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**Big Data
Quality or Quantity**

by Jorgen Pedersen and Tip Franklin

To set the scene

Big data is like teenage sex:

Everyone talks about it,
Nobody really knows how to do it,
Everyone thinks everyone else is doing it,
So everyone claims they are doing it.

Points of Discussion

1. Quick look at traditional ITS technologies
2. Overview of some current progressive ITS technologies
3. Where will data take us
4. How can we use this data
5. Data Visualization
6. Answering the Question – Quality or Quantity?
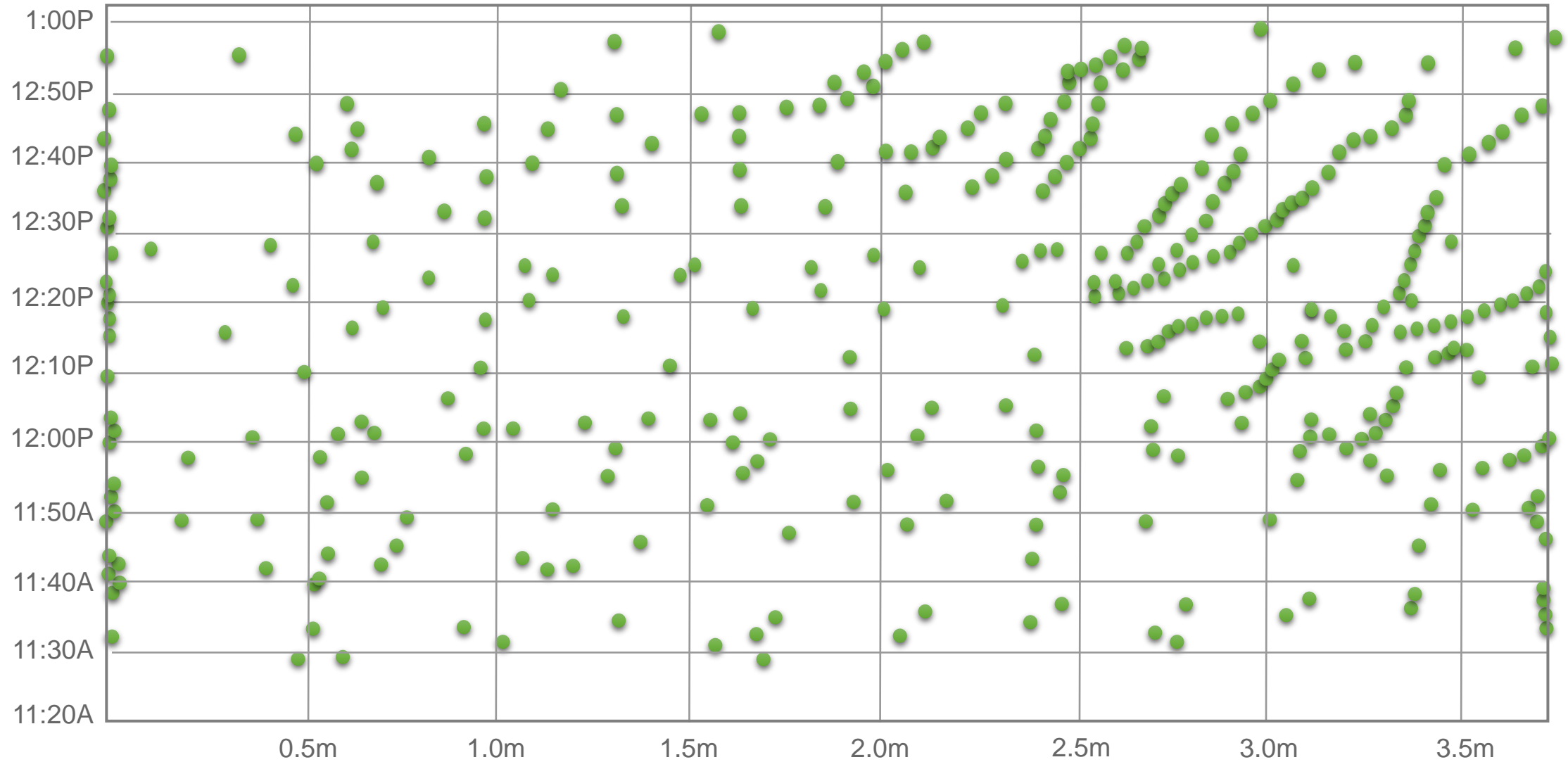7. The Processes Surrounding Successful Integration
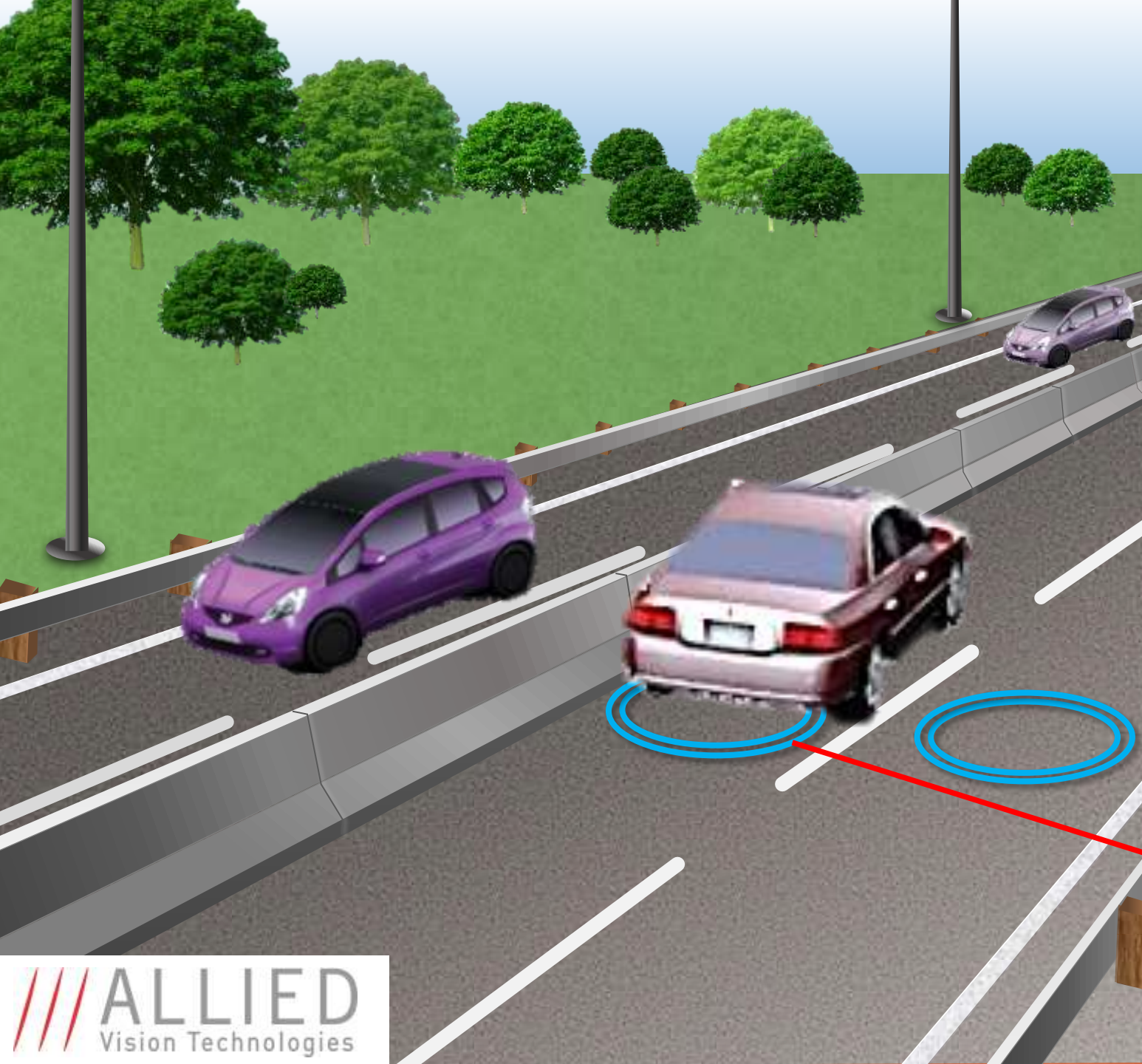
- Binary Data Delivery
- Occupancy
- Volume
- Can deduce flow
- But does count every vehicle

