

Abstractions for Shared Sensor Networks

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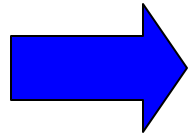


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Shared Sensor Nets



- Macroscopes are expensive:
 - to design
 - to build
 - to deploy
 - to operate and maintain



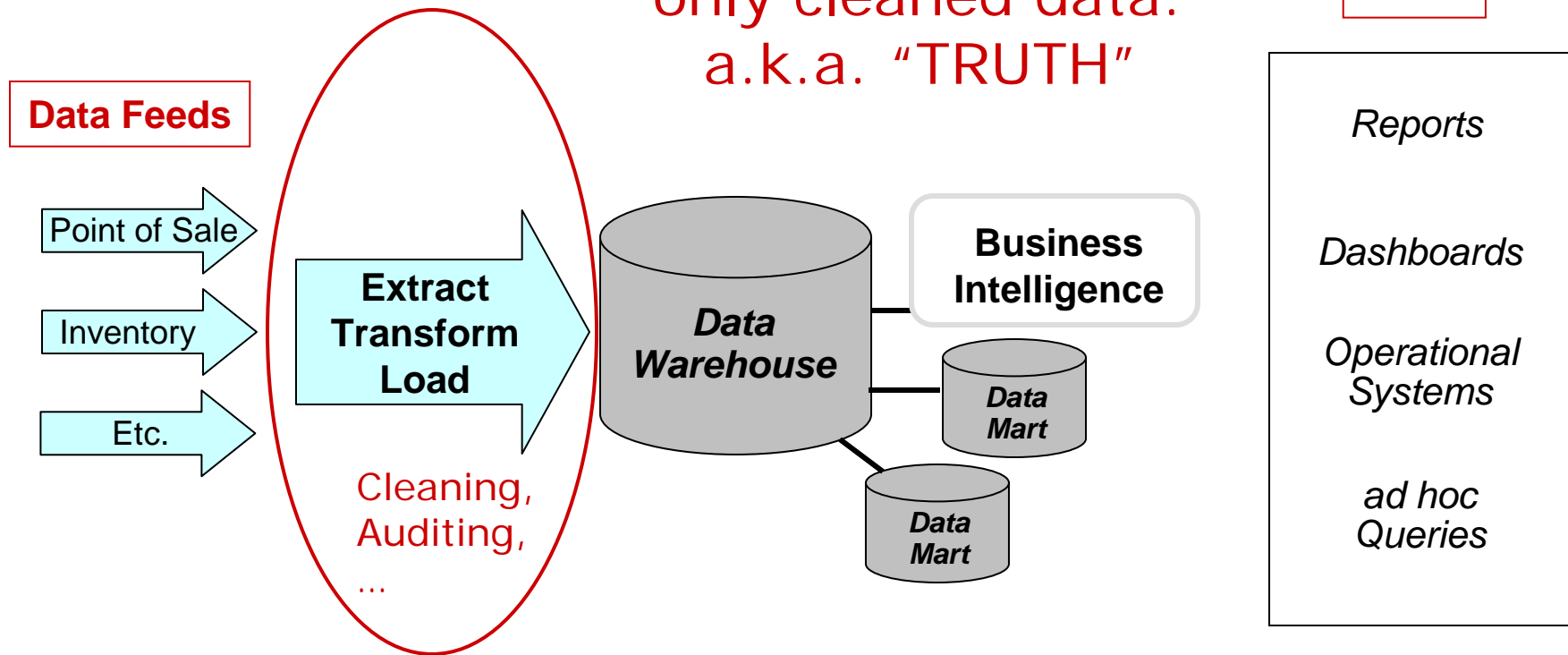
They will be shared resources:

- across organizations
- across apps w/in organizations

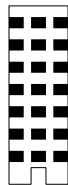
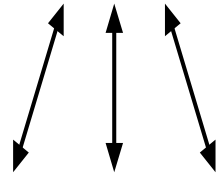
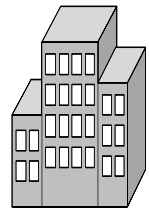
Q: What are the right abstractions to support them?

