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NVH data management

Mastering the flood of NVH data through ASAM-ODS and MDM

Dr. Dietmar Rapf

science + computing ag

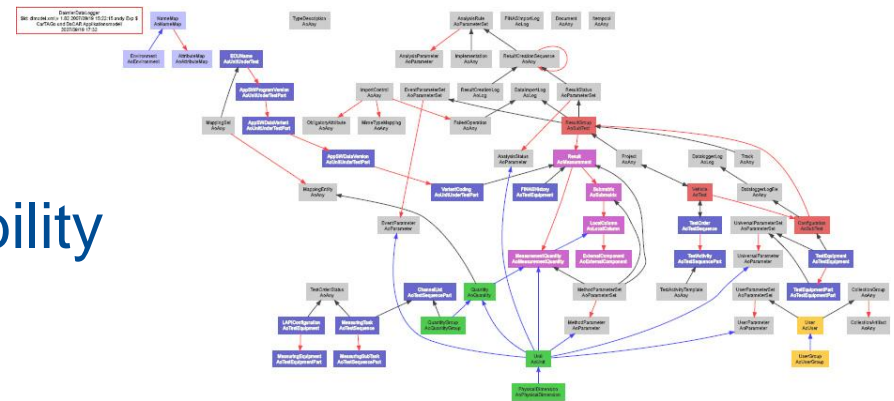
IT Service and Software Solutions for Complex Computing Environments

Tuebingen | Muenchen | Berlin | Duesseldorf

Data management – Why?

Data management keeps records of measurements

- CAT-data are important and expensive data
- Guarantees the documentation of the development process
- Helps in questions of product liability



⇒ Each CAT-discipline needs data management!

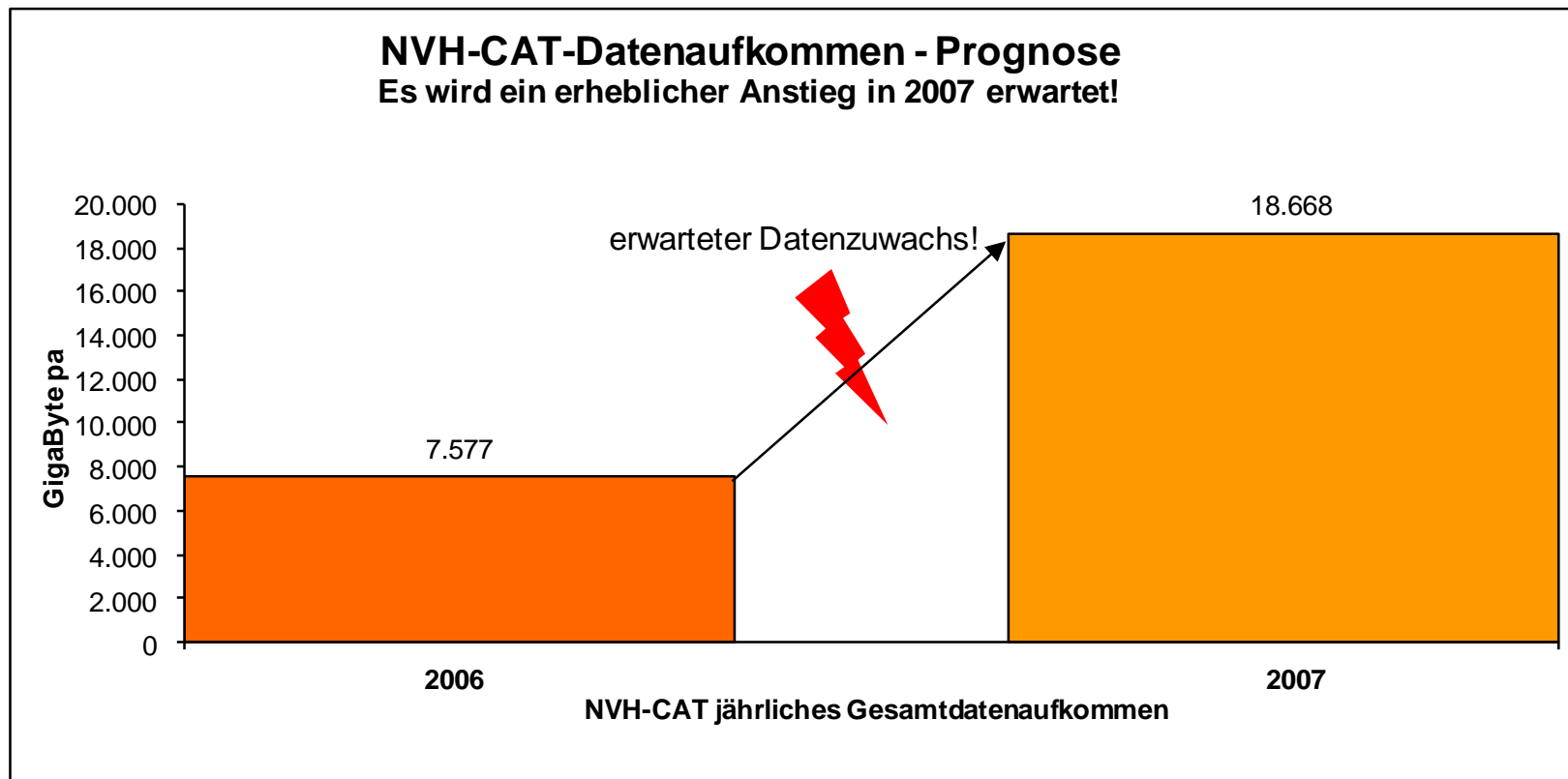
How does your data management look like?

