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Minutes of meeting

User Forum 2019

Scandic Hell
2019-03-12 12:00-17:30

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Agenda

- 12:00 General information
  - Welcome and presentation of project teams
  - Finances 2018 and Budget 2019
  - Response time and error statistics
- Error definition
  - Advances in testing in SHOP
  - HP option in the models
  - Discussion: Establishing a reference group
- Break-out: Discussion and feedback / Improvement proposals/ Organizing and form of web-meetings ref. contract
- 14:00 Coffee Break
- Alignment of ProdRisk/SHOP API
- IT and functional roadmaps
- Break-out: Discussing direction and priorities
- 16:30 Plenum
  - Summary from the groups
  - Discussion and feedback
- 17:00 End of meeting (Ended 17:30)

Introduction to the User Forum
User Forum is a yearly event where administrative and IT related issues regarding SINTEF's models are discussed. Major lines in budgets and spending are shown and discussed. The delivery for the previous year and the future plans and roadmaps is presented and users gives feedback and advise to SINTEF regarding improvements.

This is not the only time SINTEF want input. Talk to us during the year also.

1 General Information (Michael)

See also the presentation from the plenary session.

1.1 Activities in 2019

Some activities in SINTEF tied to development of the models has been:

- Stavanger workshop on hydro scheduling
- API on long term models
- HydroCen ProdRisk-Shop simulator tool, prototype might be ready before summer
- Roadmap, scenarios for 2030. Results show that prices will sometimes be very low for northern Europe

1.2 Model administration

All the activities for the models are connected in one project that is yearly planned. SINTEF tries to see the different tools in connection and harvest synergies with respect to administration, joint systems, cross-cutting competence, harmonized processes between the tools.

For multiple years the roadmaps give direction of the work. The work with the models is performed under SINTEF's business model, hence non-profit, resulting in shifting money between years. Licence-fees from new customers or from selling new additional functionality is used for further development of the models.

1.2.1 Organization (Organization chart in the presentation)

The project is in process of finding a contract responsible to take over for Hans Christian. Until September Michael will handle the contracts, so users might experience that it is not very fast response.

1.3 Budget and numbers

The maintenance project is one of the largest projects that we have in our department. Every second week the leadership in the project has meetings for discussion and following up on what is going on. Including budgeting and re-budgeting and prioritizing tasks and activities.

Currently we are working with one-year budgets. Michael argues that it might be a bit too short with 1-year planning for larger developments and trends. If the management group finds it useful we will consider to switch to longer budgeting for obtaining specific goals. In the current process we are focusing on where is the need the largest? Longer-term budgeting might also make it easier for research managers to allocate resources in longer-term perspective

The budget for 2019 is approximately 15 mill. This is lower than 2018 and 2017 and follows from the priority of V10 with API and calendar functionality in the long-term models in 2017/18. More details can be seen in the presentation. The excess consumption in the project was periodized over 3 years ending from 2021.

It is Michael's responsibility to ensure a good process in the budgeting. We are working on how to improve this process, ex. the roadmap presented last year. In parallel we are working with the ideal setup in the project

management tools used in SINTEF. We have individual tasks on the different deliveries defined in the maintenance contract so that we can follow how the budget are used.

Q: What is the green bar for LTM 2018? A: Api activities such as the version 10 upgrade with testing and error correction.

1.4 Model activities with funding from licenses

Last year (2018) , we opened 3 projects:

1. Test system on ltm (showed in 2017). People who can do this work has also done API related tasks, so we are not as finished as we would have liked. But we are closer now to have the functionality and ideas to develop this, for instance the ProdRisk project.
2. LTM API support that we moved into the maintenance project
3. Shop core development and testing.

This years decided activities aim is to get a common API interface for Shop and ProdRisk. SDK from user data to Shop data or ProdRisk data should be the same. The API layout between the two models will be the same.

Q (Nils, Hydro): in budgeting, how is prioritization done? Is it open for the users? Can they ask to see list of activities or participate in prioritization? A: we would like to have feedback on this. We use feedback from the user meeting when we are setting up and prioritizing the activities. Must find the balance between how much to discuss and determine with users, and how much flexibility we need internally. Comment Nils: I don't want to dictate, I just wat transparency. A: We will come back to this issue when discussing the possibility of a reference group.

2 The core development project (Hans Ivar)

See also the presentation that illustrate this new possibility.

What we have been doing and what we are now able to do.

Before, we had 500 test case for use with SHOP. The cases have fixed combinations of functionality and static input data. Thus we are not able to chase numerical issues that arise due to changing input data.

The project resulted in the possibility to implement a dynamic test system with automatic setup of different data sets, now we are running 15000 new cases very day. All possible combinations of functionality. In addition we can use new data every day and cover much more of the code base.

How do we do in the everyday work?