- Not robust
- Maintenance nightmare
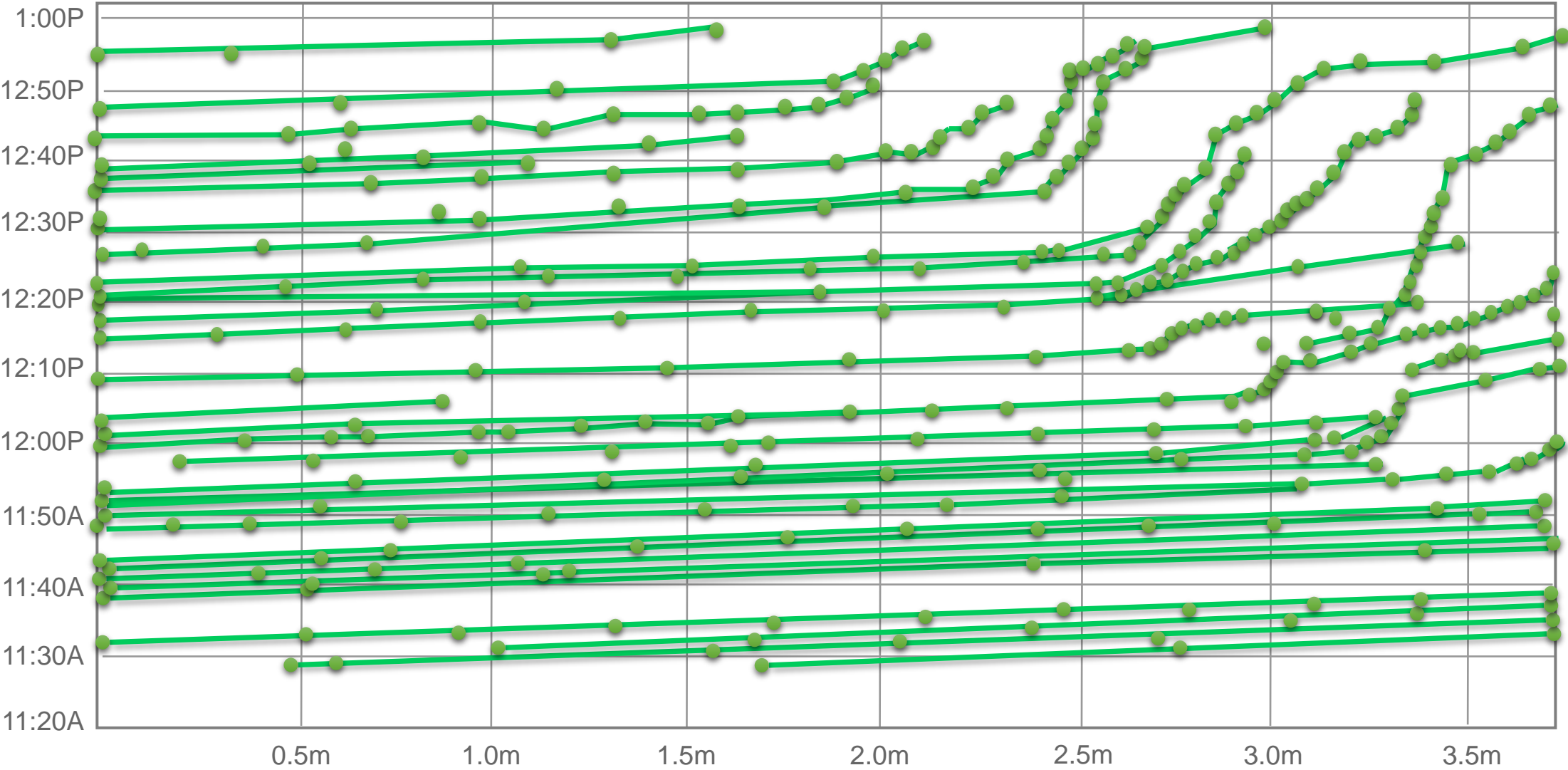- 60% functional
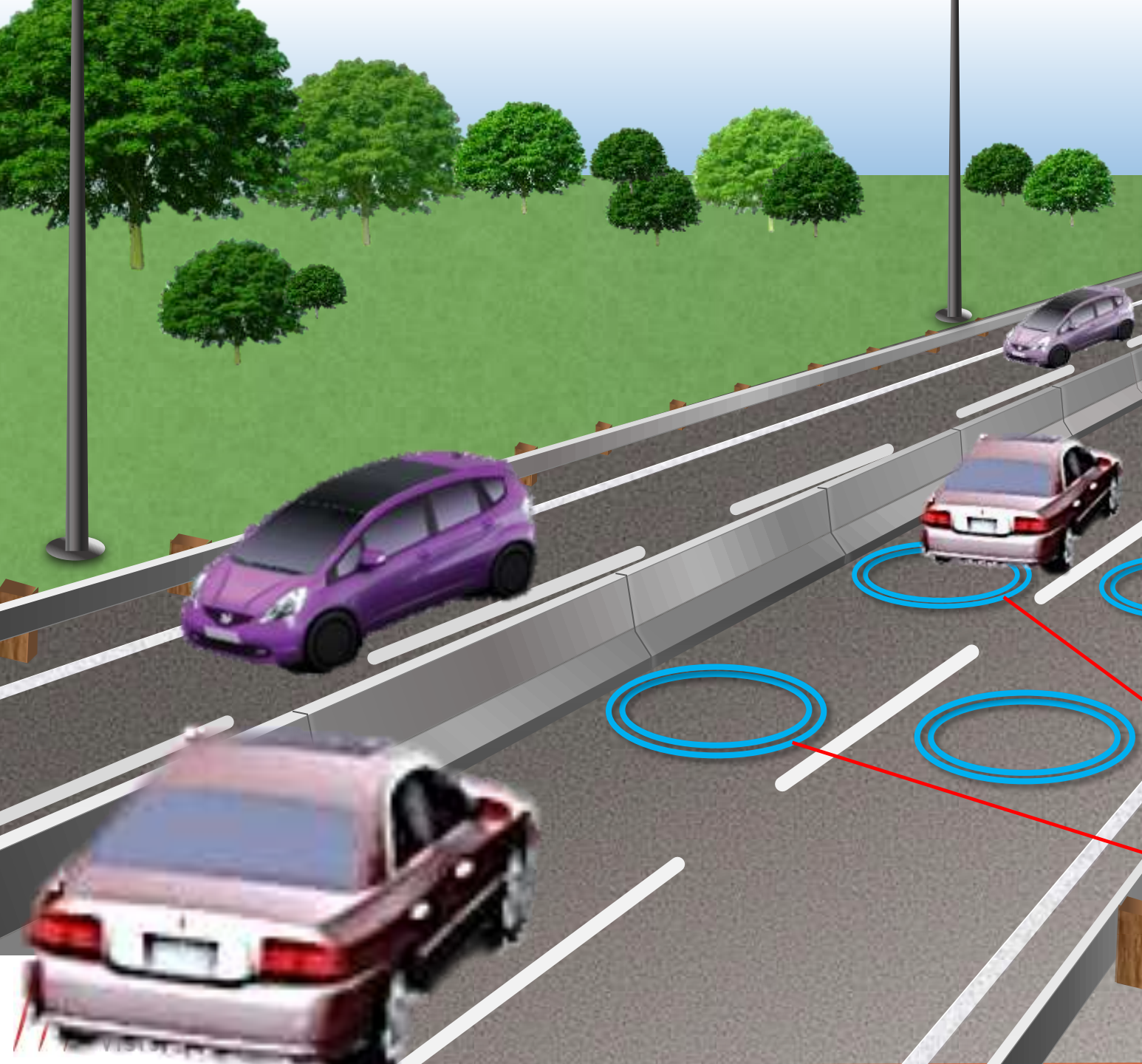
- Non-Binary Data Delivery
- Volume
- Classification
- Can deduce flow
- Counts every vehicle
- Speed

