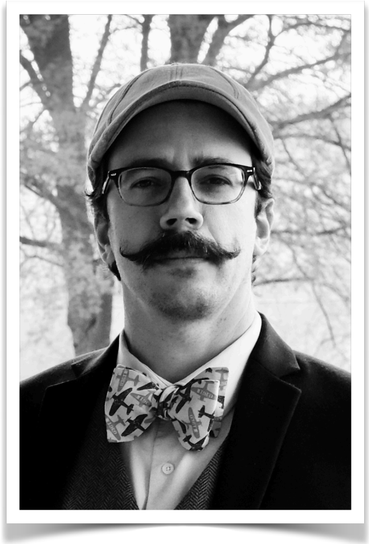
EPMS

The state of the technology, and to where might we go from here?

EPMS Technology

- Today's presenter: George Scondras
  - Twenty-five years in the controls / monitoring industry
- Today's presentation:
  - Not a nerd-fest . . . well, not much, anyway.
  - Observations and recommendations



EPMS Technology

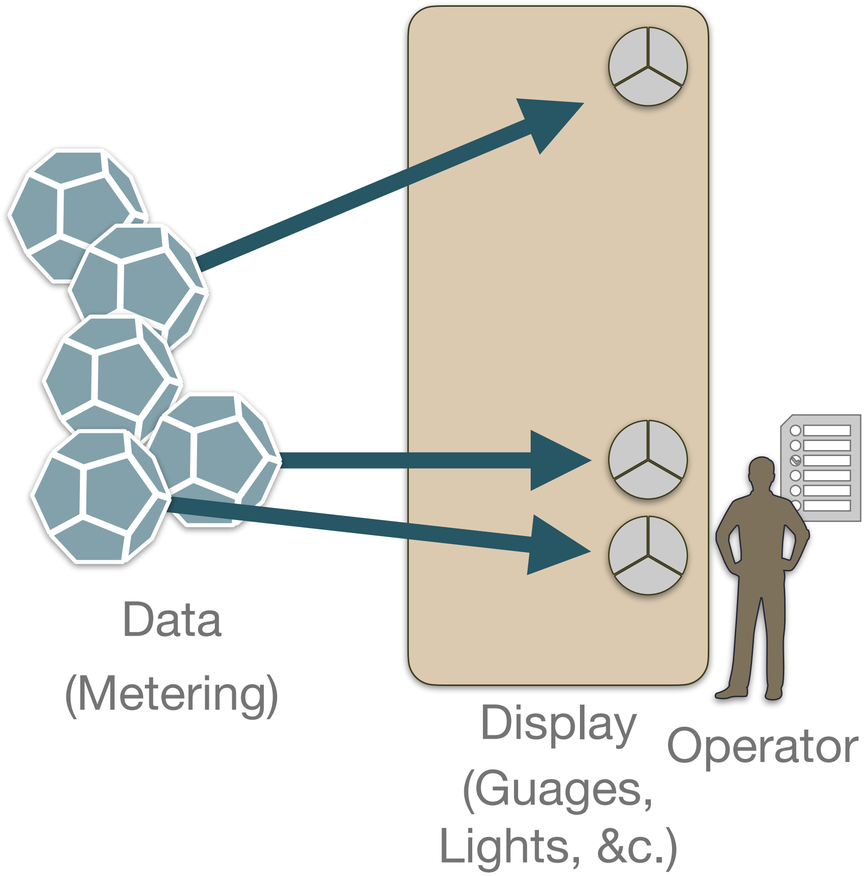
- Electrical Monitoring . . . What do you mean?
  - Present Operational Data
  - Notify Operators of Events

