UNIVERSITY OF ICELAND
SCHOOL OF ENGINEERING AND NATURAL SCIENCES
FACULTY OF INDUSTRIAL ENGINEERING,
MECHANICAL ENGINEERING AND COMPUTER SCIENCE

RAISE Center of Excellence

EURO

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

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

2021-02-11, RAISE WP2 Monthly Meeting February 2021, Online

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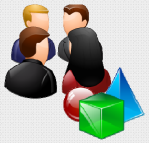
https://www.youtube.com/channel/UCWC4VKHmL4NZgFfKoHtANKg morris@hi.is

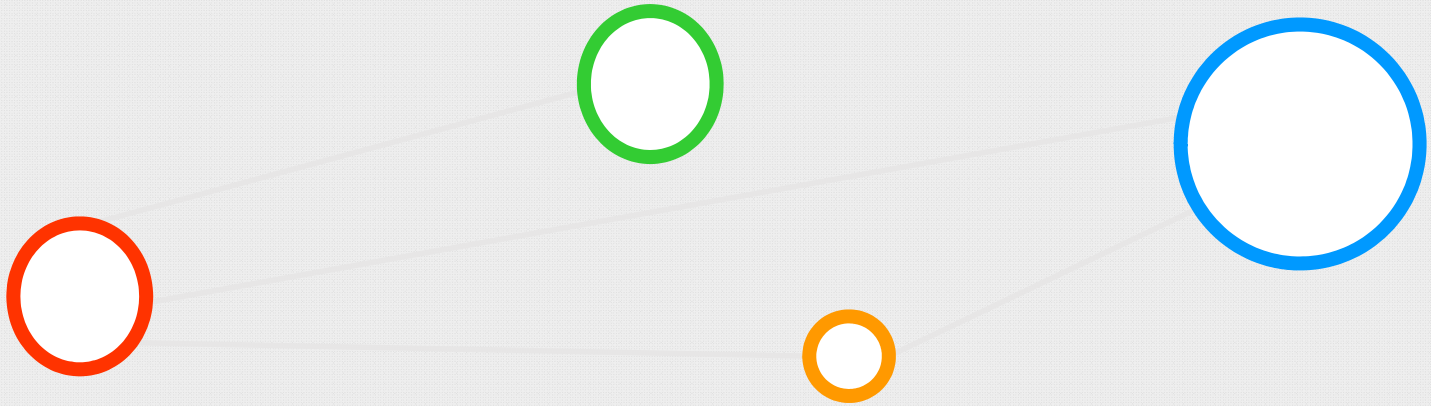
WP2 February Meeting – Welcome & Agenda

RAISE Center of Excellence

1. WP2 Short Overview
   - (Morris Riedel), ~15 Min
2. Get to know WP2 people & Clarify missing contacts of WP2 people
   - (All), ~15 Min
3. Deliverables Month 2, Progress overview & status of documents
   - (Guillaume Houzeaux & Andreas Lintermann), ~10 Min
4. WP2 Next Steps Appetizer: Software layout plan for a unique AI framework
   - Short Introduction to the Interaction Room (Matthias Book), ~10 Min
5. Next Monthly Meeting March & AOB
   - Doodle & Discussions, ~10 Min



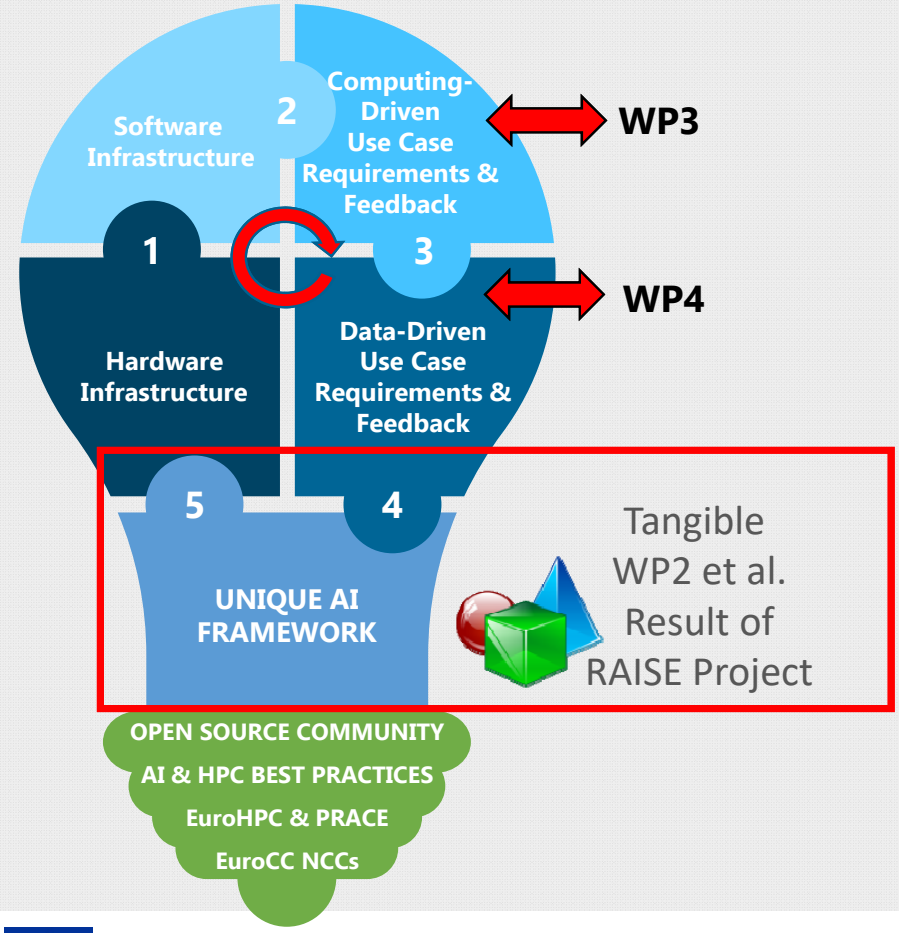
Agenda Item (1) - WP2 Short Overview



Agenda Item (1) - WP2 Short Overview

1. Brief Introduction to WP2
   - Recap from Kick-Off Objectives & Interworking with WP3 & WP4
   - Objectives, Tasks & Deliverables Timeline
2. Organizational Aspects
   - Monthly Meetings
   - Document Store
   - Mailing List check
   - Role of Fact Sheets
   - Role of Interaction Room Meetings, etc.
3. Q&A Session
   - Questions from the participants