- Not robust
- Maintenance nightmare
- 60% functional

GFVD – GPS Floating Vehicle Data

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- Rich data availability
- Speed
- Volume
- Can Clearly identify flow
- Can identify Prediction

- Statistically representative?
- Most accurate at peak flow
- Arterial Assessment?
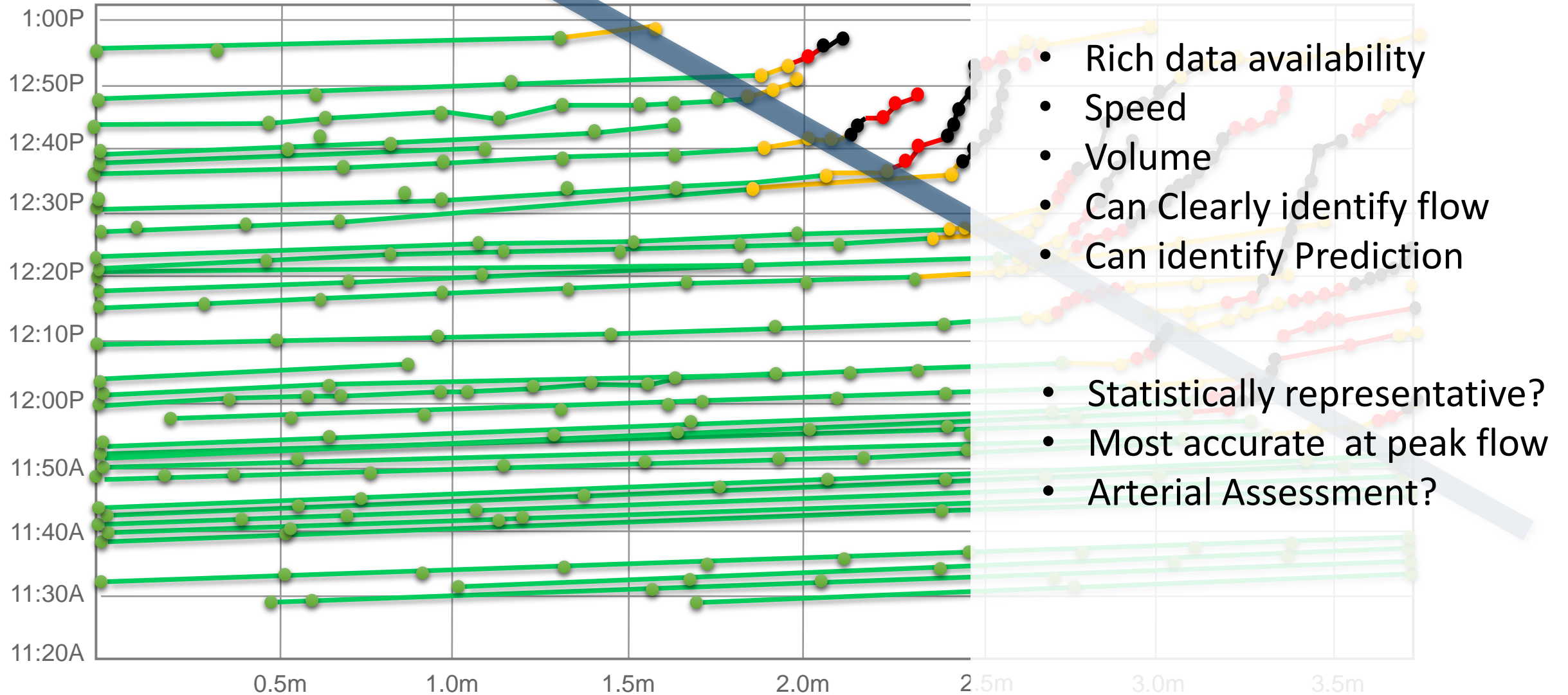
CFVD – Cellular Floating Vehicle Data

