PLATAINE®
people-smart automation

Smart Manufacturing Best Practices: Supporting Ramp-up in Challenging Production Environments

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Agenda

- Addressing the Current Industry Challenges
- The Digital Factory Vision
- The Critical Steps for a Fully Connected, Intelligent, Digital Factory
- Challenges & Best Practices
- Pushing the envelope; taking it to the next level

Market Proven Solutions in the Most Challenging Production Environments

Select Customers

AIRBUS GROUP
天津波音复合材料 波音合资公司 Boeing Tianjin Composites A BOEING JOINT VENTURE BOEING
QARBON AEROSPACE
BLUE ORIGIN
IAI
tpi
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CTRM DRB-HICOM
Triumph Group, Inc.
KAMAN
STARK
AAT COMPOSITES
ALESTIS AEROSPACE

Select Partners

SAP
SIEMENS PLM SOFTWARE SIEMENS
CTC An Airbus Company
The University Of Sheffield. AMRC ADVANCED MANUFACTURING RESEARCH CENTRE
McKinsey &Company
Marubeni
NATIONAL COMPOSITES CENTRE

Awards and Recognition as Market Leader

Information Security Management System ISO 27001 Certified

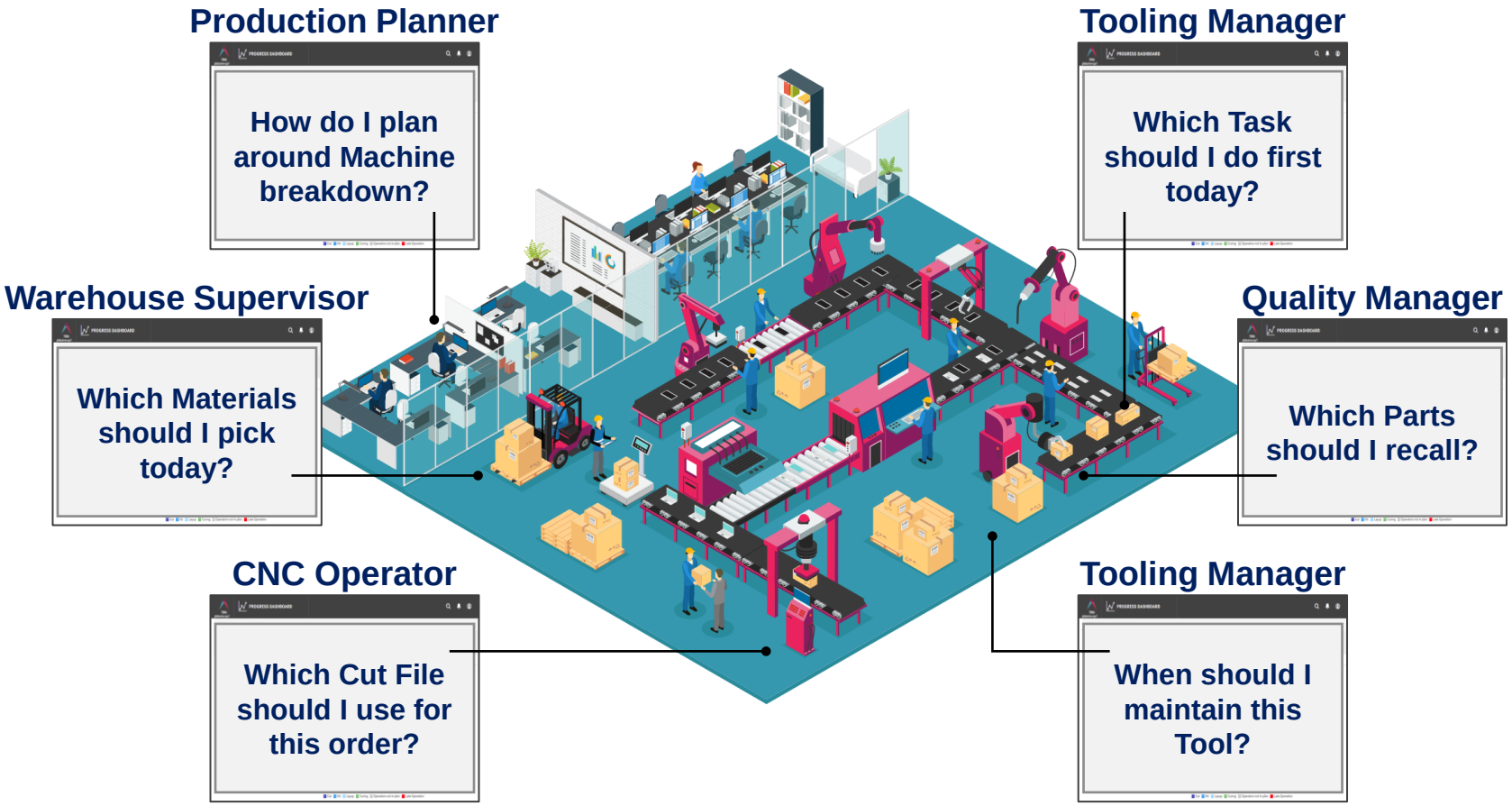
FROST & SULLIVAN BEST 2021 PRACTICES AWARD

JEC GROUP WINNER OF 2014 INNOVATION AWARD

CompositesUK Trade Association
Industry Award Winner 2016 - Innovation in Manufacture

A Day in the Life of a Factory

Shop-level staff make **dozens of decisions** daily with
limited data, poor visibility, and with poorly connected systems



The result:

