



Management tools for R&D engineering projects: Coordination perspective for large international consortium (NeXOS)

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NeXOS is a cross-functional and multidisciplinary project funded under the EU FP7 Program, which involves 21 organizations from six different European countries. They all have different backgrounds, interests, business models and perspectives. To be successful, NeXOS applied an international recognized management methodology tailored to the specific project's environment and conditions, with an explicit structure based on defined roles and responsibilities for the people involved in the project and a means for effective communication between them (Fig.1). The project, divided in four different stages of requirements, design, integration, validation and demonstration, allows a clearer monitor of its progress, a comparison of the level of achievement in accordance with the plan and an earlier detection of problems/issues, leading to implementation of less disruptive, but still effective corrective actions. NeXOS is following an ambitious plan to develop innovative sensor systems with a high degree of modularity and interoperability, starting with requirements definition through validation and demonstration phase. To make this integrative approach possible, a management development strategy has been used incorporating systems engineering methods (Fig.2). Although this is standard practice in software development and large scale systems such as aircraft production, it is still new in the ocean hardware business and therefore NeXOS was a test case for this development concept. The question is one of scale as ocean observation systems are typically built on the scale of a few with co-located teams. With a system of diverse technologies (optical, acoustic, platform interfaces), there are cultural differences that must be bridged. The greatest challenge is in the implementation and the willingness of different teams to work with an engineering process, which may help ultimate system integration, but may place additional burdens on individual participants. This presentation will address approaches for effective operations in this environment.

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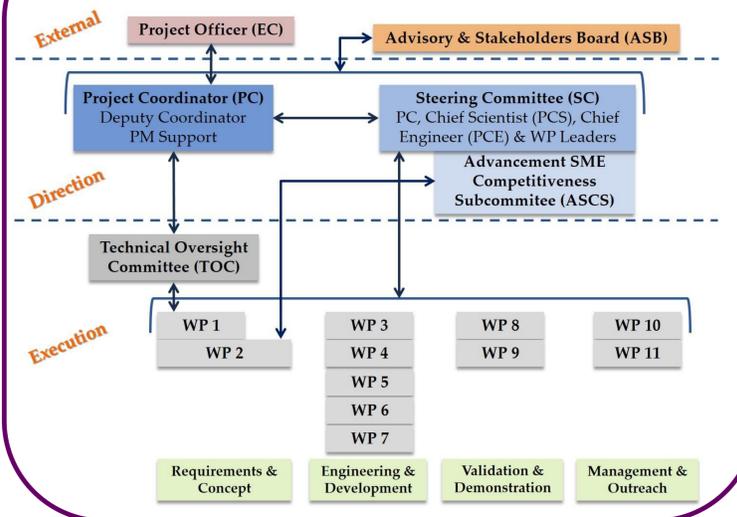
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Summary 1

NeXOS is a cross-functional and multidisciplinary project, which involves 21 organizations from six different European countries. The main objective is the development of new multifunctional and interoperable sensor systems based on optical and passive acoustics technologies, aiming to support a number of scientific, technical and societal challenges, ranging from more precise monitoring and modelling of the marine environment (EU-MSFD) to an improved management of fisheries (EU-CFP). To be successful, NeXOS applied the international recognized management methodology, PRINCE2®, tailored to the specific project's environment. The project, divided in four different stages of requirements definition, design, integration, validation and demonstration, allows a clearer monitor of its progress, a comparison of the level of achievement in accordance with the plan and an earlier detection of problems/issues. To make this integrative approach possible, a management development strategy has been used incorporating systems engineering methods. Although this is standard practice in software development and large scale systems such as aircraft production, it is still new in the ocean hardware business and therefore NeXOS was a test case for this development concept.

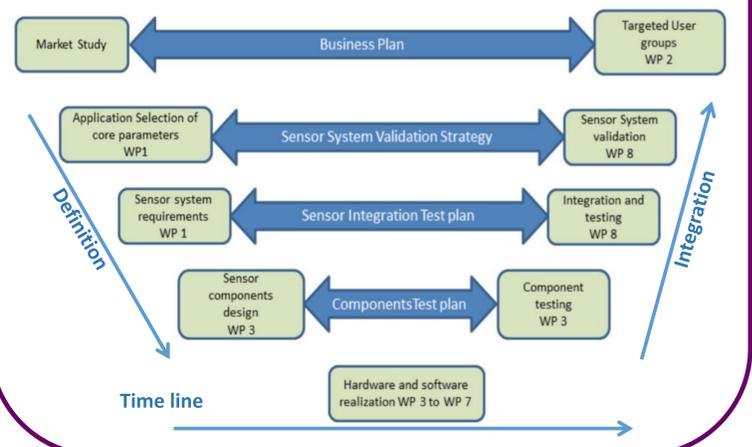
2 Project Management structure

NeXOS decision-making structure has 3 levels of organization, each one with specific roles and responsibilities.



