THE ASSEMBLY SHOW
OCTOBER 24-26
2023
ROSEMONT, IL
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AGR
THE ARTHUR G RUSSELL COMPANY

Customer Service and Support:

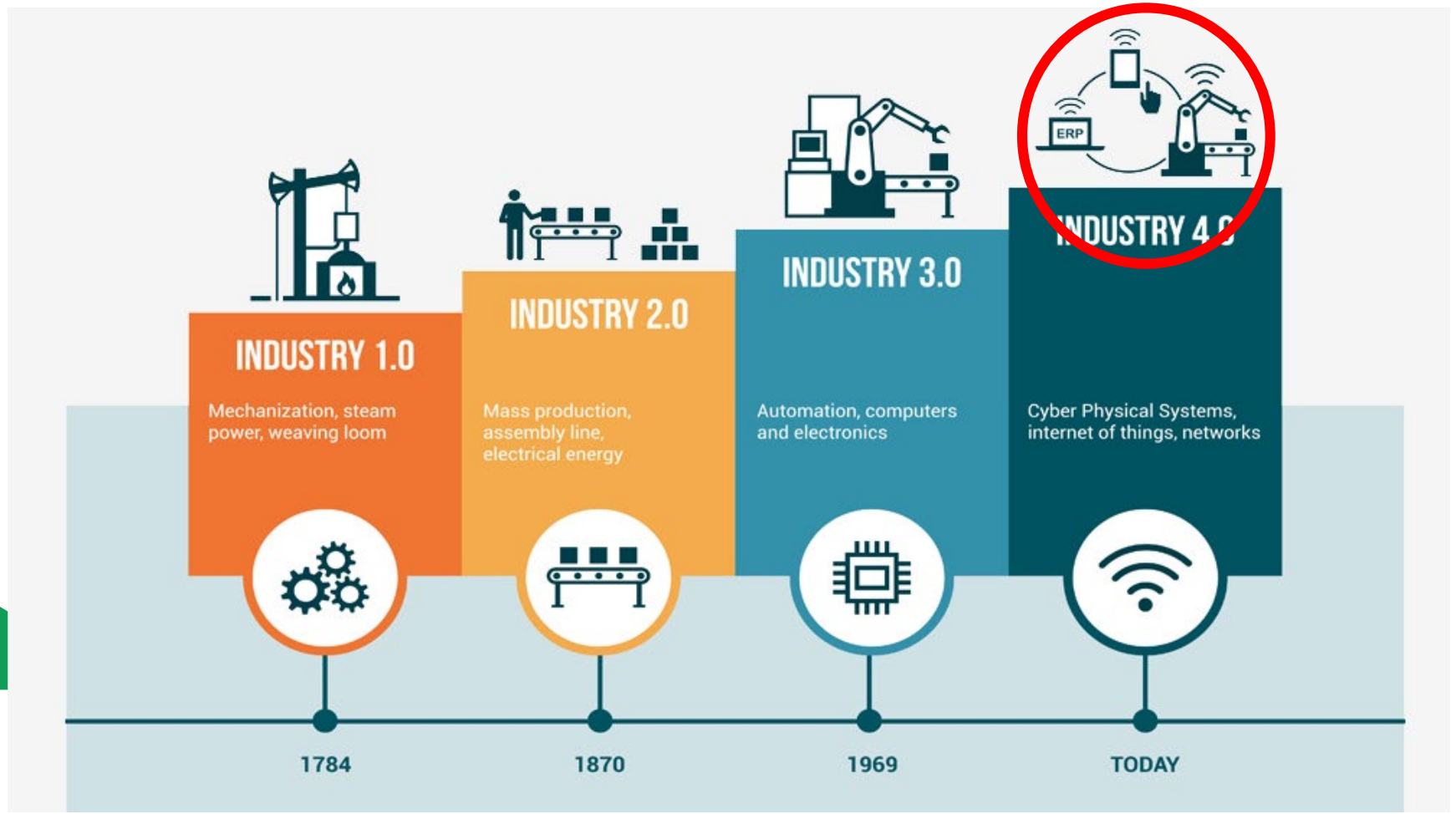
OEM and SI Leverage of Industry 4.0. Not Such Dangerous Liaisons

October 2023

Agenda

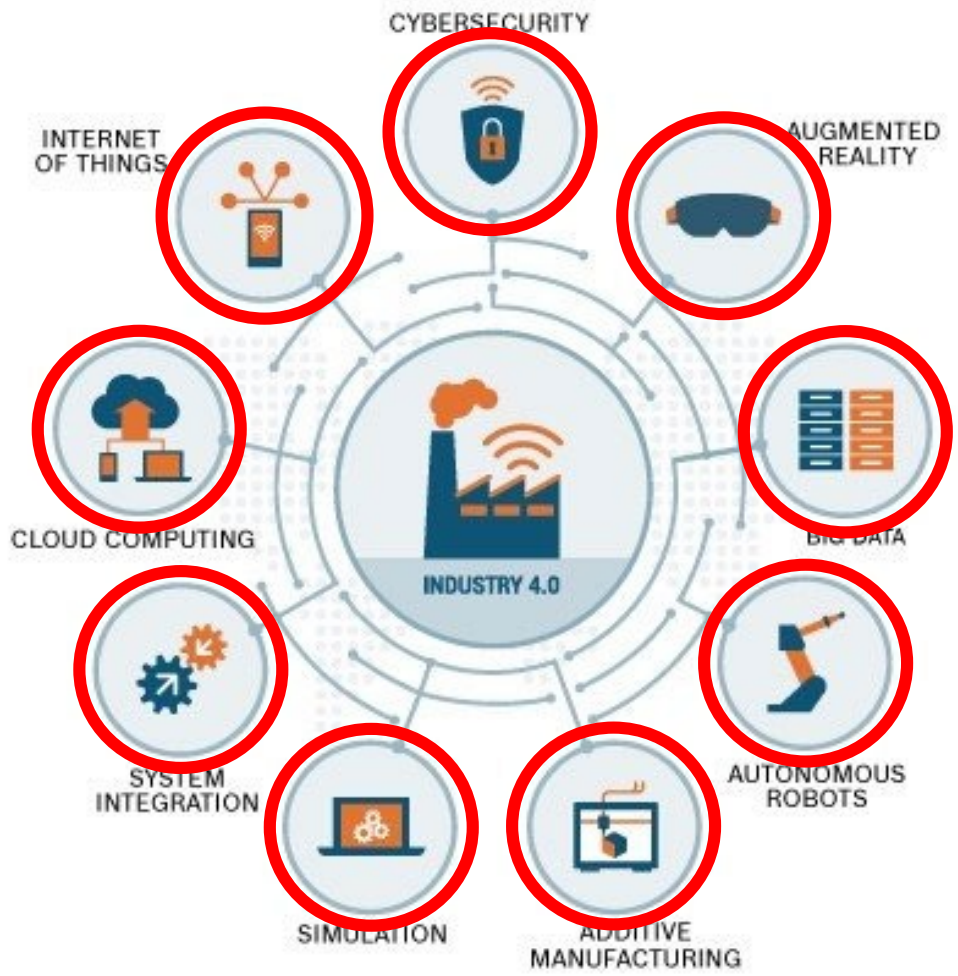
- What is Industry 4.0?
- Original Response to Industry 4.0
- What OEMs are seeing
- Why is that?- What is missing in industry?
- Readiness and maturity of the customer
- IIoT integration considerations
- Components of a support program leveraging Industry 4.0
- Leveraging AI
- Lemonade from lemons (leveraging i4.0 for support offering)

