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Why The IPC Connected Factory Exchange Standard Is Critical For Successful Industry 4.0

1. Aegis Software Introduction

2. Digital "Land-fill" Is Killing Industry 4.0

3. The IPC Connected Factory Exchange Standard

4. CFX & Industry 4.0

Aegis: Technology for Business Leadership

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Co-Chair Of IPC Connected Factory eXchange

2000+ Factories Around the Globe

Digital Manufacturing Thought Leadership

Unmatched Time-to-Value

Twenty Years Experience

Delivering Modern MES Innovations

Global Company with Local Support
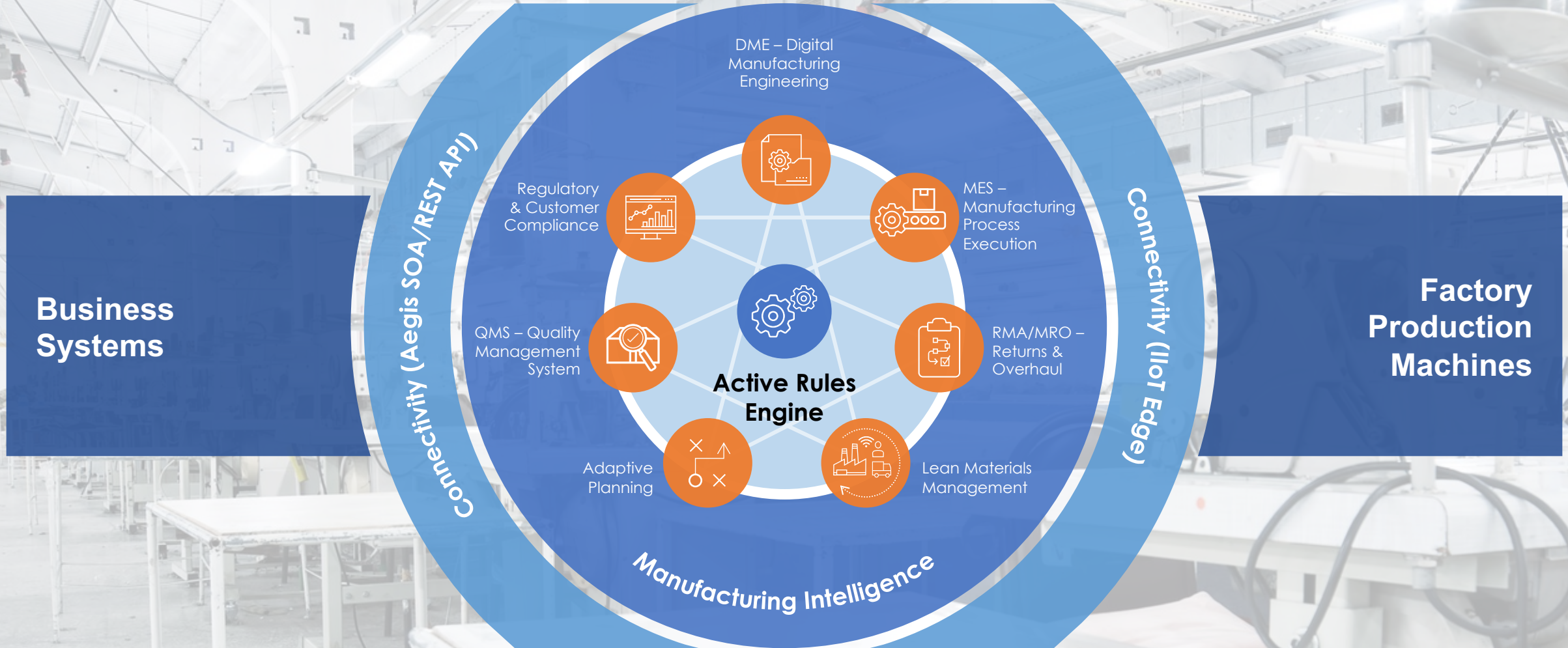
Co-operative Machine-vendor Partnerships

17 Years of Customer Service Awards

Gartner 'Notable Vendor' Recognition

Aegis FactoryLogix Digital Manufacturing

Business Systems

Connectivity (Aegis SOA/REST API)

Connectivity (IIoT Edge)

Factory Production Machines

DME – Digital Manufacturing Engineering

Regulatory & Customer Compliance

MES – Manufacturing Process Execution

QMS – Quality Management System

RMA/MRO – Returns & Overhaul

Adaptive Planning

Lean Materials Management

Active Rules Engine

Manufacturing Intelligence

FactoryLogix™

AEGIS SOFTWARE

Is Industry 4.0 OK?

