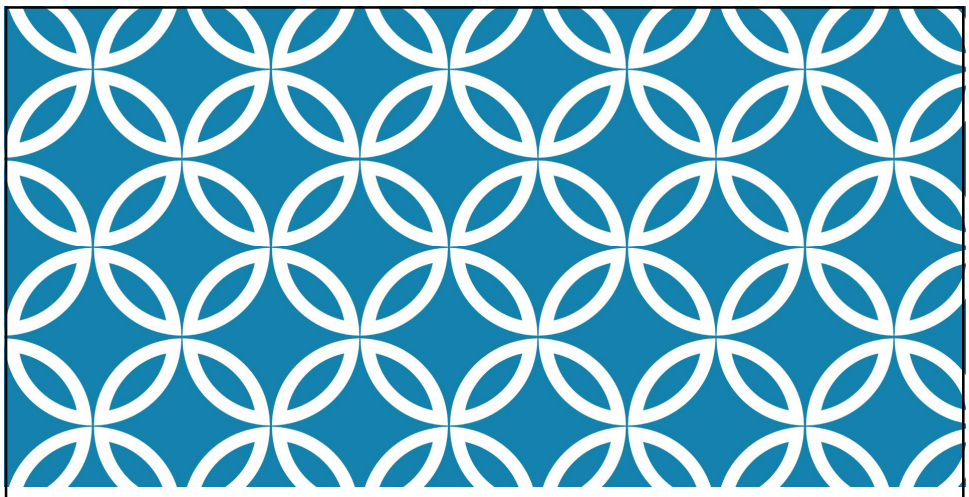

ASSET DYNAMICS

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Program

- Introduction
- Exploring Asset Management by gaming
- Exploring the decrease of the condition of an asset
- Exploring the increase of the condition of an asset
- Exploring SD community interests with asset management
- Closing

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copernicos groep veranderaanpakkers — change agents in asset management

- We are specialized in Asset Management (AM)
  - Life Cycle Management of complex technical systems
  - With many actors involved
  - With different perspectives and specialisms
- We believe in, and facilitate, co-creation and integral thinking
- That is why we are convinced System Dynamics (SD) can contribute a lot to Asset Management
- We are practitioners of SD in the field of AM

ASSET DYNAMICS

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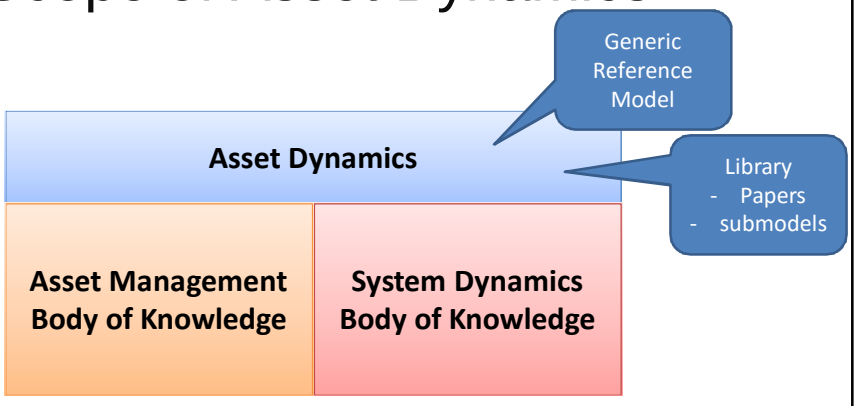
Scope of Asset Dynamics



Asset Dynamics is built on its foundation:
- Asset Management
- System Dynamics

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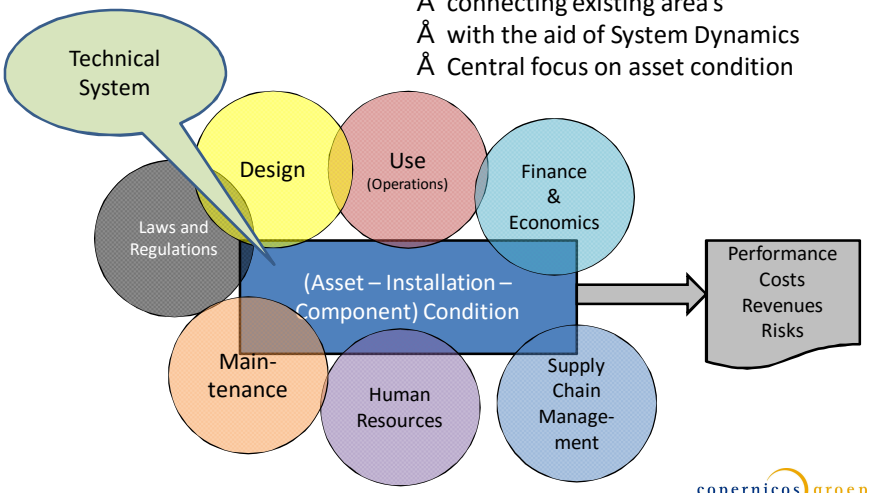
Scope of Asset Dynamics