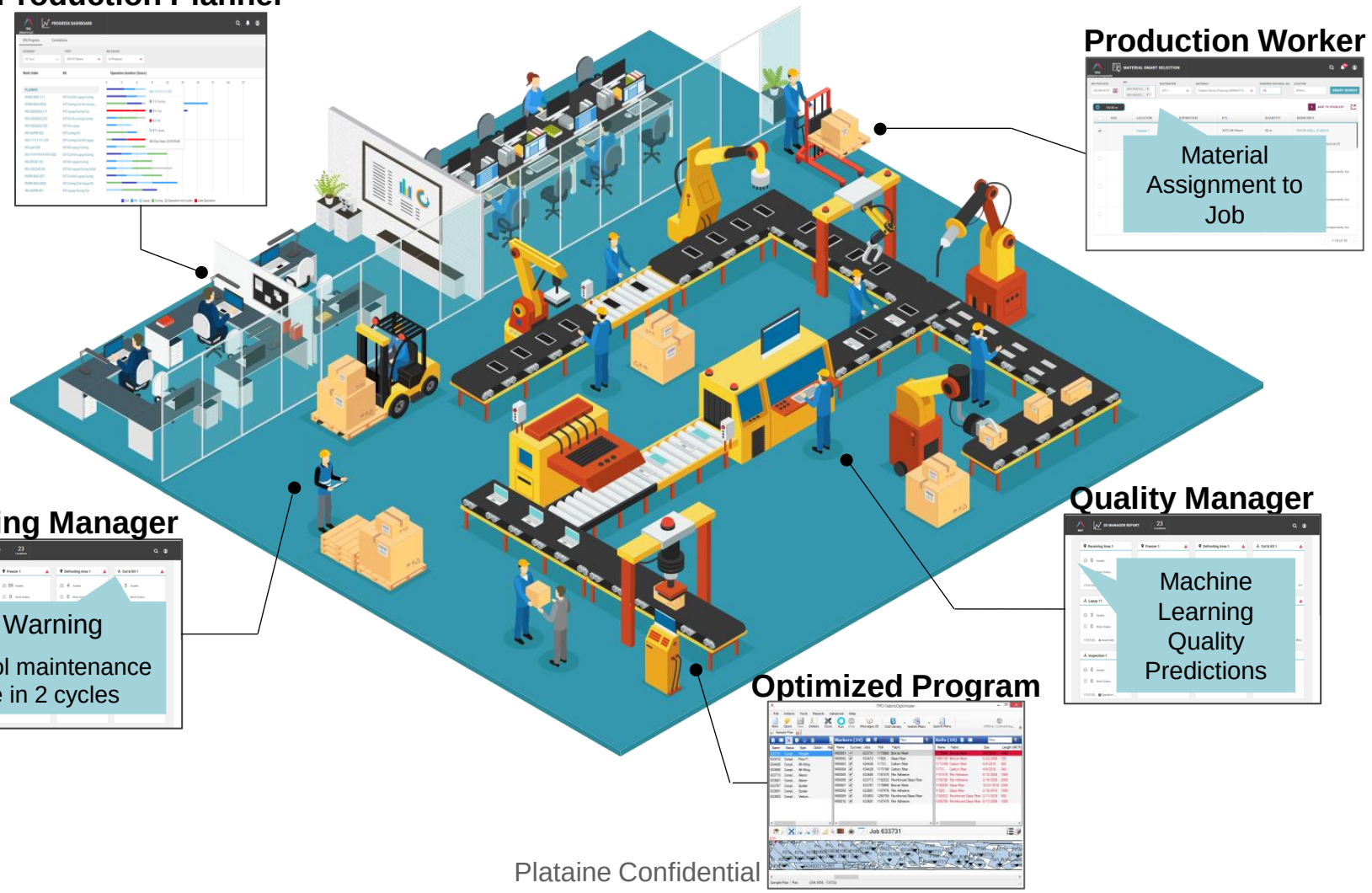
Low Productivity

Increased Waste

Reduced Quality

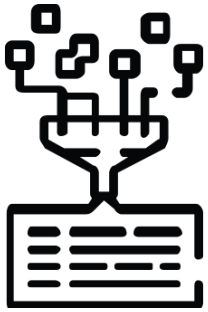
The Opportunity:
A Fully Connected, Intelligent, Digital Factory

Enterprise Level, Persona-Based Digital Assistants



The Critical Steps for a Fully Connected, Intelligent, Digital Factory

COLLECT

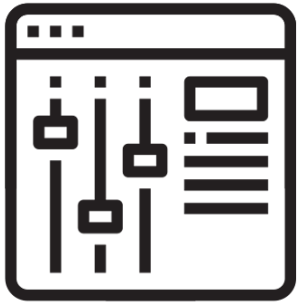


Collecting data from sensors in real-time

ANALYZE

AI providing predictions & recommendations

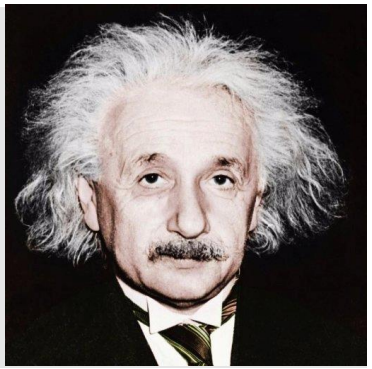
OPTIMIZE & AUTOMATE



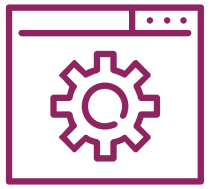
Driving efficiency, while reducing costs & waste

Solving a problem first requires clear Problem Statement & Definition

> ***If I were given one hour to save the planet, I would spend 59 minutes defining the problem and one minute resolving it."***
>
> - Albert Einstein

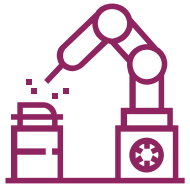


Step 1: Data Collection: getting as much [relevant] data, in digital format, in real time



Enterprise systems:

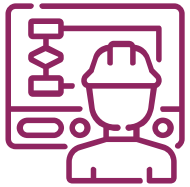
PLM, ERP, MES…



“Things” on the production floor:

