Offshore~WMEP
A cross-company O&M-Database

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Fraunhofer IWES

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A cross-company O&M-Database

Contents

- Fraunhofer IWES
- Motivation and approaches
- The project: Offshore~WMEP
- Challenges for cross-company O&M-Databases
- Standards: Available standards and need for action
- First Experience
- Conclusion and Outlook

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Fraunhofer Institute for Wind Energy and Energy System Technology

Foundation: 2009 **Employees:** approx. 500

Directors: Prof. Dr. Andreas Reuter, Prof. Dr. Clemens Hoffmann

Annual budget: approx. 30 million Euro

Formerly:

- Fraunhofer Center for Wind Energy and Maritime Engineering CWMT in Bremerhaven
- Institute for Solar Energy Technology ISET in Kassel

Research spectrum:

- Wind energy from material development to grid optimization
- Energy system technology for all renewables

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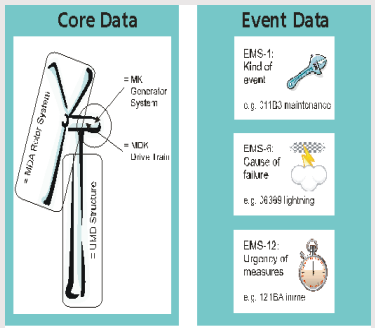
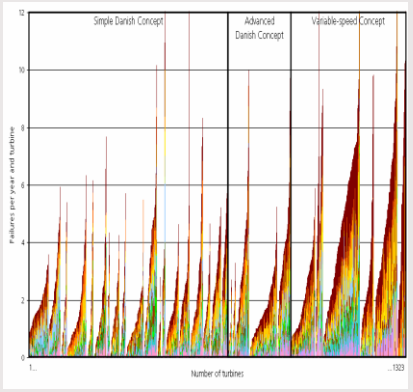
Research Group Reliability and Maintenance Strategies





Services & Products

- Acquisition and structuring of O&M data using industry standards
- Statistic-based weak point and root cause analyses
- Customer-specific data evaluation and studies
- Maintenance strategies
- Consultancy services

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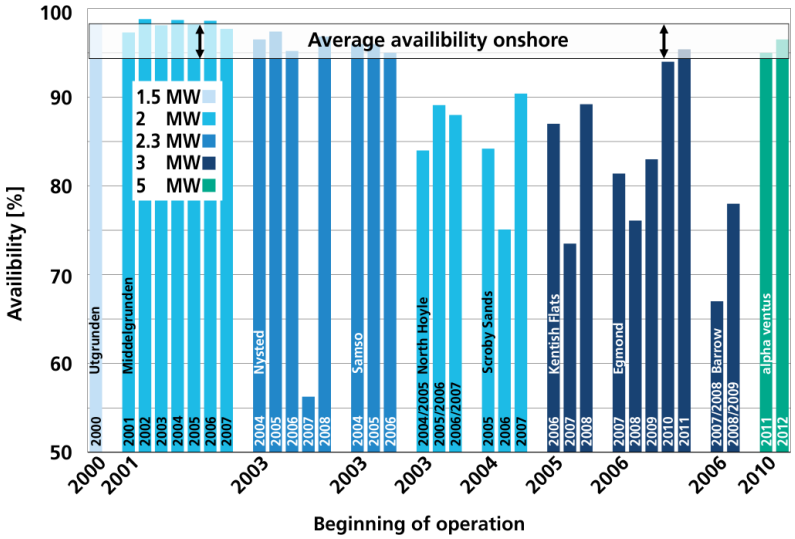
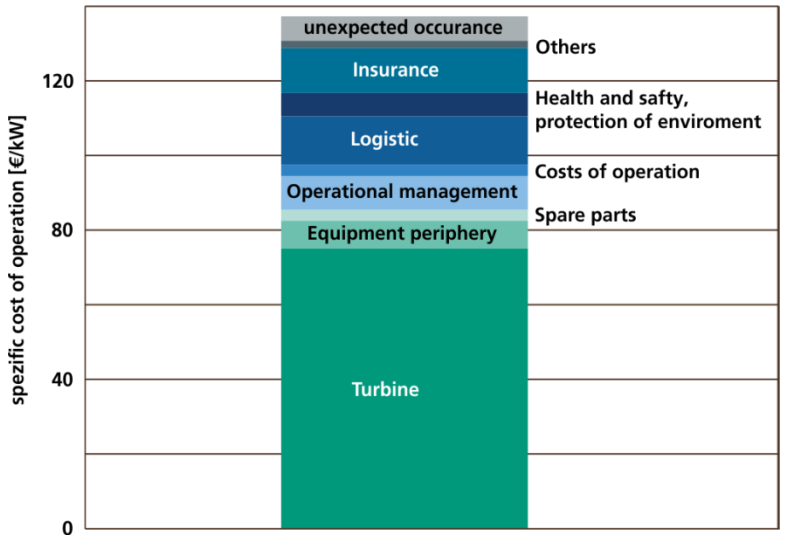
Motivation and approaches

