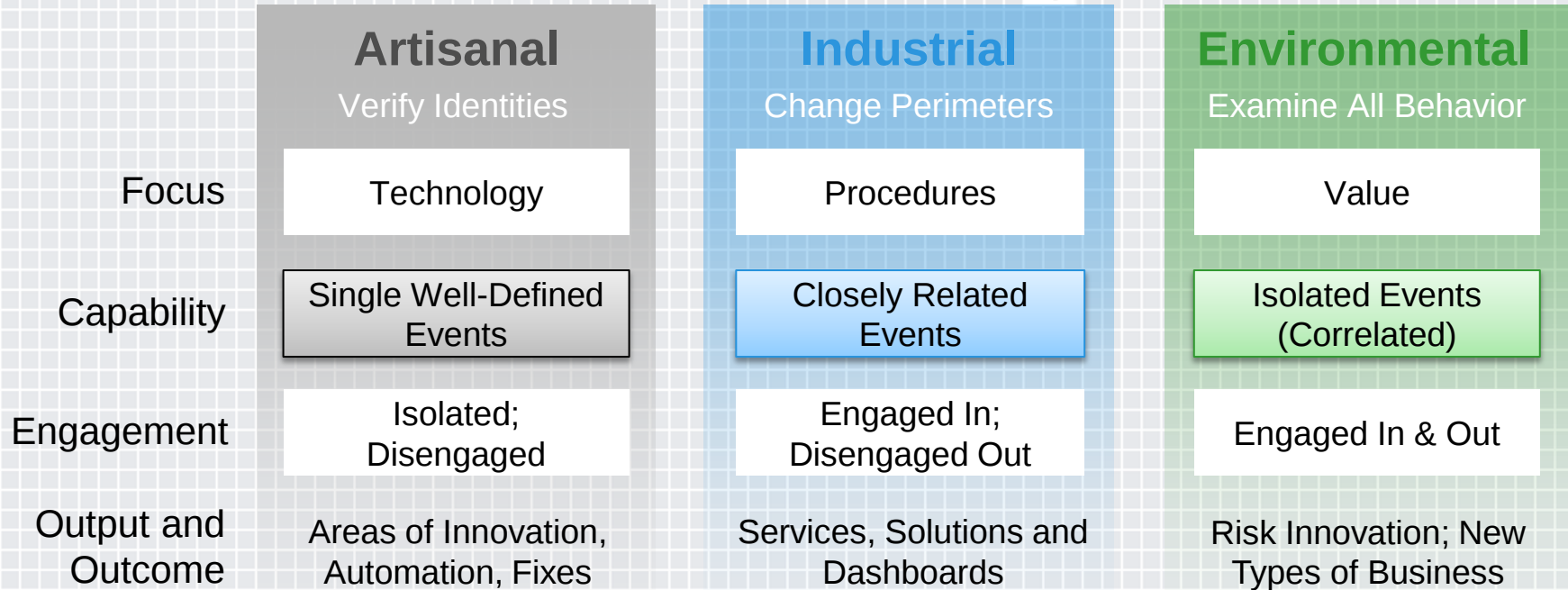


ISEA SYSTEMS SURVIVAL ACTION



INTELLIGENCE EVOLUTION

PEOPLE, DATA and TRANSACTIONS



COMPUTE POWER REVOLUTION

1996

Artisanal

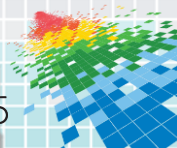
“hardware cost for **24-node BEOWULF** cluster \$57K
—compared to commercial
supercomputers between
\$10m and \$30m”



2006

Industrial

“**30** men's
heft of grasp
in the gripe of
his hand”



SMARTER, BETTER, FASTER

◆ Find: Improve Identification

1. Human Enhancement
2. Compute Power

◆ Survive: Data Continuity Method and Technology

2016?

