Scalability in Automation

for enterprise-wide visibility & increased efficiency

Amy Wooten
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GE Digital

GE Digital in GE

GE Digital

At GE Digital, we are putting our industrial software to work to accelerate global transitions that will impact every industry on the planet

Grid Software

40% of electricity created on the planet is touched by our industrial software

Manufacturing Software

For 30+ years, our software has helped more than 18,000 global manufacturing customers achieve operational agility with software that delivers enterprise-wide visibility and scalability – in CPG/F&B, Automotive, Pharma & LS, Water Utilities, etc.

Power Generation / Oil & Gas Software

Our industrial software manages more than 3000 gas and steam turbines, roughly 1/6th of the worlds installed power base.

Aviation Software

Our software helps 450+ customers, 6000 pilots, and 57,000 crew improve customers' safety and efficiency, and improve the passenger experience

GE Power

Equipping 90% of transmission utilities worldwide

GE Renewable Energy

Installed 400+ GW capacity globally

GE Aviation

Powering two-thirds of commercial aircraft departures*

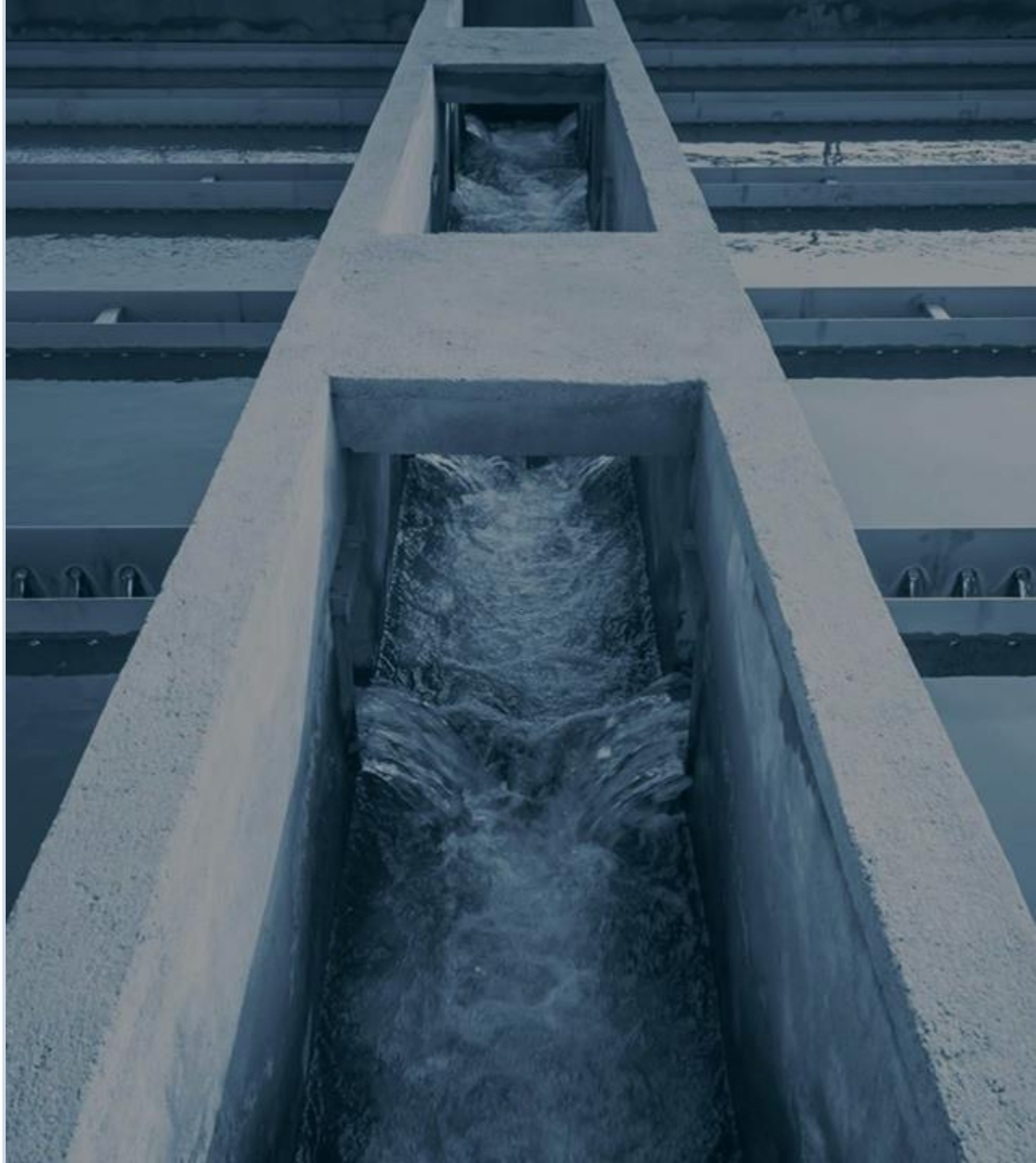
GE Healthcare

17,000+ babies born every day with the help of our equipment

The importance of scalability in automation

Areas to consider

- Development & roll-out
- Maintenance – total life cycle of applications
- Performance
- Vulnerability
- Accessibility

