Fourth Inter-Celtic Colloquium on Hydrology and Management of Water Resources

WISKI
Quality Assurance for Hydrometric Network Data as a Basis for Integrated River Basin Management

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Cooperation with agencies in UK, Ireland

Biggest partner is Environment Agency of England and Wales

Hydrometric archive replacement project (HARP)

Selected hydrometric archive → WISKI

Software development driven by EA

Major aspect was data quality control
Contents

- Introduction
- Handling of hydrological data
- Quality assurance
- Conclusions
Demand on hydrological network data by hydrologists, engineers, decision makers and the public is increasing in quantity, quality and time to delivery.

For us, this means, that we have to process the raw data to value added products and information in an efficient way.

Standardized quality assurance procedures can help to fulfill this requirement.

Standardized data formats and data exchange.

For best results such tools are needed in the whole chain: measurement → data acquisition → validation and correction → dissemination → use.

Support of these processes with different tools and functions.
Data quality assurance

Quality assurance

- QA on data level
- QA on workflow level
- QA on system level
- QA on IT level
QA on data level

- Securing the raw data before processing
  - original and production time series

- Standardized procedures for data validation, correction and evaluation
  - plausibility checks
  - standardized correctors
QA on data level

Automatic plausibility checks

![Plausibility checks window](image)
QA on data level

- Securing the raw data before processing
  → original and production time series

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  → plausibility checks
  → standardized correctors

- If available, use of national and international standards or agreed organization wide standards
  → e.g. ISO 748, British BFI, standard frequency analysis

- Continuous quality marking of the data by users or automatically by the system
  → Quality flag and remark system
QA on data level

Quality flag and comment system
QA on data level

Quality flag and comment system
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Use of audit trail tools for logging and evaluating data changes
   “who worked on which data at what time and what was the reason the results?”
QA on data level

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QA on data level

The Audit trail

Audit trail log

Audit trail filter

Audit trail query builder
QA on workflow level

- Clear definitions and policies
  - Guidelines

- Adoption to the requirements of the individual organization
  - WISKI wizards
  - Use Case
  - Best Practice Guides

- Regular training of the users
The hydrological network

- Spatial analysis in GIS environment
  → WISKI ArcGis Extension

- Optimization of number and location for the gauges
QA on system level

Spatial analysis
The hydrological network

- Spatial analysis in GIS environment
  → WISKI ArcGis Extension

- Optimization of number and location for the gauges

- Validation of rating curves in a catchment by calculation of the annual water balance
  → WISKI formula / KiBasic
The archive

- Overall analysis about trends in number and length of gaps in the records
- Overall analysis about trends in data quality
- Overall analysis about trends in time to publish the data
- Comparisons between these indicators between different regions, directorates or departments
IT infrastructure

- Standardized methods and policies for data base back-up and maintenance
- Back-up strategy for data base and software servers, multiple network lines
- Regular data base maintenance (statistics etc.)
- Regular checks of hardware and backup systems
IT Infrastructure of the Environment Agency

National Archive
38,000 Stations
2.6 Billion data points
> 200 GB database

300 concurrent user
600 in total

WISKI

Citrix
Oracle

QA on IT level
Conclusions

- The WISKI system was introduced to provide a reliable and flexible archive enabling a central, consolidated source of information.

- It can provide a modern software platform with sufficient flexibility to encompass future business change and data demands.

- Its implementation in different authorities reduces costs for support and maintenance.

- It frees up staff resources to improve data quality, undertake more comprehensive analysis and to convert data into information for managing the environment.

- On all QA levels ideas, strategies or tools exist to increase the quality of data and information.

- Due to the never ending process of increasing quality continuous discussion on this topic is needed.
Thank you!
Thank you!

AWRA Conference

Frank Schlaeger Stan Malinky Jürgen Stein Roland Funke
How to achieve quantity and quality goals of the Water Framework Directive in the Celtic countries?
There are no values in the time range 09.07.2003 00:00:00 to 07.04.2006 10:01:58

**Min-Max plausibility check**

- Value above specified limit From: (12/01/2000, 05:30) To: (12/01/2000, 05:45)
- Value above specified limit (12/01/2000, 06:15)
- Value above specified limit From: (12/01/2000, 06:45) To: (14/01/2000, 02:30)
- Value above specified limit (14/01/2000, 03:00)
- Value above specified limit From: (14/01/2000, 03:30) To: (14/01/2000, 04:00)
- Value above specified limit From: (14/01/2000, 04:45) To: (14/01/2000, 05:00)
- Value above specified limit (14/01/2000, 06:45)
- Value above specified limit From: (01/02/2000, 09:30) To: (01/02/2000, 10:00)
- Value above specified limit From: (01/02/2000, 10:30) To: (01/02/2000, 10:45)
- Value above specified limit From: (01/02/2000, 11:15) To: (02/02/2000, 22:15)
- Value above specified limit (02/02/2000, 22:45)
- Value above specified limit (02/02/2000, 23:30)
- Value above specified limit From: (03/02/2000, 00:00) To: (03/02/2000, 00:15)
- Value above specified limit (03/02/2000, 01:00)
### Source time series
- **Station:** Abbey Heath
- **Time series:** 033034.FQ.DayMean
- **Parameter:** Flow

### Analysis time range
- **From:** January 2000 to July 2003
- **Calendar Year**
- **Water Year** from January to December

### Include/Exclude
- **Percentage Missing accepted:** 100 %

### Settings
- **Method:** long term duration line
- **Evaluation of:** Absolute values
- **Don't show values beyond limit**
- **Moving Average (days):** 1

### Graphic configuration
- **Probability axis:** normal distributed
- **Value axis:** logarithmic
- **Insert curve into:** New graph

### Moving Average
- **Against days:** none, 1, 7, 10, 15, 30, 60, 90, 120, 150, 180, 360

### Data availability
- C: complete
- G: good
- I: incomplete
- M: missing
- E: estimated
- S: suspect
- U: unexpected

### Data quality
- G, E, S, U, M in %: good
Summary

- Requirements of EU-WFD lead to need of software for integrated data management

- Existing software WISKI for water quantity management

- Extension by Water Quality Module WQM
  - Data management
  - Data monitoring
  - Data analysis
  - Data assessment
  - Data presentation

- Complete solution for decision support and data management

- Useful tool to meet requirements of WFD
Handling hydrological data

WISKI-Key features

WISKI-Explorer

WISKI-Map

WISKI-Graph
Complex management tasks:

- Water quality data management
- Monitoring of all water bodies
- Combined water quality and quantity data analysis
- Assessment of current water body status
- Presentation of results
WISKI-Package

- Client-Server-Architecture (RDBM Systems)
- Complete Windows 32-bit application
- Hydrological work bench with data stream from telemetry to final report in one system
- Hydrological data are stored in time series
- Analysis tools based on international standards
- Automatic processing tools for data exchange to other systems, export or reports