This Conference brought to you by

www.ttcus.com

Linkedin/Group:
Technology Training Corporation

@Techtrain

Technology Training Corporation

www.ttcus.com

Raytheon

Customer Success Is Our Mission

"Big Data Analytics Needed to Measure Intelligence Potential"

Symposium on Big Data For Defense and National Security
Washington, DC

Dr. Darrell Young
Raytheon Principal Fellow
September 24, 2014

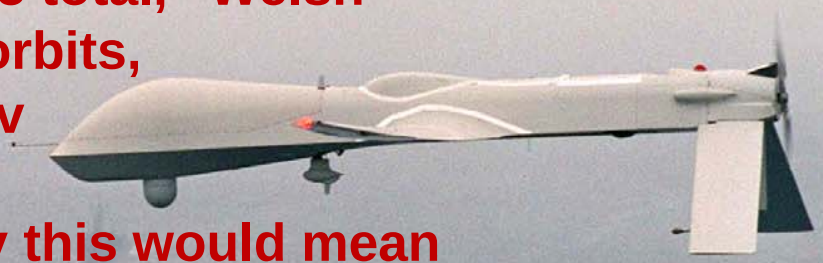
Data explosion is accelerating with no end in sight

Raytheon

- **It took 12 years for DoD to collect first 250,000 hours of video.**
- **The second 250,000 hours only took 18 months**
- **The third (2009) just 12 months (*source:* Scientific American 2011)**

".. we're on our way to 65 total," Welsh said. (referring to FMV orbits, *source:*www.defense.gov December 2013)

if collected continuously this would mean 250,000 hours in 6-months



65 FMV orbits is about 1-hour of video every minute.

By comparison: For every minute on the internet:

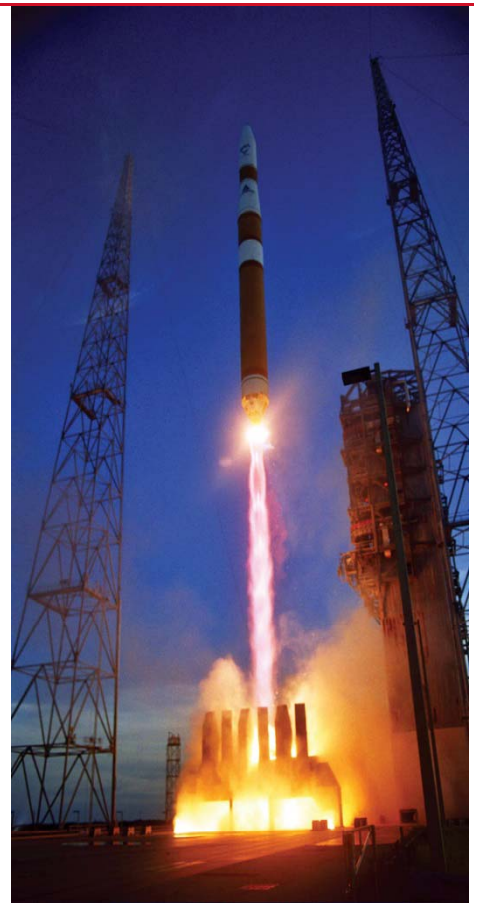
1. Youtube uploads 72 hours of video
2. Vine users share 8,333 videos

Sources: www.domo.com, bits.globs.nytimes.com,intel.com apple.com, April 2014 time.com, dailymail.co.uk,skype.com,statisticbrain.com

Raytheon

More big data internet facts for comparison

Data Growth just starting to take off.



Every minute of the day:

1. Twitter tweet 277,000 times
2. Yelp users post 26,380 reviews
3. Pinterest users pin 3,472 images
4. Email users send 204,000,000 messages
5. Pandora users listen to 61,141 hours of music
6. Instagram users post 216,000 new photos
7. Apple users download 48,000 apps
8. Skype users connect for 23,300 hours
9. Tinder users swipe 416,667 times
10. Google receives over 4,000,000 search queries
11. Facebook users share 2,460,000 pieces of content
12. Internet-of-Things expected to create much more data

Sources: www.domo.com, bits.globs.nytimes.com,intel.com apple.com time.com, dailymail.co.uk,skype.com,statisticbrain.com

Raytheon

The Big Data revolution is algorithms

"The big data revolution is that now we can *do something* with the data."

"The doubling of computing power every 18 months (Moore's Law) "is nothing compared to a big algorithm"—a set of rules that can be used to solve a problem a thousand times faster than conventional computational methods could."