What is Industry 4.0?



Industry 4.0 Pillars

AGR's Focus and Use



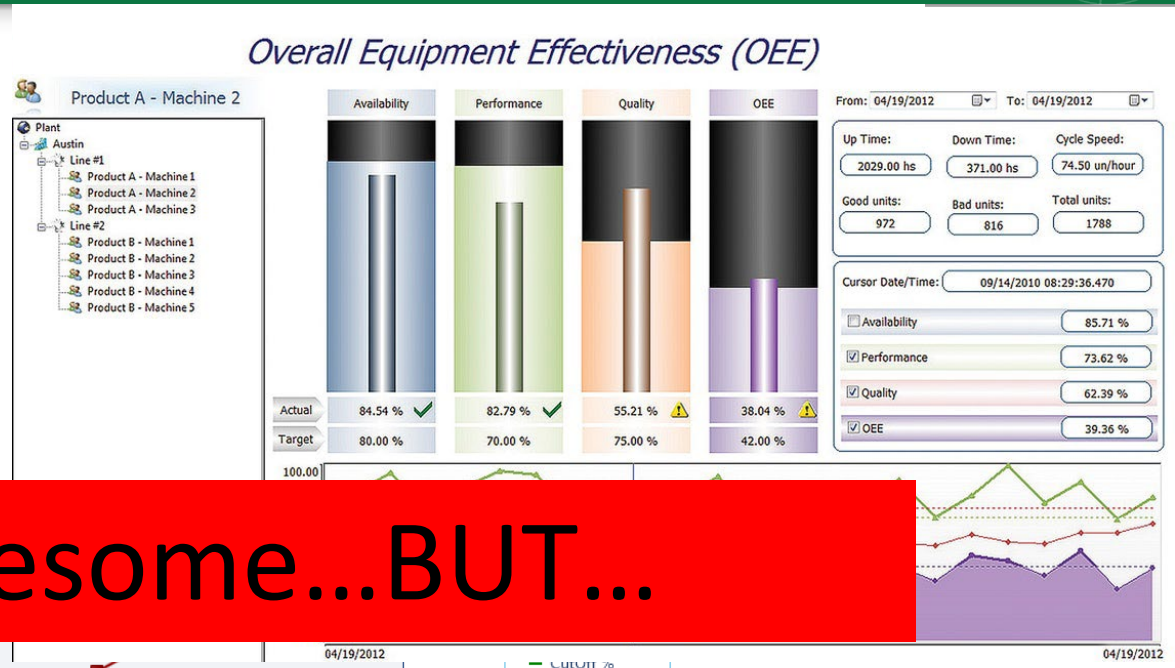
i4.0T areas of focus:

- Internet of Things (IIoT)
- System Integration
- Big Data Analytics
- Augmented Reality
- Cloud Computing
- Cybersecurity
- Advanced Robotics
- 3D Printing (additive)
- Simulation

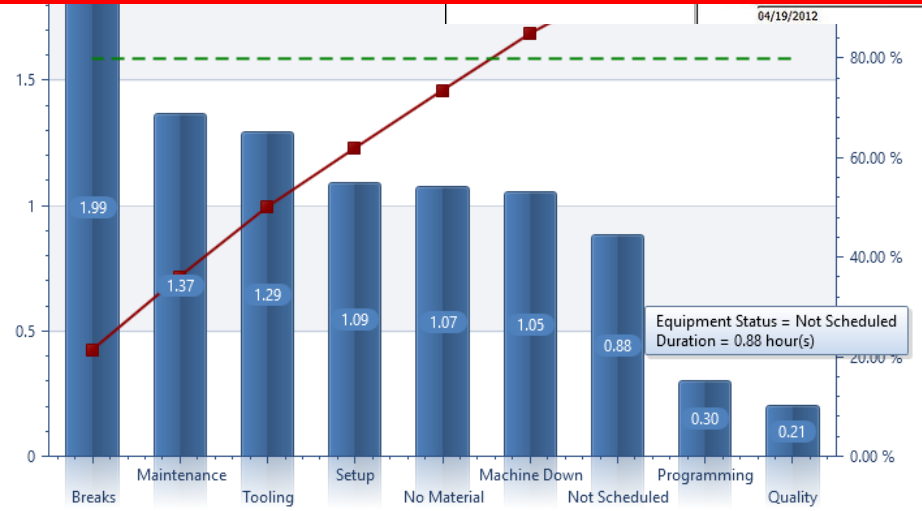
First Pass Offering

Enable machine for i4.0T for customer's use:

- Add sensors
- System Integration
- Add a module for onboard analytics
- Results in…



