Data Driven Engineering with Functional Data Management

openMDM Working Group Annual Summit 2023
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a product by
Karakun
Introduction
That’s what it’s about

Component- and system properties for functional development.

→ These properties define the **DNA** of a product

We call these properties **“Functional Data”**

Others call it also “Technological Data” or just “Parameters”

**EXOKNOX is a Data-Driven Functional Data Management System**

→ The base system is like a Geo-PDM-System, but for functional data
  + components requirements management
  + order-/delivery management for supplier integration
  + (process automation)

→ EXOKNOX uses an extended openMDM model
# Functional Data are the Basis of any Technical Development

EXOKNOX is an integration platform

<table>
<thead>
<tr>
<th>Use in R&amp;D context</th>
<th>Results Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tracks, Maneuvers, Load Cases</td>
<td></td>
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</table>

EXOKNOX is a reliable source for SDM systems

<table>
<thead>
<tr>
<th>Technical product</th>
<th>Geometry-related Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both for Hardware and Simulation</td>
<td></td>
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We also feel comfortable in the management of material data and material models

<table>
<thead>
<tr>
<th>Product structure</th>
<th>3rd party system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geometry CAD data</td>
<td></td>
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</table>

Requires technology data for parameterization

<table>
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<tr>
<th>ECU code/CAE models</th>
<th>3rd party system</th>
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Our FDM system EXOKNOX Hub and EXOKNOX Free

Big Data mngmt and analysis platform

Presented at the openMDM Summit 2022

EXO NOX is a reliable source for SDM systems

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Why

When we started our activities, no functional data management system was available at the market, providing both
- product data management principles
- a data model representing component specific details like named channels, test conditions, ...
This Inspired Us to Develop a Functional Data Management (FDM) System

Efficiency and Data Quality
- As former simulation engineers, we know the pain points when it comes to handling functional data
- Basis for development speed are comprehensive functional data of high quality

Closed Process Chain
- Efficient product development needs
- Up-to-date data for the entire development organization
- Simulation and test campaigns with quality-checked data
- Seamless supplier integration

Future-Proof
- Compliance with the prostep iViP / VDA data exchange format FDX
- Upcoming digital certification
- Demand for interoperable system - no vendor lock-in
How

We created a unified digital workplace for all product development stakeholders.

The flexible data-driven approach uses an extended openMDM data model together with an own ODS server.
The FDM Solution is Based on Two Pillars

Providing the first end-to-end functional data management platform

**FDX Data Standard**
- FDX: Standard format of functional data for sharing data between departments and with suppliers
- FDX uses openMDM and ASAM ODS as underlying standards

**Software Solution**
- Implementation of product data management principles
- Realization of the one-source principle
- Implements the FDX standard
- Process support

Remark:
Using the openMDM data model and parts of the openMDM BL provides an elegant solution for the requirements of data model evolution
EXOKNOX provides a closed functional data process across multiple development cycles:

- Target data objects allow all developers to define their *functional requirements* for the component or system.
- A component manager (BTV) can consolidate these requirements and thus *identify conflicting goals at an early stage*.
- Ordering functionalities *integrate* both internal and external *data suppliers* via the standardized FDX data exchange format.
- *Automated quality* checks prevent known and avoidable errors in as-is data.
- EXOKNOX offers *data analysis functions* and can perform data transformations via integrated Python scripts to supply data to *downstream processes* such as MBS simulations.
- Product data management functionalities such as versioning, status, roles and others ensure the *traceability of changes*. 

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Functional Requirements and Data Collection

- **Target Data Definition**
- **Target Data Consolidation**
- **Data Order**
- **Data Creation (internal / external)**

Closed Process Chain

- **OEM**
- **Supplier**

As-is Data Delivery

Analysis + simulation transfer

Modification / Versioning

Data Delivery and Data Use

Downstream Processes

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What

Data-driven functional data management system in two variants

EXOKNOX$^{\text{hub}}$ → Multi-User system based on a client-server infrastructure

EXOKNOX$^{\text{free}}$ → Single-User application especially for part suppliers to ensure a closed process chain
EXOKNOX: A Unified Solution for Functional Data Management

Additional features not shown here:
- Metadata editors
- Metadata comparison
- Quality control views
- Integrated syntax checking
... and so much more!

For a demonstration of EXOKNOX, contact us at info@exoknox.com
Live Demo

1. Finding Data – Some examples amongst many possibilities
2. Data Editors – Context sensitive representation of a big data model
3. Data Comparison – Visual and tabular
4. Automation Scripts for Downstream Processes
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