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TODAY

WHAT'S AHEAD

GAME PLAN



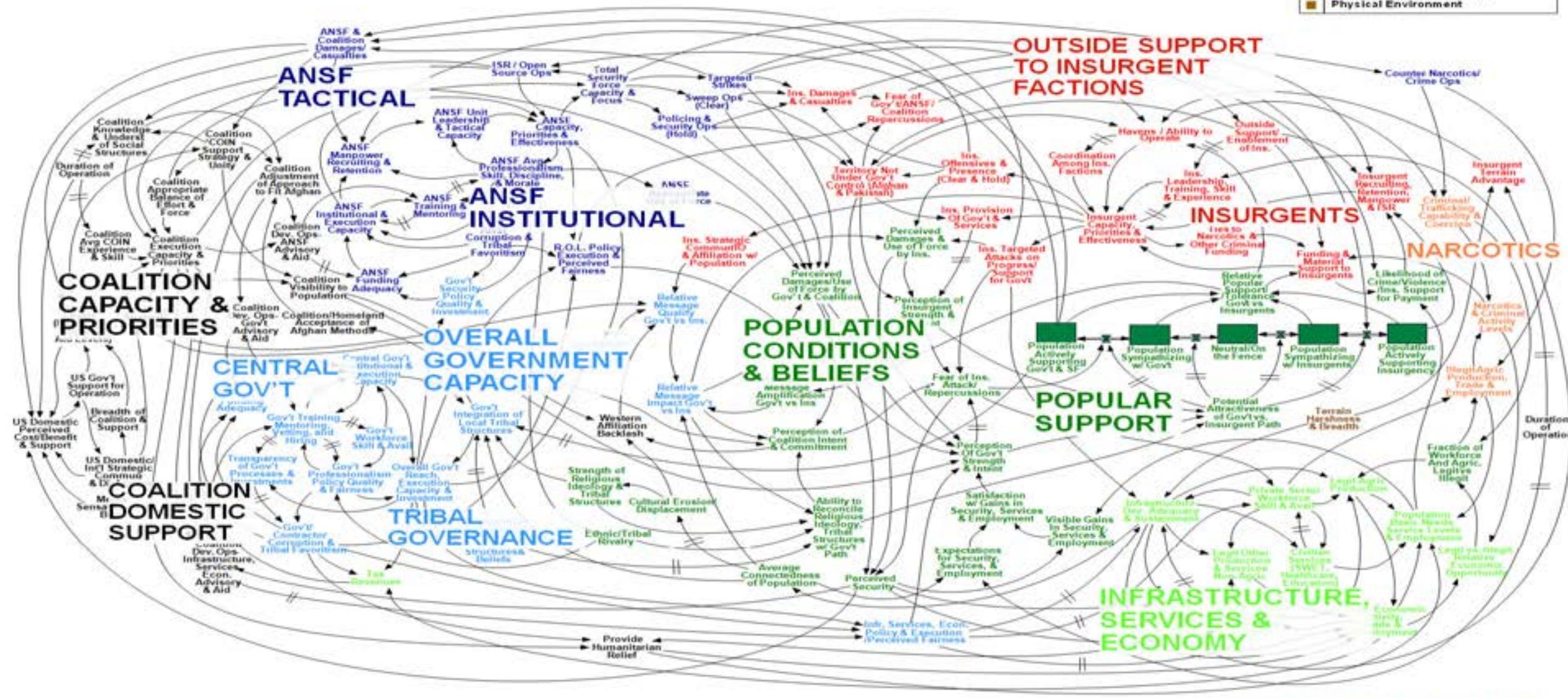
A photograph showing a group of people in a meeting or conference. Many of the people have their hands raised, indicating an active discussion or a vote. The focus is on the hands and forearms, with some people's faces visible in the background. The lighting is bright, and the overall atmosphere appears to be one of engagement and participation.

A show of hands . . .

