# CONNECTING PRODRISK

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**User Meeting Hydro Scheduling 2019**
**Scandic Hell 13th March 2019**

# WHY CONNECTING PRODRISK?

- ProdRisk is a powerful SDDP hydropower scheduling tool based on decades of research at SINTEF
- Drawback
  - Command line user interface (or more recently APIs)
  - Highly dependent on files to store data
- ProdRisk users have to develop their own infrastructure solutions

- Connecting prodrisk is a collaboration between Powel and SINTEF integrating Powel software infrastructure with SINTEF's ProdRisk
- Funding clients:
  - Trønderenergi and Lyse


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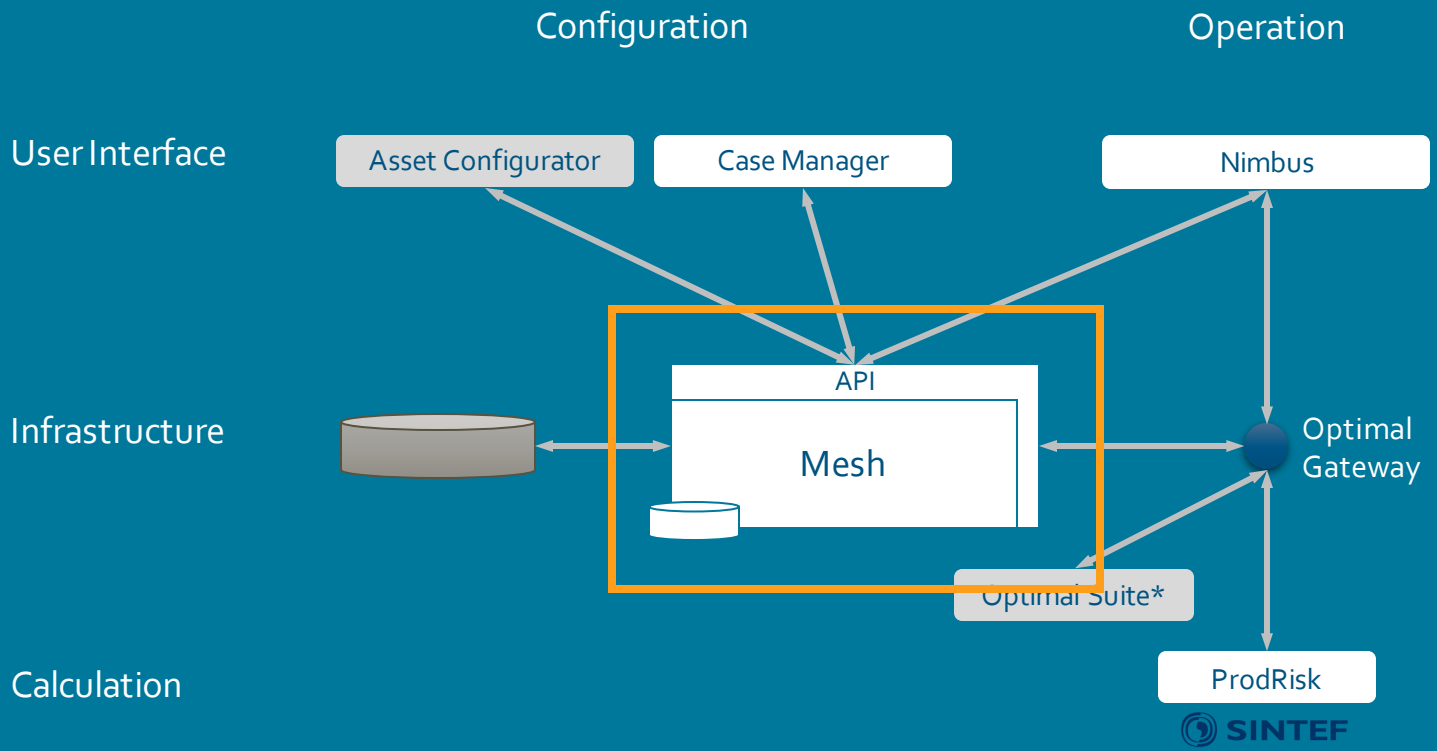
# POWEL OPTIMISATION FRAMEWORK – INTEGRATED WITH PRODRISK