Gary King, "Why big data is a big deal", Harvard Magazine, March-April 2014

Raytheon

Intelligence Potential

- Intelligence Potential is a class of “Big Algorithms” that makes Big Data manageable
- Intelligence Potential is the likelihood the data technical characteristics support the intelligence task
- Task completion depends on actual content

Intelligence Potential is needed to navigate through data lakes and pools

Raytheon

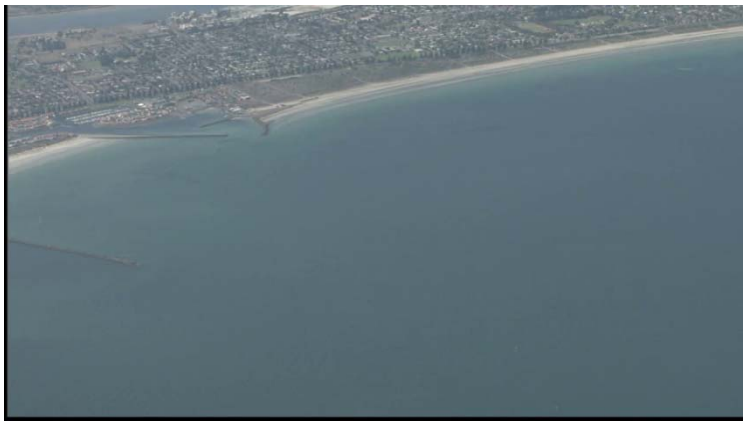
- **Example:** Tagging of Video with Video-National Intelligence Interpretability Rating Scale (V-NIIRS) enables analyst to search for video based on commonly understood intelligence tasks

- V-NIIRS defines the “Intelligence Potential” of the video to support intelligence activities like tracking vehicles or dismounts