Sensors, machines

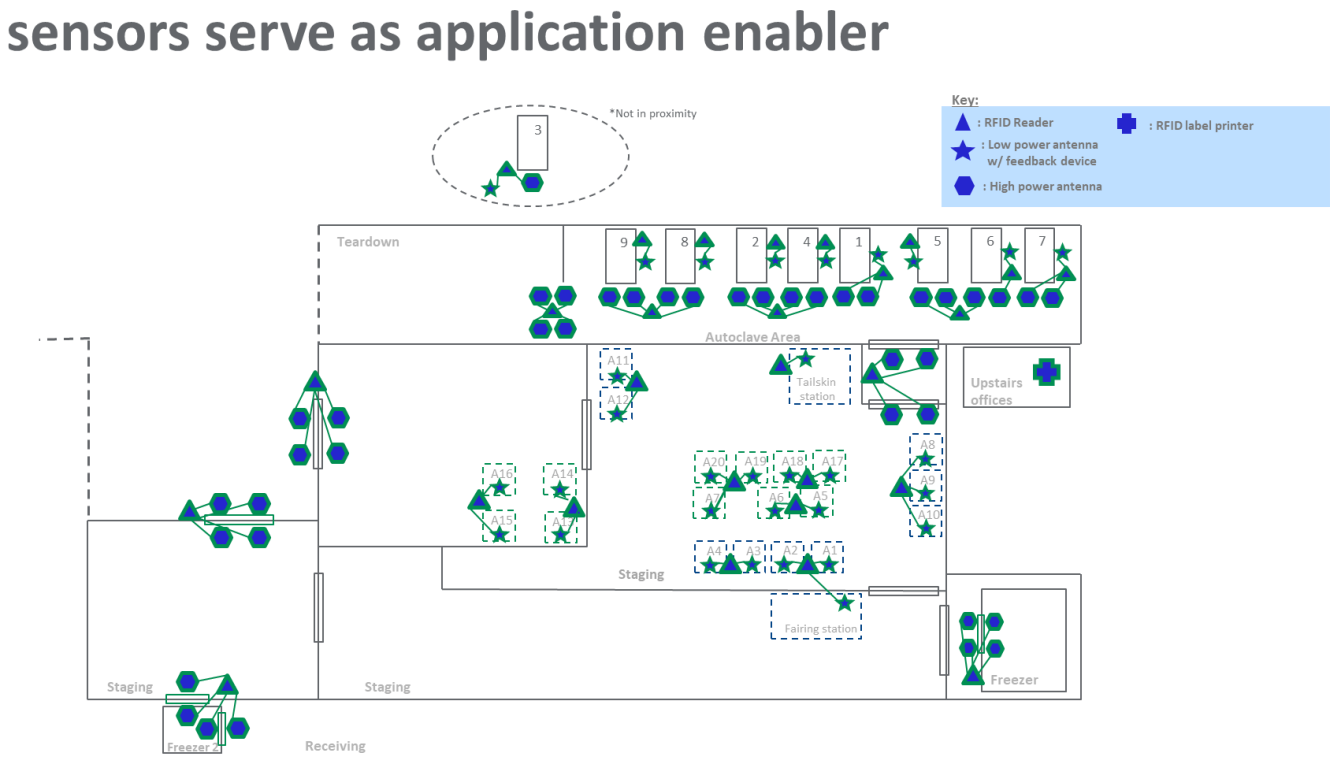
The ‘Un-connectables” – older machines, parts, materials, tools…



Human (operator) input:

Applications, wearables

Example: sensor network deployed specifically to address concrete business problem(s)



Step 2: Put the Data in Context (Context Awareness)

Why is context important?

Data alone is typically meaningless without context

The richer the context, the more we can do

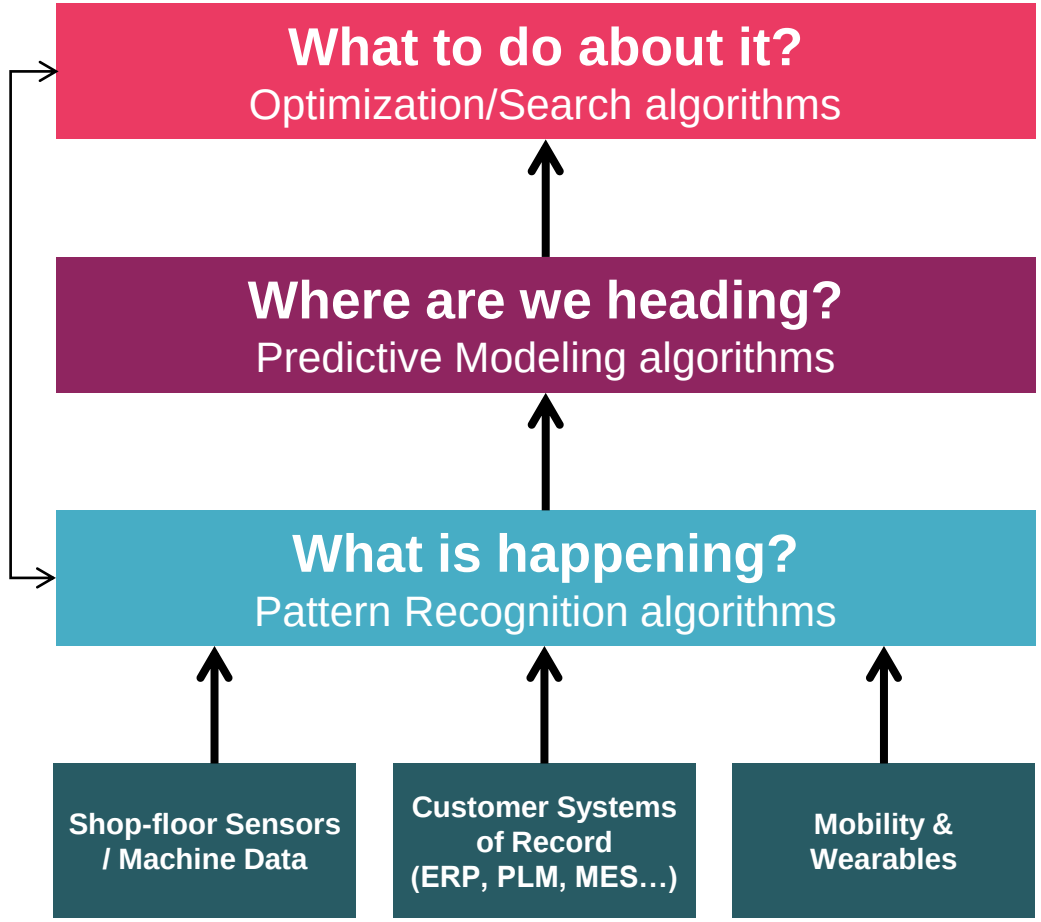
Questions:

How do we create context?

How do we go from Context to Actions?