2018: Productivity Continues To Decline In German Manufacturing Companies

What Exactly Was The "5 Year Plan"?

- You can only purchase assets "with Industry 4.0"

- So, everyone has a (different) Industry 4.0 story

- But what has been actually created? Marketing!

Today's "Status Quo":

- New ways to market old ideas and products

- But, decision-makers now see through the stories

- Do not talk about Industry 4.0 any more!

Industry 4.0 Drivers Are Still Valid

It still costs us more to transport products from remote manufacturing locations, than to manufacture them

Business Case:

- So, manufacture close to the market
- "No distribution chain", re-shoring….
- Invest saved costs into automation technology
- Turn Taxes and Tariffs into business opportunities

Challenges:

- "Build to Order" with "Mass Production Efficiency"
- Differentiate: find and utilize trusted technologies

Industry 4.0 Struggles At Step One

Industry 4.0 Requirement:

- Need automation of automated processes

- Decisions aided / made by computerization

- Faster response and optimization

Step One Challenges:

- Can we trust current data to make critical operational decisions? **No…**

- Can we afford bespoke solutions on every machine and process to deliver data? **No…**

Only 5% of SMEs Have Any Real Form Of Industry 4.0 Deployment

Collateral Damage: "Digital Landfill"
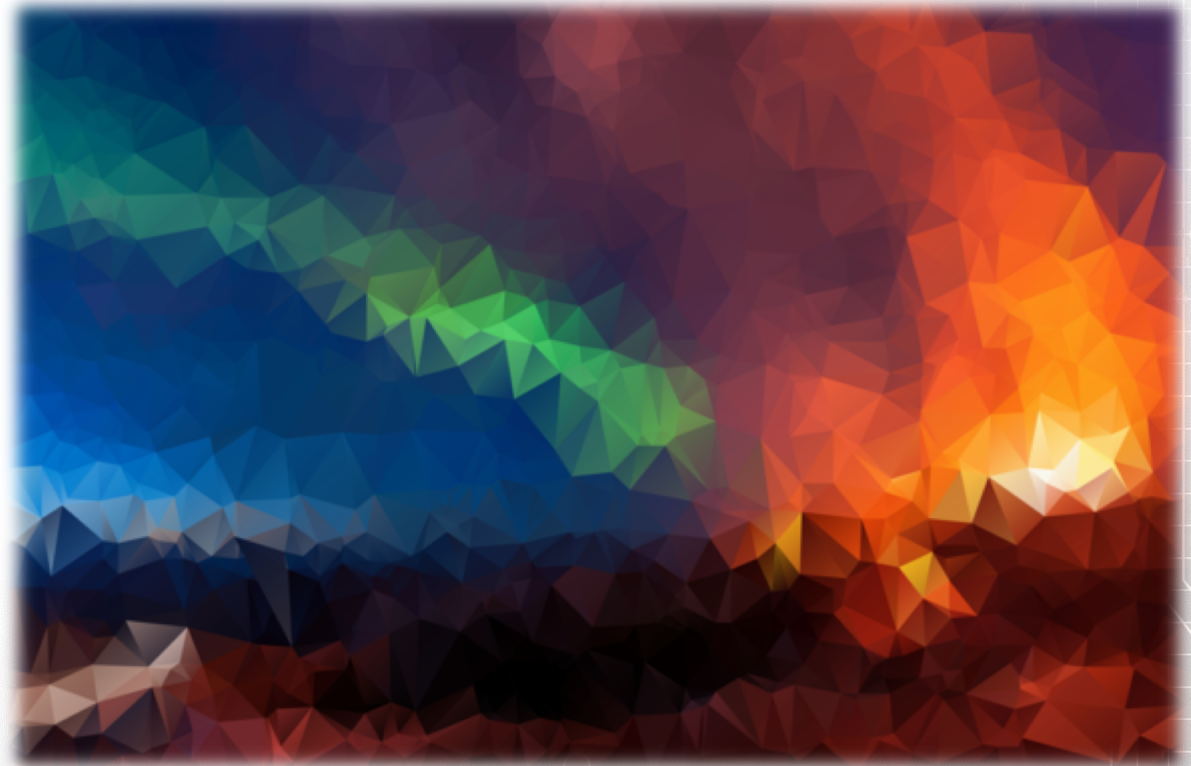
Unsustainable Paradigm:

- Accumulating data has little value
- Accelerating costs, site or cloud

Two Critical Issues:

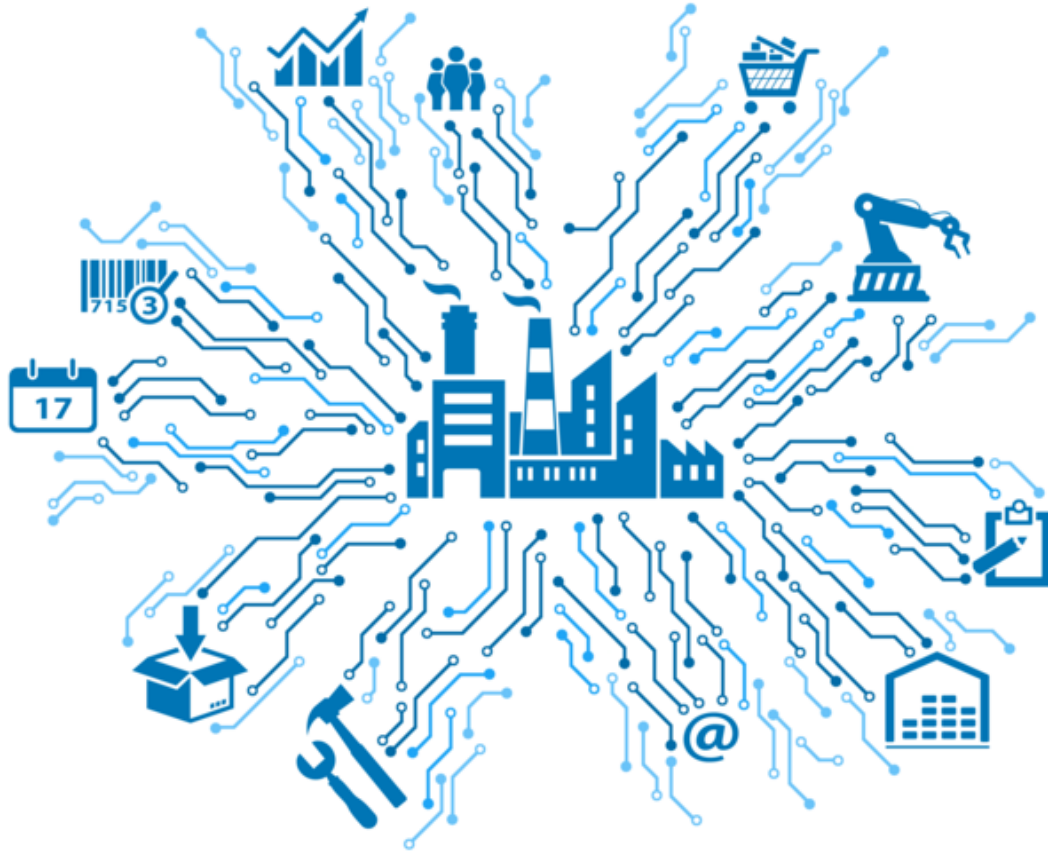- Differing data content & definition
- Little contextual value

Digital Judgement Day Coming:

- When even advanced AIs give up....

"Only 20% Of Data Pushed To The Cloud Has Any Actionable Value"

Interface To IIoT, From Bad to Worse?

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Legacy Interfaces:

- Pass data from one side to another
- Content is specifically defined
- € xxk, NDAs, months developing & test
- On-going support, as changes occur

IIoT Technology:

- Omni-directional data flow
- Unknown uses and users
- Who defines the content?
- But, content **must** be defined....