- V-NIIRS is easily computed using the video metadata and video properties

Raytheon

VNIIRS Example



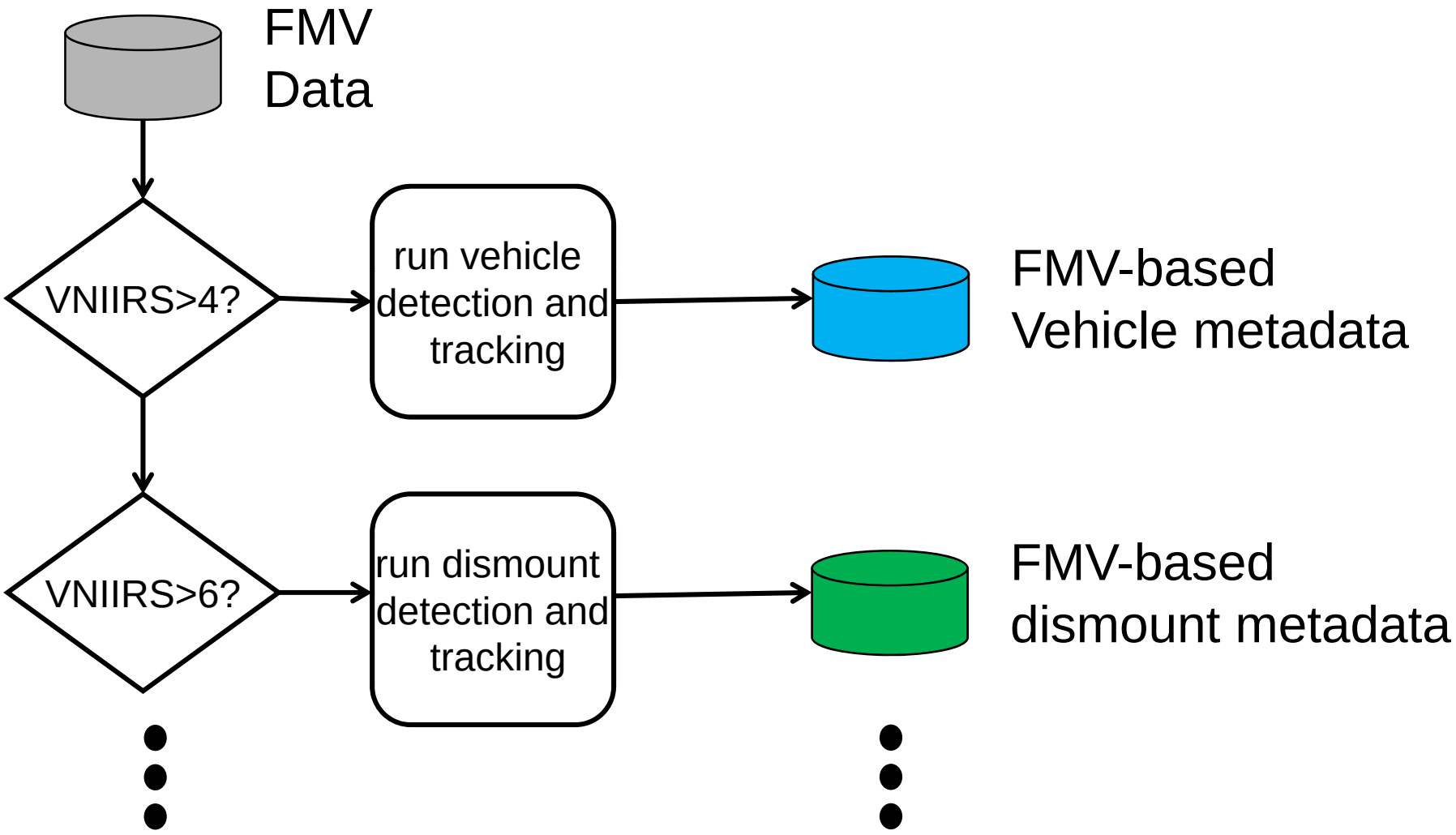
Low VNIIRS

High VNIIRS

- **V-NIIRS indicates if the video supports the desired intelligence task**

Raytheon

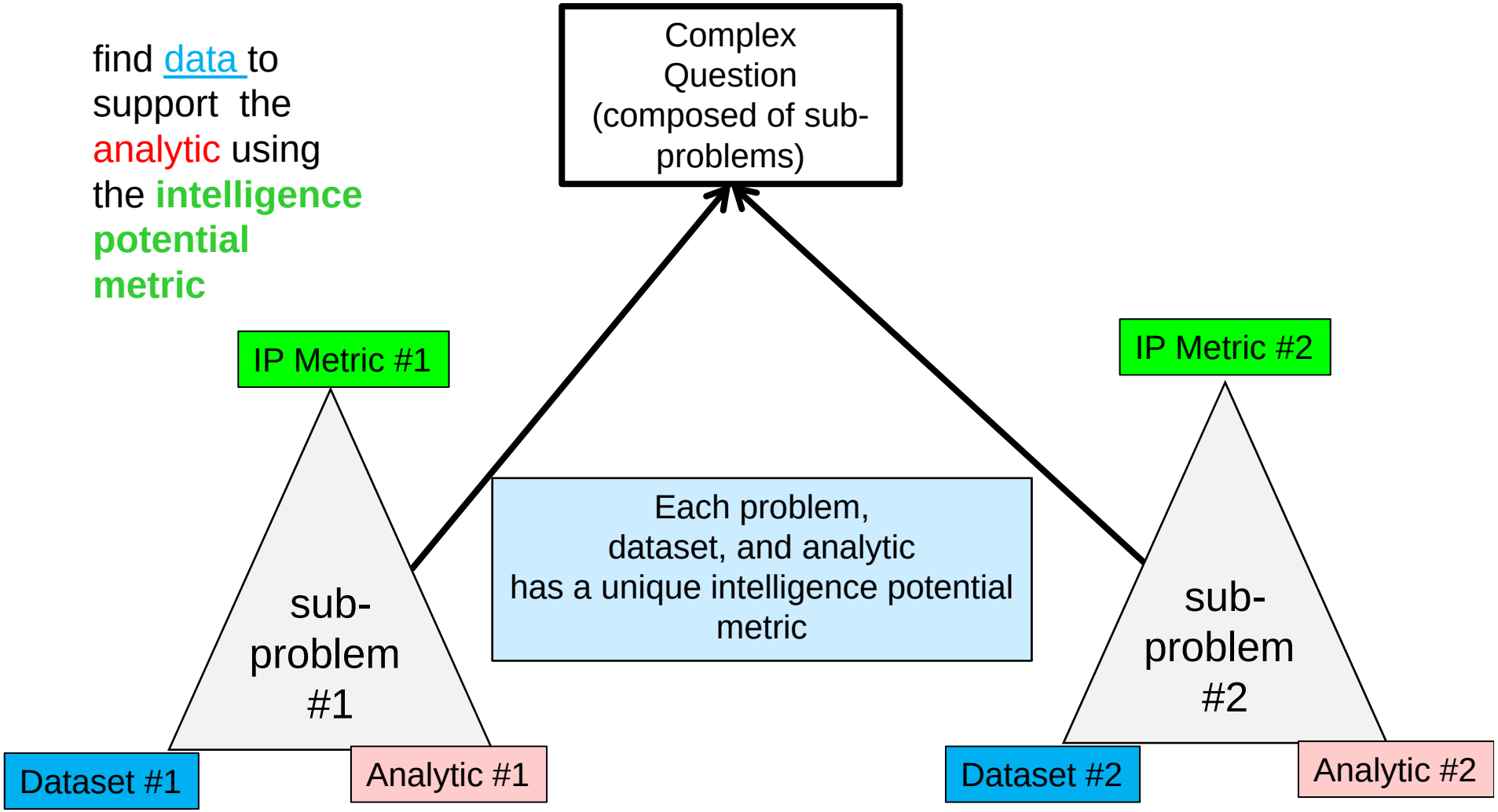
V-NIIRS indicates when to run other analytics