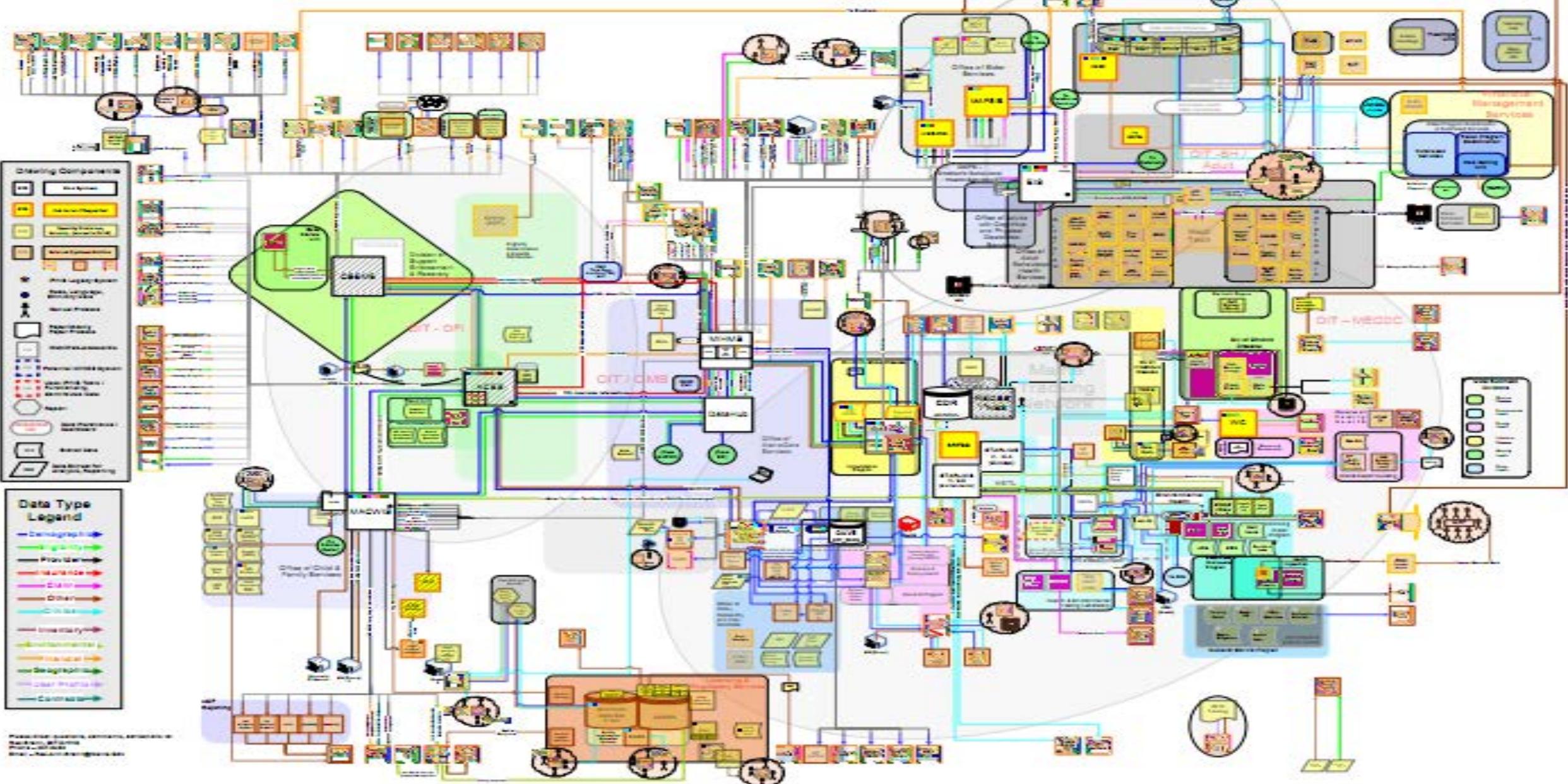
Afghanistan Stability / COIN Dynamics

= Significant Delay

- Population/Popular Support
- Infrastructure, Economy, & Services
- Government
- Afghanistan Security Forces
- Insurgents
- Crime and Narcotics
- Coalition Forces & Actions
- Physical Environment



WORKING DRAFT - V3



Corporate IT applications

Even medicine – once held in high regard . . .

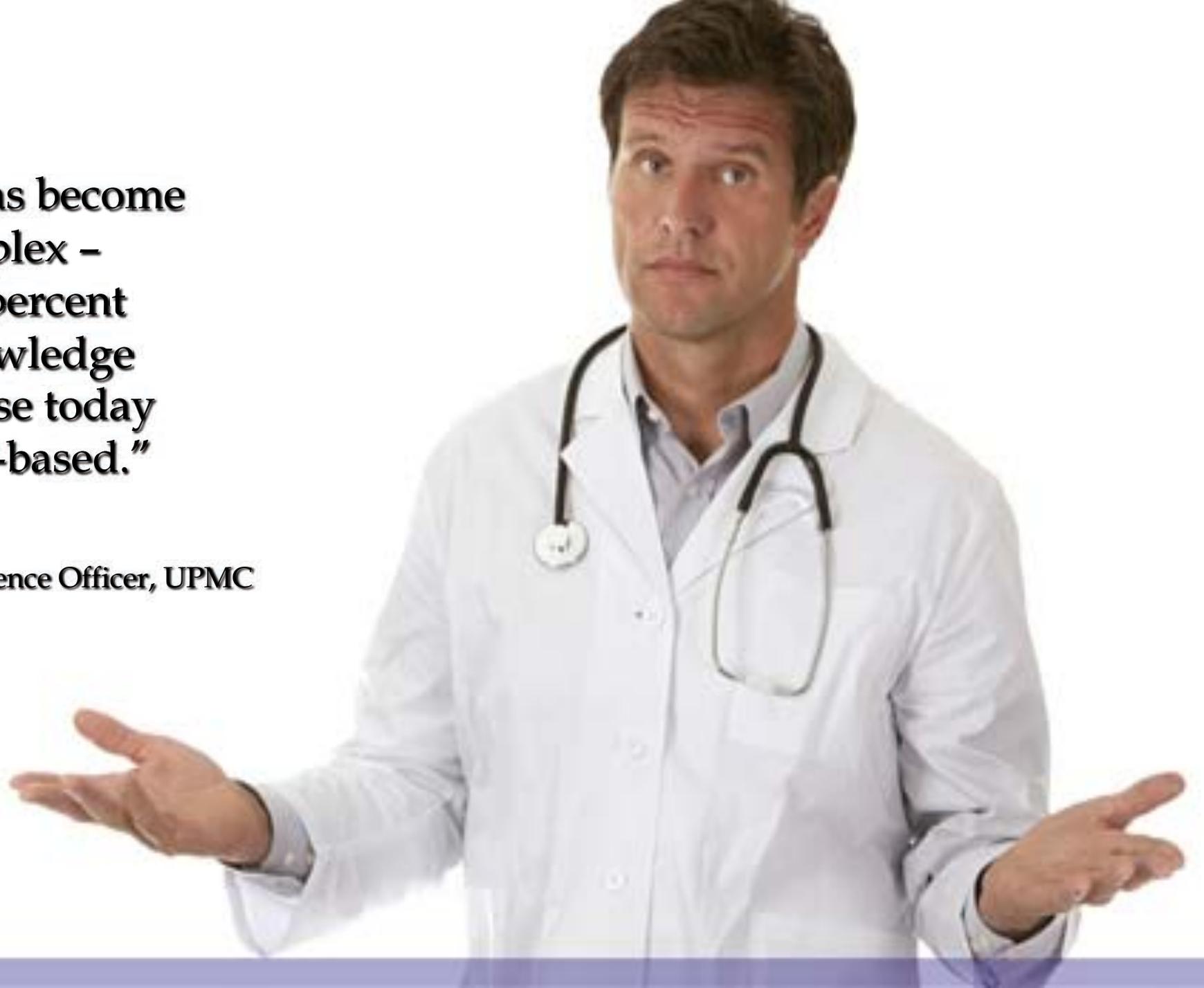
Medical information is doubling every 1-2 years,
much of it “unstructured.”

To keep up with breakthroughs
in their field of medicine, a doctor would have to
devote over 160 hours each week
to reviewing papers and articles.

FACT: 81% of physicians report spending 5 hours
or less per month reading journals.