Step 3: Solving Business Problems

Addressing the Full Workflow Creates Superior Value: Diagnosis, Prognosis and Treatment



Solving the 3 critical questions in all operational cycles:

1. What is Happening Now?
2. What is going to Happen?
3. What to do about it?

Proactive AI:

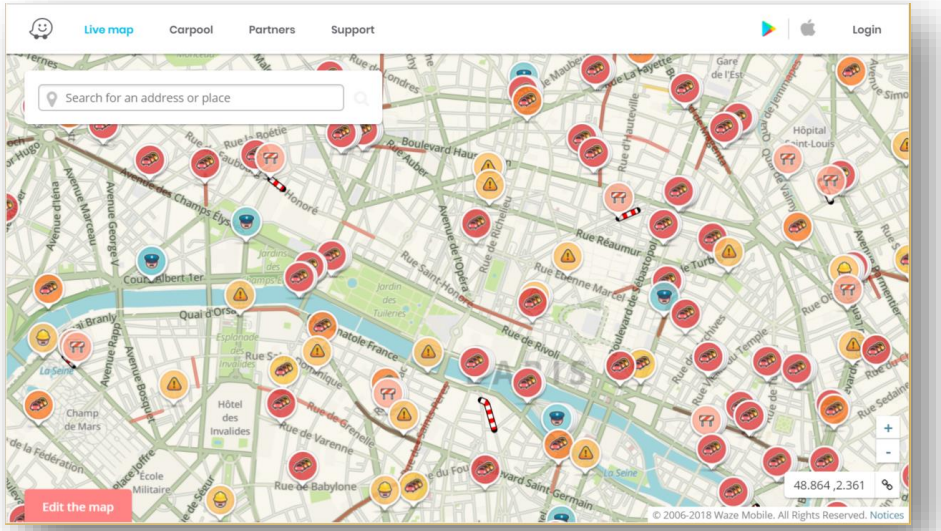
- Proactive, Data Driven
- Actionable Alerts & Optimized Recommendations

Based on an integrated set of AI/ML algorithms

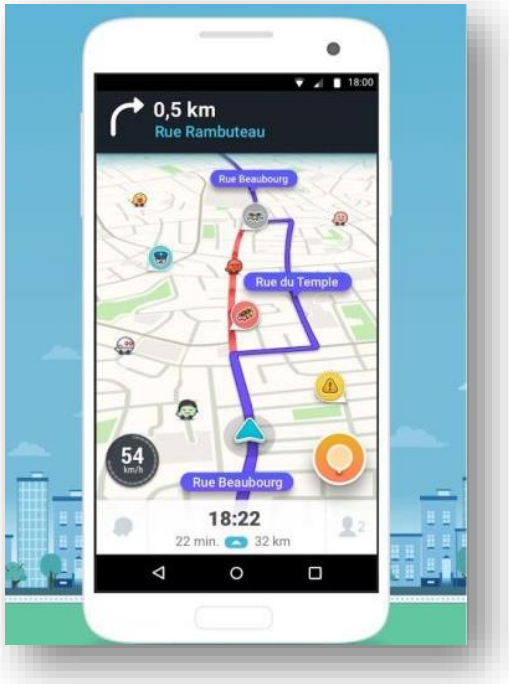
- Extensive set of Digital Twins & Digital Threads
- Geared for AI in manufacturing

An Intelligent Digital Assistant is NOT a Dashboard

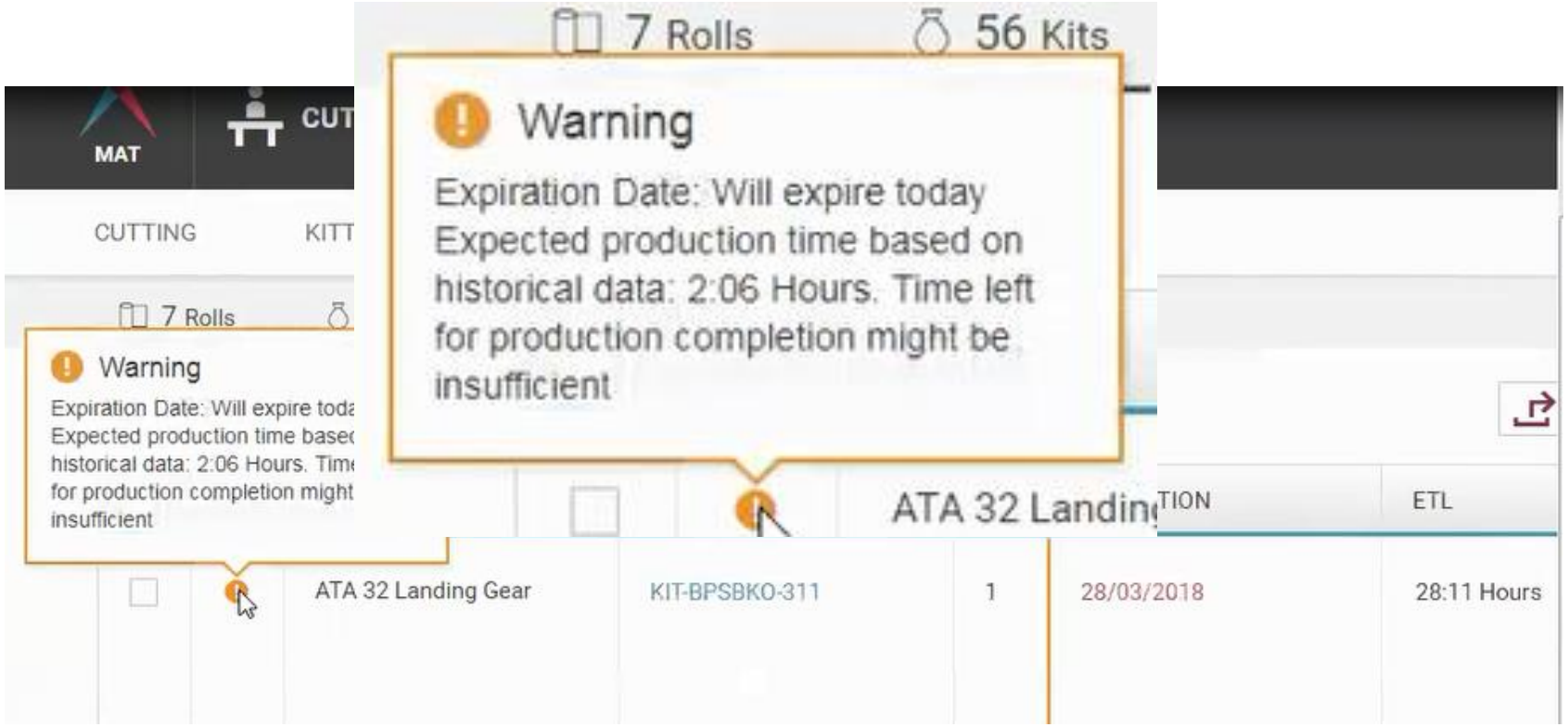
Dashboards display data,
but do not solve problems