Environmental

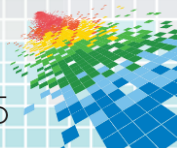
Examine All Behavior

Value

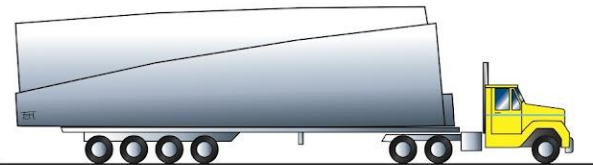
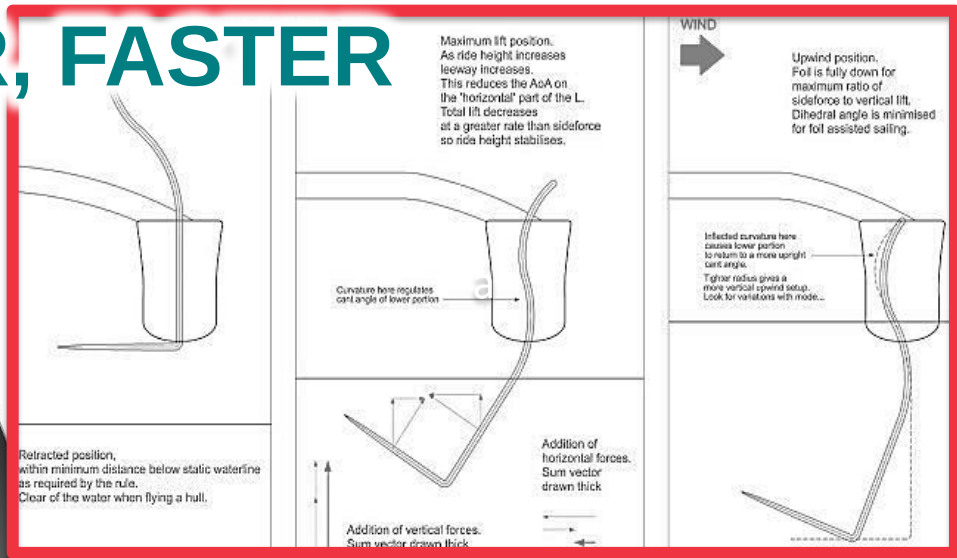
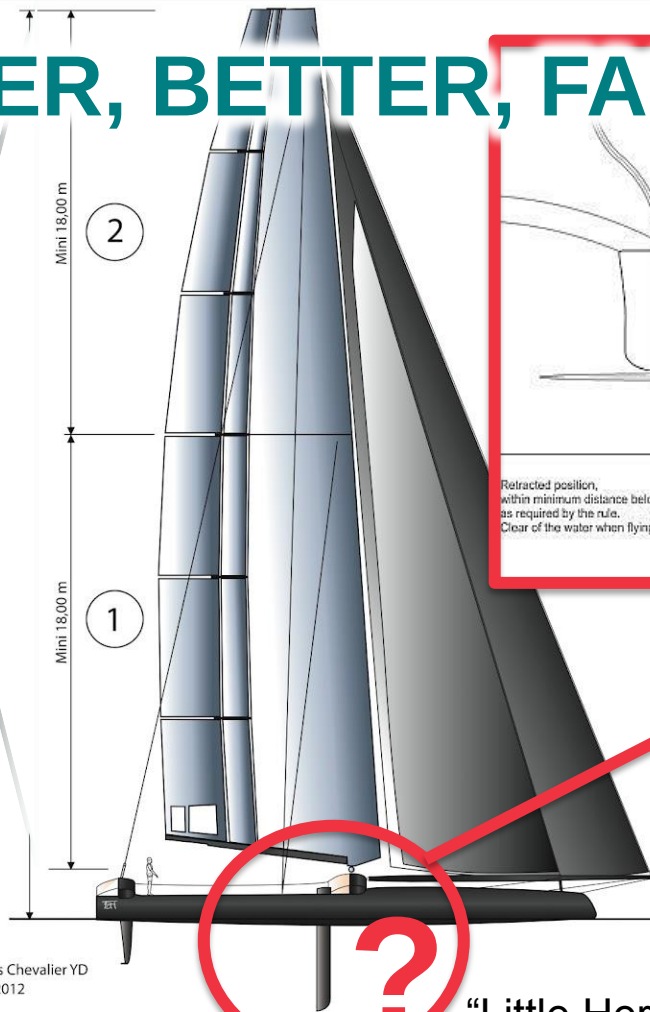
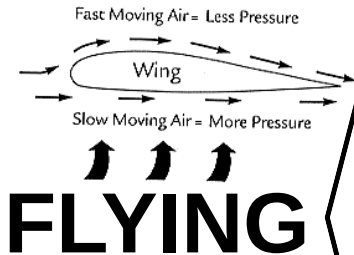
Isolated Events
(Correlated)

