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# OPTIMISING MAINTENANCE DATA MANAGEMENT

TO BOOST TURBINE EFFICIENCY

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# OPTIMISING MAINTENANCE DATA MANAGEMENT

## ■ Introduction

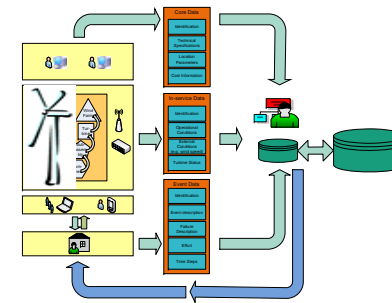
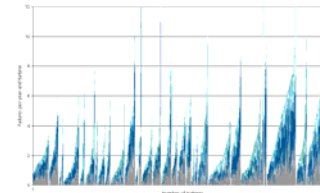
- Motivation
- Background

## ■ Wind Turbine Maintenance

- Maintenance Organisation
- Reliability of Wind Turbines
- Common Data Base

## ■ Data Management

## ■ Conclusions & Outlook



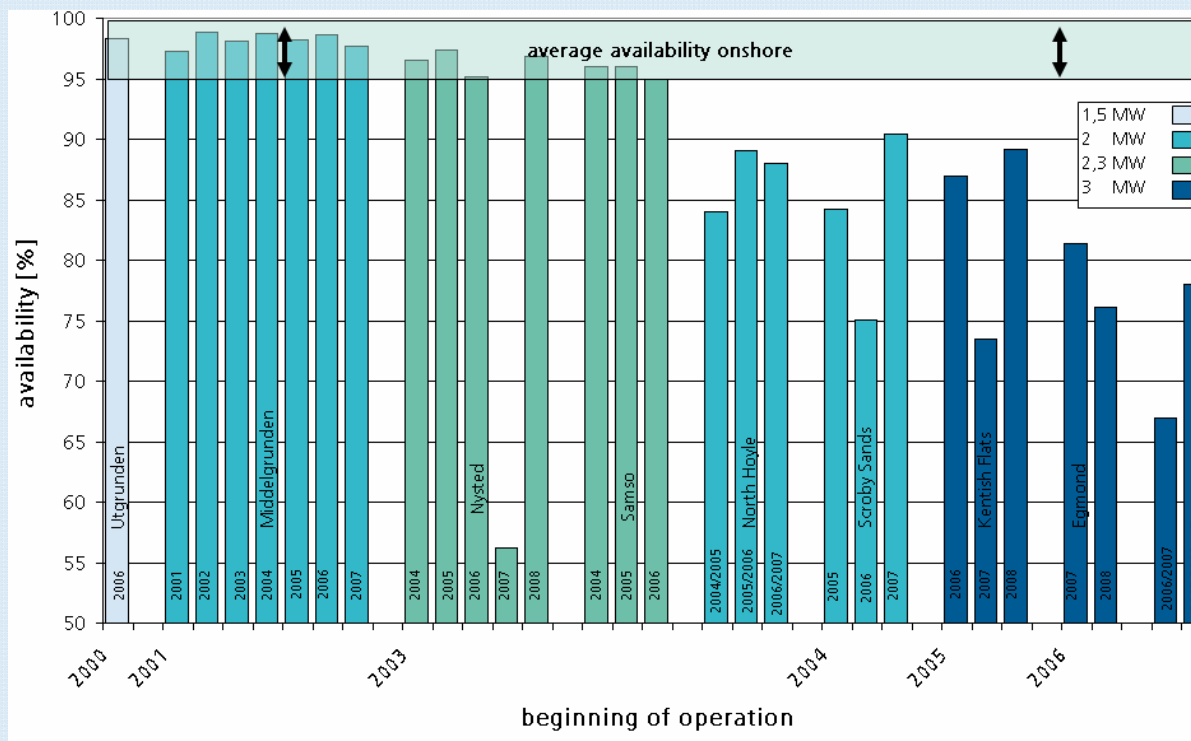
# Motivation

Starting Point: Modern wind turbines achieve high availability

Number of faults cause unplanned downtimes

➔ high maintenance efforts and costs

Offshore: drop of availability expected



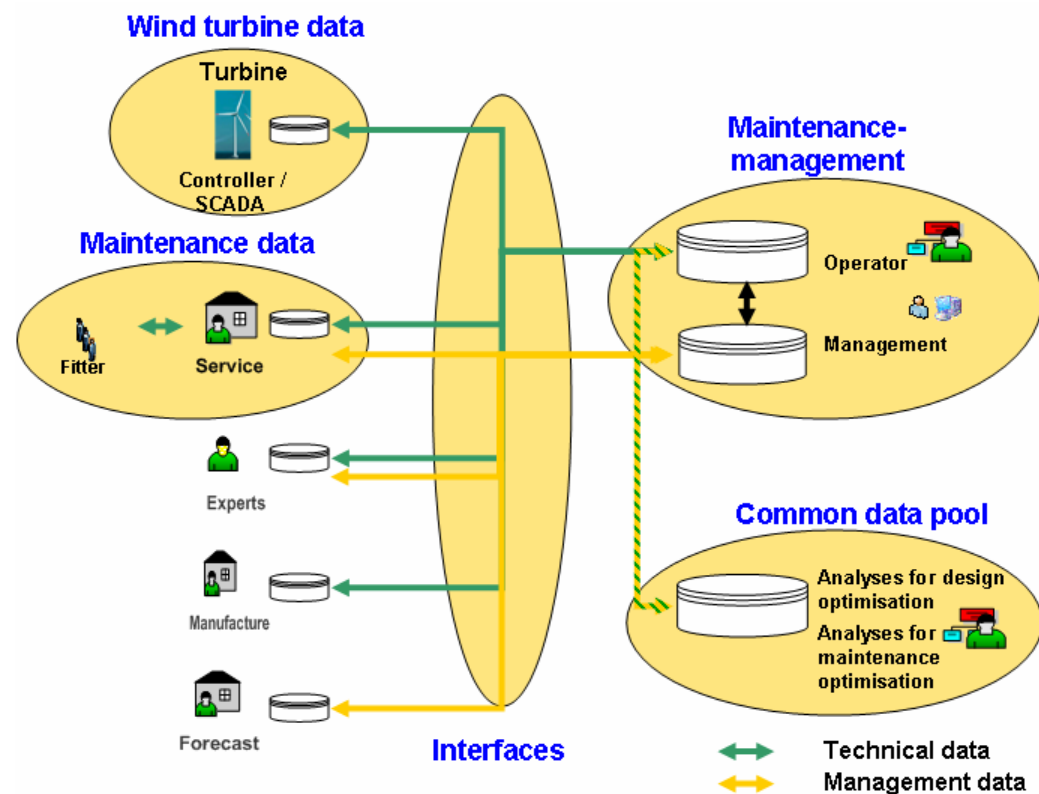
# Background



## EVW (Increasing availability of wind turbines)

Funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

Task: Knowledge management and maintenance optimisation as methodical base for increasing the availability of wind power plants