- exploring the area of Asset Management
- connecting existing area's
- with the aid of System Dynamics
- Central focus on asset condition



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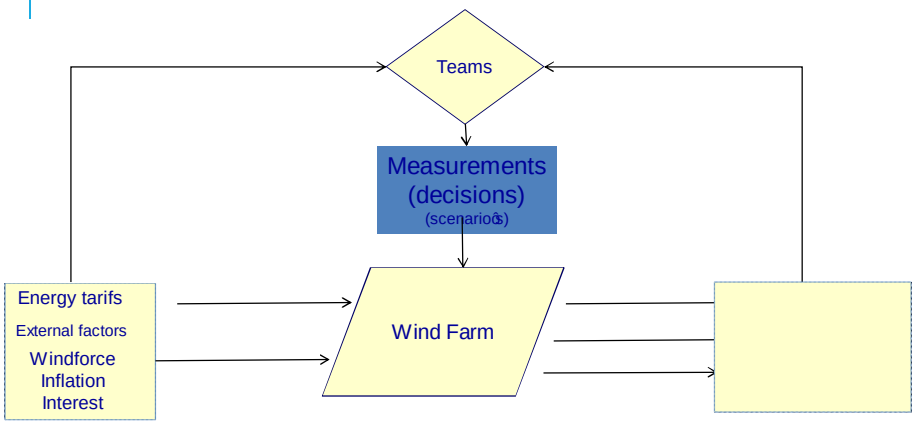
Exploring Asset Management

http://dgame.amicoservices.nl

Principles of the game



Asset Dynamics: connecting mental models

The condition of an asset is starting point and main focus

Generates availability → Generates production/revenues

Which KPI's are effected by Asset's condition?

Condition of asset

Increases by maintenance
- Preventive maintenance
  - Time based maintenance
  - Use based maintenance
  - Condition based maintenance
- Corrective maintenance

Decreases by usage
- duration
- Type of use
- Environment

Generates manhour load
- Maintenance on site
- Maintenance in workshop
- Maintenance by supplier

Generates costs (life cycle costs)
- Maintenance costs
- Fuel costs
- Personnel costs
- Investment costs
- Facility costs

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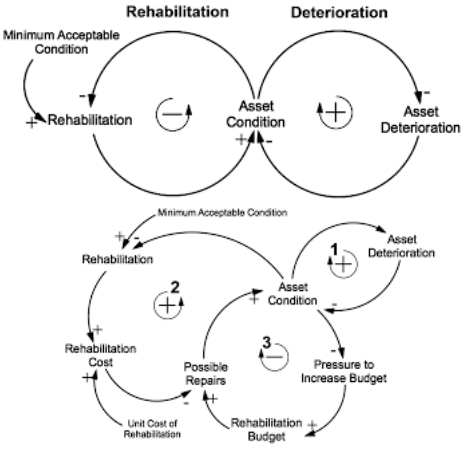
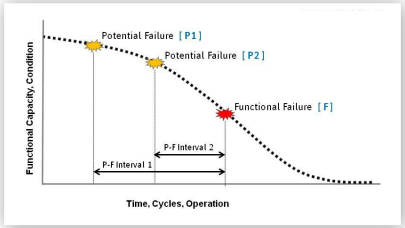
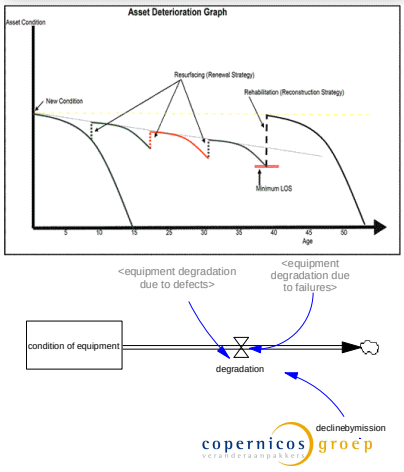
Behaviour of an asset

Deterioration model of an asset







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Workshop 1: Decrease of condition of asset

- Which factors determine the decrease of the condition of an asset and in what way?
- Which stakeholders have which influence?

- Elements to think of could be:
  - Usage time
  - Usage intensity
  - Usage environment
  - Usage variations
  - Etc.

