MESA

Maritime Europe Strategy Action

TTG 1 – Energy Efficiency

Workshop,

Brüsel, 5 March 2014

SEVENTH FRAMEWORK PROGRAMME

Programme

1	Introduction MESA and TTG 1	J. Marzi, HSVA
2	Ship Resistance	J. Marzi, HSVA
3	Hydrodynamic and aerodynamic Propulsion	J. Marzi, HSVA
4	Prime Movers	A. Teo, Rolls Royce
5	Auxiliary Energy – use and conversion	Ph. Corrignan, BV
6	On-board consumers	G. Rousseau, DCNS
7	Energy Management	Ph. Corrignan, BV
8	Assessment of energy efficiency improvement and Technology uptake in the Shipping industry	T. Smith, UCL
9	Summary discussion & recommendations	J. Marzi - moderation

MESA – IN A NUTSHELL

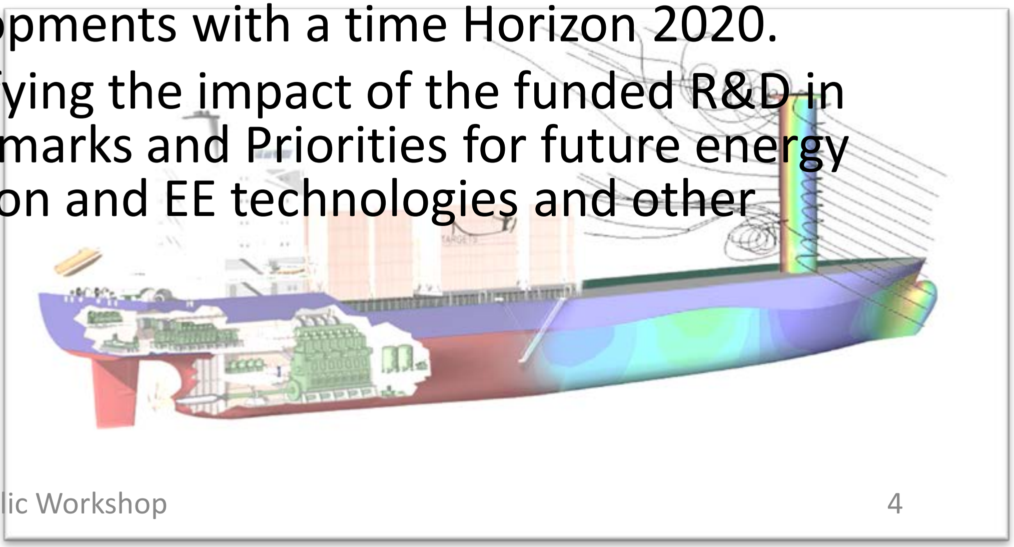
Objectives

Networks:

- Provide a **platform** for communication and exchange for important thematic areas such as energy efficiency R&D, safety R&D, production R&D and e-maritime R&D in/for the maritime industry.
- Compile past results and concert existing European research activities in the field. (SoTA)

Strategy Group:

- **Enhance** the impact of presently funded projects (FP7).
- **Pave the way** for future developments with a time Horizon 2020.
- Setup a mechanism for quantifying the impact of the funded R&D in the industry by defining benchmarks and Priorities for future energy efficient maritime transportation and EE technologies and other thematic areas addressed.
- Link with WTB^TP



MESA - Structure (I)

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Strategy Group

Thematic Technology Groups (Networks)

E-Maritime

- State of the art
- Gap analysis
- Research Needs

Production

e of the art
analysis
arch Needs

Safety

ate of the art
ap analysis
esearch Needs

Energy Efficiency

- State of the art
  - Thesauraus
  - Assessment of EU projects
  - Global Sota
  - Other industries
  - …
- Gap analysis
- Research Needs
- Monitoring of on-going developments