Engaged In & Out

Risk Innovation; New
Types of Business



SMARTER, BETTER, FASTER

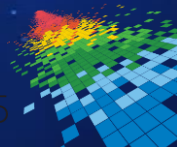


“Little Herbie” (Stability Augmentation Systems)

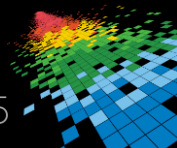
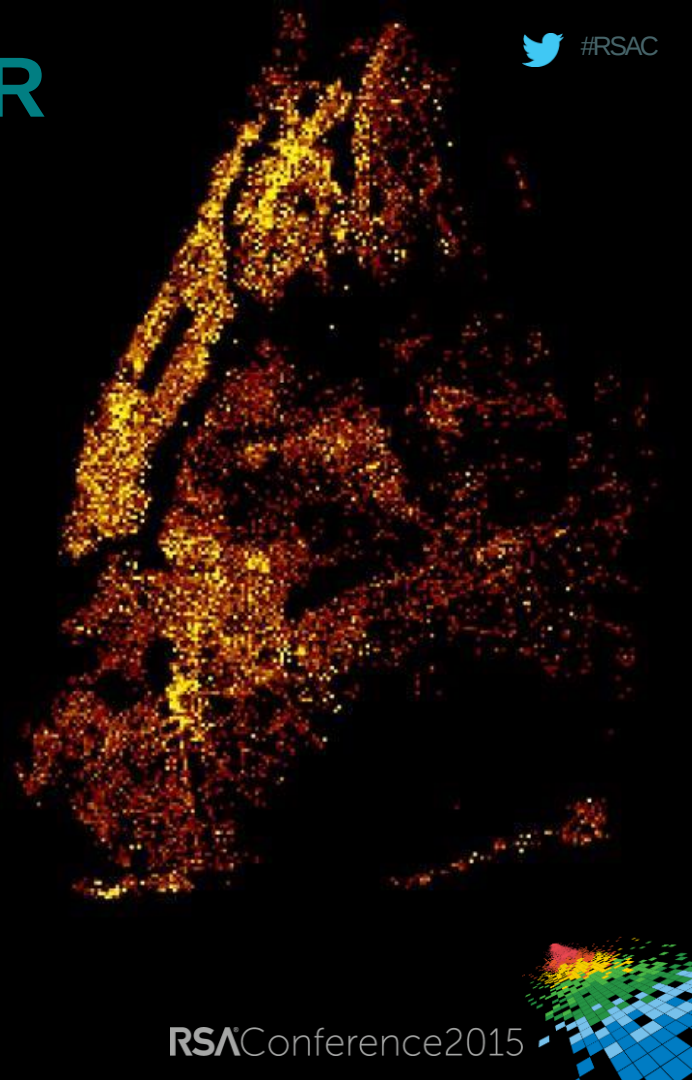
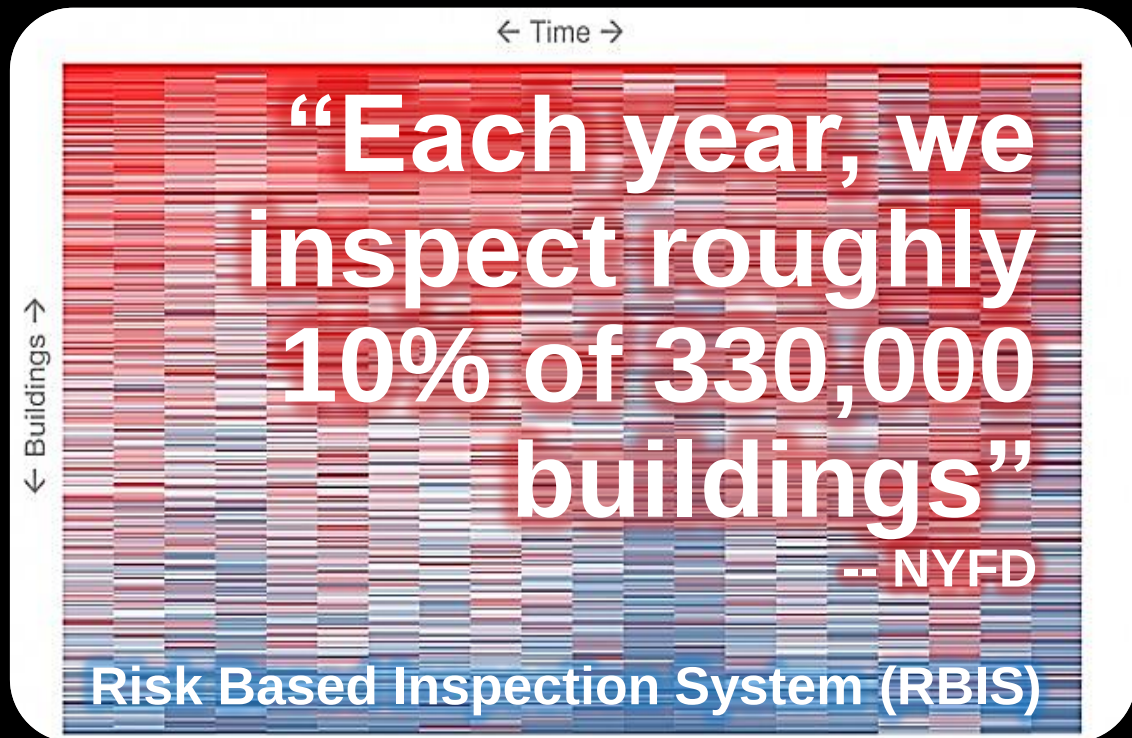
SMARTER, BETTER, FASTER