- Every 15 in checks if server is available,
- The starts a batch of 15 min cases
- Most of the time the server is used for this activity

How do we build a new system every day? Here Pyshop is the starting point of building topologies every day. One example is plant modelling where the method only needs to know the number of plants and highest head. Then it can build a set of plants with random height. Then change the seed to make new topology. Another example is to change optimization period. Now we can use data collected from the internet to trigger start points of cases that and goes back 1 year. To produce a state that is representable for the operational cases we take input from one year ago: inflow from NVE and prices from Nordpool. By this we expect to catch realistic cases that is close to how you would use the model in real life.

In a systematic way it can be checked:

- That production increases if the price is higher than the water value.
- Can test two or more functionalities and combinations
- Ex: add loss, should give less objective
- Add dynamic segmentation -> should give less prod unbalance
- Functionality can be turned on and off.

We do not have test for all functionality yet, but we plan to expand the system over the next year(s).

An interesting side effect is that the same system will help us design systems in SHOP that will be able to give warnings for inconsistent input that is difficult to capture today.

We expect that the value of this will be high as we go from a case-driven to a user-driven test system. This part of the SHOP system is placed in a GIT-repository that could be opened to the user. If you run PyShop you can run tests and also make your own test scripts that you can give to us to test in our serves or test by yourself on your servers.

Q: Did you find any bugs? A: Do not have less than 0.5 m head in shop. Behave poorly.

The core testing project has been made possible due to license funding. In the project we have tried several approaches and ended up with this approach that is facilitated be the Shop-API. This experience with API and test systems we now planned to make use of in ProdRisk.

3 Error statistics (Bernt)

Redmine statistics and reports (See presentation)

Bugs reported from ltm
Trend that peak come early in the year. Perhaps when adapting data set for new year?
Bugs report for stm
Shop 12 shows an increase in error that can be traced back to end of 2017

Q: what does the codes mean? Critical etc? A: Good question, it is important that we have a common understanding of this priority.
Q: interesting to know if you get duplicate errors? How many errors are open now? A (Hans Ivar): There are few duplicate errors but not many. Have to access RedMine to get the exact number of errors.
Q: Last year we discussed and decided that it was important to inform all when critical errors occur. I have not seen any of this? A (Michael): important to know the categories that prioritize the errors. We have not had any emergency upgrades based on critical and total breakdown of model use that I know of. If we experience errors that we believe have severe consequences for other users we will go with information to all. A (Hans Ivar): it depends on particular use, iterations, its not sure that one error at one user automatically affects other users

4 Definisjon of criticallity (Michael)

I do not see a problem with people overreporting critical errors, but anyway I believe that is OK to repeat the criticality definition from the contract.

Critical error is when you get stuck, no way of getting the results you want. For SINTEF, correction of a critical error is more expensive because other work must be put aside. The error correction process also suffers from time pressure when there is little time to think, discuss, plan and find the best approach. We on the SINTEF side

should phone you when you get errors in order to make the prioritization correct. We will try to improve our dialog with you on this issue.

Q: Could we get a streamlined process for releases? A: (Michael) We certainly want a streamlined process. Currently this is what happens: the message/error is sent to Redmine, gets a number that will be sent to you for reference. People on watch will see that something new has come up. We should call you to discuss. Then it will be assigned to somebody in SINTEF that is available for following up. The Shop group has meeting almost every work day for follow-up of errors. On LTM, we go through all open cases one a week. and where the primary experts can come with advice to people how hare handling this case. If there is critical errors there will be specific discussion regarding this case. When the error is corrected the user will get information about where to download the correction together with information about the differences between the new and later versions. We see that there are steps that can still be improved in this process.

Q: Many of the errors we have reported take time. In version 12 we have had a lot of errors. Each error that stops us from using version 12 is critical. A (Michael): I expect and assume that a fix for a critical error should also immediately result in installation and operationalization of the correction.
Q: A list of known errors could be useful.
A (Michael): We will investigate the possibility that the error list can open. This requires that you as users performs the quality check of the information regarding an error that can be open and what information that is confidential.
C: Would a sentence that can explain the error but can be open be helpful? A (Michael): This is exactly the solution that we are working on. We would like to be able to autogenerate an error list on daily basis or even on request.
Q. Can this list be combined with a work-round that can be public? A (Michael): we will try to find solutions that can allow that.

5 Information about the HP option (Michael)

SINTEF can offer large scale use of optimization capacity from IBM for use in the scheduling tools.
See the presentation. If you want to know more talk to Michael Belsnes or Bjørn Holmvik (Powel)

6 Reference group (Michael)

It might be an idea to make a reference/advisory group where we can have more frequent meetings. It will require extra effort for people joining. Could give input to the agenda to user forums making them better meetings. In some projects/activities there is an extra benefit that we are reporting to somebody or a group. This could make progress easier, and the results more focused to what the users need. We would like the group also to have people who could input advise on technology side. Is this a good idea? Would you be interested? About than half of the participants are positive to the idea.

