

UNIVERSITY OF ICELAND SCHOOL OF ENGINEERING AND NATURAL SCIENCES

FACULTY OF INDUSTRIAL ENGINEERING, MECHANICAL ENGINEERING AND COMPUTER SCIENCE





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

Prof. Dr. – Ing. Morris Riedel et al. School of Engineering & Natural Sciences, University of Iceland 2021-09-30, RAISE WP2 Monthly Meeting September 2021, Online



@Morris Riedel 🛛 💽 @MorrisRiedel

@MorrisRiedel

https://www.youtube.com/channel/UCWC4VKHmL4NZgFfKoHtANKg

morris@hi.is

WP2 September Meeting – Welcome & Agenda

- 1. Approval of minutes from Monthly Meeting August 2021
 - ▶ (All), ~5 Min
- 2. Review WP2 Status on Interaction Rooms
 - > (Morris Riedel, Matthias Book, Helmut Neukirchen), ~10 Min
- 3. Debrief Milestone AI/HPC Methods (M7)
 - > (Morris Riedel), ~10 Min
- 4. Debrief Deliverable D2.12 Framework (M9)
 - Morris Riedel & Andreas Lintermann), ~20 Min
- 5. Resources & Deliverable D2.2 (M12)
 - (Guillaume, Guillermo, Cristóbal), ~5 Min
- 6. Compelling Scoreboard Review & Next Steps
 > (All), ~10 Min





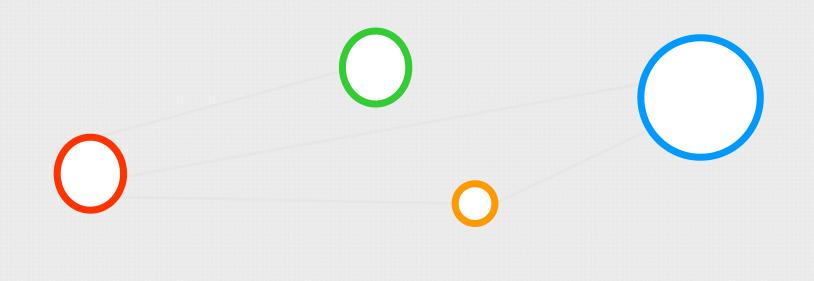






Agenda Item (1) – Minutes Approval – Meeting August 2021







Minutes Approval – Monthly Meeting August 2021

Minutes available in BSCW

https://bscw.zam.kfa-juelich.de/bscw/bscw.cgi/3704758

> TBD(all): Any objections or additions/changes?

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Recent searches * Search or filter results	Due date ~ 4h
8 - Create Fact Sheet Task 4.4 Sound Engineering r21 - created 3 minutes ago by Morris Riedel 🔞 WP2 Fact Sheet Collection Completed 😬 Apr 30, 2021	updated just now
i - Create Fact Sheet Task 4.2 Seismic Imaging 20 - created 8 minutes ago by Morris Riedel 🔇 WP2 Fact Sheet Collection Completed 🗎 Apr 30, 2021	🤨 🛱 i updated just now
- Create Fact Sheet Task 4.3 Manufacturing 18 - created 1 month ago by Morris Riedel 🔘 WP2 Fact Sheet Collection Completed 🛗 Apr 30, 2021	no 😰 🛱 updated just now
- Create Fact Sheet Task 3.1 Turbulent Flow 17 - created 1 month ago by Morris Riedel 🔇 WP2 Fact Sheet Collection Completed 🗎 Apr 30, 2021	updated 16 minutes ago
- Créate Fact Sheet Task 4.1 Fundamental Physics 16 - created 1 month ago by Morris Riedel 🔇 WP2 Fact Sheet Collection Completed 🗎 Apr 30, 2021	updated 2 weeks ago
- Create Fact Sheet Task 3.2 Clean Energy 14 - created 1 month ago by Morris Riedel 🕲 WP2 Fact Sheet Collection Completed 🗎 Apr 30, 2021	updated 15 minutes ago
- Create Fact Sheet Task 3.5 Coating 13 - created 1 month ago by Morris Riedel 🔇 WP2 Fact Sheet Collection Completed 🛗 Apr 30, 2021	no 😰 🛱 updated just now
- Used Doodle for WP2 Monthly Meeting April 2021 Date & Time 12 - created 1 month ago by Morris Riedel 🔕 WP2 Monthly Meeting - April 2021 🛗 Apr 30, 2021	updated 14 minutes ago
- Create Fact Sheet Task 3.3 Reacting Flows & Task 3.4 Engine Design 11 - created 1 month ago by Morris Riedel 🔞 WP2 Fact Sheet Collection Completed 🗎 Apr 30, 2021	updated 12 minutes ago
- Used Doodle for WP2 Monthly Meeting May 2021 Date & Time 19 - created 11 minutes ago by Morris Riedel 🗿 WP2 Monthly Meeting - May 2021 🛗 May 31, 2021	updated 11 minutes age
- Create WP2 Expertise Matrix Draft and Circulate for WP2 Review 7 - created 2 months ago by Morris Riedel 🔕 WP2 Expertise Matrix Exists 🛗 May 31, 2021	updated 15 minutes ago