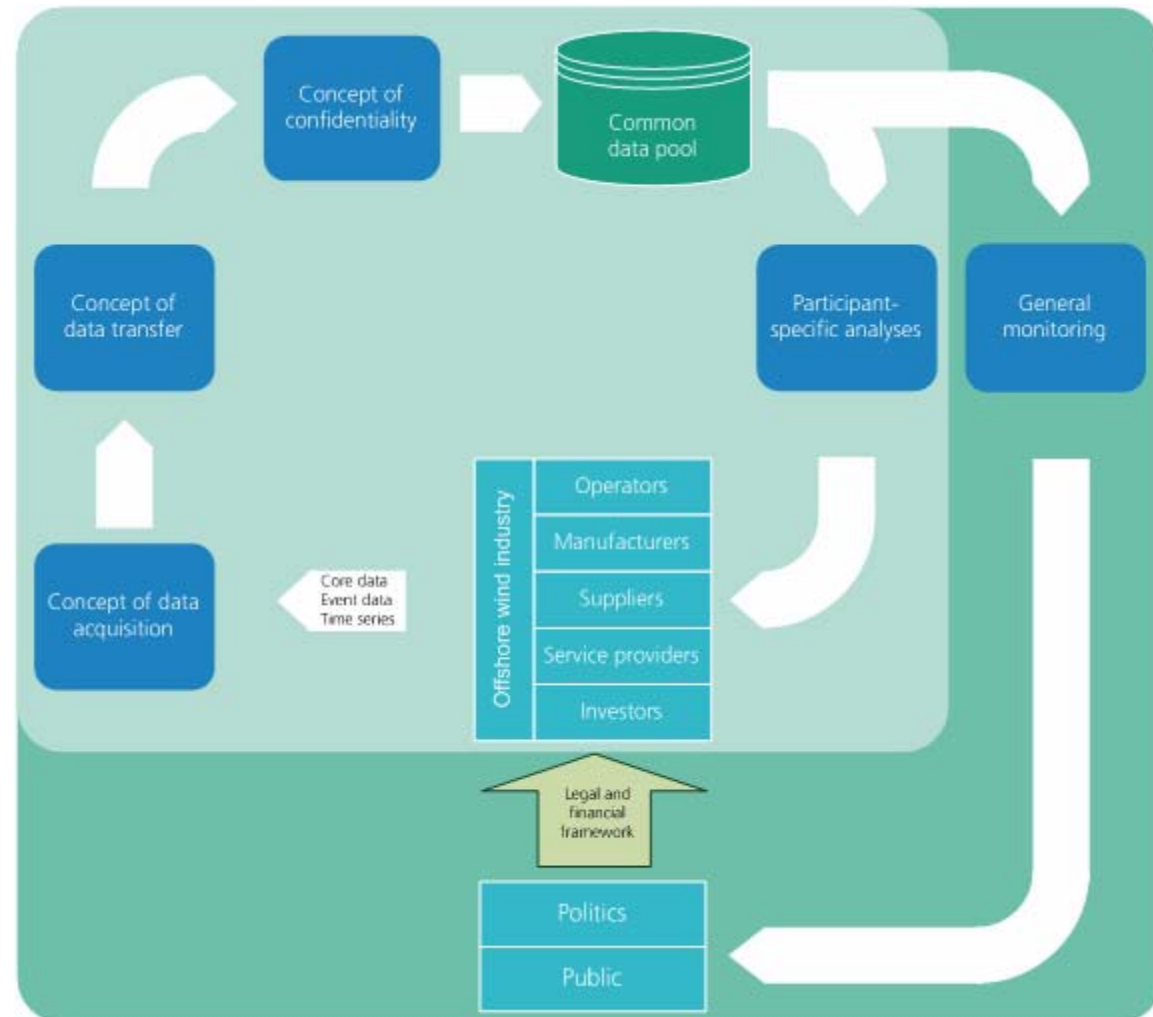


# Background

## Offshore~WMEP

