RED HAT FORUMS

THE CULTURE OF CONNECTED OF THINGS

The Open Source ecosystem, the Red Hat Technology and the Open Culture

Luca Gabella

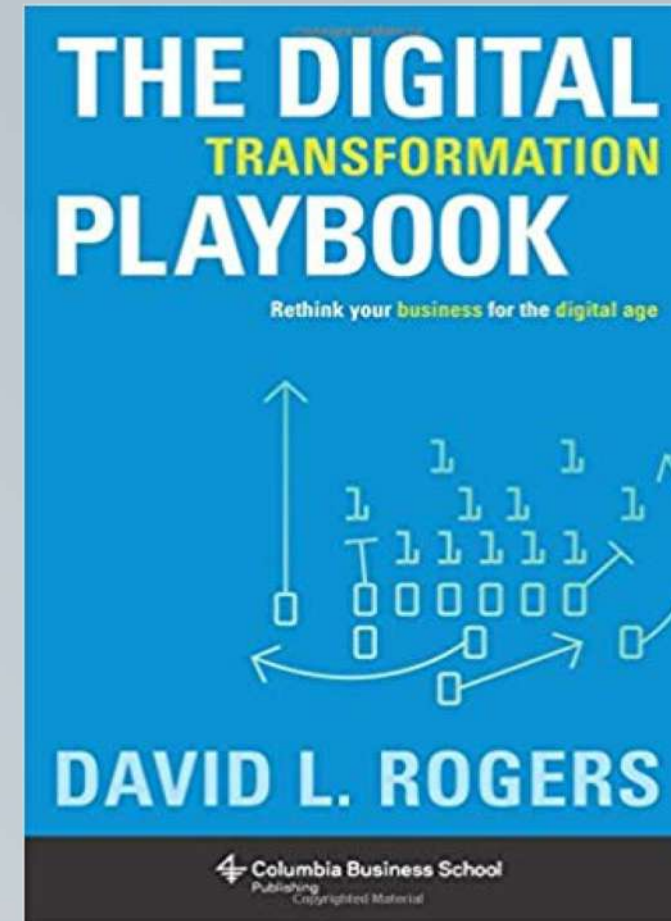EMEA BDM for IoT & Digital Transformation
Milano, December 2019

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DIGITAL FORCES' FIVE KEY DOMAINS RESHAPING

ALL COMPANIES MUST BECOME GREAT SOFTWARE COMPANIES

Peter Schwarzenbauer, member of BMW management,
https://www.nytimes.com/2017/02/08/business/germany-bmw-daimler-volkswagen-uber.html

INTELLIGENCE IS NEEDED EVERYWHERE AT THE RIGHT TIME

GARTNER top 10 strategic trends for 2019

Intelligent
- Autonomous Things
- Augmented Analytics
- AI-Driven Development

Digital
- Digital Twin
- Empowered Edge
- Immersive Experience
- Privacy and Ethics
- Quantum Computing

Mesh
- Blockchain
- Smart Spaces

AUTONOMOUS THINGS

DIGITAL TWINS

EMPOWERED EDGE

IMMERSIVE EXPERIENCES

BLOCKCHAIN

SMART SPACES

Sources: GARTNER top 10 strategic trends for 2019
https://www.gartner.com/smarterwithgartner/gartner-top-10-strategic-technology-trends-for-2019/

Abstract of few IDC predictions for the EDGE

Digital Transformation is driving almost half of company digital investments

By 2021, consumer-facing industries will spend more on the network, computing, and storage resources in edge locations than on upgrades in core data-centers

By 2022, local cloud offerings will account for a quarter of all hosted private cloud spending

IoT, AR/VR, Robotics and machine learning are the main drivers behind this trend and generally speaking in most of the Digital Transformation initiatives

Sources: IDC
IDC Prediction #9 https://www.idc.com/getdoc.jsp?containerId=AP42219717
IDC Directions 2018, Rick Villars: Creating the Data Space: When Edge Is at the Core of the Business

