RESPONSIBILITY ASSIGNMENT IN SYSTEMS ENGINEERING

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Abstract

The constantly increasing system complexity leads to various challenges in established companies, which can be controlled by using systems engineering processes. INCOSE defines explicit processes with concrete inputs and outputs (artifacts) for this purpose. Systems Engineering roles can be used to organize the tasks of the processes within the company. In this work, the responsibilities of the systems engineering roles on the process artifacts are evaluated by means of the RACI scheme and examined by means of cluster analysis. The work steps are accompanied by discussions and results of a systems engineering transformation project with a large German automotive OEM. The goal of the study is to identify the minimum size of a systems engineering team and prioritize the systems engineering roles. As a result, the (sometimes contradictory) requirements from the methodological perspective of systems engineering and the organizational perspective of project management become manageable in the control and execution of systems engineering projects.

Input/Output	Mod. Eng.	Sys. Arch.	Sys. Int. Mgr.	Tech. Mgr	Proj. Leader	Stake. Int.	Req. Eng.	Life Cycle Eng.	Imp. Eng.	V&V Eng.	Sec. Eng.	Process Owner	Config. Mgr.	Infom. Mgr.	Entrepreneur
Configuration management report				C									R A		
Configuration management strategy				C									R A		
Customer satisfaction inputs		C	C			R A	C								
Decision management strategy				C	R A										C
Decision record				C	R A										I
Decision report				C	R A										I
Decision situation				C	R A										I
Design definition record	A					R									
Design definition strategy	R A														
Design traceability	R A					C									
Disposal constraints								R A							
Disposal enabling system requirements							A	R							
Disposal procedure				C				R A							
Disposal record								R A							
Disposal report								R A							
Disposal strategy								R A							
Disposed system								R A							
Documentation tree				R A										C	
Enabling system requirements							R A								
Final RVTM		C	C	C		C	A			R			C	C	
Human resource management plan					R A							C			C
Human resource management record				R	A							C			I
Human resource management report				R	A							C			I
Implementation constraints	C	A	C	I	I				R		C		C		
Implementation enabling system requirements	C	A	C				C		R		C		C		
Implementation record		A	C	I					R					C	
Implementation report		A	C	C					R					C	

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Implementation strategy	C	A	C	A	I		C		R	I	C		C		
Implementation traceability	C	A	C	C			C		R						
Information management record				C										R A	
Information management report				I										R A	
Information management strategy				C	I									R A	
Information repository														R A	
Infrastructure management plan				R A	C							C			I
Infrastructure management record				R A								C			
Infrastructure management report				R A	I										
Initial RVTM		C	C	C		C	A			R			C	C	
Installation procedure			C	A					R		C		C		
Installed system	C	C	C	C	C				R		C	C	C	C	A
Integrated system or system element		C	C	C			C		R A	C	C		C	C	
Integration constraints	C	C		C	I		C		R A				C		
Integration enabling system requirements							C		R A						
Integration procedure				C					R A	C	C		C	C	
Integration record									R A						
Integration report									R A						
Integration strategy				C	I				R A						
Interface definition	C	C	R A	I			C		C		C		C		
Interface definition update identification	C	C	R A	I			C		C		C		C		
Knowledge management plan				R A											
Knowledge management report				R A											
Knowledge management system				R A											
Life cycle concepts			C	I	I			R A					C		C
Life cycle constraints								R A					C		I
Life cycle model management plan			C	I	I			R A	C						

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Life cycle model management record								R A							
Life cycle model management report				C	I			R A							
Life cycle models	C	C	C	C				R A	C				C		
Maintenance constraints				A	I		C	R					C		I
Maintenance enabling system requirements	C	C		A			C	R					C		
Maintenance procedure				A			C	R					C		
Maintenance record				A			C	R					C		
Maintenance report				A			C	R					C		
Maintenance strategy				A	C		C	R					C		I
Major stakeholder identification					I	R A									C
Measurement data			C						R A				C	C	
Measurement needs			C						R A				C		
Measurement record			C						R A				C		
Measurement report			C						R A				C	I	
Measurement repository			C						R A				C		
Measurement strategy			C						R A				C	C	
MOE data			C				C		C		I			R A	
MOE needs			C				C		C		I			R A	
MOP data			C				C		C		I			R A	
MOP needs			C				C		C		I			R A	
Operation constraints		C	C	C			C		R A				C		
Operation enabling system requirements		C		C			C		R A				C		
Operation record				C					R A				C		
Operation report				C					R A						
Operation strategy		C	C	A	C				R						
Operator/maintainer training materials									C			R A			
Organization infrastructure					R A							C			C

