DEVELOPMENTS LTM

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LTM - Developments

- **Version 10 (Vansimtap, Samkjøringsmodellen, Samlast, Samnett, ProdRisk)**

- ProdRisk new functionality

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Version 10 -

- Started with a API project – initiated and partly financed by Statkraft
  - API project consisted of three phases
    - Result API
    - Input API
    - Calendrical time
  - The two first phases are delivered and approved by Statkraft
    - Calendrical time – implemented but not approved

- Additional version 10 implementation not included in API project
  - Tilpro, Snomod, Vansimtap seasonal model, ProdRisk, Samnet, Samlast, Samoverskudd, API to Powel database (Idbatch and Smagrev), …

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Version 10 – Results

- Time series results on new file format:
  - Detsimres.h5 - Detailed hydro results
  - Samres.h5   - Aggregated hydro, transmission, and market results (previously on SAMRES.SAMK and UTVEKS.SAMK)

- Results always stored with sequential time resolution

- API
  - Use 3. part library for reading Hdf5

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Version 10 inputs

- New file formats for times series input (hdf5)

  - Inflow and temperature archive

    - Inflow scenarios for the whole planning period

  - Firm loads

  - Exogenous prices, wind and solar power, transmission capacity

  - Every price dependent contract can be specified with time series for price and capacity

- Python API for specifying all inputs

- New LTM application that replaces Vansimtap user interface

  - Major change - Possible to run models with XML based input files

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Version 10 other changes

- Use Powel API for coupling to Powels database
  - Inflow statistics and forecasts, reservoir fillings and planned maintenance

- License management system (same as used for Shop)

- Possibility to use calendrical time

- Exogenously made temperature correction of load
  - New type of firm contracts that are scenario dependent

- New ProdRisk functionality

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Version 10 project

- Much larger (and costly) project than initially foreseen
  - Involves the whole program code
  - All major developers not available for finalizing the project
  - Complicated testing and error identification

- Very large model flexibility
  - Start process to reduce after version 10
    - E.g., Time resolution (sequential/accumulated)

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Version 10 status and implementation

- Major development finished

  - Some known errors

- Propose to assist every utility in the upgrading process starting from April 1 – one at a time

  - Initial upgrade and testing

  - Document upgrading steps

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ProdRisk development (incl. in version 10)

- Linear start up costs

- Improved modelling of non-convex PQ curve in final simulation (by using binary variables)

- Reservoir ramping constraint

- Limits on bypass

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LTM related research projects

- MAD project (presentation by Ole Martin)

  - EMPS-W – Protype replacement for Samtap, to a much larger degree based on formal optimization

- PriMod (presentation by Mari and Arild)

- HydroCen

  - Future prices (presentation by Linn Emelie)

  - ProdRisk-SHOP simulator

    - ProdRisk API (presentation by Per Eilif)

  - Modelling state dependent constraints in ProdRisk type model

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LTM –Future (2020 -)

- Robustness

- Decrease complexity, reduce flexibility
  - A limited transition period to version 10.

- Improved test procedures

- APIs for all inputs, running the models, error messages

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Development dimensions

- Inputs, data structures, modularization
  - API project

- Functionality/flexibility
  - E.g. Load forecasting functionality: Snomod, Tilpro, Powel HBV, Ascii based climate correction, API input.

- Algorithms
  - Type of solution method (Samkjøringsmodell, EMPS-W, FanSi, SDDP …)

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Teknologi for et bedre samfunn