"Exploring the Universe with the world's largest radio telescope"

2011
SKA System delta CoDR
Risks and Risk Management

Kobus Cloete

23 February 2011

Presentation Overview

- Risk management Plan
- Status of the risk register
- Risk exposure estimates in current Risk Register
- Risks
  - Technical
  - Managerial
- Way forward

Risk Management Plan

- Did not change since the Feb 2010 system CoDR
- Risk management plan describes:
  - Purpose and objectives of risk management
  - Responsibilities
  - Integration
  - Internal communications
  - External communications
  - Risk management process
- Feb CoDR presentation appended for reference

Status and Development of Risk Register

- Developed first risk register April 2009.
- Updated a few times since then.
- Organisation of the register:
  - System, Dish array (WBSPF), Dish array (PAF), Dish array (all), Sparse aperture arrays, Dense aperture arrays, Signal processing, Software and computing, Signal transport and networks, Infrastructure, WP3, Management
- For the dCoDR added text to indicate progress and status of each risk, will be removed afterwards
- Added a few risks and closed one off
- Added estimate of risk exposure

Risk Exposure (1)

- Based on guidelines in the Risk Management Plan but simplified to 3x3 matrix
  - **Likelihood:**
    - Not likely : Low
    - Likely : Medium
    - Very likely : High
  - **Impact:**

Impact	Cost	Schedule	Performance
Low	Around 2% impact	Very minor or no slip in milestone (several weeks)	Very minor or no impact
Medium	Around 5% to 10% impact	Moderate slip in milestone (several weeks to few months)	Moderate functional impact or reduction in performance, performance almost acceptable but require minor redesign
High	Larger than 20% impact	Critical slip in milestone (more than 6 months)	Critical functional impact or reduction in performance, performance not acceptable and require new design

Risk Exposure (2)

– **Exposure:**

		Impact		
		Low	Medium	High
Likelihood	High	Medium	High	High
	Medium	Low	Medium	High
	Low	Low	Low	Medium

– The estimated risk exposure to SKA Phase 1 (SKA1) and SKA Phase 2 (SKA2) as shown in the table is subjective and has been estimated by the SPDO domain specialists based on their view and knowledge of the domain.

Risks

- Technical risks addressed in High Level System Description presentation.
- Rest of this presentation will focus on Management Risks

Management Risks (1)

- 12.1 Project management systems and controls are ineffective for the SKA project
  - SPDO Project Manager appointed. Progress within WP2 has been made and will be utilised till the transition to the SKA Project Office has been completed.
- 12.2 SPDO Contributing Organisations unable to carry out work packages to the point of actual promised delivery.
  - This has been the focus of the effort within the WP2 Management Team for the past few months. Estimation of the work that can be completed has been made, gaps are being investigated.
  - Milestones and deliverables have been agreed
  - Dates for reviews have been agreed

Management Risks (2)

- 12.3 Lack of SPDO staff resources to complete the design and policy work needed for PrepSKA.
  - The SPDO staff has been increased during 2010 and measures to insource services are also being investigated.
- 12.4 SKA project structure deficient
  - A structure for the new SKA Organisation has been proposed in the Pre-construction Project Execution Plan (PEP). The plan will be reviewed by an external panel during early March 2011.
- 12.5 Loss of valuable experience, relationships and knowledge during project execution and post project.
  - Following the external review of the PEP during March 2011, the decision on the location of the SKA Project office and the confirmation of the budget, some uncertainties may be removed.
  - Risk that the combination of these decisions will influence the continuity of personnel remains.
  - Risk within institutes not very high.