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EXAMPLES OF USE CASES

Augmented reality for on site inspection
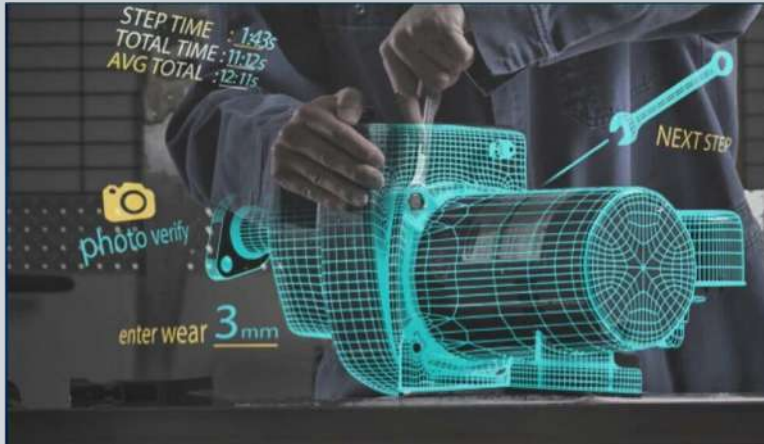
Predictive Maintenance for production

Worker Safety

Autonomous vehicles

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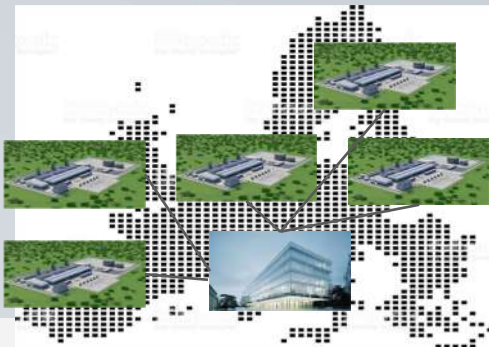
INDUSTRY BUSINESS NEEDS APPLY SIMILAR CONCEPTS INTO VERY DIFFERENT IoT SOLUTIONS

An example of the concept of predictive maintenance applied in three different cases

Medium size running +2000 new energy generation plants in Europe	Global mining company	A world leader manufacturing machine/plants

- Real time monitoring and once a year review of the remote predictive model to improve plants efficiency
- Position the value prop to customer expectation, upgrade the support organization (people, skills)
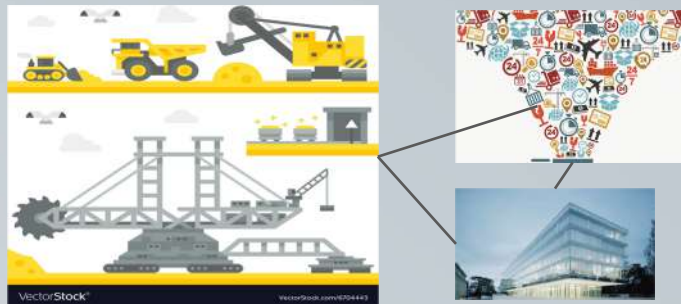
- Online centralized monitoring and predictive models to minimize downturn of the mining assets
- Deep integration with suppliers (legal, process, IT), data scientist organization, deep cross silo integration, asset management

- Real time predictive model at the edge to maximize plants performance
- Review business model towards servitization, relocation of technical workforce