Do We Need "Another Standard"?

Existing Standards Fail To Deliver Value:

- Examples: SECS-GEM, CAM-X, OPC etc.

- Just move data from point to point

- *Do not define full data / message content*

- Propagate proprietary content (unreadable, unusable)

- Include hidden and secret functionality

Another IIoT Technology?

New IIoT Solutions

- Standards based: REST API, TCP/IP, XML, JSON, MQTT etc.

- Also, simply move proprietary data

- Made worse by the need for expensive middleware

- Include hidden and secret functionality

We Need Contextualization Of Data

Creating Context From "Big Data":

- Each machine knows what happens **inside**

- Cannot know **external** influences, root causes

- Context = **Symptom** + **Cause** = **Opportunity**

- Obtained from different perspectives

How are you supposed to analyse data when there is none most of the time?

Industry 4.0? Not Yet.....

For The Business?

- Cannot trust the data
- Pressure machine vendors!

For Machine Vendors?

- Customer pressure increases costs
- 30+ different interfaces per average vendor

For IT Teams & Solution Suppliers?

- Each vendor's data is different
- Inconsistent, unreliable, expensive

This looks way too expensive – you first!

Introduction to:

IPC "Connected Factory Exchange"

- A standard to enable Industry 4.0

- IIoT "plug & play"

- Open, consensus-based, >300 participants

- Machines, processes, systems & humans

- No licensing, contract or dependencies

- All discrete assembly manufacturing

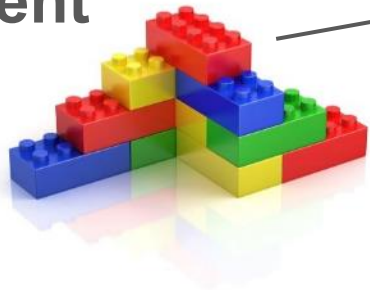- Published April 2019

Plug And Play Data Content Definition

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Communication Protocol

AMQP Advanced Message Queuing Protocol

- Secure (like ATM)
- Encrypted option
- Send and forget (host)
- Point to point (direct)

Defined Language Content

- Structured topics and messages across all manufacturing elements
- "Build" a model for any type of automation