Management Risks (3)

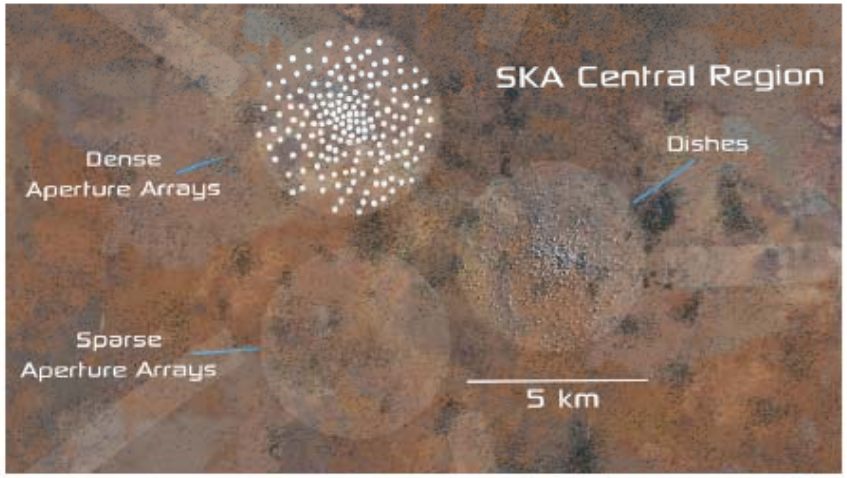
- 12.6 The SKA project fails to understand external project environment
  - A detailed analysis of (some of) these aspects is being performed as part of the site selection process.
- 12.7 Handover between SPDO and SPO
  - As soon as the SPO has been established the management of the two organisations should plan and execute an effective transition and handover plan.
  - Handover between current institutes and possible 'new players' in Work Package Contractor arrangements also a high risk

Way forward

- Ensure that the risks currently listed are management and mitigated
- Ensure that new risks are identified and captured
- Review risks at next level (as part of each of the CoDR's to be conducted this year)
- Roll up risks and compile complete SKA risk register