- Rich data availability
- Speed
- Volume
- Can Clearly identify flow
- Can identify Prediction
- Phones don't have to be on

- Statistically representative?
- Most accurate at peak flow
- Arterial Assessment?
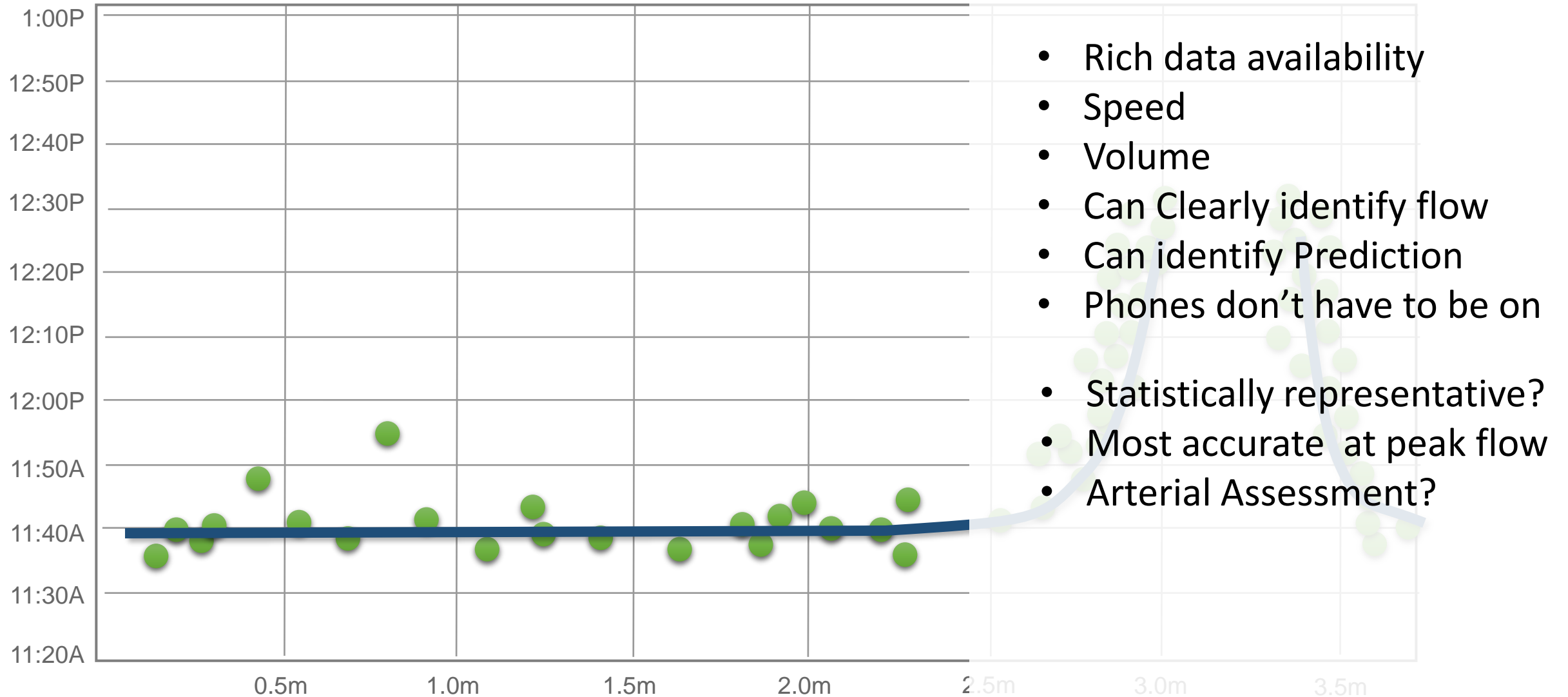
ALPR – Automatic License Plate Recognition

