BALANCING COORDINATION MECHANISMS IN COMPLEX PRODUCT SYSTEMS DEVELOPMENT – A CASE STUDY OF AN EUROPEAN R&D COLLABORATION

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The MIDCAS Project

SAAB · AleniaAeronautica A Finmeccanica Company · CIRA · DIEHL BGT Defence · DLR · CASSIDIAN · ESG

indra · SAFRAN Sagem · SELEX Communications · SELEX GALILEO · SELEX Sistemi Integrati · THALES

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Complex Product Systems - CoPS

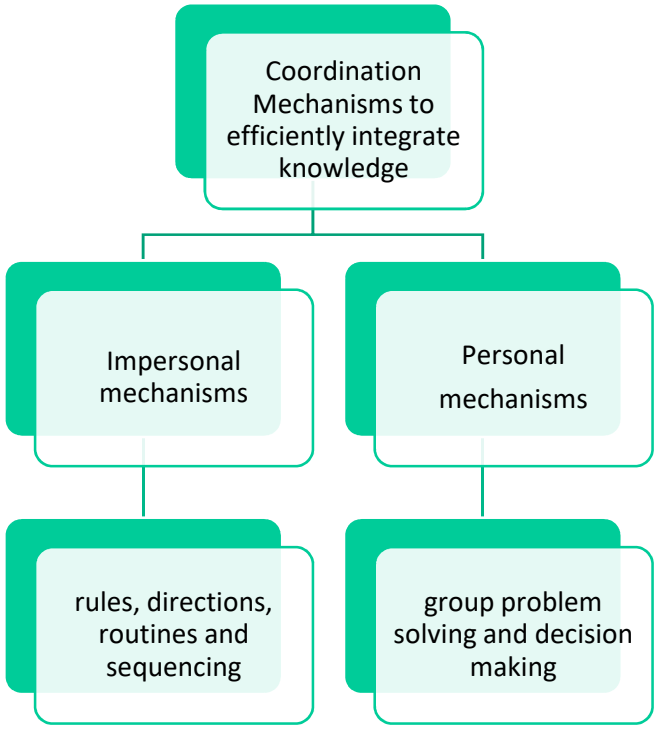
CoPS vs. mass production industries (two ideal types)

	CoPs project organisation	Commodity products, functional organisation[a]
Product characteristics	Complex component interfaces	Simple interfaces
	High unit cost	Low unit cost
	Product cycles last decades	Short product life cycles
	Many skill/knowledge inputs	Fewer skill/knowledge inputs
	(Many) tailored components	Standardised components
Production characteristics	Project/small batch	High volume, large batch
	Systems integration	Design for manufacture
Innovation processes	Innovation paths agreed ex-ante among suppliers, users etc.	Innovation path mediated by market selection
	People-embodied knowledge	Machinery embodied knowhow
Competitive strategies and innovation coordination	Focus on product design and development	Focus on economies of scale/cost minimisation
	Organic	Mechanistic
	Systems integration competencies	Volume production competencies
	Management of multi-firm alliances in temporary projects	Focus on single firm (e.g., lean production, TQM,MRP II)
Industrial coordination and evolution	Elaborate networks	Large firm/supply chain structure
	Project-based multi-firm alliances	Single firm as mass producer
	Temporary multi-firm alliances for innovation and production	Alliances usually for R&D or asset exchange
	Long-term stability at integrator level	Dominant design signals industry shakeout

Hobday, 1998

Knowledge Integration

"an efficient knowledge integration occurs when organizations maximize the use of impersonal mechanisms, and leave the costly and more personal mechanisms for group problem solving and decision making, the last taking the form of meetings" (Grant, 1996).