Motivation

- LCOE need to be reduced
- Energy yield and O&M-Costs are of high importance
- A cross-company database enables performance benchmarking and sound reliability characteristics
- Whole industry needs best practices



Source: Wind Energy Report Germany 2014



Source: Wind Energy Report Germany 2014

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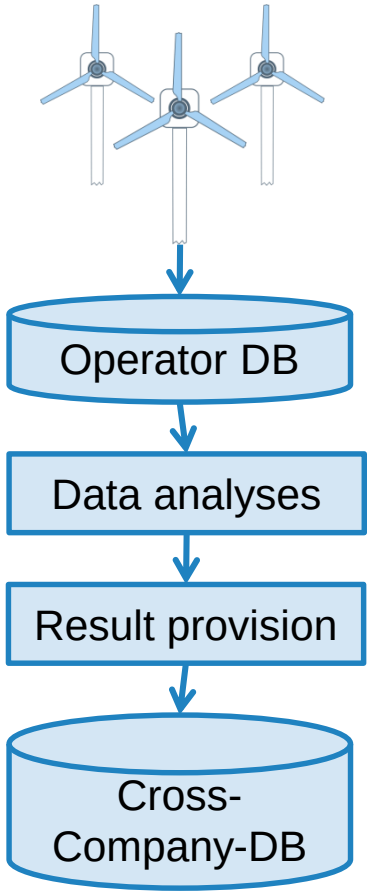
Motivation and approaches

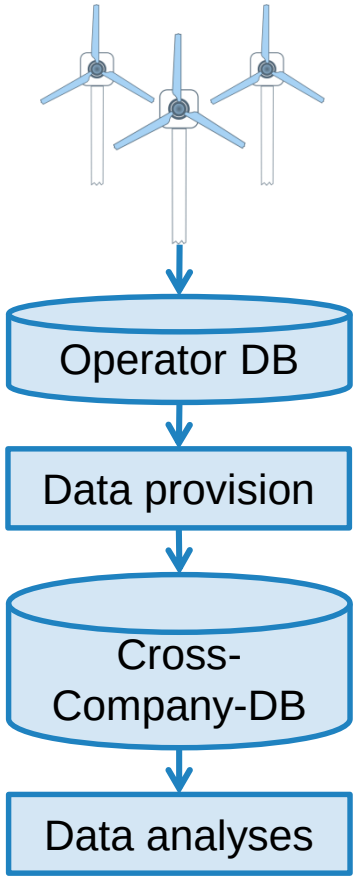
Approaches

Result data approach



- Easy data transfer
- Less analyses effort for CC-DB
- Great effort for additional analyses
- Consistent results hard to ensure

Raw data approach



- Consistent results ensured
- Additional analyses easy to implement
- Enables reliability characteristics
- High effort for data transfer and standardisation
- Large database required