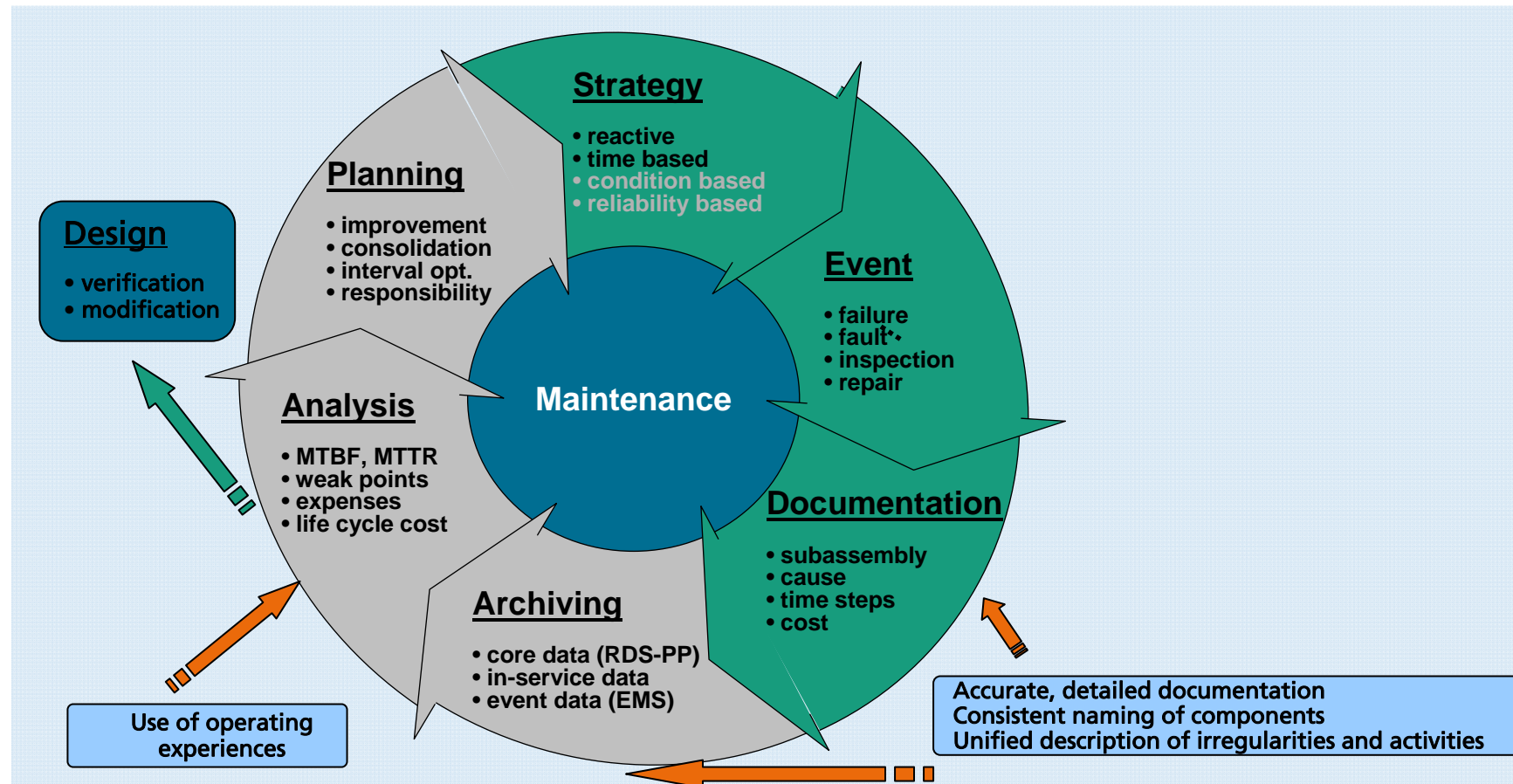
Funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