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Understanding Asset Dynamics in steps

(diagrams and kpi's cost effectiveness)

1. 'Natural' state of an asset – deterioration because of tear and wear
2. Impact of operations on an asset
3. Corrective maintenance to solve failures
4. Preventive maintenance to prevent failures
5. Overhaul to extend lifetime
6. Design quality regarding assets' life time maintenance, operations and functionality needs
7. Human resource capacity

- (Re-)design to adapt to future needs (fit for purpose)
- Optimization: balancing design, maintenance and operations (costs vs. Revenues)
- Learning process – optimizing during life cycle

The different parameters to control the life cycle behaviour
i.e. performances/revenues and costs of the assets

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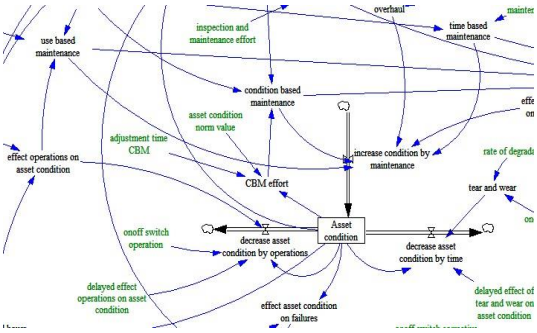
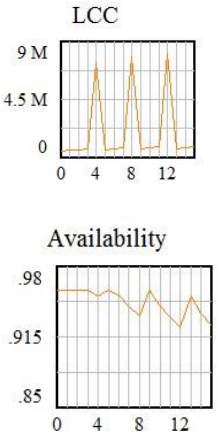
Demonstrating influence of assetôs use to its condition and performances





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Workshop 2: Exploring the increase of the condition of an asset

- Which factors determine the increase of the condition of an asset and in what way?
- Which stakeholders have which influence?
- Which type of maintenance influences assetôs

- Elements to think of could be:
  - Type of maintenance
    - Preventive\corrective
    - Time based, use based, condition based

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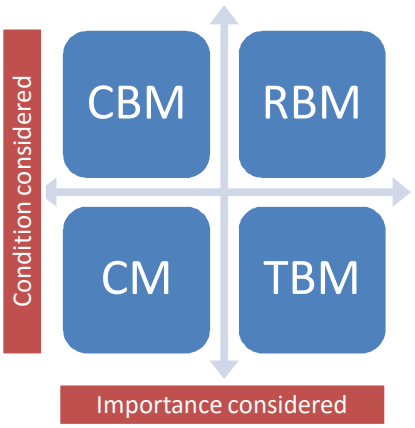
Maintenance strategies

Maintenance strategies can be divided into different approaches which lead to varying maintenance costs and asset availability. One common way to classify maintenance strategies is to distinguish whether the condition of the component is considered on the one side and whether the importance of the component is considered on the other side.



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Mechanisms in current Asset Dynamics Reference Model

- Productbreakdown structure of asset (multi level):
- Degradation/recovery behaviour of installations based on composition of type of installation
- Degradation of condition through use of asset
- Degradation of condition through TIME
- Recovery of condition of asset by maintenance
  - Preventive maintenance
  - Corrective maintenance to solve failures
- Priority mechanism for maintenance (risk based)
- Obsolescence of equipment in installations
- Redundancy of equipment in installations
- ELOT (Endlife Of Type) mechanism for installations

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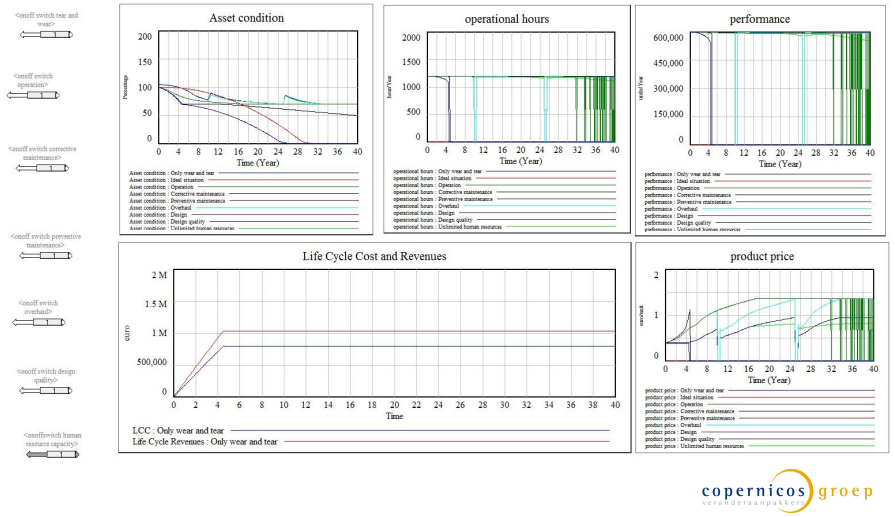
Asset Dynamics Dashboard



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System Dynamics in a collaborative modelling environment can improve decision making and therefore the results of Asset Management


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