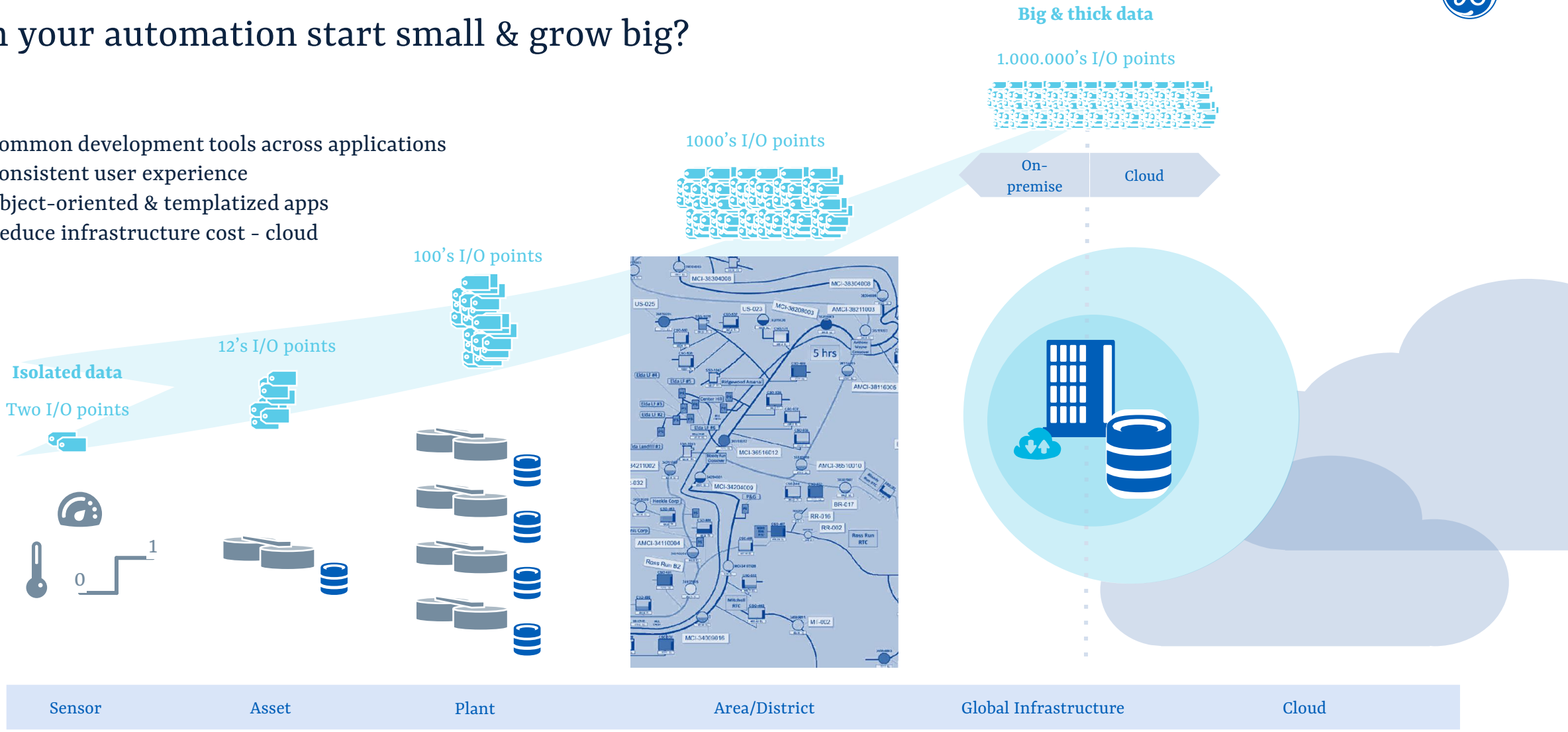


Development & Roll out

From sensor to cloud

Can your automation start small & grow big?

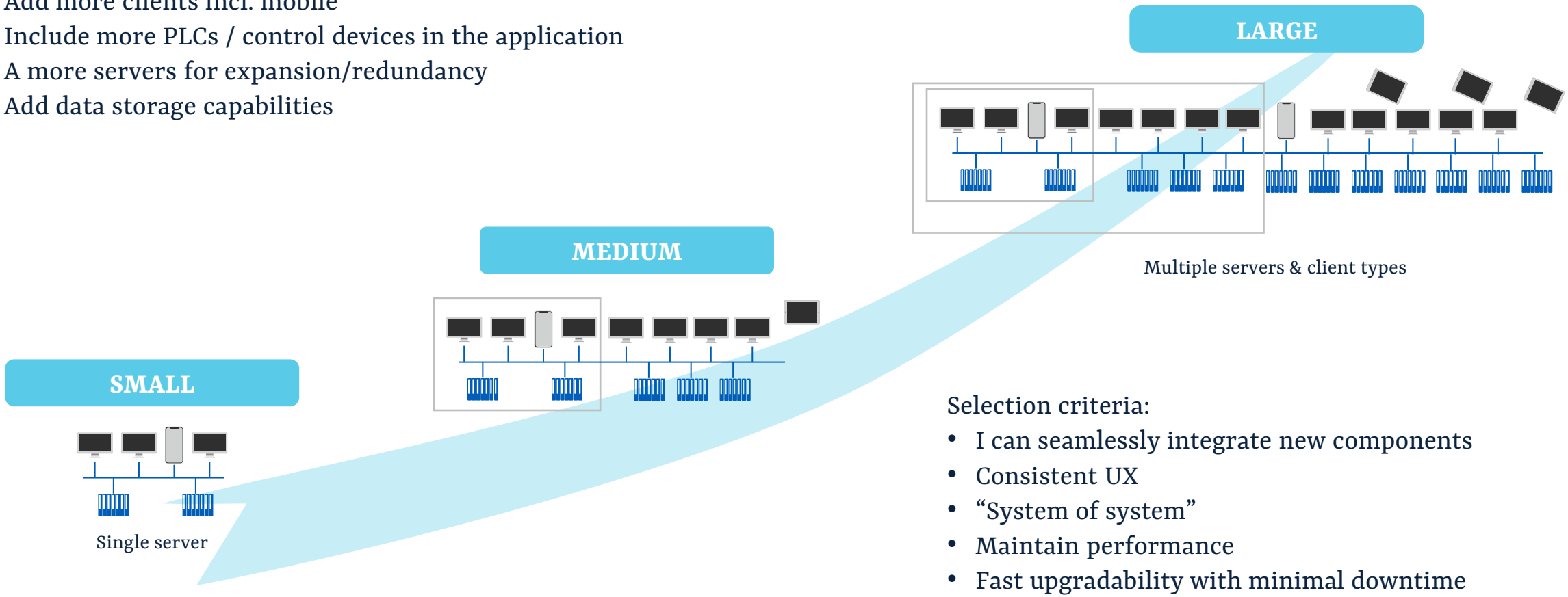
- Common development tools across applications
- Consistent user experience
- Object-oriented & templatized apps
- Reduce infrastructure cost - cloud