Regular (open) Workshops

Presentation of Results

MESA-Structure II

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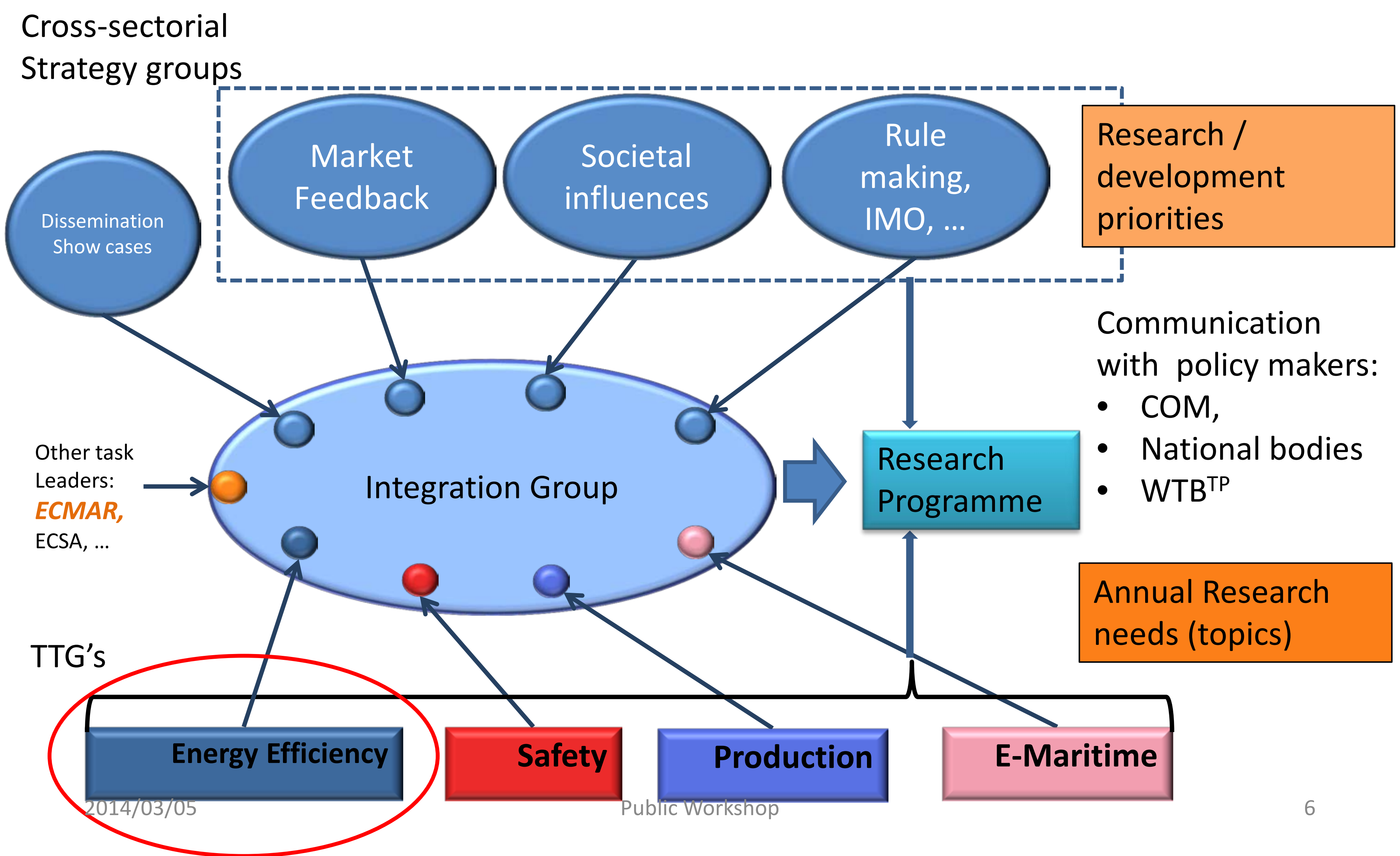

Present Situation

- Analysis of past and on-going projects.
- First overview has been established,
- … and the first compilation of the state-of-the-art is in hand.

Next Steps

- Gaps and research needs to be discussed in the Integration Group ("round table" with TTGs and Strategy Groups)

TTG 1 ENERGY EFFICIENCY

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Approach

- Collection of contributions to all relevant sectors / areas affecting and influencing the energy efficiency of ships,
- Definition of a Catalogue of EE related elements and specification of technology sub-areas and their group leaders;
- Analysis of relevant EU, national and private (industrial) research;
- Analysis of applications / showcases;
- Analysis of relevant networks and organisations active in the field.
- Compilation of the SotA,
- … to result in a “technical” Gap Analysis.
- Definition of global assessment criteria to evaluate the influence / impact of relevant technologies (KPIs) .