Traditional Macroscopes

All users/apps see
only cleaned data:
a.k.a. "TRUTH"

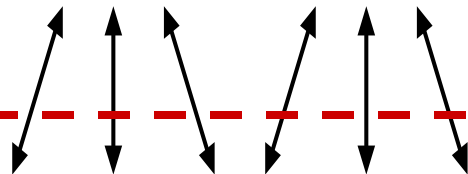
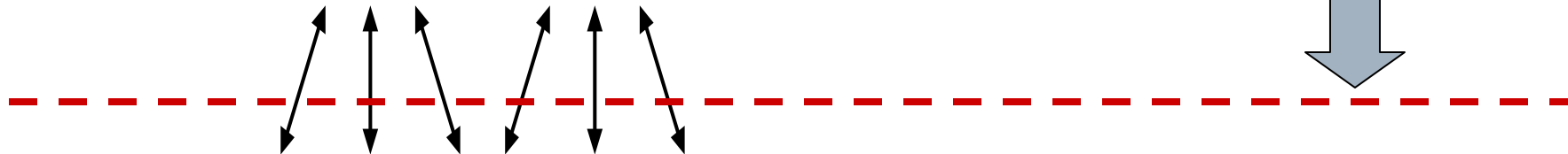
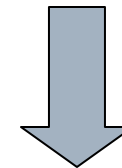


VICE - A Virtual Device Layer

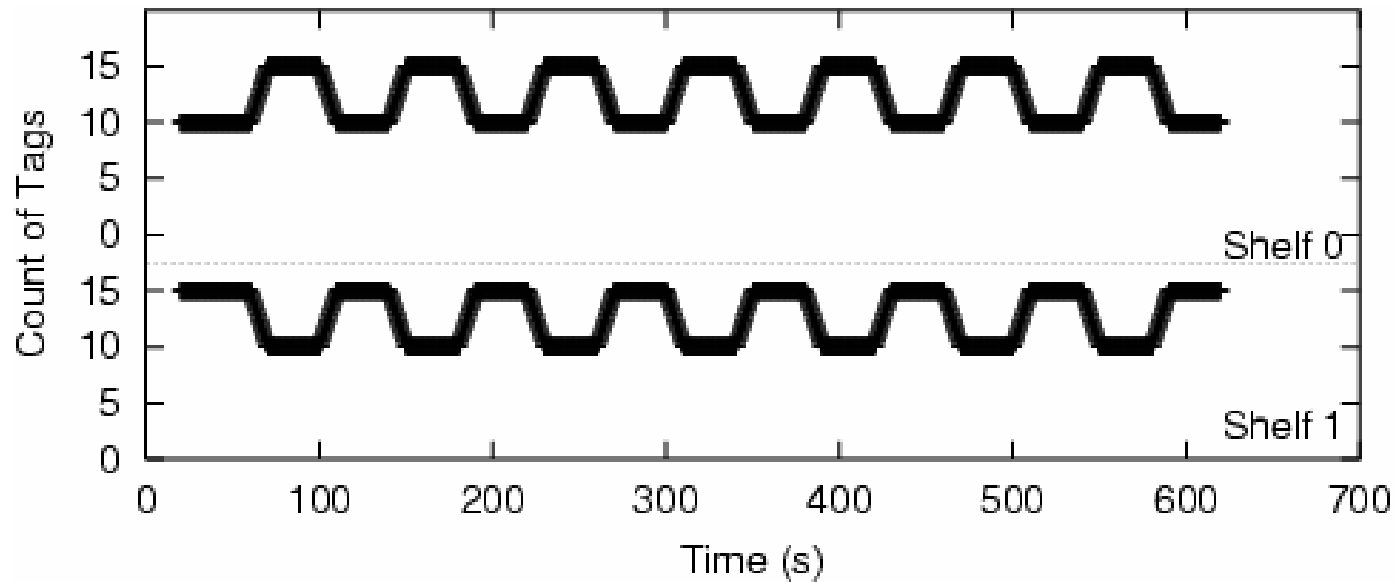


Vice API is a natural place to hide much of the complexity arising from physical devices.

“Virtual Device (VICE) API”