Automation that scales

Expand the system as required:

- Add more clients incl. mobile
- Include more PLCs / control devices in the application
- A more servers for expansion/redundancy
- Add data storage capabilities



Selection criteria:

- I can seamlessly integrate new components
- Consistent UX
- “System of system”
- Maintain performance
- Fast upgradability with minimal downtime

Scalability & flexibility

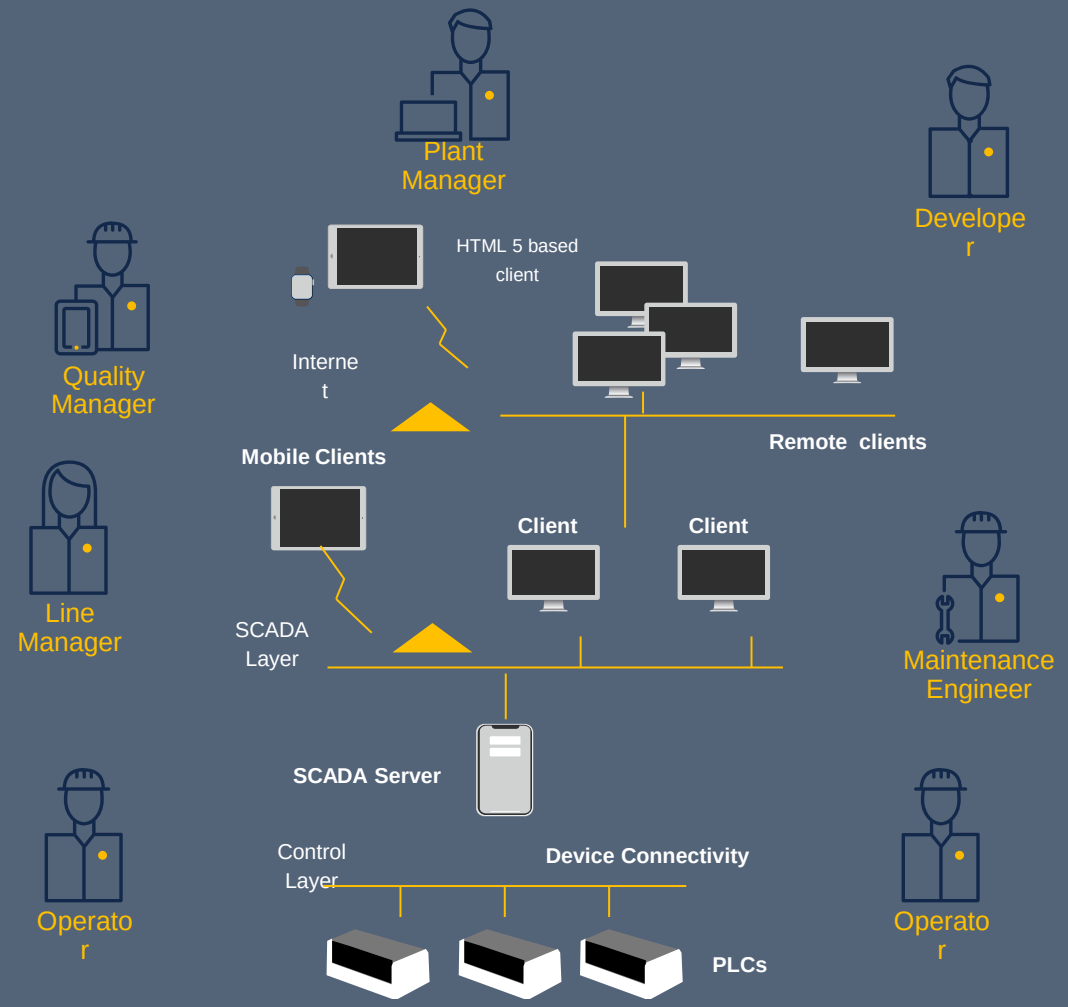
Choosing the right client for the job

A Client Server Architecture

- Scale from a single station point solution … to Enterprise applications.
- Supports hundreds of clients simultaneously

What type of client:

- Personas
- Thin or thick clients?
- On the plant floor & remote
- Use standard technologies:
  - Terminal Services
  - HTML 5 for interoperability
  - OPC UA for interoperability



Rapid Application Development (RAD)