POP8 -VA

K16754 -VA

WQ786 -MD

LU123Y -TN

LU123Y -MD

FJ897Y -CA

ALPR – Automatic License Plate Recognition

Speed Citations / Red Light Enforcement

SPEED LIMIT ENFORCED BY AIRCRAFT

- Rich data availability
- Speed
- Volume
- Can Clearly identify flow
- Can identify prediction
- Identifies every vehicle
- Single Unit - Multi Uses
- Single/Multi Lane Scanning
- Local processing
- Low bandwidth

Connected Vehicle – Smart City

- All in one place / Statistically Representative
- Predict / Using DSRC
- Flow / Can communicating with:
- Speed of / Cars of every road
- Safety / Street lights
  - Predictive braking / Traffic Signals
  - Working other users / People on Foot
- Delivering / Adaptive Signal Controls
  - Speech / Synchronize flow
  - Minimize / Braking pollution
- Road use charging / Hazard conditions
  - Carlets Road Charging / Oglets Road
  - Avoidance / Windscreen wipers on
- Transit Passenger Comms / Express Lanes

But what is Big Data?

We have identified some of the elements required to deliver big data. But what is big data?

Big data is the concept of collecting data from multiple different and often disparate data sources with a view to identifying underlying data trends. For example:

Google predicted an outbreak of Flu due to the numbers of people searching cold medications – CDC took a week longer.

We identified the volcano effect using CFVD, what if we now combined cell tower usage in the event that we started to identify a complete lack of data? If this peaks disproportionately, this could be just one of many signs of congestion.

Undertaking an Enterprise Asset Management Program MTA recently identified that the main contributors to metro failures, could be significantly reduced by understanding and analyzing the data they "currently" have.

Data Visualization Tools

- Data Integration Tools
- Data Visualization Tools
- Management Dashboards
- Mapping Tools

- Standardization
  - TMDD
 - Processes

Quality or Quantity?

Both.

But data is only as good as the systems, standards, processes, tools and capabilities of the underlying systems and environments in which it is to be used.

As data transitions and becomes richer, and more abundant, the limitations of what we can do with it will be only limited by our own imaginations.

Cautionary note. One of the limitations with "currently" available data is cost from commercial distributors. It is therefore suggested that these new and abundant data sources, should remain in the public domain, enabling this data to be used to improve every element of the transportation network from collection, operational control to public dissemination.