- Hand over to SPO for further management

Thank you

SPDO



SKA System CoDR

Risk Management Plan
RMP

Kobus Cloete

25 February 2010

What is a risk and components of risk

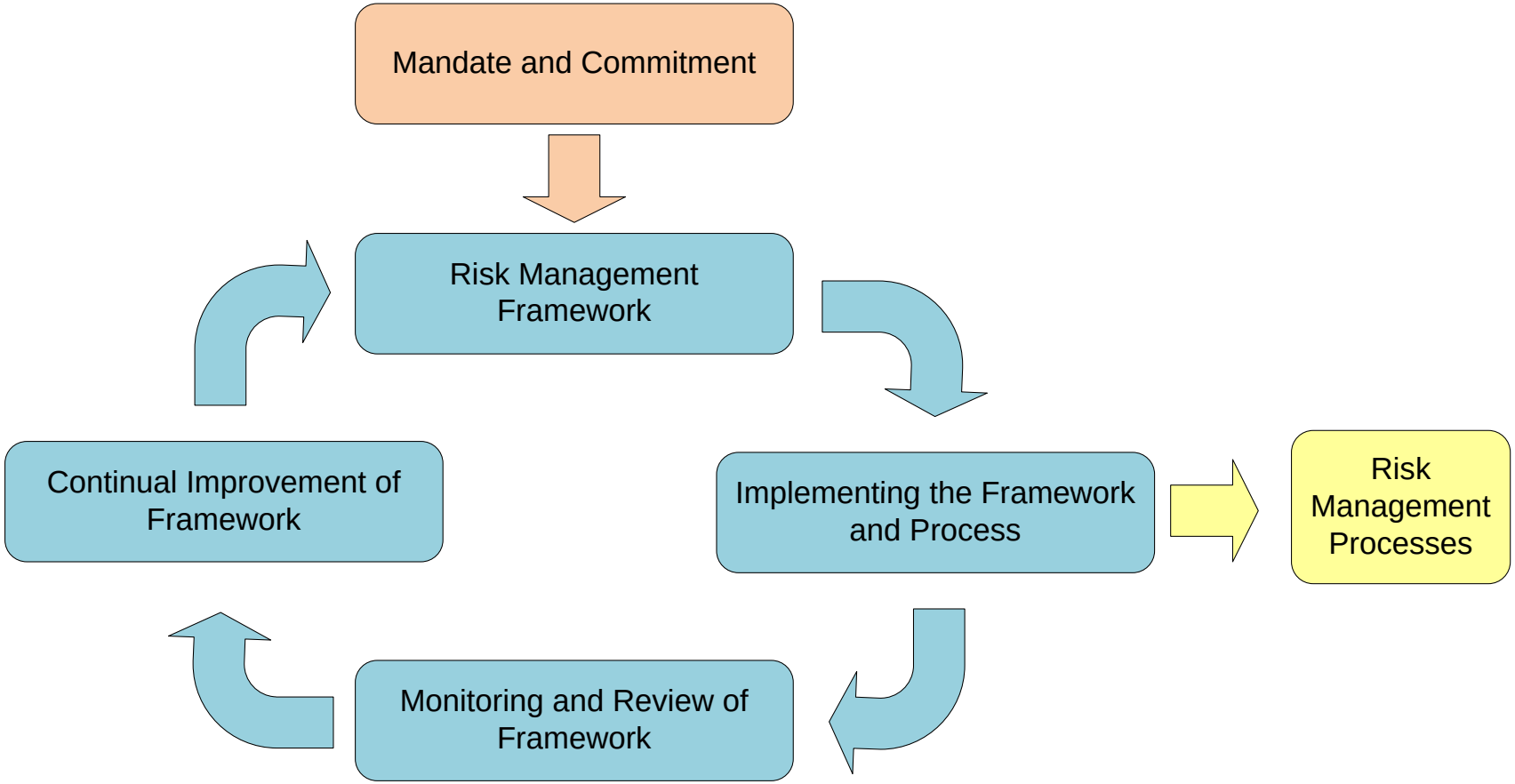
- An uncertain future event that will prohibit the project from achieving its goals and objectives within cost, schedule and performance constraints
- Three components of risk are:
  - *A future root cause (yet to happen), which, if eliminated or corrected, would prevent a potential consequence from occurring,*
  - *A probability (or likelihood) assessed at the present time of that future root cause occurring, and*
  - *The consequence (or effect) of that future occurrence.*
- A future root cause is the most basic reason for the presence of a risk. Accordingly, risks should be tied to future root causes and their effects.