**“Medicine has become
too complex –
about 20 percent
of the knowledge
clinicians use today
is evidence-based.”**

**Stephen Shapiro
Chief Medical and Science Officer, UPMC**

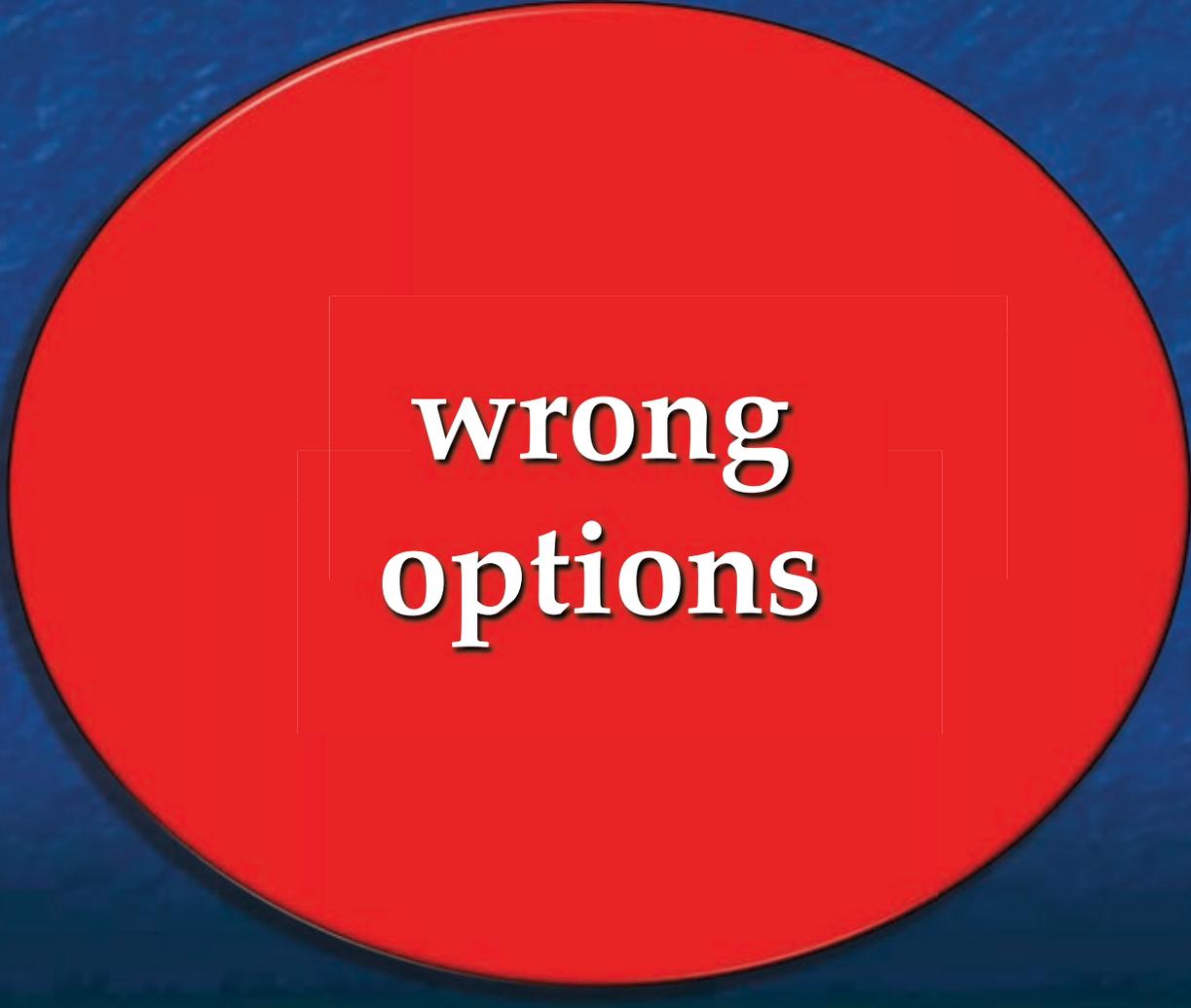


**“We are navigating
a thicket
of complexity.”**

*Carly Fiorina,
former CEO
Hewlett-Packard Co.*



In a complex environment the number of wrong options
overwhelm the number of right ones.



**wrong
options**



>



**right
options**

We enter a “High Failure-Rate Environment (HFRE)”





Complex, High Failure-Rate Environments
produce a variety of symptoms . . .



- Dilemma of over-choice. Too many options is the same as having none. Paralysis by analysis: when/where do we stop analyzing and act?
- Confusion between empirical facts and unproven beliefs & opinions. *HIPPO: Highest Paid Person's Opinion in the room wins.*
- Institutional Resistance: Pavlovian tendency to continue doing what was previously successful, even though it's no longer working as well, and won't work in the future. Doing nothing feels safer than changing.
- Talent Recruitment/Training Challenges: What talents do we need? Where do we find the talent? Can we develop it in-house?
- Failure-avoidant, fear-based culture: Risk-takers driven out or quit.
- Others . . .



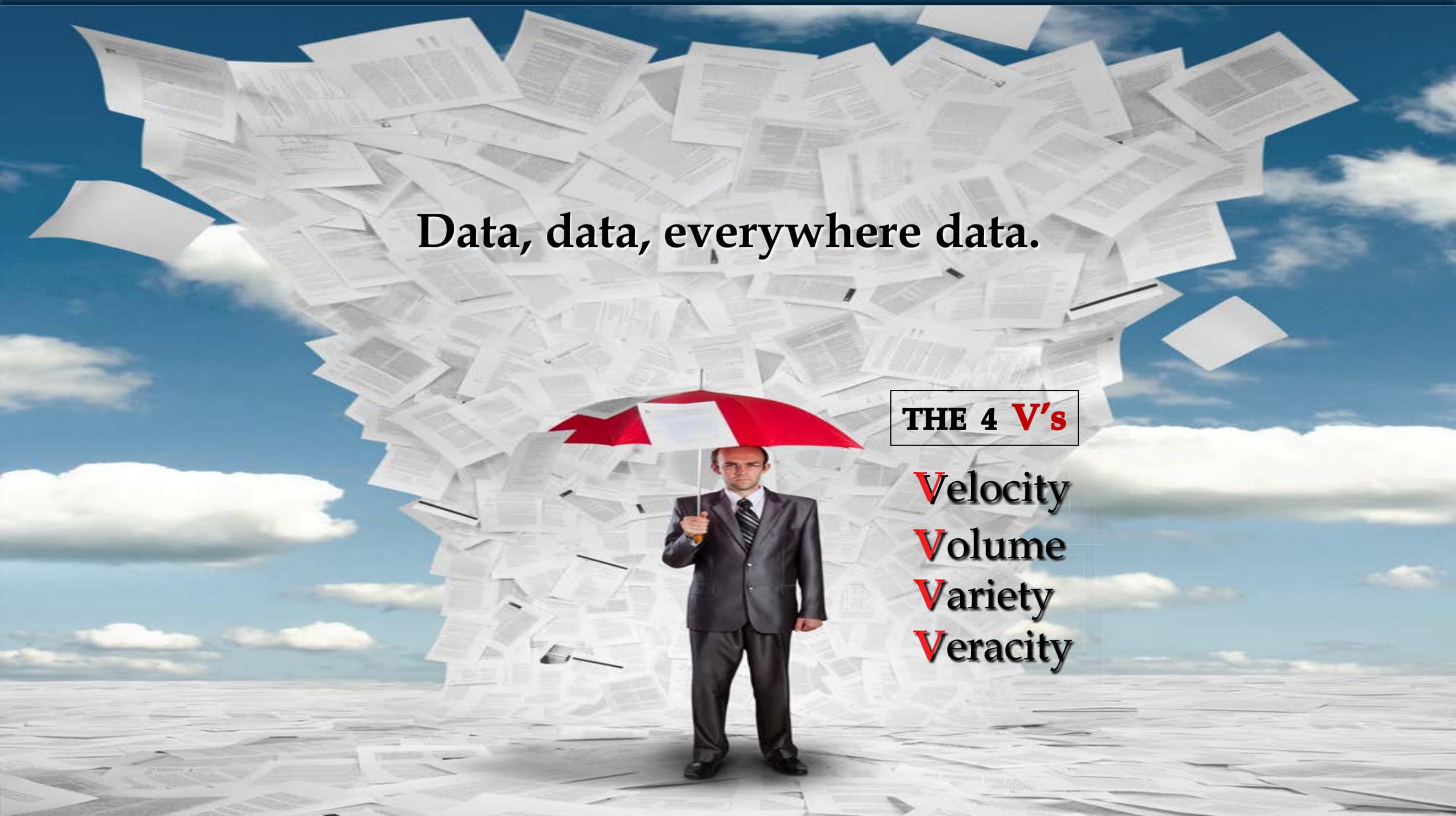
How did we
get here?