Data is Encoded using {JSON}

: "CFX.Production.Work...
: "1.0",
...amp": "2017-08-29T10:34:11.6757089...
...queID":   "346be717-6421-483...
...277b643",
...Source": "MACHINE12345",
"RequestID": null,
"MessageBody": {
    "ID": "db6e6191-515d-44b7-a092-cc94021d9f5e",
    "UnitCount": 2,
    "UnitLocations": [
        {
            "UnitIdentifier": "UNIT1112245",
            "LocationIdentifier": "1"
        },
        {
            "UnitIdentifier": "UNIT1112246",
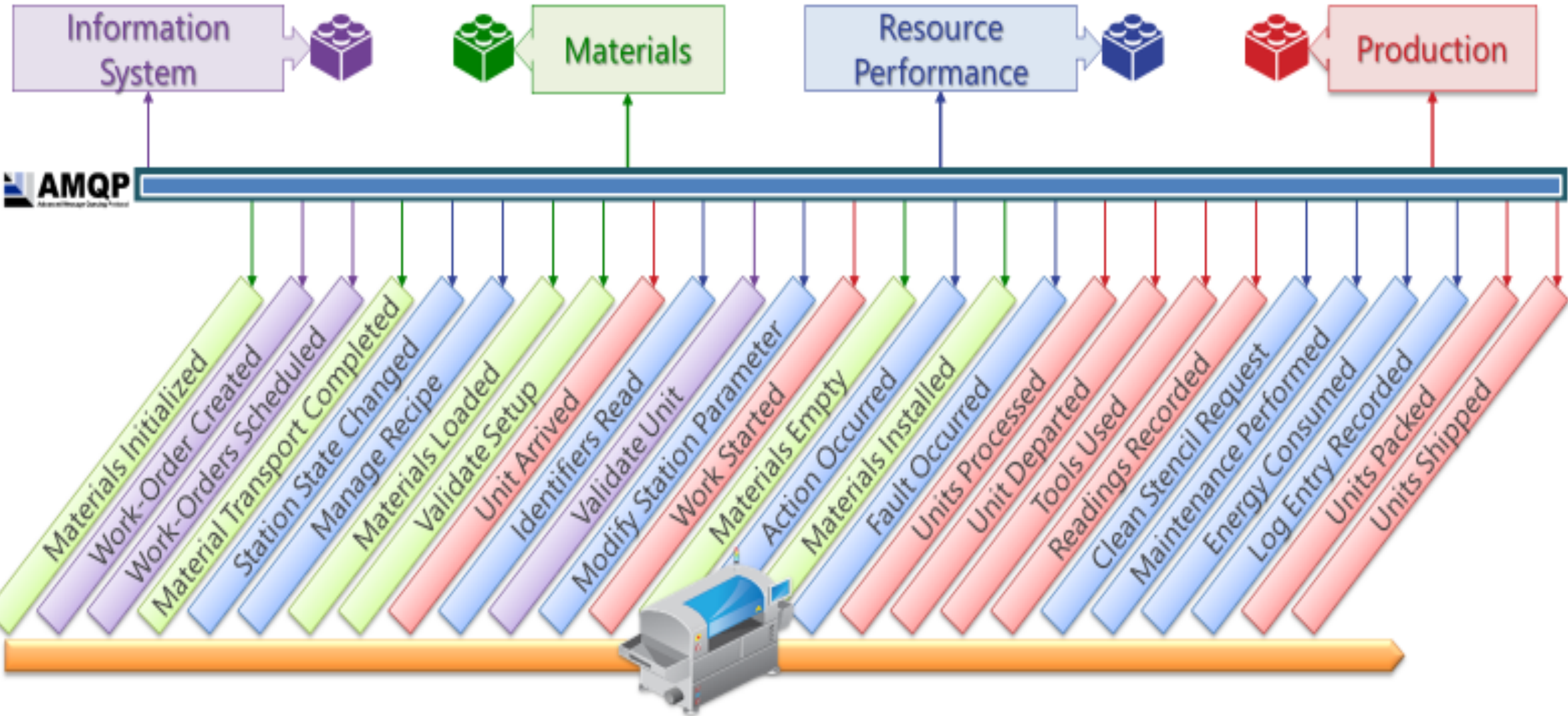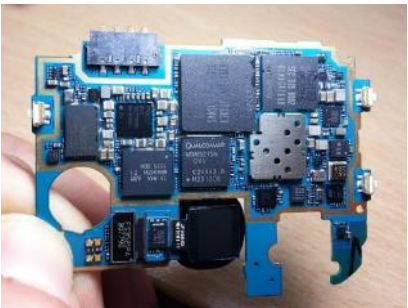   "LocationIdentifier": "2"

Ah! Now I understand!

CFX Content Defined (Messages & Data)

Easy CFX Adoption / Integration

Software Development Kits:

- Open-source SDKs available free of charge from IPC
  - Windows .Net, Linux, Labview, JAVA, etc.
- 100s of machines have demoed with native CFX

Extended Reach Linux SDK:

- SOIC CFX Client, 20mm x 20mm, $9 chip
- CFX Client Kernel < 20Mb
- Inside soldering iron, torque wrench etc.

Dumb Machine? No problem!

- Seica "shoebox", made in Italy
- CFX client on Raspberry Pi
- Multi-digital I/O with tailored software

CFX Enables Smart Digital Manufacturing

Business Enablement:

- Achievement of Smart Industry 4.0 business goals
- ROI fully scalable across sectors and tiers

Machine Vendor Solutions:

- Reduced interface costs, easy adoption
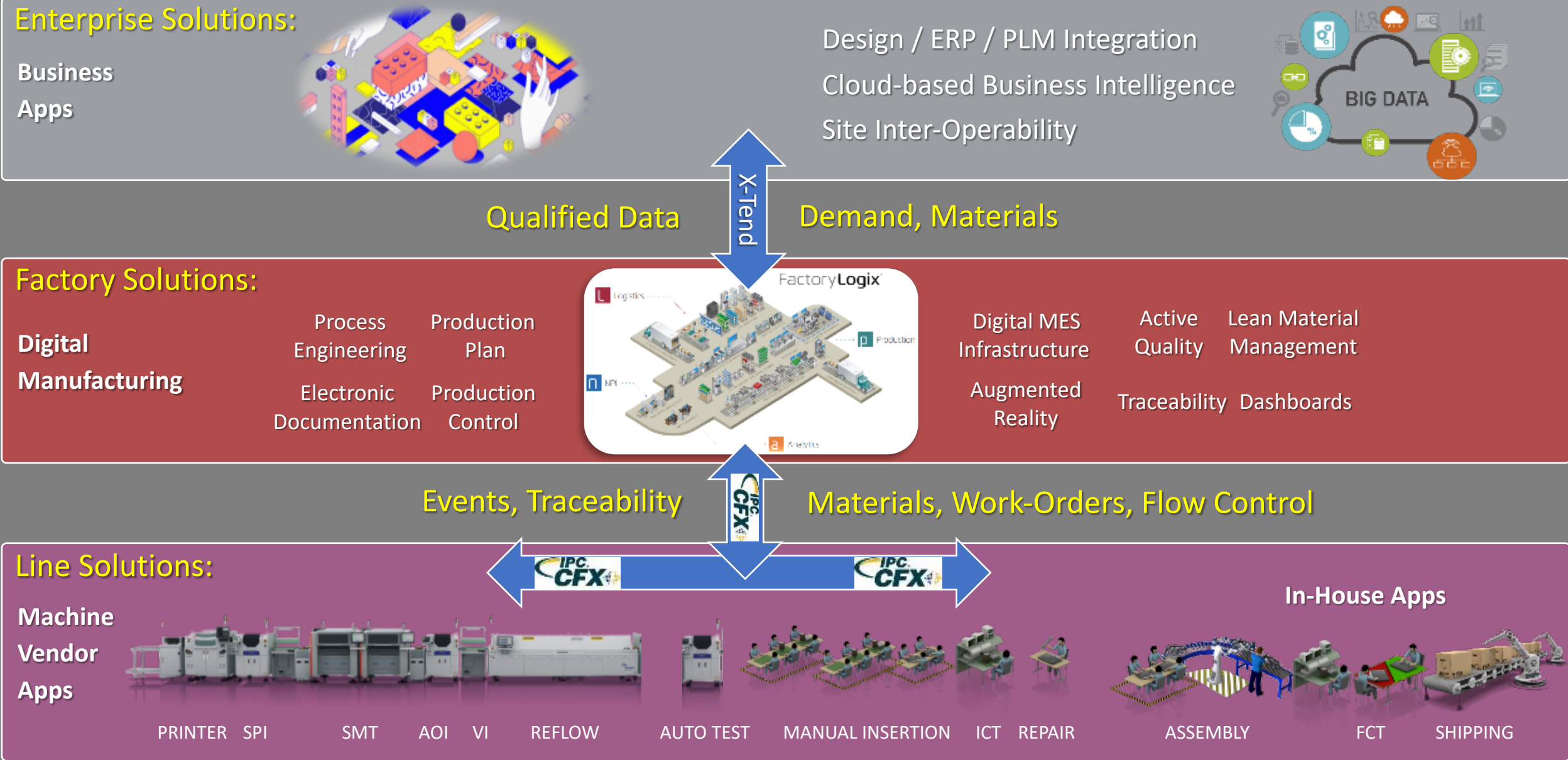- Smart value creation opportunity

IT & MES Solutions:

- Reduced integration costs, expanded reach
- Create next-generation Smart ("AI") applications

*Let's All Be Smart
Together With CFX!*

CFX & FactoryLogix Digital Manufacturing

Enterprise Solutions:

Business Apps

Design / ERP / PLM Integration

Cloud-based Business Intelligence

Site Inter-Operability

BIG DATA

Qualified Data

X-Tend

Demand, Materials

Factory Solutions:

Digital Manufacturing

Process Engineering

Production Plan

Electronic Documentation

Production Control

FactoryLogix

Logistics

NPI

Production

Analytics

Digital MES Infrastructure

Augmented Reality

Active Quality

Lean Material Management

Traceability

Dashboards

Events, Traceability

IPC CFX

Materials, Work-Orders, Flow Control

Line Solutions:

Machine Vendor Apps

IPC CFX

IPC CFX

In-House Apps

PRINTER   SPI   SMT   AOI   VI   REFLOW   AUTO TEST   MANUAL INSERTION   ICT   REPAIR   ASSEMBLY   FCT   SHIPPING

CFX Support Differentiation By Aegis

Legacy ERP / MES / MOM / PLM:

- Will support CFX minimum requirement

- Created >10 years ago, original code from 1990s….

- Legacy system infrastructure is old, interface-based

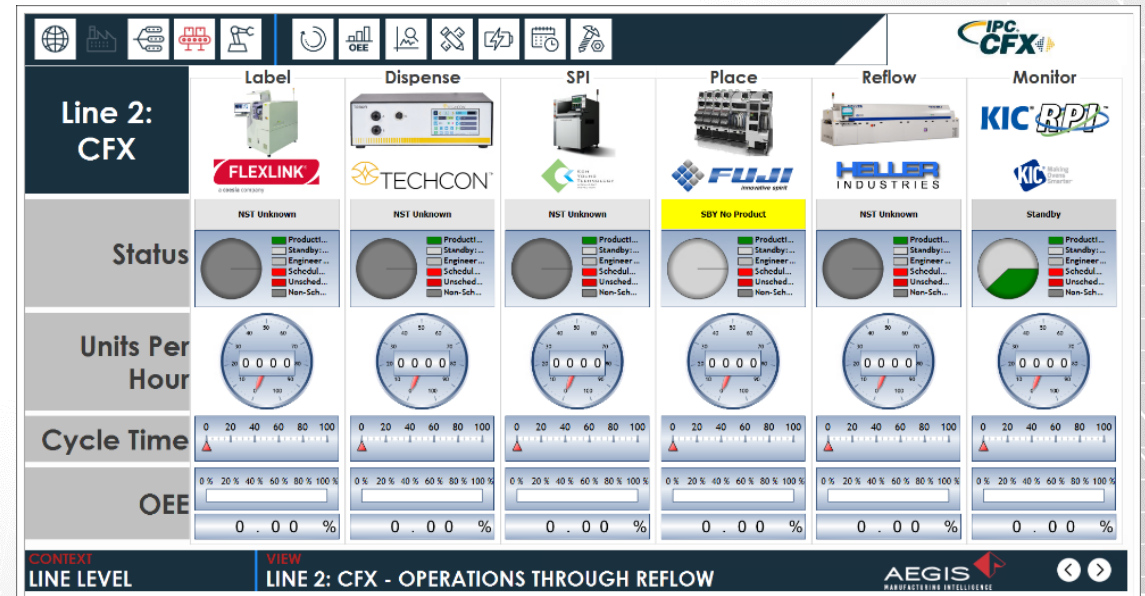## Aegis FactoryLogix Advantage:

- Threw away legacy constraints

- Created modern software technology & infrastructure

- CFX IIoT full-value digital manufacturing

"Big Data" Collection:

- Analysis with many different types of data

- Contextual qualification

- Digital visibility

Applications:

- Decisions, dashboards, alerts, reports

- Productivity, efficiency, OEE, KPIs

- Capacity planning, JIT routing

- JIT Lean supply-chain

- Full traceability (IPC-1782)

- Feedback to design (IPC-2581)

CFX & FactoryLogix In Action – APEX SHOW 2019

Operational Data:

- Engineering data (programs, documents etc.)
- Product data (production unit information)
- Material information (supply-form, exceptions)
- Safe "Poke-Yoke" control

Self-Optimization:

- Automated changeover
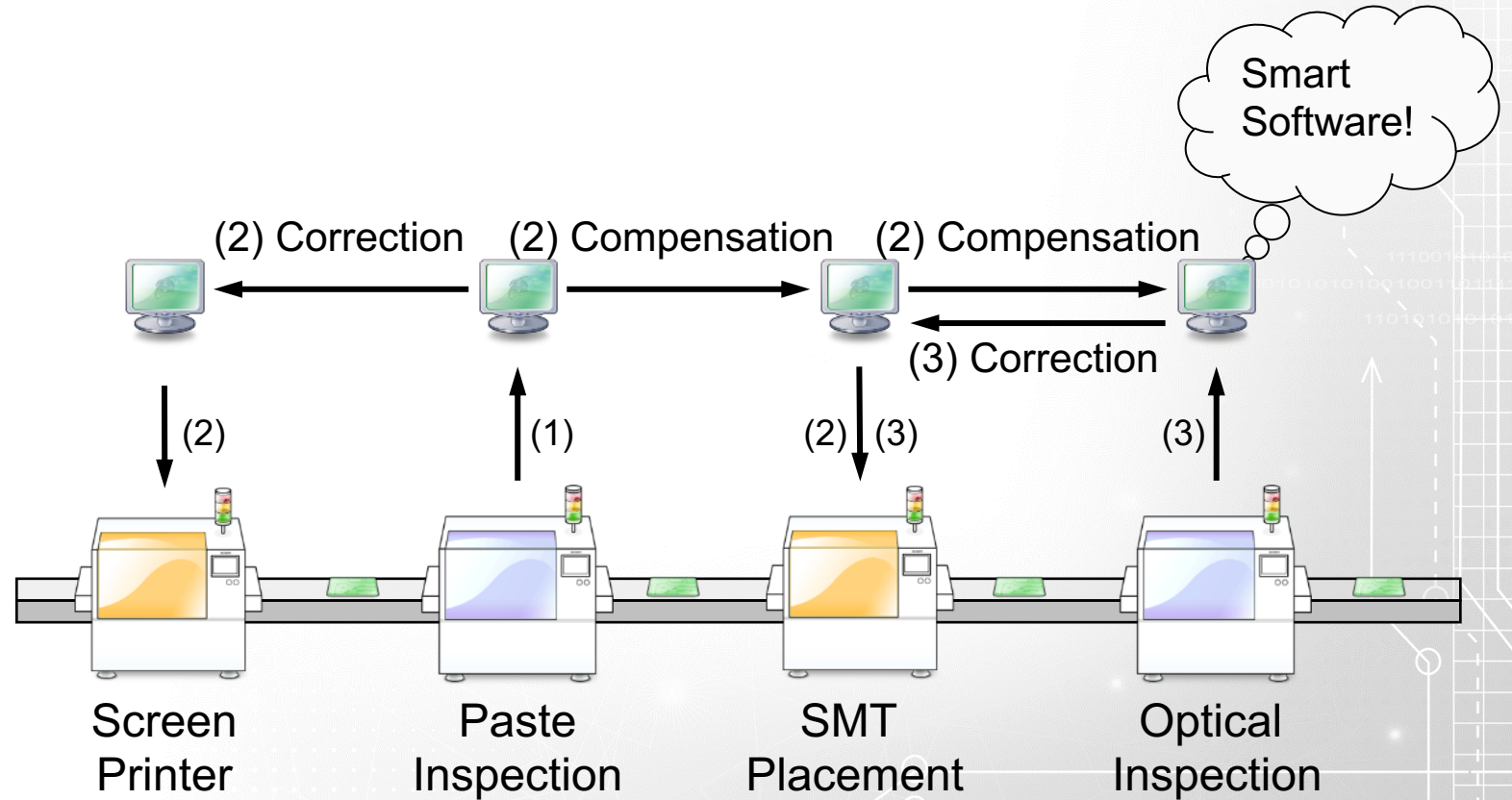- Multi-product setup optimization
- Active quality management

Automate Transactions:

- Stock purchase / material movement
- Tool and machine maintenance
- Program / document setup

Applications:

- Enhanced ERP / MRP
- Resource reservation & management
- Computerized supply-chain & adaptive planning
- Assembly, inspection, test, maintenance, logistics etc.

Digitalizing Human Operators:

- Our most flexible asset
- Inclusive - greater value in the digital factory
- Hands-free manufacturing
- Live expert tuition

Aegis FactoryOptix Augmented Reality:

- Part of the standard system
- No special setup / data customization required

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Thank You

Any Questions?

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