Risks versus issues

- If any event can be described in the past tense it is an issue to manage and not a risk.
- Risks are future events and the focus of risk management is to identify, plan and execute strategies and plans to prevent them from happening, or mitigate their impact.
- Should not identify issues and manage the consequences instead of identifying risks and management of the root causes.
  - Will mask the true risks and will only succeed in tracking risks rather than to mitigate or resolve risks.
  - Will lead to crisis management and will limit the options available to resolve the crisis.

Framework

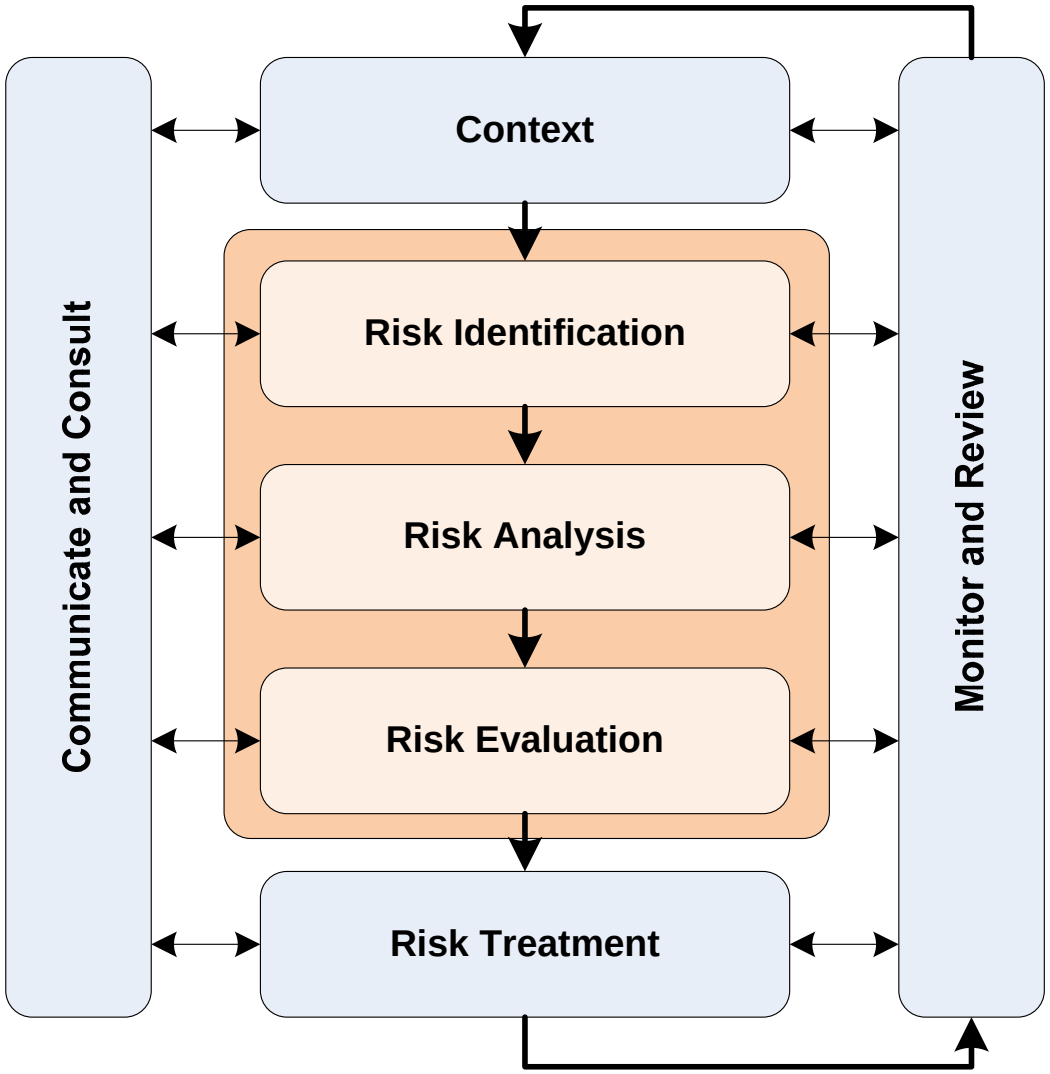
SPDO



Framework

- Risk management plan also describes:
  - Purpose and objectives of risk management
  - Responsibilities
  - Integration
  - Internal communications
  - External communications

Risk management process



Mapping of risks

- Likelihood
  - Technology readiness
  - Software
  - Alternative
- Consequences
  - Cost
  - Schedule
  - Performance

Likelihood					
5	L	M	H	H	H
4	L	M	M	H	H
3	L	L	M	M	H
2	L	L	L	M	M
1	L	L	L	L	M
	1	2	3	4	5
	Consequence				

Risk identification and reporting

- Brainstorming sessions
- Risk assessment workshops
- Work sessions during Technical Design Reviews
- External review(s) of risk register/database
- Structured or semi-structured interviews with experts
- Using knowledge, expertise and experience of team
- Failure Mode and Effect Analysis (FMEA)
- Fault Tree Analysis (FTA)