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THE REALITY FROM THE FIELD
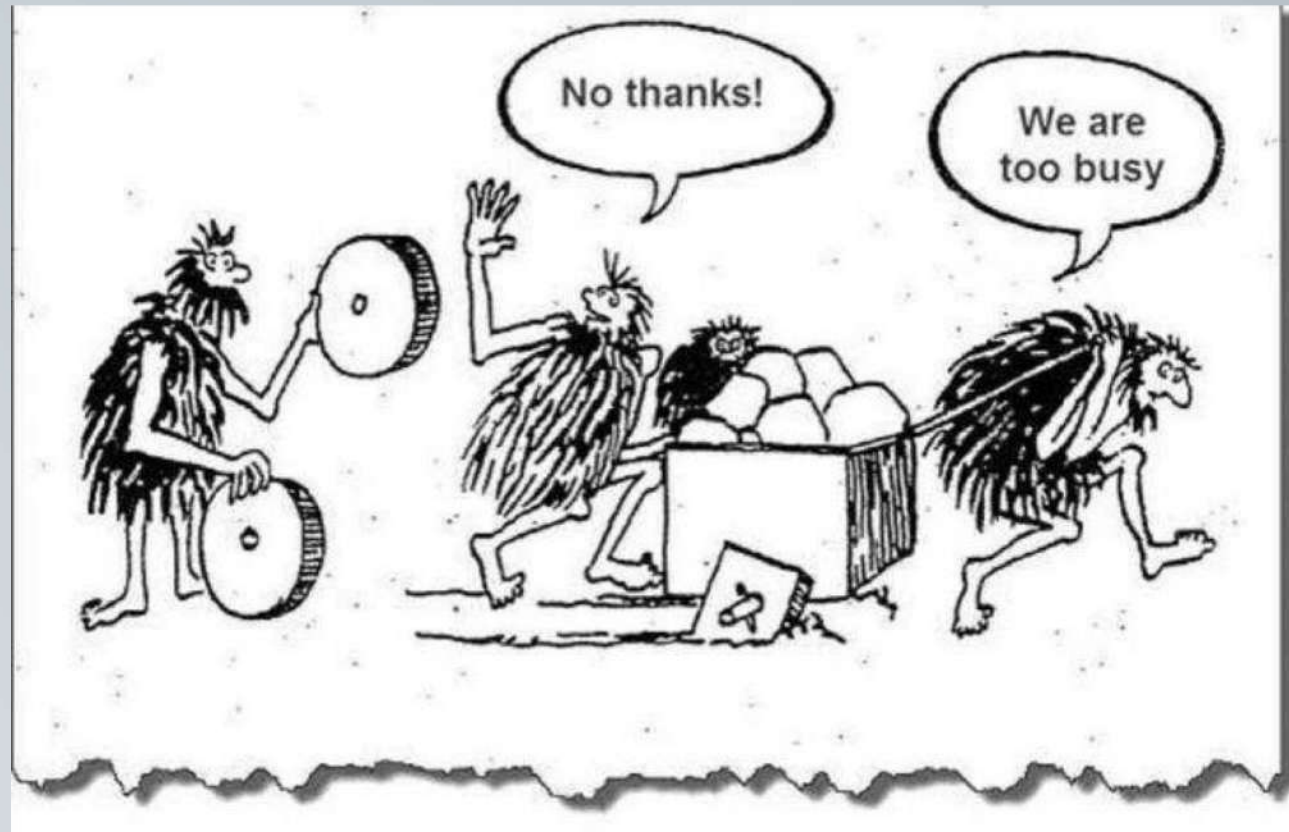
ENABLING YOUR ORGANIZATION TO BECOME A DIGITAL LEADER

Supportive ecosystem

Leading technologies
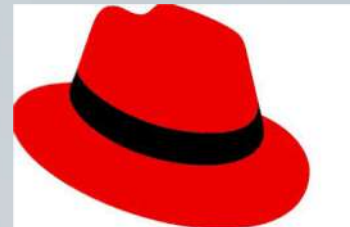
The right Culture

OPEN SOURCE CULTURE

Collaboration

Shared problems are solved faster

1,000,000+ PROJECTS

Transparency
(both access and the ability to act)