Q: would there be different groups on STM and LTM? A (Michael): this has not been discussed. Sometimes it is questions that cut across the models (administrative) but sometimes not (technical). We will consider this when we discuss whether or not to do this. At least such a group should have representatives matching the different models.

7 ProdRisk-Shop API (Hans Ivar)

See the presentation.

Some basic assumptions:

- Advantage that functionalities can build on top of the API. Might change what is inside the model box and what can be outside, it will be easier and possible to handle more issues on the outside.
- Beneficial if what we build and learn from one model is used on other models

- Would beneficial if we could reuse some of the API code for other models
- Any difference that is allowed to continue will cost a lot to maintain over time

We will look on question such as:

- Which parts of modelling can be generalized?
- What can be done on top of API closer to user: ex. software development kit
- Wrapper in python that makes it easier to use the API, as in SHOP. Can it be the same?
- What functions and data should be available for both shop and prodrisk?

ProdRisk is closest to Shop and the starting point of the current ProdRisk API is an earlier version of the Shop API. This will also be beneficial for simulator currently developed in FME HydroCen. Hence the starting point is with many similarities, but also with many small differences.
The biggest job in the project is not the API itself, but the functionalities below and above the API, the mapping and the wrapping. There are some fundamental differences between the models "below the API". Shop has one data source and all in memory. ProdRisk with many data sources and several ways for data to go into the model.

We aim at more harmonized input to ProdRisk. Would like to reduce the dataflow between the modules and the different formats of data that that the flow represents. The project is still in the planning phase, but we have resources and people to do this in the next half year.

Q: When do we expect the first results to test? A (Michael): We have not made a timeline yet. But project plan is discussed.
Q: How is this related to Vansimtap? If you solve the ProdRisk problem, do you also solve the Vansimtap problem?
A (Birger): We have defined it to be ProdRisk. The API will focus on the data necessary to run ProdRisk, and there are other files that are needed to run Vansimtap, so it is not a direct one-to-one link, although it will be quite similar.
C: We would like to have both. We would probably wait to implement a ProdRisk API until Vansimtap is done, otherwise we would have to do it twice.
A: ProdRisk vs Vansimtap, aren't all the input data the same? If we want detailed results for reservoirs, would that be part of the results now? A: (Birger): If you don't need the end-values, just set time horizon longer.
Idea (Arild) : could we just verify that giving manual end values, compared to values from Vansimtap, give enough results? We need to verify. Comment from user: we have done some testing and it seems ok to us.

8 General comments/request

Can budgeting be available in advance of the decision and hence increase transparency?
More statistics on "public" errors would be interesting
SINTEF should have better processes for informing users in case of critical errors.
Is the definition of criticality of errors known to all?
Making the list of errors available to all – not the detailed description but a heading. Can the error list be coordinated with information about the possible work-arounds?

9 Breakout session 1 - IT, Management, What to model

Se the presentation from the breakout session with all results from all groups.

10 Breakout session 2 - KTM/LTM

10.1 Roadmap for Shop (Hans Ivar)

Good discussion in last section, this will be considered as input to the roadmap, now we will focus on integration and features.

Things we are working on, plan to work on that will be included considered for the KTM roadmap. The Roadmap discussed here is for maintenance project, but also for other projects:

- Solver library, linux, docker, pyshop, matlab
- Alternative integration options
- First language take a long time and effort, but other languages are easier
- Ideas - not implemented yet.
- Input data verification and validation.
- Tunnel modelling

Topics that was discussed were:

- Documentation improvements. The user should not have to read 130 pages, and we aim to make more interactive documentation so that you can get help for exactly what the user need
- Performance improvement. Have been adding functionally which has decreased performance considering calculation time but have not considered explicit computational measures. Some ideas that we can consider is: relative variable, helpful variables, warm start possibilities. It is possible to apply meta heuristics after we build the model, before we start Cplex. Separate building of lp models or architecture changes to the LP models that can make then more efficient.

11 Summary in Plenum (Group leaders and Michael)

Group 1 mainly discussed Version 10 of LTM

Group 2: Raised the question: should everything implemented from scratch? The main feedback from the group is that the direction with API and modularization that SINTEF started in is the right one.

Group 3:
Well-functioning API for all models. New technology should be tested such as GPU. Easier access to models: containers, linux, more analysis, sensitivity, calculate cost matrix, higher performance. SINTEFs thoughts on open source. Partnership: help to self-helf. Somewhere to ask questions and get feedback from SINTEF and other users. Documentation should be improved. Easier to search for what you need. Release plans.

Group4: Expectations to SINTEF ex a better way to communicate with and between users. Easy understandable use of the models - documentation. Seamless use of data and models. Higher performance needed in all models.. How to manage legacy code and the role of SINTEF as both program house and research institute.

Text

TASKS

TASK NO	TASK	RESPONSIBLE	DUE DATE
1	Information from the meeting	Management group and Ellen Aasgård	
2	Sense check and eventually implement Reference group	Michael Belsnes	