*) Powel Optimal Multi-Asset, Optimal Thermal, Optimal Hydro, Optimal Spotbid, Optimal Midterm

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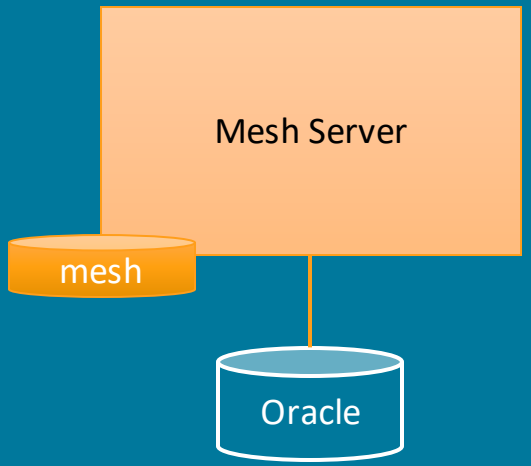
# MESH

Provide structural information and time series – fast and consistent

A No-SQL database with objects and integrated time series kernel

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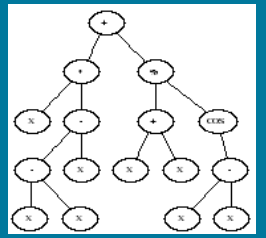
# MESH

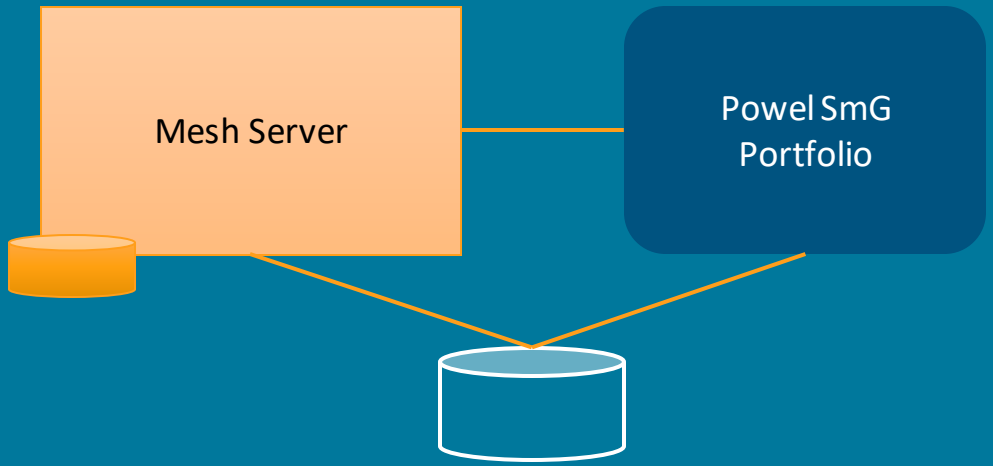
- Provide a configurable object structure
  - Can be extended along the way
- Built on formalized information model(s)
  - Objects and relations
  - Foundation for template calculations and reports
- An information HUB
  - Enables cooperation
  - A reliable source of information