Mr. Tip Franklin

Extracting Qualified Intelligence
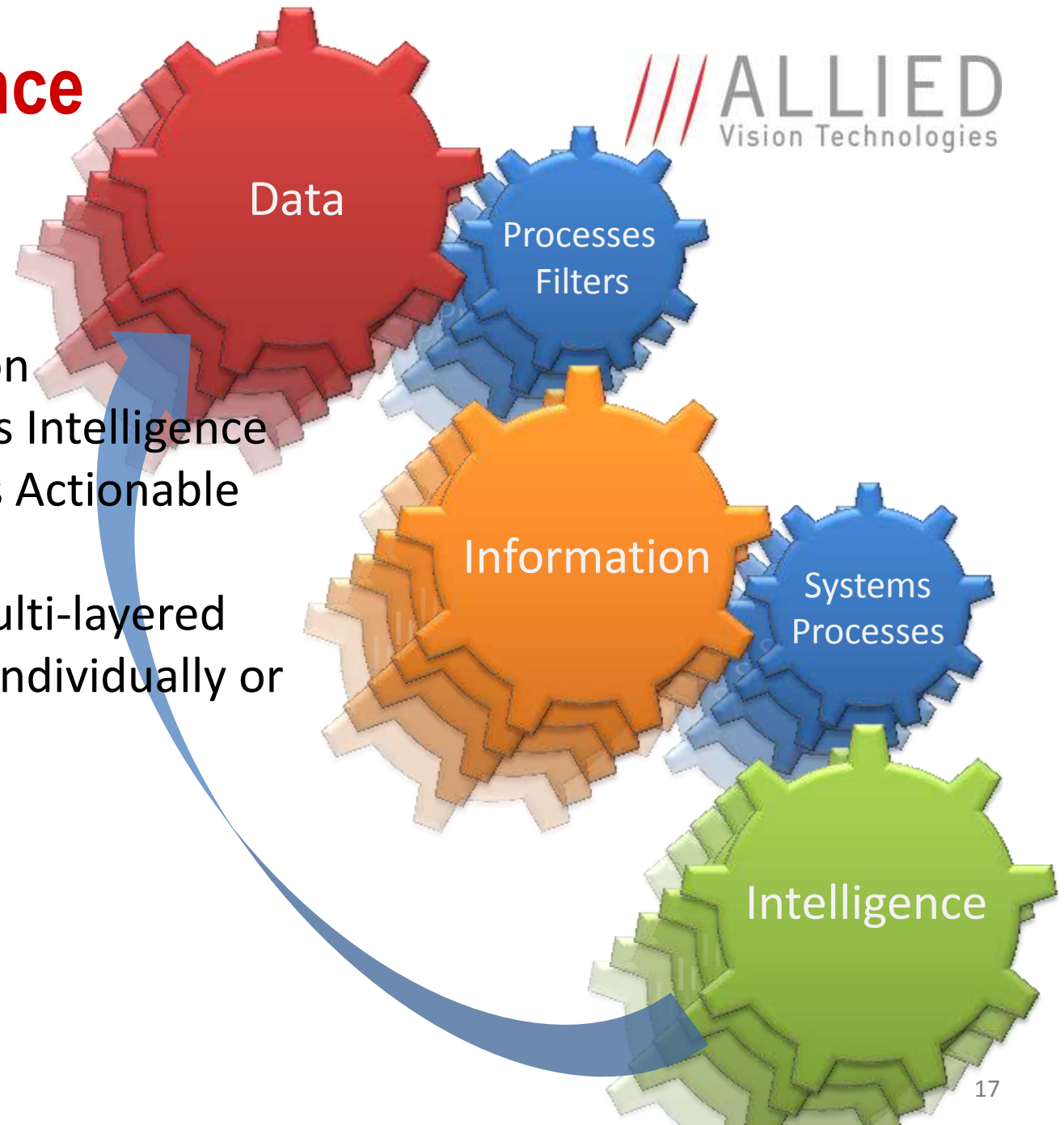
- Data once collected begets Information
- Information through Systems develops Intelligence
- Intelligence once distributed becomes Actionable

The development of big data requires multi-layered data extraction capabilities, all of which individually or collectively can be used by:

- Other Systems
- Operations Staff

Data

Processes Filters

Information

Systems Processes

Intelligence

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To Ensure Successful Transition…

In order to understand and address this increase in data availability and successfully make transition from *data* to *information* we must:

- Better understand the data sources.
- Understand data limitations
- Understand data gaps
- Understand how data gaps can be filled to provide smoothed data
- Deliver automated pre-processing systems which convert in real-time

In order to use *information* as actionable *intelligence* we must:

- Better integrate data from multiple data sources
- Have the ability to (both automatically and manually) remove or add additional data sets to complete an otherwise incomplete picture
- Better data visualization
- Provide automated updates to TMC Operators and Managers
- Intelligence Distribution Network

Questions to be Answered?

Some of the questions that must be addressed:

- How will you use data?
- How will you process, store and distribute it?
- What will be your litmus test as to viability, usability and credibility?
- How do you identify and control your sources?
- How will you process visual and aural data (i.e. CCTV, machine vision and telephonic reports?
- How will you prioritize establishment, restoration and maintenance of data sources?
- How will you prioritize the flow of data through the various communication media?
- What is the evaluation process for inclusion/exclusion of sources?
- Who else can use your data; how do you get it to them and in what form (raw or processed); and what is the timeline to provide it?
- What are the external sources of data that could be useful to you?
- What is the filter process for identifying the correct data to store for planning processes?
- What changes, if any, need to be made within your personnel organization and individual attributes (skills, knowledge and abilities –SKA) to be able to handle this?

Thank you for listening

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Any Questions?