WP2 Objectives – 'AI & HPC at Exascale backbone'



Hardware Infrastructure

Prepare & Document available production systems at partners' HPC centers

Examples: JUWELS (JUELICH), LUMI (UoICELAND), DEEP Modular Prototypes, JUNIQ (JUELICH), etc.

Software Infrastructure

Prepare & Document available open source tools & libraries for HPC & AI useful for implementing use cases

Examples: DeepSpeed and/or Horovod for interconnecting N GPUs for a scalable deep learning jobs

Computing-driven Use Cases Requirements & Feedback (→ WP3)

Use cases with emphasize on computing bring in co-design information about AI framework & hardware

Examples: Use feedback that TensorFlow does not work nicely, so WP2 works with use cases on pyTorch

Data-driven Use Cases Requirements & Feedback (→ WP4)

Use cases with emphasize on data bring in co-design information about AI framework & hardware

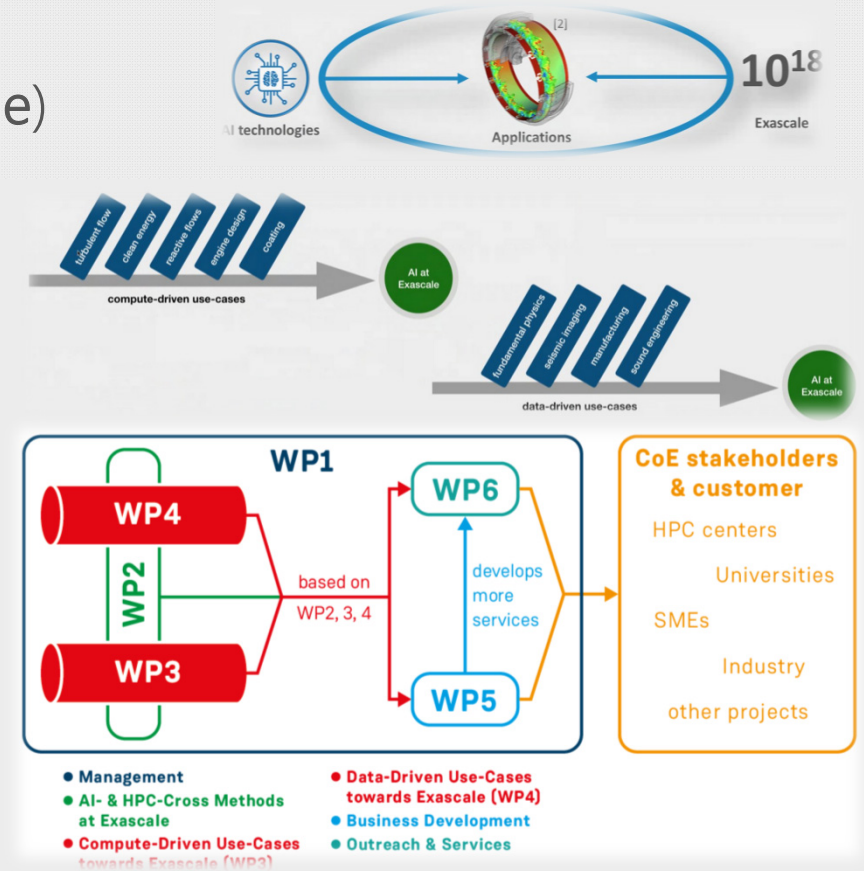
Examples: Deployment blueprint by using AI training on cluster module & inference/testing on booster

UNIQUE AI FRAMEWORK

Living design document & software framework blueprint for using HPC & AI offering also pretrained AI models

WP2 & Connections to other WPs – 'WP2 in a nutshell'

- WP3 (Compute-Driven Use-Cases towards Exascale)
- WP4 (Data-Driven Use-Cases towards Exascale
- Developments in these WPs will be supported by the cross-linking activities of WP2
  - E.g. scaling machine & deep learning codes with frameworks like Horovod/Deepspeed
  - E.g. introduction to new AI methods such as Long-Short Term Memory (Time series)
  - E.g. data augmentation approaches
  - E.g. benchmarking HPC machines and offer also pre-trained AI algorithms (i.e., transfer learning)
  - E.g. offer neural architecture search methods for hyperparameter – tuning in semi-automatic way



WP2 Tasks

Task 2.4 Software design of a unique AI framework plan (M1-M36)

Preparing AI Design Plan 1

Preparing AI Design Plan 2

Preparing AI Design Plan 3

Revising the project plan

Revising the AI design plan 1

Revising the AI design plan 2

Revising the AI design plan 3

Task 2.5 Cross-Sectional AI Methods (M3-M36)

Task 2.2 Hardware prototypes (M1-M18)

Task 2.3 Benchmarking on disruptive technologies (M19-M36)

Task 2.1 Modular and heterogeneous supercomputing architectures (M1-M36)

