DIGITAL TWIN FACILITATED STAKEHOLDER IDENTIFICATION

The Systems Engineering Group Zürich

SWISSED 2020

The Systems Engineering Group Zürich

ALTAIR

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SSSE
Swiss Society of Systems Engineering

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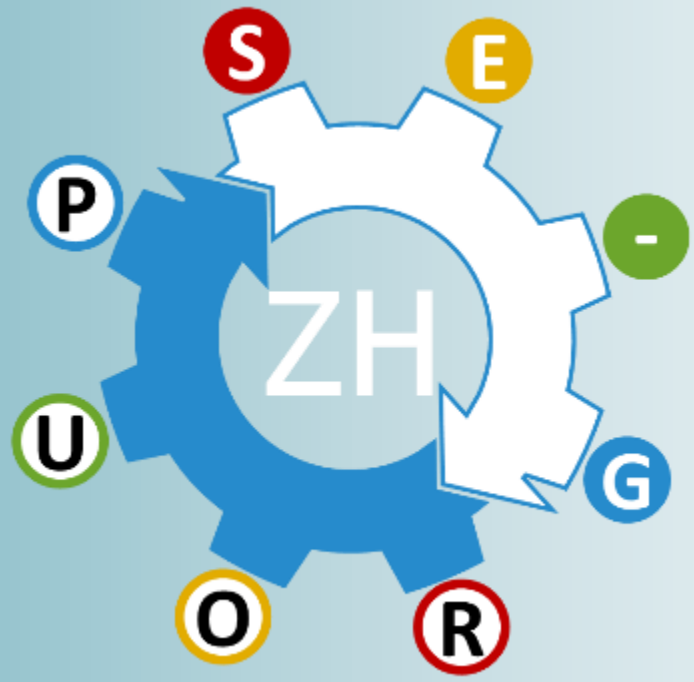
Technische Hochschule Ingolstadt



MAN Energy Solutions
Future in the making

RIETER

STADLER

Schindler

SIEMENS
Ingenuity for life

Two Illustrating Examples

An analogue and digital mock-up of a new intercity train

A simulation of a trading platform for digital assets

Stated and Unstated Needs

It must be able to replace its predecessor

It must be cheap

It must be accessible for people with disabilities

This will reduce our personnel costs

It must blow our competitor away

It shall be maintainable by 3rd parties

It must be highly configurable

It must be producible on our machinery

It must be safe

Stated and Unstated Needs

This will make me unemployed

It must be able to replace its predecessor

Will is be compliant with FINMA regulations?

