Innovation and Digitalisation
Exploiting Data

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Going beyond current limitations – Smart Assets

**Smart trains**
Communicate with each other and control room sharing location, speed and track conditions ahead. Capable of autonomous operation.

**Smart locomotives and wagons**
Measure infrastructure and locomotive condition.

**Smart infrastructure**
Self aware, self diagnosing and communicates with trains and control room of track and locomotive condition.

**Intelligent condition monitoring systems**
Fitted with object identifications system and integrated with database and control room. Augmented reality capability.

**Real-time condition assessment systems**
Monitor real time asset condition, communicates with trains and control room and integrated with condition monitoring systems for verification.
Modal Integration at the Service of Global Distribution

26-28 June 2018, Genoa, Italy

Connectivity

Risk

Customer

People/ Process
Aspirational Information Application

**Big Data**
- **Business Systems**: SAP, IBM, Oracle, Data Warehouses
  - **IoT Devices**: LCMS, CAS, Sensors, Machines, IOOS
  - **IoT Devices**: External Systems
    - Weather, Marine Traffic, Financial
- **Social Networks**: TV, Web Services
  - IRIS, Info, API Taxonomy, SmartFreight
- **Web Services**: Salesforce, Info, API Economy

**Insight**
- **Analyze Data**
  - Analytics, Visualization, Business Rules, Workflow Management

**Decision-Making**
- **Human**: Individual decision making
- **Team**: Collaborative decision making
- **Automatic**: Fully-automated algorithmic workflows

**Action**
- **Process**: Execute action into workflows & machines
- **Response**: Communicate decision
- **Transaction**: Execute action back into business systems

**Ideal Information Application Model**
Aspirational Information Flow Model

Information systems should provide the intended recipient an accurate response to any of these questions:

- What is happening?
- Should it happen?
- What happened?
- Why did it happen?
- What will happen?
- What should happen?

**CONTROL**

01 Discovery
  - Measure
  - What is happening?

02 Prevention
  - Alarm
  - Should it happen?

**CENTRAL / CLOUD DATA ORCHESTRATION**

03 Hind sight
  - Descriptive analytics
  - What happened?

04 Insight
  - Diagnostic analytics
  - Why did it happen?

05 Foresight
  - Predictive analytics
  - What will happen?

06 Optimisation
  - Prescriptive analytics
  - What should happen?

**ANALYSE & OPTIMISE**

**OPERATIONS**
Running Longer Trains – 4km/train – South African Iron Ore Train

Train Length: 4 km

Remote 1
Remote 2
Remote 3: End of Train
Lead Consist

Distributed Power Technology - South Africa’s 342 Wagon RDP Iron Ore Train
Computerized Driver Assistance for the Railway of the future Rio Tinto Australia – Successful Test of an Autonomous Train
International Heavy Haul Association Conference (IHHA)

12-14 June 2019
Narvik, Norway
THANK YOU