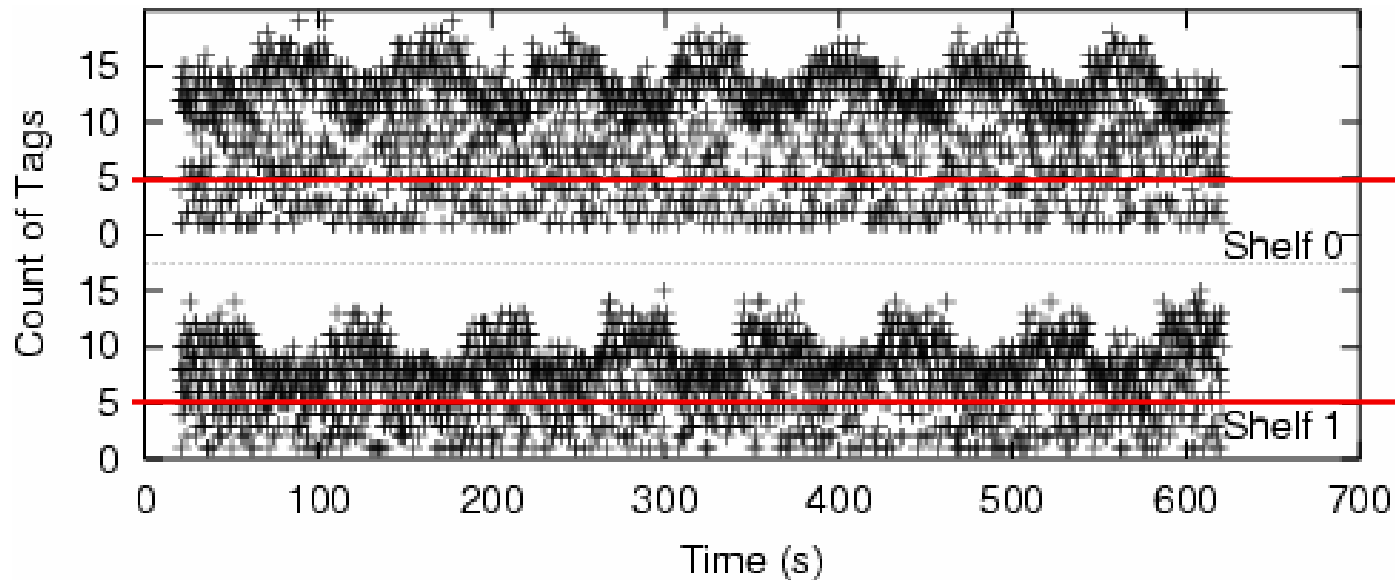


Shelf RFID Test - Ground Truth



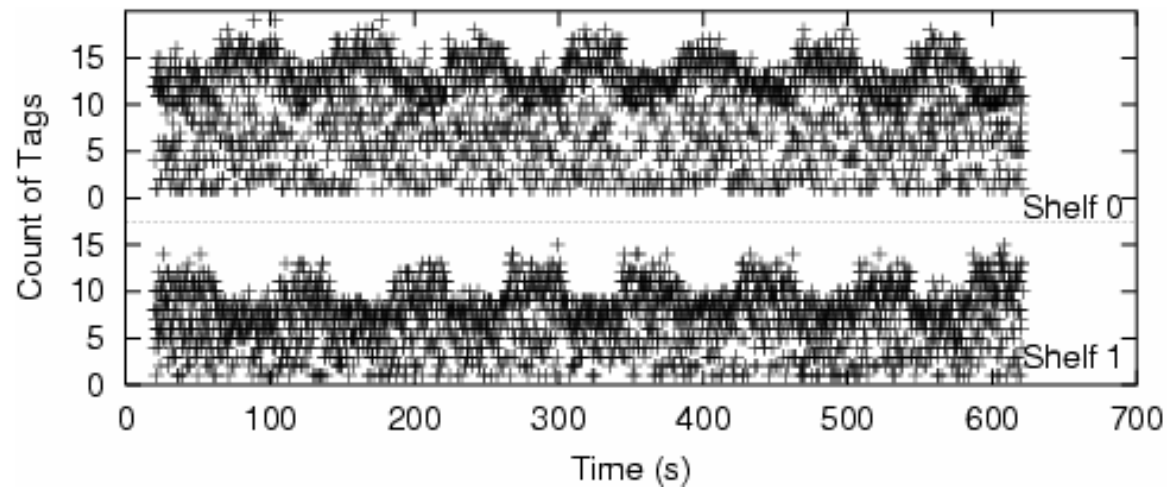
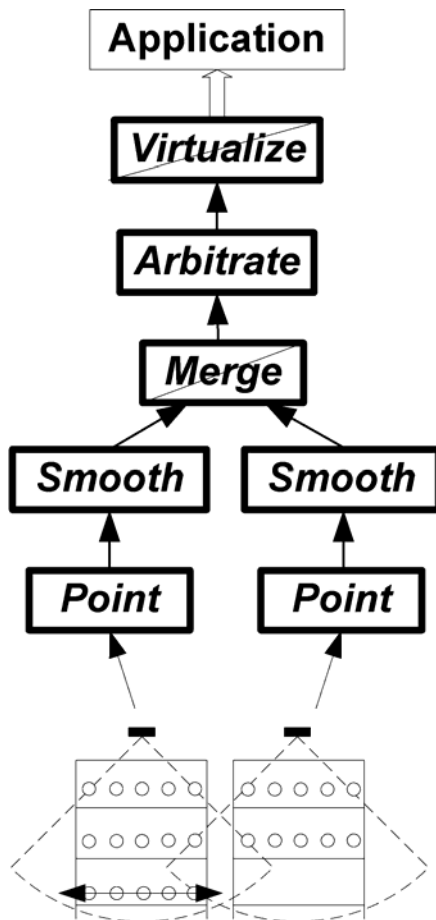
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Actual RFID Readings