In the 70's and 80's
computing focused on
DATA PRODUCTION
& DISTRIBUTION

*“Every 2 days,
we create as much
information as we
did since the dawn
of civilization to 2003.”*

- Eric Schmidt, Google



A man in a dark suit and glasses stands in the center, holding a red and white striped umbrella. He is surrounded by a massive, chaotic storm of white papers that appear to be falling from the sky and covering the ground. The background is a bright blue sky with scattered white clouds. The overall scene conveys the overwhelming volume and variety of data in the modern world.

Data, data, everywhere data.

THE 4 V's

Velocity
Volume
Variety
Veracity

In the 90's we graduated
from data production and distribution to
MOBILITY, MONITORING and **ANALYTICS**





Accessing only the data we need, when and where we need it,
in a format that facilitates faster, more targeted solutions.

**A proliferation of devices ensued:
More mobility. More capabilities.
More speed. More cost-effective.
More background analytics.**



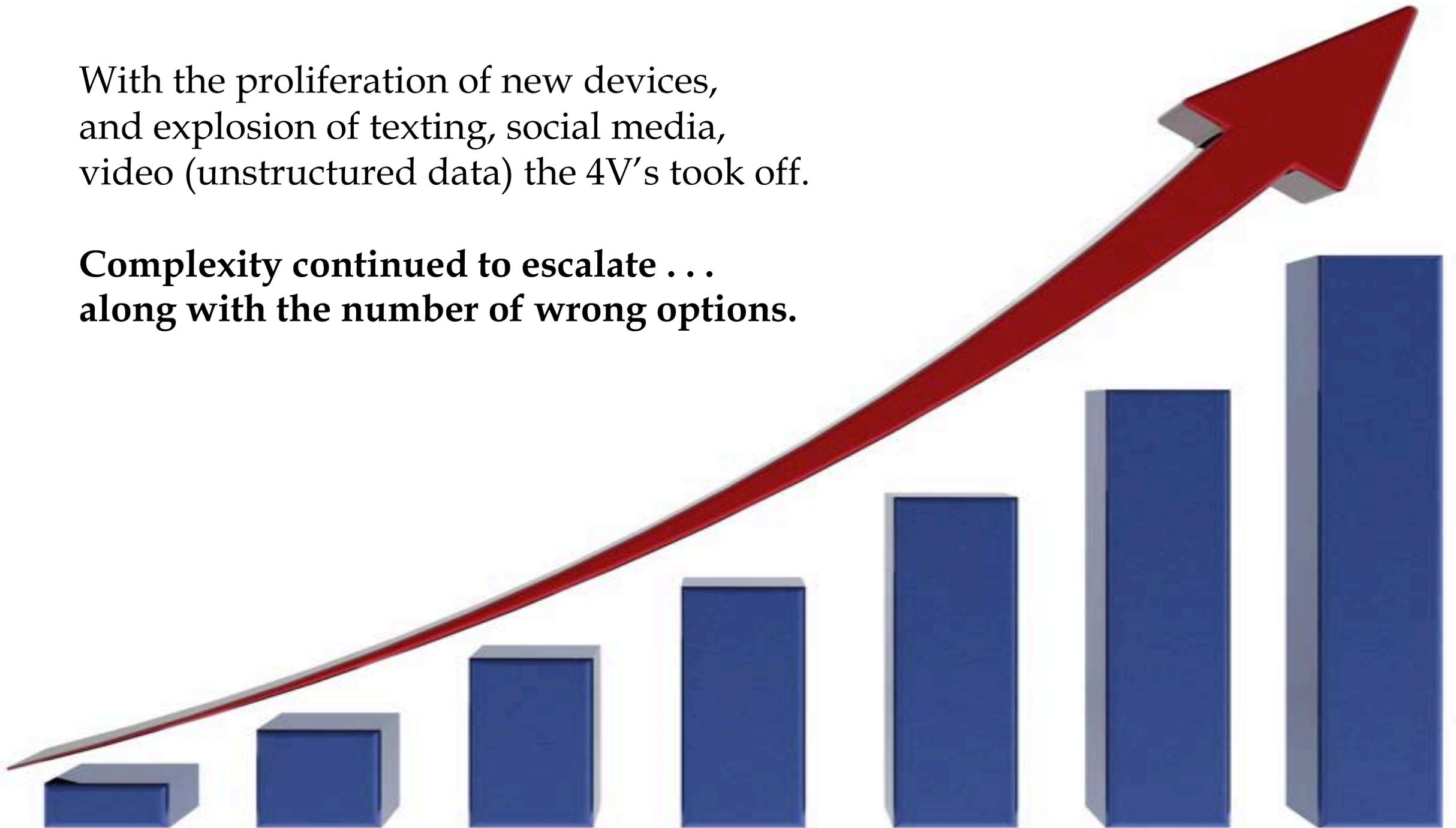
Data Visualization made monitoring easier, and facilitated rapid, data-based decision-making.