78% of companies run Open Source

Working together creates standardization

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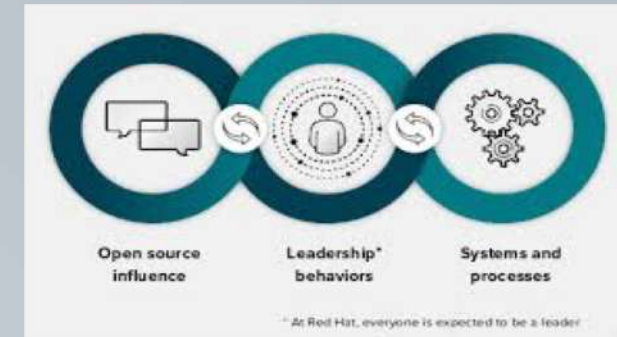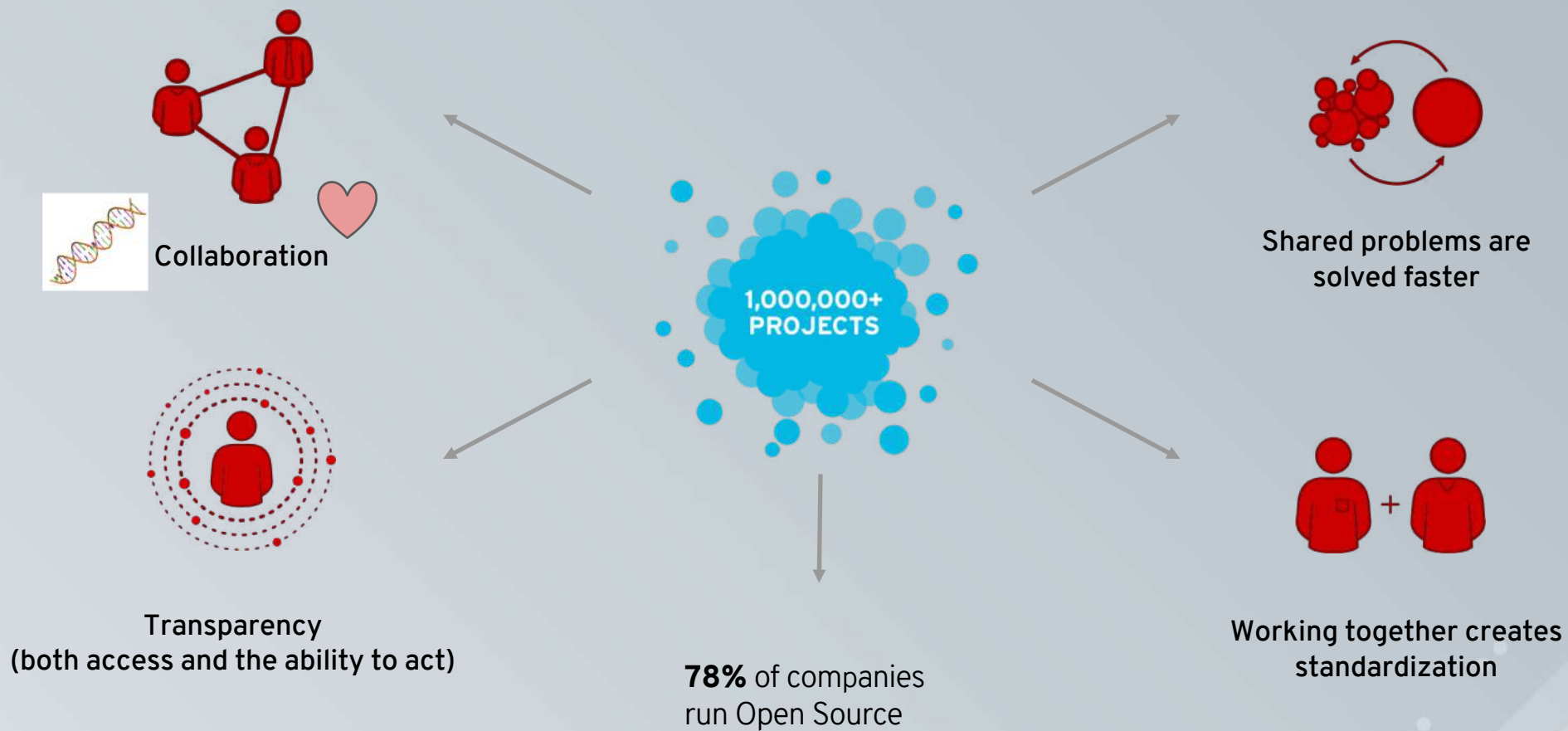
FROM COMMUNITIES TO ENTREPRISE
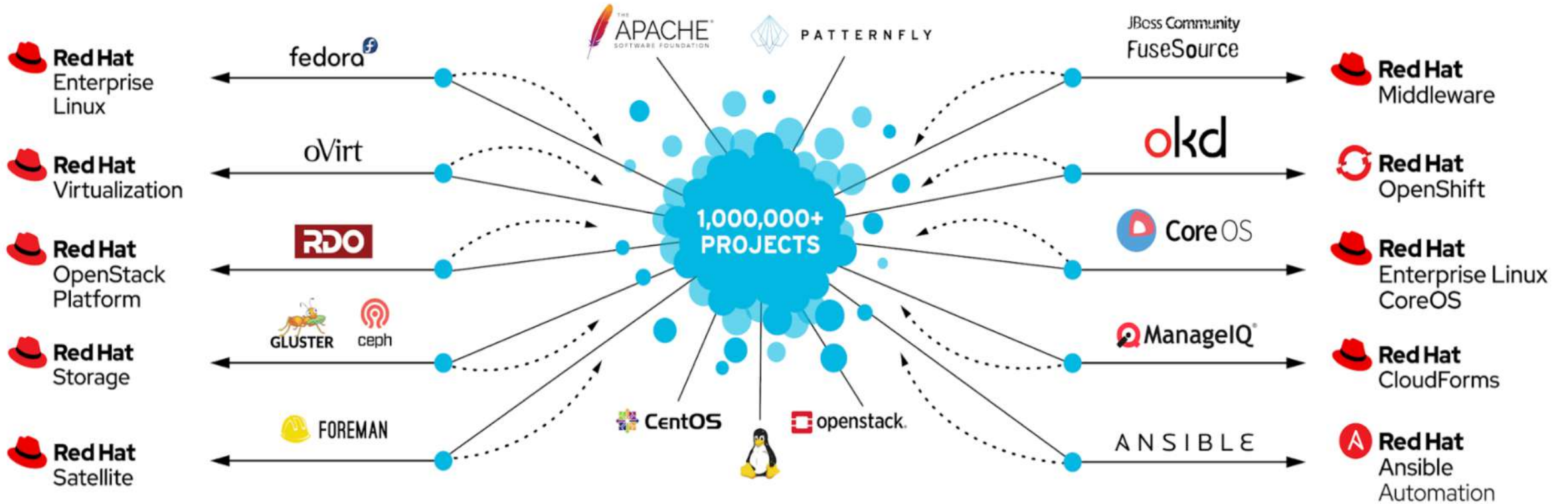
Red HAT helps companies to abstract complexity in engaging with Open Source meanwhile getting all its benefits