Created / adapted by Customer

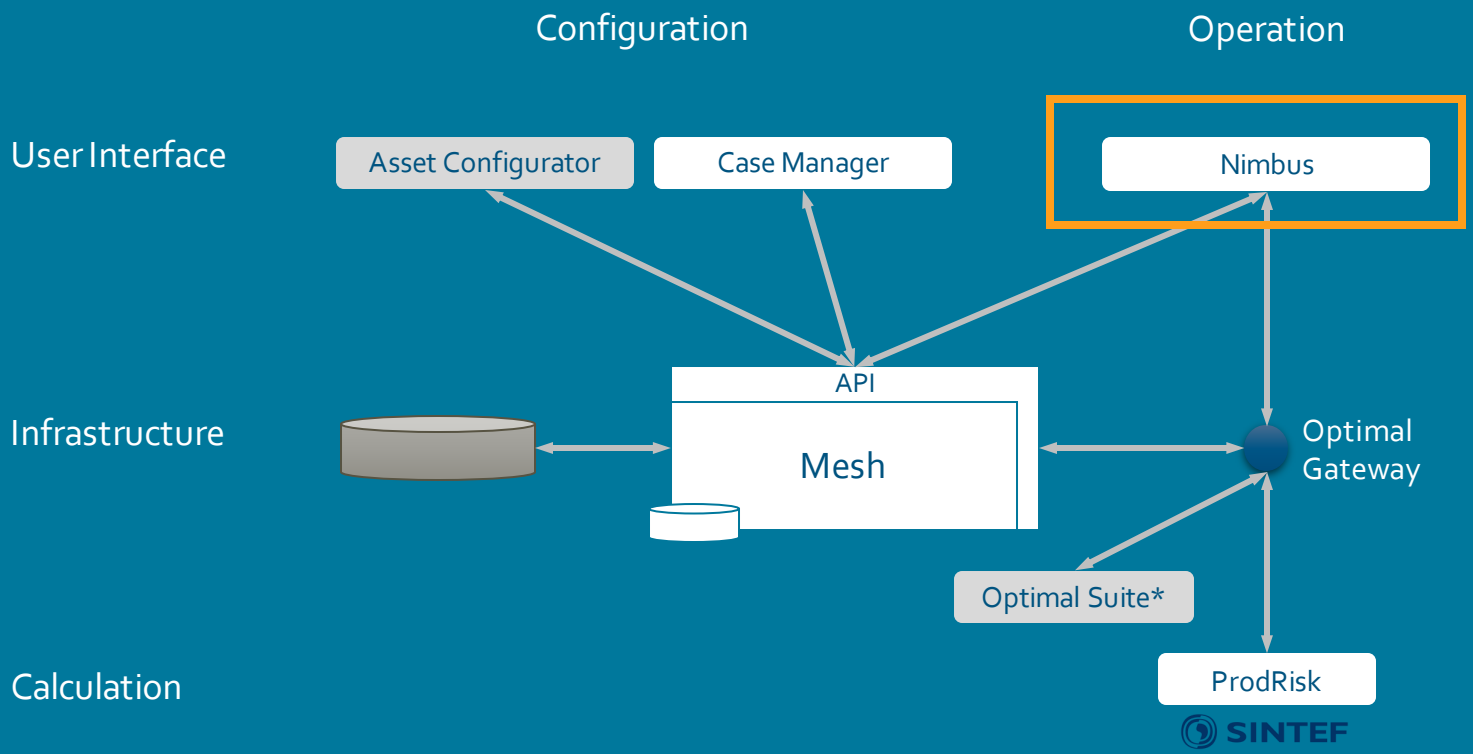


# MESH AND SMG

## Exchange through database or direct API



# POWEL OPTIMISATION