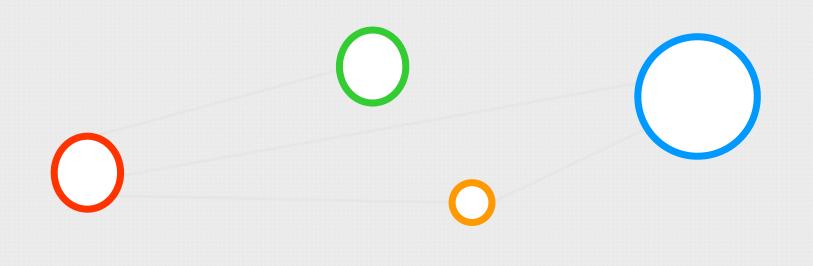
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-	2021_06_29CoE-RAISE-WP2_CPU_Lintermann.pptx	-	1.1 M	andlin	+	2021-06-30 08:20	教
	2021_06_29CoE-RAISE-WP2_Dataprojects_Lintermann.pptx	-	1.3 M	andlin	+	2021-06-30 08:20	教
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e	2021_07_22_Monthly_Meeting July 2021	-	3	M.Riedel		2021-08-07 17:42	
	Slides & Materials from meeting 2021-07-22						
	2021_07_22_CoE-RAISE-WP2-Monthly-Meeting-Riedel-v1.pdf	~	8.9 M	M.Riedel	→	2021-07-23 10:45	妆
	2021_07_22_CoE-RAISE-WP2-Monthly-Meeting-Riedel-v1.pptx	-	8.8 M	M.Riedel	+	2021-07-23 10:46	教
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	2021_08_30_CoE-RAISE-WP2-Monthly-Meeting-Riedel-v1.pptx	-	8.1 M	M.Riedel	+	2021-09-30 08:16	教
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	Slides & Materials from Meeting 2021-09-30						





