



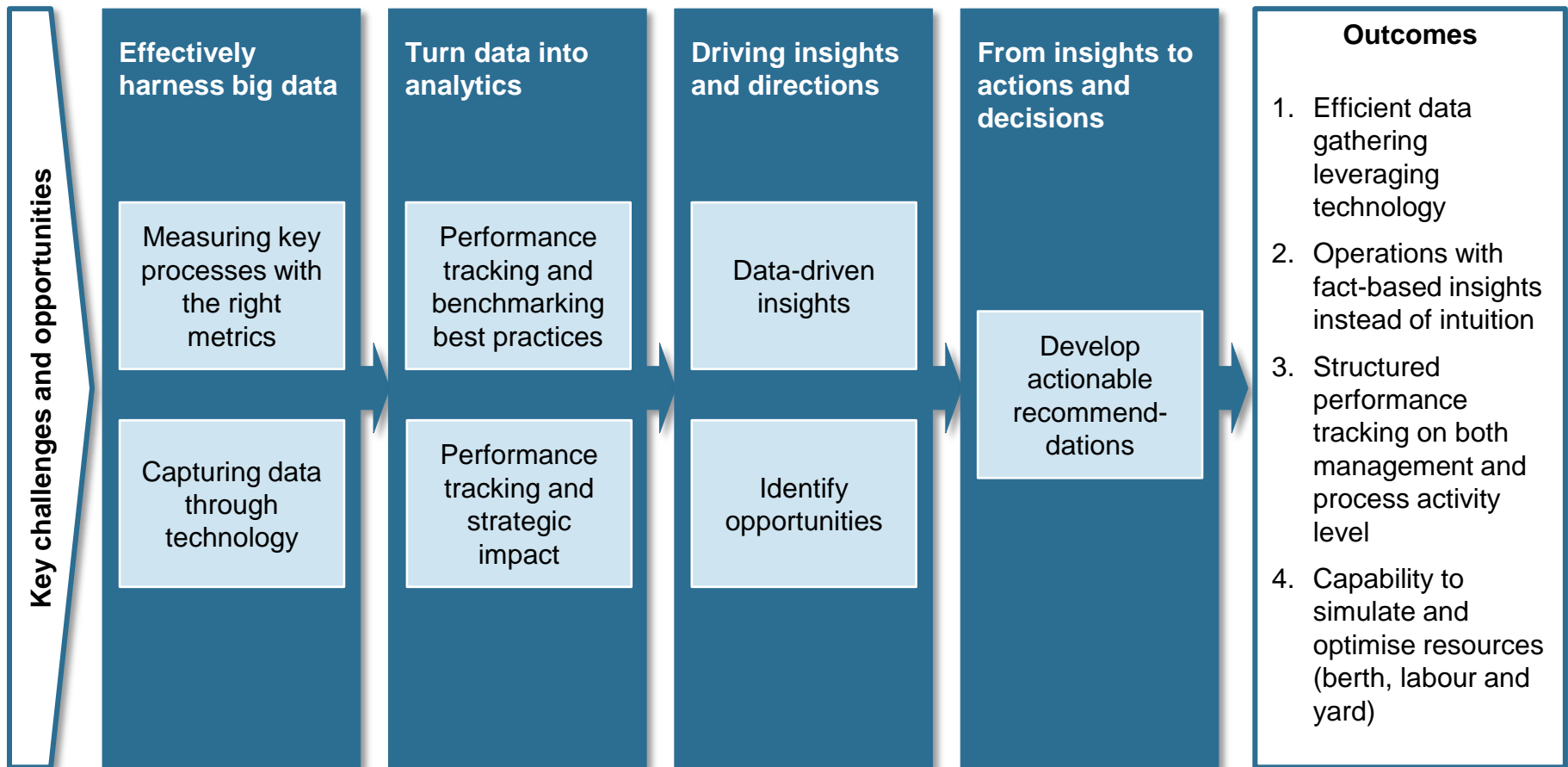
# Delivering an IIoT Proof of Concept for Jurong Port

High performance. **Delivered.**

# Jurong Port Experience

The objective was to establish a capability to run operations analytics leveraging technology.

Operations research capabilities:



# The project set the vision for operations research journey through five distinct deliverables

## Project deliverables

### Deliverables description

### Target outcome



**Performance value tree** – Develop KPI value tree model linked to detailed operational metrics

Risk mitigation and improved business planning through sensitivity analysis and scenario modeling



**Internet of things PoC** – Establish PoC for data capture through sensors on port equipments (e.g. Cranes) and feed into performance value tree

Drive automation journey by leveraging cutting edge technology to make a best-in-class port



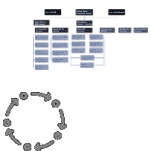
**High performance bulk/break-bulk port benchmark<sup>^</sup>** – Benchmark operations processes and KPI in collaboration with peer ports

Baseline performance and adopt best practices from similar ports to improve performance



**Productivity improvement initiatives and opportunity case** – Identify productivity improvement initiatives and implementation approach

Performance improvement roadmap and value case based for productivity improvement across processes, people and technology



**Operating model with OR capabilities** - Develop operations capability high level design and roadmap

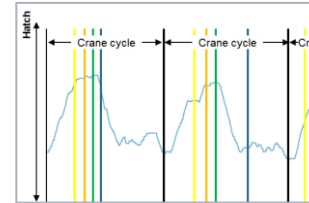
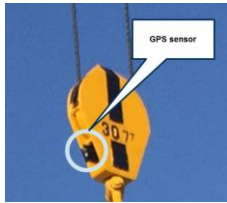
Established high level capability roadmap (organisation, process, tools etc.) to support future operations and continuous improvement

<sup>^</sup> depending upon the selection and availability of benchmarking Port(s), deliverable might be delayed post project timelines

Focus so far

# ...and ran a proof-of-concept for ship crane activity analysis

## Future state concept



- Custom built industrial grade sensor devices detecting crane movements with precision
- Stevedores deploy sensors during quayside operations
- Easy handling and latching on the cranes by stevedores
- Number of sensors to be deployed is dependent on daily average number of cranes in operation
- Cloud platform hosted on-site or off-site
- Data transmitted over Wi-Fi / cellular network to cloud platform
- Data can also be transmitted to a on-site 'base-station' that is integrated with the cloud
- The algorithm detects key process events in the raw data:
  - Crane swing from berth to hatch
  - Cargo rigging by stevedores
  - Cargo lifting
  - Crane swing from vessel to berth
  - Cargo unrigging from lifting gear
- Data directly fed into the BI system to develop dashboard and enable user conduct analysis
- **Possible use cases in multiple areas e.g.:**
  - Real-time productivity monitoring including alerts based on pre-defined business rules
  - Benchmarking
  - Continuous improvement initiatives