WP2 AI- & HPC-Cross Methods at Exascale – Monthly Meeting

Prof. Dr. – Ing. Morris Riedel et al.
School of Engineering & Natural Sciences, University of Iceland

2022-11-24, RAISE WP2 Monthly Meeting November 2022, Online

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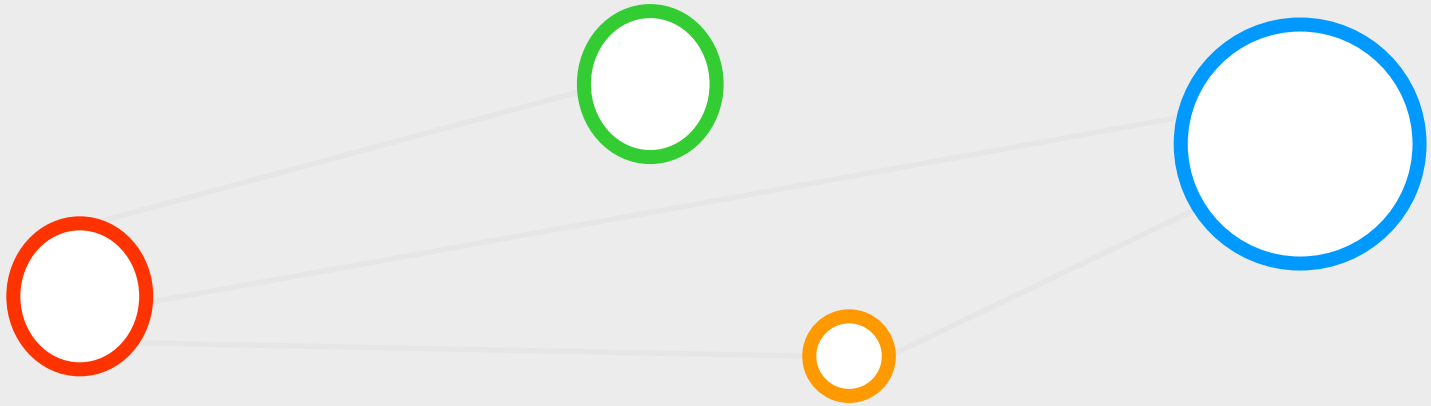
https://www.youtube.com/channel/UCWC4VKHmL4NZgFfKoHtANKg morris@hi.is

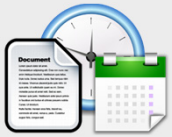
WP2 Meeting November – Welcome & Agenda

1. Approval of minutes from Monthly Meeting October 2022
   - (All), ~5 Min
2. Review WP2 Status on Interaction Rooms
   - (Morris Riedel, Matthias Book, Helmut Neukirchen), ~5 Min
3. Review Framework Adoption Status
   - (Morris, Andreas, et al.), ~10 Min
4. M24 Deliverable Status
   - (Morris, Rakesh, Guillaume/Cristobal, Fabian et al.), ~30 Min
5. Status WP2 Training Plans
   - (Morris et al.), ~5 Min
6. Compelling Scoreboard Review & Next Steps
   - (All), ~5 Min

Agenda Item (1) – Minutes Approval – October 2022



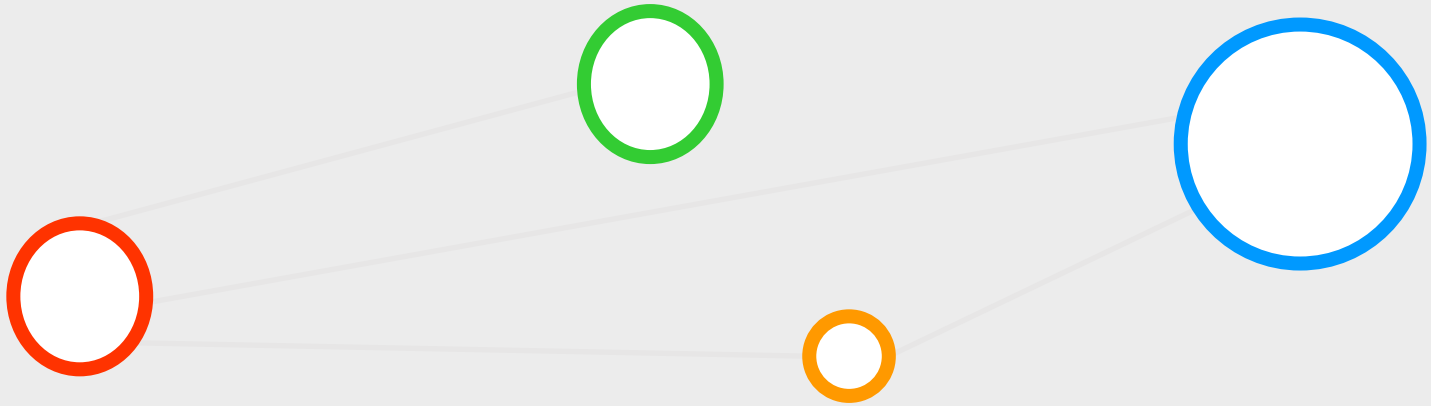
Minutes Approval – Monthly Meeting October 2022



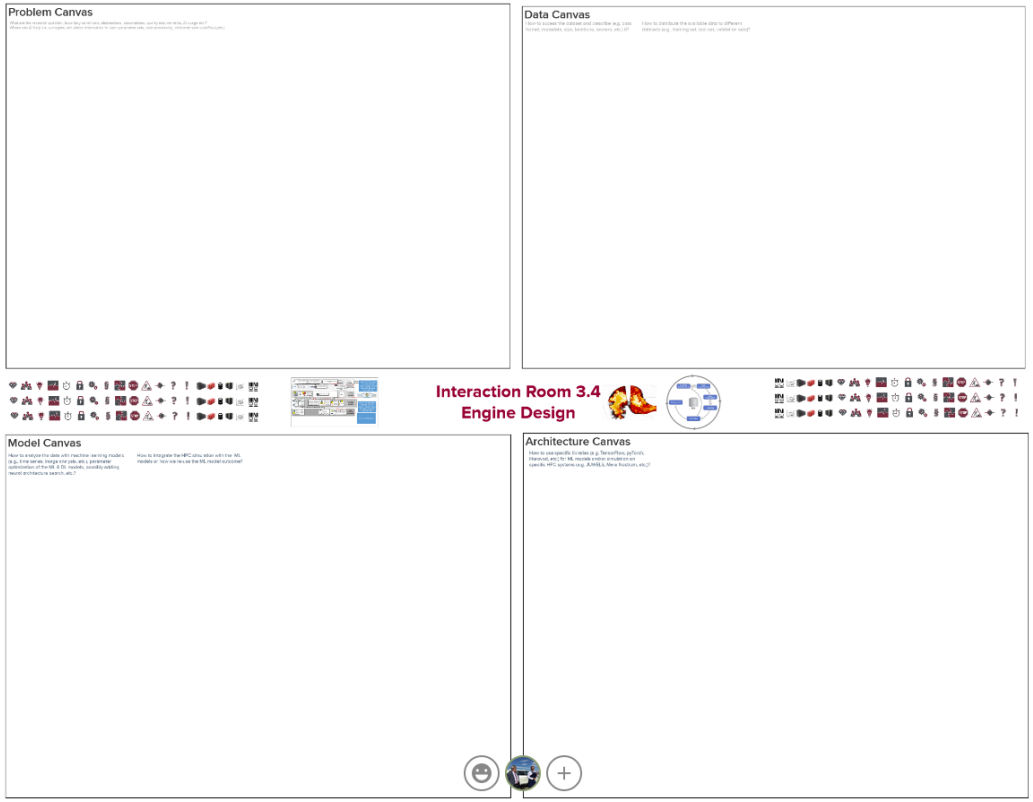
- Minutes available in BSCW
  - https://bscw.zam.kfa-juelich.de/bscw/bscw.cgi/3340884
  - TBD(all): Any objections or additions/changes?