- IT-Service and Software Solutions for complex computing environments
 - CAE for 20 years
 - CAT for 12 years
 - Long lasting sector engagement
 - in automotive
 - Long lasting customer loyalty
- ⇒ Profound knowledge of CAE- and CAT-processes of the automotive industry and their suppliers



For 20 years in Tübingen
Munich, Ingolstadt, Düsseldorf, Berlin

- Data forecast in 2006:
 - doubling of yearly data amount in 2007 compared to 2006



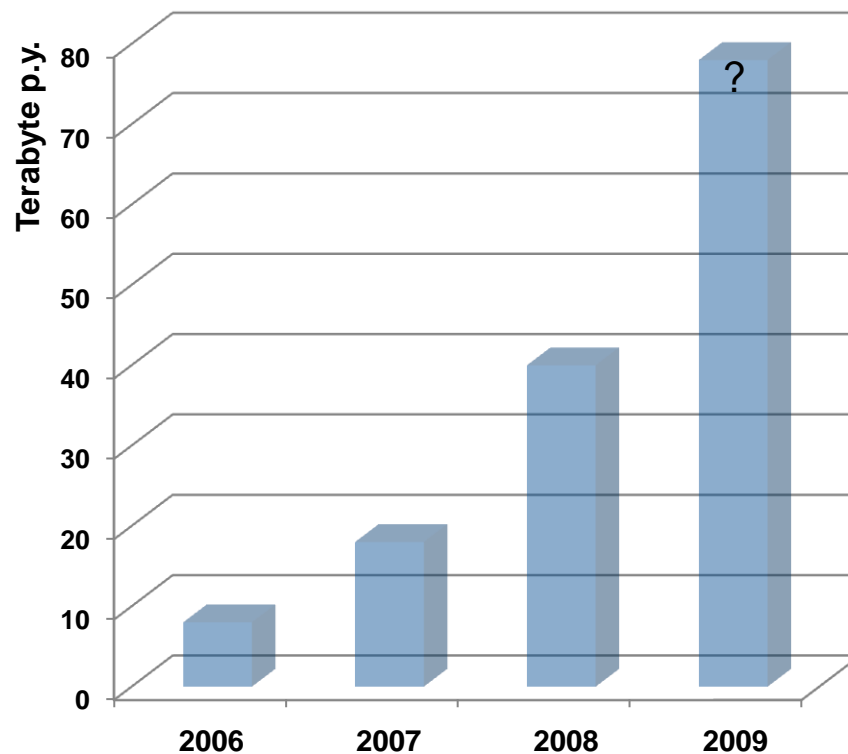
Reasons for growing amounts of data

- Using 24-bit instead of 16-bit technology in A/D converters
 - higher quality of data
 - data amounts grow by 50% per se
- Recording of temporal raw data is possible
 - acoustic comparing of sound afterwards
 - more complex offline analyses are possible
 - temporal raw data are the mass data
- Faster measurement equipment leads to
 - higher sampling rates for individual channels
 - more synchronously sampled channels (cascading technology to come!)
 - high frequency testing is possible
 - more tests in less time