bubbles
20+ mph

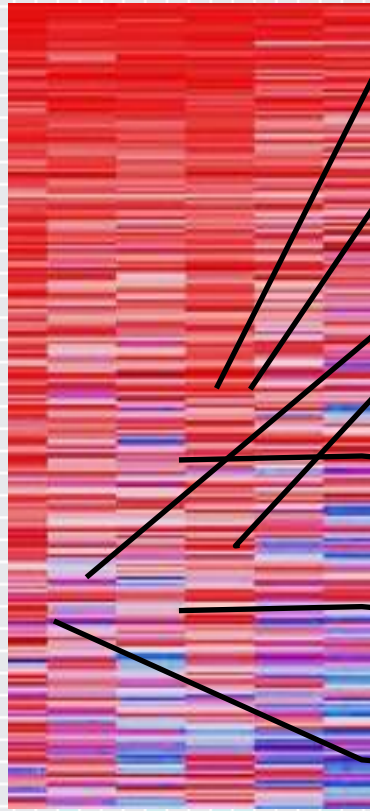
no bubbles
6 mph



SMARTER, BETTER, FASTER

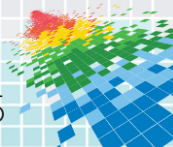
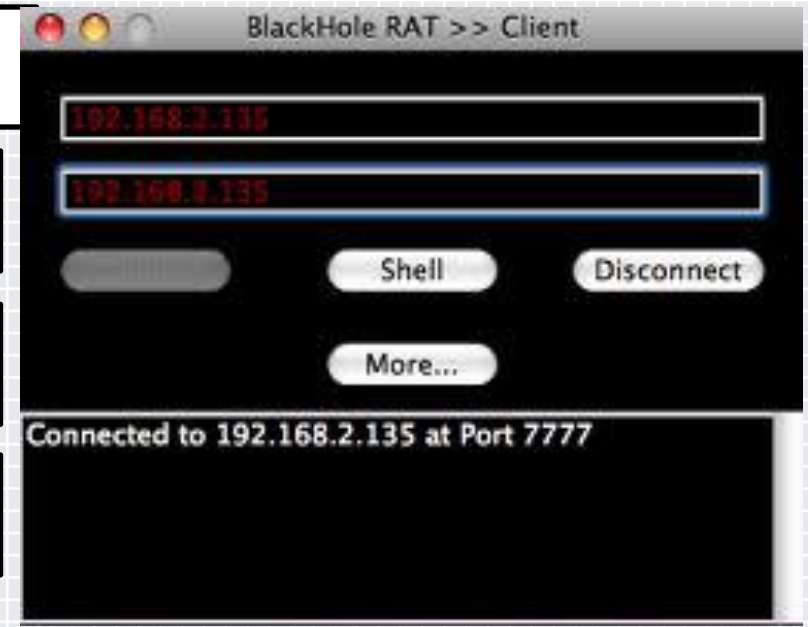


SMARTER, BETTER, FASTER



Average 2 Burritos/wk	145lbs
Campaign Donation	Running RAT (fingerprint)
2 Children	Flight to Vegas
Called Doctor x5	231 Yrs Old
Patched Chrome	Streaming Blade Runner
Unpatched Android	

“I don’t like that man...have to get to know him better.”