The project is a follow-up project to the onshore wind energy monitoring program 'Scientific Measurement and Evaluation Program' (WMEP) and accompanies the offshore wind energy deployment in Germany



# Maintenance organisation

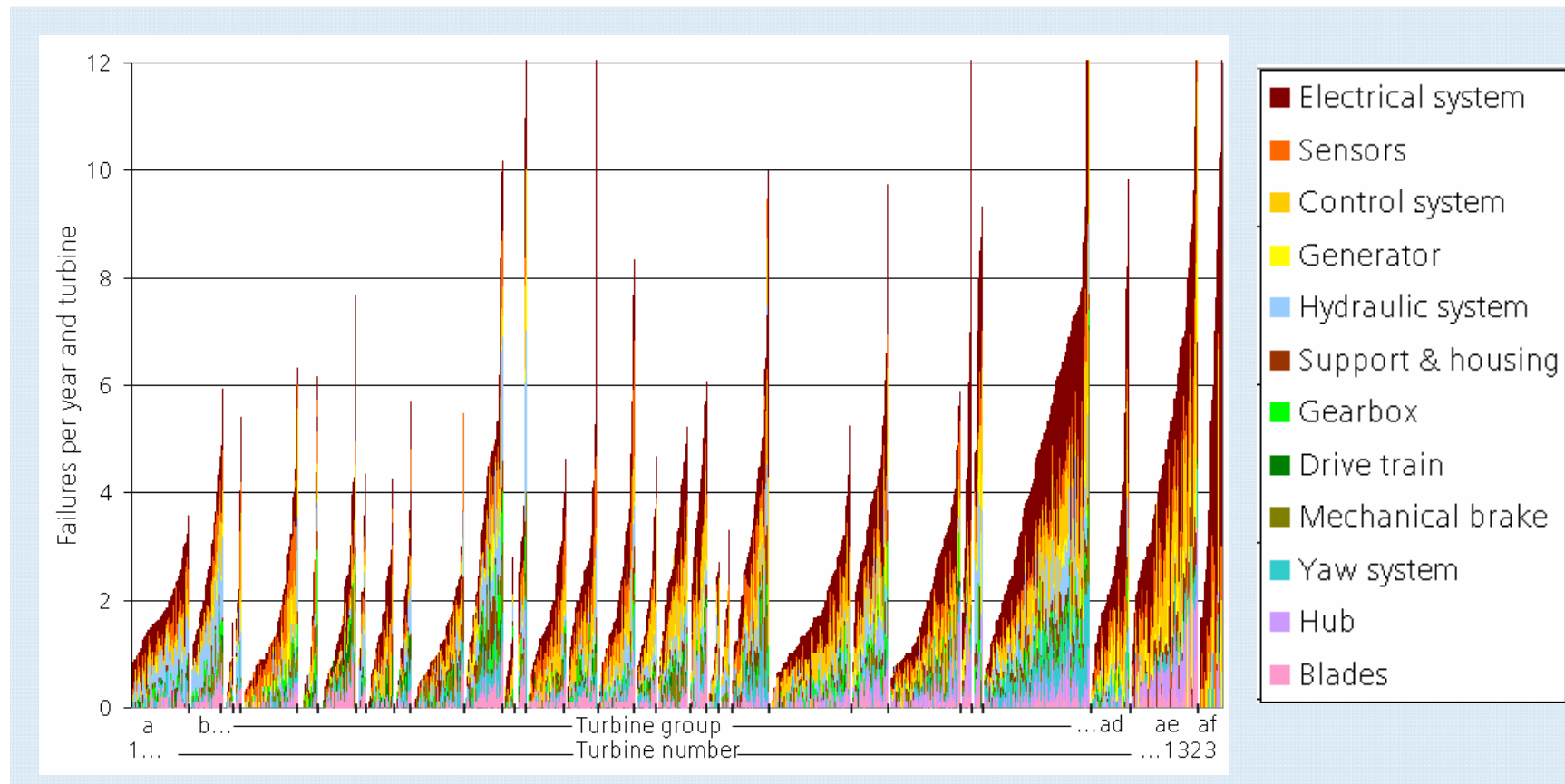
## ■ Lacking of a closed maintenance loop