EPMS Technology

- Electrical Monitoring — What do you mean?
  - Present C
  - Notify Op

The Carousel of [EPMS] Progress

- Part 1 . . . Analog Age



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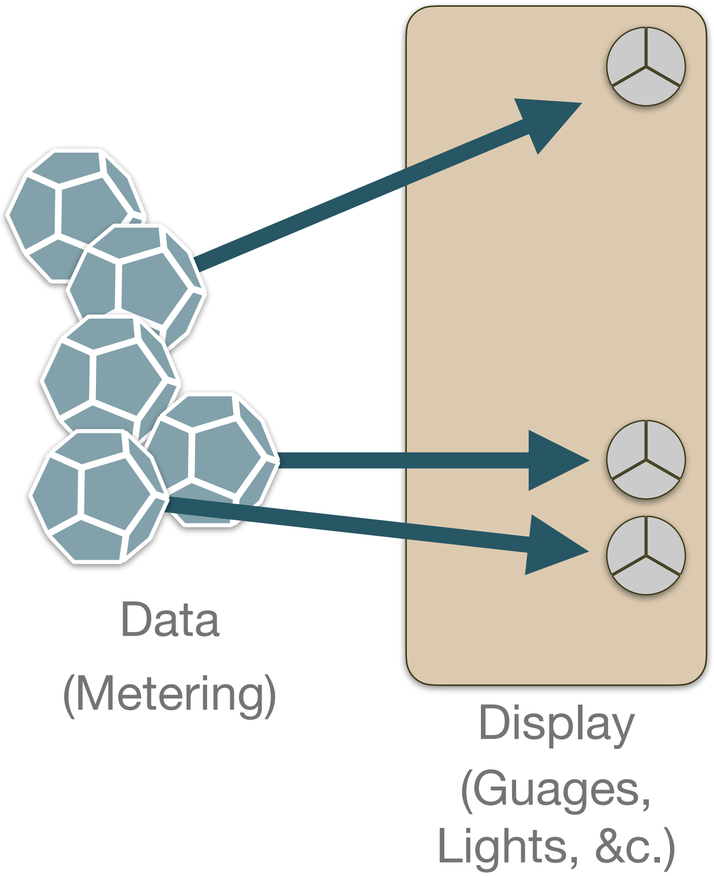
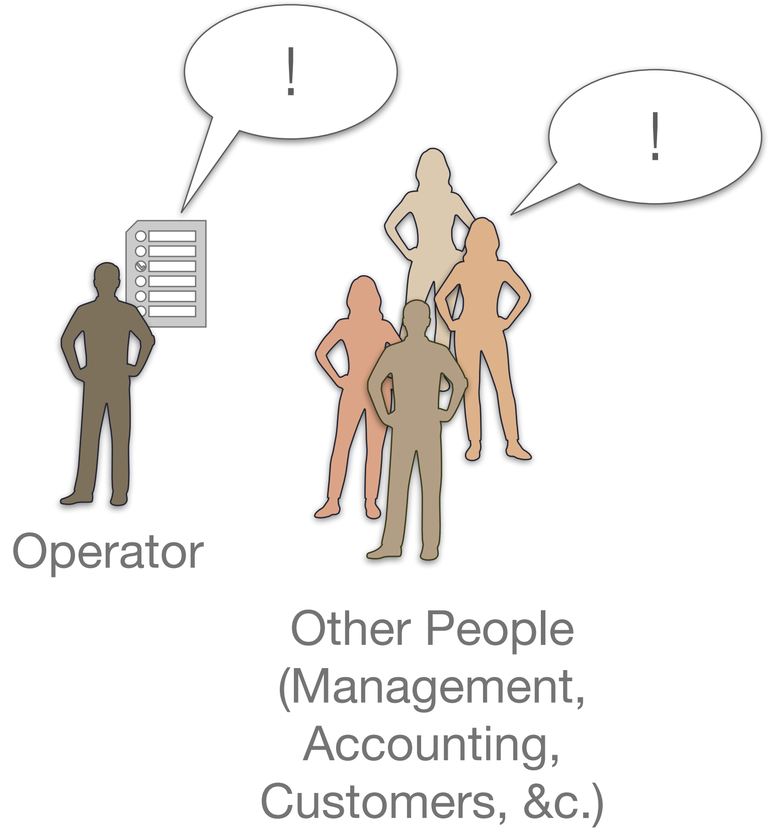
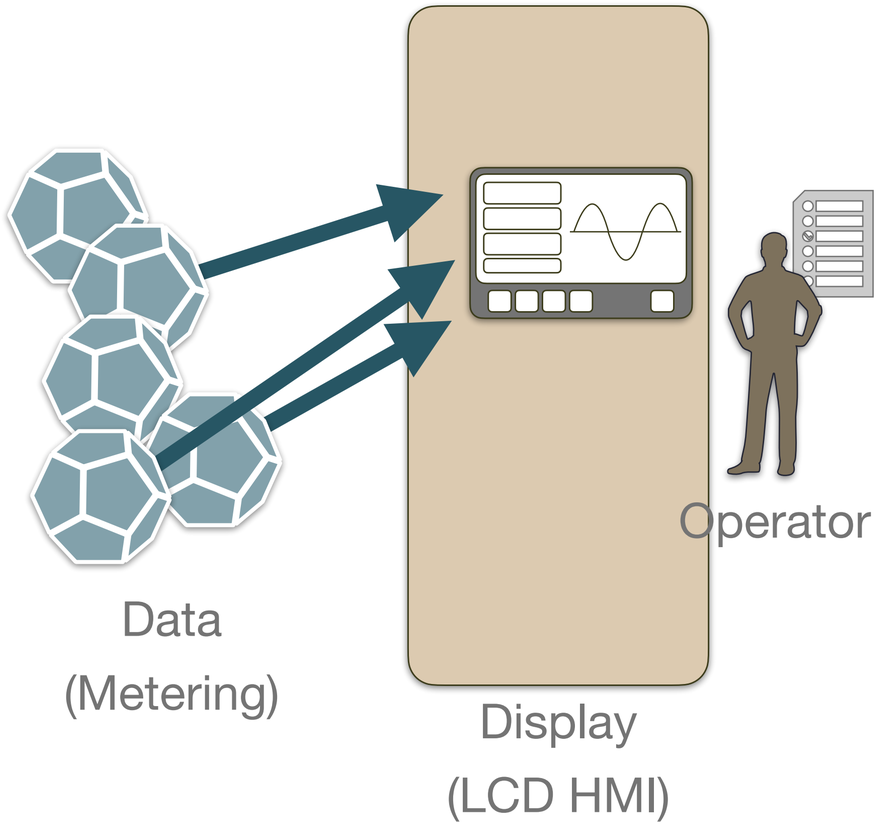
- Part 1 . . . Analog Age





The Carousel of [EPMS] Progress

- Part 2 . . . Digital Dawn



The Carousel of [EPMS] Progress

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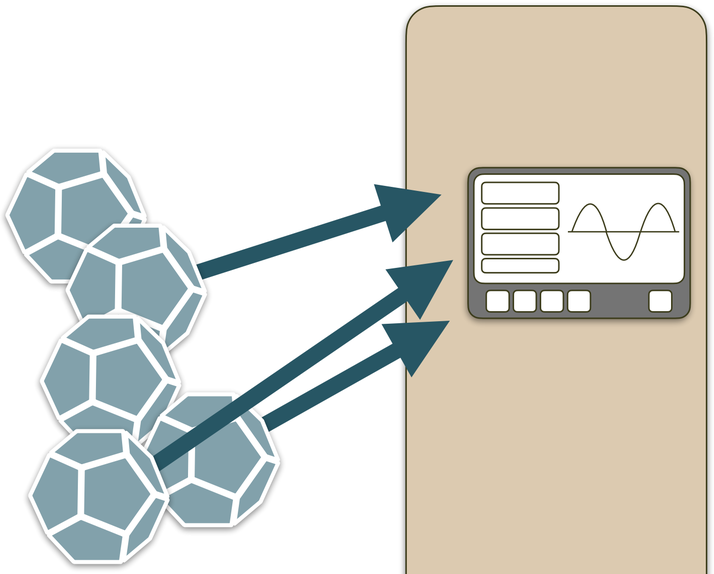
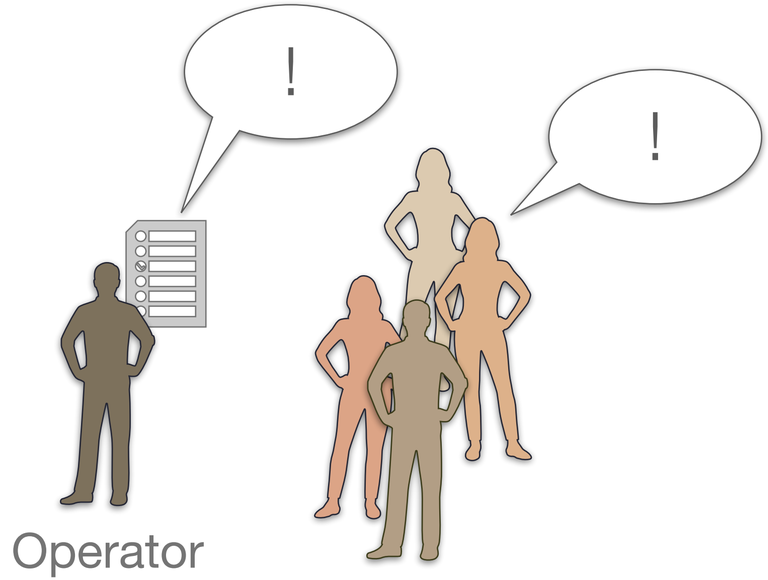


Data
(Metering)

Display
(LCD HMI)