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

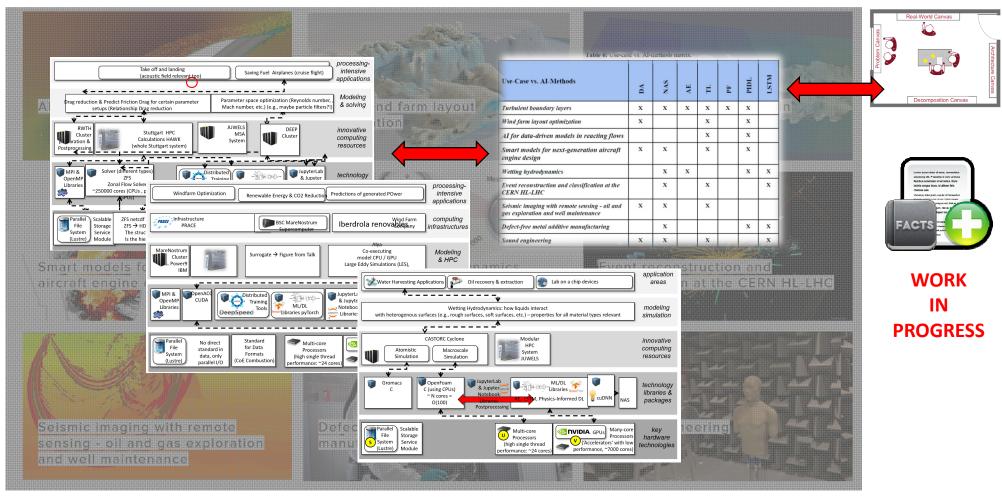






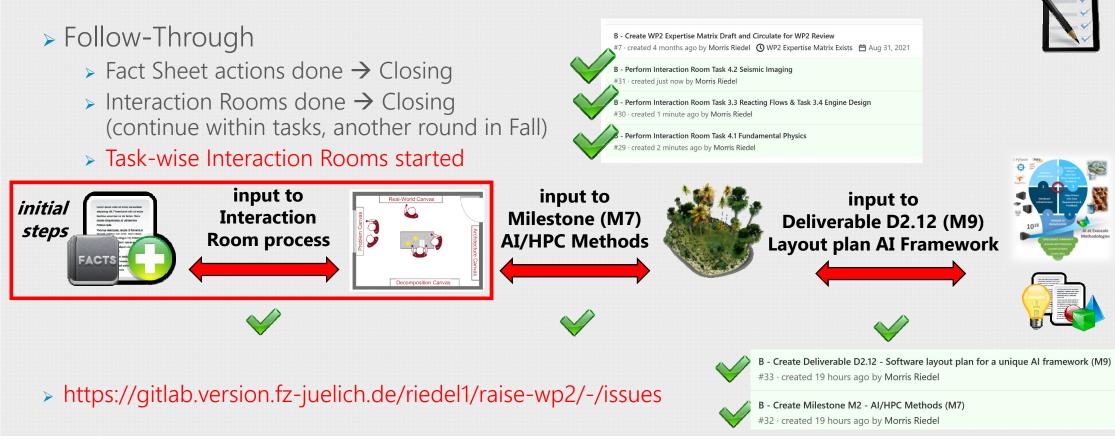
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WP2 Updates – Action Item Fact Sheets (refinement started)





RÁSE



WP2 Updates – Action Items Tracker & Status Updates



Interaction Room Status & Discussions – WP3/WP4 Overview

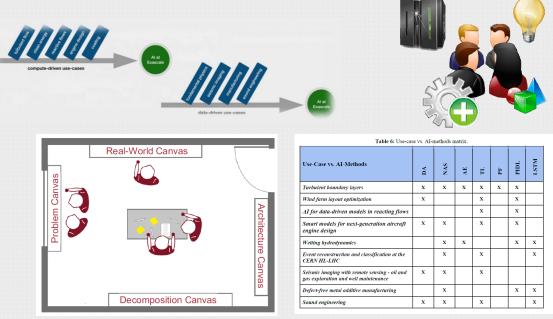


► WP3

- > T3.1: Turbulent Flow (started)
- > T3.2: Clean Energy (started)
- > T3.3: Reactive Flows (started)
- > T3.4: Engine design (started)
- > T3.5: Coating (started)

> WP4

- > T4.1: Fundamental physics (started)
- > T4.2: Seismic imaging (started)
- > T4.3: Manufacturing (started)
- > T4.4: Sound engineering (started)



- Continuing Steps
 - Carve out more details on AI/HPC methods
 - Identify concrete detailed algorithms
 - Evaluate and benchmark scalability of methods





Interaction Rooms via MURAL Boards & Milestone Inputs

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			🗌 💼 🛛 🕀 Actions & Scoreboard	
			Follow-through & Compelling Score	eboar
			🗌 💼 🛛 🕀 Fact Sheets	
			Fact Sheets & Materials	
			🔲 💼 🛛 🕂 Interaction Rooms	
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			IR3.1 Turbulent Flow: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621377866397	1/8613c384
			IR3.2 Clean Energy: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621377887905/c	b44cca3ee
			IR3.3 Reactive Flows: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621377959022/	/0c363886
			IR3.4 Engine Design: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621377976343/	8d7aba6be
			IR3.5 Coating: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621377991014/7a5d7e	1eaf23017
			IR4.1 Fundamental Physics: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/16213780	
			IR4.2 Seismic Imaging: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/162137802383	
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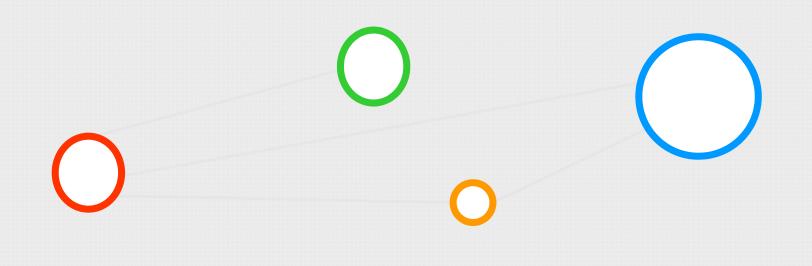
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> TBD(all): Do people use the MURAL boards (e.g., Task 3.4 is pretty empty but with Task 3.3)? https://bscw.zam.kfa-juelich.de/bscw/bscw.cgi/3591551