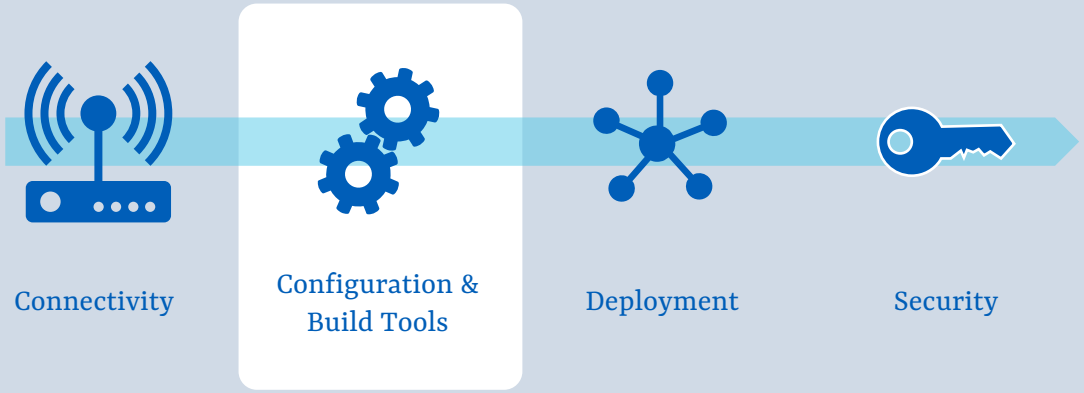
Faster time to value and adaption to change

Configuration vs. programming

An open ecosystem provides the most flexibility

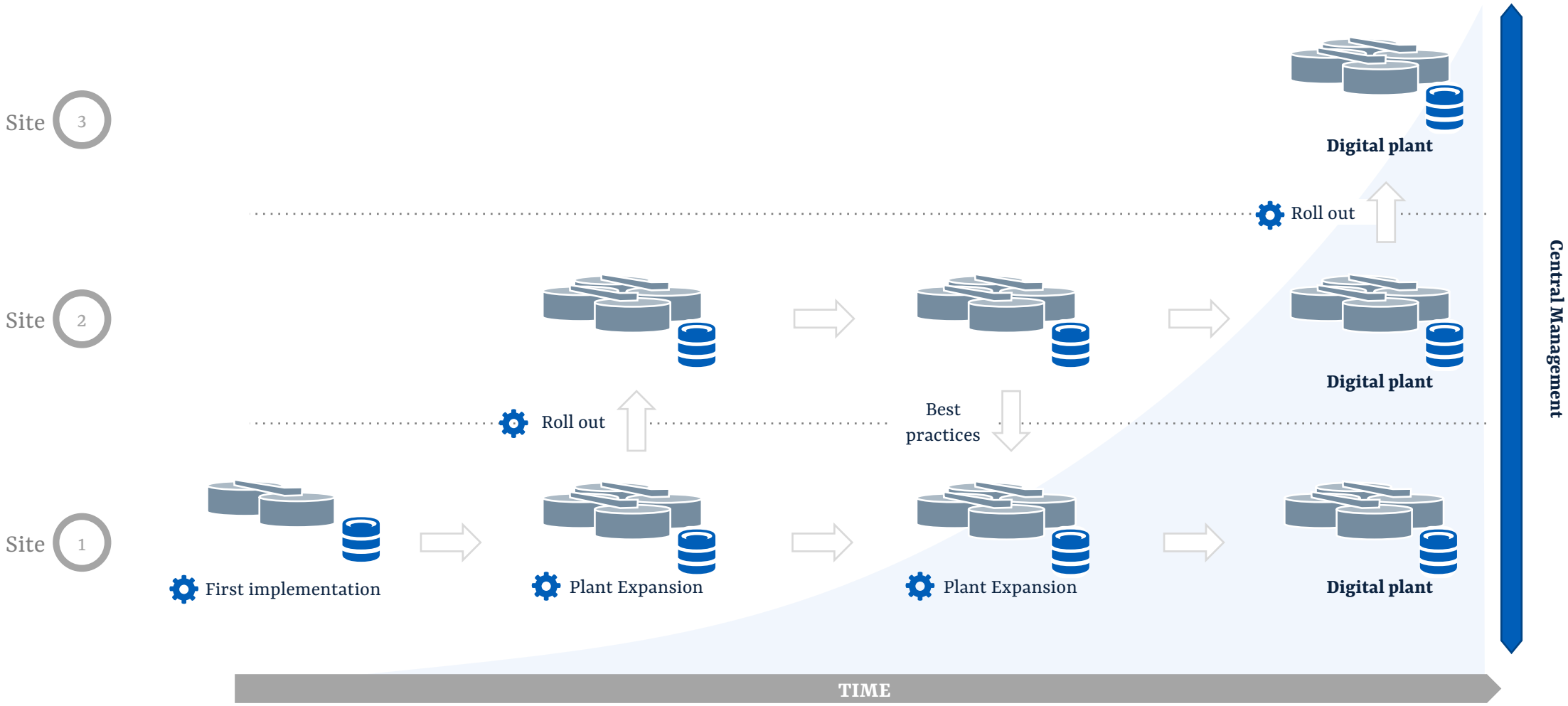
Data modelling & tag management are key - define your data structure/model once

Key capabilities out-of-the-box reduce development time – configure once & re-use



