Software Classification Methodology and Standardisation

07 March 2003

esa

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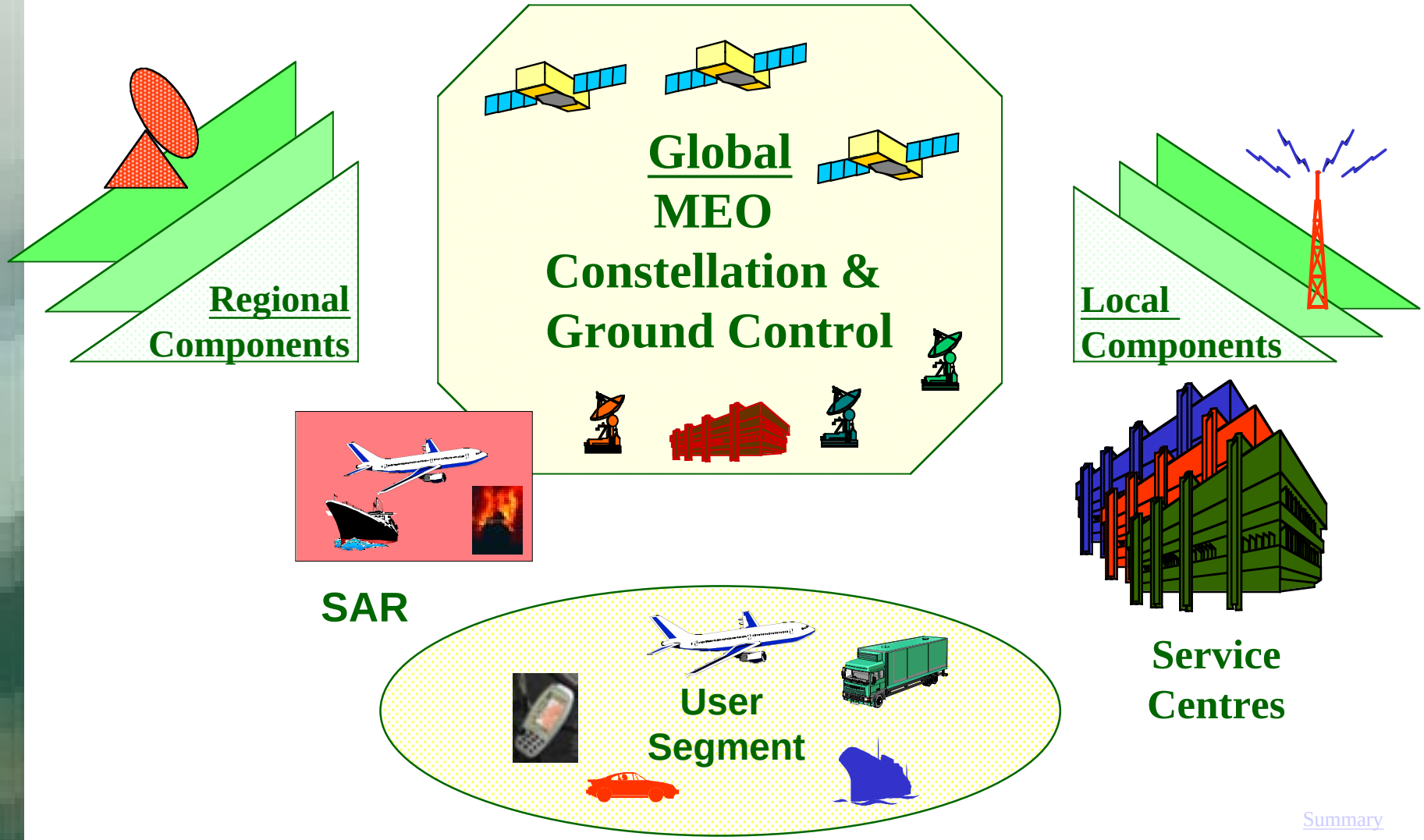
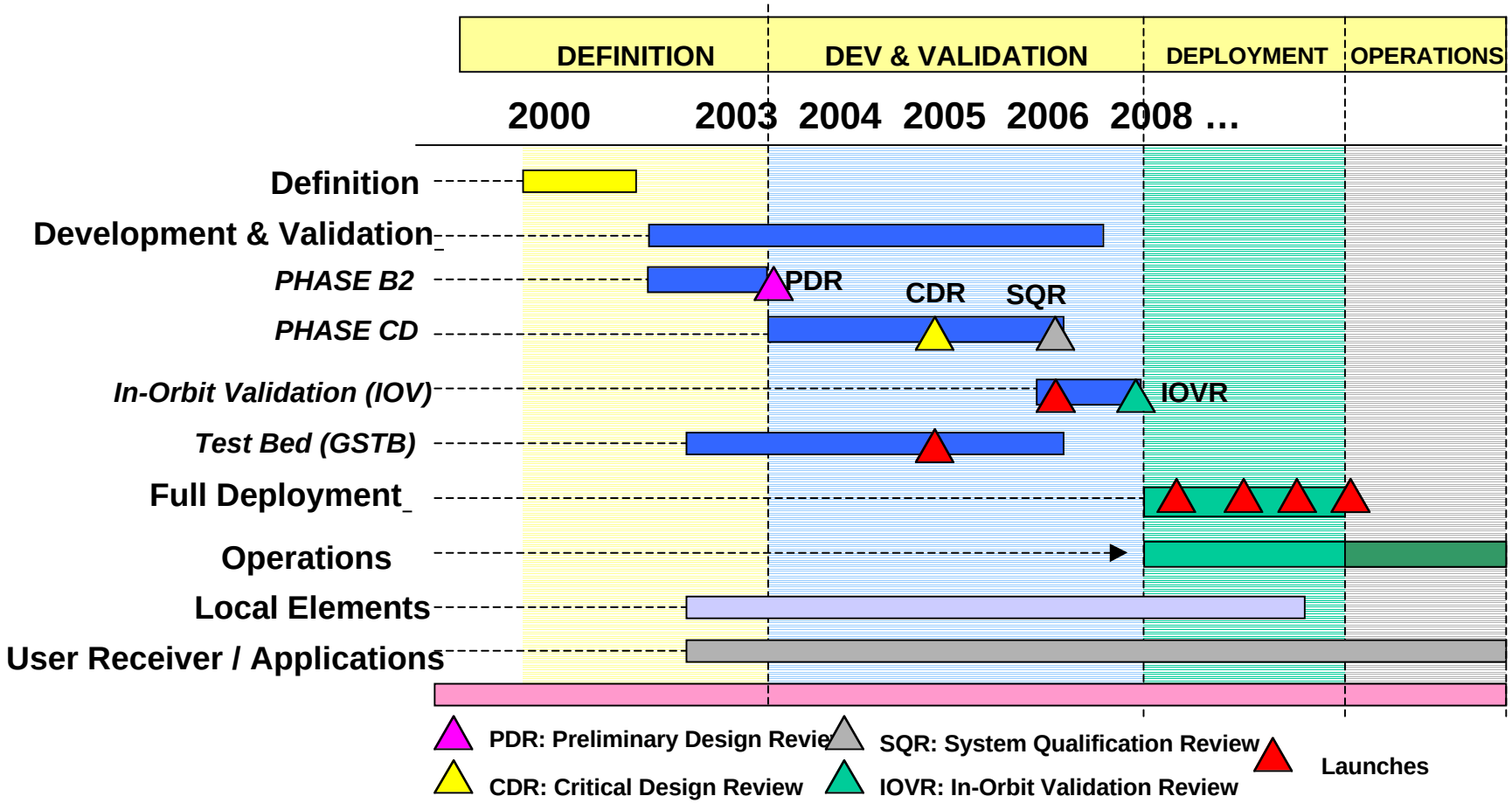
GALILEO System Overview



