MADe – Engineering Taxonomies

Maintain consistent usage of technical terminology across the product lifecycle.

Key benefits

- Consistency of both intra- and inter-organisational communication
- Usability – Guides the completion and reporting of analysis
- Transferability– supports reuse of models and analysis

Key features

- Functional Modelling – Describing the disigned for operation of a system
- Failure Concepts – description of causes, mechanisnms and faults
- Environmental Factors – environmental variables that impact system performance
- Maintenance Actions – enables libraries of maintenance tasks

The Problem: Clear and understandable communication within and between engineering organisations is essential for efficient and accurate realization of complex engineering projects. Problems can arise when teams of varying disciplines and professional backgrounds use alternate and non-standardised terminologies.

The Solution: MADe presents verified and robust engineering taxonomies for the purposes of failure analysis, system modelling, logging mission and environment variables, and maintenance reporting and diagnostics. Users can focus on completing meaningful analyses to support engineering decision-making rather than deliberating on the semantics of terminology or worse, producing ambiguous content for the target audience.

An agreed upon consistent taxonomy facilitates ease of communication across the breadth of a product's lifecycle. From conceptual design to operation, the development of core system knowledge remains in the same language throughout.

Comprehensive taxonomies to aid engineering

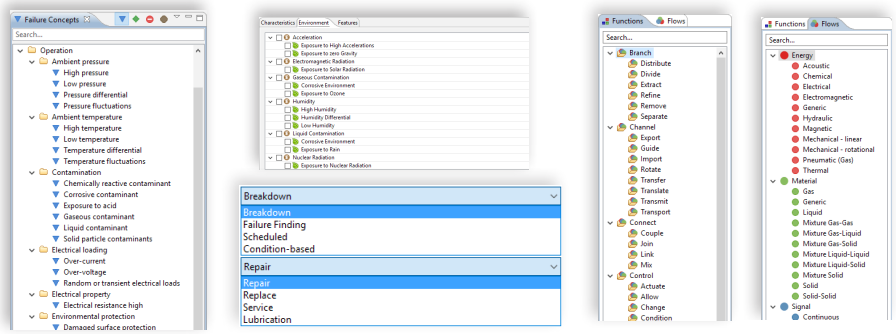

Figure 1: Clockwise from left: Failure Concepts, Environmental, Functional, and Maintenance taxonomies

Which analyses are improved by standardised taxonomy?

The use of taxonomies supports major analyses conducted iteratively over the course of a system's lifetime:

- Failure Analysis – understanding how the system can fail (and what causes the failure).
- Criticality Analysis – establishing which failures are important (cost / operations / safety).
- Environmental Analysis – completing trade-studies on the impacts of prospective operating environments.
- Maintenance Analysis – defining maintenance approaches and tasks.
- Defect Reporting – assuming that field data aligns with analysis terminology to enable FRACAS.

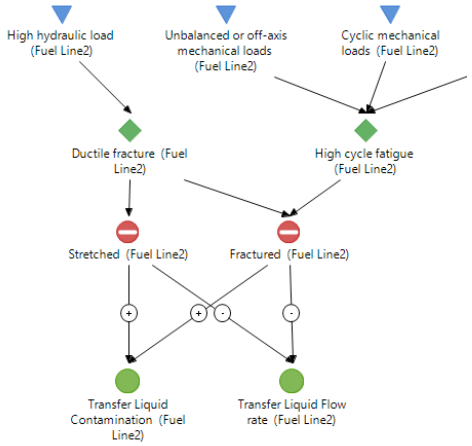

Figure 2: Physical failure modelling utilizing the Failure Concepts taxonomy

How does this compare to traditional approaches?

Without the implementation of a taxonomy, subjective opinions can impact upon processes which by definition should be objective. If individuals cannot accurately define and agree the meaning and appropriate usage case for certain terms then the clarity and quality of the analysis can be lost.

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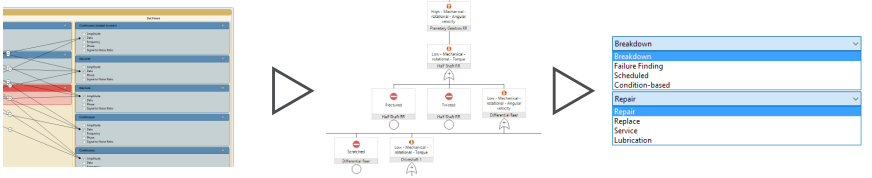
made
decisions better MADe...

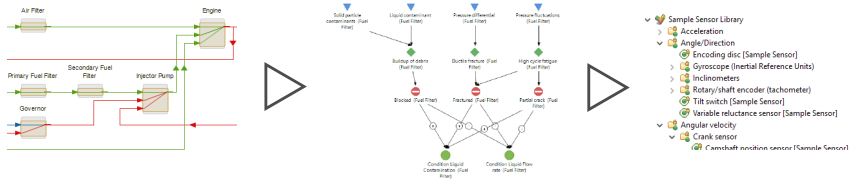
How does MADe MPD generate key asset usage information?

Design → Analysis → Maintenance



1) Definition of system's items with functional taxonomies.
2) Produce related analysis (Fault Tree Analysis).
3) Define maintenance actions in terms of approach and type.

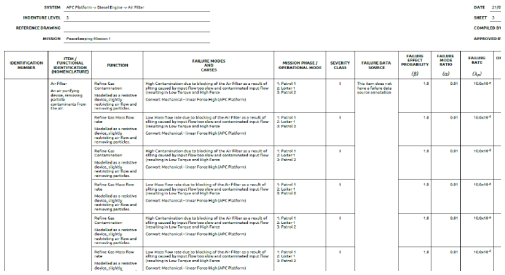
Functional Modelling → Physical Failures → Diagnostics



1) Conceptual design – identify system-level functions.
2) Detailed Design – physical failures are attributed to functional items.
3) Sensor Library represents common sensing devices with matched flow properties.

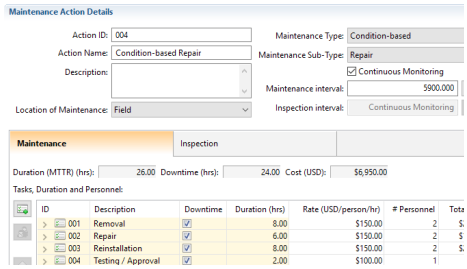
Analytical applications of MADe taxonomies

FMEA/FMECA



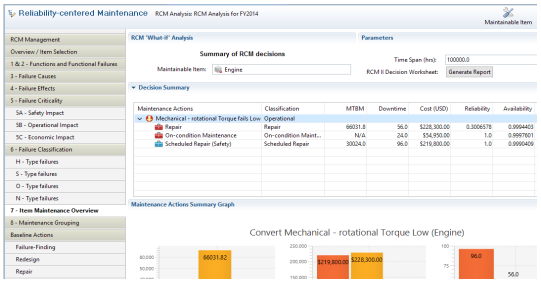
FMEA/FMECA leverage the functional and physical models to track failures.

Maintenance Actions



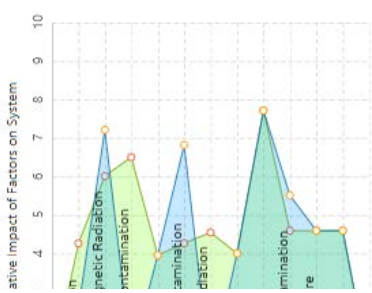
Maintenance actions are ascribed to the system.

RCM



RCM utilises the functional, physical and maintenance taxonomies.

Environmental Profiling and Analysis



Development and comparison of Operating Environments

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