Raytheon

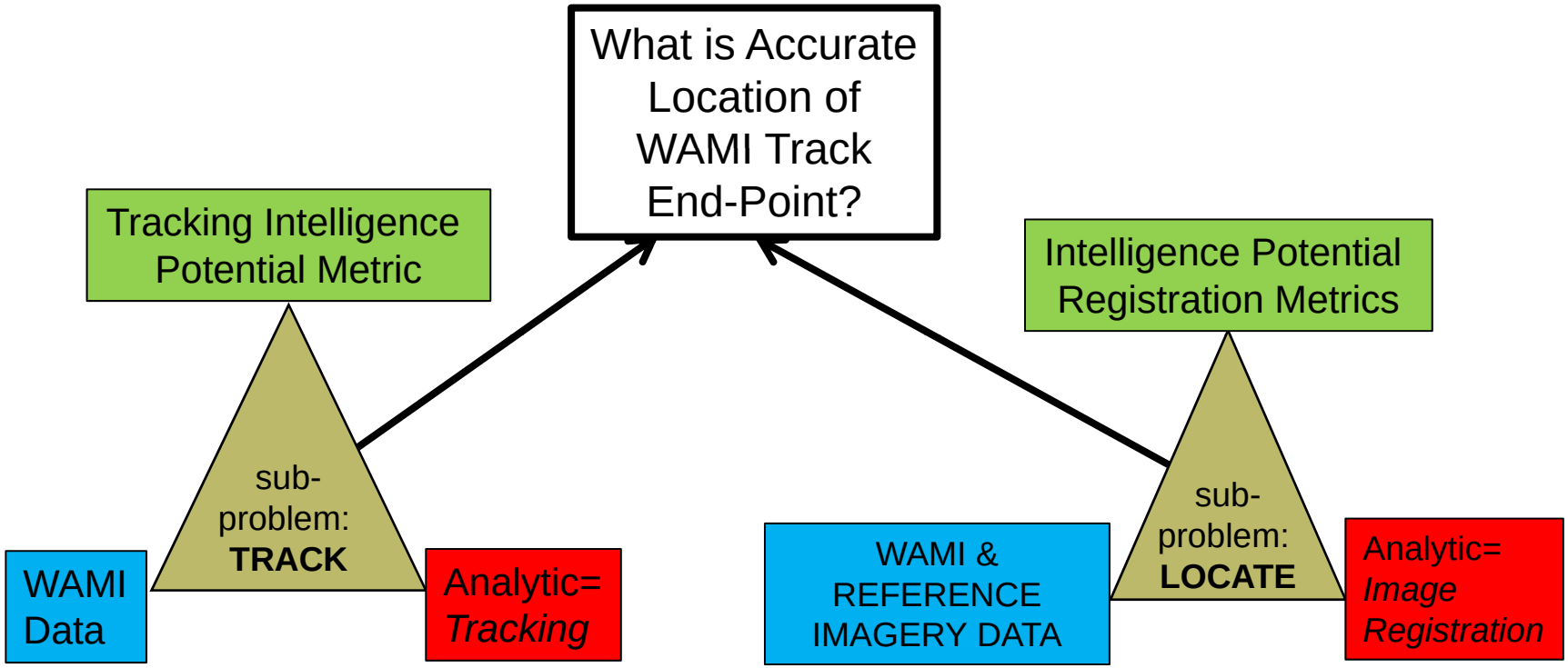
Intelligence Potential to Solve Complex Question