Reduce Build/Deploy Time & Reduce Overall TCO

Rollout Challenges – Company-wide



Cost of deployment & maintenance

5 points to consider

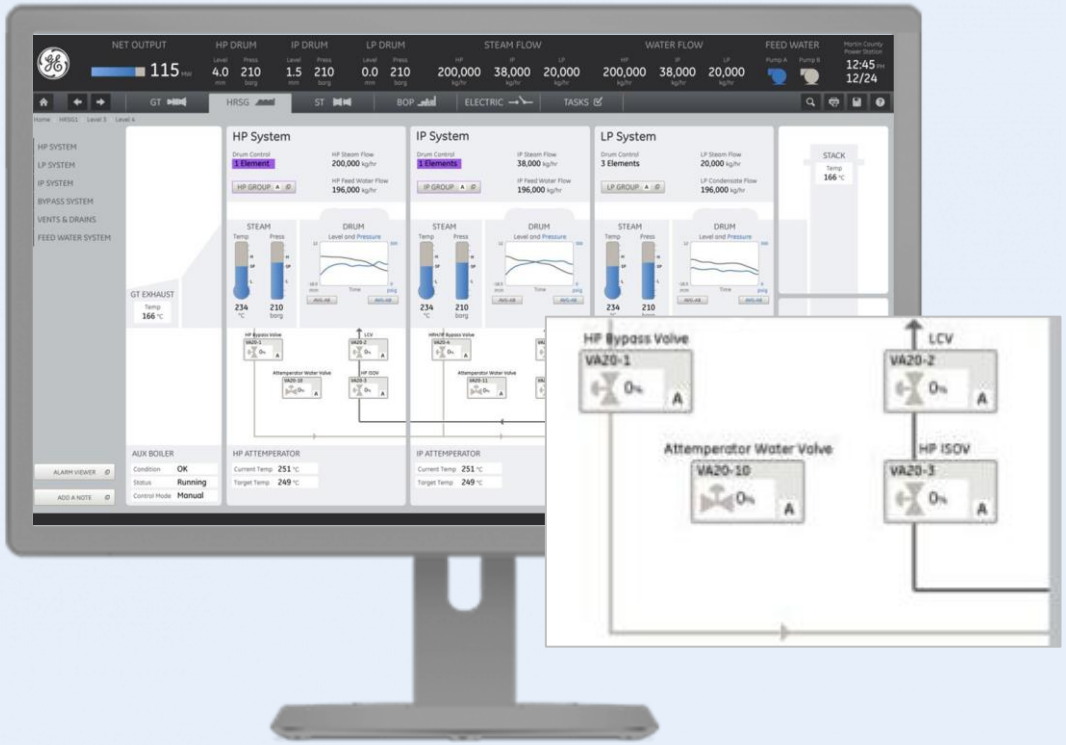
Installation: Anyone can do it – system shall be installed and running in just hours

Configuration: Intuitive, WYSIWYG interface, configuration – not programming

Data availability: Make required data available in a fast and easy way – connectivity & interoperability

Data & System accessibility: Remote access thru web tools for modifications & enhancements

Maintenance: Solution shall require minimum on-line maintenance – easy to scale & upgrade



Reduce costs of deployment & maintenance

Performance

Different applications require different execution speed

Company-wide analytics & reporting

Minutes to hours

"Control Tower"