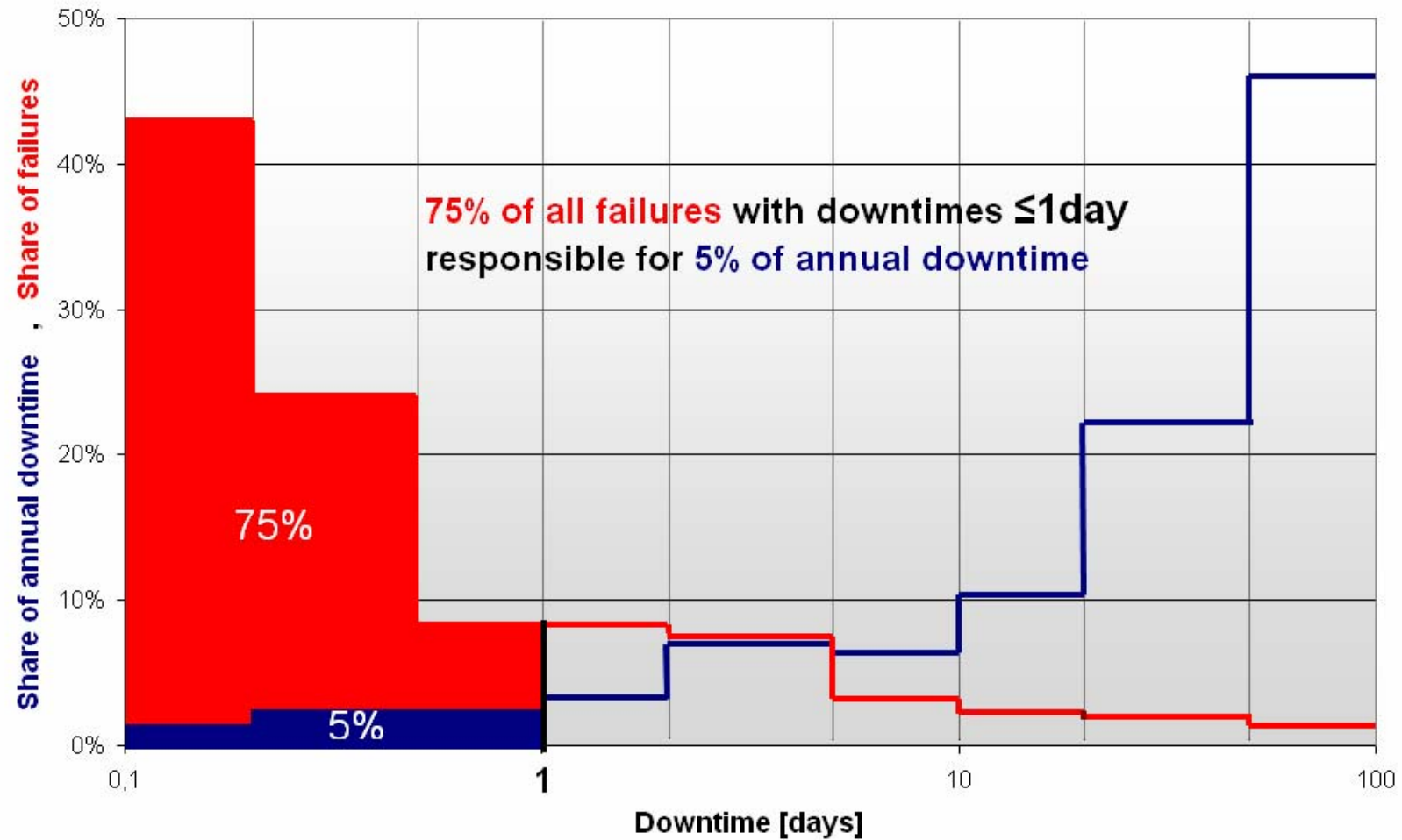
# Reliability of wind turbines

$$\lambda = \frac{\sum n}{T}$$

$n$ : number of failures  
 $T$ : Time of operation  
 $n = n(\text{failure cause; Subassembly})$