Agenda Item (3) – Debrief Milestone AI/HPC Methods (M7)









Achieved Milestone MS₂ AI/HPC Methods (M7)



ilestones						
Number 🔺	Name	Lead Beneficiary	Delivery Date (Annex I)	Achieved	Delivery Date (actual)	Comments
1	Project kick-off	FZJ	31 Jan 2021		22 Jan 2021	The kick-off took place online via video conference with >40 participants coming from all partners, linked third- parties and third-parties. The kick-off included a keynote
2	AI/HPC methods	UOI	31 Jul 2021	۵	31 Jul 2021	The software engineering process driven by WP2 in collaboration with all WP3/WP4 use cases started with the development of Use Case Fact Sheets. This was
3	Training courses	BSC	30 Apr 2022			
4	Use-cases / technical developments	UOI	31 Dec 2022			
5	Business plan	FLANDERS MAKE	30 Jun 2023			
6	All final reports	FZJ	31 Dec 2023			

> Discussions with PMO

- Should be not a formal report (not too long, not too short)
- > Optional document (not required to send to EC)
- Links to MURAL Boards included
- Summarizes findings of MURAL Board discussions (w.r.t. Model/Data/Architecture Canvas)
- > Refining our initial Matrix of Methods & identify common methods
- Means of Verification ('practical use' in use cases): 'First set of AI and HPC methods is ready to be used in the use-cases'

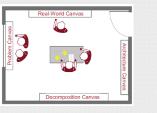
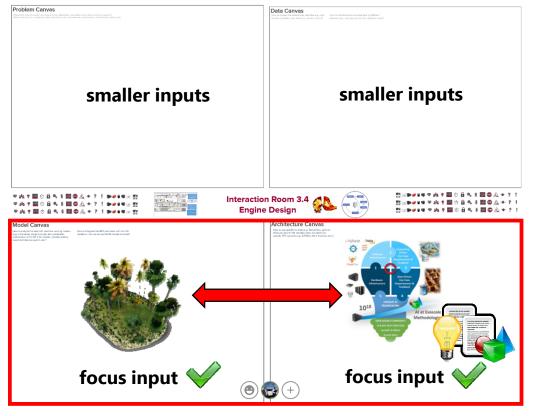


Table 6: Use-cas	e vs. Al-	methods n	natrix.				_
Use-Case vs. AI-Methods	νq	SVN	AE	Ë	ЪF	PIDL	ILSTM
Turbulent boundary layers	х	х	х	х	х	х	
Wind farm layout optimization	х			х		x	
AI for data-driven models in reacting flows				х		х	
Smart models for next-generation aircraft engine design	x	x		X		X	
Wetting hydrodynamics		х	х			х	х
Event reconstruction and classification at the CERN HL-LHC		x		x			x
Seismic imaging with remote sensing - oil and gas exploration and well maintenance	x	x		x			
Defect-free metal additive manufacturing		x				х	х
Sound engineering	х	х		х			х



Interaction Rooms via MURAL Boards & Milestone / Deliverable RÁSE







IR Mural Links

 IR3.1 Turbulent Flow: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621377866397/8613c384d54f66fb5c78599ff307a4ce8a9090c0?sender=u15e3008bb41d6628a5bb5701

 IR3.2 Clean Energy: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621377887905/cb44cca3eedd3bb9964fbfa36af16b1bfcee085f?sender=u15e3008bb41d6628a5bb5701