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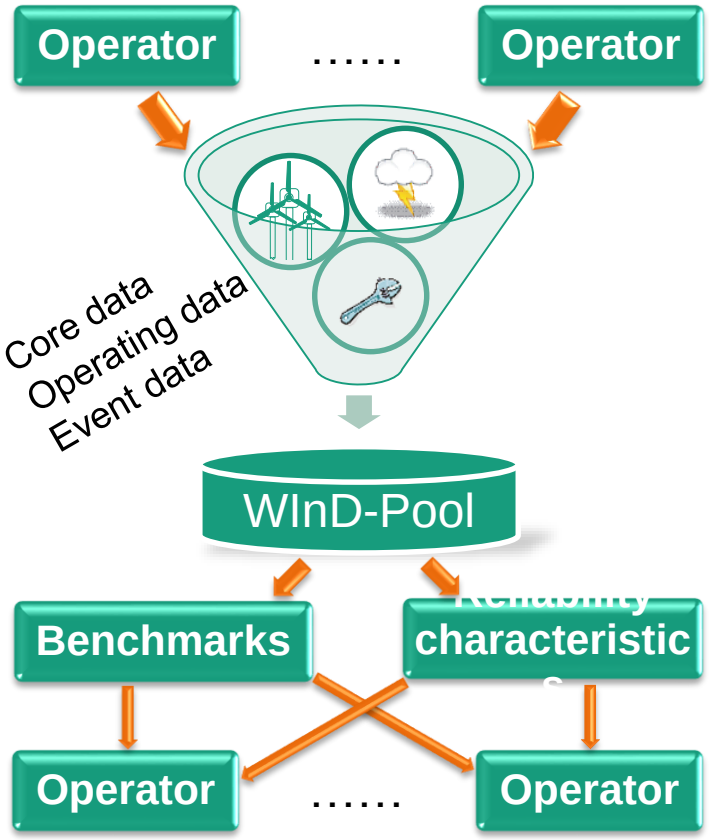
Offshore~WMEP

Monitoring Offshore Wind Energy Use in Europe

- Funded by Federal Ministry for Economic Affairs and Energy
- Aims of project:
  - To answer fundamental questions on development of the utilization of wind power offshore

    → General monitoring
  - To optimize maintenance and availability

    → Systematical collection and evaluation of operational experiences



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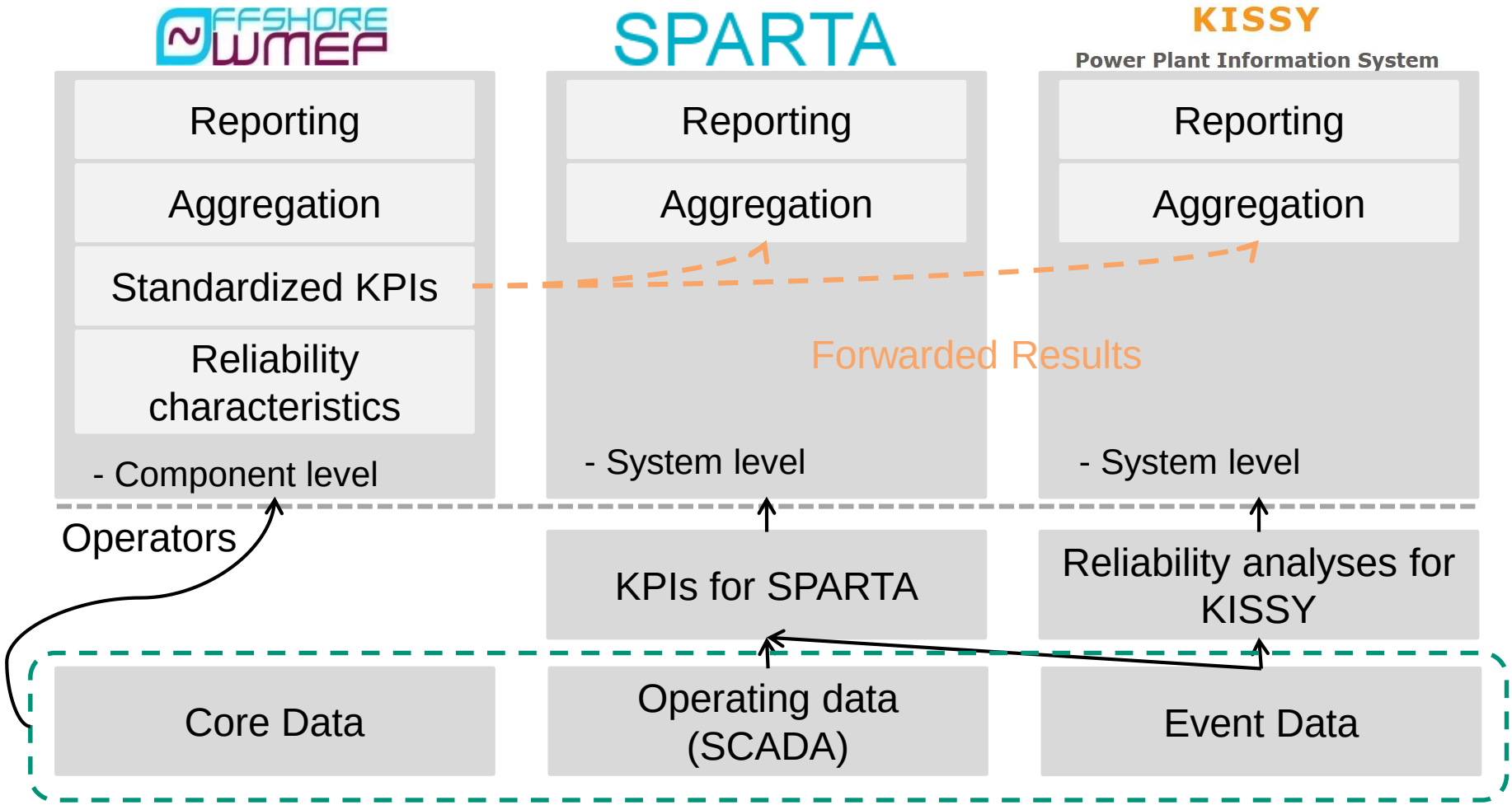
Comparison to other projects and collaboration