Partners in TTG 1

Project

- HSVA
- Rolls Royce Power Engineering PLC
- Bureau Veritas
- DCNS SA
- Brookes Bell LLP

Additional Groups / Contributors

- **GreenSEENet** partners
- ***ECMAR*** partners
- WEGEMT
- Links with international groups / bodies relevant for Energy Efficiency

Technology Sub-Areas

1	Ship resistance	HSVA
2	Ship propulsion	HSVA
3	Prime mover	RR
4	Auxiliary energy (conversion) (solar, wind (not for propulsion), seaway energy)	BV
5	Other on-board energy consumers	DCNS
6	Energy Management & Optimisation Systems	BV (BB)
7	Ship operations *	
8	Lightweight Structures (this is a cross sectorial topic which should be taken up in production too.)	In cooperation with TTG 3

Have been defined as an internal structure of TTG 1

*) Ship operations is a multi sectorial field which includes aspects from different Sectors – we will need to further detail this in the coming weeks.

The Catalogue of EE related technology sub-areas

- Step 1: Each sub-area has been further detailed.
- (Examples in the individual presentation).
- The approach is to define relevant topics for each sub-area and structure each topic (=> "the catalogue"). Based on this structure, past and on-going projects are analysed and lists / contributions are compiled.
- Step 2: Check for completeness.
- Step 3: further description of the state-of-the-art.
- Step 4: Gap analysis.

Analysis: Projects and Achievements (Example)

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MESA	Maritime Europe Strategy Action														
TTG 1	**Energy Efficiency**			Project											
		Fund	FP	Acronym	Title	MARPOS Reference	what has been done?	main technologies	achievements	open issues / gaps	follow-up activities	Problems solved?	final research needs	Showcase / demonstrator	web site / Contact
1	**Ship resistance**														
1.1	Form resistance					ENE-1-1, COM-1-1, COM-1-2, ENV-3									
		EU	5	Fantastic	Functional design and optimisation of ship hull forms		First principle design tools for CFD predictions (panel codes) integrated with optimisation techniques (e.g. modeFrontier) allow optimising the hull form of a vessel with respect to wave resistance.	panel codes	basic hullform optimisation process, CAD-CFD coupling for panel codes						http://www.transport-research.info/web/projects/project_details.cfm?ID=13968
								Genetic optimisation		numerical accuracy	VIRTUE	well,			
								parametric CAD modelling							
		EU	6	VIRTUE	The Virtual Tank Utility in Europe		improvement of accuracy of RANS codes, form optimisation, benchmarking, validation	RANS codes,	a set of improved and validated RANS codes has been developed	geometric complexity, general comparison with model tests, scalability (full scale predictions)				example hullform optimisation for a tanker, implementation in different flow codes: ISIS, PARNASSOS, FreSCo+	www.virtualbasin.org
									Application of RANS codes in automated hullform optimisation processes remains an issue. First attempts have been made for simplified applications (bare hull, double body flow) in VIRTUE. Complexity and performance of computations as well as integrated pre-processing – geometry modification and grid generation – are still an issue of research.					Hullform optimisations can lead to significant reductions of the resistance part in question, depending on the start configuration, improvements of up to 15% in wave resistance have been achieved applying the tools. This has been demonstrated in a large number of present commercial projects.	
									1st full scale predictions performed	scalability (full scale predictions), need for efficiency increases of prediction tools, due to the larger computational models					
		EU	7	TARGETS	Targeted advanced research for Global Efficiency of transportation Shipping		hullforms for energy efficient vessels, optimised appendages, operational optimisation (influence of trim on resistance)	CFD codes (potential and RANS), adjoint solver	trends for bulbous bow optimisation, initial study for multi-hull configurations, fast concept for trim optimisation (response surf.)	operational resistance - added resistance in seaways, optimisation for life-cycle conditions (see 1.3)	FP 7/5 project SHOPERA(?)				www.targets-project.eu
		D		Form-Pro	Ship hullform optimisation with active propulsion based on an adjoint equation approach		Development of an adjoint solver	RANS, adjoint solver, CAD-CFD coupling	working adjoint solver for high Reynolds-Number, optimisation demonstration Bulk Carrier hull	adjoint solver for free surfaces, further adjoint objective functions	NoWelle (D) project	on-going research (start 2013)		Optimisation of a bulk carrier aft body, asymmetric ship, (e.g. Naval Architect, June 2012)	www.hsva.de
		EU	7	ADAM4EVE	Adaptive and smart materials and structures for more efficient vessels		functional test of the feasibility of adaptive hullforms for resistance improvements during different operational conditions, bulb and stern geometry	material technologies, CFD analysis	on-going project (2013)						

- This approach will be detailed / further explained in the following workshop sessions.