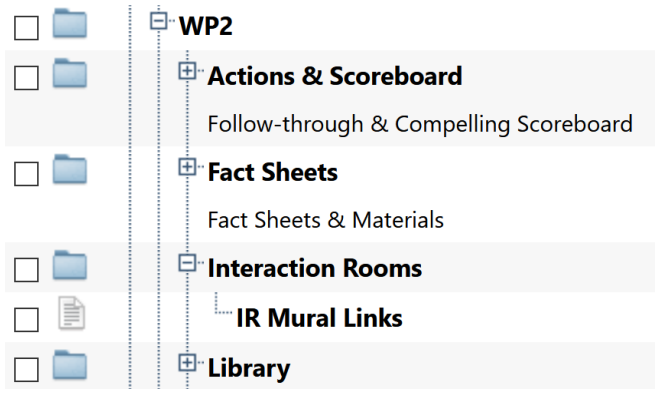
2021_11_26_Monthly_Meeting November 2021 Slides & Materials from Meeting 2021-11-26	2	M.Riedel	2022-01-17 12:56
2022_01_31_Monthly_Meeting_January_2022 Slides & Materials from Meeting 2022-01-31	2	M.Riedel	2022-02-28 11:10
2022_02_28_Monthly_Meeting_February_2022 Slides & Materials from Meeting 2022-02-28	2	M.Riedel	2022-03-30 09:41
2022_03_30_ Monthly Meeting March 2022 Slides & Materials from Meeting 2022-03-30	2	Katrine	2022-04-29 10:23
2022_04_29_Monthly-Meeting April 2022 Slides & Materials from Meeting 2022-04-29	2	M.Riedel	2022-05-31 11:23
2022_05_31 Monthly_Meeting May 2022 Slides & Materials from Meeting 2022-05-31	2	Katrine	2022-11-22 12:34
2022_06_28_Monthly_Meeting_June_2022 Slides & Materials from Meeting 2022-06-28	2	M.Riedel	2022-07-28 14:51
2022_07_29_Monthly_Meeting_July_2022 Slides & Materials from Meeting 2022-07-29	2	M.Riedel	2022-08-03 09:49
2022_08_26_Monthly_Meeting_August_2022 Slides & Materials from meeting 2022-08-26	1	Katrine	2022-09-30 12:25
2022_09_30_Monthly_Meeting_September_2022 Slides & Materials from meeting 2022-09-30	2	Katrine	2022-11-22 12:35
2022_10_ 27_Monthly_Meeting_October_2022 Slides & Materials from meeting 2022-10-27	2	Katrine	2022-11-24 07:44
2022_11_24_ Monthly_Meeting_November_2022 Slides & Materials from meeting 2022-11-24	0	Katrine	2022-11-22 12:37

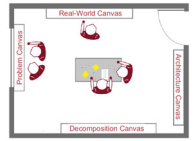
Agenda Item (2) – Review WP2 Status on Interaction Rooms



Interaction Rooms via MURAL Boards & Milestone Inputs







IR Mural Links

IR3.1 Turbulent Flow: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621377866397/8613c384d54f66fb5e78599ff307a4ce8a9090c0?sender=u15e3008bb41d6628a5bb5701

IR3.2 Clean Energy: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621377887905/cb44cca3eedd3bb9964fbfa36af16b1bfcce085f?sender=u15e3008bb41d6628a5bb5701

IR3.3 Reactive Flows: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621377959022/0c363886f24833ecb19b025d87324b57fd50e2db?sender=u15e3008bb41d6628a5bb5701

IR3.4 Engine Design: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621377976343/8d7aba6be09af3b2ffd305d2f709c53661ac889d?sender=u15e3008bb41d6628a5bb5701

IR3.5 Coating: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621377991014/7a5d7e1eaf230178342d1e1d4a84d656d9055d52?sender=u15e3008bb41d6628a5bb5701

IR4.1 Fundamental Physics: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621378007555/6f0d5285fcaec5eafa515bd6676c84d8b4879d39?sender=u15e3008bb41d6628a5bb5701

IR4.2 Seismic Imaging: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621378023838/a0b9503abb837ae3e28af4bb8d9adbec33874998?sender=u15e3008bb41d6628a5bb5701

IR4.3 Manufacturing: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621378038069/93df6fa7a41093f4eaae7be9d72979dc2ba42b9d?sender=u15e3008bb41d6628a5bb5701

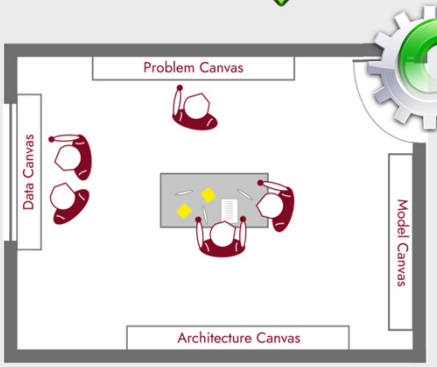
IR4.4 Sound Engineering: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621378050431/b5fa12219002404059f90a4bbb0101fa379a8503?sender=u15e3008bb41d6628a5bb5701

- 3rd iteration with a view on EuroHPC Hosting Sites, SMEs/Industry & CoEs will be started
  - Focus on where exactly is code running and what HPC sites might be interesting in the future
  - Update of the SW Framework Components (e.g., scikit-learn for statistics, NumPy, Dali Data Loader, etc.)

Interaction Room Status & Discussions – WP3/WP4 Overview

- WP3 (third round IRs)
  - T3.1: Turbulent Flow → Dec/Jan
  - T3.2: Clean Energy → Dec/Jan
  - T3.3: Reactive Flows → Dec/Jan
  - T3.4: Engine design → Dec/Jan
  - T3.5: Coating → Dec/Jan
- WP4 (third round IRs)
  - T4.1: Fundamental physics → Dec/Jan
  - T4.2: Seismic imaging → Dec/Jan
  - T4.3: Manufacturing → Dec/Jan
  - T4.4: Sound engineering → Dec/Jan
- 3rd iteration of Interaction Rooms → schedule

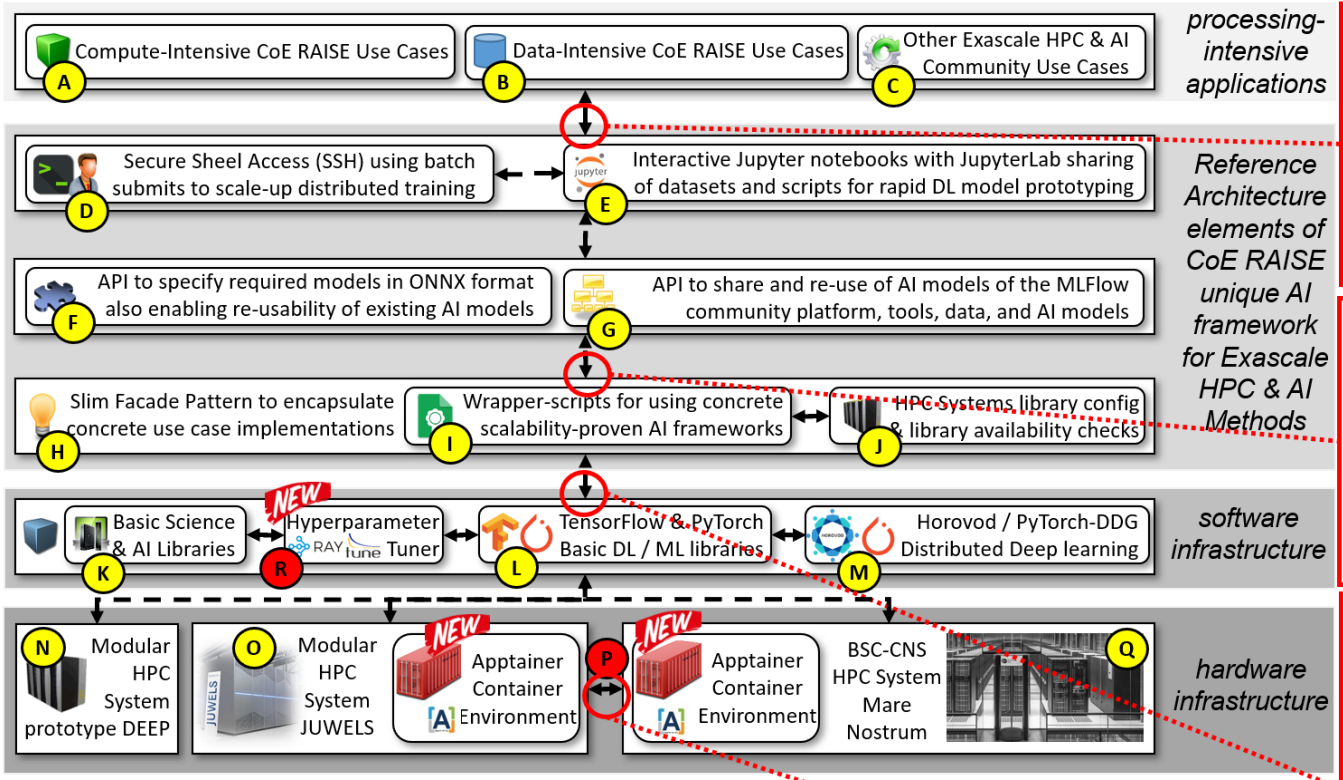
Continously Updating



Case	AE	PINN	ANNs		CNN		NO	GNN		RNN		GAN	TF				SVM	RF
ails	CAE		ANN	RBF-ANN	U-Net	RES NET	FNO	MLPF	GAT	LSTM	GRU	WGAN	MViT	ViViT	Swin			
for turbulent boundary ers	X	X	X									X						
AI for wind farm layout optimization				X												X		
AI for data-driven models in reacting flows					X				X									
Smart models for next generation aircraft engine design					X				X									
AI for wetting hydrodynamics	X	X					X			X								
Event reconstruction and classification at the CERN HL-LHC use case								X										
Seismic imaging with remote sensing for energy applications	X	X				X	X			X	X					X	X	X
Detect-free metal additive manufacturing	X		X									X	X	X	X			
Sound Engineering	X		X															

- Next round Interaction Rooms after Review
  - Carve out more details on AI/HPC methods
  - Contribute to the Unique AI Framework
  - Update our HPC/AI Methods Matrix

Realization of SW Framework – IR Results (see D2.10)



✓ RQ1, RQ2, RQ4, RQ5

❖ Parts of the framework layout plan is to provide Kernels for Jupyter notebooks with correct version setups of modules for specific HPC Systems

✓ RQ3, RQ6 NEW

❖ Parts of the framework layout plan is to provide lightweight & abstract Python APIs building on ONNX enabling exchange with MLFlow, OpenML, ClearML, etc.