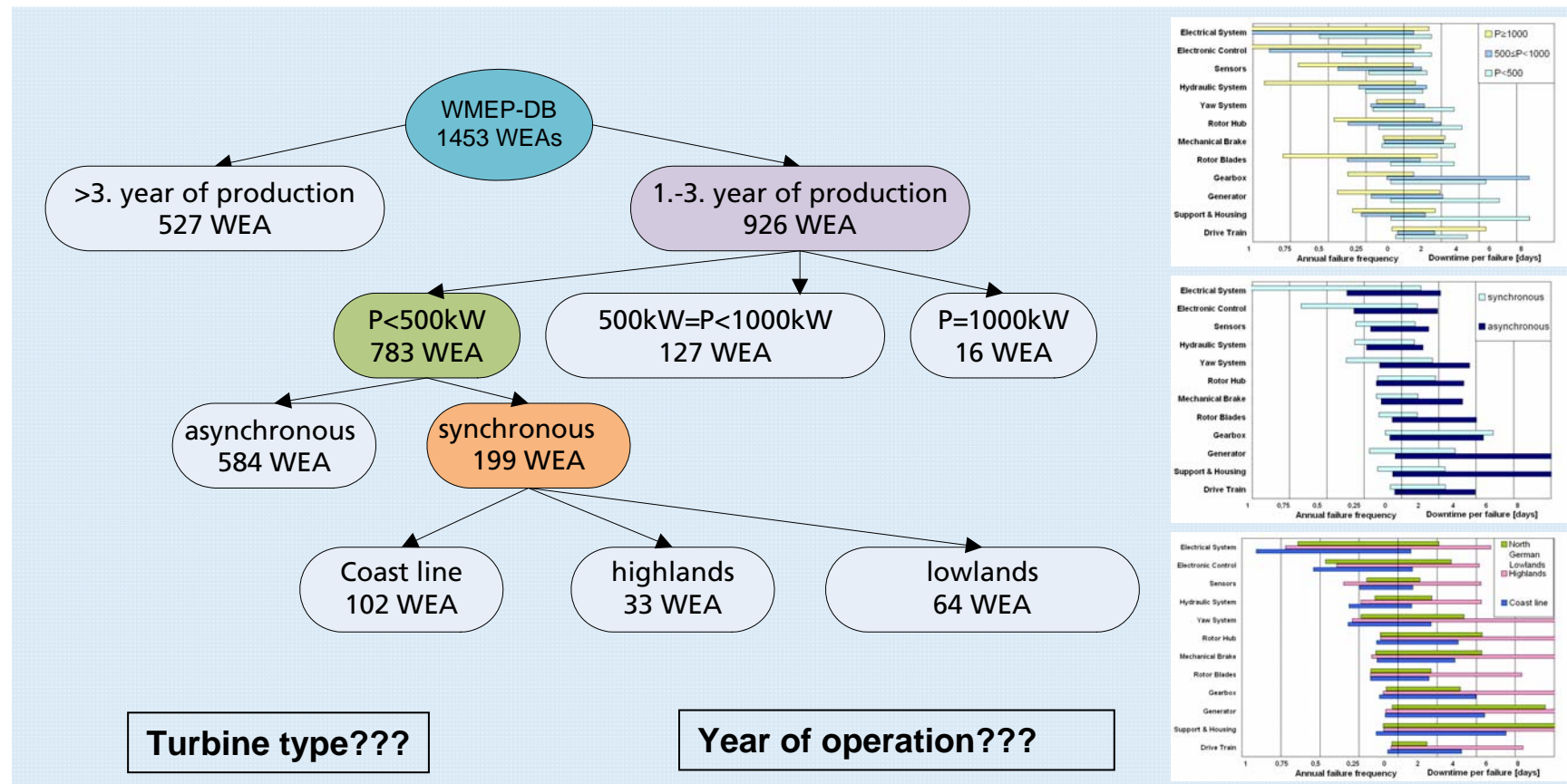
# Reliability of wind turbines



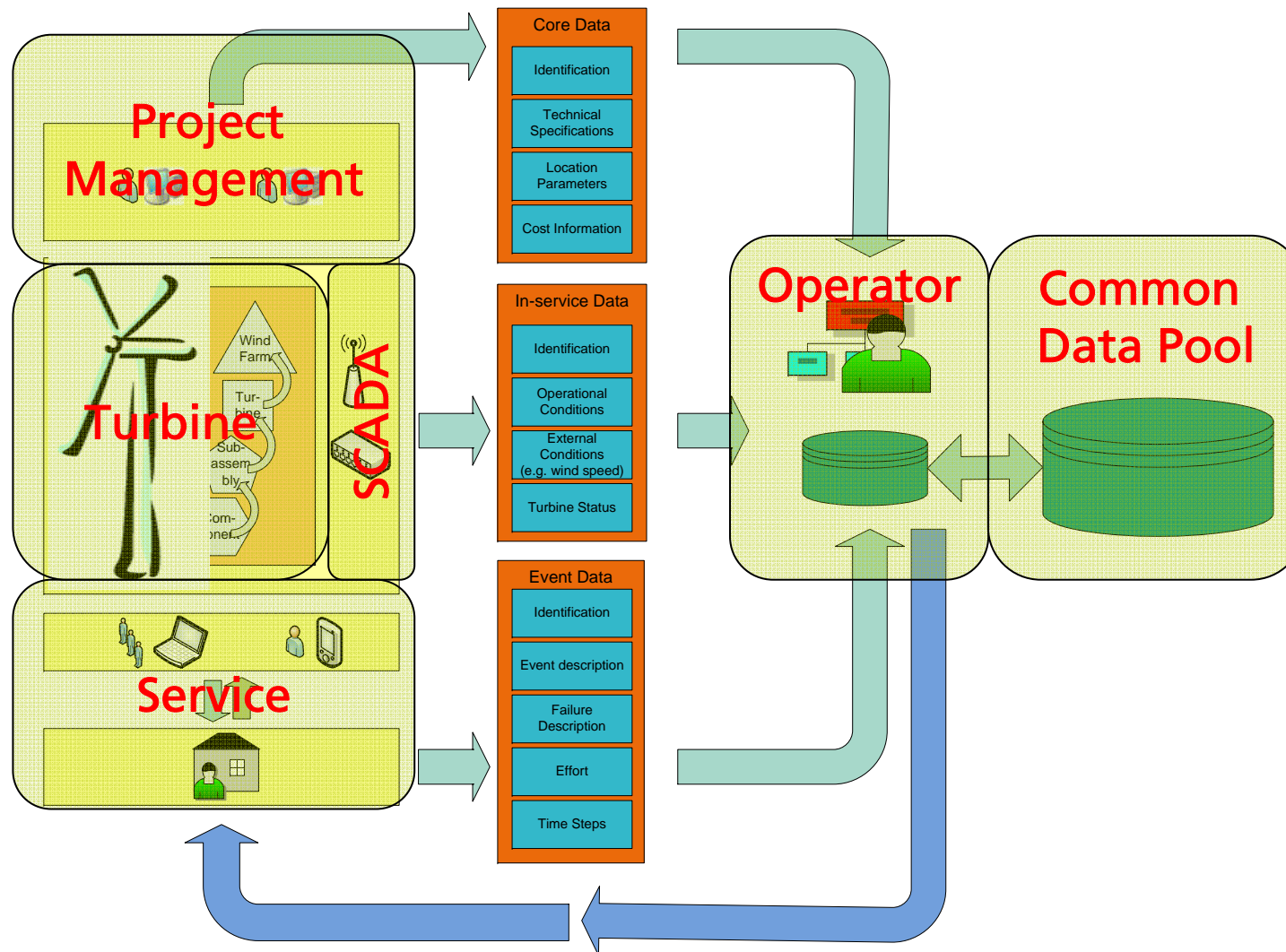


# Appropriate Failure Statistics

- For differential analysis