 IR3.3 Reactive Flows: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621377959022/0c363886f24833eeb19b025d87324b57(d50e2db?sender=u15e3008bb41d6628a5bb5701

 IR3.4 Engine Design: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621377976343/8d7aba6be09af3b2ftd305d2f709c53661ac889d?sender=u15e3008bb41d6628a5bb5701

 IR3.4 Engine Design: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621377991014/7a5d7e1eaf230178342d1e1d4a84d656d9055d522sender=u15e3008bb41d6628a5bb5701

 IR4.1 Fundamental Physics: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621377802353/6f0d5285fcaec5eafa515bd667c84d8b4879d39/sender=u15e3008bb41d6628a5bb5701

 IR4.2 Seismic Imaging: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621378007555/6f0d5285fcaec5eafa515bd67c84d8b4879d39/sender=u15e3008bb41d6628a5bb5701

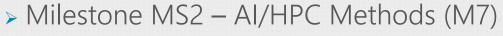
 IR4.3 Manufacturing: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/1621378038069/93db6ñ7a41093/teaac7be9d72979de2ba42b9d?sender=u15e3008bb41d6628a5bb5701

 IR4.4 Sound Engineering: https://app.mural.co/t/matthiasbook8855/m/matthiasbook8855/162137805431/b5fa1221900244059f90a4bb6101fa379a8503?sender=u15e3008bb41d6628a5bb5701

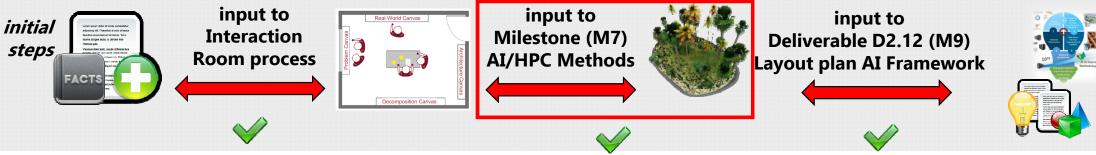
https://bscw.zam.kfa-juelich.de/bscw/bscw.cgi/3591551



WP2 Updates – Location Milestone MS2 AI/HPC Methods (M7)



- Format and Template clarified with PMO: <u>https://bscw.zam.kfa-juelich.de/bscw/bscw.cgi/d3657643/CoE%20RAISE_MS_Template.docx</u>
- > Not an official document, maybe only useful in the review;
- > Summary (1/4 page) provided as comment in EU portal by clicking the checkbox for MS2
- > Google Document to keep it as a living document with important updates from Mural over time
- > TBD: Snapshot at end of August for archiving via Word document as MS2 document (optional)
- Location (shared for everyone to edit): <u>https://docs.google.com/document/d/1Az88KP9Z4USFA5hPMnqRhCE_8I9IzxnnvsYIhE2UXzc/edit?usp=sharing</u>







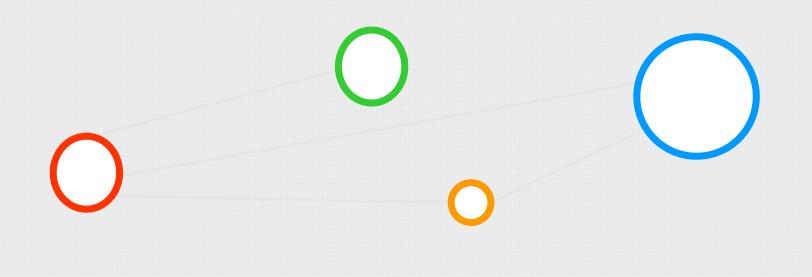
Google Doc Milestone AI/HPC Methods (M7) – Living Document RASE

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								CoE RAISE	Al for wind farm layout optimization			х				x	х	Х				
							Center of Excellence "Research on Al- and	Al for data-driven models in reacting flows				х						Х				
BEFORE Simulation-F			Simulation-Based Engineering at Exascale" Grant Agreement Number: 951733	Smart models for next generation aircraft engine design				х						х								
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Smart models for next-generation aircraft engine design	x	x		x		x			Seismic imaging with remote	Х				х								
Wetting hydrodynamics		x	х			x	x		sensing for energy applications													
Event reconstruction and classification at the CERN HL-LHC	x	x		x			x		Detect-free metal additive manufacturing	х				х								
Seismic imaging with remote sensing - oil and gas exploration and well maintenance	x	x		x																		──
Defect-free metal additive manufacturing		x				x	x		Sound Engineering												X	Х
Sound engineering	х	x		х			x									1						1



