

In-Service diagnostics of the catenary/pantograph and wheelset axle systems through **INtelligent** algorithms: **SENTINEL**

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1 Background

Continuous, **rough environmental conditions** weaken several physical properties of driving components and even **lead to failure** of vehicles and associated infrastructure between periodical technical checks.

To prevent incident and guarantee safety hazards, SBB must take today trains **periodically out of service** for condition checks and maintenance.

Taking trains out of service reduces the availability of the train and **increases the costs** for the whole fleet over its entire life cycle.

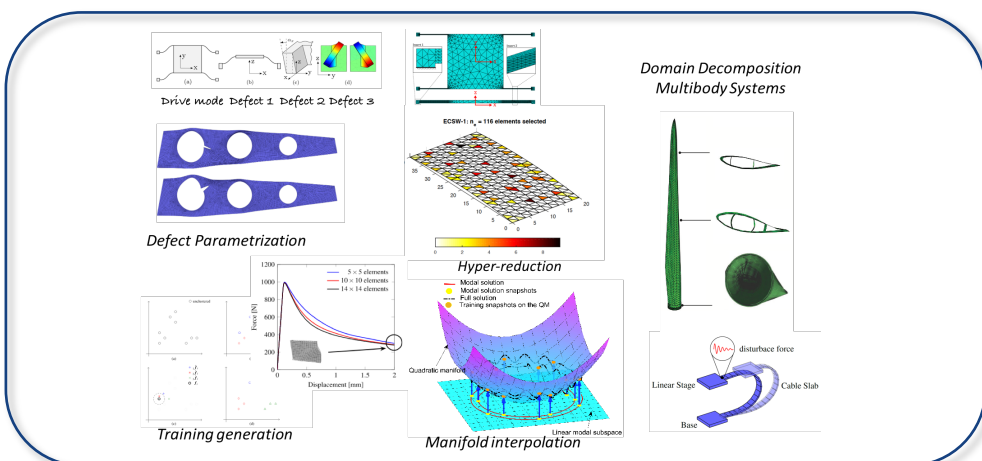
Today it is very **difficult to detect permanent changes** in the condition of drive components on a train in operation.

2 Scope

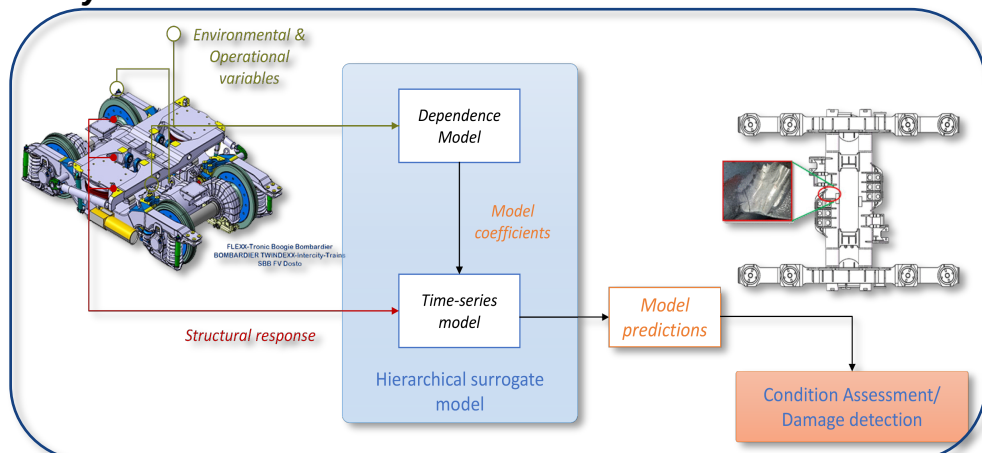
We aim at developing **diagnostic techniques** for assessing the **condition of critical components** of train vehicles, relying on use of **monitoring data** that is extracted **in-service**.

Expertises

Reduced Order Models - Dr. P. Tiso/ Prof. E. Chatzi

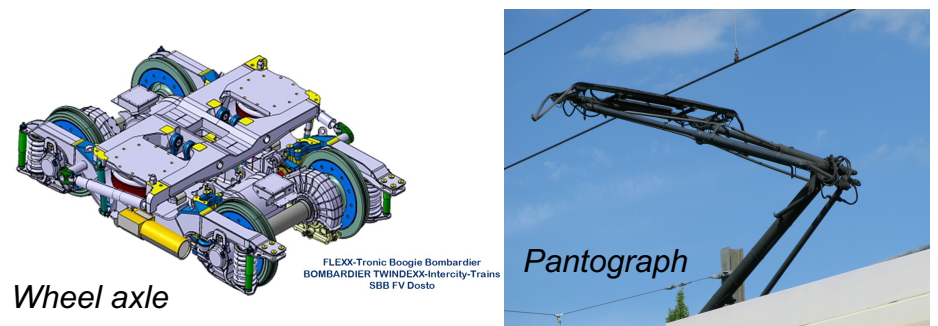


System Identification - Prof. E. Chatzi



3 Methods and Applications

- **model-based assessment**, by means of **parametrized reduced order models (ROMs)** of the components at hand
- **System identification** strategies for early detection of **damage and/or malfunctioning**.
- **Machine Learning based assessment** (health monitoring)



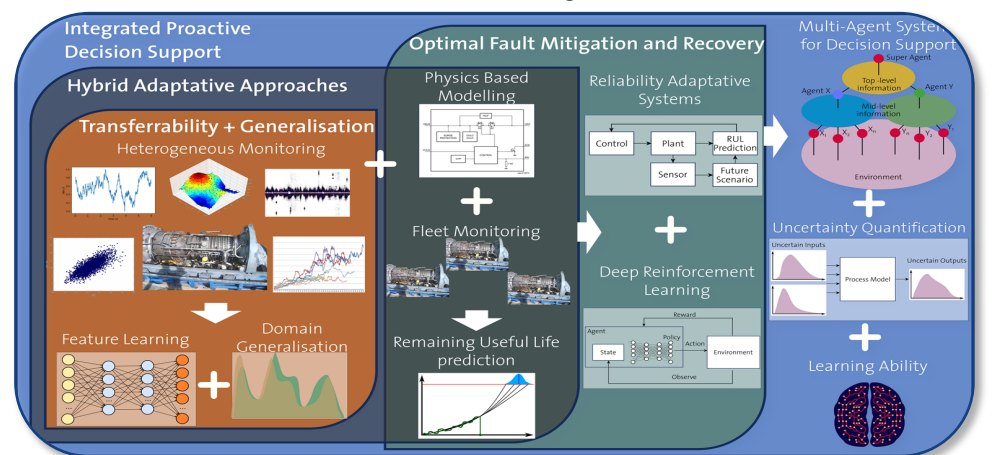
Hybrid detection:

We **fuse ROMs with data** for fault detection on **wheel set/axle/shaft** of the bogie.

Data-driven detection:

No physical model employed, rely only **pantograph-catenary contact force** signals and fusion of contact/vibration-based/optical sensing) for **automated fault detection**.

Data-driven assessment - Prof. Olga Fink



On-board sensing and data acquisition Tm 232

Mr. Martin Lottaz/ Mr. Dominic Fried