UNIQUE AI FRAMEWORK

SOFTWARE INFRASTRUCTURE

WP3 & WP4 INTERACTIONS

HARDWARE INFRASTRUCTURE

TIME

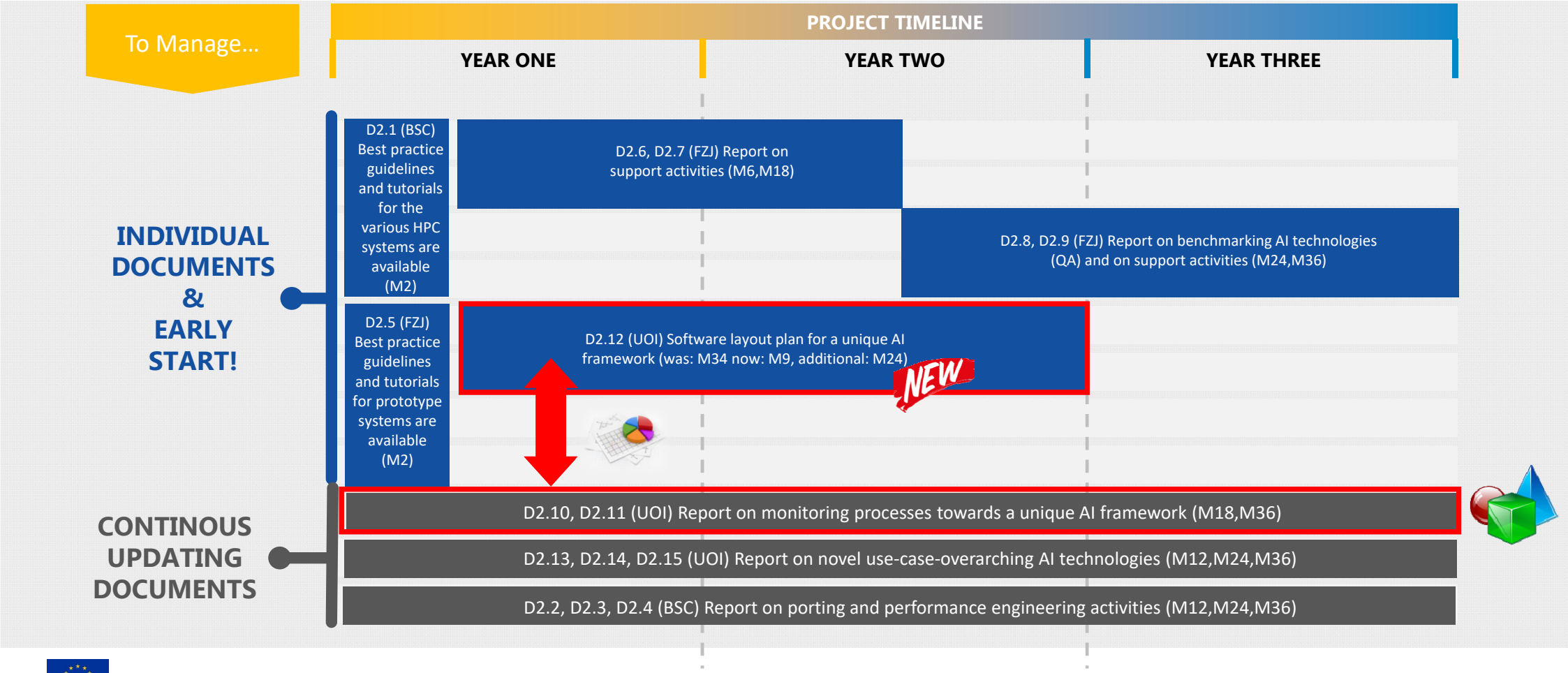
PRE KICK-OFF STAGE

YEAR 1

YEAR 2

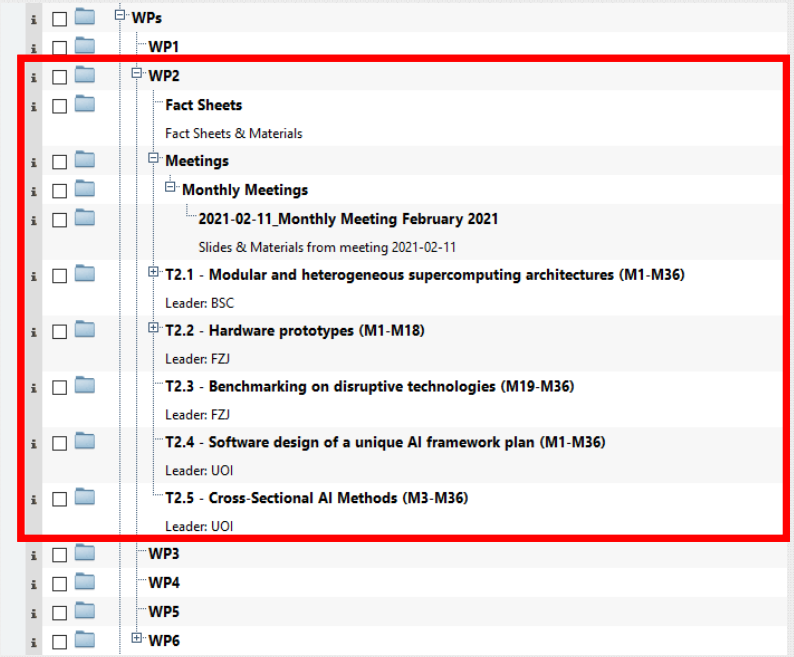
YEAR 3

WP2 Work on Deliverables & Milestones



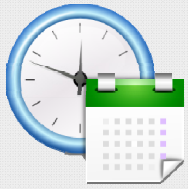
WP2 Document Store BSCW & Monthly Meetings