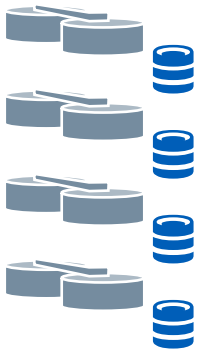
1 sec to a few sec

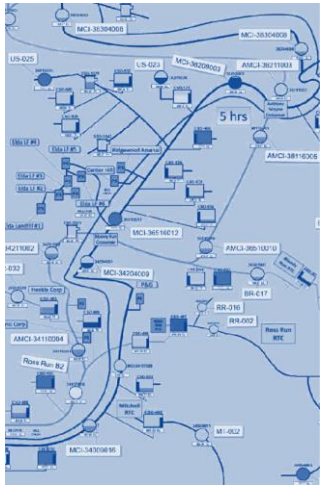
Few sec to a minute

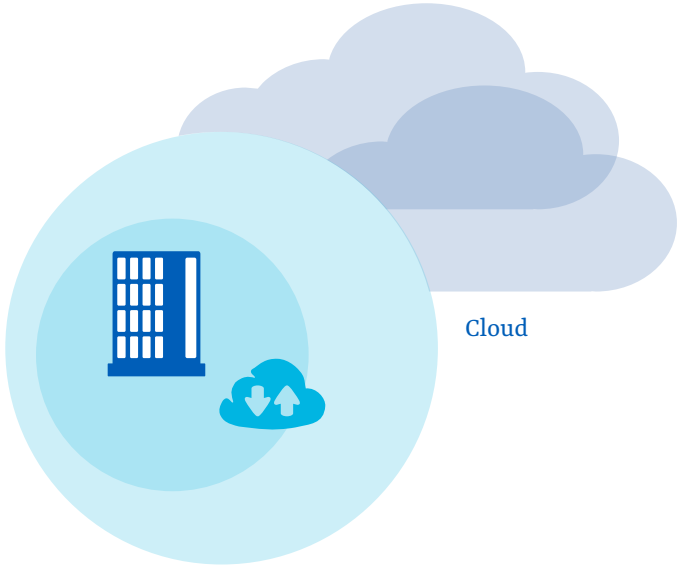
Automation / SCADA

Millisecond

Millisecond to < 1sec







Cloud

Sensor	Asset	Plant	Area/District	Global Infrastructure	Cloud

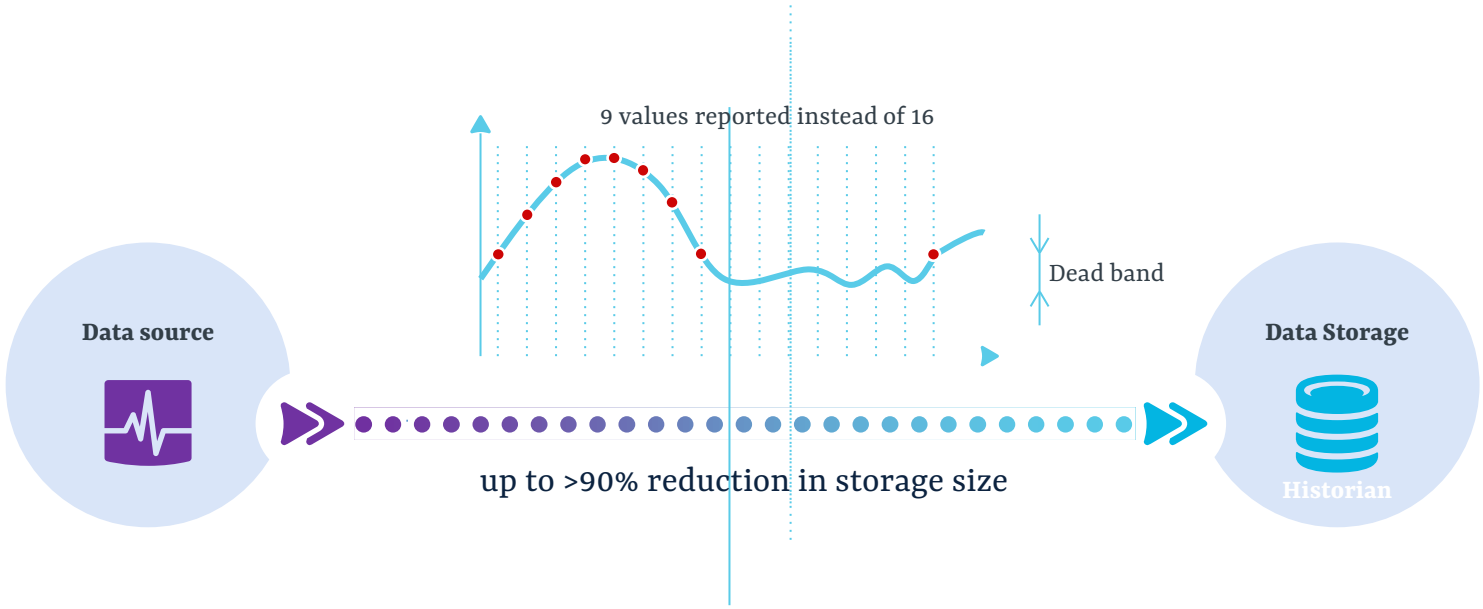
What it means for industrial data

Operational data requires “near real time” speed to ensures optimal analysis & decision making – no data gap allowed!

RDBs(1) cannot meet high performance data collection

An industrial data historian provides efficient data storage and compression:

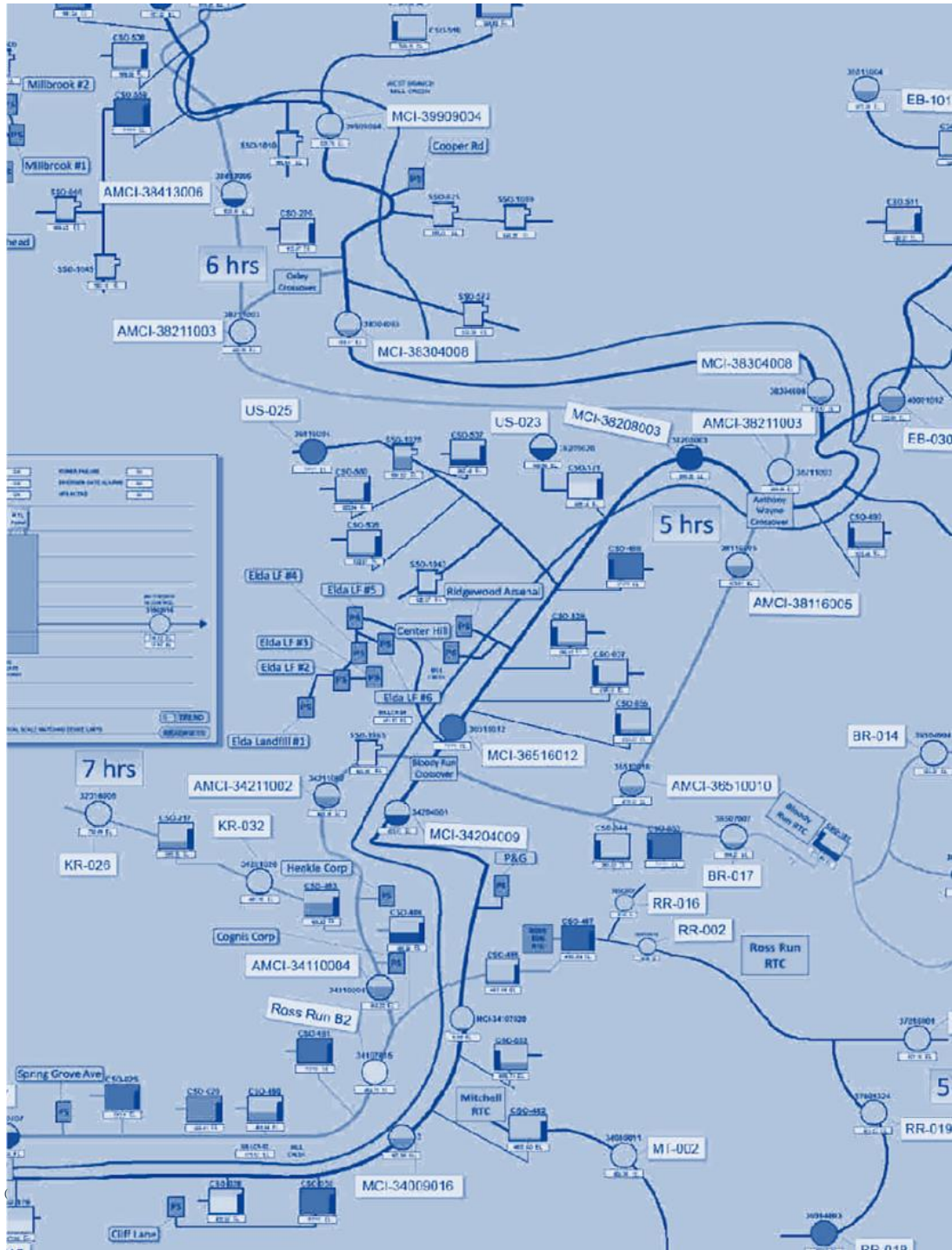
- Reduce storage size
- Improve performance
- Decrease IT costs