An intelligent digital assistant provides
real-time recommendations & alerts



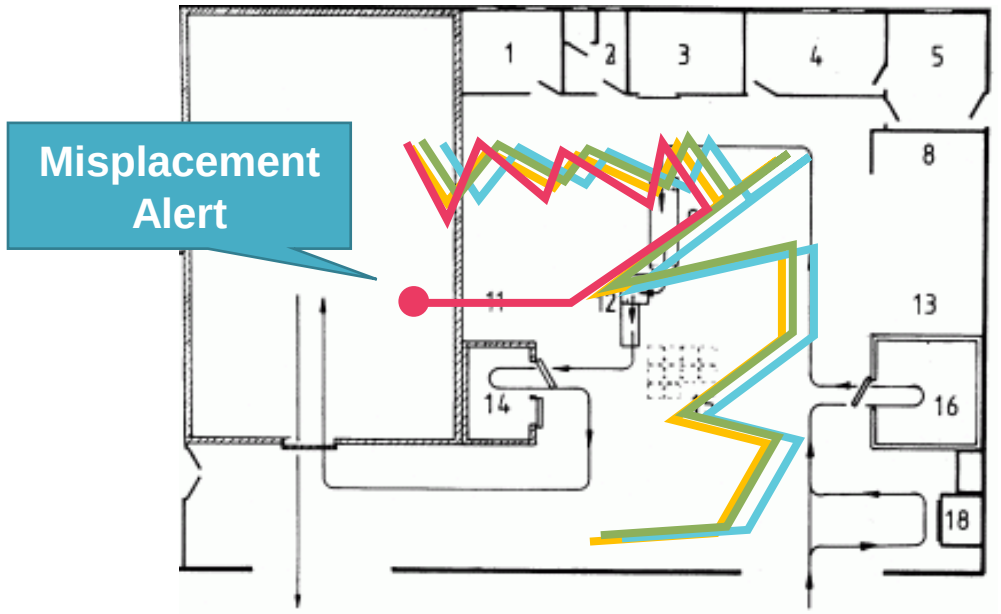
Context Aware Alerts for Production Delays or Quality Problems



Alert on Asset Misplacement

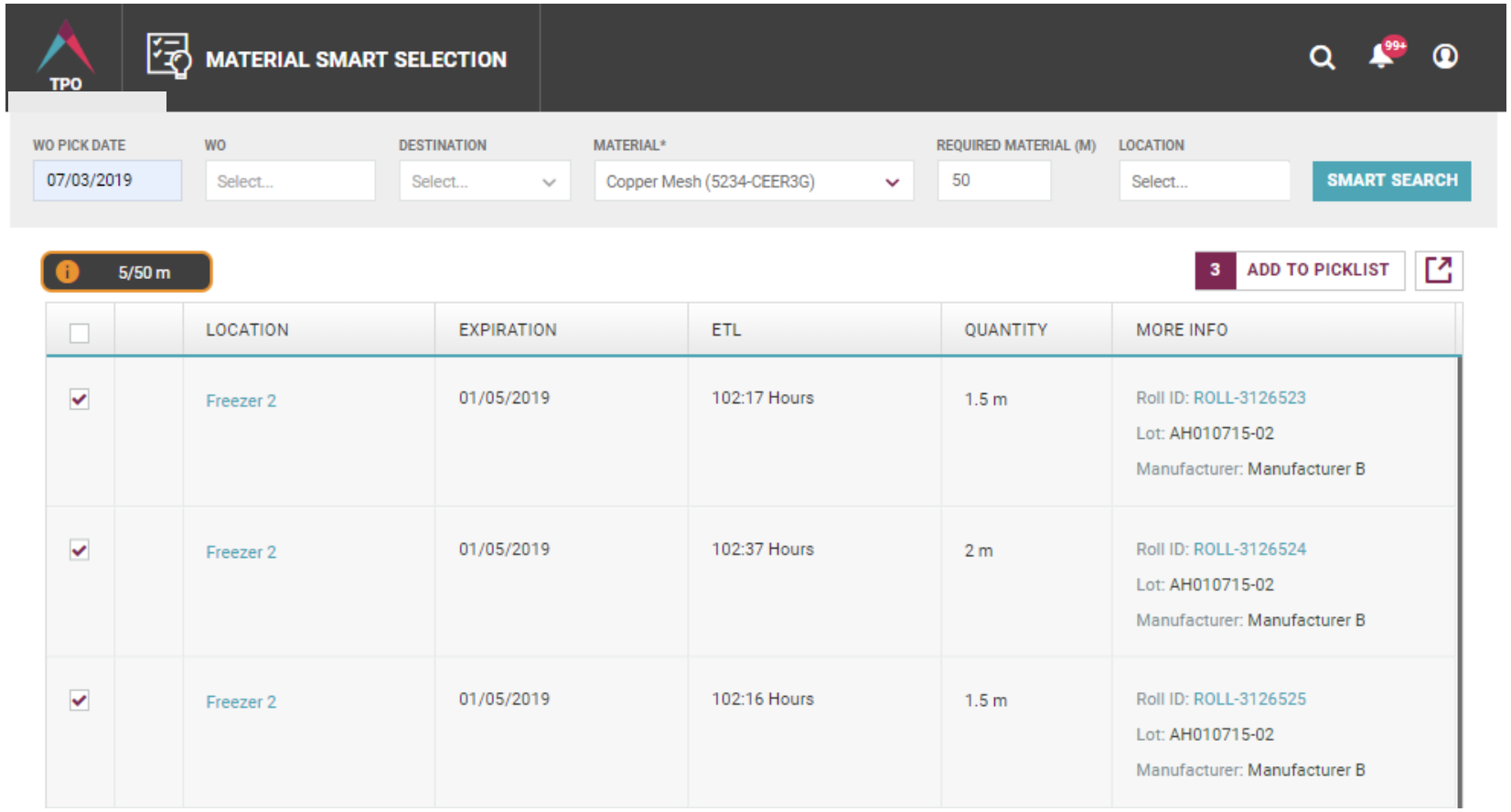
- The Challenge: tools and assets are being misplaced, causing production delays and rework