Agenda Item (4) – Debrief Deliverable D2.12 (M9)



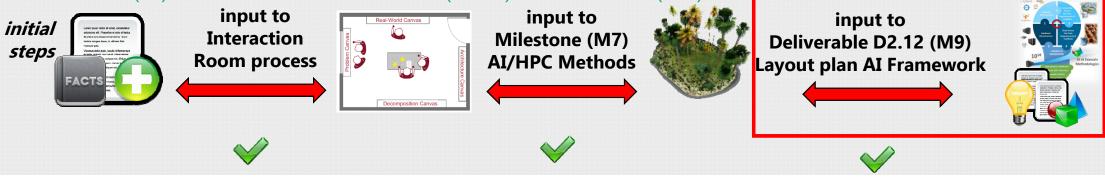




Debrief Deliverable D2.12 Framework (M9)

> Deliverable D2.12 - Software layout plan for a unique AI framework

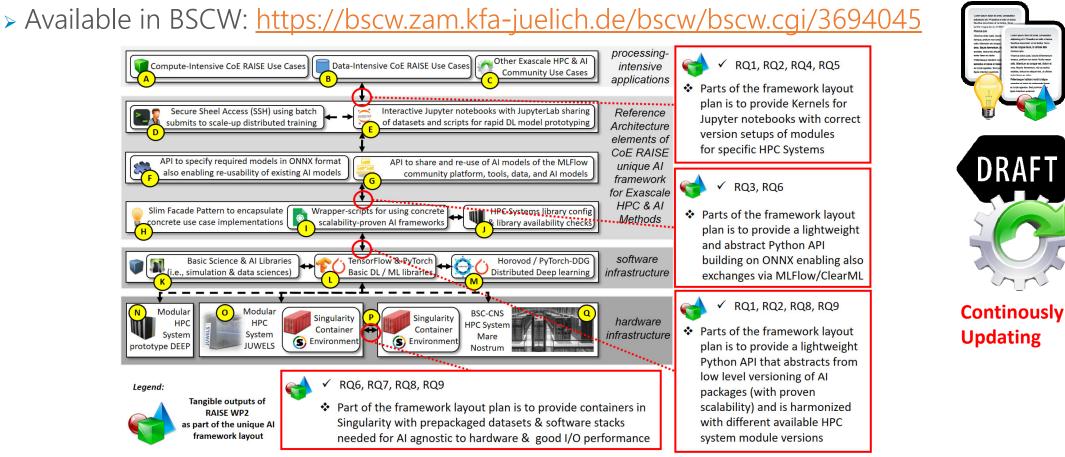
- > Initial ideas around a comprehensive set of tools, also consider OpenML.org work
- > Challenge: massive toolsets available (e.g., distributed training tools via GPUs are ~10, etc.)
- > No need to re-invent the wheel, consider ONNX and other interoperable ML model formats
- Library: Google document as initial start to collectively better work on it, interface (Matthias?, OpenML?), Meta-API library ideas: how can I link and integrate it, import coe_raise_lib, etc.?
- > Initial version in the word document as official document D2.12, but will be updated over time
- > TBD(all): Discussions between Gael (ATOS) and Matthias (Uol)





Debrief Deliverable D2.12 Framework (M9) – Initial Blueprint







Changed Time Schedule for M12/December Deliverables (1)

> TBD(all): check your involvement for producing & reviewing

<u>https://bscw.zam.kfa-</u>

juelich.de/bscw/bscw.cgi/d3287337/CoE%20RAISE Deliverables Status.xls

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:

- 29.11.2021:

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".

- 06.12.2021:

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).

- 06.12.2021 - 14.12.2021:

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.

- 14.12.2021:

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

- 14.12.2021 - 21.12.2021:

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".

- 21.12.2021 - 22.12.2021:

The PMT generates the final PDF.

- 23.12.2021:

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.