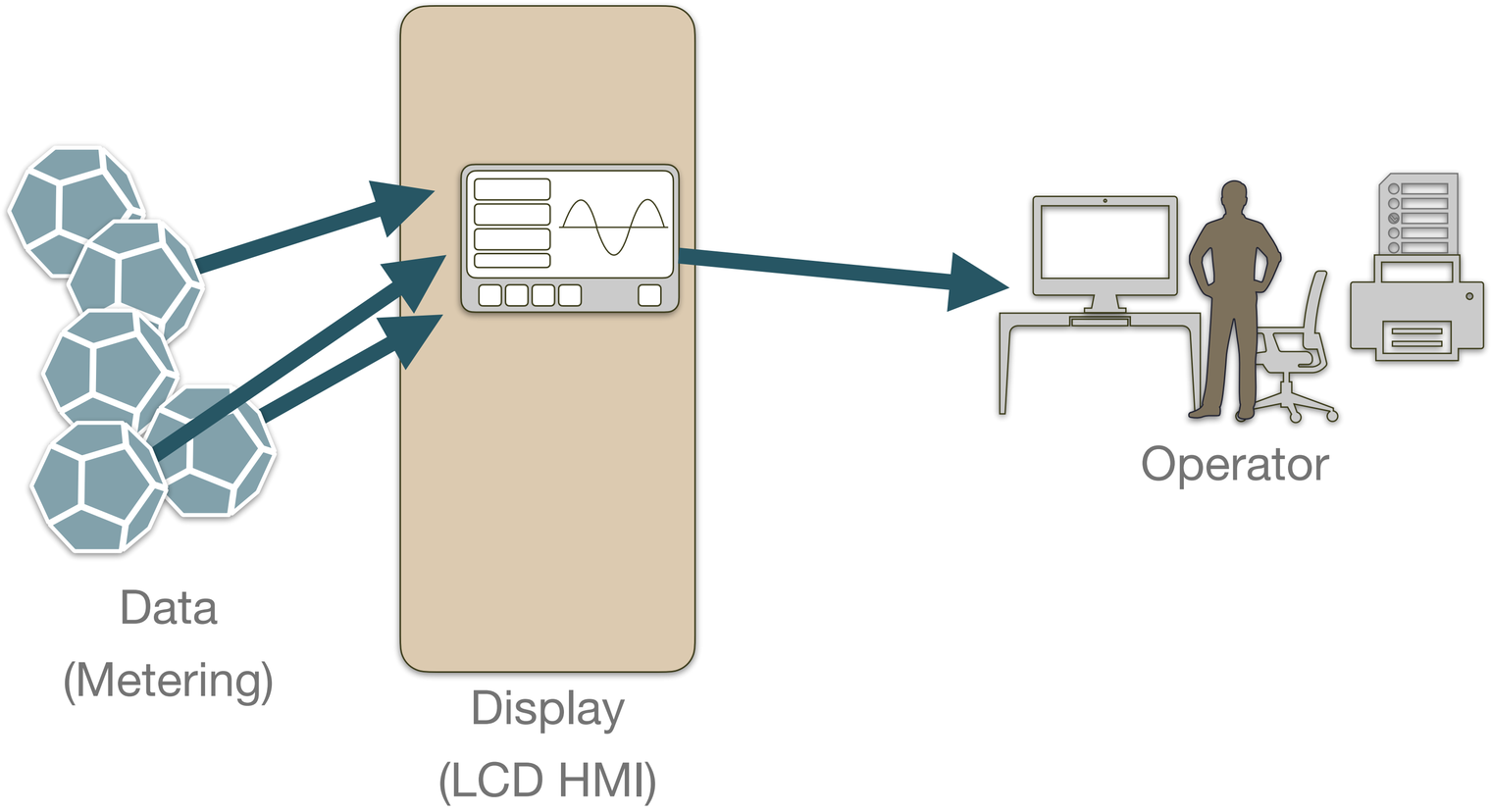


Operator

Other People
(Management,
Accounting,
Customers, &c.)

The Carousel of [EPMS] Progress

- Part 3 . . . Real EPMS Appears



The Carousel of [EPMS] Progress

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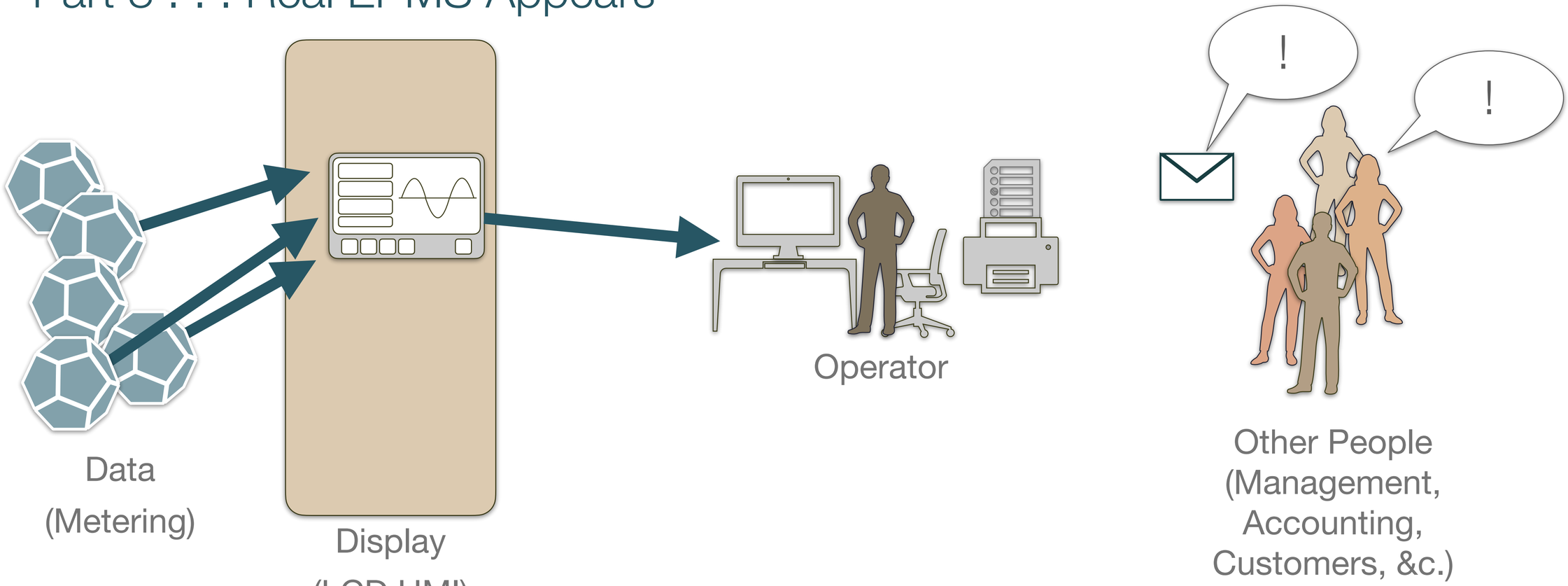