This is awesome…BUT…

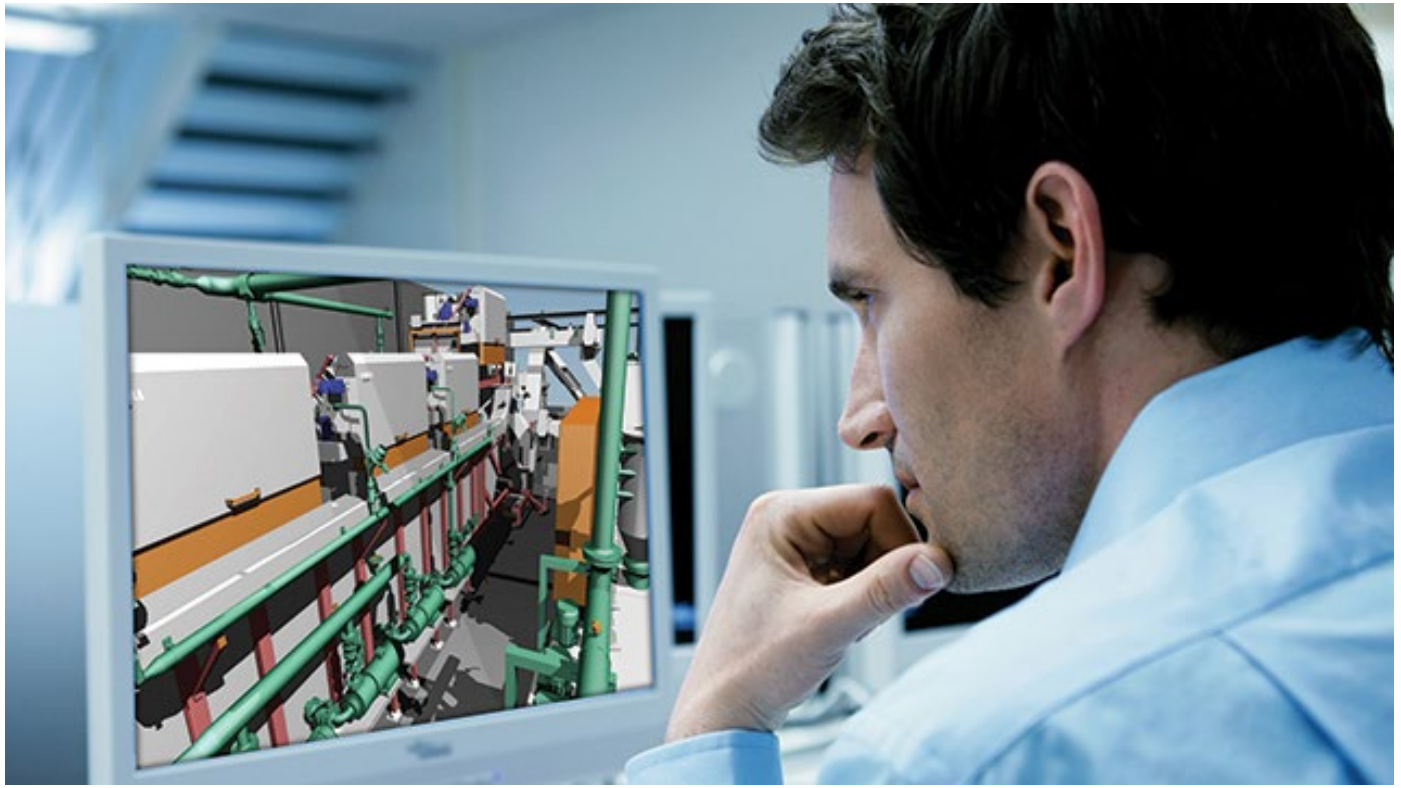


Outputs & Dashboards:

1. Machine Speed Profile
2. Output Bottlenecks
3. Lost Time Pareto
4. Scrap Pareto
5. Station timing Analysis
6. Operator Response time
7. KPIs - sensors and processes

What OEMs Are Seeing

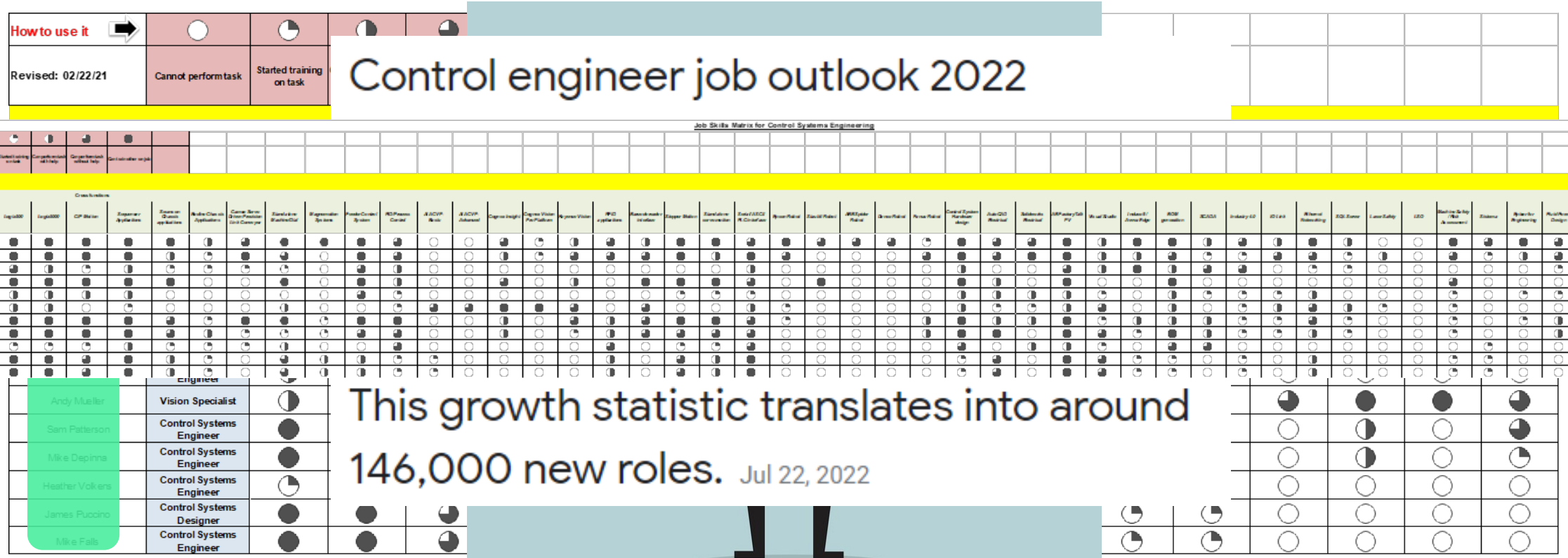
- Customers are engaging OEM partners to be part of the maintenance and support of the machinery.
- In real time