- BSCW Store: https://bscw.zam.kfa-juelich.de



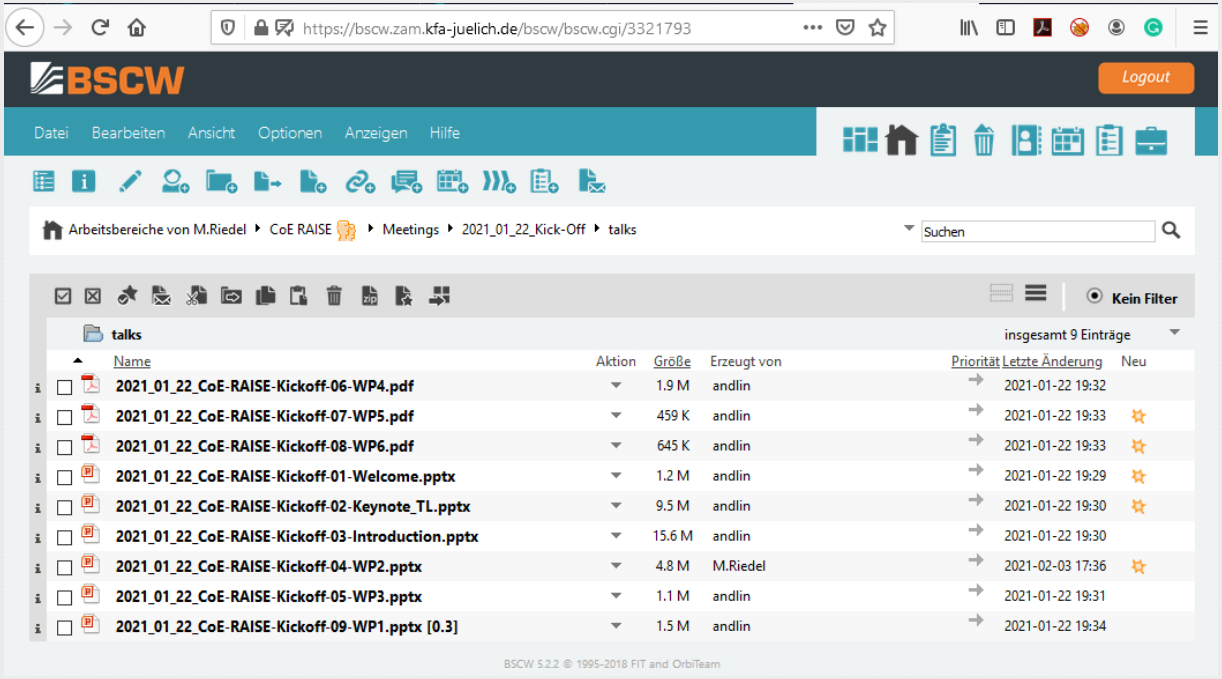
- **To share documents, reports, etc.**
  - **Access given by PMT**

- Monthly Meetings:
  - From March: Short Status Update of Task Leaders
  - Update on Fact Sheets & Interaction Room Process
  - Tracking Deliverable Progress



WP2 & More Information RAISE & WPx → Kick-off Slides

- BSCW Folder: https://bscw.zam.kfa-juelich.de/bscw/bscw.cgi/3321793



WP2 Mailing List

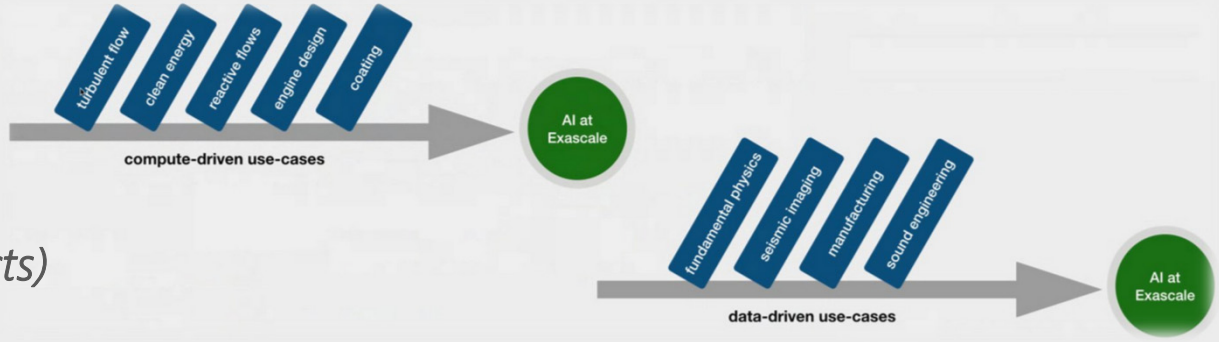
Email lists and functional emails (to add/remove members, please notify PMT; see also BSCW):

raise_psb@fz-juelich.de	members of the project steering board
raise_finance@fz-juelich.de	all people from the financial departments
raise_pmt@fz-juelich.de	members of the project management team
raise_pc@fz-juelich.de	email address coordinator (Andreas Lintermann)
raise_tcb@fz-juelich.de	members of the technical coordination board
raise_tow@fz-juelich.de	all WP leaders and deputies
raise_pub@fz-juelich.de	all people responsible for publications
raise_wp[1-6]@fz-juelich.de	participants of the respective WPs
raise_wp2@fz-juelich.de	WP2 mailing list
raise_all@fz-juelich.de	all members

Mailing list raise_leadresearcher@fz-juelich.de will be deleted upon creation of the PSB mailng list!