pralbygene_forpaper_abbr.xls

	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	
factory	1.15E-01	6.92E-02	6.92E-02	2.24E-01	4.02E-01	5.22E-01	6.07E-02	4.72E-01	1.92E-01	2.14E-02	1.20E-01	1.12E-01	8.22E-01	5.10E-01	7.02E-01	3.10E-02	7.80E-01	9.12E-01	9.30E-01	4.02E-02	5.92E-01	8.32E-02
IO	N/A	N/A	1.18E-01	2.42E-01	1.74E-01	1.74E-01	7.31E-01	1.74E-01	1.15E-02	3.32E-02	3.10E-01	1.06E-01	3.44E-01	3.56E-01	N/A	4.50E-01	4.12E-01	3.12E-01	N/A	N/A	N/A	N/A
def	N/A	N/A	4.72E-01	1.41E-01	2.96E-01	7.59E-01	4.22E-01	3.31E-01	2.94E-01	7.02E-01	8.22E-01	6.71E-01	8.91E-01	N/A	N/A	4.72E-01	6.52E-01	N/A	8.12E-01	N/A	N/A	N/A
gham	8.30E-01	6.48E-01	7.52E-01	6.48E-01	1.51E-01	1.81E-01	8.91E-01	5.42E-01	5.28E-01	4.86E-02	3.56E-01	8.42E-01	1.12E-01	1.61E-01	8.88E-01	3.22E-01	1.76E-01	2.32E-01	3.72E-01	7.31E-01	7.31E-01	
family	N/A	N/A	4.72E-01	1.41E-01	2.96E-01	7.59E-01	4.22E-01	3.31E-01	2.94E-01	7.02E-01	8.22E-01	6.71E-01	8.91E-01	N/A	4.72E-01	6.52E-01	N/A	8.12E-01	N/A	N/A	N/A	
new	5.42E-01	1.07E-01	1.41E-02	1.02E-02	8.88E-01	1.74E-01	4.11E-01	5.32E-01	4.08E-01	4.32E-01	8.88E-01	6.38E-01	2.64E-01	4.48E-01	1.28E-01	5.42E-02	5.82E-01	8.42E-01	4.98E-02	7.52E-01	8.32E-01	
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3.14E-01	6.28E-02	8.14E-01	2.02E-01	4.41E-01	3.02E-01	6.52E-01	6.52E-01	9.24E-02	4.32E-02	5.42E-01	4.31E-02	6.22E-01	4.02E-01	7.24E-01	2.82E-01	4.32E-01	1.07E-01	8.88E-01	5.61E-01	1.04E-01		
9.78E-01	7.67E-01	8.42E-01	3.72E-01	1.88E-01	3.89E-02	8.18E-01	6.77E-01	9.02E-01	8.84E-01	7.28E-01	3.76E-02	7.94E-01	8.91E-01	7.61E-01	7.61E-01	3.16E-02	1.47E-02	6.62E-01	7.17E-01	7.42E-01		
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N/A	N/A	5.12E-01	1.02E-01	1.64E-01	2.42E-01	2.32E-01	2.12E-01	1.62E-01	2.92E-01	2.21E-01	1.02E-01	2.46E-01	N/A	N/A	2.06E-01	4.32E-01	N/A	8.01E-01	N/A	N/A	N/A	
7.94E-01	2.66E-03	8.32E-01	1.24E-01	9.34E-01	1.29E-02	6.26E-01	5.21E-01	3.42E-01	3.86E-01	1.68E-01	7.98E-01	2.52E-01	4.22E-01	5.88E-01	5.07E-01	3.52E-01	5.36E-01	9.36E-01	7.84E-01	4.72E-01		
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5.42E-01	3.24E-01	1.94E-01	1.07E-01	6.72E-01	3.97E-01	4.72E-01	2.38E-01	3.81E-01	4.80E-01	2.22E-01	7.12E-01	5.62E-02	9.32E-01	5.44E-01	4.03E-01	7.37E-01	6.22E-01	7.59E-01	6.12E-01	6.88E-01		
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9.12E-01	6.52E-01	7.22E-01	1.54E-01	5.62E-01																		
9.12E-01	6.52E-01	7.22E-01	1.54E-01	5.62E-01																		
2.41E-01	8.32E-01	3.76E-01	6.88E-01	8.18E-01	8.18E-01	2.42E-01	4.19E-01	6.58E-01	4.03E-01	6.44E-01	2.82E-01	4.00E-01	3.14E-01	4.44E-01	7.02E-01	8.11E-01	6.48E-01	5.10E-01	9.12E-01			
2.41E-01	8.32E-01	3.76E-01	6.88E-01	8.18E-01	8.18E-01	2.42E-01	4.19E-01	6.58E-01	4.03E-01	6.44E-01	2.82E-01	4.00E-01	3.14E-01	4.44E-01	7.02E-01	8.11E-01	6.48E-01	5.10E-01	9.12E-01			
1.24E-01	1.98E-01	8.32E-01	3.17E-02	5.48E-01	1.02E-01	1.38E-01	4.52E-01	7.07E-01	7.28E-02	7.92E-01	1.86E-01	2.26E-01	3.32E-01	3.28E-01	3.16E-01	3.22E-01	4.48E-02	4.42E-01	1.41E-01	1.48E-01		
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6.42E-01	6.98E-01	3.41E-01	2.46E-01																			

With the proliferation of new devices,
and explosion of texting, social media,
video (unstructured data) the 4V's took off.

**Complexity continued to escalate . . .
along with the number of wrong options.**





Technology to the rescue!

2011: Big Data comes of age



An iceberg floating in a blue ocean. The tip of the iceberg is above the water line, while the much larger, submerged part is below. The sky is a lighter blue with some clouds, and the water is a deep, dark blue. The text 'BIG DATA' is overlaid on the submerged part of the iceberg.

< WHAT WE KNOW...

< THE REST...

BIG DATA

IBM Watson Memorial Sloan Kettering

Understands natural language questions



What condition has red eye, pain, inflammation, blurred vision, floating spots and sensitivity to light?

Analyzes large volumes of unstructured data



Physician notes, medical journals, clinical trials, pathology results, blogs, Wikipedia

Generates and evaluates hypothesis



Possible diagnosis

Confidence

Uveitis

91%

Iritis

48%

Keratitis

29%

Presents responses with confidence levels



Supports iterative dialogue to refine results



Family history, patient interview, physical exam, current medications, test results

Learn from results over time



What actions were taken? What treatments were prescribed? What was the outcome?