WHY OPEN SOURCE FOR IoT

- **Open source & open standards = interoperability**

- **Take advantage of community & accelerace innovation**

- Iterate more quickly with less risk

- Speed time to market to deliver solutions

- Maintain control of your IoT technology and licensing

- **Wider integration selection with platforms and devices**

- Lay the foundation for future system and requirements scaling

BUILDING THE INTELLIGENT ENTERPRISE

ENHANCE THE IOT PLATFORM OF AN APPLIANCE MANUFACTURER

Vorwerk, the European Appliance manufacturer, wanted to develop an IoT solution for its new line of products sold worldwide and needed a stable and fully automated container platform which will serve as an IoT backend working on multi-cloud environments

- **Openshift to act as the IoT back-end platform to deploy and support its IoT solutions via +7000 containers and +800 VMs**
- **CloudForms on top of the solution as a brokerage and cost control solution to leverage the multi-cloud environments in different geographies**

BUILDING THE INTELLIGENT ENTERPRISE
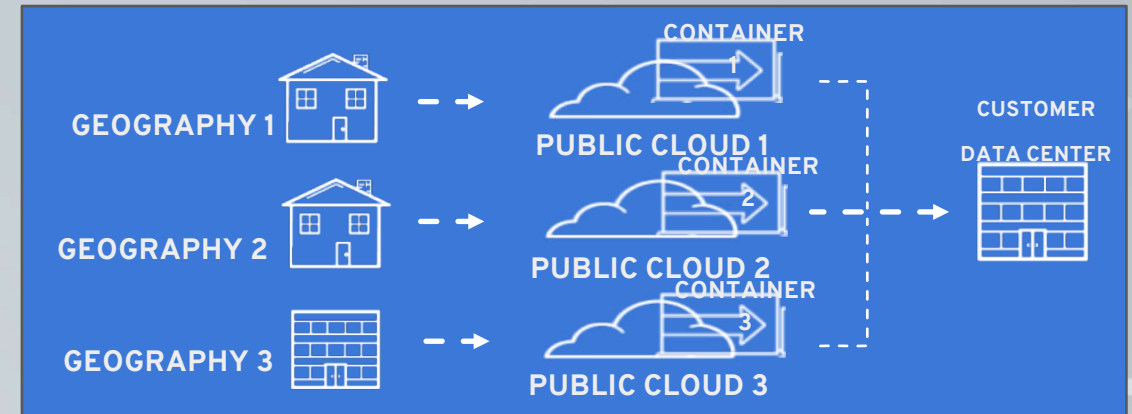
BUILDING INTELLIGENT FACTORY USING REAL-TIME DATA

POSCO ICT sought to cost-effectively create an intelligent factory that uses real-time data from Internet of Things (IoT) sensors to monitor and control facility conditions, maintain a stable operation environment, and extend the lifespan of the facility.