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Project infrastructure needs	C	C	C	C	R A	C	C	C	C	C	C	C	C	C	C
Project lessons learned	C	C	C	C	R A	C	C	C	C	C	C	C	C	C	C
Project performance measures data	C	C	C	C	A	C	C	C	C	C	C	R	C	C	C
Project performance measures needs	C	C	C	C	A	C	C	C	C	C	C	R	C	C	C
Project planning record		C		R	A										
Project portfolio					R A										C
Project schedule					R A										
Project status report		C			R A				C	C		C	C	C	
Project tailoring strategy					R A										C
Quality management corrective actions															
Qualified personnel					R A										
Quality assurance evaluation report															
Quality assurance plan															
Quality assurance record															
Quality assurance report															
Quality management evaluation report															
Quality management guidelines															
Quality management plan															
Quality management record															
Quality management report															
Records															
Reports															
Request for supply		R	I	I	A	C	I	I					C		C
Risk management strategy		C		C	C	C					C	R A			
Risk record		C		C	C	C					C	R A			
Risk report		C		C	C	C					C	R A			
SEMP		C	C	R	I				C	C		A	C	C	
Source documents															
Stakeholder needs						R A									
Stakeholder needs and requirements definition record						R	A					C		C	

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Stakeholder needs and requirements definition strategy						R	A								
Stakeholder requirements						R	A								
Stakeholder requirements traceability						R	A		C	C				C	
Strategy documents				C		R A		C							C
Supplied system		R		A			C		C				C		
Supply agreement				A	R		C								
Supply payment				C	R A										
Supply record		R		A	C										
Supply report		R		A	C										
Supply response				A	R										
Supply strategy		R	I	I	A	C	I	I					C		C
System analysis record	C	C		C			C		C	C	C	A		R	
System analysis report	C	C		C			C		C	C	C	A		R	
System analysis strategy				C								R A		C	
System architecture description	C	A		I	I		C		R				C		
System architecture rationale	C	A		I	I		C		R				C	C	
System design description	C	A	C	I	I	C	C		R				C	C	
System design rationale	C	A	C	I	I	C	C		R				C	C	
System element descriptions		A	C	I			C		R				C		
System element documentation	C	C		C					R					A	
System elements		A		R					R				I		
System function definition		R A	C				C								
System function identification		R A	C				C	C					C		C
System functional interface identification		C	R A						C						
System requirements		C	C			C	R A						C	C	
System requirements definition record							R A								
System requirements definition strategy		C		R		C	A	C		C		C			C
System requirements traceability		R					A		C	C					
TPM data		C		C					R	A			I		
TPM needs		C		C					R	A				C	
Trained operators and maintainers															
Transition constraints		C		R	C			C				A			
Transition enabling system requirements		C		R	C			C		C		A			
Transition record		C		C				R						C	
Transition report		C		C				R						C	

Input/Output	Mod. Eng.	Sys. Arch.	Sys. Int. Mgr.	Tech. Mgr	Proj. Leader	Stake. Int.	Req. Eng.	Life Cycle Eng.	Imp. Eng.	V&V Eng.	Sec. Eng.	Process Owner	Config. Mgr.	Infom. Mgr.	Entrepreneur
Transition strategy		C		C	C			C				R A			
Updated RVTM		C	C	C		C	A			R			C	C	
Validated requirements		C				C	R A			C					
Validated system	C	C					C			R A					
Validation constraints		C					C			R A		C			
Validation criteria		C	I				R			A					
Validation enabling system requirements										R		A		C	
Validation procedure		C		C	I					R A		C			
Validation record		C		C	I					R A				C	
Validation report										R A				C	
Validation strategy		C		C						R A		C		C	
Verification constraints		C					C			R A		C			
Verification criteria		C	I				R			A					
Verification enabling system requirements										R		A		C	
Verification procedure		C		C	I					R A		C			
Verification record		C		C	I					R A				C	
Verification report										R A				C	
Verification strategy		C		C						R A		C		C	
Verified system	C	C					C			R A					
WBS				R	C							A			