- Evaluates massive amounts of structured and unstructured data with lightening speed. (No human can).
- Computer-assisted decision-making reduces demand for experts/specialists. Addresses staffing shortages while reducing costs and improving outcomes.
- Instantly prioritizes next steps, making data actionable.
- Objective, comprehensive, fact-based analysis of unlimited number of primary AND related factors.
- Makes historical analysis and accurate forecast of future outcomes possible.



Big Data analytics
elevates
everyone's expertise
across the board,
taking pressure off of
the competition for
experienced talent
while making
data actionable.

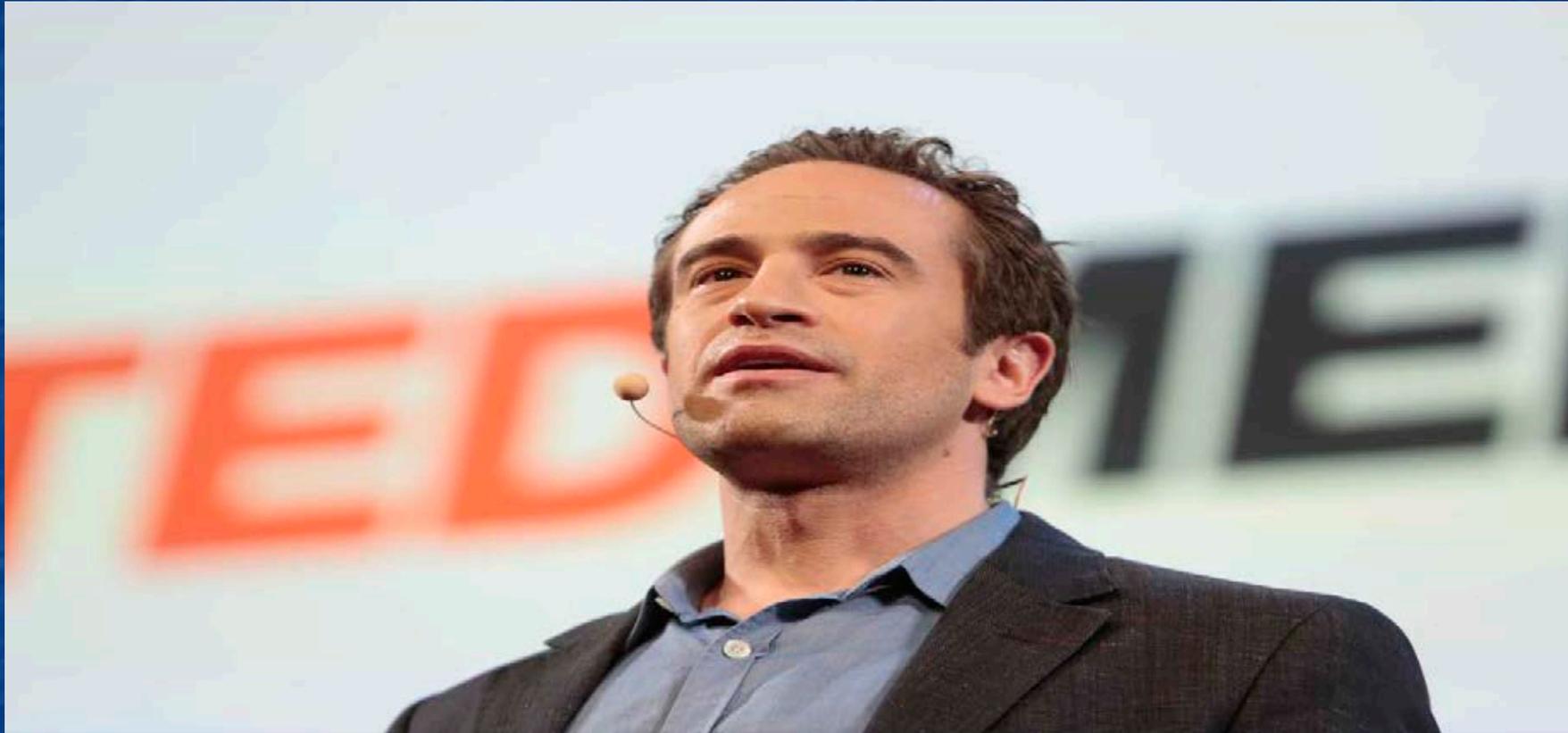
According to IDC,
worldwide revenues for Big Data analytics
grew to more than \$150 Billion in 2017
and is expected to exceed
\$210 Billion by 2020.



At the same time, Crowd-Sourcing came of age –
facilitating rapid, cost-effective data collection and analytics.

For example,
It turns out “rare diseases” aren’t really that rare . . .

More than 1 in 10 diagnosed with a rare disease.
Average 7.2 years to diagnose a rare disease.



CrowdMed leverages crowd-sourcing to
diagnose rare diseases 50 times faster!

Social media/mobile crowd sourcing exploded

APR
2019

DIGITAL AROUND THE WORLD IN APRIL 2019

TOTAL
POPULATION



7.697
BILLION

URBANISATION:

56%

UNIQUE
MOBILE USERS



5.110
BILLION

PENETRATION:

66%

INTERNET
USERS



4.437
BILLION

PENETRATION:

58%

ACTIVE SOCIAL
MEDIA USERS

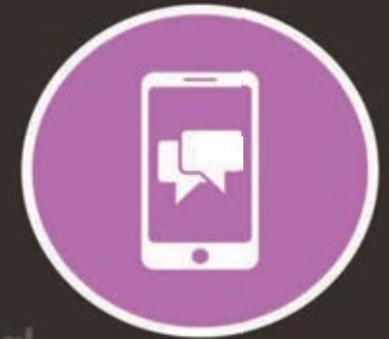


3.499
BILLION

PENETRATION:

45%

MOBILE SOCIAL
MEDIA USERS



3.429
BILLION

PENETRATION:

45%



we
are
social



we
are
social

WHAT'S AHEAD



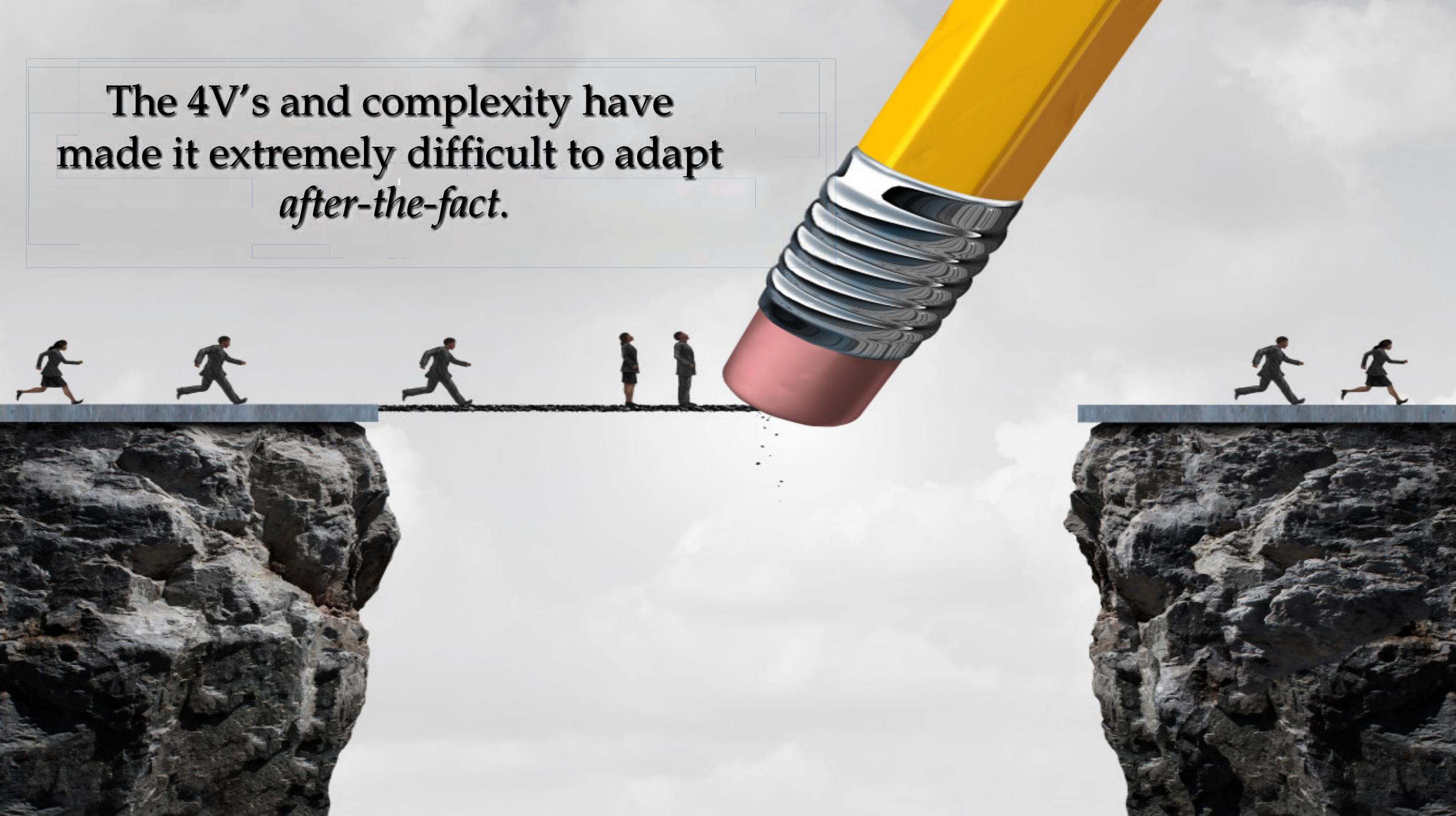
THE NEXT GREAT LEAP

from data production, distribution,
mobility, monitoring, analysis,
visualization and Big Data to

**Artificial Intelligence (AI),
and Predictive Analytics.**



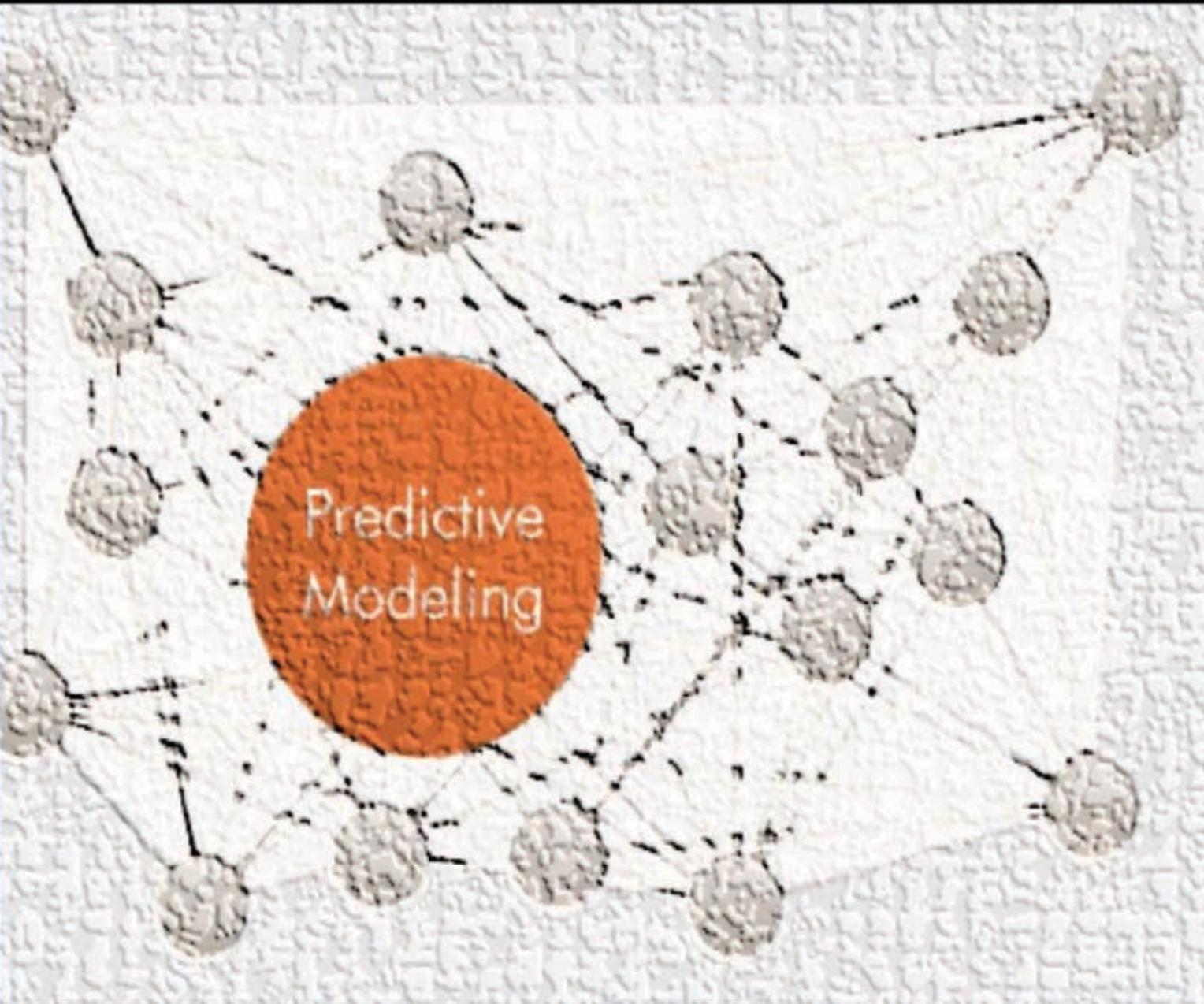
The 4V's and complexity have
made it extremely difficult to adapt
after-the-fact.