FRAMEWORK – INTEGRATED WITH PRODRISK

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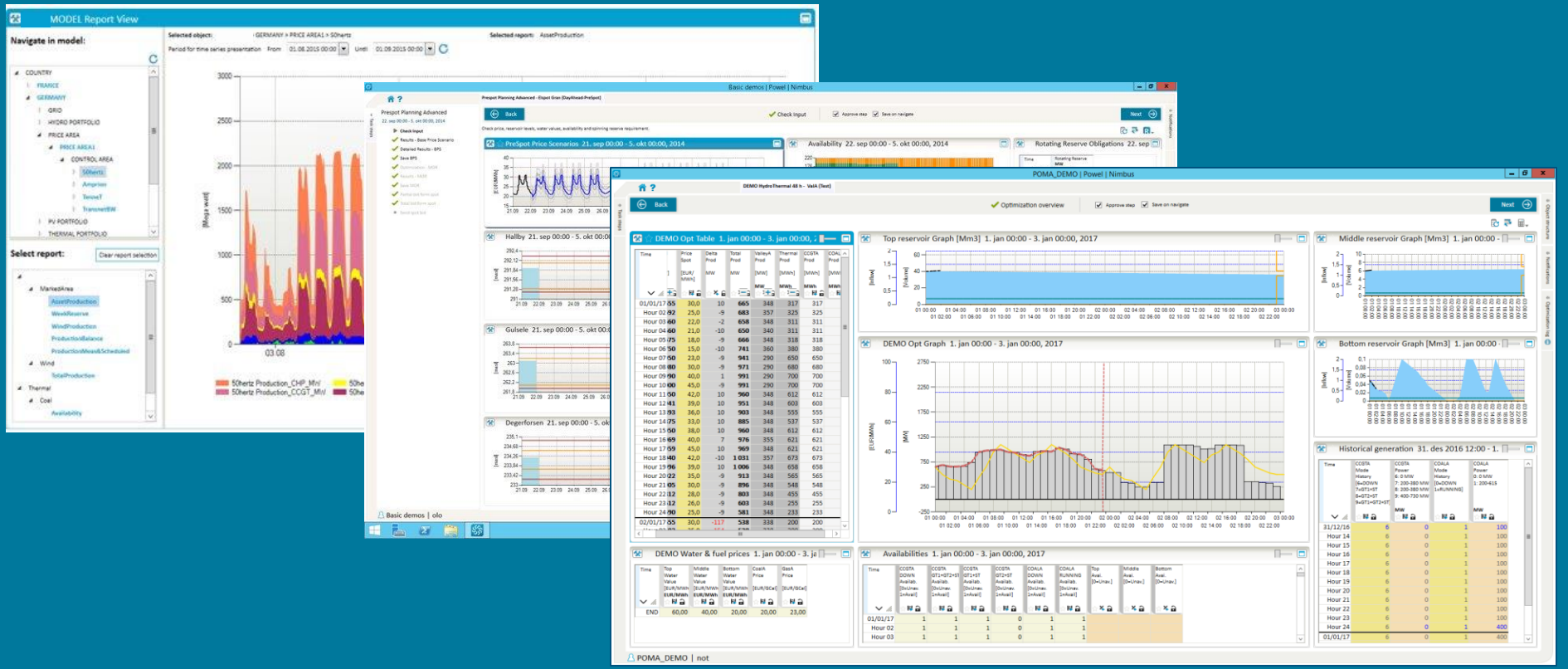
# NIMBUS/MESH