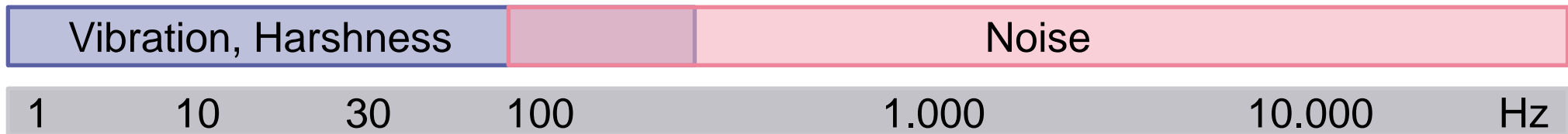
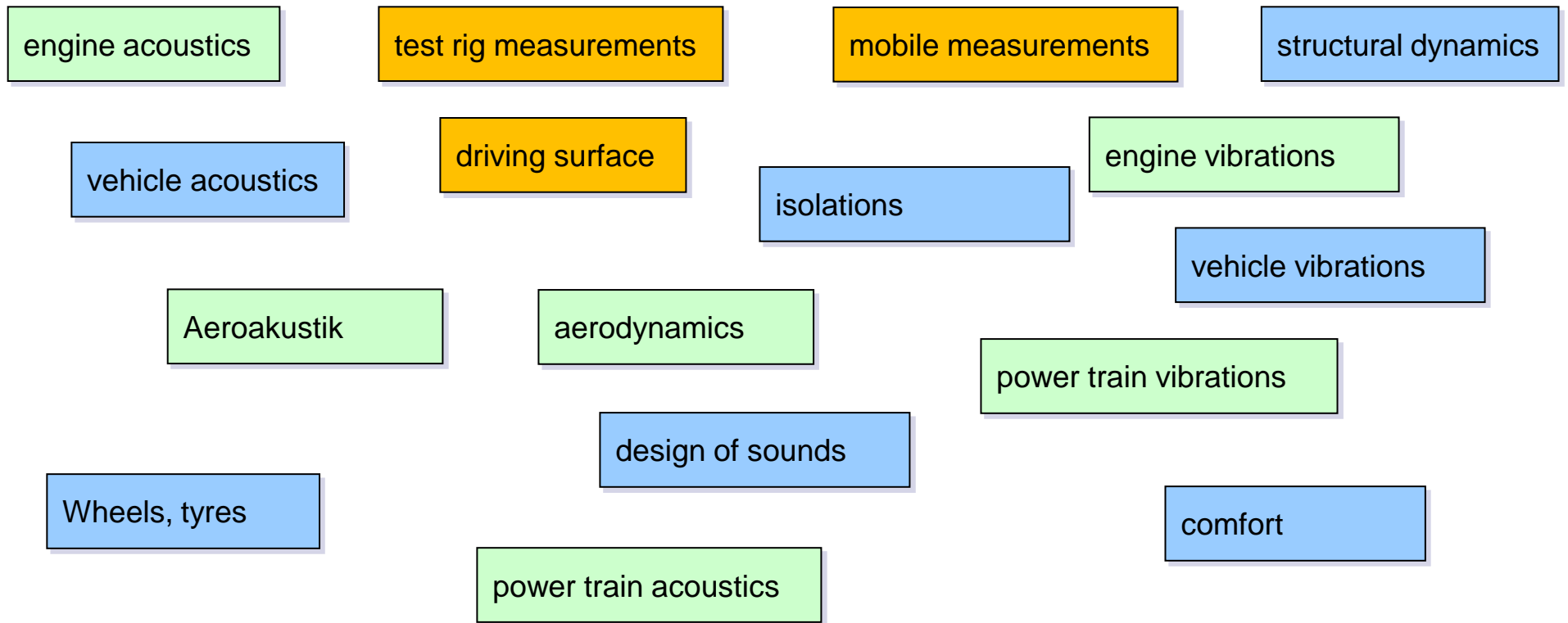


Growing data amounts in NVH

- Reality in 2009:
 - more than yearly doubling of the data amounts in NVH
 - still growing

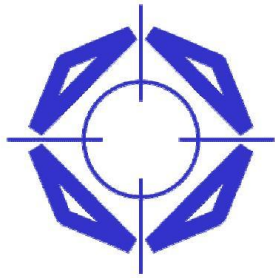


NVH – a manifold field



Implementing a NVH data management system

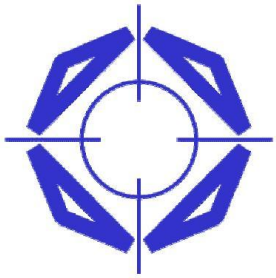
- Central storage pool for all NVH data
 - shared data pool for all NVH engineers
 - reliable data store (backup)
 - centrally organized from-bin transfer from storage (-> 'endless' storage)
- sustainability of data access
 - no dependency on tools or proprietary formats, even in long term
 - flexibility in handling the diversity in tools and processes
 - free choice of software developers
- Bundling measurement data and descriptive data together
 - enhanced validation of the data basis through documentation
 - traceability of the decision making process