✓ RQ1, RQ2

❖ Parts of the framework layout plan is to provide a lightweight Python API that abstracts from low level versioning of AI packages (with proven scalability) and is harmonized with different available HPC system module versions

Discuss updates on DALI Data Loader, NumPy, Scikit-learn, Quantum, etc. DeepSpeed, DeepHyper, Google JAX?

Continously Updating!

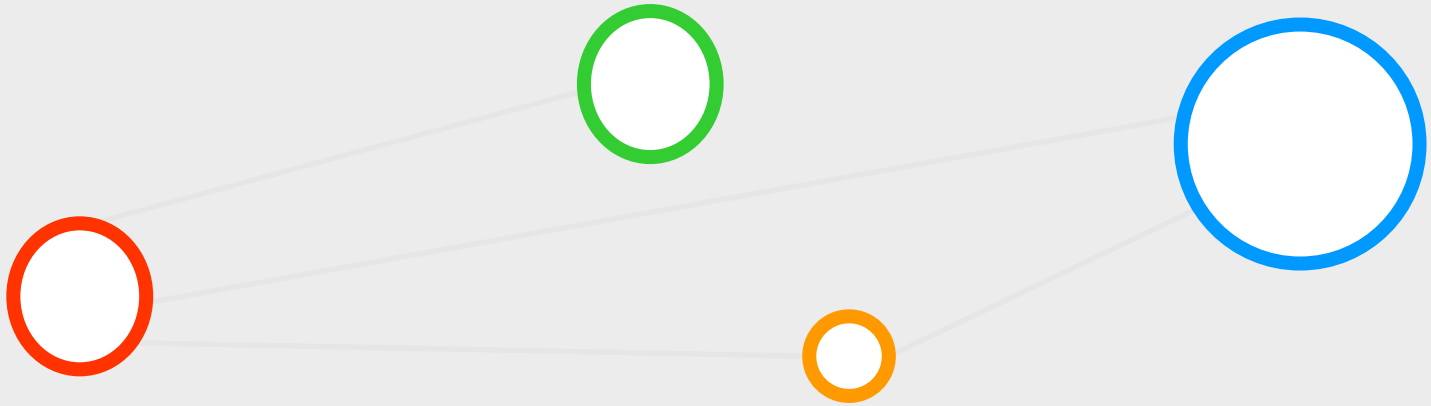
Legend:

Tangible outputs of RAISE WP2 as part of the unique AI framework layout

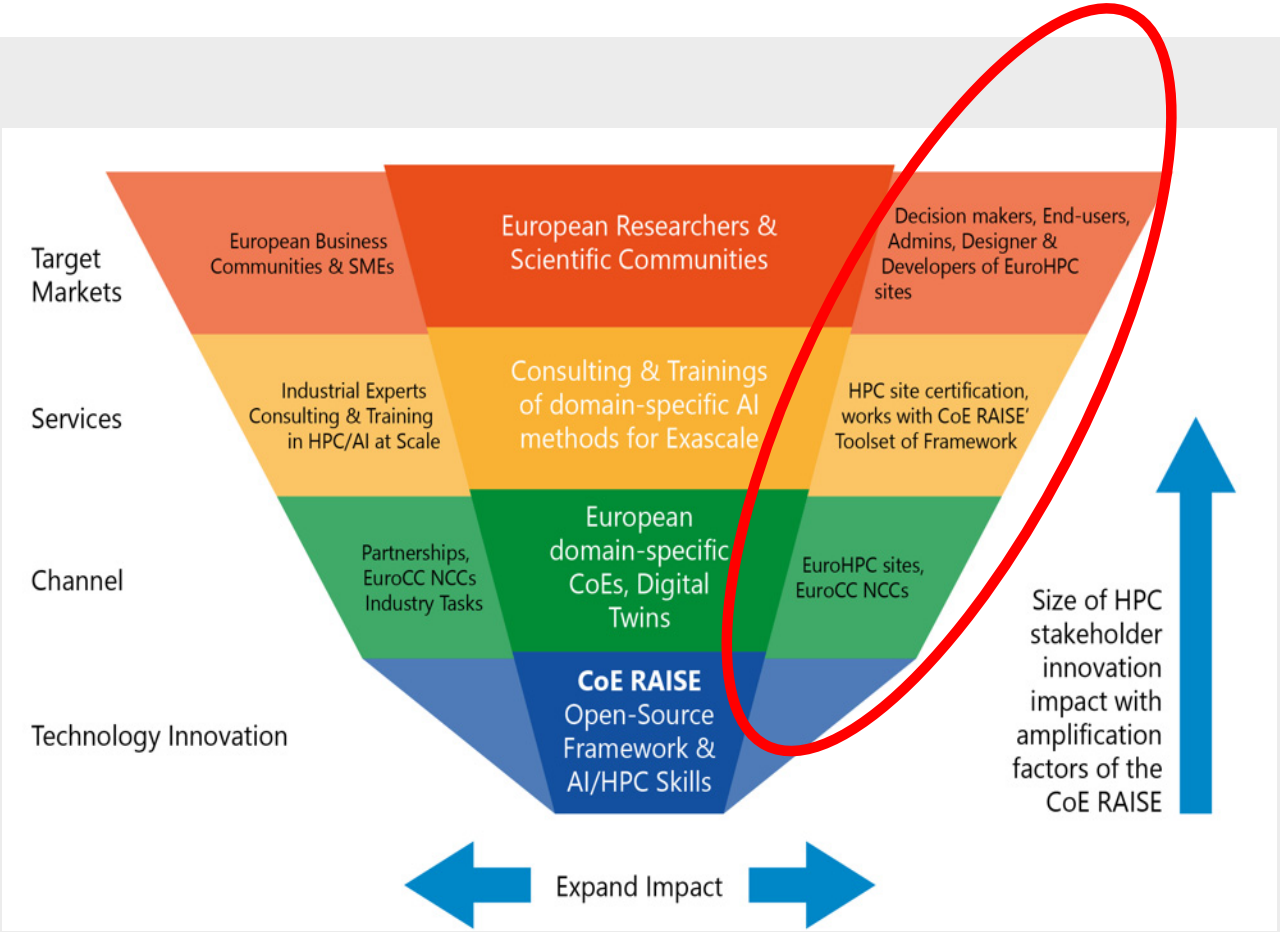
✓ RQ6, RQ7

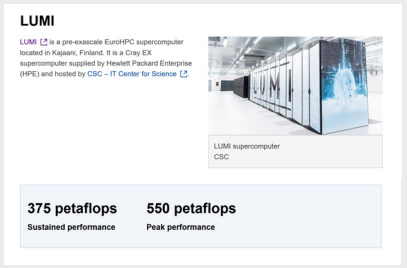
❖ Part of the framework layout plan is to provide containers in Apptainer with prepackaged datasets and required software stacks needed for AI models

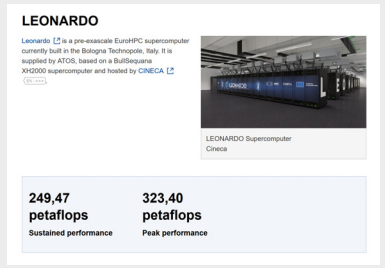
Agenda Item (3) – Review Framework Adoption Status