Source: © Siemens USA

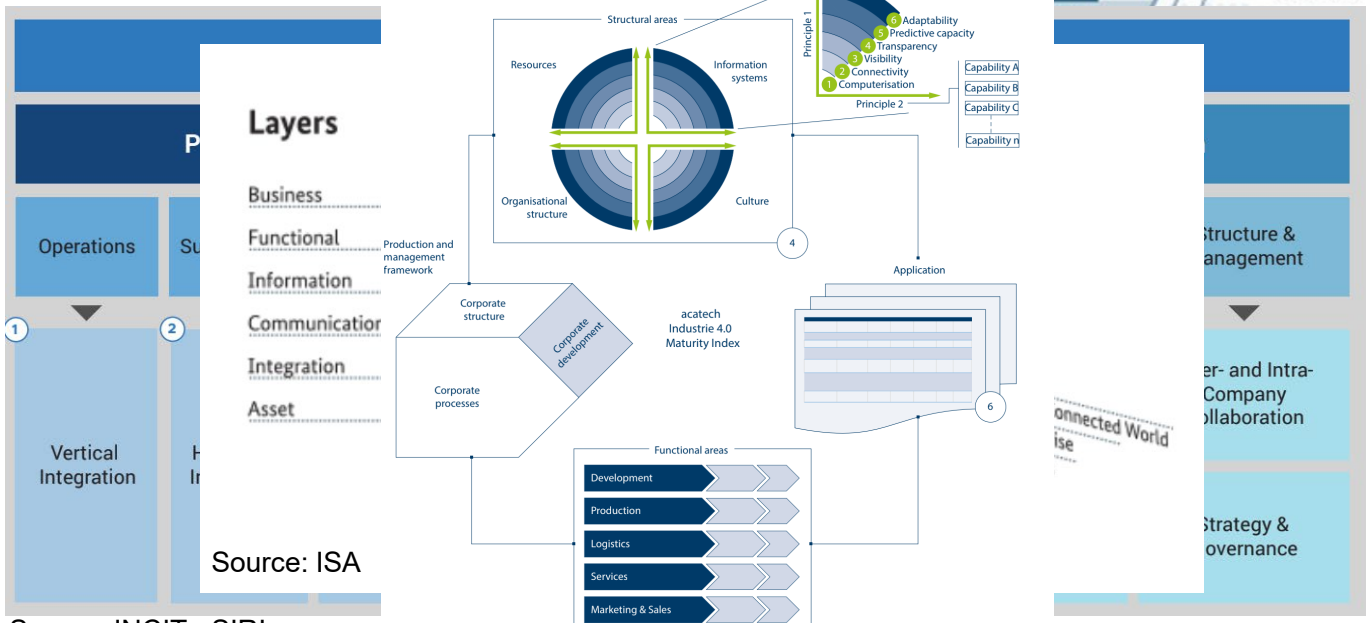
Why?

- Why is that?- What is missing in industry?



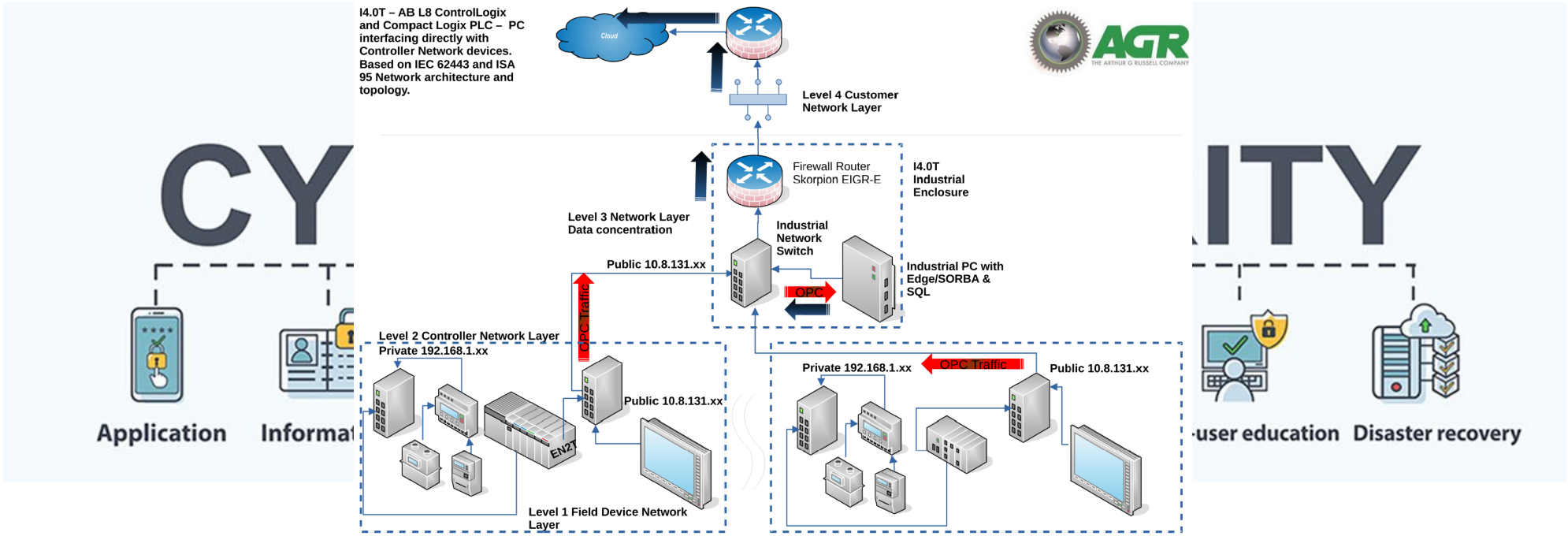
What's needed to make the transition

- Leverage Industry 4.0 techniques
- Readiness and maturity of the customer
- Ready as a culture and technology
- Readiness must be all-encompassing
- Assessment tools
  - Siri
  - RAMI
  - Acatech
  - Many others



What's needed to make the transition

- Unique to each company
- Technology seems to be the first and easiest "go-to"
  - Might be putting the cart before the horse
- Cybersecurity
  - Network Infrastructure
  - Understand and participate in customer's cybersecurity