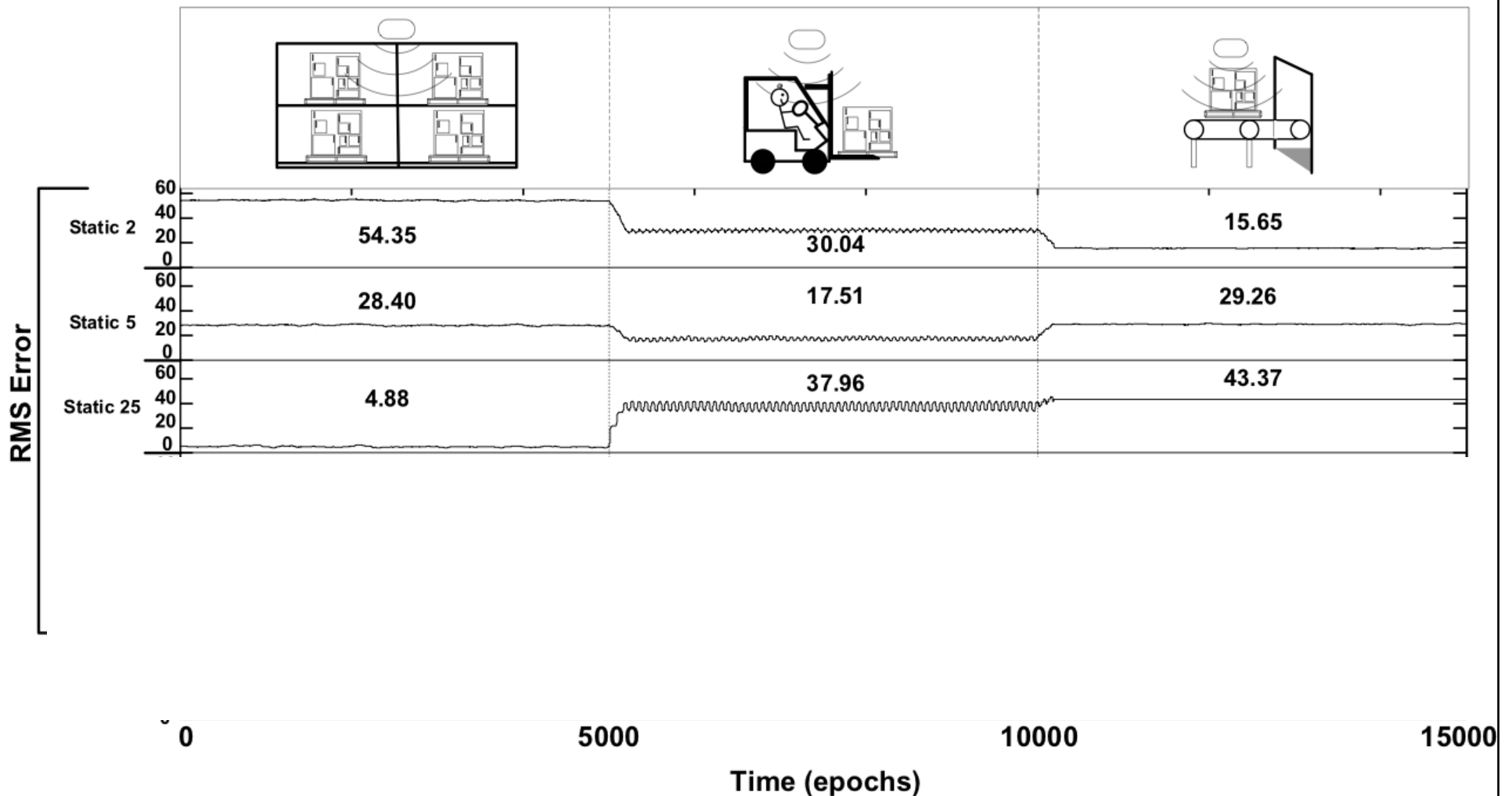
"Restock every time inventory goes below 5"