- The solution: create a typical production trail by for each asset type,
  by “learning” its historical movement.
- Alert relevant users upon deviation from the expected production trail

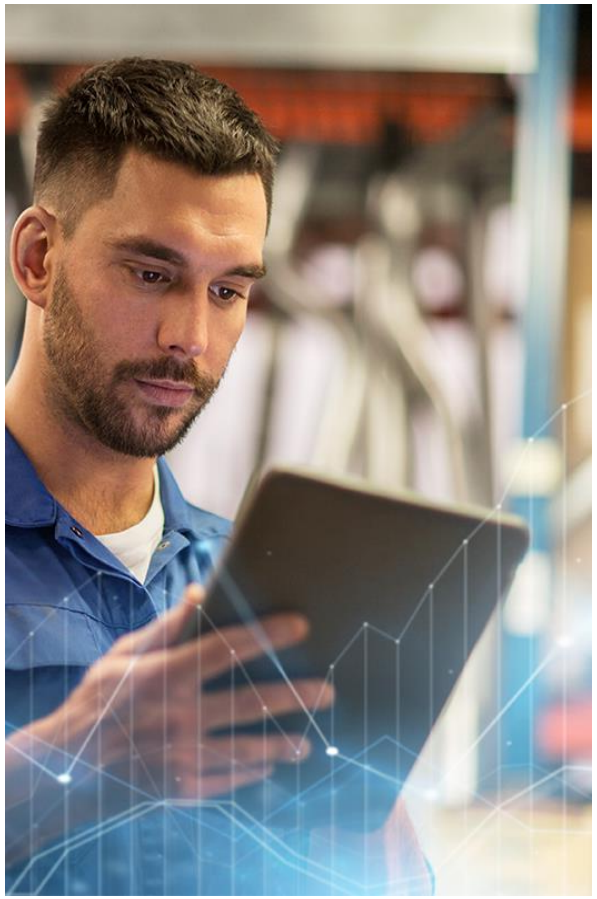


Going from Alerts to Recommendations:

Optimized Material Selection based on current status and predicted production flow



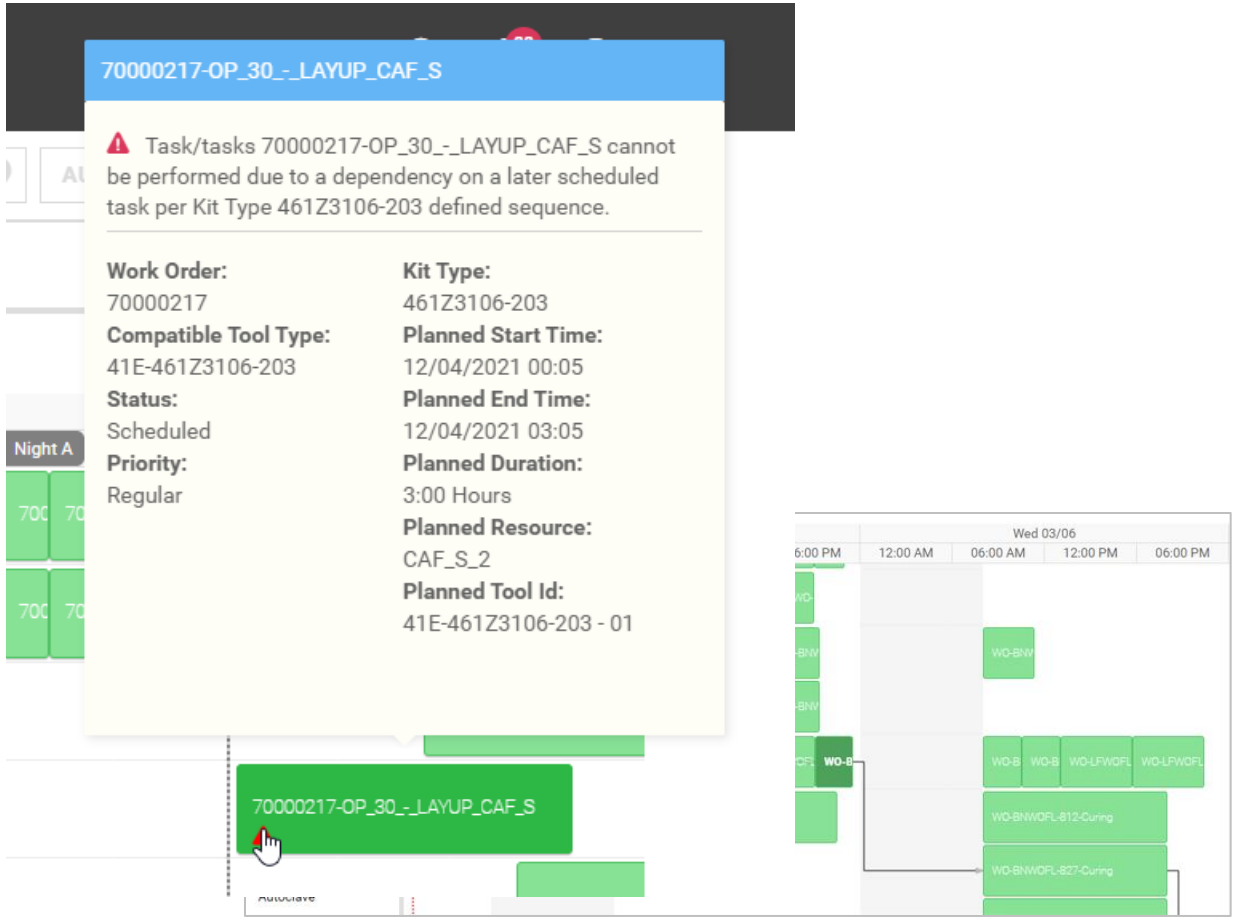
Trusting your Digital Assistant (Human adoption of AI)



- You can’t demand trust, you must earn it
- Typically, people start trusting AI, when it:
  - consistently makes decisions that are as good, or better
  - makes their life easier
  - does not make ‘glaring mistakes’
- It takes time to train the man-machine team