IIoT

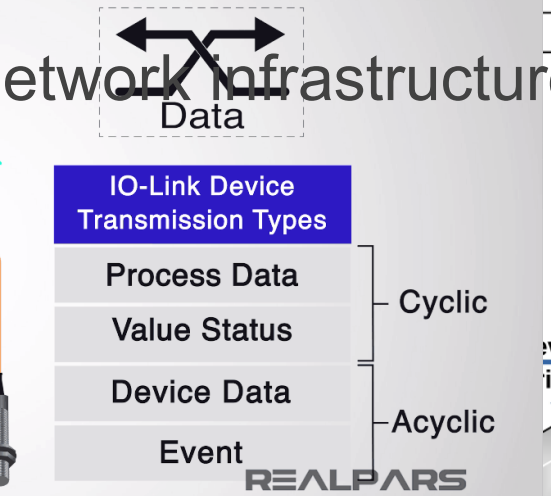
IIoT

IIoT steps

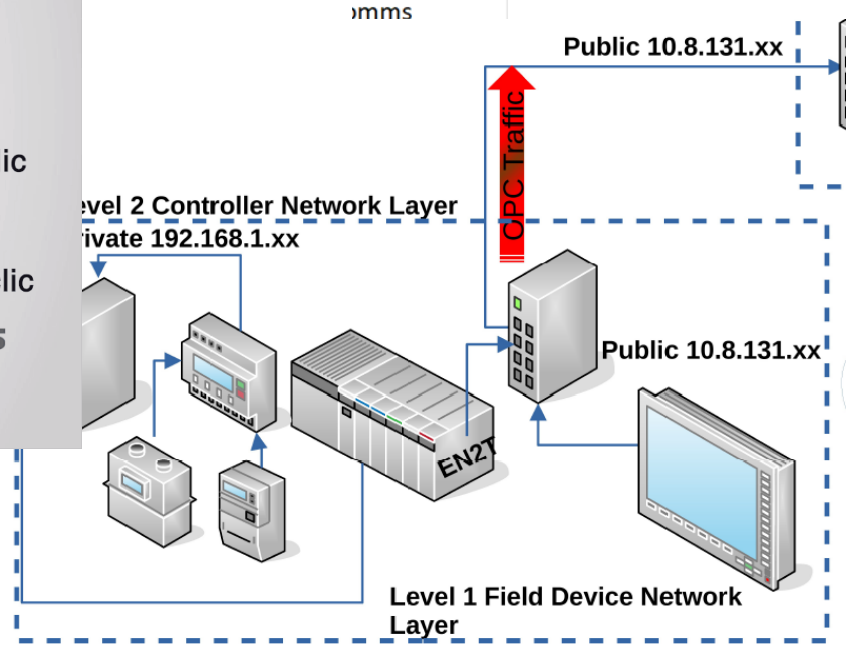
- Expose the data
  - Technology
  - Sensors
  - Machine network
    - Public and private network infrastructure

	A	B	C	D	E	F
1	Station Number / I					Vision Inspect Hub Orient
2						
3	Type of station					Vision
4	Cycle Timer exist (y					N/A
5	resolutio					
6	Data poi					
7						
8						
9						
10						
11						
12						
13						

