PRD-LMD 2021 Kick-off

Liquid metal activities in FP9

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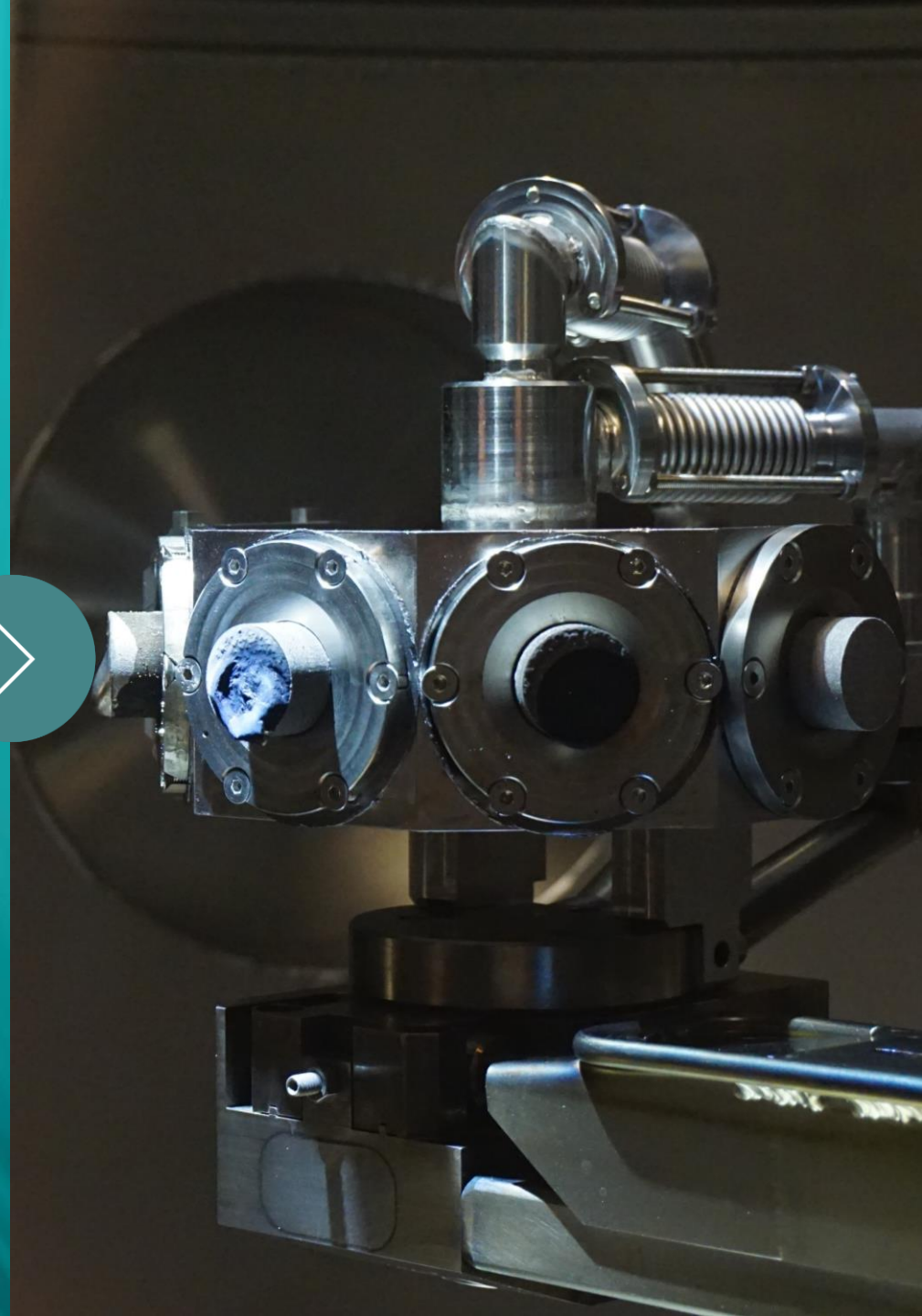
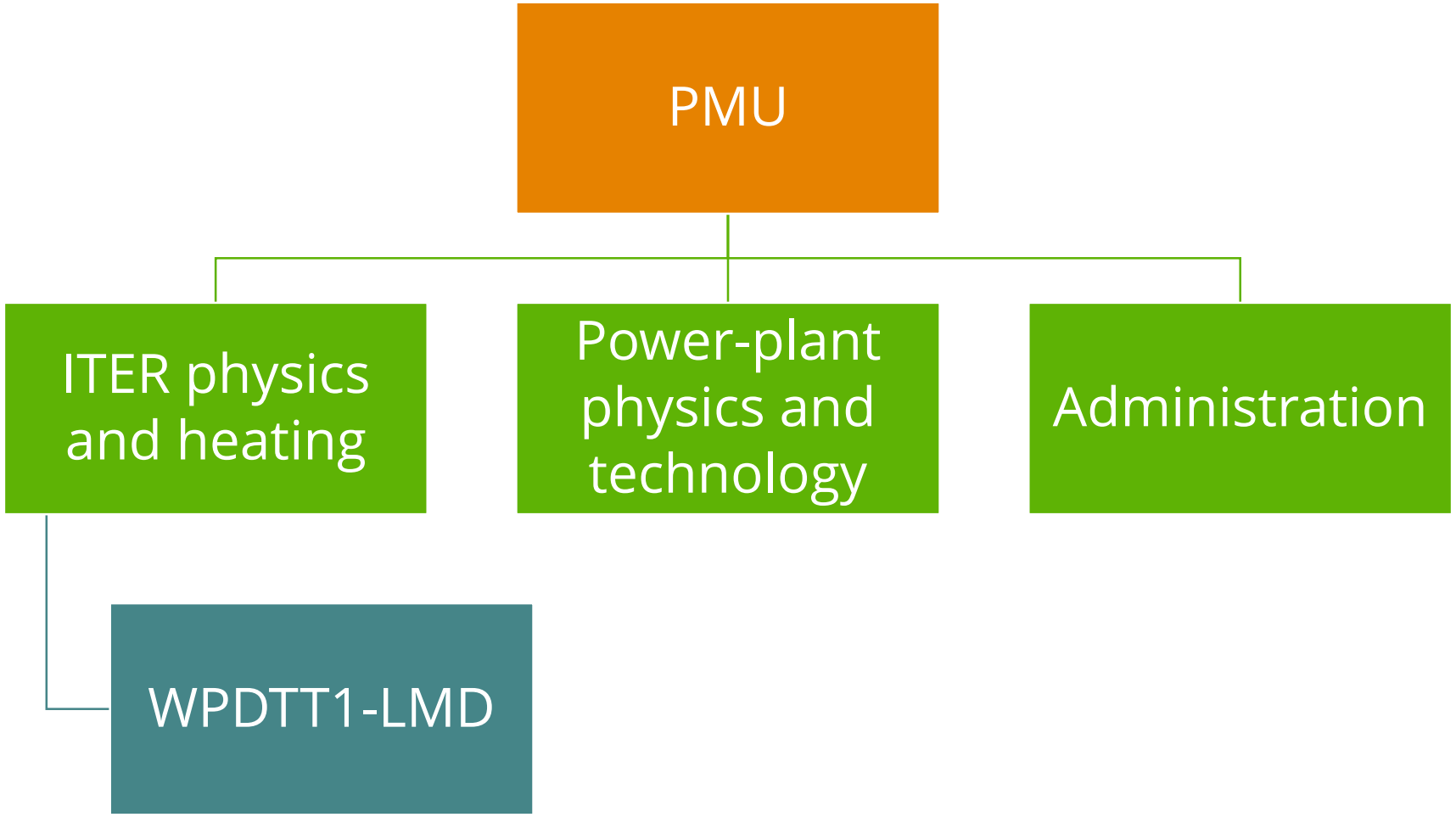
PRD-LMD Kick-off June 2021