EPMS Technology

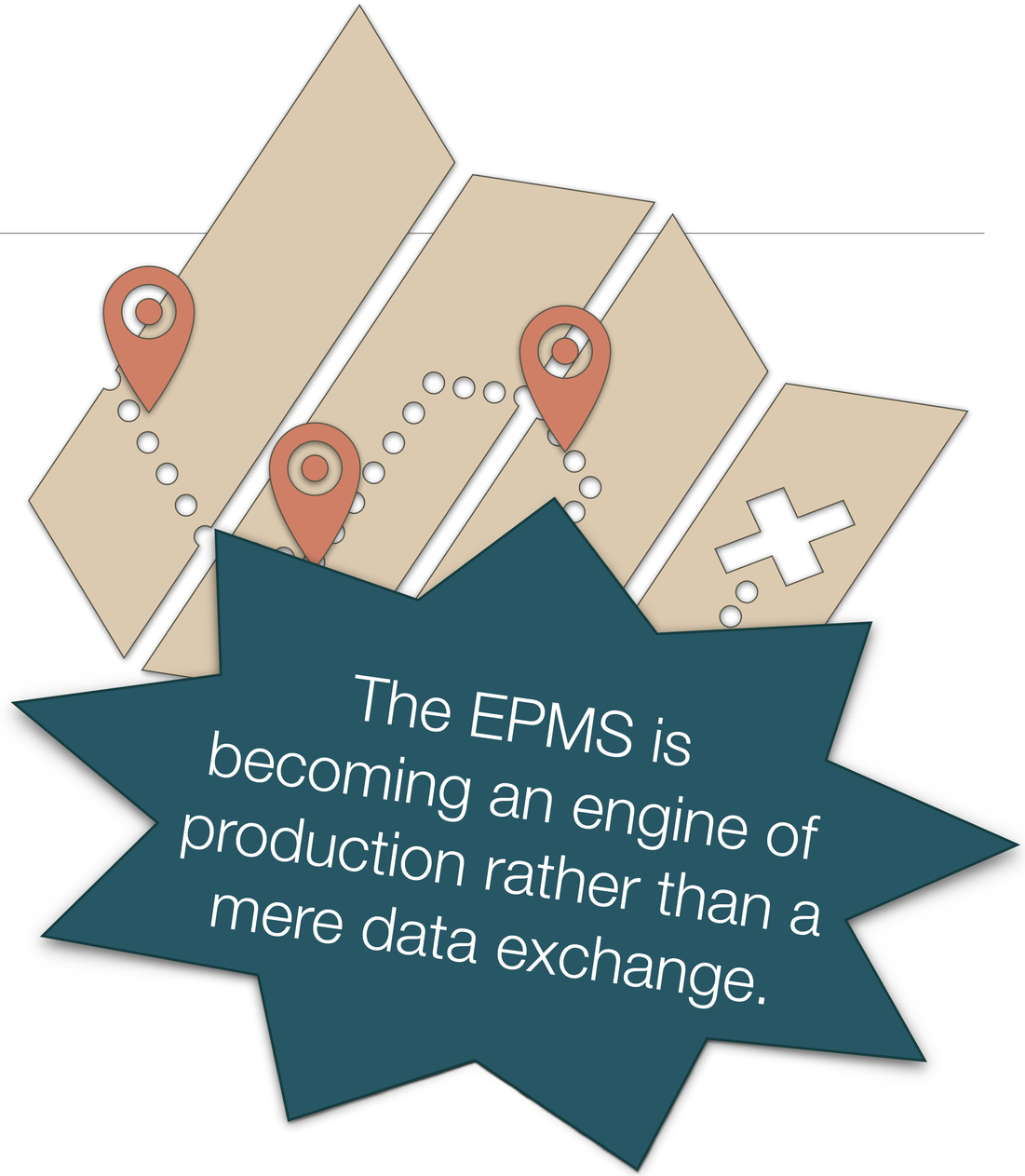
- Electrical Monitoring . . .
  - Present Operational Data
  - Notify Operators of Events
- Create New Data
- Interface With Other Systems

In what ways might we extend an EPMS ever further than what we have already seen?

EPMS Technology

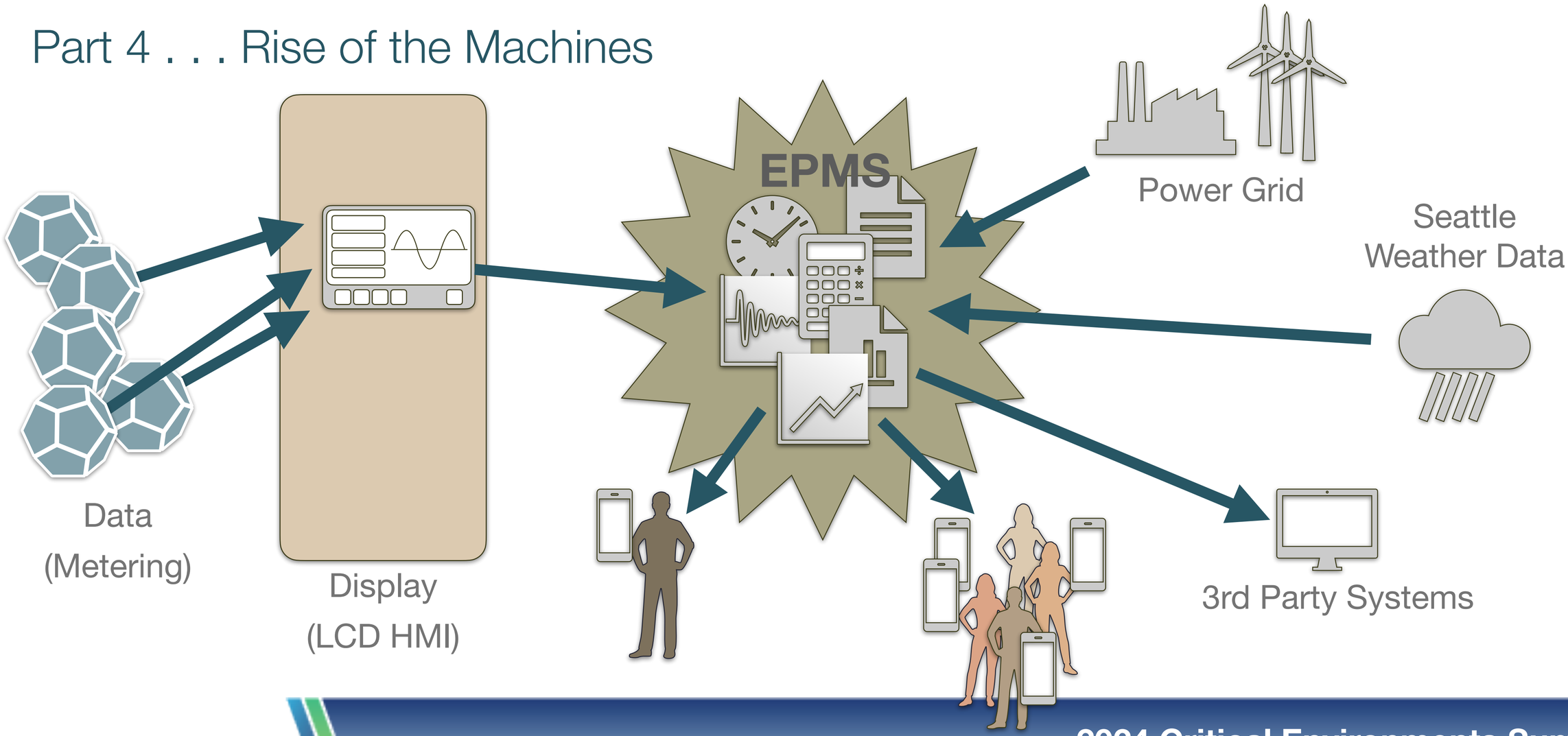
- Electrical Monitoring . . .
  - Present Operational Data
  - Notify Operators of Events