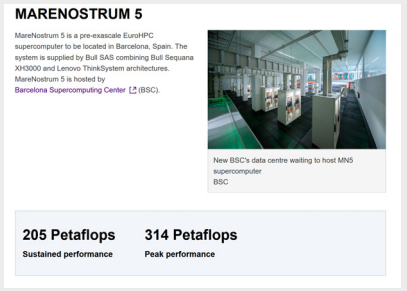


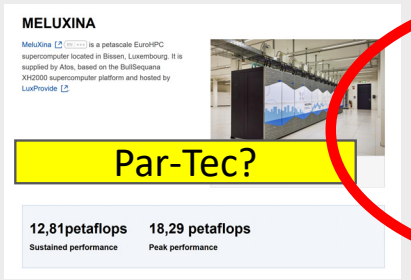
Towards SW Framework Adoptions



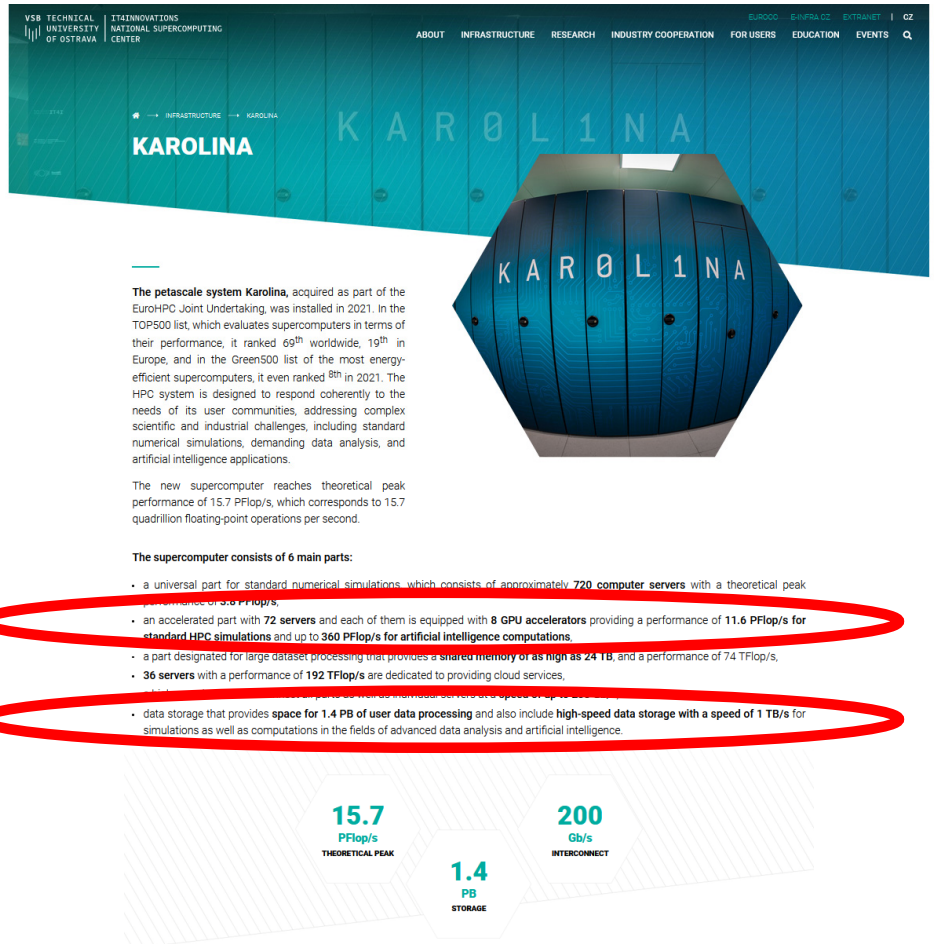


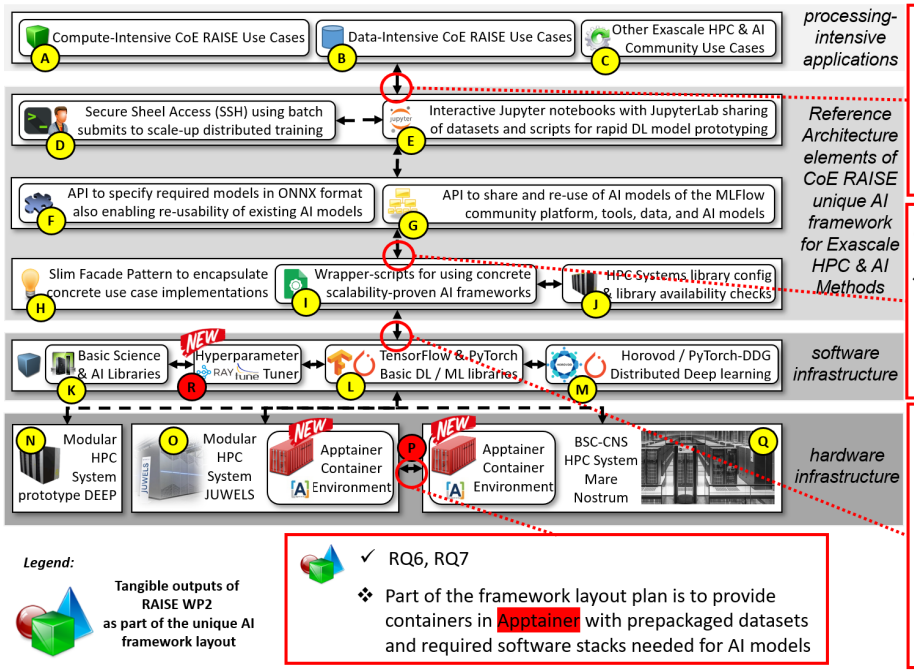






SW Framework Adoption: Check Karolina in Praque Meeting





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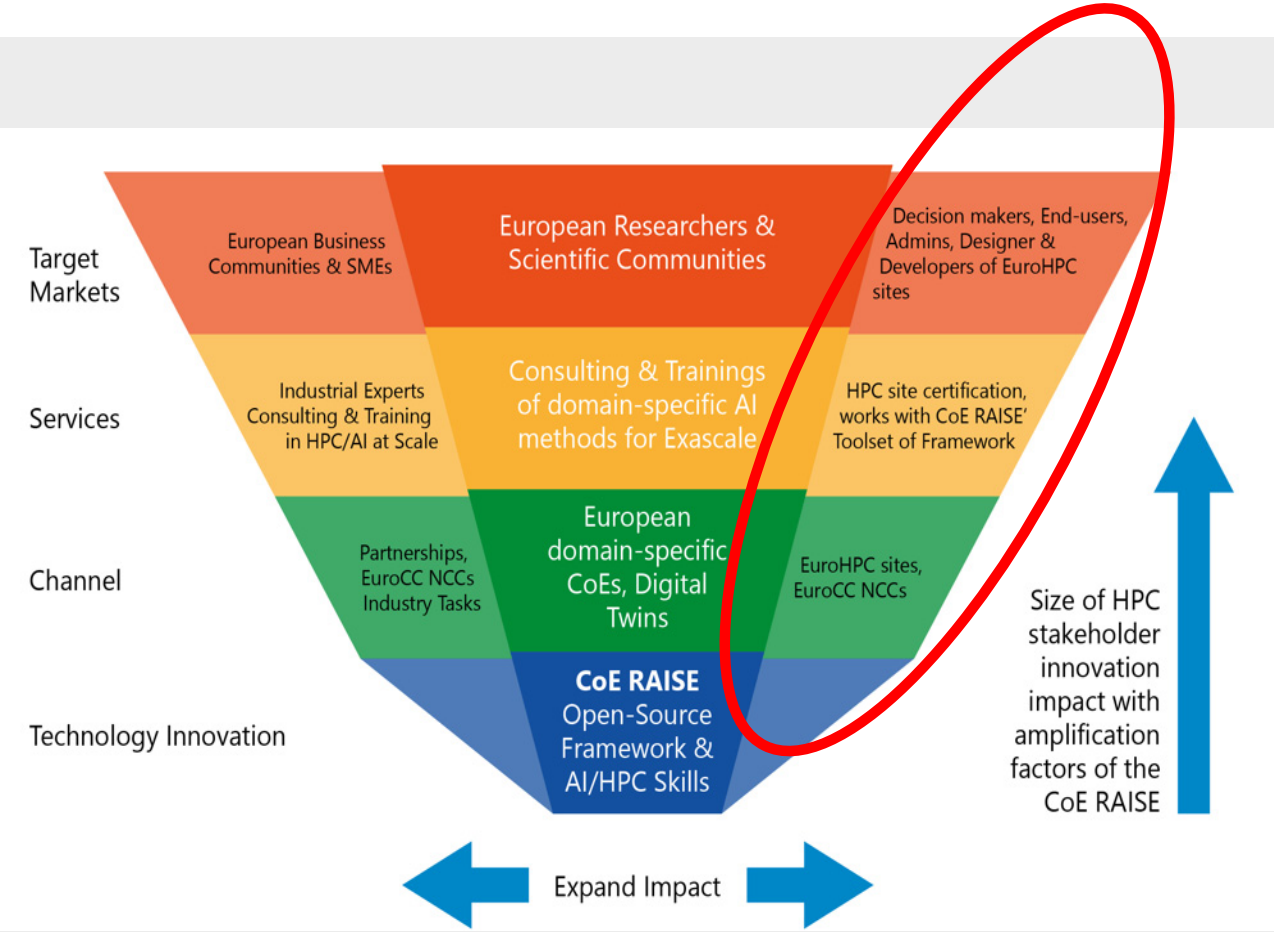
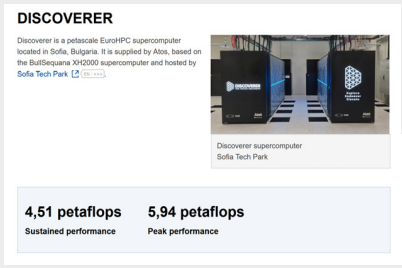
✓ RQ6, RQ7