AI-Based Scheduling in Dynamic Environments

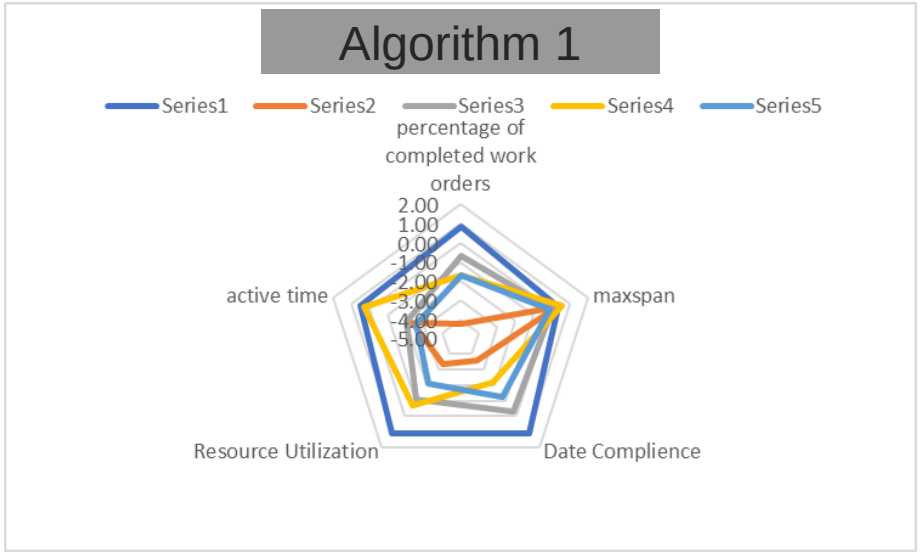
- **Holistic Approach, considers all aspects of production**: work orders, materials, tools, machines, HR…
- **Business Oriented:**
  - Dynamic, Real-Time
  - Driven by business Rules & KPIs (+tradeoffs)
  - Emphasis on practical execution
- **Learns from the Users, Teaches Itself**



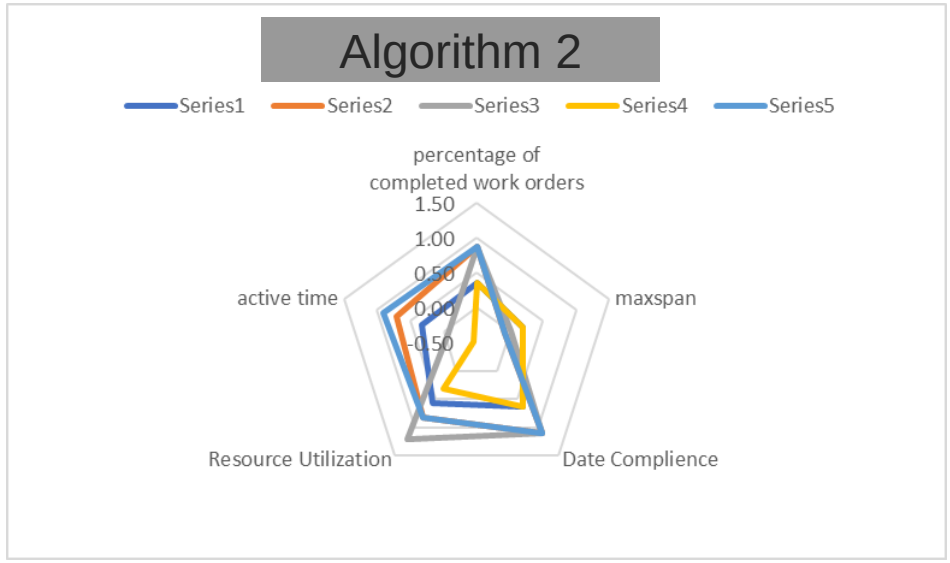
A Learning System: Practimum-Optimum™ Scheduling Learns from the Users, Teaches Itself

- **The algorithm automatically teaches itself deep structures in the schedule's universe**
  - trade-offs between competing goals, clusters of similar schedules, demand patterns…
- **Historic schedules are not mandatory, but very useful when available**
  - Over time, as the algorithm is being used and real-life data is gathered, it and improves its performance.
- **Strong emphasis on Executability**: What is Mathematically Optimal is not always Practically Optimal

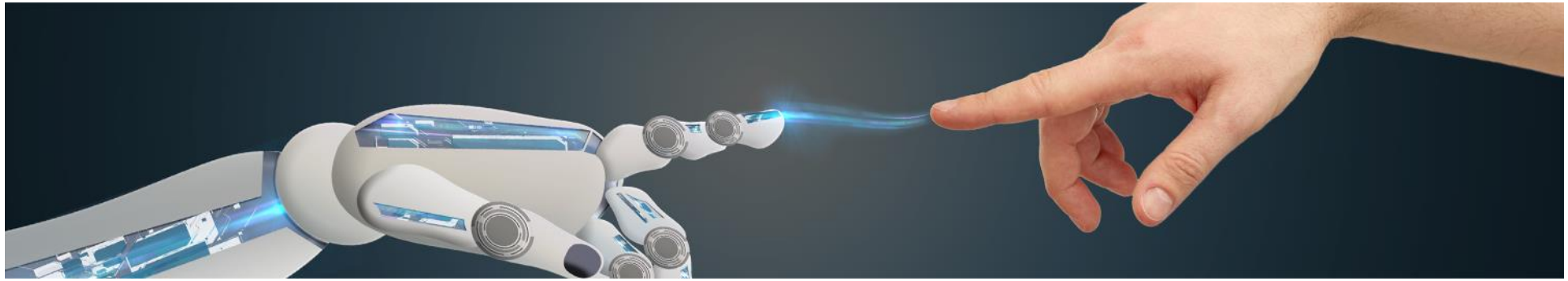
Algorithm 1, with 5 different tactics



Algorithm 2. with 5 different tactics



The Man-Machine Team



As computer intelligence level increases:

- Dependence on user's skills, knowledge and experience decreases
- The user spends less time on mundane tasks, spends more time on value-add tasks
- The user-computer **team** produces better decisions than anyone of them individually
- **Overall productivity goes up, error rates go down**