PREDICTIVE ANALYTICS



- ✓ Connects infinite number of dots (structured & unstructured data) in real time.
- ✓ Instantly unearths new patterns and anomalies for precise forecasting of outcomes.
- ✓ Accurately assesses risk for better decision-making
- ✓ Makes actionable recommendations to avert failure and leverage new opportunity.



Predictive analytics
doesn't just
connect the dots,
thanks to
"machine learning"
it continuously adds dots -
analyzing new variables,
finding new patterns,
quickly spotting and reacting
to irregularities.

Every new dot leads to
new insights and
greater precision.



Enabling forward-facing
leaders to get out *ahead of change.*

to **PREDAPT!**



PREDAPTATION = PREEMPTIVE

To quash, alter or lessen
undesirable events and outcomes,
and leverage future opportunities,
by taking action
before change occurs.

ADAPTATION = REACTIVE

To adjust to new conditions
while or after change occurs.

We know more about the future
than ever before . . .



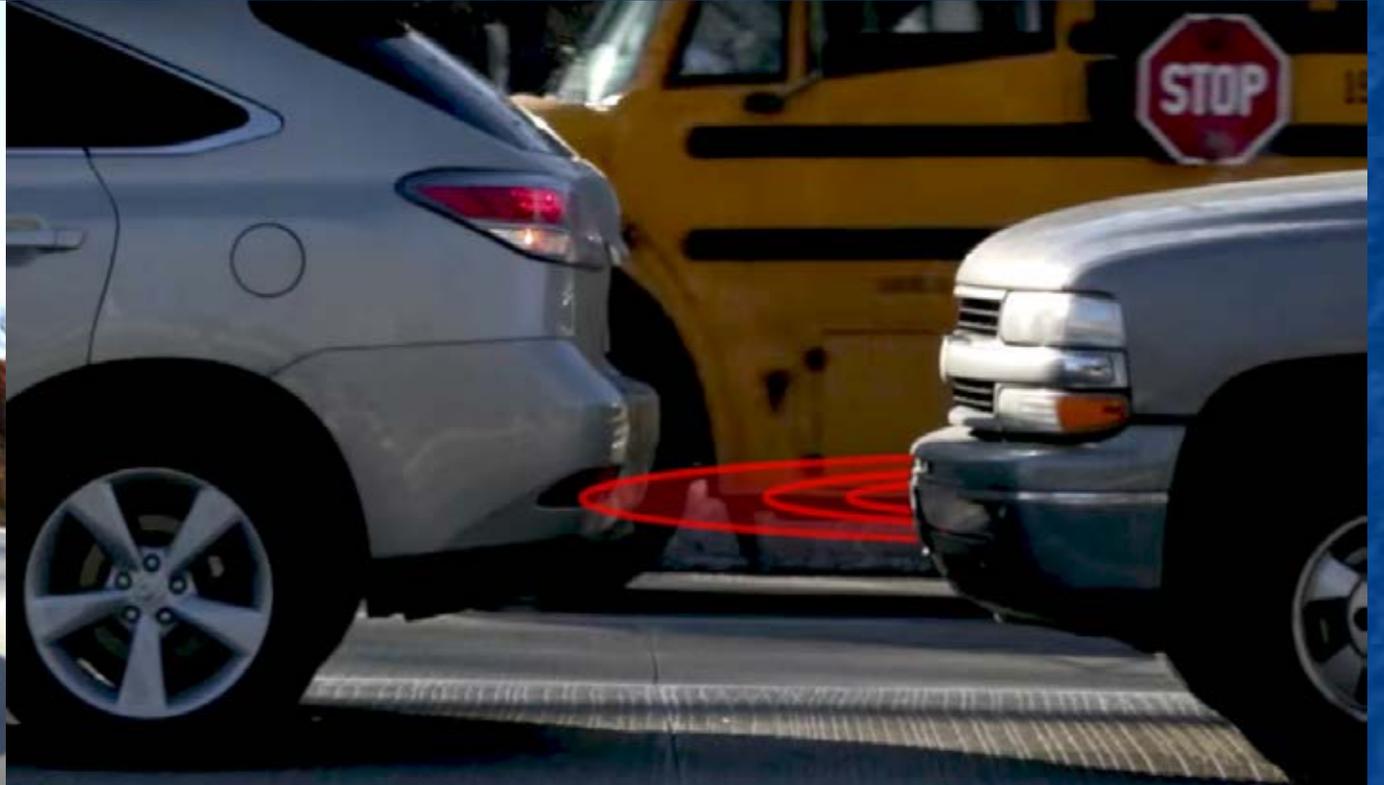
We know more about the future
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2DG
77
DR
80

Automobiles *anticipate* obstacles and automatically stop.



MKZ Lincoln monitors steering and braking warning drivers when they need to pull over and rest.

Data analytics can now predict a person is going to trip and fall within the next 3 weeks with 86 percent certainty.



A 3-5 centimeter per second change in a person's normal walking gait occurs up to 3 weeks prior to a fall.



Predaptation:
acting before-the-fact

- ✓ Send an alert of increased falling risk to mobile phone and other devices
- ✓ Alert caretakers, family, friends, co-workers
- ✓ Proactively repair gait through physical therapy or at-home exercises
- ✓ Use a walker, cane, etc. for support
- ✓ Avoid stairs, uneven terrain, travel, etc.

Predaptation:

When a dangerous change in locomotion is detected,
self-inflating airbags!



Sensors measure pressure applied to a cane or walker, for early detection of spine issues.



By avoiding falls, it is estimated seniors can avoid full-time care an additional 3 years!



Foreknowledge means forepower!



Take weather analytics for example . . .

GOES, next-gen
weather satellites:
3x more data,
4x greater resolution,
5x faster