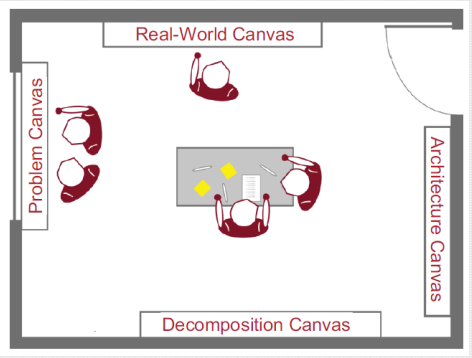
WP2 Process for our Discussion

- Fact Sheets
  - Foster initial understanding
  - Living document & each Fact Sheet per WP3/WP4 Use Case
  - *(Experience from many other EU projects)*
- Selected Contents
  - Short Application Introduction
  - Clarify Primary Contacts
  - Codes/Libraries/Executables
  - HPC System Usage Details
  - Specific Platforms & 'where is what data'?
  - Machine/Deep Learning Approaches of Interest (WP2 members in turn will then work on this)



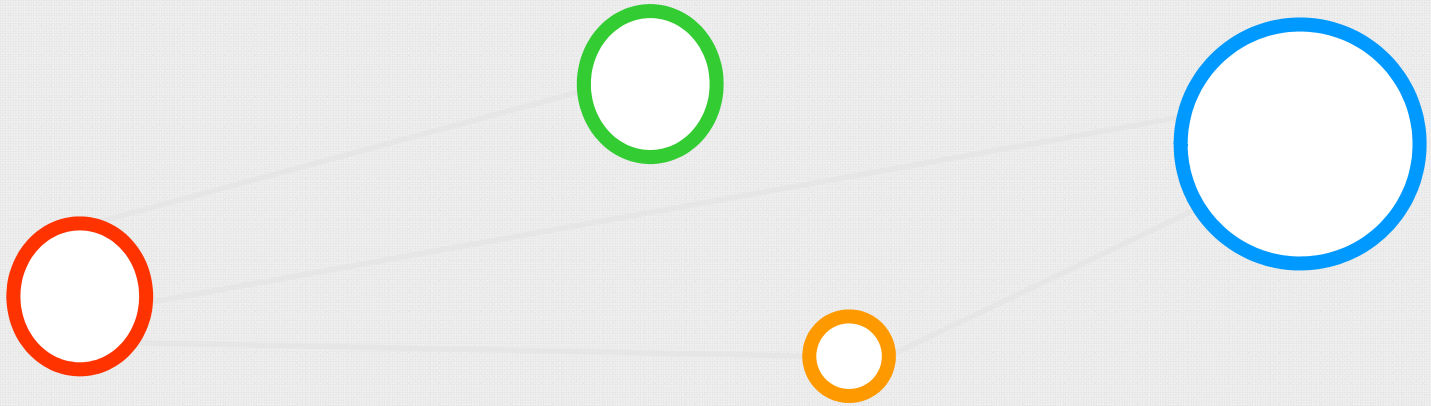
initial steps

Short presentation Matthias Book later



interaction room process

Agenda Item (2) - WP2 People



Agenda Item (2) - WP2 People – Goals

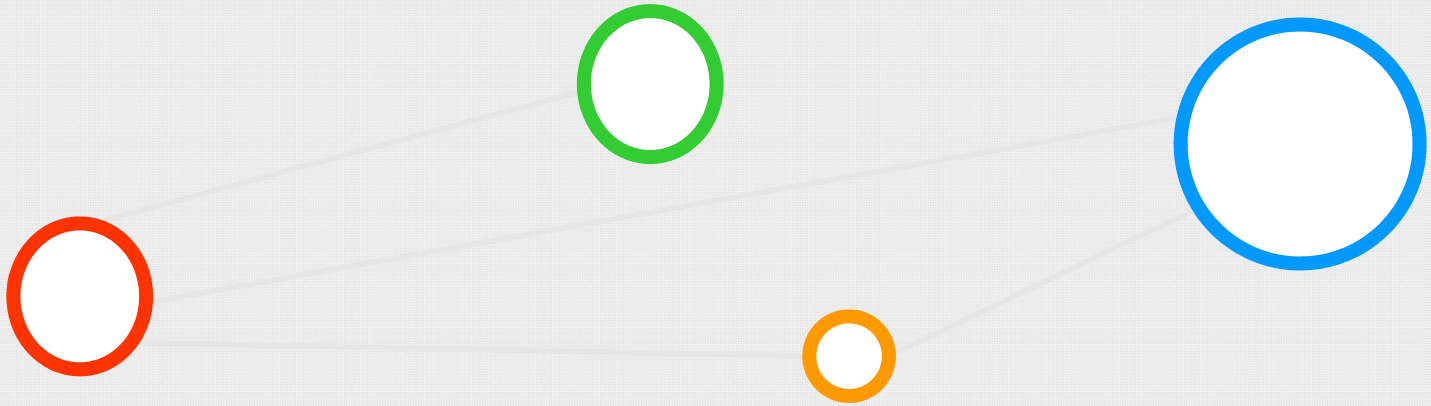
1. Short round among call participants
   - E.g. organization, role, expertise
   - Emphasize on WP2 contributions please
   - TBD(Morris): Note partners attending: UOI, …
2. Missing people per Partner?
   - TBD (all): Please send missing people to the PMT email
   - Do we miss someone not yet in the mailing list?