It must be fair for all participants

Training less than 2 day

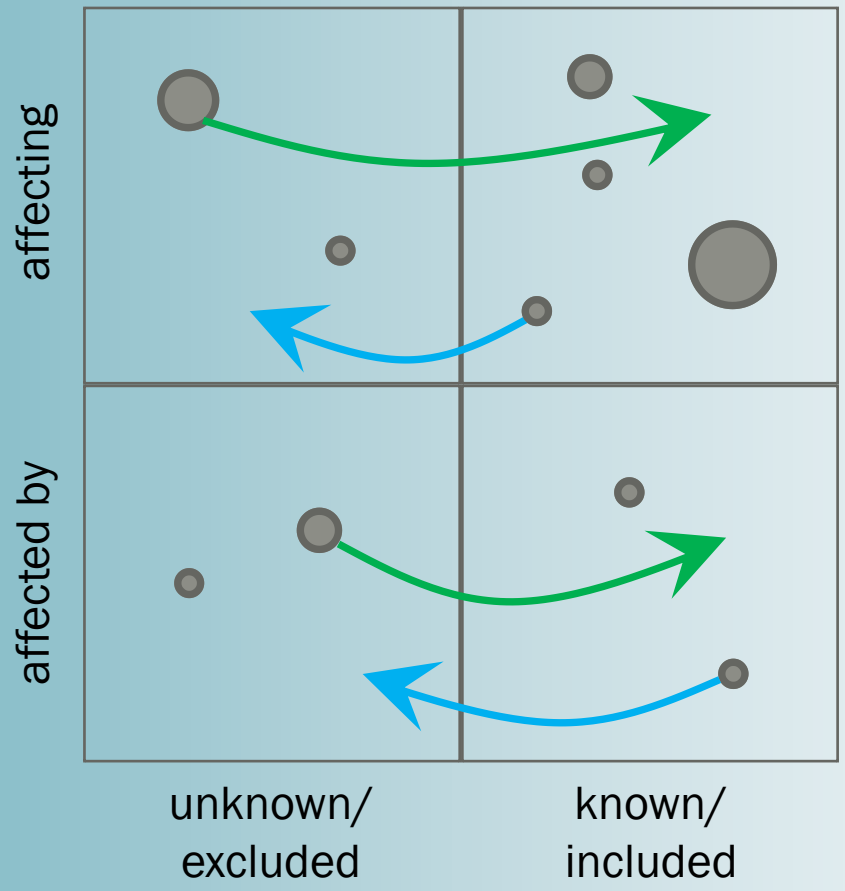
It must be highly configurable

It must defend the system against cyber attacks

Stakeholder Classification

Some stakeholders affect the project, e.g. other transporters

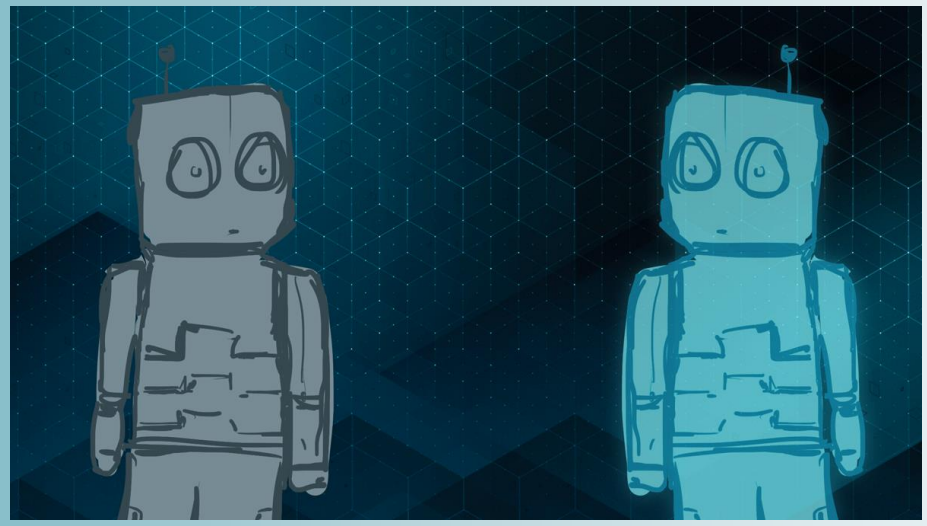
Some stakeholders are essential to get approval, e.g. regulators



Some stakeholders are affected, e.g. people with disabilities

Some stakeholders are affected, e.g. traditional traders

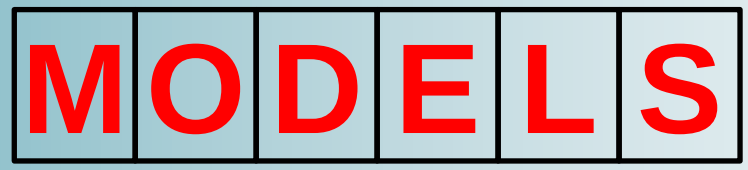
What is a Digital Twin?