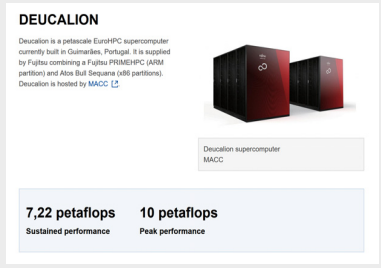
❖ Part of the framework layout plan is to provide containers in Apptainer with prepackaged datasets and required software stacks needed for AI models

- IT4Innovation
  - Vit Vondrak (not in workshop)
  - Tomas (hopefully in workshop)
  - TBD: Check what SW already installed & clarify access for CoE RAISE WP2 folks

Towards SW Framework Adoptions

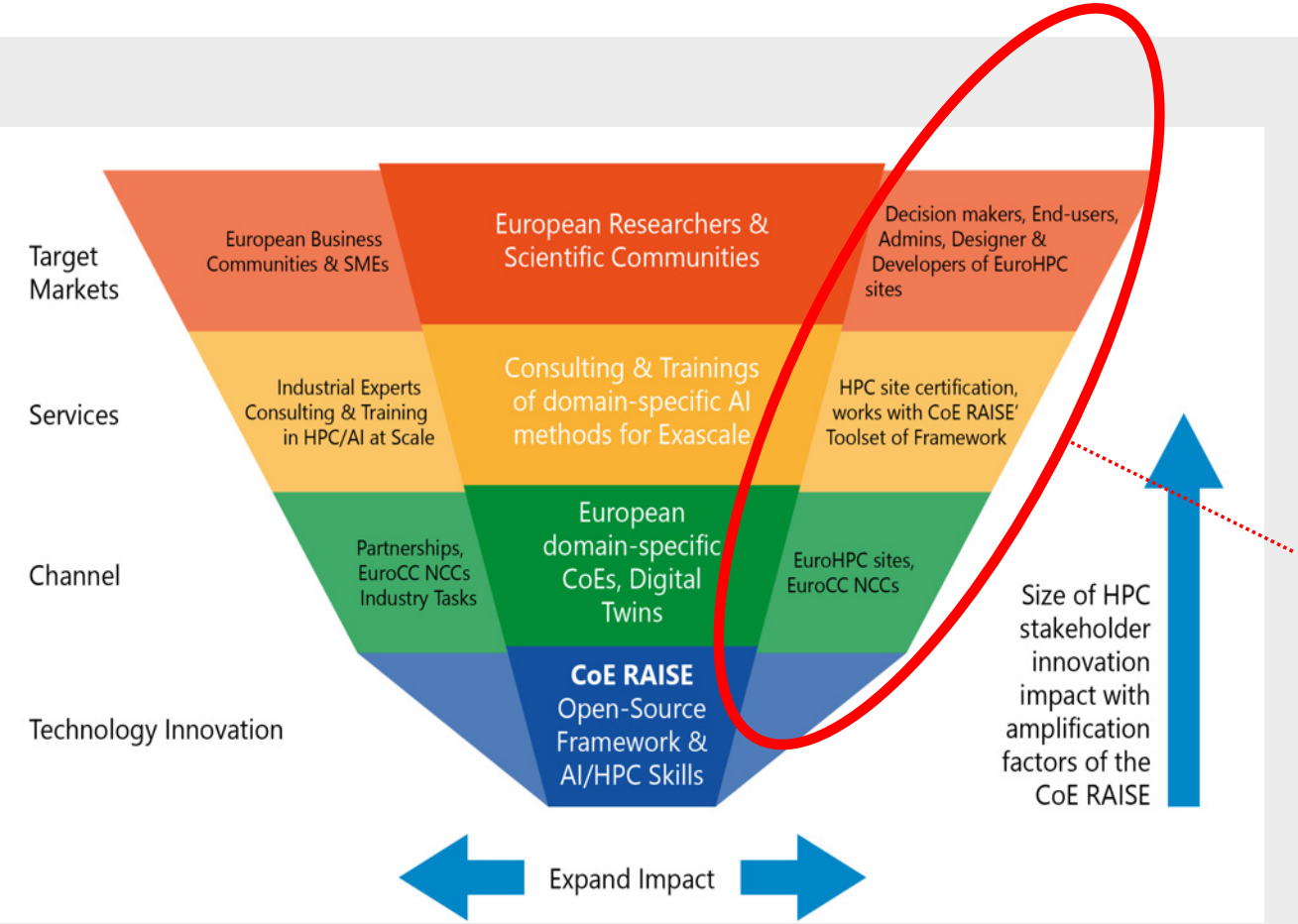






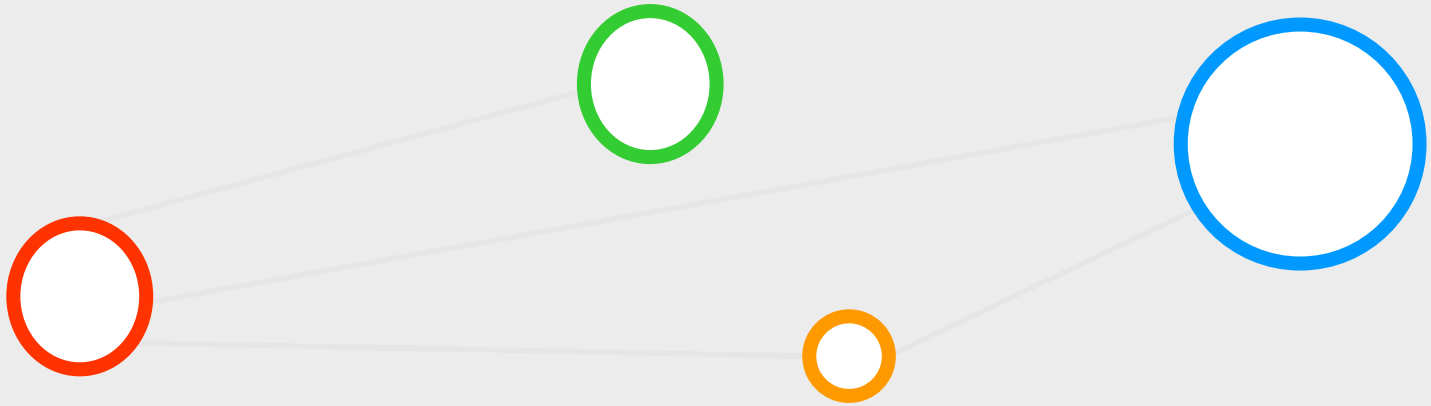
- Other project partner sites?
  - RTU system → Lauris
  - DEEP system → Morris
  - JUELICH Systems → Morris
  - LUMI → CERN?
- Vit Vondrak (IT4Innovation),
  - Tomas

Towards SW Framework Adoptions



- 1. Goal Project Sites
  - Talk to administrators of AI tools & technologies about framework
  - Assumption: many tools already deployed, but in different modules
- BSC
  - Contact received – Thanks!
- LUMI
  - Contact existing (2 PhDs work on LUMI already)
- RTU
  - Lauris is contact & forwards
- 2. Goal: Vega, Meluxina, Contacts?

Agenda Item (4) – M24 Deliverable Status



M24 Deliverable Timelines

From: Andreas Lintermann <A.Lintermann@fz-juelich.de>
Sent: Thursday, October 20, 2022 1:15 PM
To: Morris Riedel <m.riedel@fz-juelich.de>; Katrín Ólöf Egilsdóttir - HI <katrine@hi.is>; Lapeyre Corentin <corentin.lapeyre@cerfacs.fr>; Maria Girone <Maria.Girone@cern.ch>; Lammens Wouter <wouter.lammens@flandersmake.be>; Rose Gregorio <rose.gregorio@bsc.es>; Houzeaux Guillaume <guillaume.houzeaux@bsc.es>; Sarma Rakesh <r.sarma@fz-juelich.de>; Meinke Matthias <M.Meinke@aia.rwth-aachen.de>; Wiechol Monika <office@aia.rwth-aachen.de>; Eric Wulff <eric.wulff@cern.ch>; Hans-Christian Hoppe <hans-christian.hoppe@par-tec.com>; Ilmārs Slaidiņš <Ilmars.Slaidins@rtu.lv>; Bresser, Michael <m.bresser@fz-juelich.de>; leo.nicoletti@atos.net <leo.nicoletti@atos.net>; Matthias Book - HI <book@hi.is>; REMI DRUILHE <remi.druilhe@atos.net>; Albers Marian <M.Albers@aia.rwth-aachen.de>; RICHARD Stephane (SAFRAN HELICOPTER ENGINES) <stephane.richard@safrangroup.com>; Joan Farnos <joan.farnos@bsc.es>; Lintermann Andreas <A.Lintermann@fz-juelich.de>; Jennifer Lopez Barrilao <lopez@par-tec.com>; Schmitz Ina <schmitz@par-tec.com>; Speck Robert <r.speck@fz-juelich.de>; Göbbert Jens Henrik <j.goebbert@fz-juelich.de>; CASA <cristobal.samaniego@bsc.es>
Cc: FM-raise_pmt <raise_pmt@fz-juelich.de>
Subject: RAISE: Roadmap M24 Deliverables

Dear All,

Since we have been successful in delivering last year's Christmas deliverables on time, I would like to stick this year again to the same procedure such that everyone can go into the Christmas break without worries :)...