(1) RDB: Relational Database

Optimizing data access for performance

- Polling vs. report by exception/ event
- Optimizing request to control system to reduce load
- Hybrid cloud deployment based on data categorization

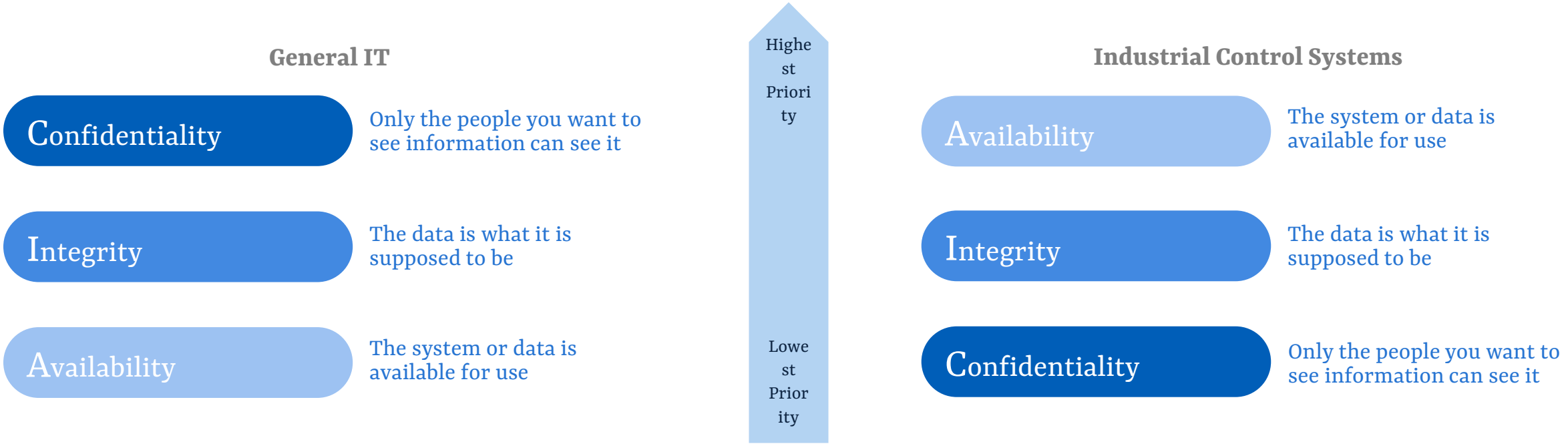


Cost of vulnerability

Production data needs to be highly reliable and available to ensure accuracy and quality for improvements

Security Goals - The “CIA” model

Maintain the **Confidentiality**, **Integrity** and **Availability** of systems and data



Ref.: Cyber Security Assessments of Industrial Control Systems, CNPI / US Homeland Security

Data vulnerability – points to remember

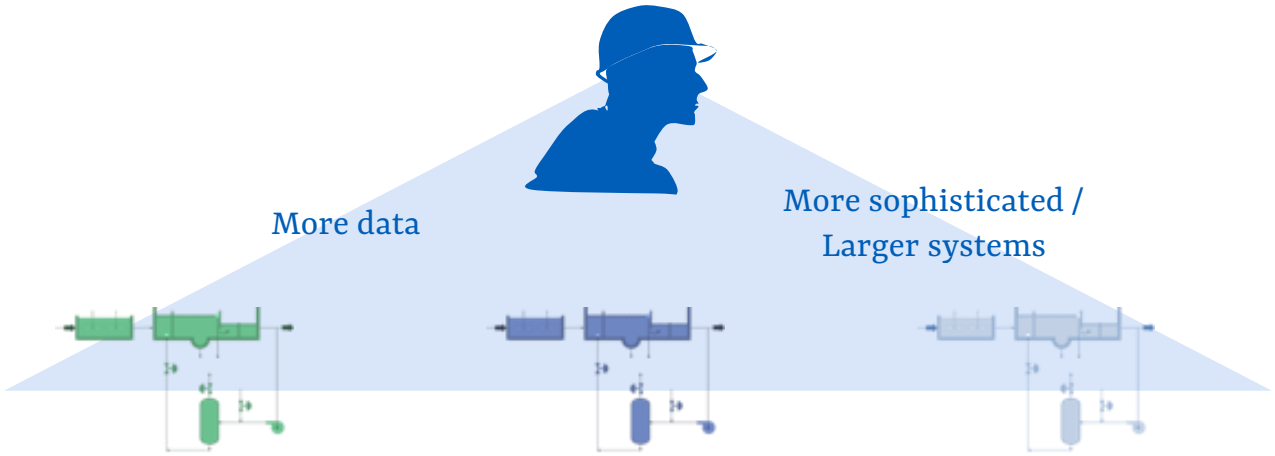
- Address the 3 security pillars: Availability, Integrity, Confidentiality
- Improve system availability with regular upgrades & alignment to latest features - You may have higher, hidden costs by continuing to use an obsolete system
- Use redundant & failover configurations for minimal disruption - Avoid downtime and information gaps
- Pick a solution which integrates with your IT security such as Active Directory & multiple domains support (MFA*, biometric login, …)