find data to support the analytic using the **intelligence potential metric**



Raytheon

Example: Wide Area Motion Imagery

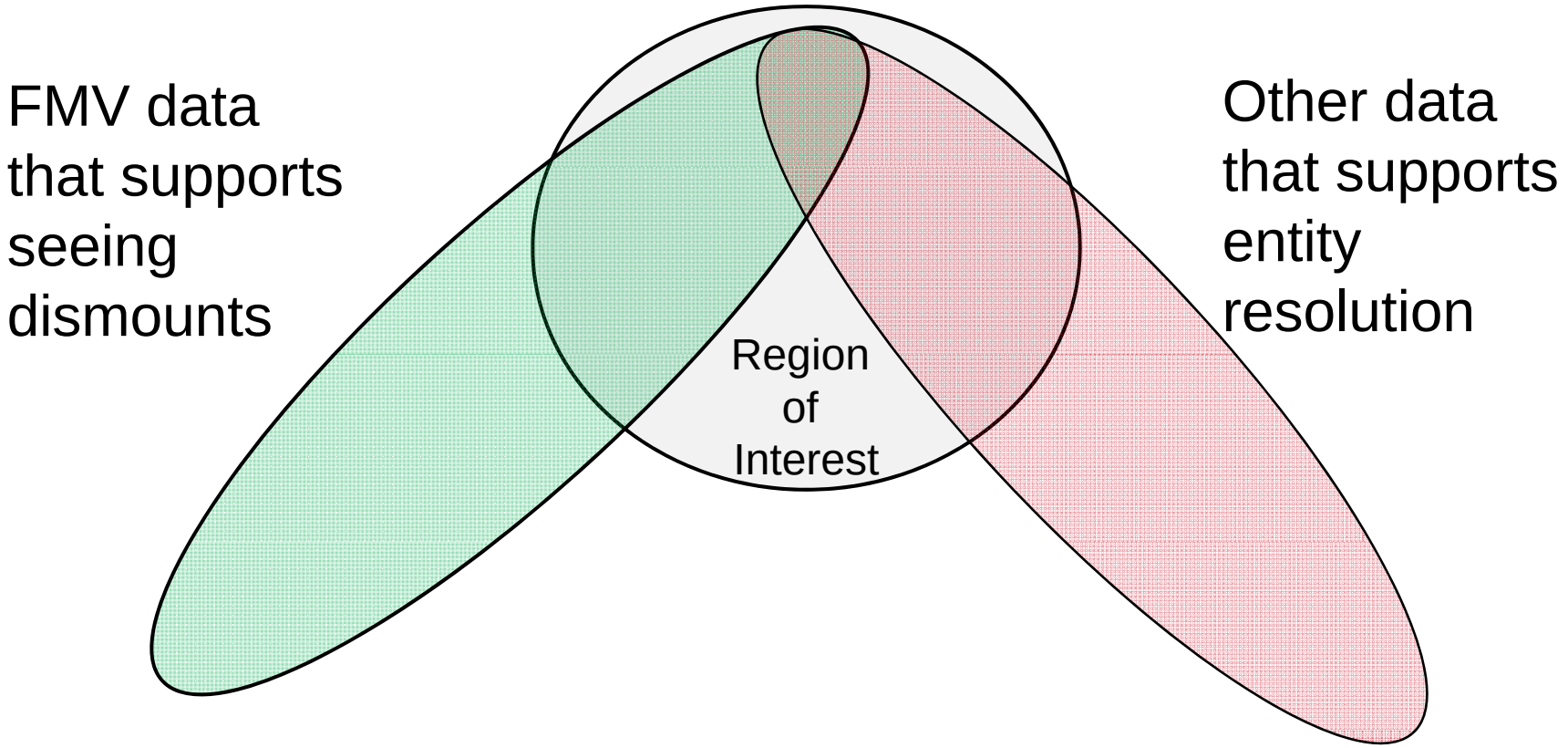


find WAMI data to support the *Tracking* analytic using the **Intelligence Potential Tracking Metric**

find WAMI / Reference data to support the *Image Registration* analytic using the **Image Registration Metric**

Intelligence Potential is needed to help guide analysts in forming and testing hypothesis.