You are receiving this mail because you are either a responsible WP leader, a responsible deliverable author, or an internal reviewer for the upcoming M24 deliverables in December (see your responsibility in https://bscw.zam.kfa-juelich.de/bscw/bscw.cgi/d3287337/CoE%20RAISE_Deliverables_Status.xls - Note that there will be some updates to this document in the very near future!).

As we have 8 Deliverables coming up and with the Christmas holidays in mind, we would like to start with the preparation of the deliverables earlier. We are now looking at the following time schedule:

- 29.11.2022:
The author(s)upload(s)the Deliverable to the BSCW server to CoE RAISE / Reports and Deliverables / In progress / DX.Y. The author(s)inform(s)the WP leader the internal reviewer and the PMT about the uploaded document. The document name includes the term "Draft".

- 06.12.2022:
The internal reviewer returns the document with comments and suggestions in track-changes mode to the author(s). The reviewed document is placed into the same folder on the BSCW as the original document and the PMT and WP leaders are informed in addition to the author(s).

- 06.12.2022 - 14.12.2022:
Continuous exchange between the author(s) and the reviewer (the PMT can already be involved). When a final version is ready for the PMT to review, the author(s) uploads the revised Deliverable to the BSCW server and informs the WP leader, the internal reviewer, and the PMT. The PMT starts to review the Deliverable and keeps track of all changes.

- 14.12.2022:
The PMT uploads the commented version to the BSCW server and informs the author(s) and the WP leader.

- 14.12.2022 - 21.12.2022:
Continuous exchange between the author(s), the reviewer, and the author(s). At the end, all corrections requested by the PMT have been included and the document is uploaded to the BSCW server. The file name includes the term "Final".

- 21.12.2022 - 22.12.2022:
The PMT generates the final PDF.

- 23.12.2022:
The Coordinator submits the Deliverable to the EC and places the finally submitted version into the BSCW folder CoE RAISE / Reports and Deliverables / EC submitted.

M24 Deliverable Content Strategy WP3/WP4

Participants:
Maria Girone, Morris Riedel, Corentin Lapeyre, Rakesh Sarma, Andreas Lintermann

- D3.2 and D4.2
  - will have the same structure (template was sent around by Maria)
  - content per use case
    - current status incl. review of M12 achievements (to highlight the progress)
    - generalizable methods beneficial across use cases
    - results section specific to the use case results (with a reduced description of the AI/HPC methodologies)
    - plan for exascale execution
- D4.2 Tk 4.1
  - will link in the generalizable section to the general quantum methods to be described in D2.8
  - hyperparameter optimization will be mentioned but explained in WP2 deliverables

https://docs.google.com/document/d/15bo6dkj0AHpP7sy_XVmgacOFLuC359r_rGWOecbJlEA/edit?usp=sharing

M24 Deliverable Content Strategy WP2

Guillaume / Cristobal

D2.3 Report on porting & performance engineering

- Morris talks to Guillaume about the content
- Andi is on the contract for AVBP usage at FZJ (benchmarking hopefully to become a part of D2.3)
- Guillaume to report on successful compute-time applications (LUMI-Q, LUMI-G, other projects, PRACE, etc.)
- news from Alya and m-AIA (latter GPU porting activities?!): Alya porting and performance test on graviton3 (CPU configuration similar to the grace one which will be part of MN5).

Rakesh

D2.8 Benchmarking & support report

- reports on the general methods (QSVR, QSVM)
- will have a contribution from the RS use case
- will have a contribution from CERN

Morris — **Fabian?**

D2.15 Novel AI Methods Report (Update)

- similar to last year's deliverable
- will report on the AI technologies and update the AI matrix

Morris

D2.12 (due in M26) needs to be discussed later → SW Framework Update (M26)

https://docs.google.com/document/d/15bo6dkj0AHpP7sy_XVmgacOFLuC359r_rGWOecbJlEA/edit?usp=sharing

M24 Deliverable Status D2.3 → Guillaume/Cristobal

Guillaume / Cristobal	D2.3 - Morris talks to Guillaume about the content - Andi is on the contract for AVBP usage at FZJ (benchmarking hopefully to become a part of D2.3) - Guillaume to report on successful compute-time applications (LUMI-Q, LUMI-G, other projects, PRACE, etc.) - news from Alya and m-AIA (latter GPU porting activities?!): Alya porting and performance test on graviton3 (CPU configuration similar to the grace one which will be part of MN5).
Rakesh	D2.8 - reports on the general methods (QSVR, QSVM) - will have a contribution from the RS use case - will have a contribution from CERN
Morris	D2.15 - similar to last year's deliverable - will report on the AI technologies and update the AI matrix
Fabian?	
Morris	D2.12 (due in M26) needs to be discussed later

https://docs.google.com/document/d/15bo6dkj0AHpP7sy_XVmgacOFLuC359r_rGWOecbJlEA/edit?usp=sharing

M24 Deliverable Status D2.8 → Rakesh

Guillaume / Cristobal — D2.3

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Rakesh — D2.8

- reports on the general methods (QSVR, QSVM)
- will have a contribution from the RS use case
- will have a contribution from CERN

Morris — D2.15 — **Fabian?**

- similar to last year's deliverable
- will report on the AI technologies and update the AI matrix

Morris — D2.12 (due in M26) needs to be discussed later

https://docs.google.com/document/d/15bo6dkj0AHpP7sy_XVmgacOFLuC359r_rGWOecbJlEA/edit?usp=sharing

M24 Deliverable Status D2.15 → Morris

Guillaume / Cristobal — D2.3

- Morris talks to Guillaume about the content
- Andi is on the contract for AVBP usage at FZJ (benchmarking hopefully to become a part of D2.3)
- Guillaume to report on successful compute-time applications (LUMI-Q, LUMI-G, other projects, PRACE, etc.)
- news from Alya and m-AIA (latter GPU porting activities?!): Alya porting and performance test on graviton3 (CPU configuration similar to the grace one which will be part of MN5).

Rakesh — D2.8

- reports on the general methods (QSVR, QSVM)
- will have a contribution from the RS use case
- will have a contribution from CERN

Morris — D2.15 — **Fabian?**

- similar to last year's deliverable
- will report on the AI technologies and update the AI matrix

Morris — D2.12 (due in M26) needs to be discussed later

https://docs.google.com/document/d/15bo6dkj0AHpP7sy_XVmgacOFLuC359r_rGWOecbJlEA/edit?usp=sharing

M24 Deliverable Status D2.15 → Review History

(M12)
In D2.14 (Novel AI Methods Report), we reported the AI methods details of our HPC/AI matrix at M12.

(M18)
We then briefly described the updated matrix in D2.10 (Monitoring report) at M18.

(M24 - ~NOW)
For our coming deliverable D2.15 (Novel AI Methods Report Update), we will go into details of methods again for M24.

Use Case	AE	PINN	ANNs		CNN		NO	GNN		RNN		GAN	TF			SVM	RF
Details	CAE		ANN	RBF-ANN	U-Net	RES NET	FNO	MLPF	GAT	LSTM	GRU	WGAN	MViT	ViViT	Swin		
AI for turbulent boundary layers	X	X	X									X					
AI for wind farm layout optimization				X											X		
AI for data-driven models in reacting flows					X				X								
Smart models for next generation aircraft engine design					X				X								
AI for wetting hydrodynamics	X	X					X			X							
Event reconstruction and classification at the CERN HL-LHC use case								X									
Seismic imaging with remote sensing for energy applications	X	X					X	X			X	X				X	X	X
Defect-free metal additive manufacturing	X		X									X	X	X	X		
Sound Engineering	X		X														

M24 Deliverable Status D2.15 → Review Input Status

Maybe a thin deliverable

- Task 3.1 → Input received (new content)
- Task 3.2 → Reminder done
- Task 3.3/3.4 → Answer (no new content)
- Task 3.5 → Reminder done

- Task 4.1 → Answer (no new content)
- Task 4.2 → Reminder done
- Task 4.3 → Partly input received (new content)
- Task 4.4 → Input received (no new content)

Work on ClearML (FM) in D2.12 (M26)

Fabian Contents?
Adoption Task working with other projects
→ D2.15 NHR Coupler X
→ D2.8/D2.3 Inputs