- **Red Hat Enterprise Linux as an open source foundation for its critical systems and Red Hat Virtualization & Red Hat JBoss Enterprise Application Platform, to support data analysis conducted at the smart factory**

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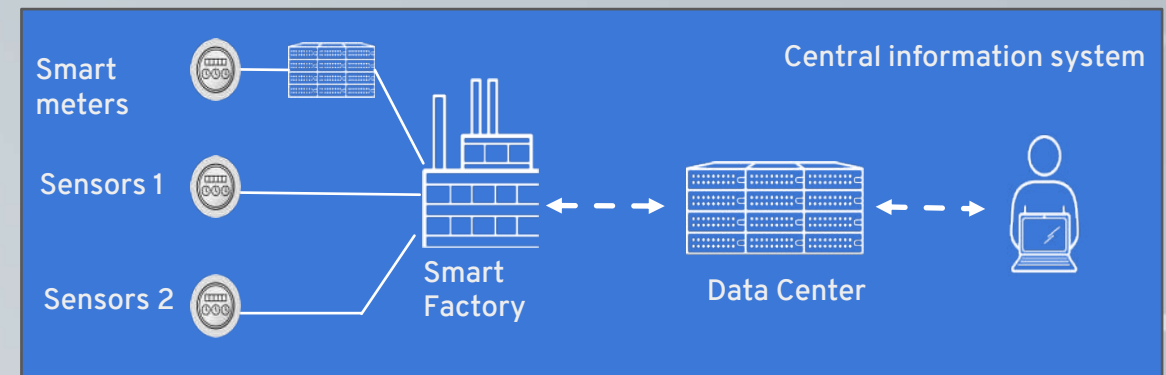
BUILDING THE INTELLIGENT ENTERPRISE

SMART TRAIN AT THE EDGE

SBB, the Swiss Railways Company empowers its trains with intelligent gateways to provide onboard information system. The IoT gateways feeds in-train Information terminals - shows next stop and additional train connections, process loudspeakers for alert messages, handle surveillance cameras.

DATA CENTER

- RHEL
- Ansible

- Opoenshift
- Sattelite
- Ansible

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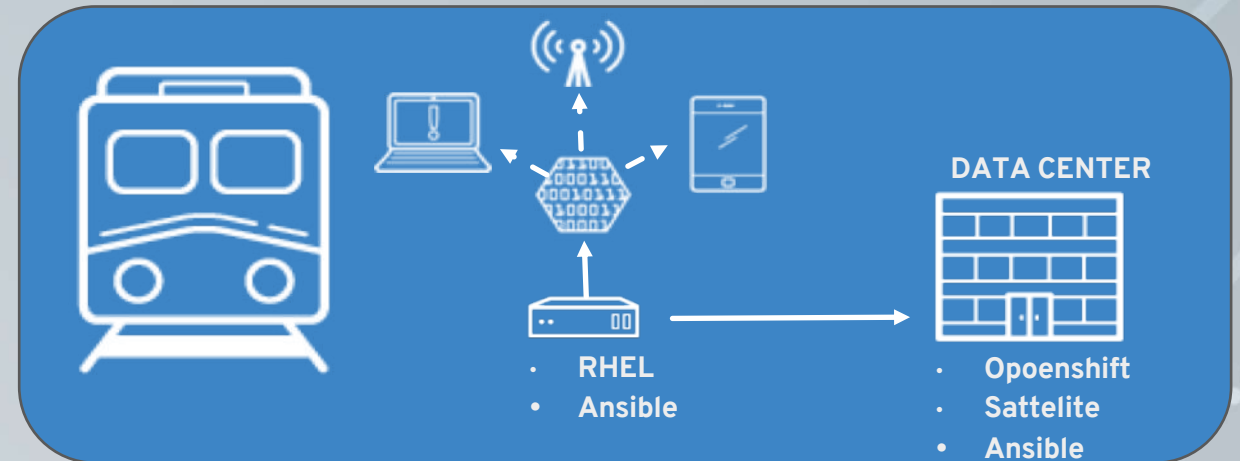
BUILDING THE INTELLIGENT ENTERPRISE