Source: © Banner Engineering



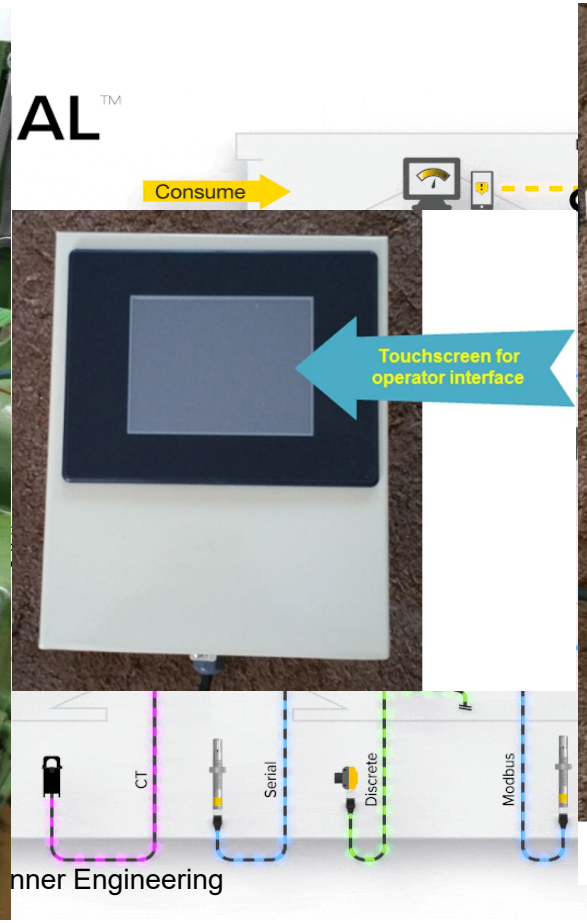
Source: © Realpars

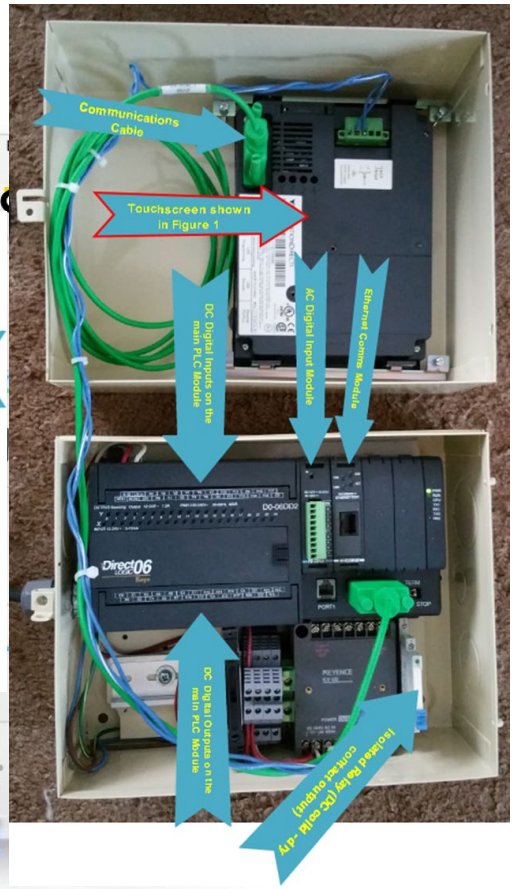


IIoT

IIoT steps

- Don’t leave out legacy machines

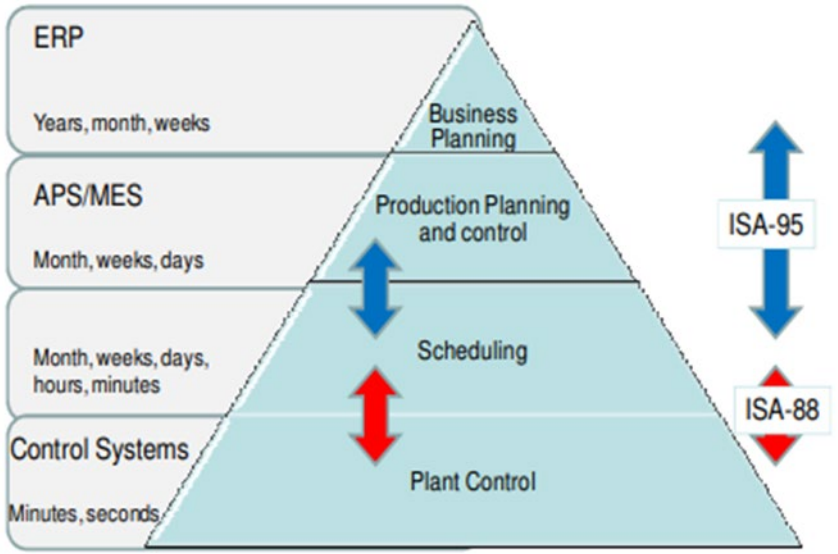




IIoT

IIoT steps

- Collect the data
  - Database – a repository of some kind
  - Cloud or local considerations
    - Depending on the level of security needs (medical device, pharmaceutical), local may be the only option



IIoT

IIoT steps

- Analyze the data
  - There are a myriad of ways to do this
    - Some SCADA packages have this built in
    - Offline analytics examples:
      - PowerBI
      - Excel from a rudimentary standpoint
      - Sorba AI – local– covers the scenarios where data has to stay on-prem
    - Online analytics examples:
      - Sorba AI – cloud analytics – covers the scenarios where data has to stay on-prem
      - Aveva
      - ThingWorx PTC

IIoT

IIoT steps

- Apply the learning
  - Probably the most important part and the differentiator between Industry 3.0, 3.5, and 4.0.
  - The cyber-physical interface to the factory floor and the “closing of the loop” by applying the learning from the historical past and experience
  - Forecasting and AI

Leveraging i4.0T

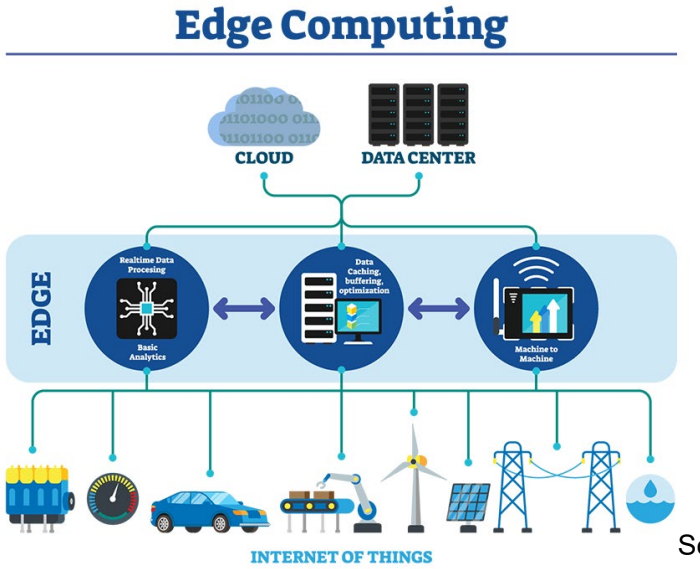
Components of a support program leveraging Industry 4.0

- Technology
- Software
- Storage – To cloud or not to cloud. That is the question!
- Augmented Reality (AR)

Leveraging i4.0T

Components of a support program leveraging Industry 4.0

- Technology
  - Edge computing
    - Cuts down on network traffic
    - Distributes computing power (computers can be less capable, therefore less costly)
    - Federated system topology is possible



Source: IEEE

Leveraging i4.0T

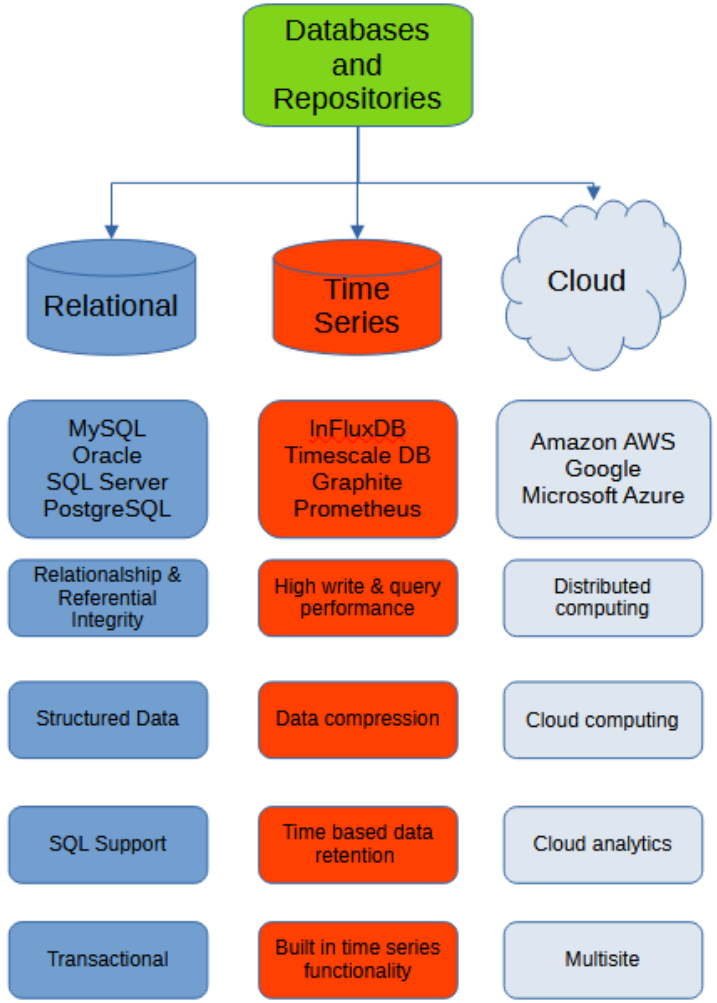
Components of a support program leveraging Industry 4.0