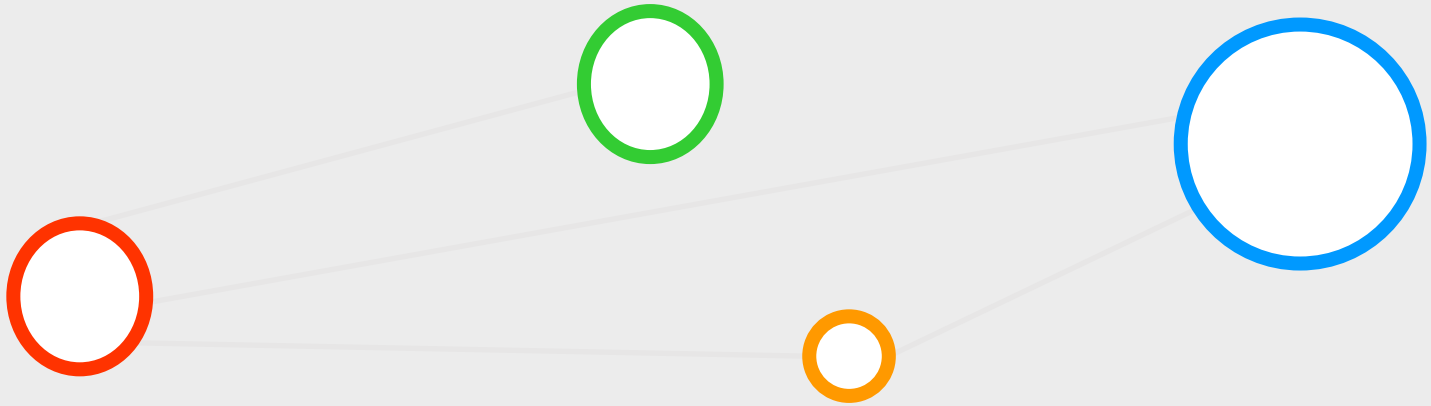
Use Case	AE	PINN	ANNs		CNN		NO	GNN		RNN		GAN	TF				SVM	RF
Details	*CAE*		*ANN*	*RBF-ANN*	*U-Net*	*RES NET*	*FNO*	*MLPF*	*GAT*	*LSTM*	*GRU*	*WGAN*	*MViT*	*ViViT*	*Swin*			
AI for turbulent boundary layers	X	X	X									X						
AI for wind farm layout optimization				X												X		
AI for data-driven models in reacting flows					X				X									
Smart models for next generation aircraft engine design					X				X									
AI for wetting hydrodynamics	X	X					X			X								
Event reconstruction and classification at the CERN HL-LHC use case								X										
Seismic imaging with remote sensing for energy applications	X	X				X	X			X	X					X	X	X
Detect-free metal additive manufacturing	X		X									X	X	X	X			
Sound Engineering	X		X															

Coupling CFD: X

NHR Use Case: X

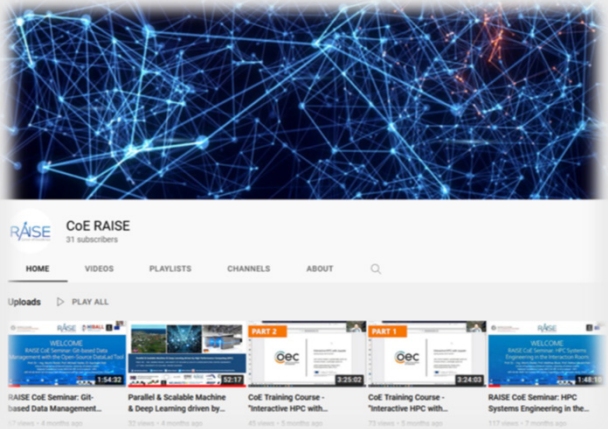
Covid Use Case: X

Agenda Item (5) – Status WP2 Training Plans



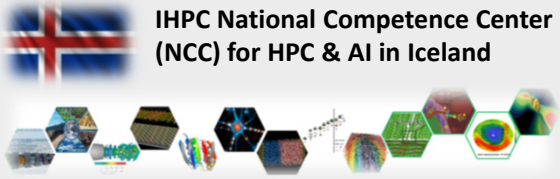
WP2 Monthly Trainings – Review & Plan

- Monthly WP2 Trainings
  - Co-organized with Icelandic National Competence Center (NCC) funded by the EuroCC project: http://ihpc.is
  - Performed since Quarter 2 of the project (April 2021)
  - Selected dates via agreement of availability of speakers
  - Used as major AI/HPC methods information/training for WP3/WP4
  - Contributed to outreach via YouTube Channel recordings: https://www.youtube.com/channel/UCAdIZ-v6cWwGdapwYxdN7dg
  - TBD(Katrín): Schedule the YouTube Training series with speakers & Update Training Plan



Plan for next months

- **Carry on with monthly WP2 trainings in the same style, but schedule on 3-4 month horizons**
- **Repeat certain trainings with advanced content and updates of activities**
- **Work better together with WP6 on releasing seminars on YouTube channel more regularly**
- **Collect slides of speakers and make them available on BSCW and/or on the RAISE Web Page**



IHPC National Competence Center (NCC) for HPC & AI in Iceland

WP2 Monthly Trainings – Review & Plan

WP2 Monthly Trainings – Review & Plan

December:
No Seminar

January:
RTU CUDA Seminar
(THANKS!)

February:
none

2022-03-31 14:00 GMT
Graph Neural Network
Morris: Intro GNNs (30 min)
Leo from Atos (45 min)
Eric from Cern (20 min)

TBD (all): Please suggest further training & teaching seminars for YouTube channel on our WP2 mailing list to plan better ahead

WP2 Monthly Trainings – Review & Plan

April:
Quantum Annealing
Maybe Gabriele Examles from SVMs, Amer SVR

May:
Using OpenML for sharing datasets, algorithms, and experiments

9th of June:
Morris: GPUs in general
Arnis & Cuda @ RTU

July:
none
(vacation period)

August:
SW Framework

September:
Transformer Models

TBD (all): Please suggest further training & teaching seminars for YouTube channel on our WP2 mailing list to plan better ahead

WP2 Monthly Trainings – Review & Plan

October:

LSTM & GRU in CFD

November:
Matlab – Parallel Toolbox? RTU HPC Machine?
Plus external speaker, Mathworks?

Alternative SVM lecture (UOI) + QSVM (FZJ)?

December:
Project Partners?

January:
Project Partners?

Shifted RTU Matlab (chadi) Training, etc.

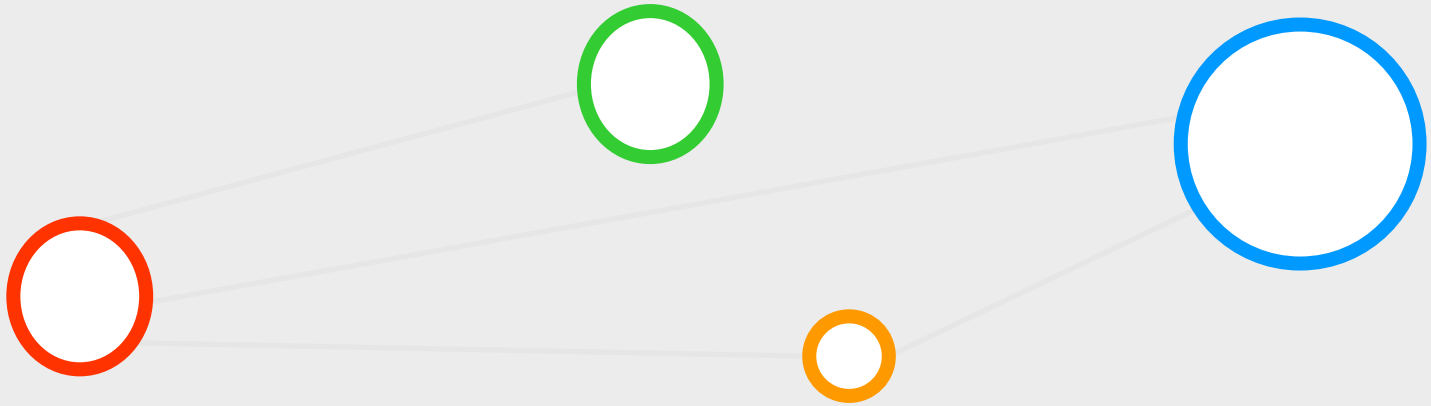
ATOS: affects of change in persons?

February:
EOSC – NI4OS-Europe or TREX Project (in scheduling) Request Project Partners? (continous integration ATOS)???
→ Katrin: check and schedule

March
Project Partners?