* MFA: Multi-Factor Authentication

Accessibility

The right information anywhere, any time

Visualization a control that scales



- A single source of truth, from operators to managers
- Persona-based visualization - Get operational information in the hands of the people who need it
- Equip your workforce with mobile devices – for increased efficiency
- A holistic view of the performance to increase collaboration

Example

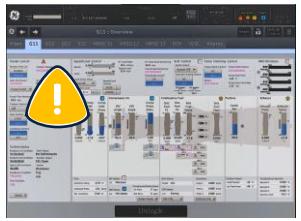
Remote monitoring and control of a large critical plant at GE Power

Remote monitoring & control at GE Power

Control room
(supervisor)

Full Control

Plant floor
(operator)



Monitoring only
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Remote monitoring & control at GE Power

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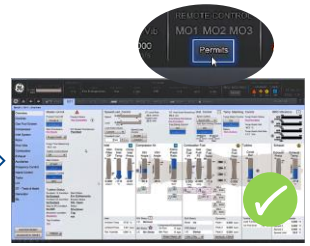
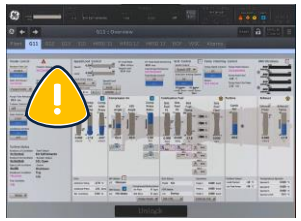


Permits

Grant access

- Operator #1
- Asset G11

Plant floor
(operator)



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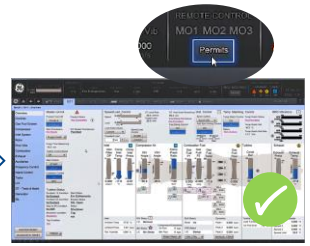

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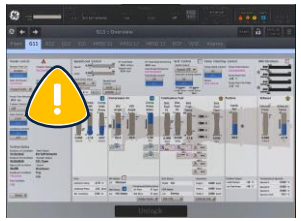

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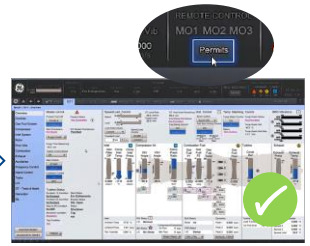

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Plant floor
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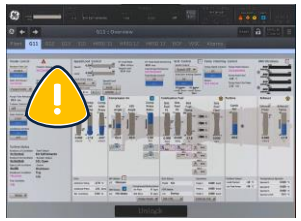

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Access granted

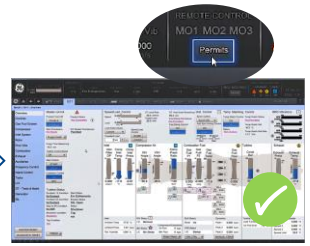
First pop up

Confirm action

Remote monitoring & control at GE Power

Control room
(supervisor)

Full Control



Permits

Grant access

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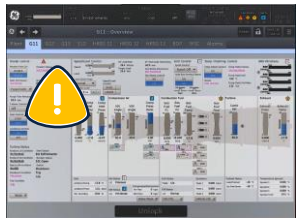
Supervisor *can take over if needed*

Control back to Supervisor

Back to normal

Plant floor
(operator)



Monitoring only
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Access granted

First pop up

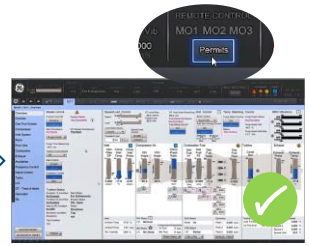
Confirm action

Release control

Remote monitoring & control at GE Power

Control room
(supervisor)

Full Control



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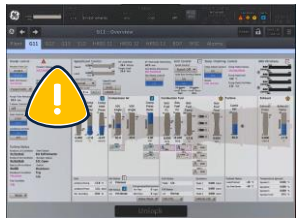

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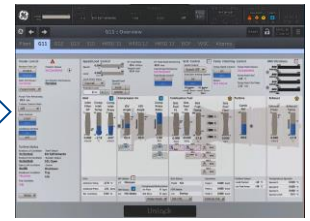

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Company-wide visibility for central operations

Key to success

- Designing the optimal interfaces
- Enabling better collaboration between:
  - Remote operators,
  - SMEs,
  - plant personnel,
  - Etc.

Summary:
The requirements for truly scalable automation

1. Use a modern, integrated architecture
2. Ensure interoperability between components –use standards
3. Assess scalability of all components & plan for space capacity
4. Develop a strong data management strategy – information flow across the facilities, storage & retrieval
5. Develop once and reuse
6. Gain control tower visibility to provide process, data, and key metric transparency.
7. Secure data and applications access – built-in security
8. Optimize your legacy technology investment

Centralized, remote & mobile operations

Key outcomes

- See all OT/IT information in context
- Make better informed decision
- Democratization of digital tools give greater accessibility
- Ability to leverage analytics for assistance, advanced warnings & intelligent decision making

Faster response time & increased operational agility

Realized outcomes & ROI*

Chemicals: 37% increase in abnormal situation handling, ROI less than a year

Water utility company: 40% faster troubleshooting, ROI less than a year

Power: 70% increase of UX usability score

Building management: 25% reduction of energy bill, ROI ~18 months

* Customer interviews

Thanks!

Q&A

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