- Software and Data Storage
  - AR software for meetings (TeamViewer Assist AR, Vuforia)
  - Data gathering interface (MQTT, OPC or part of larger program)

Leveraging i4.0T

Components of a support program leveraging Industry 4.0

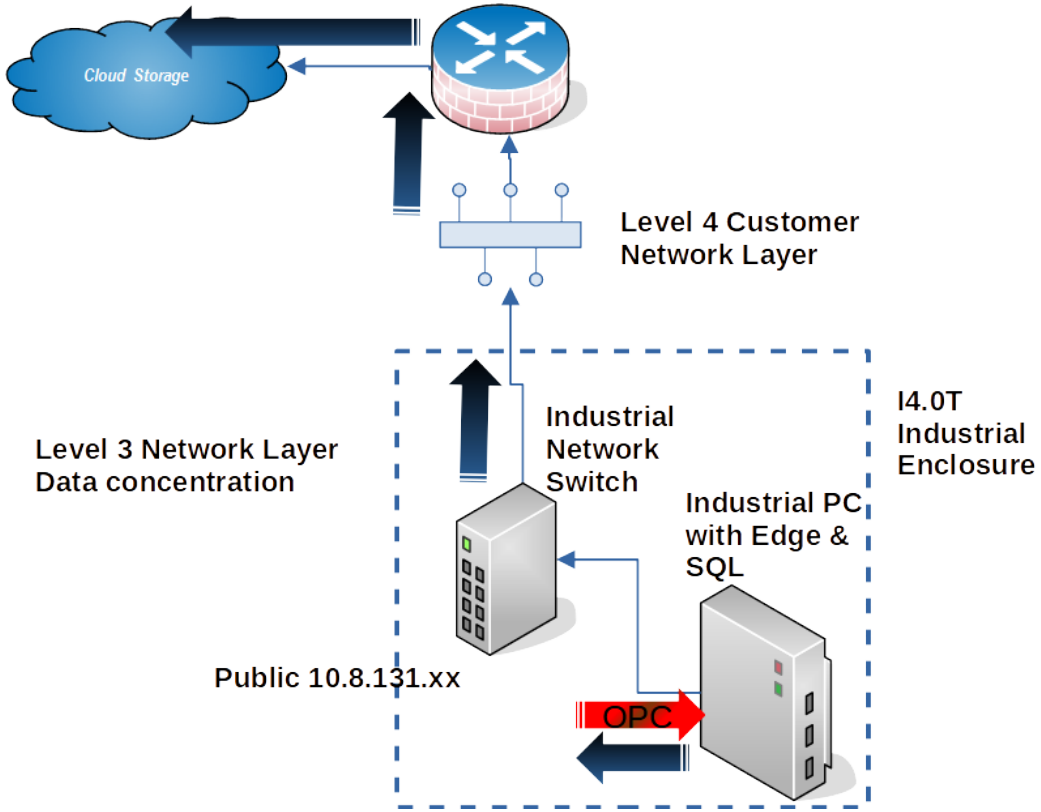
- Repository
  - Relational DB (e.g. MS SQL)
  - Time Series DB (e.g. Influx)
  - Cloud Data Services (e.g. AWS)
    - Vendors such as Aveva, PTC, Sorba have their own cloud path (which may be leased space from AWS or others)
- Cloud analysis for trend analytics
- AI software
  - Important to understand data types
  - Image based or time series data