Raytheon



Intelligence Potential of different types of data can lead to hypothesis of where further investigation might be fruitful

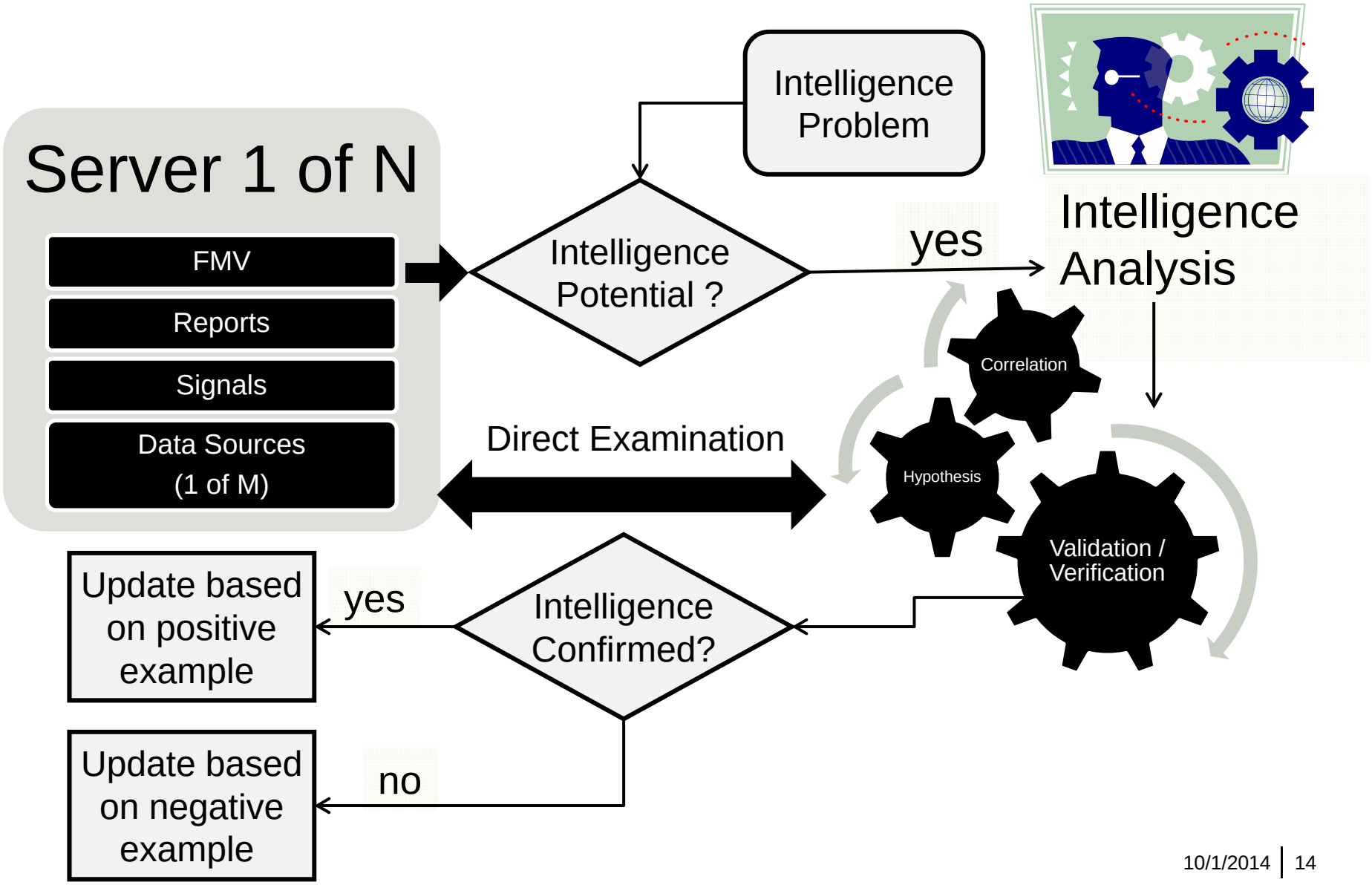
Raytheon

Confidence of Intelligence Potential

- If the intelligence task completes, then the Intelligence Potential becomes an Intelligence Actual
- Confirmation increases Intelligence Potential confidence
- Intelligence outcomes can be used to train the system to make better estimates of future Intelligence Potentials
- A system designed this way is anti-fragile and makes best use of humans and machines

Raytheon

Intelligence Potential Feedback



Raytheon

Conclusions

- Big Data revolution just starting
- Revolution enabled by algorithms
- New statistical algorithms do not replace human analysts but guide them (*and vice versa*)

Raytheon

Conclusions (continued)

- Intelligence Potential is the likelihood the technical characteristics of the data support a specific intelligence task

- Intelligence Potential can be strengthened over time using human analysis as feedback to create an anti-fragile system

Thanks!!!