  - Create New Data
  - Interface With Other Systems



The Carousel of [EPMS] Progress

- Part 4 . . . Rise of the Machines



EPMS Technology

- Electrical Monitoring . . .
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  - Create New Data
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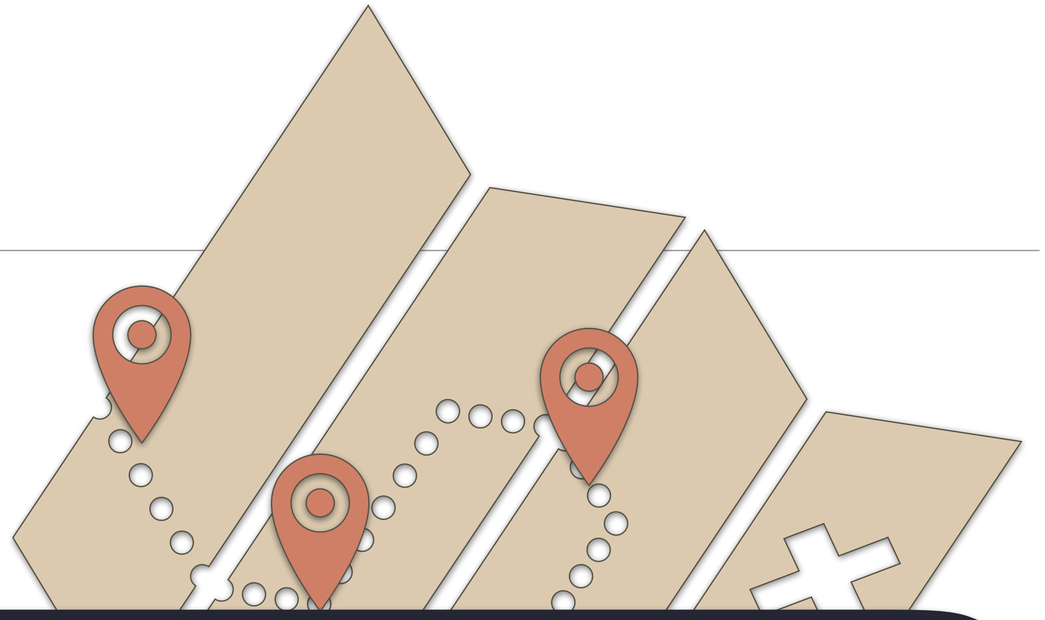


How can we aim in this direction?

How do we build “below the line” without losing sight of “above the line”?

EPMS Technology

- Electrical
  - Prese
  - Notif
- Creat
- Interf

Three Topics for a Forward Focused EPMS

- Connectivity
- Interactivity
- Productive Data

Connectivity

- New EPMS protocol: ProtoM
  - Real-time communication for all data points in a system
    - Unlimited point capacity and zero latency
  - Supports several wireless technology architectures as well as all wired architectures
  - Native TLS+ encryption
  - Plugin-support for legacy protocols ensures compatibility with existing hardware

Connectivity

- New EPMS [illegible]tocol: Proto[illegible]
  - Re[illegible]me communication fo[illegible]ta points in a sys[illegible]
    - [illegible]nlimited point ca[illegible]y and zer[illegible]atency
  - S[illegible]pports sever[illegible]ireless tech[illegible] a[illegible]itecture[illegible]
  - Nat[illegible]S+ encryption
  - Plugin-su[illegible] for lega[illegible]t[illegible] hardware

Technology alone can't save the day.

False Information.

ProtoM(agical) doesn't actually exist.

Connectivity . . . for real, this time.