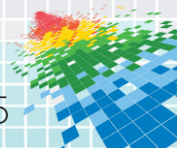


SMARTER, BETTER, FASTER

Context	IT Capability Required	Average
E-mail	Address	2
Social Media	Username	3
Telecom	Phone Number	2
Finance	Account Number	4
Health	Account Number	3
Government	Identity Number	3
E-Commerce	Username	5
Work	Username and Badge	2

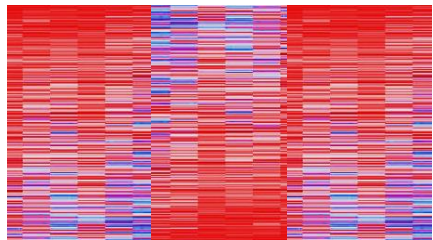
24

TYPICAL IDENTITY COUNT PER USER



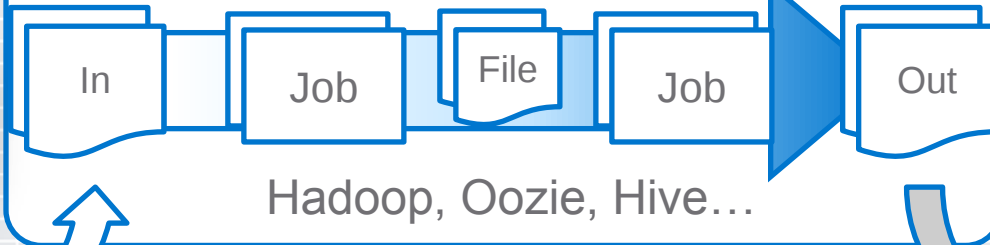
SMARTER, BETTER, FASTER

Harvesting
and Indexing



“Big Data Haiku”

Ingest, Store, Analyze



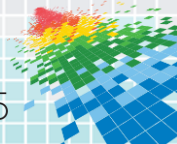
“Sqoop”

Surface

(Web Apps and
Services)



“Sqoop”



EXAMPLE: LONDON TRAFFIC ANALYSIS

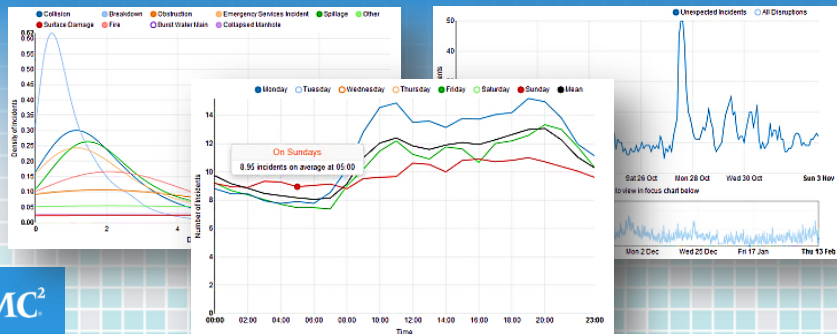
Bakerloo	Suspended
Central	Suspended
Circle	Suspended
District	Suspended
East London	Suspended
Hammersmith & City	Suspended
Jubilee	Severe delays
Metropolitan	Suspended
Northern	Good service
Piccadilly	Part suspended
Victoria	Suspended
Waterloo & City	Suspended