Work package title	AI- and HPC-Cross Methods at Exascale											
Participant No.	1	**2**	3	4	5	6	7	8	9	10	11	
Short name of participant	FZJ	**UOI**	CYI	RWTH	BSC	CERN	CERFACS	BULL	RTU	FM	SAFRAN	**TOT**
PM per partner	43	**24**	0	10	8	8	0	8	22	12	0	**135**
Start month	**1**			**End month**								**36**

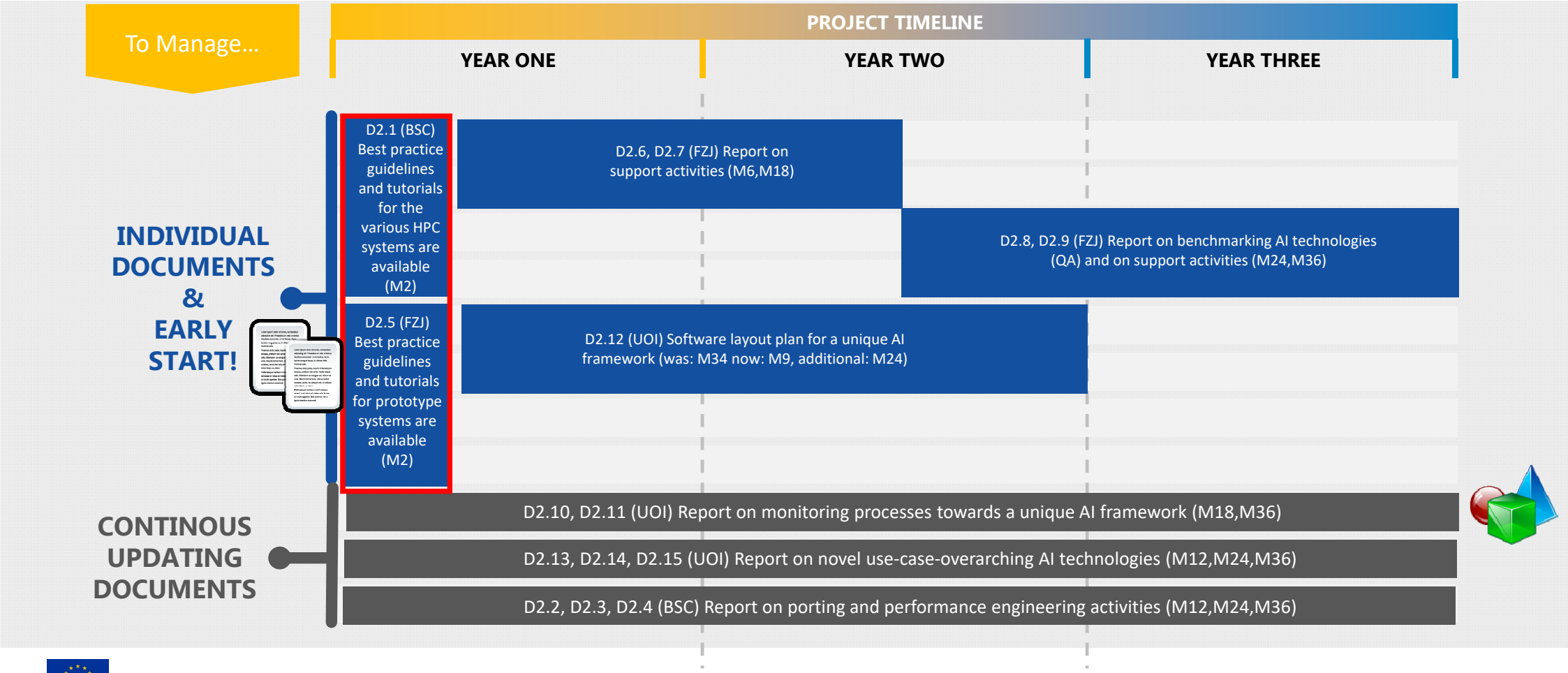
Agenda Item (2) - WP2 People – Initial Expertise List

- Andi (FZJ), hardware support to the community (JUWELS, JURECA, DEEP prototypes, quantum annealer, etc.)
- Arnis (RTU): also WP3/4, using AI, some practical background AI solutions, mainly simulation sciences
- Eric (UOI): new PHD in TACTILE engineering,
- Gabriele (FZJ): Remote Sensing, machine learning & HPC experience, contributes to WP2, WP4.2 remote sensing application, drives community remote sensing & HPC
- Guillaume (BSC): hardware support to community, wind turbines, no experience in AI so far
- Guilermo (BSC): GPU computing at BSC, last month AI activities, help in WP3
- Helmut (UOI): sw engineering & distributed systems (HPC, but also others, clouds), DEEP-EST project
- Ilze (RTU): WP2 member, data analysis, ML models, medical/transport data so far, experience in data science/AI/deep learning
- Ina (ParTec): group of project managers (with Jennifer, Andi, Konrad)
- Aplogies (Peter Niessen): 2.1 and 2.2 support colleagues, large machines in Juelich, DEEP series of project prototypes
- Jennifer (FZJ): member of PMT
- Julian (RWTH): HPC team, fluid dynamic solvers & GPUs, practical experience , some cluster systems in the project
- Apologies (Christian, RWTH)
- Lauris (RTU): RTU team leader, background HPC, lead of HPC team @ RTU university, not much about AI yet
- Matthias (UOI) SW Engineering & Computer Science, Interaction Room expert, communication between different disciplines (i.e., HPC, AI, Sim)
- Reza (UOI): PHD student in CFD, SimDataLab CFD member at UOI, aircraft engine WP3.4 use case & AI
- Seong (FZJ): CFD background, technical support for user communities, medical imaging,
- Morris (UOI): since 16 years in HPC & FZJ/JSC, now full staff member at UOI and professor for parallel/scalable AI with HPC, Clouds, and Quantum Computing
- **TBD (Morris): WP2 (Name of mailing list will be augmented → add in BSCW WP2: matrix AI vs. HPC & Sim expertise in addition to contact**
- **GDPR consent given for internal BSCW usage in the meeing by everyone (informed consent)**