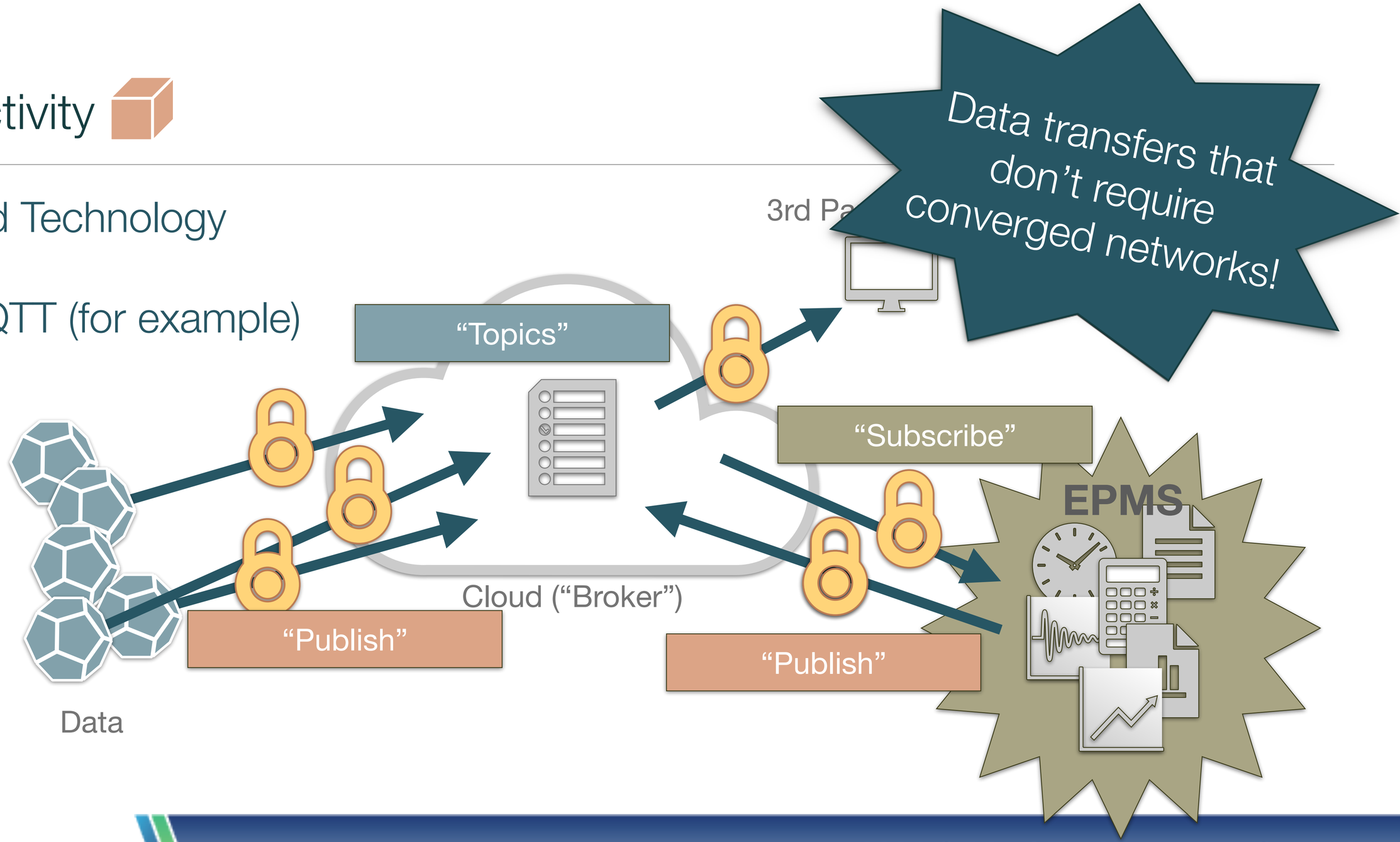
Connectivity

- Old is still new . . .
  - Modbus, OPC, snmp, &c. are still productive
    - (this isn't a "protocol Arms Race")
  - Not all protocols are the same, though; stay flexible
- Moving to IP at lower levels
  - Circuit breakers, rack-level distribution, &c.
- More IP means more security considerations


Interactivity

Interactivity

- Cloud Technology
  - MQTT (for example)



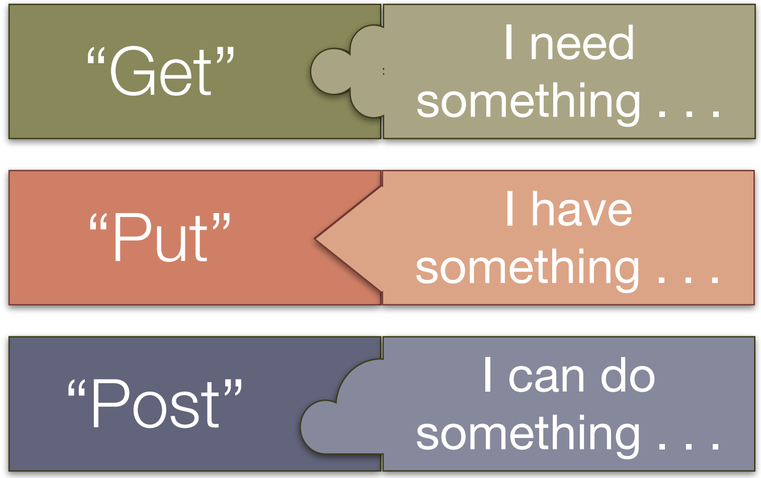
Interactivity

- Cloud Technology

- API (Application Programming Interface)

  - Standardized “handles” for authenticated clients to access data and resources

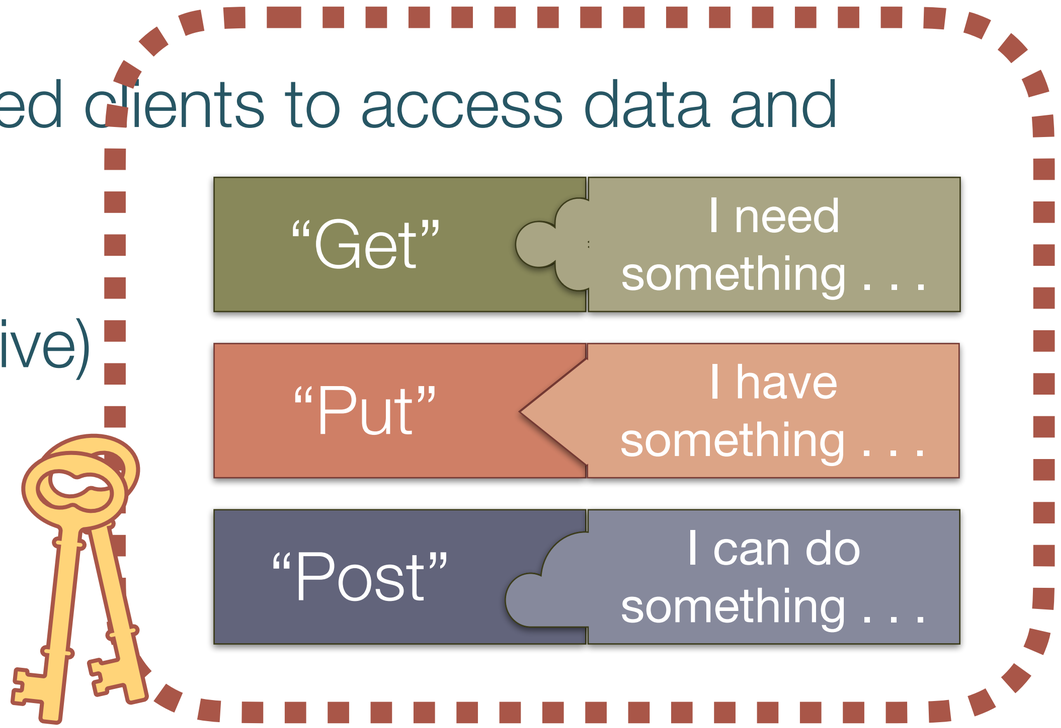
  - Ease of use (from a 3rd-party perspective)



Interactivity

- Cloud Technology

- API (Application Programming Interface)
  - Standardized “handles” for authenticated clients to access data and resources
  - Ease of use (from a 3rd-party perspective)
  - Security management by data owner



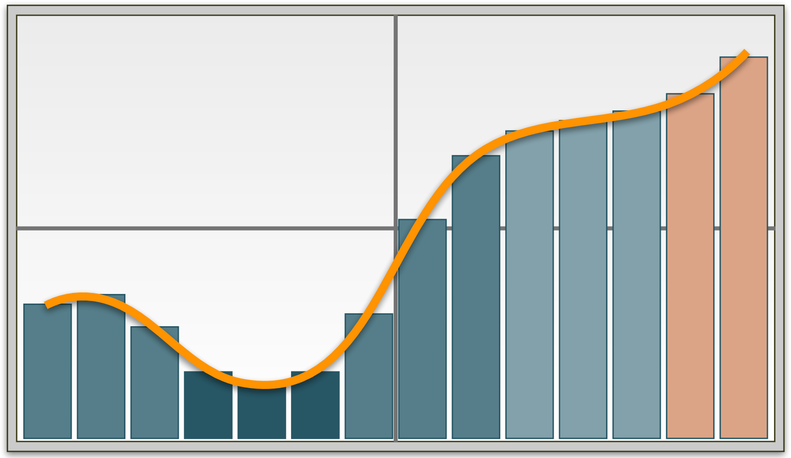

Productive Data

Productive Data

- Not necessarily "big data" (a Bronze Age buzzword . . . from 10 years ago)
- The goal isn’t just to collect the most data . . .
- The goal is to collect data so that you can use that data to increase:
  - Knowledge
  - Efficiency
  - Productivity
  - &c.