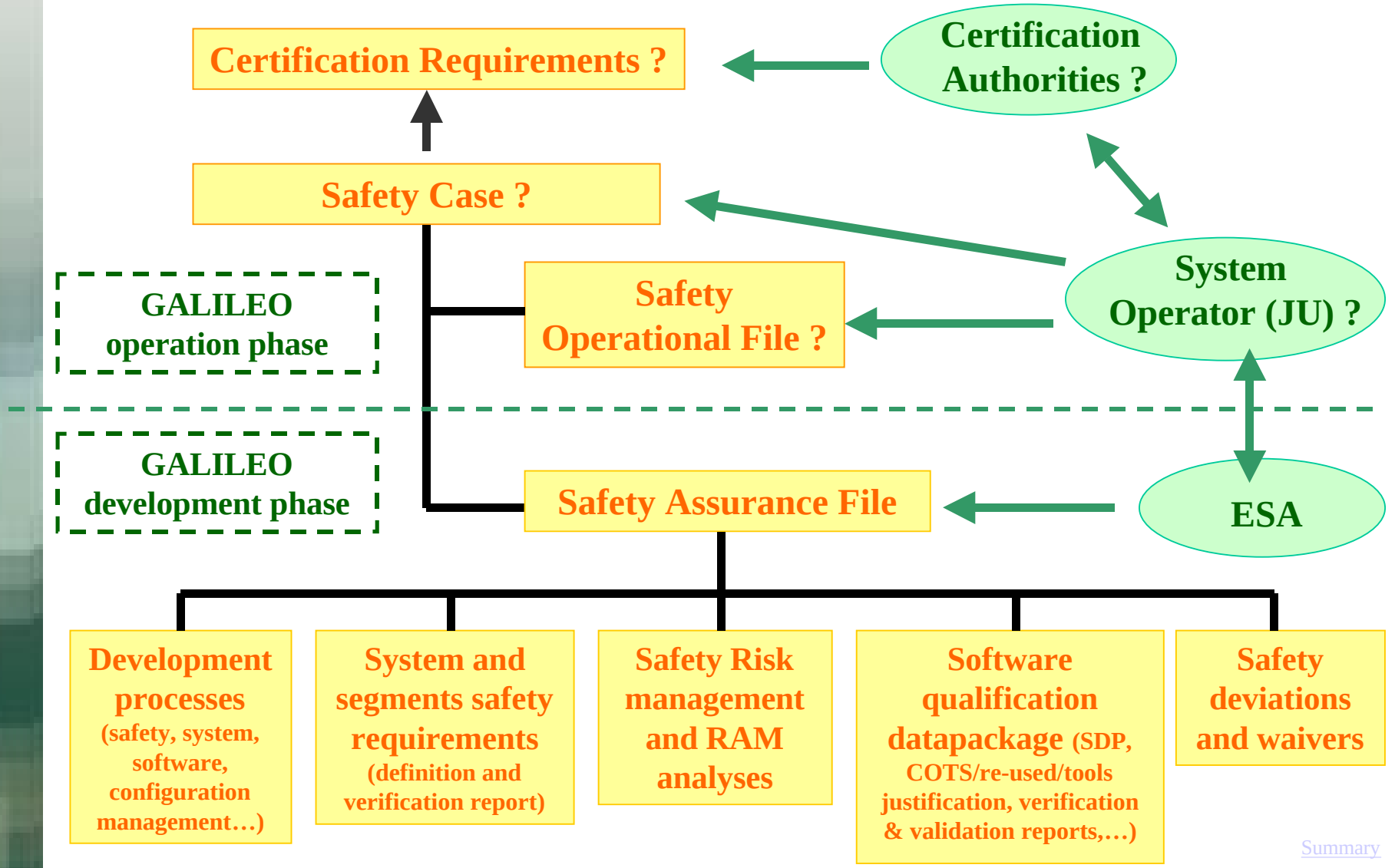
Summary

Master Schedule



Summary

GALILEO Safety Case Approach (TBC)