Agenda Item (3) - WP2 Deliverable Status D2.1 & D2.5

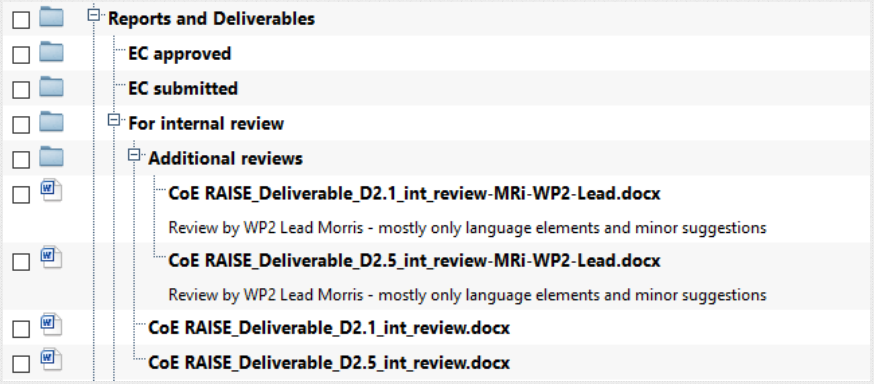


WP2 Work on Deliverables & Milestones

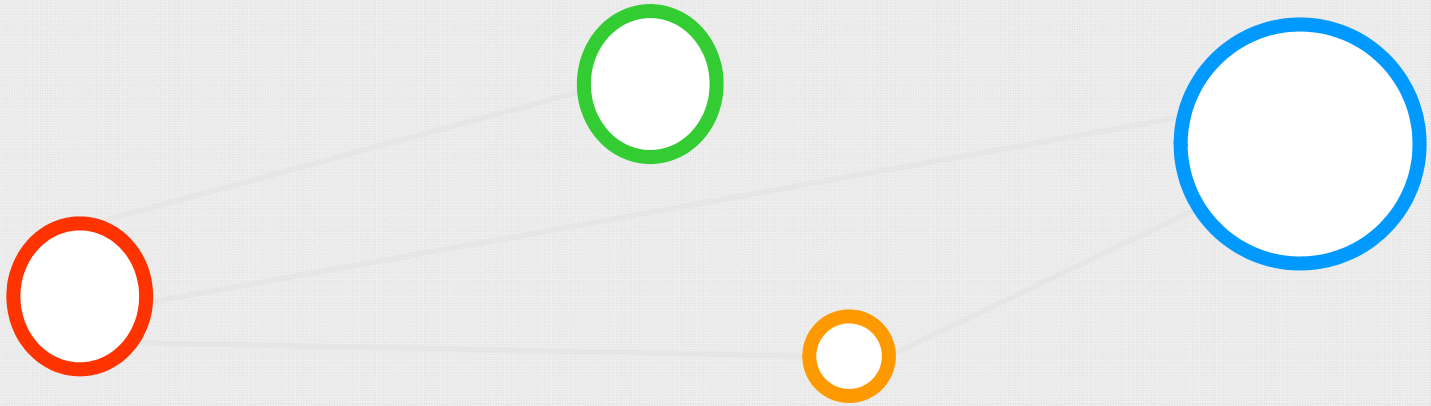


Agenda Item (3) - WP2 Deliverable Status D2.1 & D2.5

1. WP Deliverable (M2) D2.1 Status
   - In Internal Review
   - Andreas Lintermann
2. WP Deliverable (M2) D2.5 Status
   - In Internal Review
   - Guillaume Houzeaux
3. TBD(WP2 Members):
   Take a look on the deliverables
   & understand systems



Agenda Item (4) - WP2 Next Steps: Interaction Room

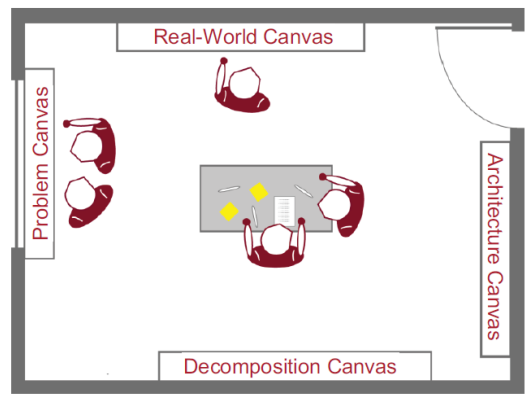


Agenda Item (4) - WP2 Next Steps: Interaction Room

- WP2 Next Steps Appetizer: Software layout plan for a unique AI framework
  - Short Introduction to the Interaction Room
  - Given by Prof. Dr. Matthias Book
- WP2 Workshop Interaction Room
  - Dedicated introductory event
  - Timeframe: February/March
- WP2 Usage
  - WP2 Fact Sheet process as input ('initial understanding')
  - Supports the proper software engineering design of the unique AI framework blueprint
  - Understand & Extract requirements & demands from WP3 & WP4 use cases

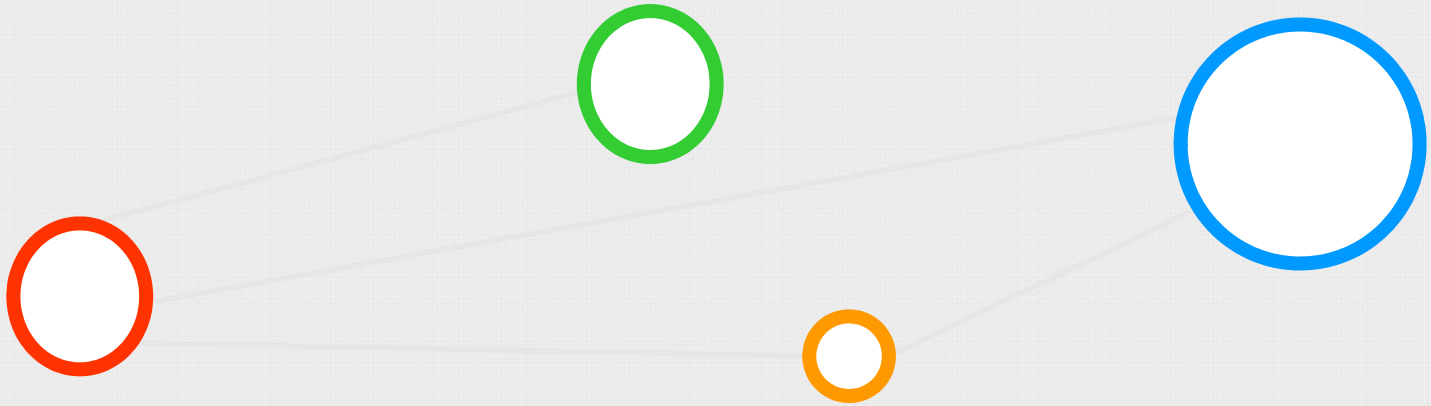
WP2 will Start Meetings with WP3 & WP4 for Online Sessions