Productive Data

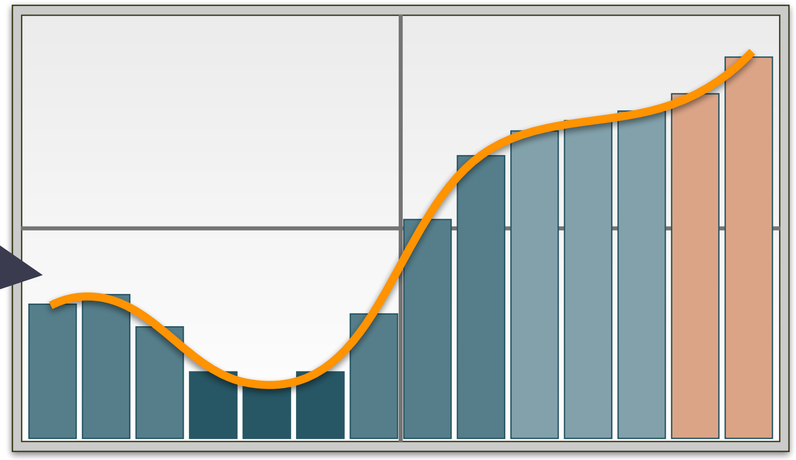
- Analytics
  - “Comparative analysis of data in order to simplify the recognition of data relationships”
  - When X increases, does there appear to be a corresponding and mathematically describable change in Y?



Productive Data

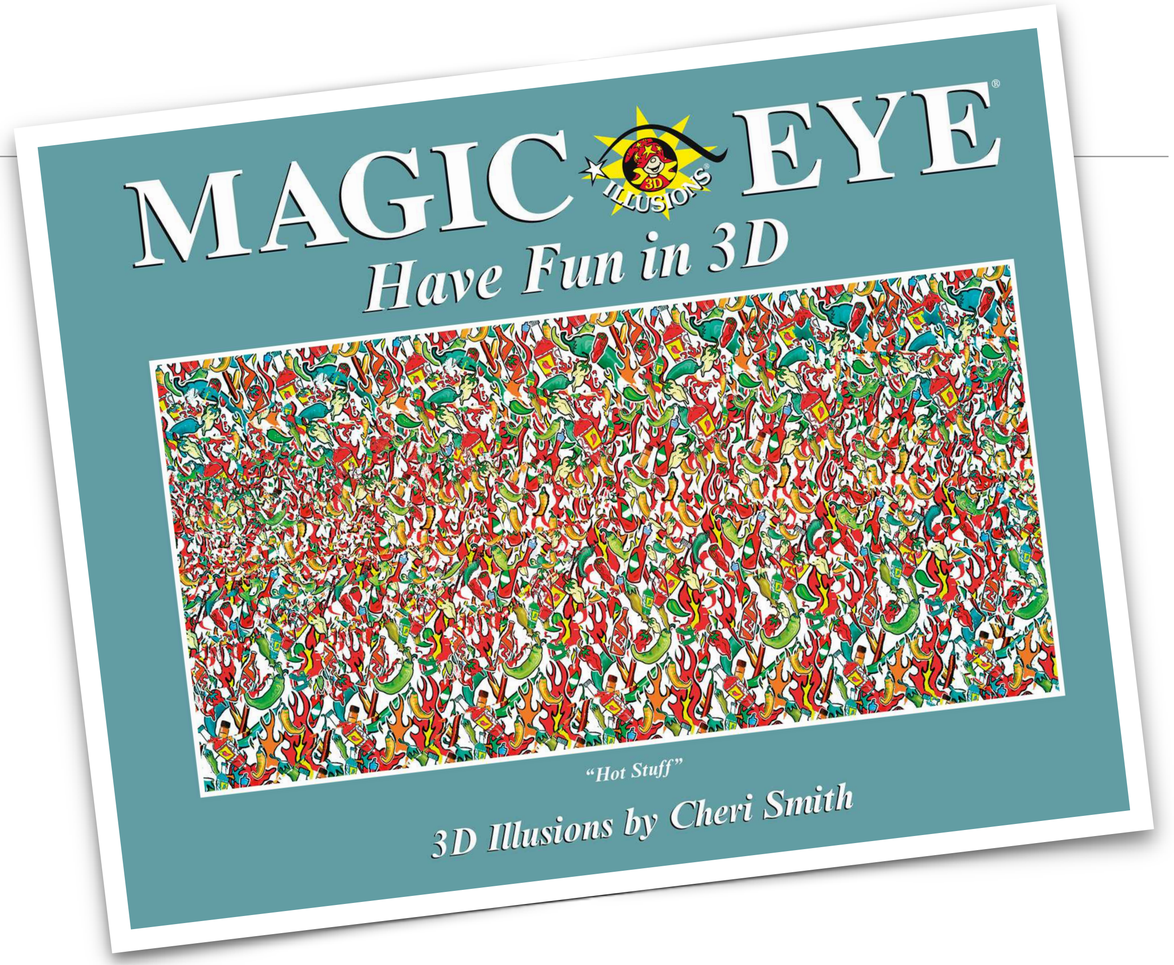
- Analytics
  - “Comparative analysis of data in order to simplify the recognition of data relationships”
  - Wher ear to be a corresponding and math e in Y?

Two-factor analysis might be easy for us to recognize, but as additional factors may need to be considered, the power of computers is leveraged.