After Vice Processing



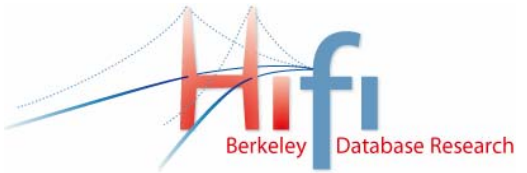
"Restock every time inventory goes below 5"

Automated Cleaning [VLDB 06]



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One Truth for Sensor Nets?



- How clean is “clean-enough”?
- How much cleaning is too much?

- Answers are likely to be:
 - domain-specific
 - sensor-specific
 - application-specific
 - user-specific
 - all of the above?

Fuzzy Truth?

Probabilistic Data Management is the key to
"Calm Computing"



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Tracking Superman @ home?

Ubisense tracking data from Ryan Appierspach

He walks
through
walls;

He flies
across
the
room...



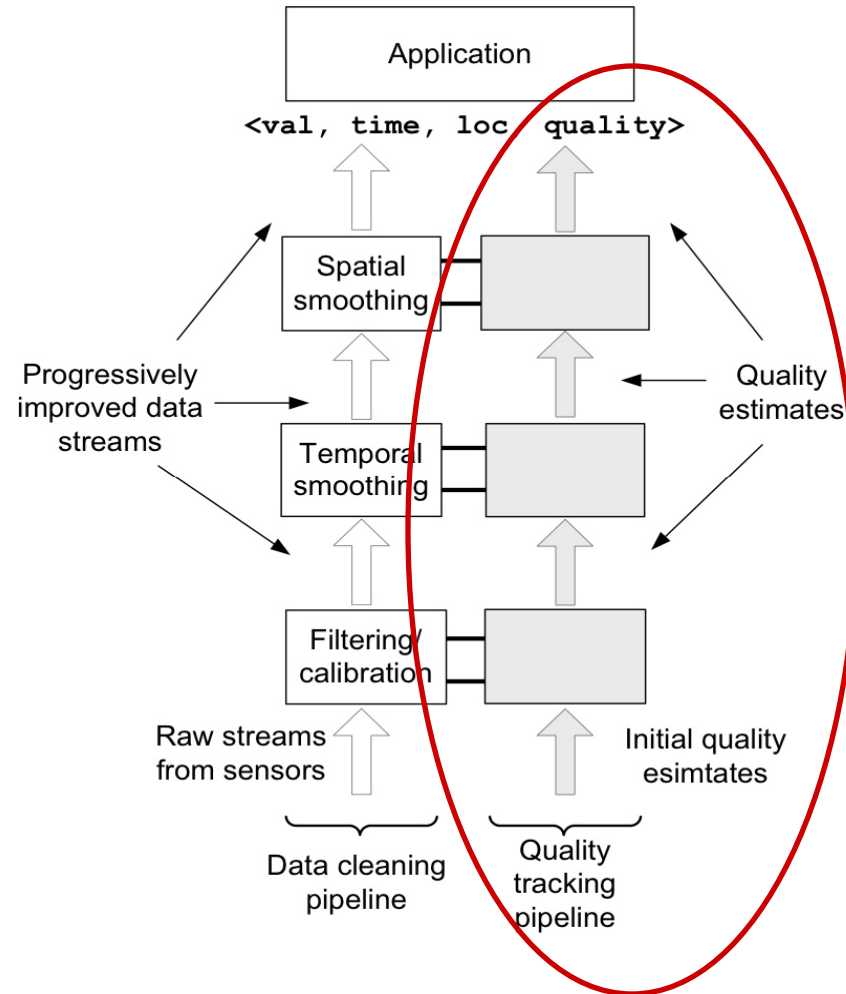
Original Data



Cleaned Data

Too much
cleaning
and you
lose detail.

Adding Quality Assessment



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Cleaning is Just One Service



Scheduling

Data
Cleaning

Provisioning

Monitoring

Tasking/
Programming

Evolution

Actuation

We will need to understand the shared/custom tradeoffs for all of these.