Challenges for cross-company O&M-Databases
Comparability, KPI-Definitions, Confidentiality

- Comparability of gathered data needs to be ensured
  - Operating data
  - Maintenance documentation
- Analyses have to be carried out according to well defined and transparent methods
  - Availability
  - ...
- Confidentiality needs to be ensured
  - Who receives results?
  - Which results may be published?

Standards
Operating data and KPI-Defintions

Operating Data

- IEC 61400-25 provides uniform communication for wind turbines
- Designations of different measurements can be utilized in a common database

KPI-Definitions

- IEC 61400-26 provides definitions for availability calculations (time based and productions based)
- Definitions for further KPIs are not available, further work is required

Standards

Available standards regarding O&M-Data

Reference Designation System – RDS-PP

Designation system for power plants, systems and components

VGB-Standard-S-823-T32

Available ✓

State-Cause-Event-System – ZEUS

Unified description of the wts state, events and maintenance measures

Technical guideline TR7 D2 (FGW e.V.)

Available ✓

Global-Service-Protocol – GSP

FGW
renewable energies

Unified protocol to exchange Maintenance information

Technical guideline TR7 D3 (FGW e.V.)

Available ✓

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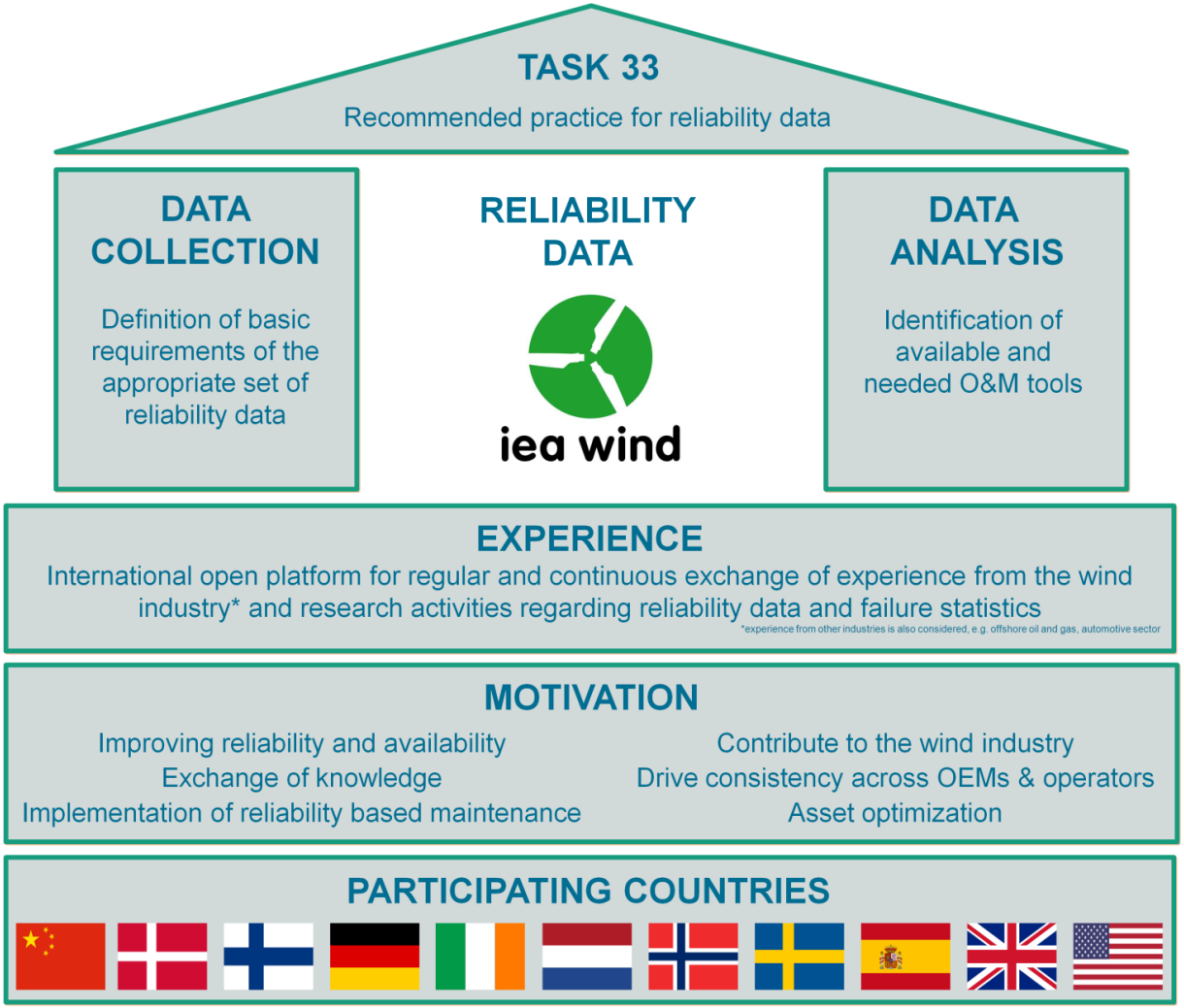
Standards

IEA Wind Task 33: Reliability data



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First Experience
Operating data

- Operating data includes data gaps and implausible values (about 5% of data)
- Different interval periods (5,10 or 15 minutes) are used, operators sometimes change interval periods