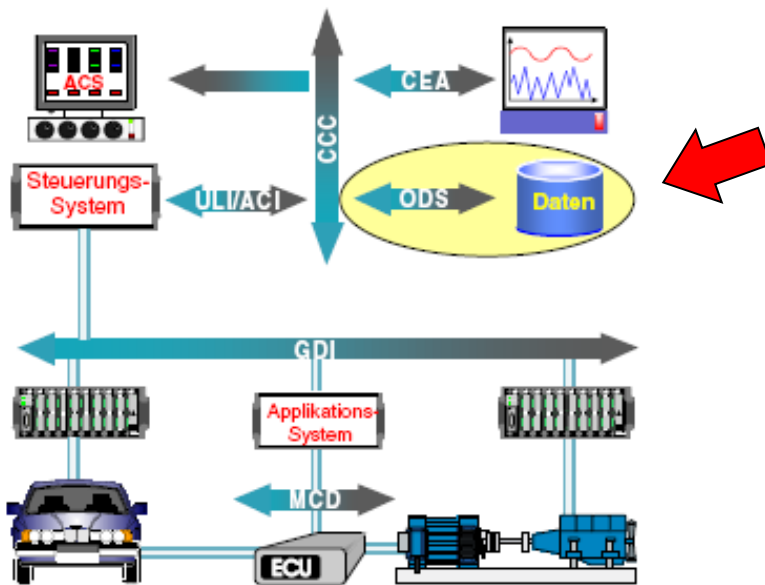
ASAM e.V.

ASAM – Association for **S**tandardisation of **A**utomation and **M**easuring Systems

- Founded by German automotive companies in 1991, registered as ASAM e.V. since 1998
- Creating standards for automation and measurement
- Simplification of development, integration and exchange of applications
- More than 120 companies are members
- science + computing ag is member of the ASAM e.V.

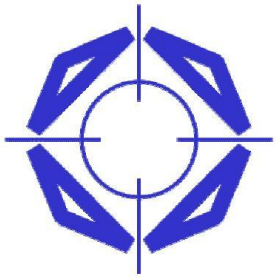


ASAM-ODS (Open Data Services)



Storing and retrieving data
=> Data Management

- Interfaces for storing, interpreting and exchanging measurement data
- Standardized data model (ASAM ODS base model)
- Simplified data storage and access to data independent of applications
- 1st version published in 2000, actual version 5.1 in 2006; version 5.2 middle 2009



ASAM-ODS



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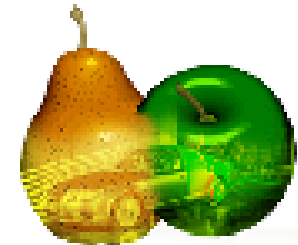
- ✓ Accepted standard in automotive industry
- ✓ Structure for the storage of CAT data
- ✓ Abstracting data recall from physical storage



- General definition allows many possible interpretations
- Application data model is required for each environment
 - depending on unit under test, test rig, measuring track, measurement task, ...
- Inflexible in practical use, high adaptation expenses
- Many things need to be defined again for every new application

MDM – Measurement Data Management

- MDM is intended to be a collection of ASAM-ODS best practices
- The MDM community maintains this collection
 - <https://www.mdm-community.org>



- Developed by Audi to implement data management tools faster and cheaper in various test surroundings
- Generic application data model allows storage of data from different units under test, test rigs, measuring tracks, measurement tasks

What is MDM ?

- a generic application model
- a client application core
- an API
- a set of optional generic software components
- a set of methods for
 - test process mapping
 - application development
 - application integration
 - test data storage organization
 - ASAM-ODS database scheme development
- <https://www.mdm-community.org>