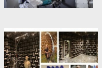
TBD (all): Please suggest further training & teaching seminars for YouTube channel on our WP2 mailing list to plan better ahead

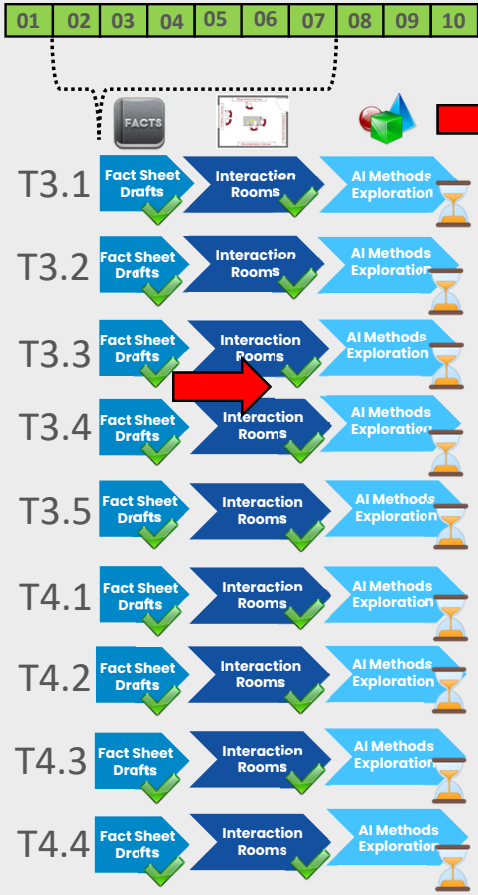
Agenda Item (6) – Compelling Scoreboard Review



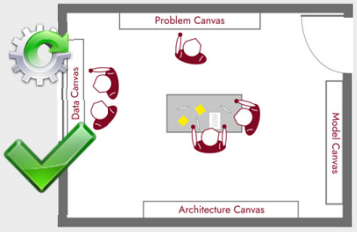
Compelling Scoreboard Review – Use Case Progress

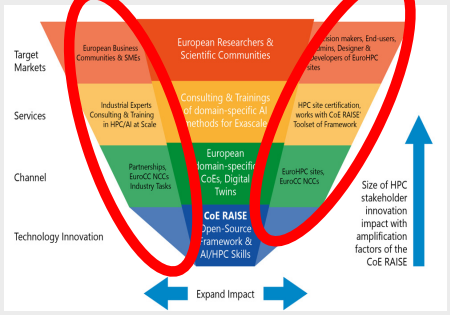
RAISE Center of Excellence





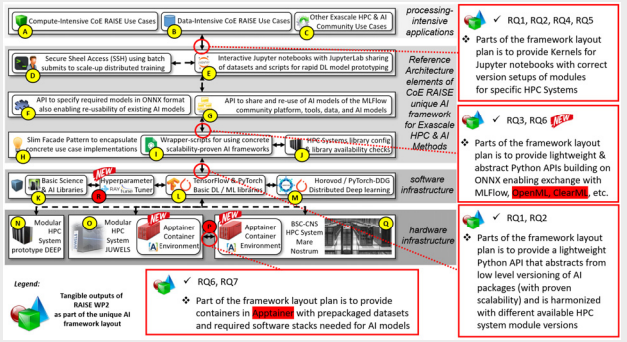
- Focus on the deliverable wave
- Realization of SW framework design started → initial collection in WP2 Wiki page RAISE (Jupyter notebooks, etc.)
- Adoption of SW Framework started: first friendly EuroHPC JU sites & project partners:
- Discuss WP4/WP4 Strategy to CoEs?



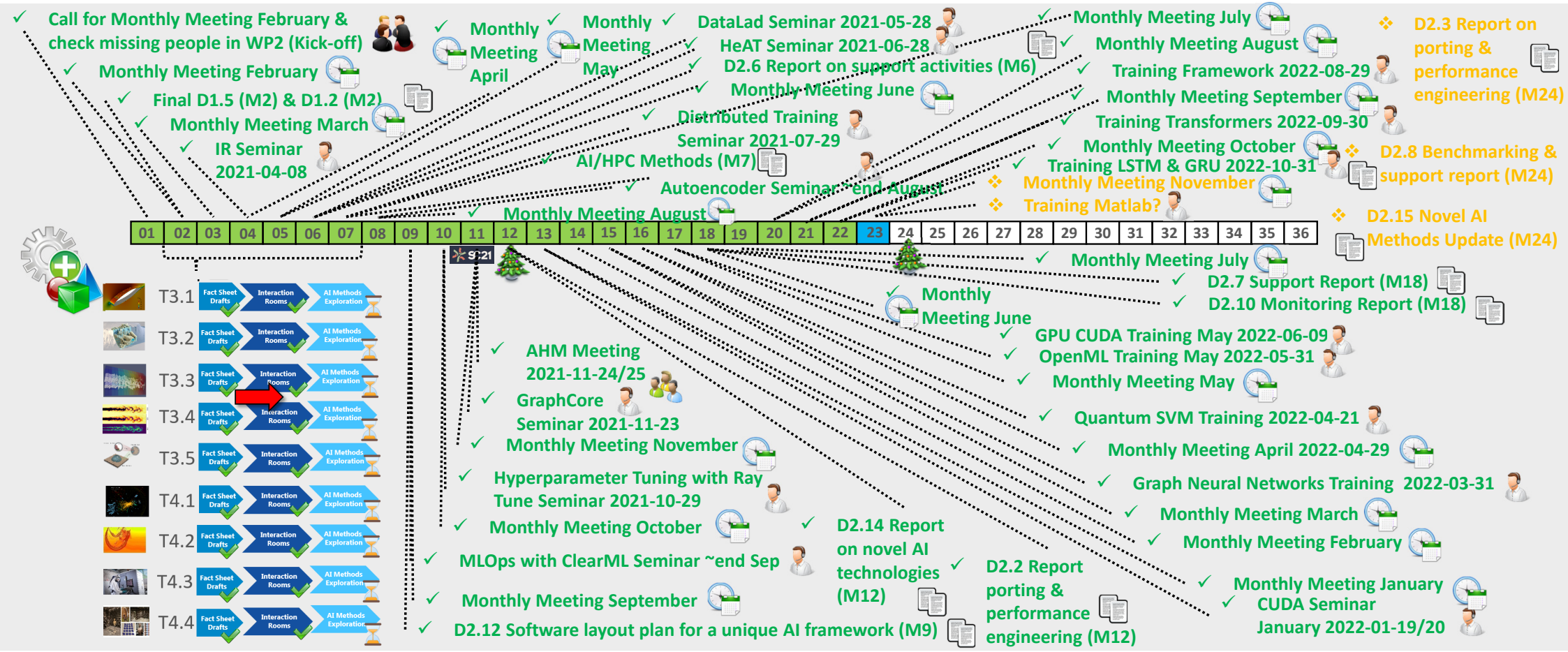


Meetings with administrators in next months to encourage adoption at EuroHPC JU Hosting Sites: LUMI, BSC, etc. → Prague meeting next (Katalina)

Use Case	AE	PINN	ANNs		CNN		NO	GNN		RNN		GAN	TF				SVM	RF
Details	*CAE*		*ANN*	*RBF-ANN*	*U-Net*	*RES NET*	*FNO*	*MLPF*	*GAT*	*LSTM*	*GRU*	*WGAN*	*MVIT*	*ViViT*	*Swin*			
AI for turbulent boundary layers	X	X	X									X						
AI for wind farm layout optimization				X												X		
AI for data-driven models in reacting flows					X				X									
Smart models for next generation aircraft engine design					X				X									
AI for wetting hydrodynamics	X	X					X			X								
Event reconstruction and classification at the CERN HL-LHC use case								X										
Seismic imaging with remote sensing for energy applications	X	X				X	X			X	X					X	X	X
Detect-free metal additive manufacturing	X		X									X	X	X	X			
Sound Engineering	X		X															



Compelling Scoreboard Review & Next Steps



Agenda Item (6) – Next Steps & Follow-Through

- Task 2.1
  - LUMI (get access via UICE), Puhuri access
  - Mare Nostrum (machine end of the year)
  - Contact identified for BSC:
  - BSC Backup Contact: Cristóbal Samaniego
  - Ahti Saar - Ahti.Saar@ut.ee - was the go-to person to create the access for Iceland LUMI project leaders (i.e. those that can create projects and grant access to users in Iceland etc).
  - (Ebba did contact him back in October 2021 to create such an access for Hannes and Henning)
  - We need a small justification why access is needed for CoE RAISE
  - Current trouble with getting no LUMI consortium member an access, work-in-progress
  - Status of LUMI access for BSC? Handled via CERN?
- Contacts to CoEs
  - CoEC
    - Combustion AI Training → Contact
    - JUELICH, BSC, RWTH (Heinz Pitch)
  - Excellerat2: one task with ML (BSC, KTH, OVGU)
    - In excellerat2, ML is for physical modeling while in CEEC it's on machine learning and physics-informed data analytics
  - CEEC (KTH)
    - CEEC: One task (UL, KTH, BSC, RWTH, CINECA, FhG)
  - HI
    - CoE CHEESE1+2

drive. enable. innovate.

RAISE Center of Excellence

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Research and Innovation Framework Programme
H2020-INFRAEDI-2019-1 under grant agreement no. 951733

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