## A highly configurable graphical user interface to analyze

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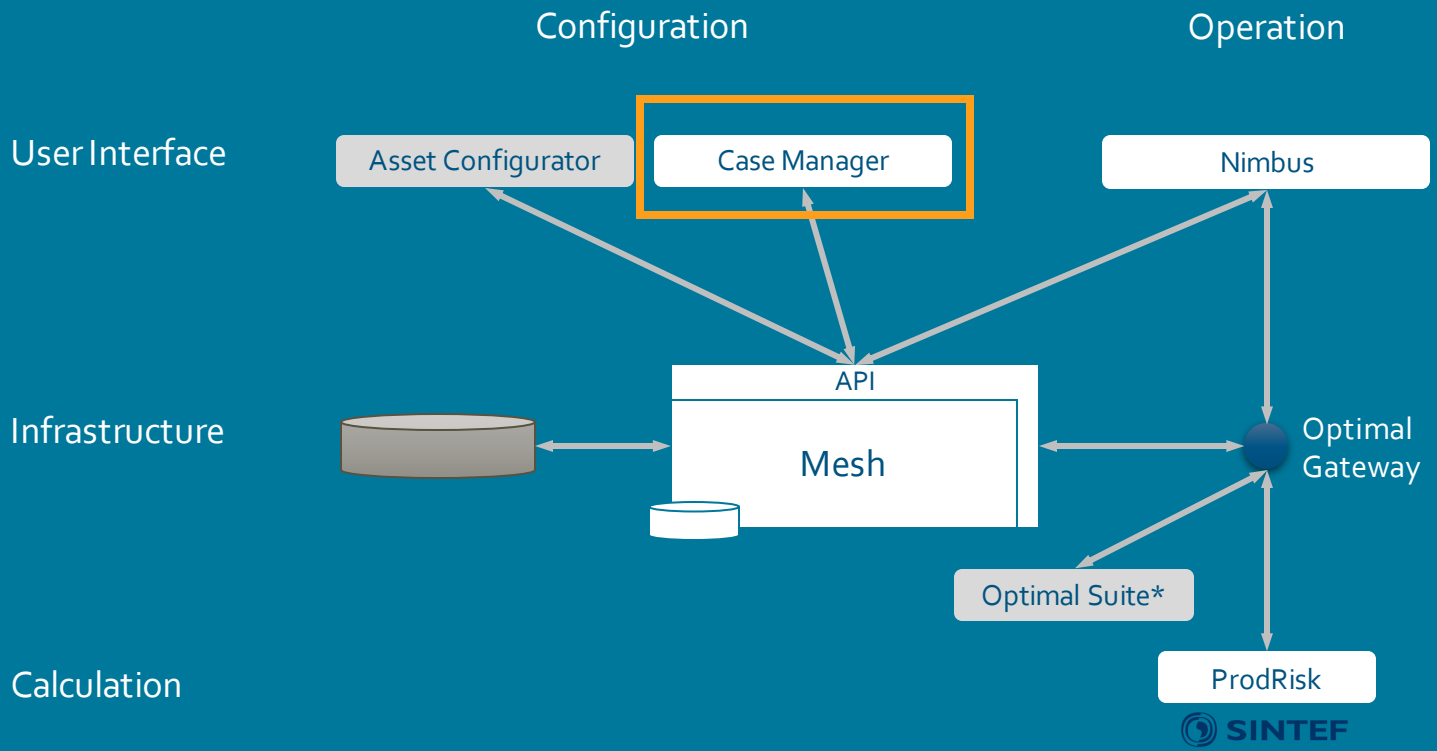
# POWEL OPTIMISATION FRAMEWORK – INTEGRATED WITH PRODRISK