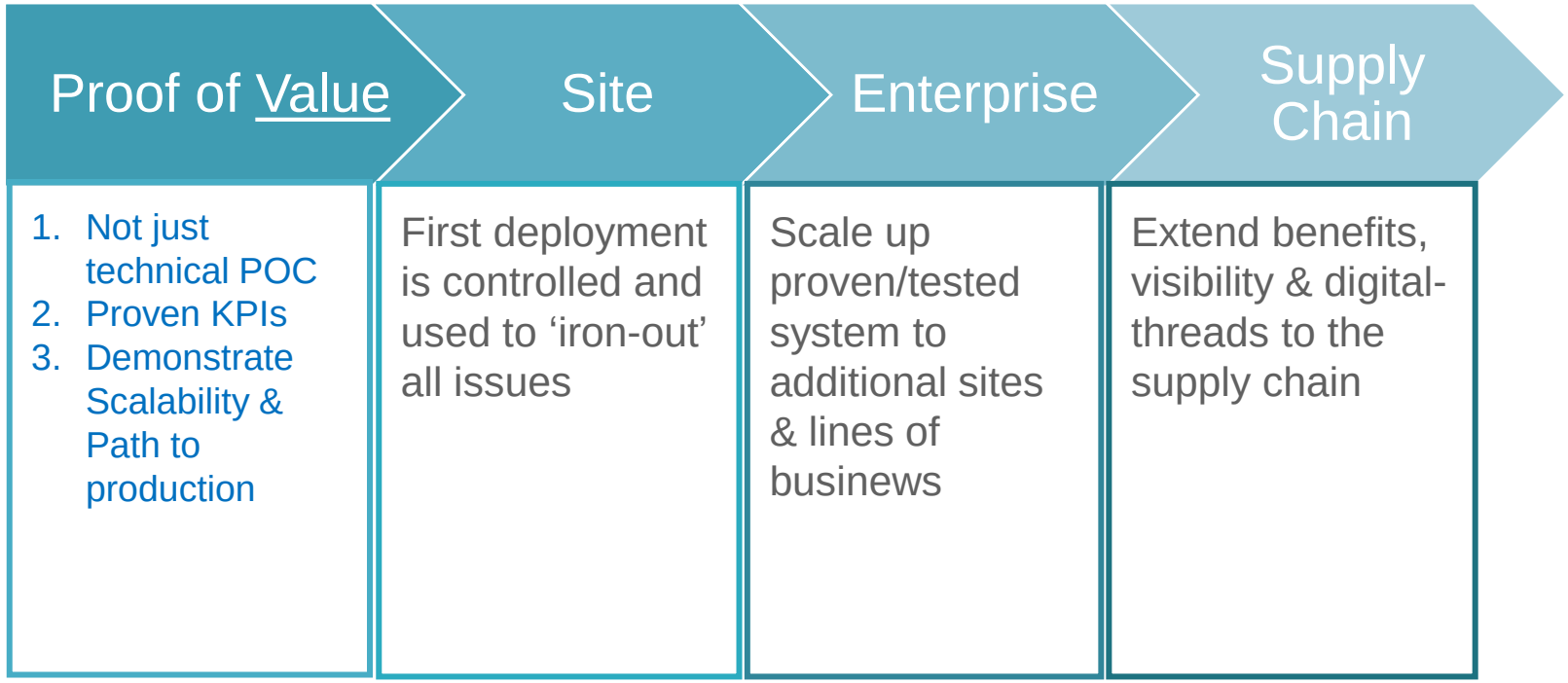
AI-Based Digital Assistants on Google Glass: Disruptive Empowerment of Production Floor Staff

- "Hands-free" user interaction with AI on the production floor
  - Natural Language Dialog/Interaction (NLP)
- Real-Time, Audio and Visual presentation of alerts and optimized recommendations to production floor staff

→ Improved productivity, better quality, full digital traceability

Demo Video

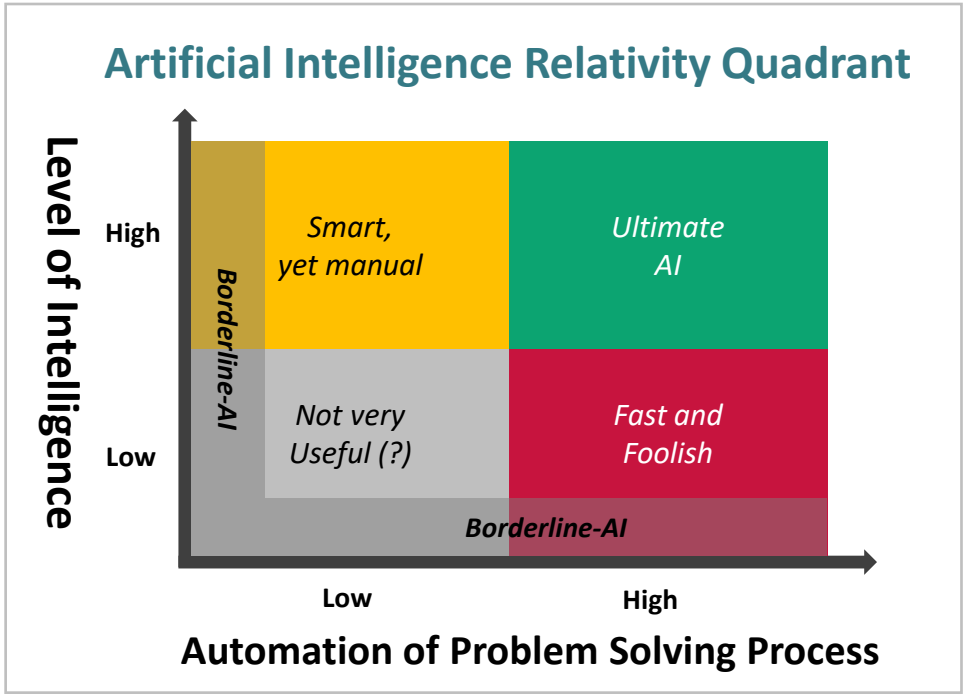
Taking the technology to production: (i) Addressing a specific pain, (ii) Quick deployments, and (iii) demonstrating strong ROI



Pushing the envelope: [Artificial] Intelligence is Relative

Two main dimensions establish a quadrant for positioning and comparing (AI) software products:

- **Level of Intelligence (Output Quality)**: high quality solutions to problem solving and decision-making challenges
- **Level of Automation**: reducing human involvement in the problem solving process



Summary

- AI and Industry 4.0 address significant business pains
- Digitalization and factory visibility is now critical than ever
- Greater Value is achieved by increased automation and higher level of intelligence
  - Not only predicting problems, also solving them
- Quantifying the benefits is within reach and demonstrates significant outcomes
- Push the Envelope with Greater Intelligence and Greater Automation

PLATAINE®
people-smart automation

Thank You

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