Traffic Disruption
Data Feed



Surface

d3.js & NVD3
Interactive SVG Figures

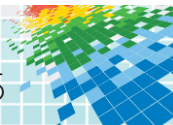
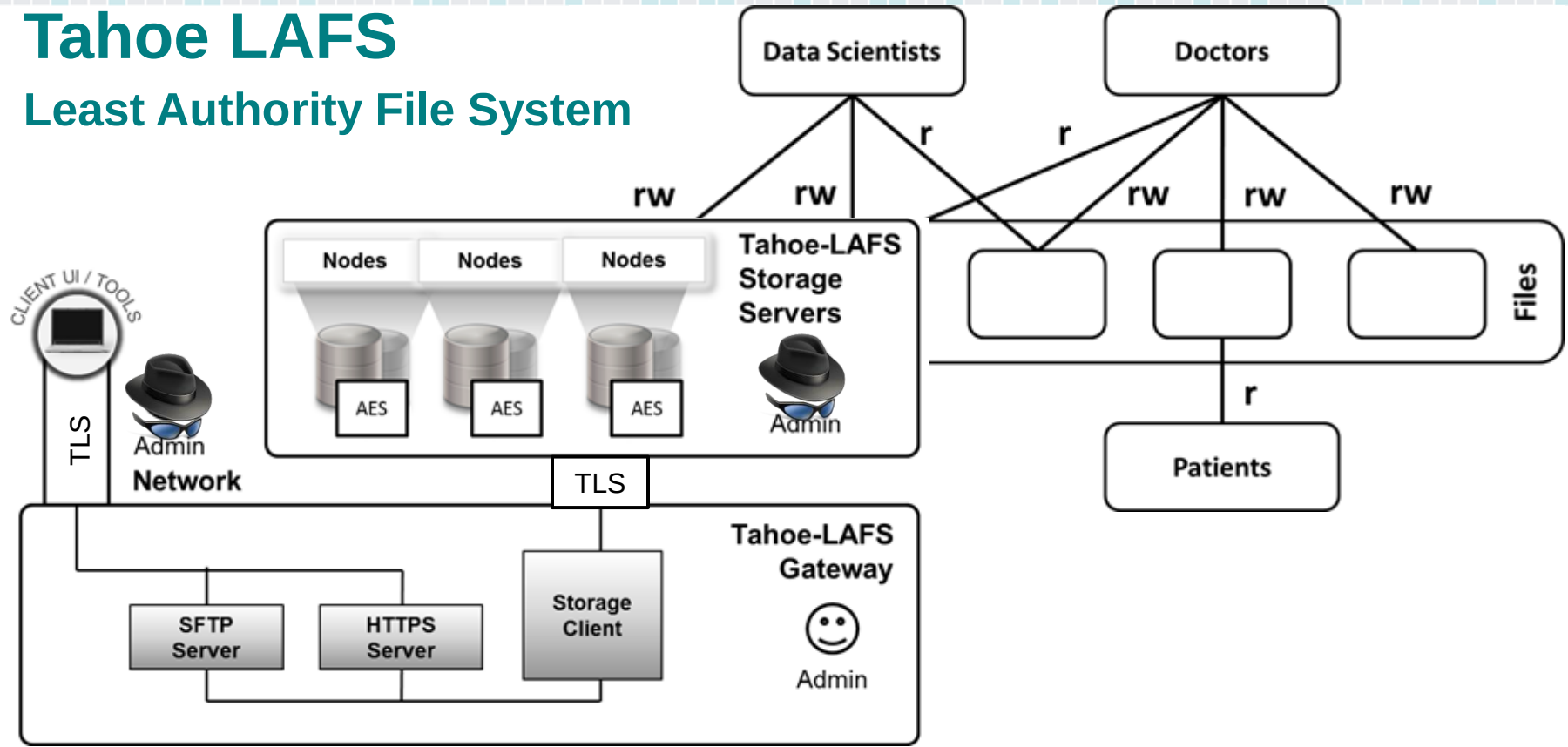