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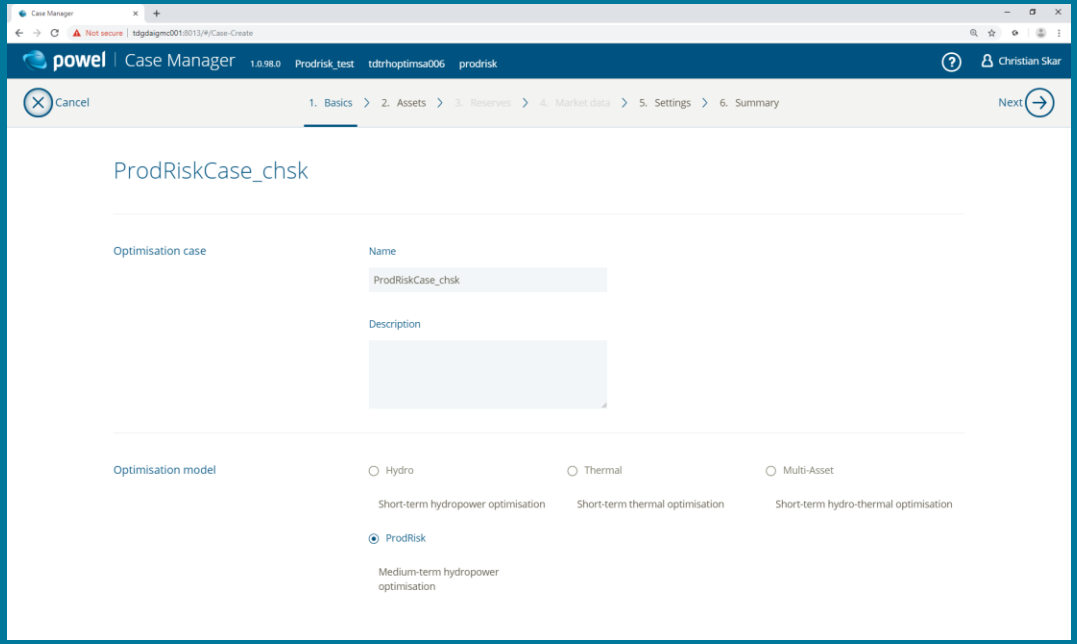
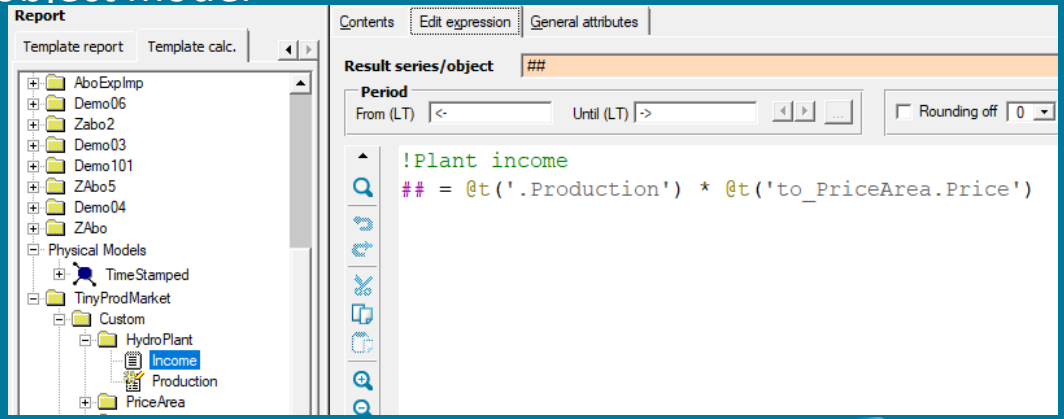
# CASE MANAGER

- Web based user interface for setting up and configuring cases for ProdRisk
- Designed as a step-by-step process
  - Select watercourse to optimise
  - Connect time series
  - Set ProdRisk settings
- In the background Mesh model is built (through the MeshAPI)
- Authentication using AD



# FUNCTIONALITY

- Tools for importing your data into Mesh → Easy to get started for existing users
- Automated ProdRisk runs using scheduled tasks
- Easy management and configuration of cases
  - For different watercourses
  - Set up sensitivity analyses quick and simple
- Customer customization of Mesh object model
  - Template calculations and reports
  - New object types, attributes