- Time zone information has to be considered
- Data export and data transfer can lead to high effort
  - Not all SCADA-Systems support easy data export
  - Some operators use multiple SCADA-Systems
- Designations of measurements are very individual, depending on operator and manufacturer

First Experience
Event data

- Status codes are not sufficient to calculate reliability characteristics
- Operators have limited access to maintenance data and work reports in many cases
- Information on affected components is not gathered in a standardized way (free text in many cases)
- Information concerning the condition of the wind turbine and maintenance work is not gathered in a standardized way (free text in many cases)

First Experience
Analyses and reporting

- Operators use individual KPI definitions
- KPI definitions are agreed by all operators and transparent (standards are utilized when available)
- Offshore~WMEP provides a report on a half yearly or quarterly base
- Report is currently provided as PDF- and Excel-file → web portal
- Hierarchical structure and graphical visualization is of high importance
- Highlighting of unusual behavior is necessary

Conclusion and Outlook

First steps have been taken … but further are required

- Offshore~WMEP is an ongoing initiative of Offshore-Operators and Fraunhofer IWES gathering operational experience and providing benchmarks
- Reliability characteristics will help to improve O&M-Strategies in the future
- Application and further development of standards is required

EVW I + II
(Onshore WT)

Offshore~WMEP
(Offshore WT)

OFFSHORE WMEP

WInD-Pool

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