- Start: Interaction Room Process
  - Supports the proper software engineering design of the unique AI framework blueprint
  - Expecting to work with WP3 & WP4 experts in an open minded way
  - Process will be guided by **Prof. Dr. Matthias Book** (Software Engineering, University of Iceland)
  - Supported by Software Engineering & testing expert **Prof. Dr. Helmut Neukirchen** (University of Iceland)

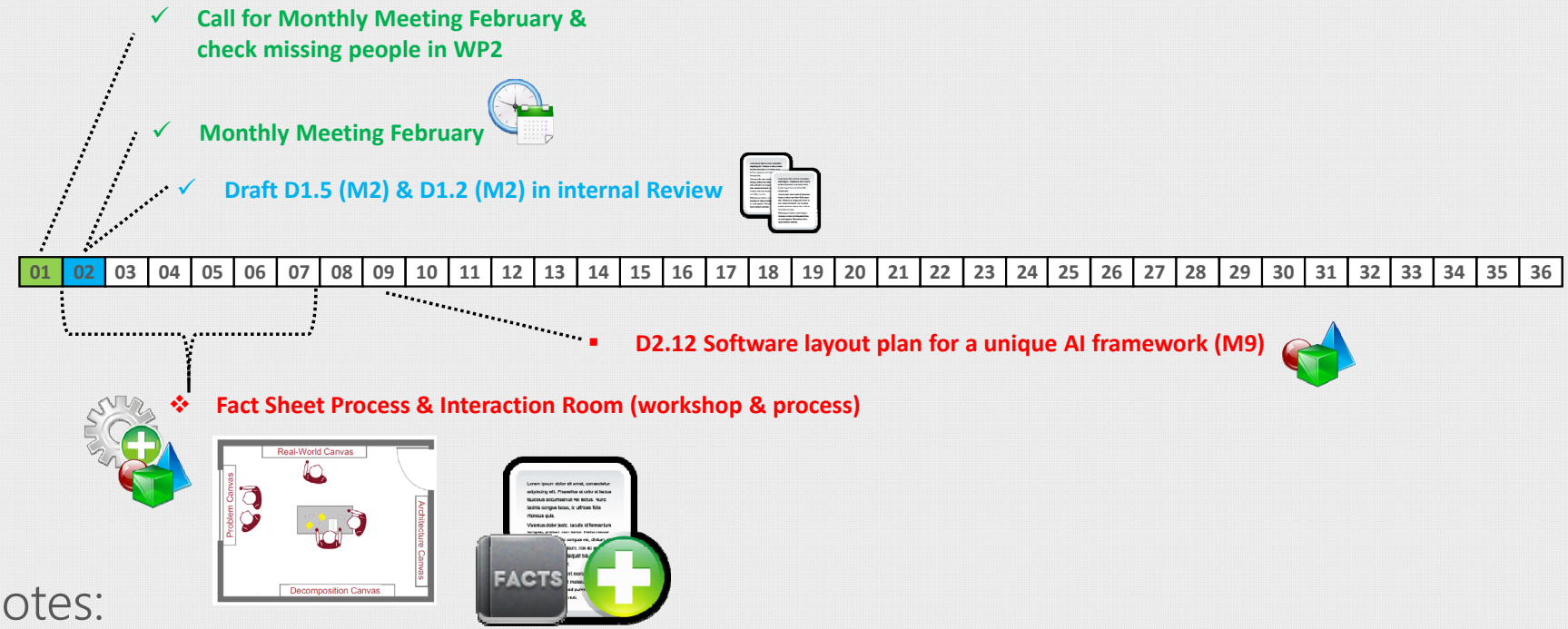


Book, M., **Riedel, M.**, **Neukirchen, H.,** Goetz, M.: Facilitating Collaboration in High-Performance Computing Projects with an Interaction Room, in conference proceedings of the 4th ACM SIGPLAN International Workshop on Software Engineering for Parallel Systems (SEPS 2017), October 22-27, 2017, Vancouver, Canada

Agenda Item (5) - WP2 Next Monthly Meeting & AOB



Summary & Next Month



- Notes:
  - Next meeting items: Understanding better the benchmarking activities & plans, resource provisioning (Guillaume)
  - TBD(Matthias/Morris): Start process with fact sheets & seach for interaction work date&time, monthly meeting doodle
  - TBD(Morris): Upload 2-3 examples of fact sheet to the BSCW folder from previous EC projects

Agenda Item (5) – WP2 Next Monthly Meeting & AOB

1. Next Monthly Meeting(s)
   - TBD(Morris) Timeframe: March, April, May: Doodle will be available soon
   - Topics: Selected progress with Factsheets & Interaction Room presentations
   - TBD(All): other topics of relevance, ideas for process, etc.
- TBD(All): Discussions & AOB?

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