# PRODRISK API CHANGES FOR CONNECTINGPRODRISK

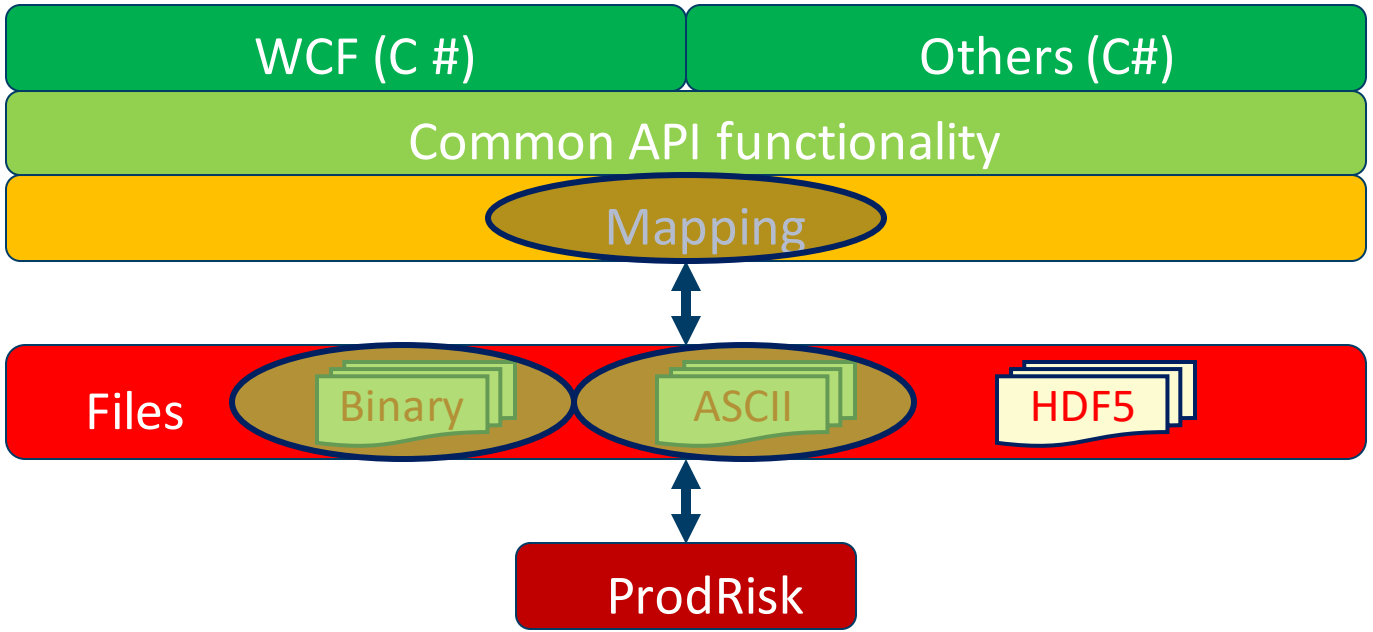
Per Eilif Wahl

# Additional information required

- Modified reading/writing of cut file (KUTT.SDDP)
  - Parameters already present
- Added height correction factors (HKORR.SDDP)
  - HeadCoeffAndCutId
  - HeadCoefficient

Note that internally in the API, time series are on an hourly basis, while many parameters for ProdRisk are on a weekly basis

# API


WCF (C #)
Others (C#)
Common API functionality
Mapping
Files
Binary
ASCII
HDF5
ProdRisk