Leveraging i4.0T

Components of a support program leveraging Industry 4.0

- Storage – to cloud or not to cloud
  - On-prem
  - Cloud
  - hybrid



Leveraging i4.0T

everaging Industry 4.0

, we can talk them through a
ng event
these here

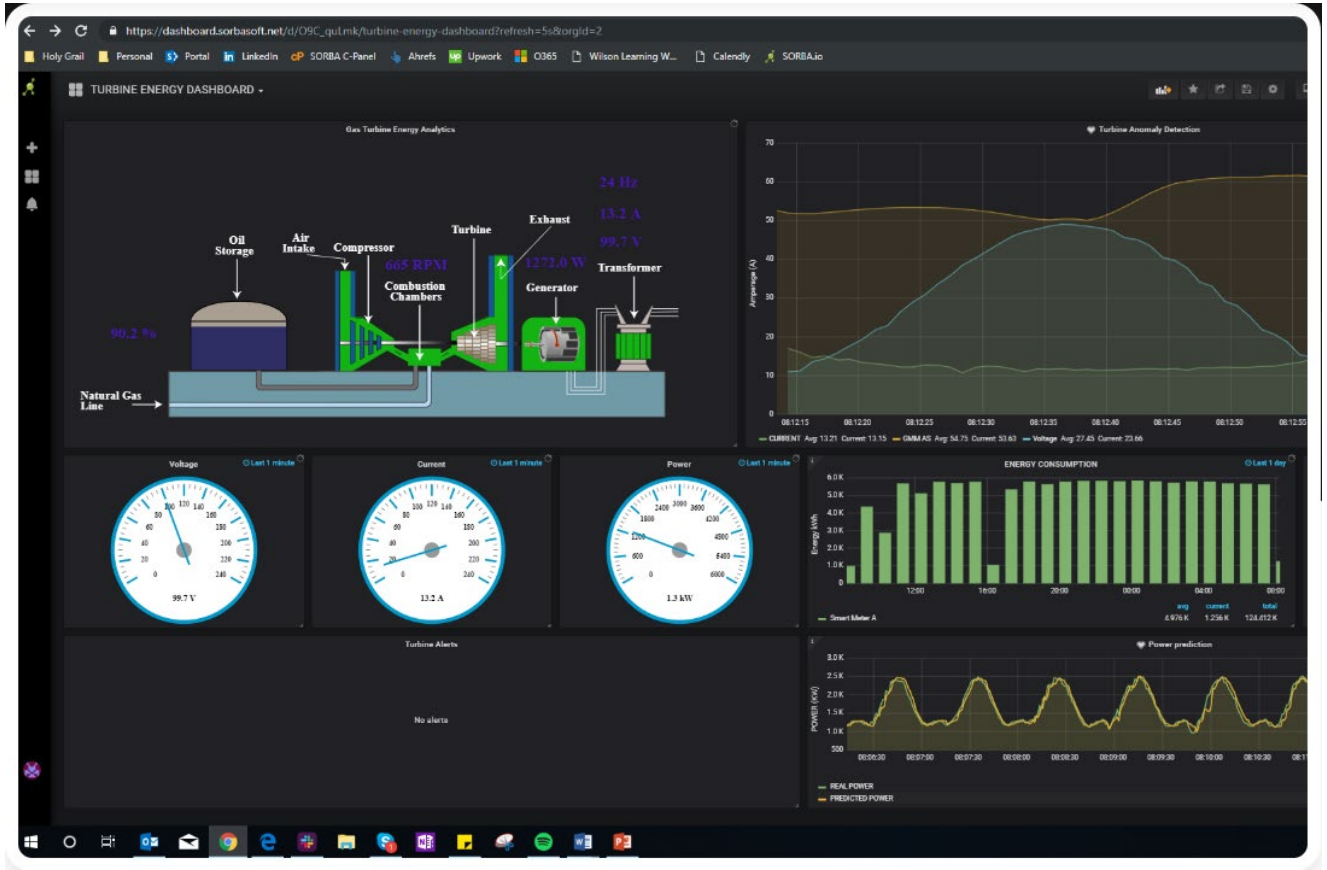
TeamViewer Assist AR

- Some level of
- If IT and cybe
  things like Mo
  a cell connect
- Meeting software
  AR or Vuforia Ch

Leveraging AI

Leverage AI

- Support response with predicted and prescriptive maintenance
- Bottleneck analysis
- Anomaly detection
- Remaining useful life
- And more….



Source: Sorba AI

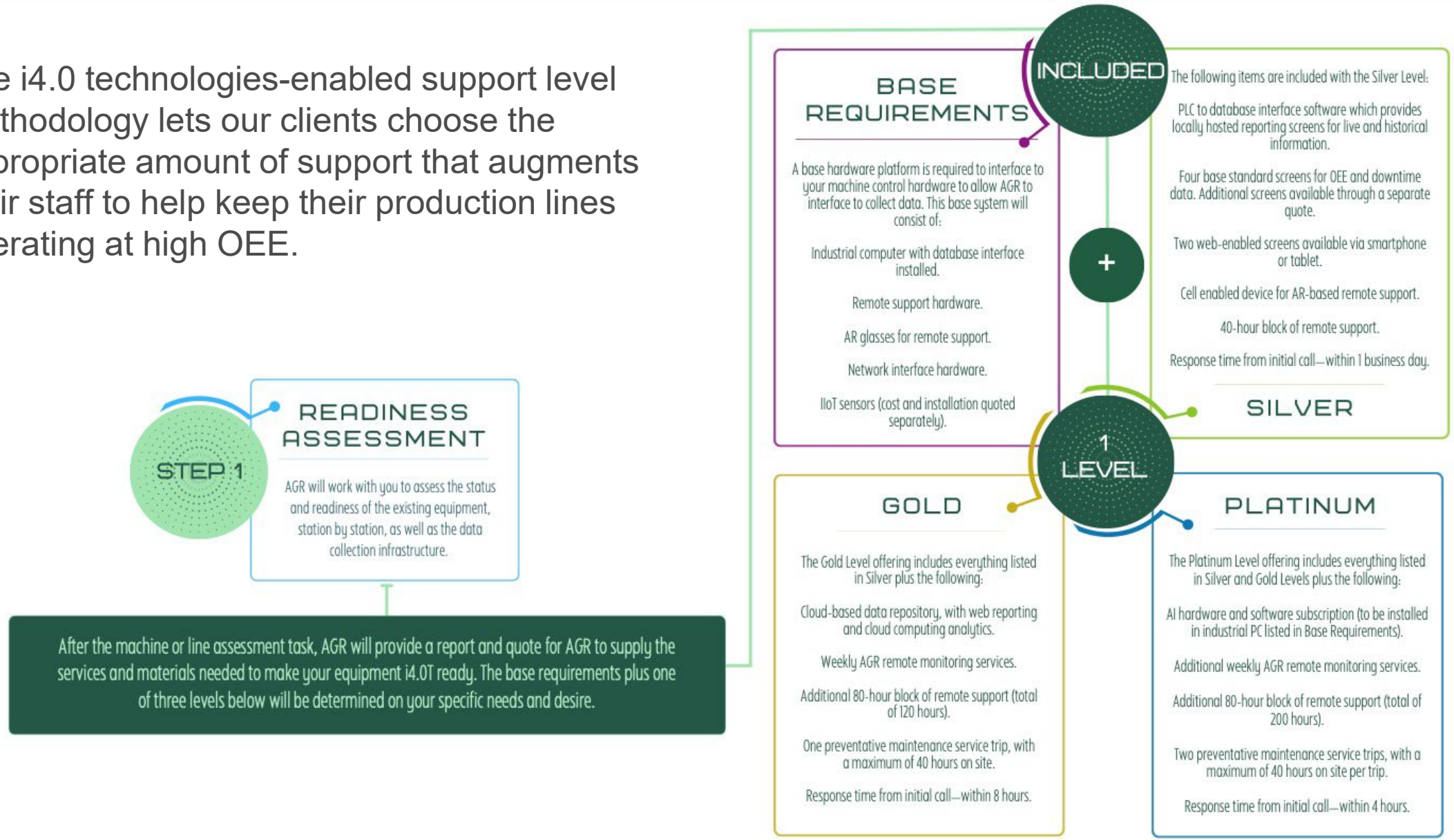
Lemonade from Lemons

Lemonade from lemons (leveraging i4.0 for support offering)

- Requirements for support
- Use all the discussed facets of Industry 4.0
- AGR's offering
  - Answers customer needs
  - Support and monitoring program differentiates us through a more complete and diverse offering

i4.0 Technologies Enabled Support Program

The i4.0 technologies-enabled support level methodology lets our clients choose the appropriate amount of support that augments their staff to help keep their production lines operating at high OEE.



Questions?

Thank You!

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Thank You!

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