distinctions regarding size, technical concepts, site conditions, etc. must be made



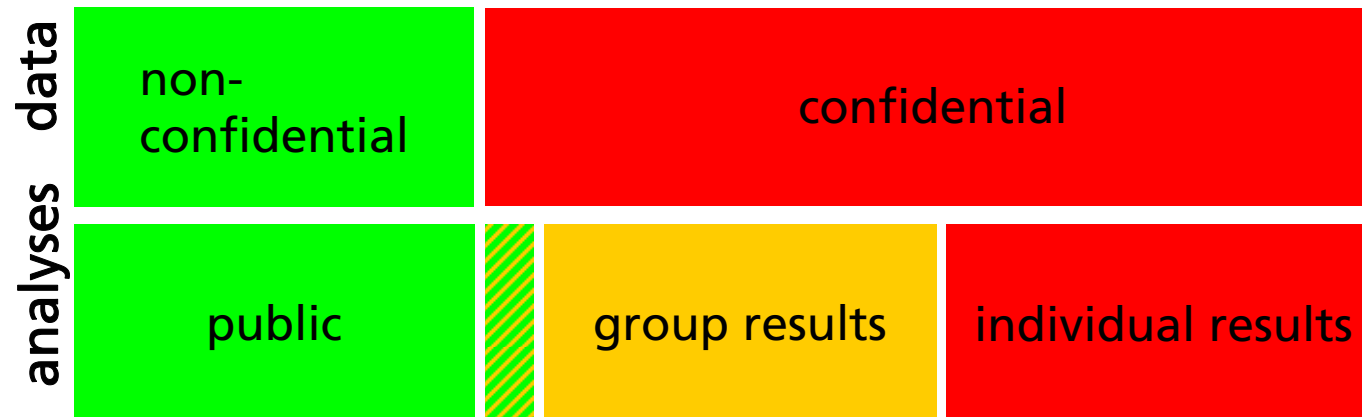
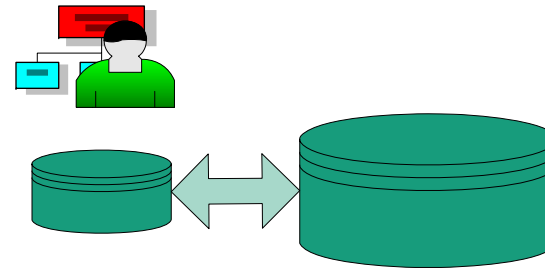
# Data Management