NVH data management – a solution

ARMADA – Administration of Result, Meta and Archive Data

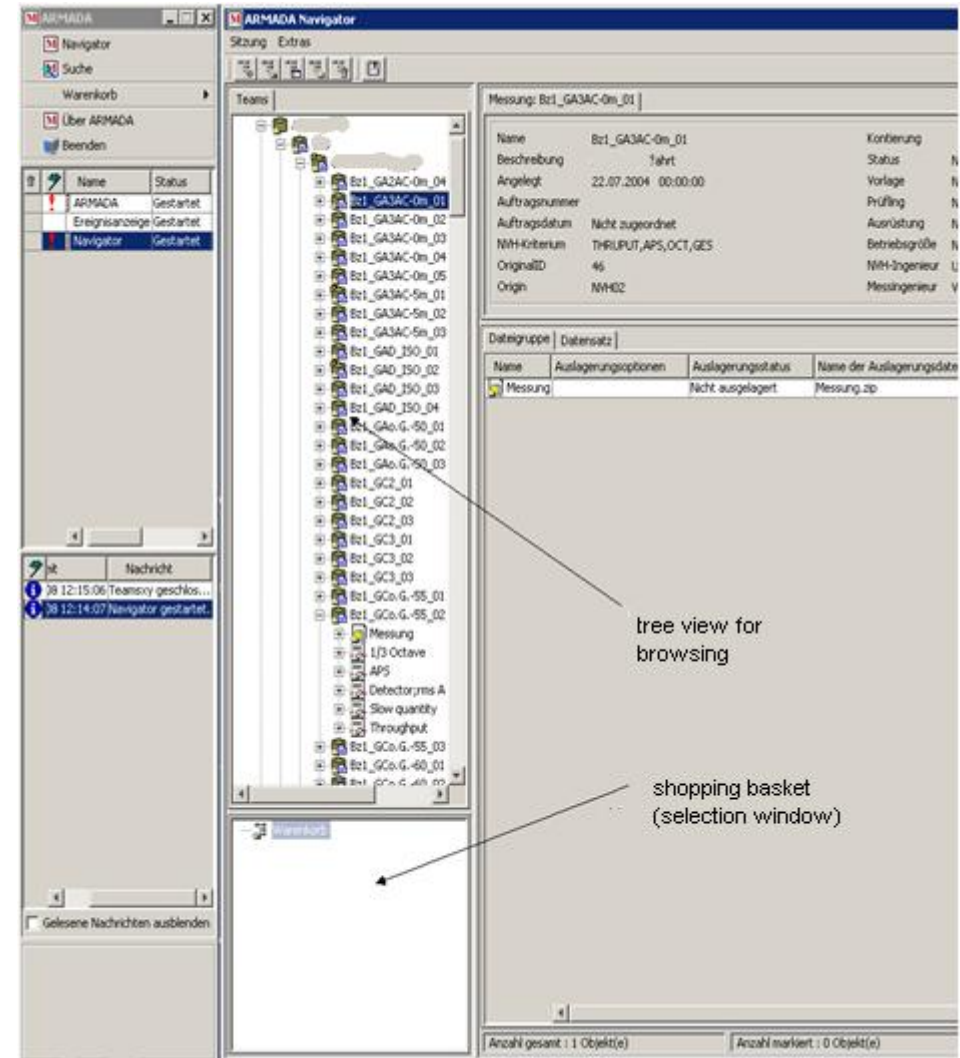
- Fat-Client solution based on MDM framework
- „Endless“ Storage is available
- From-bin transfer of measurement data onto LTO tapes
 - all data belonging to one measurement are packed together in one .zip file
 - information belonging together, stay together
 - descriptive data held in database
- Productive since April 2008
 - approx. 80 users, rising