Analyze

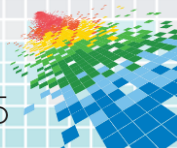
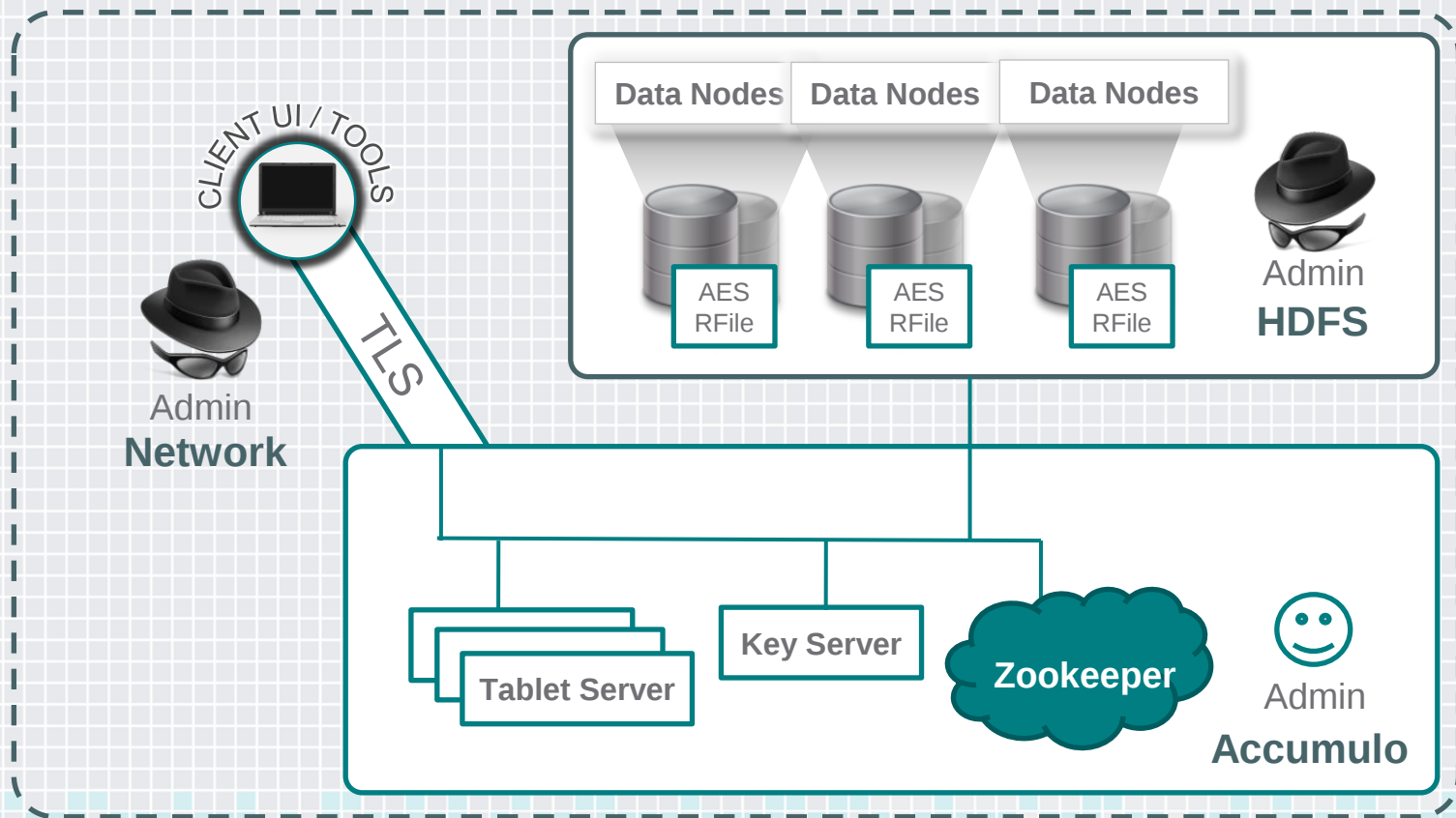