2021-09-30 RAISE WP2 Monthly Meeting September 2021





Changed Time Schedule for M12/December Deliverables (2)



TBD(Guillaume, Morris): Start preparing D2.2 & D2.14 directly after the call
 TBD(all): note that WP2 members are also involved in WP3/WP4 use cases

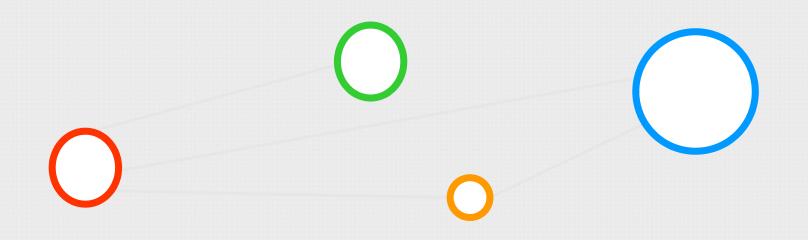
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S	

X	D2.2	Report on porting & performance engineering	BSC	R	PU 12	M. Riedel/ UOI	G. Houzeaux/ BSC	M. Meinke/ RWTH	A. Lintermann/ FZJ	29.11.2021	31.12.2021
X	D2.14	Report on novel Al technologies	UOI	R	CO 12	M. Riedel/ UOI	M. Riedel/ UOI	S. Kesselheim/ FZJ	J.Lopez/ ParTec	29.11.2021	31.12.2021
1	D3.1	Report on outcomes of WP3 use-cases	RWTH	R	CO 12	W. Schröder/ RWTH	M. Meinke/ RWTH	S. Schlimpert/ FM	J.Lopez/ ParTec	29.11.2021	31.12.2021
	D4.1	Report on outcomes of WP4 use-cases	CERN	R	CO 12	M.Girone/ CERN	V. Khristenko/ CERN	H. Neukirchen/ UOI	I. Schmitz/ ParTec	29.11.2021	31.12.2021
	D5.4	IP document and services	FZJ	R	CO 12	K. De Grave/ FM	M. Himmelsbach/	I. Slaidins/ RTU	A. Lintermann/	29.11.2021	31.12.2021
							ParTec		FZJ	20.11.2021	01.12.2021
	D6.2	Educational portfolio document	RTU	R	PU 12	R. Gregorio/ BSC		V. Harmandaris/ CYI		29.11.2021	31.12.2021
	D6.2 D6.9	Educational portfolio document Visual identity		R DEC		R. Gregorio/ BSC R. Gregorio/ BSC	I. Slaidins/ RTU	V. Harmandaris/ CYI G. Exilard/ SAFRAN			



Agenda Item (5) – Resources & Deliverable D2.2 (M12)







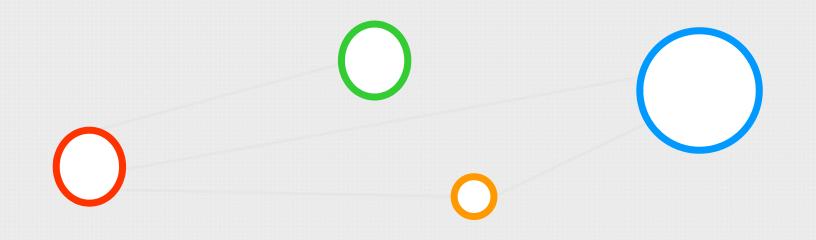
Agenda Item (5) – Resources & Deliverable D2.2 (M12)