IMPROVE AIRLINES' TECHNICAL OPERATIONS BUILDING ENTIRELY NEW, REAL-TIME, DATA-STREAM BUSINESSES

Lufthansa Technik built and operated AVIATAR using a hybrid cloud infrastructure based on enterprise open source software from Red Hat. Lufthansa Technik needed a flexible, scalable environment that could run multiple applications integrating shared repositories of industry data for predictive analytics.

- Using **Red Hat OpenShift** to develop a new product line to make airline operations safer and more reliable.
- Hybrid cloud (**Azure** + private datacenter) solution,
- Using **Red Hat Fuse** to integrate internal and third-party data and build predictive analytics to anticipate delays
- **Red Hat 3scale** enabled collaboration with third-party developers specialists in operations and fuel efficiency.

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THE POWER OF OPEN
ENABLING DIGITAL LEADERS
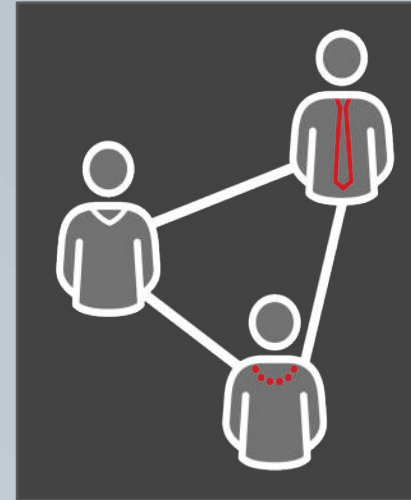
COLLABORATIVE CULTURE

New ways of working together
& building organizations

https://www.redhat.com/en/explore/the-open-organization-book#

Eclipse IoT community

"We believe the best way to support this complex environment is to base our commercial IoT platform, the Bosch IoT Suite, on open source components and open standards. These projects establish a horizontal open technology for IoT and provide the technical breeding grounds for successful business ecosystems."

- Dr. Stefan Ferber, VP of Engineering, Bosch Software Innovations

Steering Committee Members

39 Participating members such as

2.4 million lines of code   30* projects   250+ developers   130K monthly visitors
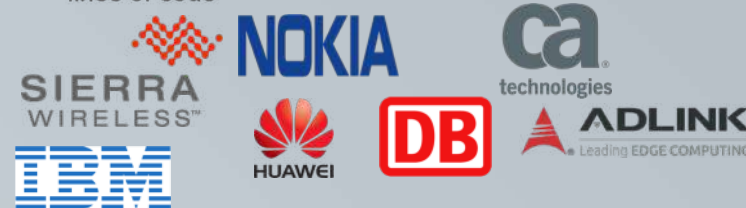
Red Hat contribute on:
- **Kura** at gateway level is an OT middleware (RH & Eurotech; based on ESF source code donated to community by Eurotech)
- **Kapua** project at cloud platform (RH & Eurotech, based on Everyware Cloud source code donated to community by Eurotech)
- **Hono** will enable connecting large numbers of IoT devices to a platform, based on EnMasse (the coming Messaging as a Service on OpenShift) (RH & Bosch)

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PARTNERING WITH EUROTECH AND CLOUDERA TO ADDRESS E2E ENTERPRISE IOT NEEDS

Operational Technology (OT) ———————————————————————————— Information Technology (IT)

Operational Technology (OT)

- Device Management
- Industrial protocols
- OT Middleware
- Intelligent gateways
- MQTT co-inventors
- OT security

Information Technology (IT)

- Messaging & Integration
- Business Rules & CEP
- Open Hybrid Platform-as-a-Service
- Enterprise Linux Platform
- IT security