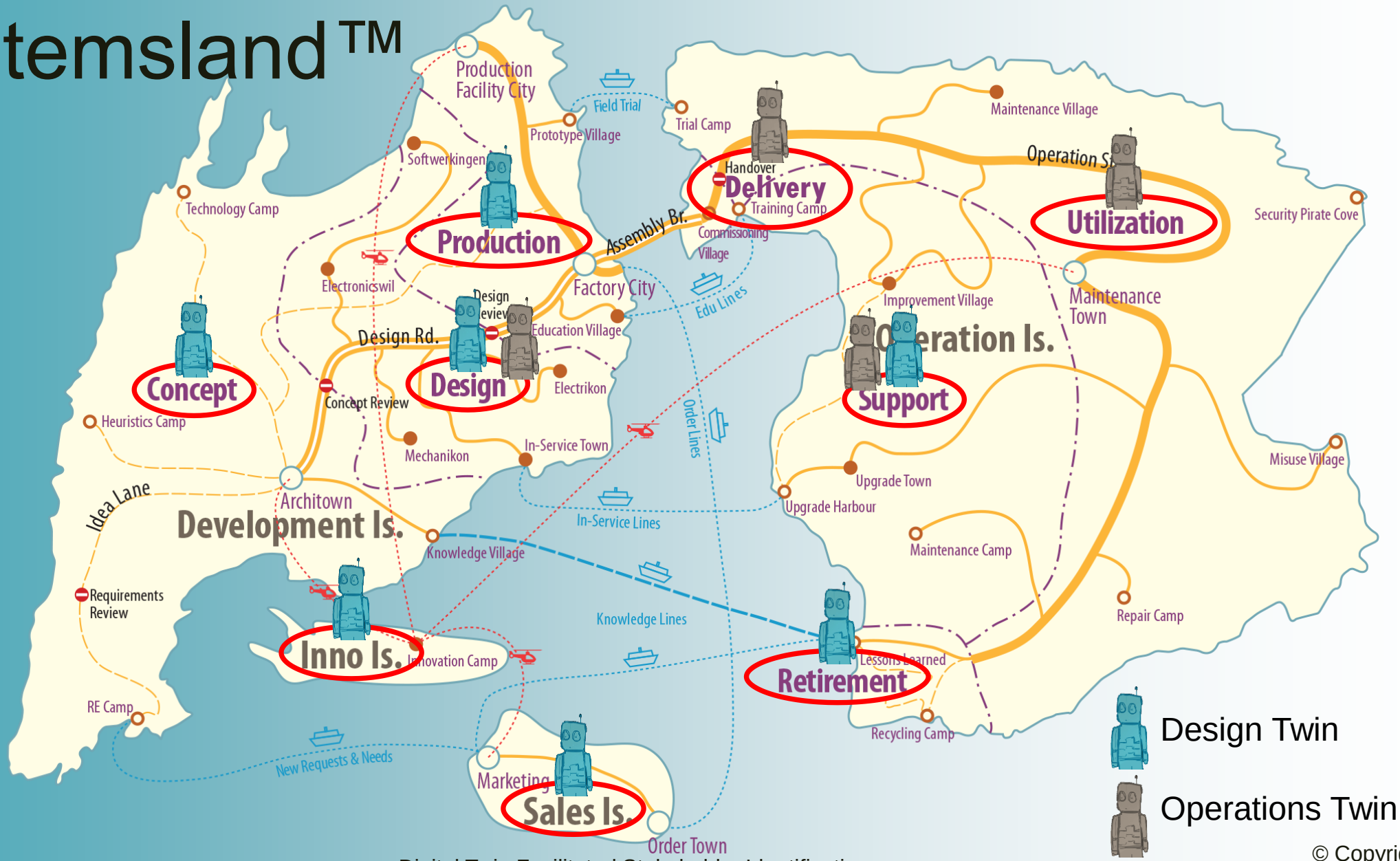
- **Digital Twin (DT)**
  A digital representation of some aspects of a (real) thing (the Original).
- **Original**
  The (real) thing (including humans and other lifeforms) that is or will be augmented by a Digital Twin.

Active Capabilities of a Digital Twin

- ***MONITOR*** the Original and its environment.
- ***OPERATE*** the Original in its environment.
- ***DUMP*** (historical) data from the Original for later analysis.
- ***ELABORATE*** responses from the Original's observations.
- ***LEARN*** and improve a model of the Original's world.
- ***SIMULATE*** alternatives and decide for actions on the Original.



Systemsland™



Design Twin

Operations Twin

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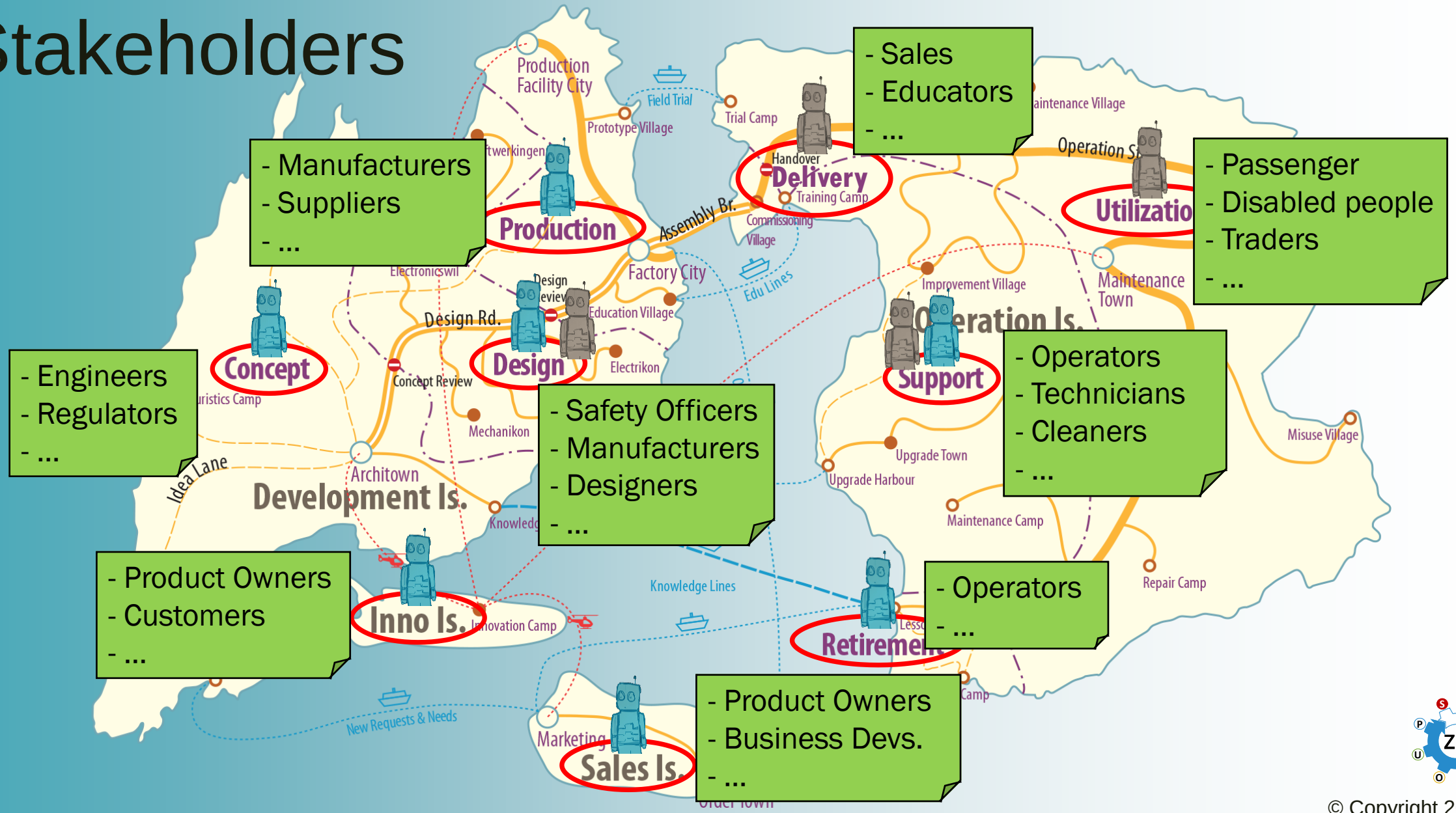
Stakeholders