ADVANCED PERSISTENT Tahoe LAFS

Least Authority File System

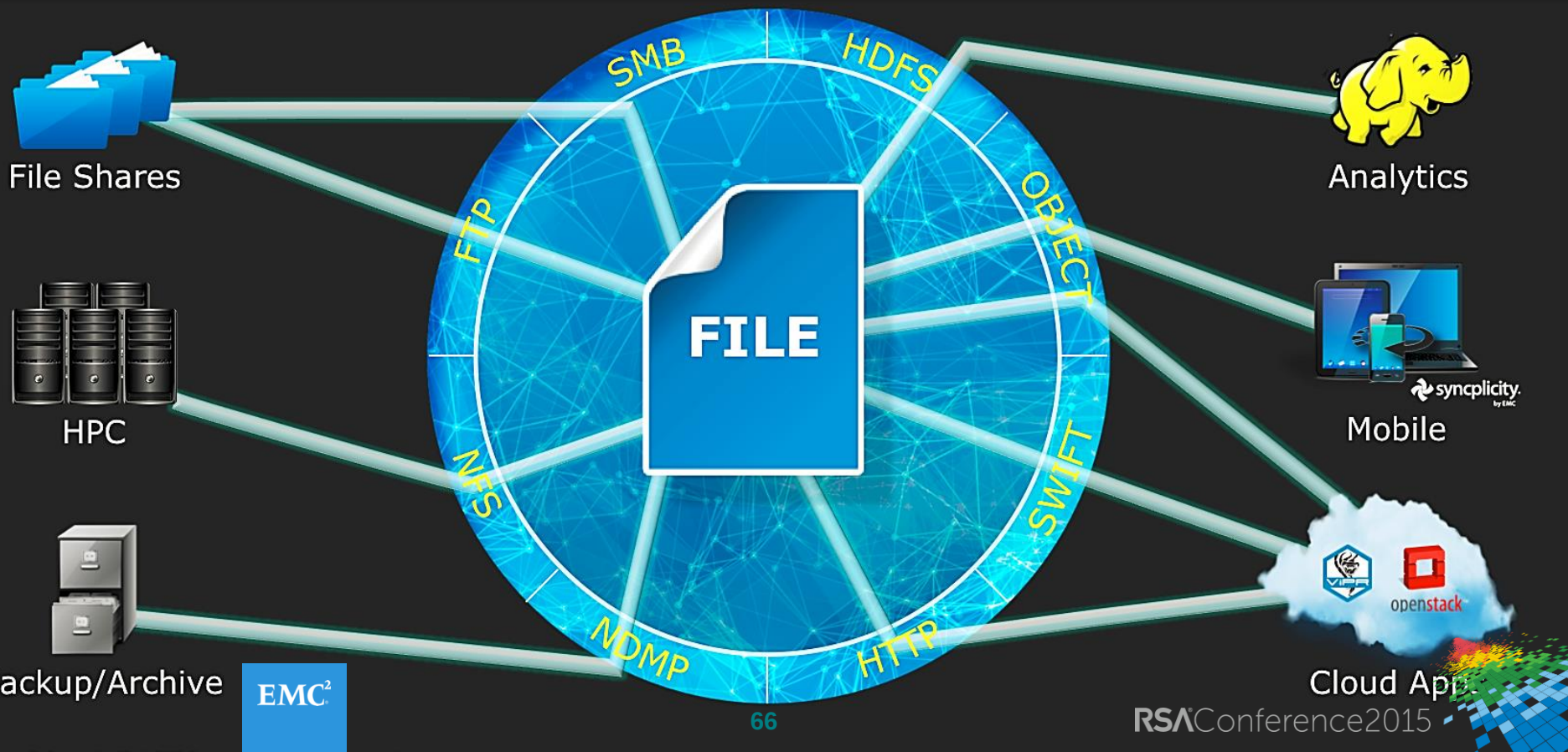


ADVANCED PERSISTENT ACCUMULO



TEXTUAL DISTRIBUTED DATA CONTROL

twitter #RSAC

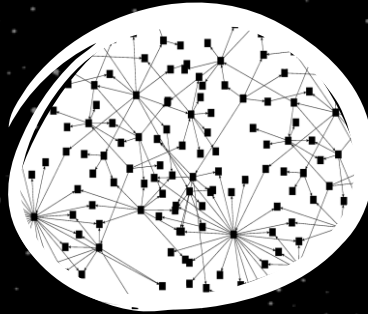




CONTEXT

Persuasion, Empathy,
Problem Solving,
Negotiation, Physical Skill

+



THREAT

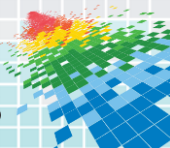
Familiarity, Change,
Persistence

+



CAPABILITY

Volume, Velocity,
Variety,
Vulnerability



RSACConference2015

San Francisco | April 20-24 | Moscone Center

SESSION ID: DSP-W01

MORE APT THAN YOU THINK: DATA PROTECTION AT MASSIVE SCALE

Davi Ottenheimer

Senior Director of Trust, EMC
@daviottenheimer

Wednesday, Apr 22nd 8:00 AM | West 3006

CHANGE

Challenge today's security thinking