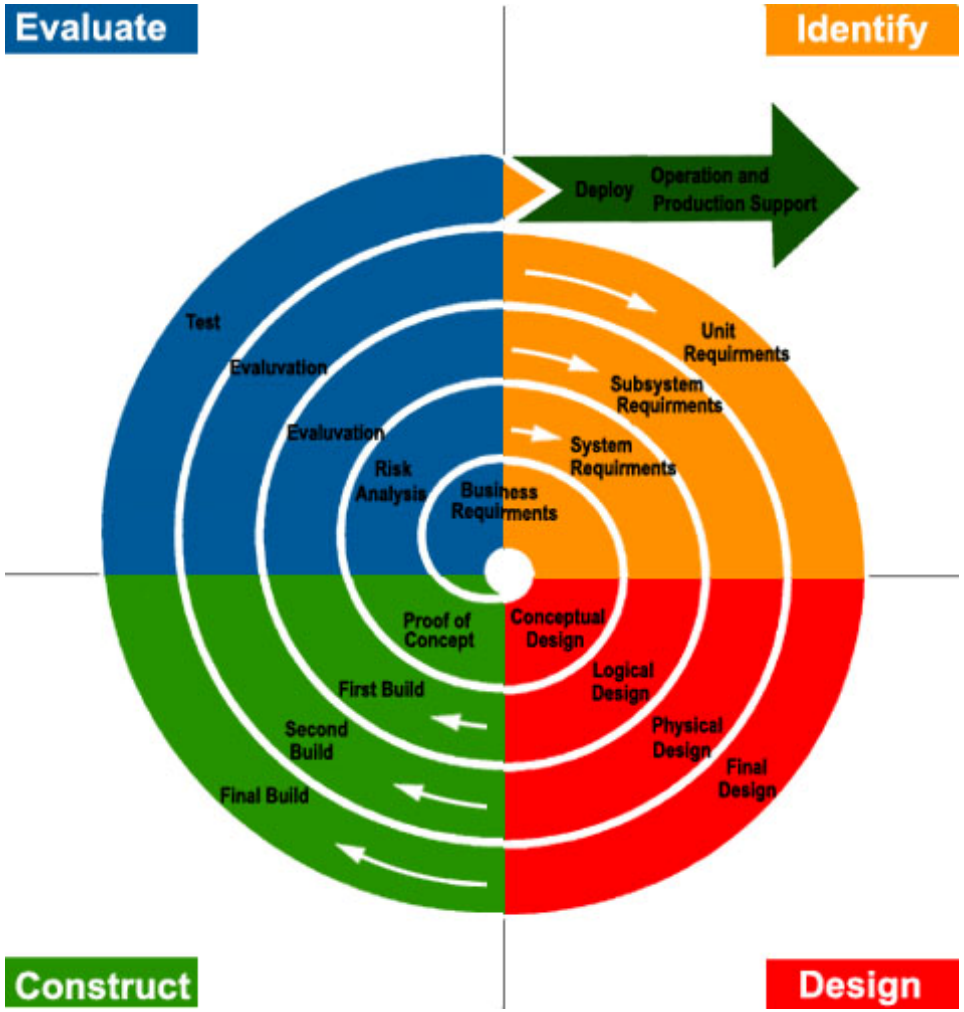
Literature Gap

- How does the use of personal and impersonal coordination evolve throughout the phases of a CoPS project?
- How are personal and impersonal coordination mechanisms combined and balanced?

Methodology

- Single case study
- MIDCAS project as the unit of analysis
- 12 interviews, study visits in Saab, extensive documentation - public (midcas.org)

MIDCAS: An incremental and Iterative Development



MIDCAS: An incremental and Iterative Development

	1st phase: defining requirements and solution	2nd phase: Implementing solution				
S&A Function Design	1st Increment	2nd Increment	3rd Increment	4th Increment	5th Increment	
S&A simulation	Development of the simulator	1st Increment	2nd Increment	3rd Increment	4th Increment	
S&A manned demonstrator	Sensor flight tests		1st Increment	2nd Increment		
S&A unmanned demonstrator					1st Increment	2nd Increment
Standardization workshops with stakeholders	1st Standardization workshop	2nd Standardization workshop	3rd Standardization workshop	4th Standardization workshop	5th Standardization workshop	6th Standardization workshop

Evolution of Coordination Modes

	1st phase: Defining requirements and solutions	2nd Phase: Implementing solutions	
Project Context	Project with a high level of complexity and task interdependence / coopetitive context under knowledge protection and IPR		
Project Stage	Conceptual development and ideation	Development of demonstrators requiring more group problem solving; Refinement of specifications and requirements;	Development of demonstrators requiring more group problem solving; Refinement of specifications;
Status of project definition	Extensive statements of work; Solutions still loosely defined; Technical requirements and specifications still immature	Technical requirements and specifications maturing; Simulations results and manned demonstrator tests revealed some issues that needed to resolved	Technical requirements and specifications refined based on unmanned demonstrator tests and stakeholders feedback; S&A Function fully described
Relational context and perceived understanding of the task	Their specific capabilities and competences are still rather unknown and trust is not yet developed.	Early implementation in simulation and demonstrator reveals diverse orientations of partners. A consensus-based decision model delays problem-solving.	Agreement on strengthening the decision-making model. Focus on completion of the project.
Impersonal coordination mechanisms	The contract, statement of work, management model, released documents, designs, and standardized reports.	Gradually evolving as more document and specifications are developed in detail. Simulations and implementation in manned demonstrator outcomes represent a leap in accumulated codified material	Gradually evolving as more documents and specifications are developed in detail. Implementation in unmanned demonstrator outcomes represent a leap in accumulated codified material
Electronic media	E-mails, skype meetings and telephone and video conferences	E-mails, skype meetings and telephone and video conferences	E-mails, skype meetings and telephone and video conferences
Personal face-to-face coordination mechanisms	Sparse meetings between key managers / 1st Standardization workshop	Extended workshops / Decision making meetings / Standardization workshops	Decrease of frequency of extended workshops and decision making meetings / Standardization workshops

Implications

The balance between the mechanisms are affected by an evolving mutual understanding of the task as a consequence of:

- differences in partners orientation as integrators or suppliers.
- the early identification of problem areas based on the incremental approach and,
- the size of the codified knowledge base of the group,

Thank You

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