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Stakeholder Needs

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Stakeholder Needs

It must be fair for all participants

- Regulators

Will is be compliant with FINMA regulations?

It must be highly configurable

- Product Mgrs

Training less than 2 day

- Educators

- Traders

This will make me unemployed

- Operators

It must defend the system against cyber attacks

- Operators

It must be able to replace its predecessor

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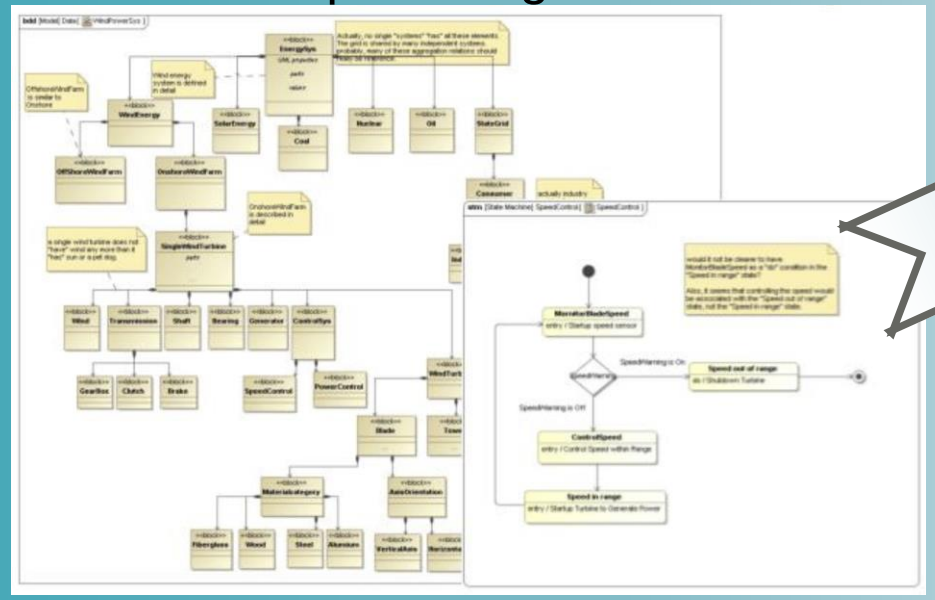
Summary

"Fit for purpose" digital twins can reach a wide variety of stakeholders.

Simple Design Twin



Sophisticated Operations Twin

Important Insights

Digital twins are digital representations of some aspects of a (physical) product and may be useful on Systemsland's Development Island as well as on Operations Island.

On **Development Island**, digital twins may act as a **new form of prototypes**:

- They can be **disseminated to a wide range of stakeholders** to gather feedback at design time
- They may act as **structured containers to get organized feedback** from stakeholders exploring them
- They may even be **re-distributed by customers** to reach their stakeholders
- They don't have to be expensive: they range from "**explorable digital diagrams**" at design time to the "**minds of machines**" at operations

However: It is important that digital twins are **"fit for purpose"**, i.e. that they are adequate for their target community!

Thank you for your attention!

(and remember to take your handout and discuss with us over coffee)