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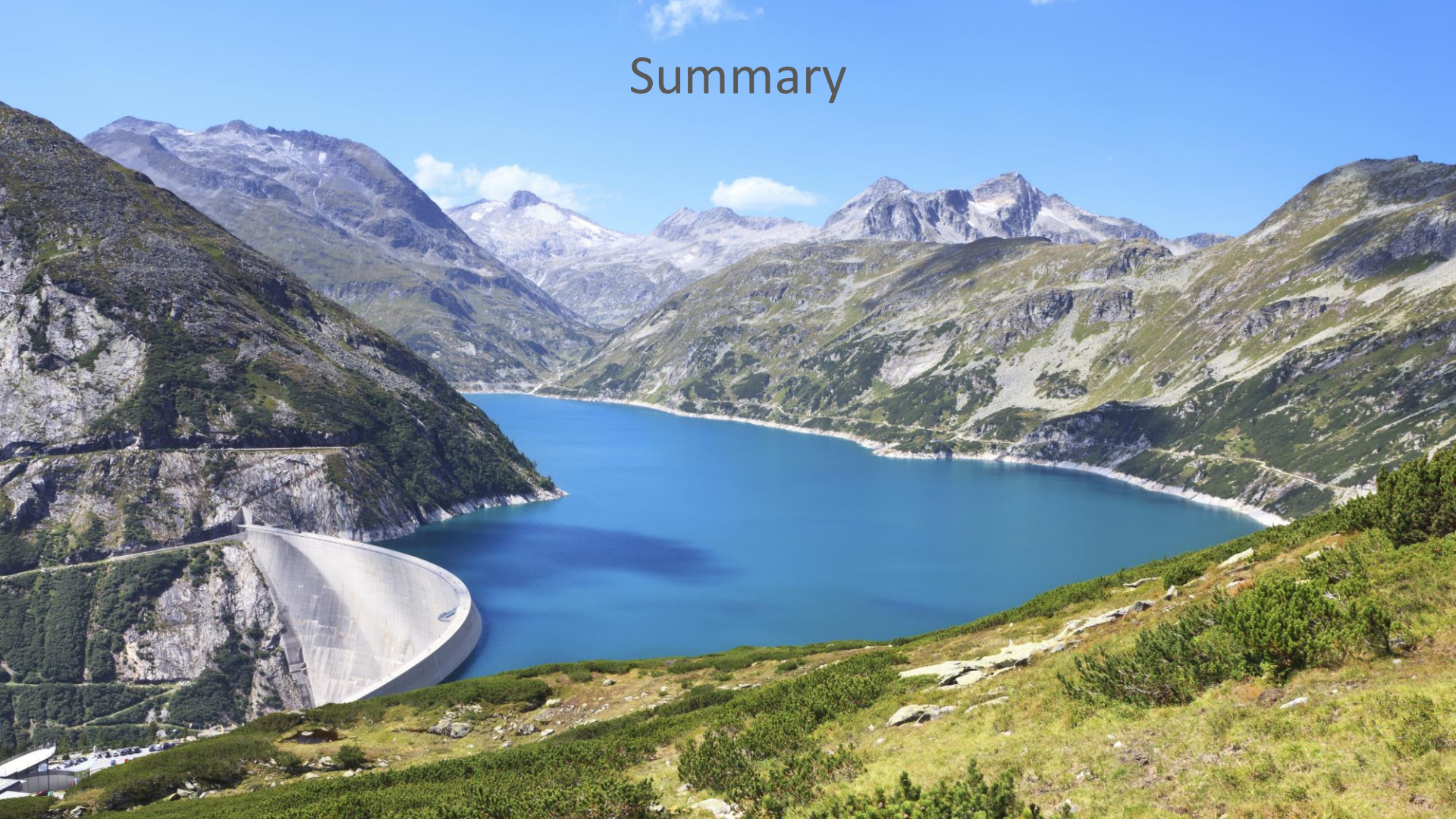
# Observations

- The API is not sufficiently robust for error situations
  - The server process should not terminate even if the data transferred are missing or erroneous
- The reading / writing of cuts should be rewritten
  - Not robust for changes in size
  - Memory leakage (Fortum problem)
- Using the API gives rise to a more dynamic execution that is not always reflected in the executables (SHOP, ProdRisk, …)

# Summary



# SUMMARY: CUSTOMER VALUE OF CONNECTING PRODRISK

- Alleviate the need for in-house solutions for working with **ProdRisk**
  - Less manual data transport
  - Less software maintenance
  - Better support for automating **ProdRisk** work process
- Powerful management of **ProdRisk** datasets in object oriented database system **Powel Mesh**
  - Files are out!
  - Direct integration with the **Powel SmG time series** database
  - Structured storage of inputs and results time series
- Analyse data in **Powel Nimbus**, set up template calculations in **Powel Calculator**
- Configure and run different scenarios using Cases (and **Powel Case Manager**)

Work better with your data:
Less time managing and more time analyzing!

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