4 System Engineering Approach

Derived from the System Engineering, NeXOS applied the V diagram, which represents the steps from the application down to the specifications and implementation. Both sides are connected through validation and testing routines, allowing every step to be connected to test or validation plans.



5 Test, Integration, Validation and Demo

As a need of a close coordination for the Test, Integration, Validation and final Demonstration (TIVD) activities, the TIVD plan and the demo Plan have been developed. This tool allowed a more systematic approach to the complex management of the 21 partners involved in the different phases of the developments of all the Nexos sensors and their final demonstration in all the platforms available in the Consortium.

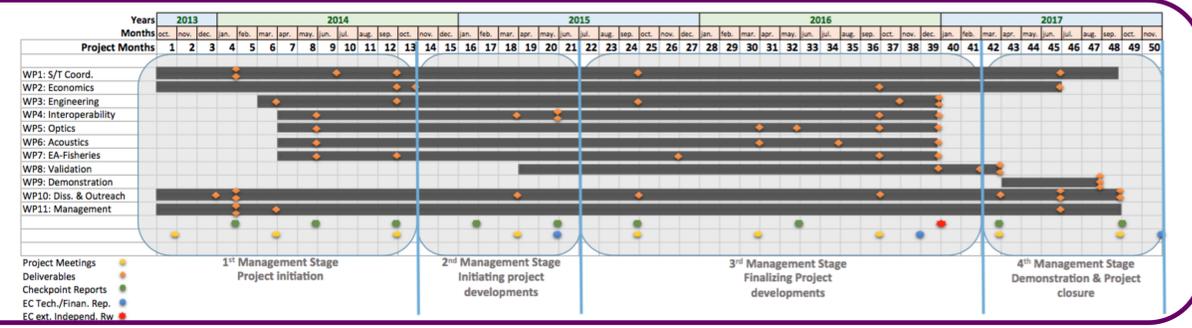
		TIVD plan				Demo Plan					
Sensor		LABORATORY TESTING				ENVIRONMENTAL TESTING (RAMS)					
Responsible person (partner acronym)	Place of the action	Start	Finish	Duration	Execution %	Responsible person (partner acronym)	Place of the action	Start	Finish	Duration	Execution %
A1.1	Owner after the project	1/04/2015	30/06/2015	90	100,00%						
	Type of Action	CALIBRATION PROCESS				INTEGRATION PROCESS					
	Timeline	1/03/2016	31/03/2016	30	0,00%	31/03/2016	31/12/2016	275	0,00%		
	Responsible person (partner acronym)										
	Place of the action										
	Type of Action										
	Platform & Provider										
	Timeline	1/01/2017	31/01/2017	30	0,00%	1/04/2017	15/09/2017	167	0,00%		
	Responsible person (partner acronym)										
	Place of the action										
Type of Action											
Platform & Provider											

	A1	A2	O1	O2	O3	EAF	PLATFORM	DEMO SITE
MED1							Beacon	MED SEA
						MED3	Fishing Vessel	
							OBSEA	
NOR1			NOR2				SEA EXPLORER	NORWAY
					NOR3		SAIL BUOY	
			NOR4	NOR4	NOR5		FERRYBOX	
						NOR6	FISHING VESSEL	
CAN1			CAN2				WAVE GLIDER	CANARY ISLANDS
CAN3							PROVOR	
CAN4							ESTOC TB	

3 Project stages and control

Stages

NeXOS is managed on a stage-by-stage basis. This principle provides the PM Structure with control points at major intervals throughout the life cycle of the project. At the end of each stage, each organizational level can monitor its progress, compare the level of achievement with the plan, detect problems/issues and risks and initiate corrective actions where needed. The number and duration of the management stages have been determined considering alignment with technical deliverables, EU and internal reporting and control.



Some conclusions 6

- 1.- The management system established during NeXOS proposal preparation, although comprehensive, was not enough to keep under control and well monitored all the planned development processes.
- 2.- The detail phases for laboratory testing, calibration, Integration and Validation, were not possible to be included as part of the initial Timeline of this complex project. This has resulted in the need to create, during the execution phase, a more detailed Project Implementation Plan. The TIVD plan resulted in a valuable tool to keep a closer control of the different developments running at the same time.
- 3.- A constant control based on the periodic meetings of the Technical Oversight Committee (TOC) and the monitoring of the V diagram as the selected System Engineering Approach has resulted essential.

Acknowledgement

NeXOS is a collaborative project funded by the European Commission 7th Framework Programme, under the call OCEAN-2013.2 - The Ocean of Tomorrow 2013 - Innovative multifunctional sensors for in-situ monitoring of marine environment and related maritime activities. It is composed of 21 partners from 6 European countries.

Contacts