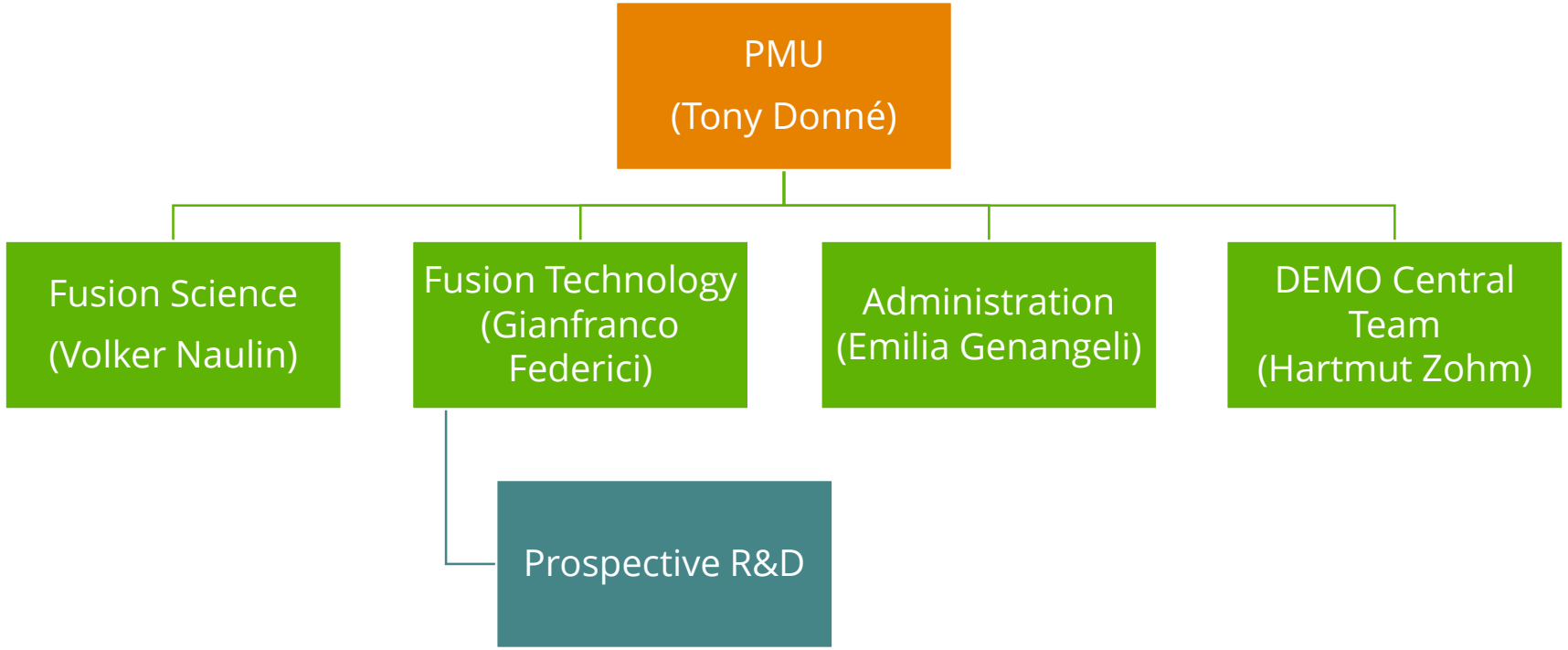
DIFFER



Introduction to LMD in FP9: situation FP8



Introduction to LMD in FP9: situation FP9



Prospective R&D

Prospective R&D (Richard Kembleton)	Divertor
	Tritium, fueling and vacuum
	Magnets
	Breeder blanket
	Materials (IREMEV)
	Materials (ADVM)
	Materials (HHFM)
	HCD: Post DEMO
	HCD: IC for DEMO
	HCD: NBI for DEMO
	Tokamak PPS
	Stellerator PPS
	LMD (Thomas Morgan)

What is PRD and how does LMD fit in?

“ alternative, risk-mitigating, options for DEMO and/or a fusion power plant, targeting the delivery of commercially viable fusion energy “ (CfP Annex_TD-EG-20-170)

Focus on long term, not annual deliverables but broader outlook

For LMD focus is on offering a realistic alternative ready for DEMO Engineering design review (~2030)

For LMD we need to develop TRL of this concept to higher level and fully evaluate/demonstrate potential and risks

New work structure

SP1: Prototype design and development

- Development of a prototype for testing in ASDEX-Upgrade, COMPASS-U and develop a mock-up for testing in HHF devices (DIFFER/ENEA)
- HHF testing of prototypes (MPG)
- Disruption testing of mock-up samples (KIPT)
- CPS concept testing in OLMAT: vapour shielding, stability, erosion and dry-out (CIEMAT)

SP2: Plant integration

- High pressure coolant integration, liquid metal loop design, DEMO optimization (CCFE)
- Self-consistent Sn scenario for DEMO (ENEA)
- Comparison of COREDIV to coupled SOLPS modelling (IPPLM)
- Electric current effects on LM flow, TE effects on LM under high B-field (ISSP-UL)

Programme for today

Item	Time	Duration	Speaker
Introduction	13:30	15+5	Tom/Richard
ENEA	13:50	15+5	Matteo Iafrati
DIFFER	14:10	15+5	Tom Morgan
CIEMAT	14:30	15+5	Paco Tabares
KIPT	14:50	15+5	Vadym Makhlai
MPG	15:10	15+5	Armin Manhard
Coffee break	**15:30**	**20**	
CCFE	15:50	15+5	David Horsley
PoliTo	16:10	15+5	Giuseppe Nallo/Fabio Subba
IPPLM	16:30	15+5	Michal Poradzinski
ISSP-UL	16:50	15+5	Imants Kaldre
Discussion and close	17:10	20	

Extra

Milestones and deliverables

Year	Deliverable	Milestone
2021		

Divertor Concepts	Helium-cooled divertor Heat-pipe concept development
Tritium Systems	PSA isotope separation experiments Li enrichment Support for PRD-NBI
Magnet Systems	HTS characterisation HTS winding pack development / magnet concept
Breeder Blanket	DCLL/HCLL MHD of liquid materials, T extraction, permeation barriers, FCIs Concept development, interface reqs
High Heat Flux Materials	Development of materials in support of e.g. divertor concepts Manufacturing, characterisation and HHF testing Routes to scale-up of production
Advanced Steels	ODS fabrication and manufacturing optimisation Testing and characterisation
Materials Modelling	Ab initio radiation damage modelling Dislocation dynamics Multi-scale modelling → macroscopic property changes
Heating & Current Drive	Post-DEMO: high efficiency EC, NBI, long-pulse support, IC NBI for DEMO (risk-mitigation → review at G2) IC for DEMO (risk-mitigation → review at G2)
Power Plant Studies	Speed-up of conceptual development cycle Systems failure modelling FPP design space exploration
Stellarator Plant Studies	Parameterised model development for e.g. magnets Remote maintenance and divertor concepts Integrated FPP design space exploration
Liquid Metal Divertor	PFC development, characterisation, and HHF testing Module development for COMPASS-U Prototype module development for DTT