Data Management & Analytics

- Enterprise Data Mgmt.
- Persistent Data Storage
- Big Data Processing & Analytics
- Real-Time Analytics
- Machine Learning
- Data Security & Compliance

Enterprise IoT open source community

OPEN END-TO-END IoT ARCHITECTURE

Integrating IoT operating technology, data management, analytics, and applications

Sensors, Actuators, Data Sources	Edge Processing & Analytics	Data Integration, Routing, Device Command/Control	Advanced Analytics & Machine Learning	Application Development, Deployment, Integration
Connected "Things"	**IOT Gateways**	**IOT Integration Hub**	**Data Management & Analytics Platform**	**Enterprise Applications**

- Device connectivity
- Remote management
- Data transformation
- Intelligent routing
- Business logic
- Real-time decisions
- Machine learning execution
- I/O services

- Device registry and management
- Device provisioning
- Message routing
- Data collection
- Event management
- Integration services
- Access control

- Data ingest
- Real-time processing
- Data storage
- Machine learning
- Real-time analytics
- Data security

- Application development and management
- Self-service provisioning
- Persistent storage
- Polyglot, multi-language support
- Automation
- Scalability
- Container portability
- Deployment flexibility

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BUILDING THE INTELLIGENT ENTERPRISE

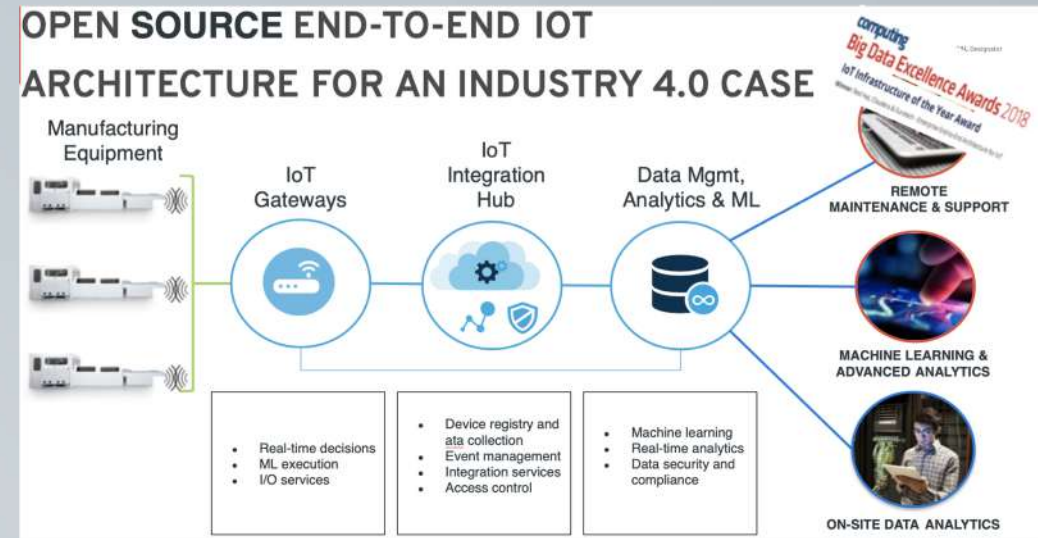# ACCELERATE DIGITAL TRANSFORMATION USING IoT AND M/L IN AN HYBRID ENVIRONMENT

One of the world's leading manufacturers of sensors and control equipment, wanted to accelerate its digital transformation using Internet of Things (IoT) and machine learning in a hybrid cloud environment building an open data processing pipeline for IoT data using an end-to-end architecture. They were able to power edge analytics and machine learning inferencing at the IoT edge that allows predictions to be made and decisions to be executed in real time.

OPEN SOURCE END-TO-END IOT ARCHITECTURE FOR AN INDUSTRY 4.0 CASE

Manufacturing Equipment — IoT Gateways — IoT Integration Hub — Data Mgmt, Analytics & ML

- Real-time decisions
- ML execution
- I/O services

- Device registry and ata collection
- Event management
- Integration services
- Access control

- Machine learning
- Real-time analytics
- Data security and compliance

REMOTE MAINTENANCE & SUPPORT

MACHINE LEARNING & ADVANCED ANALYTICS

ON-SITE DATA ANALYTICS