# Data Management

## Confidentiality concept

- Defines data and results
- Regulates which data are confidential and which are non-confidential
- Defines Individual and group results and results for public
- Controls for whom the results are available

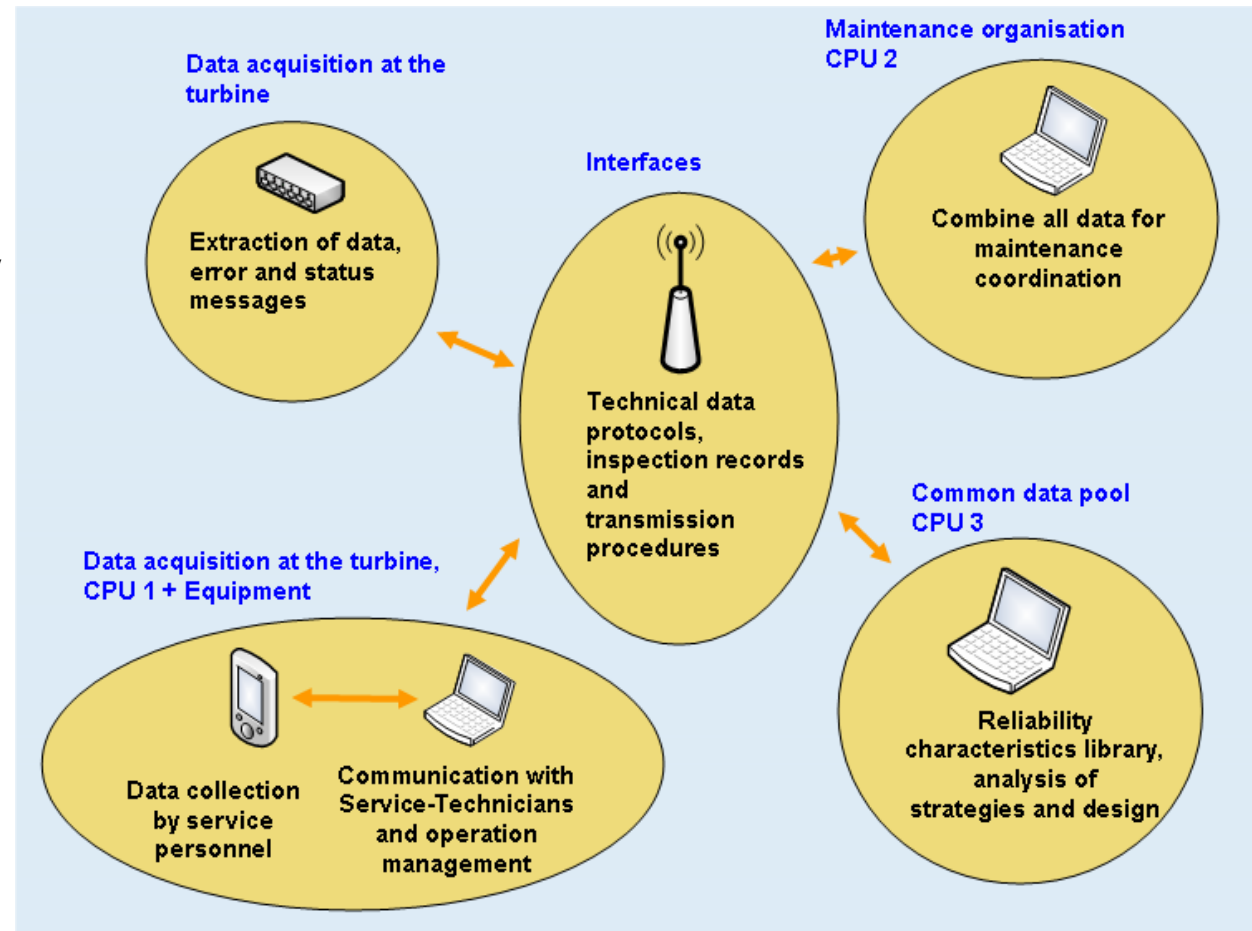


# Conclusions

- Potential for availability improvement and for reducing maintenance effort exists
- Common data base needed due to parameter diversity
- Different concepts necessary
  - Overall data structure → Core data, In-Service data, Event data
  - Standards and definitions → RDS-PP, EMS (adopted), Time steps
  - Accessibility of information → Offshore~WMEP confidentiality concept

# Outlook

- Preparing recommended practices for reliability based maintenance
- Developing a test and demonstration system
- Expand common data pool



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# ▶ DEWEK 2010

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*Thank you for your attention  
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