Summary

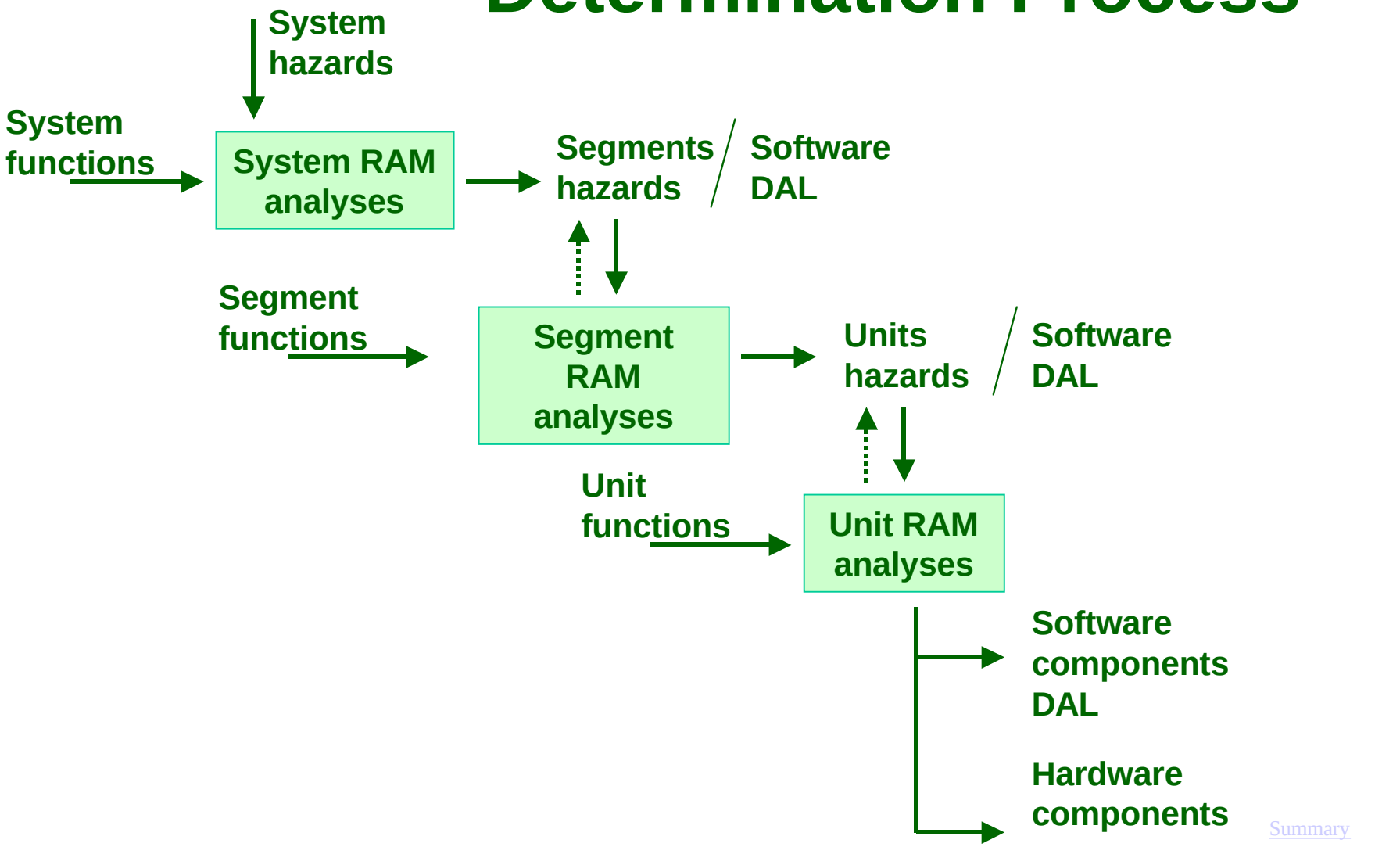
System Safety Hazards Definition and Related Software Classification

System safety hazards			Software DAL
Severity	**Direct "classical"**	**Indirect "navigation-related"**	
Catastrophic	• Loss of life, life threatening or permanently disabling injury or occupational illness • Loss of launch site facilities • Long-term detrimental environmental effects	None	A
Critical	• Temporarily disabling but not life threatening injury or temporarily occupational illness • Short-term environmental detrimental environmental effects • Loss or damage to public or private property	• The position error exceeds the specified Alert Limit and the user is not informed within the Time to Alert (Hazardous Misleading information / Integrity event)	B
Major	• Temporarily loss of satellite or ground facility not leading to catastrophic or critical event	• Loss of continuity • Loss of Search and Rescue Service	C
Minor	None	• Degradation of mission performances not leading to catastrophic / critical / major consequences (loss of availability)	D
Negligible	• All others	None	E

DAL = Development Assurance Level

Summary

System Hazards and Software DAL Determination Process



Summary

Software Standards : Objectives

- To define a “How” project standard in response to the “what” from ESA ECSS standards (E40B and Q80B)
- To have Software engineering and product assurance commonality (many European companies involved)
- To tailor ESA ECSS standards to Galileo software DAL (DO178B/IEC61508 and other standards used within relevant industry sectors - i.e. aviation, maritime, rail, road – are not applicable)
- To plan future software qualification means for Galileo certification purpose (currently no certification authority and no European certification requirements)

Summary

Software Standards : Content

- Software life-cycles vs. software types (I.e: algorithms, database, MMI, tool…)
- Software engineering methods (specification, design, coding, tests)
- Software documentation templates
- Software configuration management
- Software safety analyses
- Software re-used and COTS procedures
- Audits procedures
- Quality model and metrication
- Traceability Matrix to ESA ECSS E40B/Q80B
- Software DAL Applicability matrix

Summary

Conclusion

- No certification authorities and requirements established yet
- Safety case is the responsibility of the system operator only
- The current Safety Case approach will have to be validated with certification authorities
- Safety Assurance File is applicable to space, ground and user segments
- Diversity of industries involved in Galileo needs to define a common Galileo software standard
- Galileo Software standard is written so as to cover the DO178B objectives
- Complex software is covered by Galileo SW standard (I.e. algorithms, COTS, re-used software…)

Summary