ARMADA – functions

Browsing measurement data

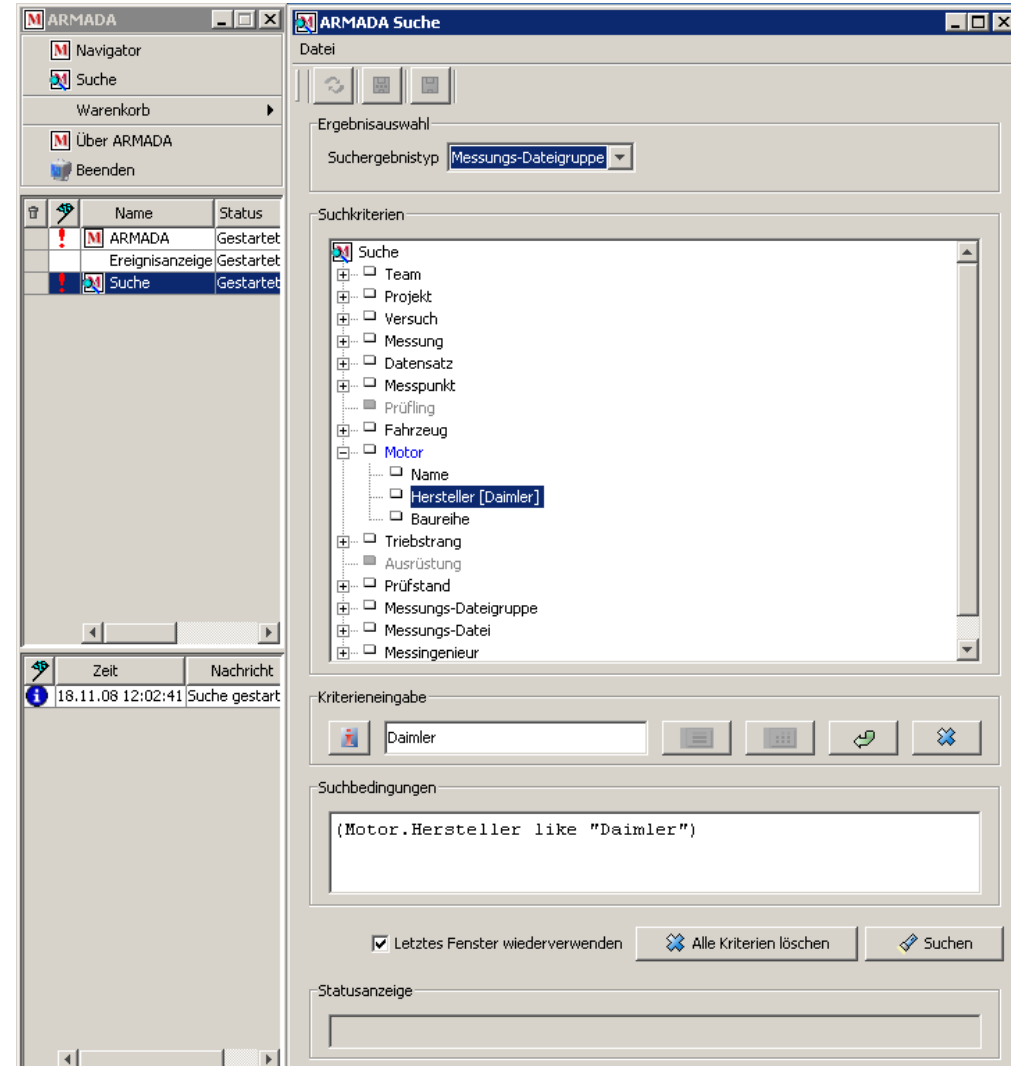
- Different, definable views
 - tree view of units under test
 - team specific structures
 - definable by the engineer
 - task centred
 - test rig centred
 - ...
- Select measurements
- Move selected measurements into shopping basket / container



ARMADA – functions

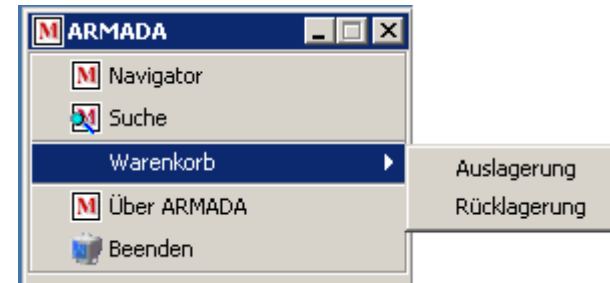
Search and find data based on descriptive data

- Combinations of search conditions
- Search independent of structures
- Results in shopping basket / container
- Results may be saved



From-bin and to-bin transfer

- From-bin transfer by hand by the user
 - all objects in the shopping basket
- Automated from-bin transfer by the system, based on predefined rules
 - age of the data
 - filling degree of individual storage bins (shares)
- To-bin transfer by hand by the user
 - to-bin transfer takes 4 hours maximum
 - all objects in the shopping basket



Flexible and extendable through the use of MDM

- Flexible concept for release process and access authorisation
 - increase of transparency of the way results were produced
 - securing data transfer
- Utilizing the potential for automation of workflows
 - improvement of efficiency of workflows
 - improved efficiency in search
- Applications access MDM data directly
- Interfacing other systems

MDM framework – new version

12. May 2009: publication of MDM 4.2

- Based on the Eclipse framework, a modern software development environment
 - Eclipse is supported by well-known IT companies (IBM, SAP, Intel, Oracle, ...)
 - wide spread, accepted, modern architecture
- MDM Base package and modules ported to Eclipse technology
- Even more flexibly extendable through the use of plug-ins
 - Open Source plug-ins in the community
 - own plug-ins
 - commercial plug-ins



Thank you for your attention

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