> (Guillaume, Guillermo, Cristóbal), ~5 Min





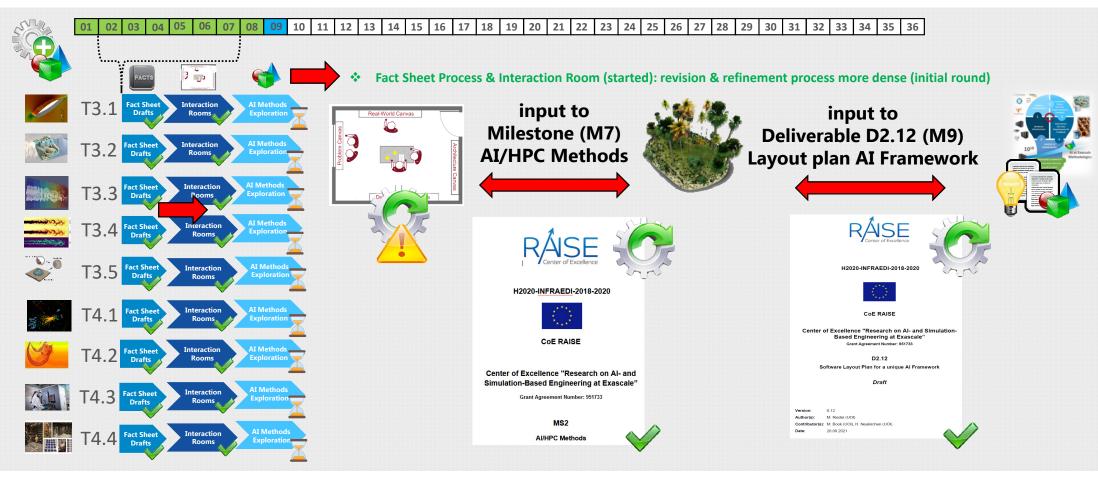
Agenda Item (6) – Compelling Scoreboard Review & Next Steps RASE





Compelling Scoreboard Review – Use Case Progress

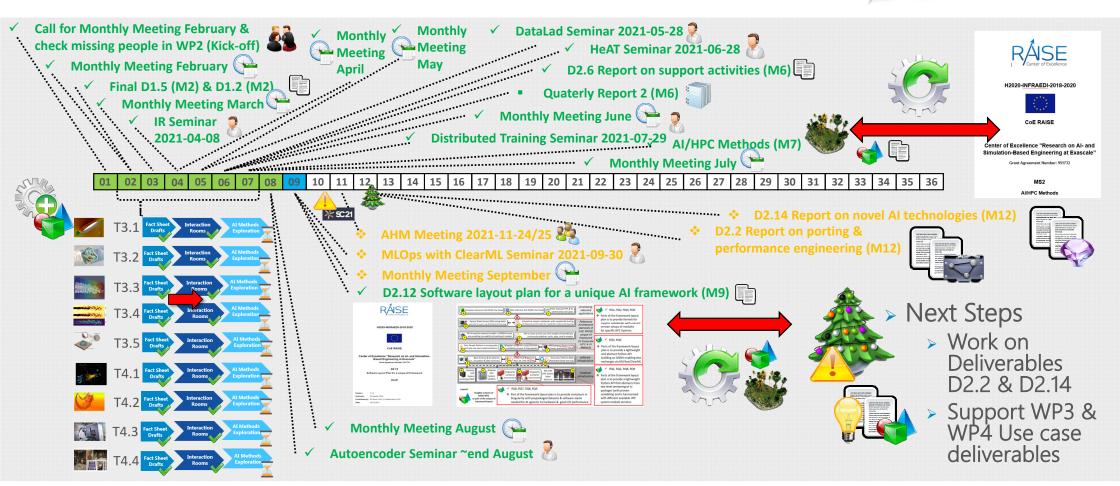






Compelling Scoreboard Review & Next Steps







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

- 1. AOB: All-Hands Meeting
 - 1. Once initial version of software layout plan is ready, maybe in Fall 2021, we present across all use cases the Milestone and Deliverable contents and new ideas and revise
 - 2. TBD(Andi): AHM Meeting
- 2. AOB: Seminar on OpenML & Interopable Formats
 - 1. TBD (Morris): Andi made contact and we have to follow-up on a date, probably later in the year
- 3. AOB: September/October Seminar with Graphcore maybe?
 - 1. TBD(Gael, Andi): Check benchmarking, etc.
 - 2. Future of HPC miletone document w.r.t. scaling: meeting
 - 3. U-Net benchmark data from CERFACS on real use case data
 - 4. ATOS has a machine: NVIDIA A100 vs. GraphCore (another project)
 - 5. Andi: access might be possible with a driving use case
- 4. AOB: Data transfers RTU, JSC, BSC?
 - 1. TBD(Lauris, Andi): check status
- 5. AOB: Data Project
 - 1. Data project was accepted (200 TB) \rightarrow also open data is provided there



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