How the right information can better enable effective & efficient port management
- Especially: Port Resilience

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The Idea: Port Resilience

Capacity / Performance measure

Time

Period of disruption

Loss in capacity

Response
First things first: What is a port?
What can go wrong?

**Economic Factors**
- Adverse economic climate
- Slowdown in business
- Bankruptcy of a major port user
- Loss of business

**Environmental Factors**
- Adverse weather
- Pollutants
- Hydrological hazards
- Unexploded WW2 ordnance

**Human Factors**
- Cyber-attack / Hacking
- Terrorism and crime
- Sabotage, theft and vandalism

**Organisational Factors**
- Industrial action
- Strikes
- Blockades & lock-downs

**Access Factors**
- Competition from another port
- Major shipping line relocates
- Seasonality

**Technological Factors**
- Saltation
- Detonation of cargo (e.g. gas tanker)
- Physical attack
- Campaigns & demonstrations

**Network Factors**
- At connecting ports
- Port inventory system failure
- Systems failures

**Port Disruption Closure**
- General confusion / lack of planning
- Insufficient resources
- Lack of risk awareness

**System failures**
- ICT failures
- Navigation system failures
- Port inventory system failure

**Vessel traffic control**
- Towage
- Pilotage

**Land Access**
- In-gate / out-gate controls
- Highway maintenance

**Hydrological hazards**
- Floods
- Siltation

**Network Failure**
- Loss of key utilities (e.g. power)

**Climate Change**
- Snow and ice
- Strong winds

**Disruption Events**
- Accidents
- Conflicting priorities amongst port stakeholders

**Port Security**
- Customs
- Port health (quarantine services)

**Transport**
- Official inspections
-ICT failures
- Navigation system failures
MARS: Simulation Tool
A Directory of Port Related Information Sources and Uses
Growth curve of how companies use information

A more precise use of resources

Integrated framework

Dynamic framework

Static framework

Data collection

Data storage

Data cleaning

Statistical analysis: mean, median, standard deviation …

Data mining

Big Data analytics: large scale automation, prediction, clustering, machine learning …

Unstructured data analytics: image data, text data, audio …

Artificial intelligence: self-directed learning

Crikey!

What is Big Data?

Big data is the personal minute to minute diary of everyone and everything – B2C, B2B and your machines.

- A more precise use of resources, a more personalised service.
- Always a missing piece of the puzzle…what data do you need?

- Considerable scope for application in Port Resilience Planning
- Access to information needed, but currently not known where to locate or access it
What data is produced as cargo flows through a port?

- What data produced?
- What is data used for?
- Which extra data needed?
‘Bagatelle’: pennies or steel balls drop between nails
Imagine pennies bouncing on different flow routes
MARVIN: gives better quality alternatives

- A crisis occurs and a node in a flow of cargo is blocked, flooded, destroyed … or something else.

- Information is needed to choose an alternative routing of the flow – just like the penny.

- MARVIN will be a directory of where to get that information.

- And would contain some of it to suggest alternative options & help in choosing… and look like Google Maps.

- Son of MARVIN would be an access point to that information.

- Grandson of MARVIN – identifies strategies to fill information gaps & use latest analytics technology.
Eye in the Sky…

- Position, Location and Movement:
  - AIS, GPS

- Advance Notice:
  - Climate and weather; Tides; “Space Weather”

- Images:
  - Port facilities; Infrastructure; “eye in the sky” verification

- Communications
  - Satellite Phones

- Mapping
  - Topography; Infrastructure; Transport Systems