Productive Data

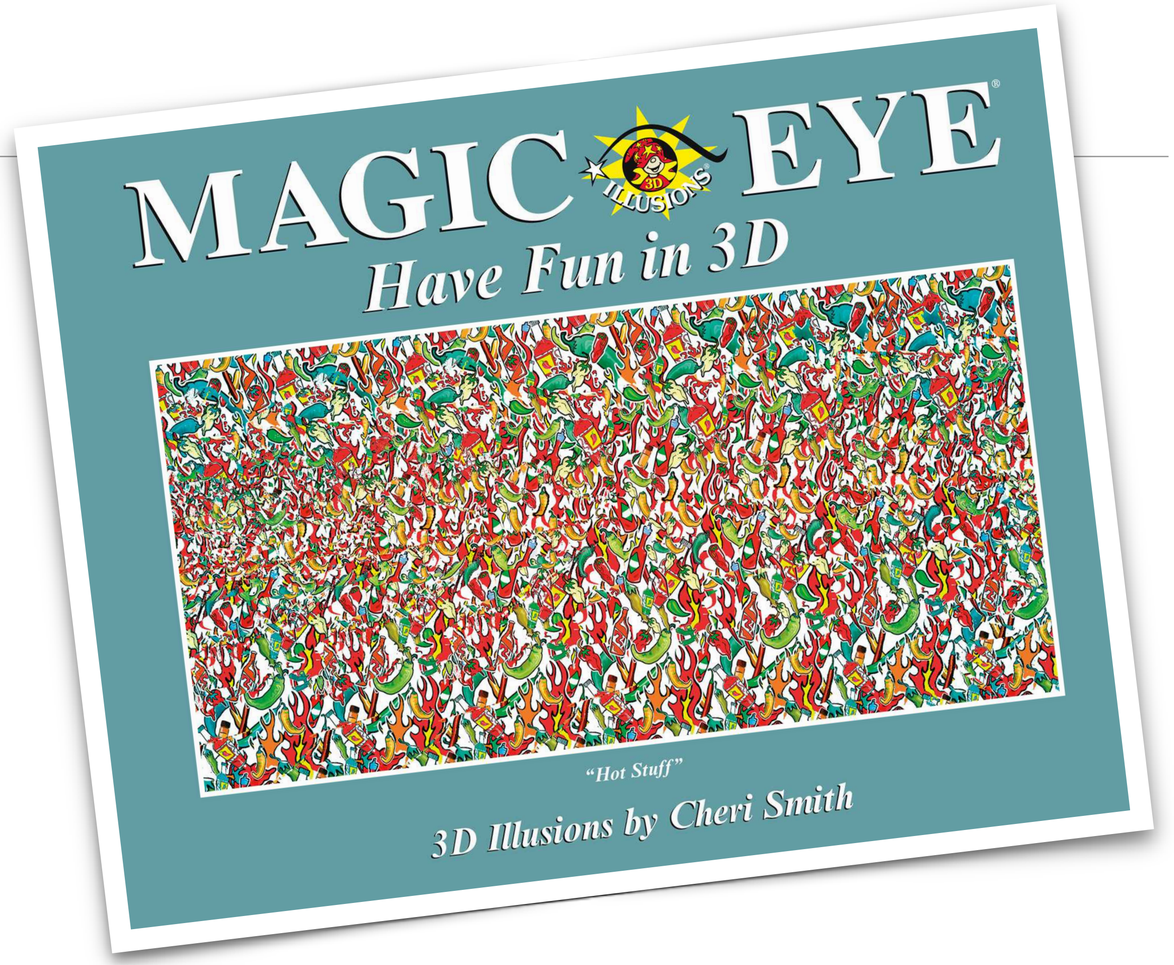
- Analytics
- Machine learning
  - You might see “things,” but they’re not the point . . .
  - You might see patterns, but those patterns actually distract you from the important image



Sometimes, the real point is both revealed and obscured by the data.

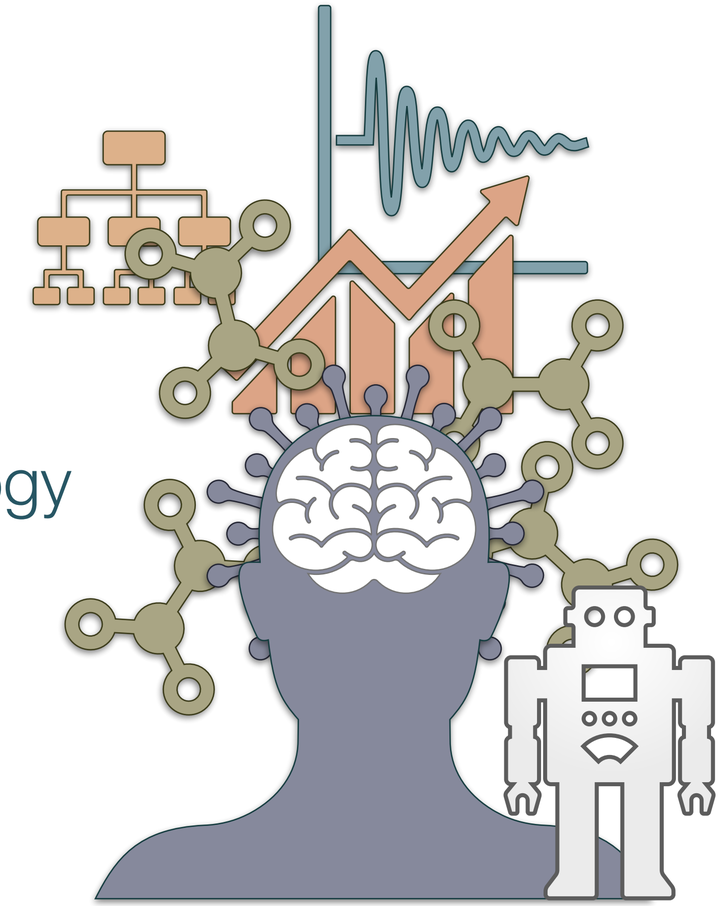
Productive Data

- Analytics
- Machine learning
  - Machine learning attempts to “notice” the small differences that we tend to overlook without getting distracted by the reality of the big patterns.



Productive Data

- Analytics
- Machine learning
- AI
  - “Hot Topic” right now because it is emerging technology
  - Possibilities are still being imagined
  - Stay tuned, and for now, do your homework



One last thing . . .

Why?

Why do we need to consider connectivity?

. . . to interest ourselves with interactivity?

. . . to pursue productive data?

Why?

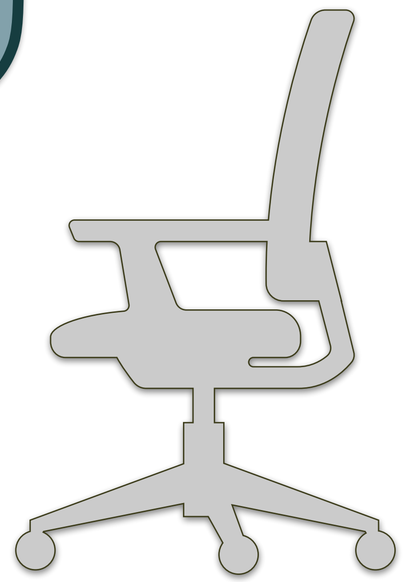
Customers are asking for more data

Security concerns are growing more acute

Experienced operators are getting harder to find

Efficiency gains are getting harder to find

Margins for error are shrinking



“The road goes ever on and on . . .”

– J. R. R. Tolkien