Risk analysis and evaluation

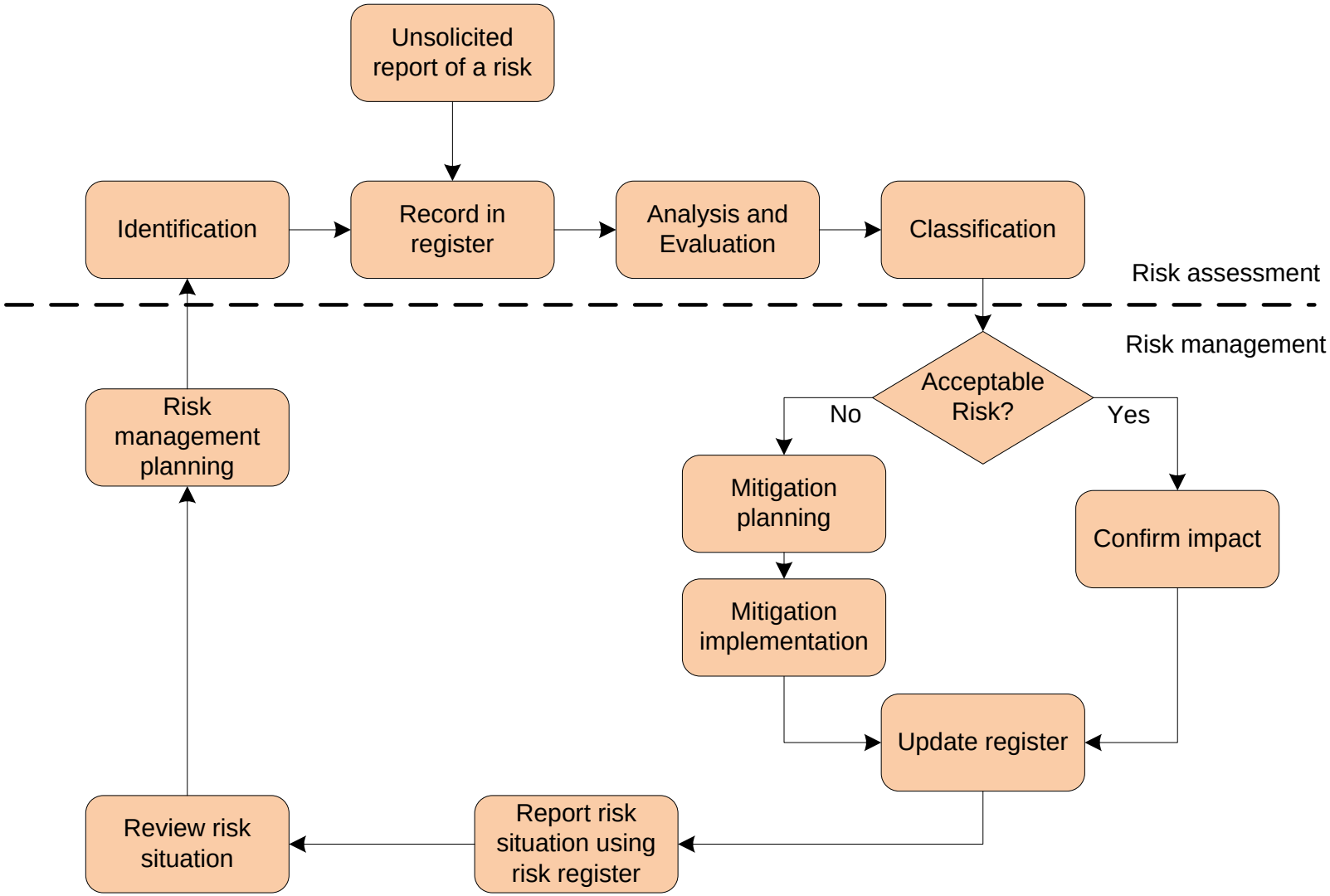
- Analysis
  - To develop an understanding of the risk and to provide the required inputs for the risk evaluation process and eventual decision making.
- Evaluation
  - To confirm the output of the analysis, to confirm which risks need treatment and to prioritise them for implementation.
  - Risk priorities allocated
    - High – Mitigation strategies will be developed and implemented as a matter of priority.
    - Medium – These are the next level of risks to be addressed once capacity is available following the implementation of mitigation strategies for the high priority risks.
    - Low – These risks should be addressed once the high and medium risks are under control

Risk treatment

- Avoidance - Eliminate the source of high risk and replace it with an alternative that has a more acceptable risk.
- Transference – Transfer the risk to another party.
- Mitigation – Active reduction of the impact of the risk by developing alternative designs or plans, prototypes, models and simulations.
- Acceptance – If there is no alternative or if the risk is deemed to be within the risk profile of the project, the risk and the predicted consequences can be accepted.

Summary of process

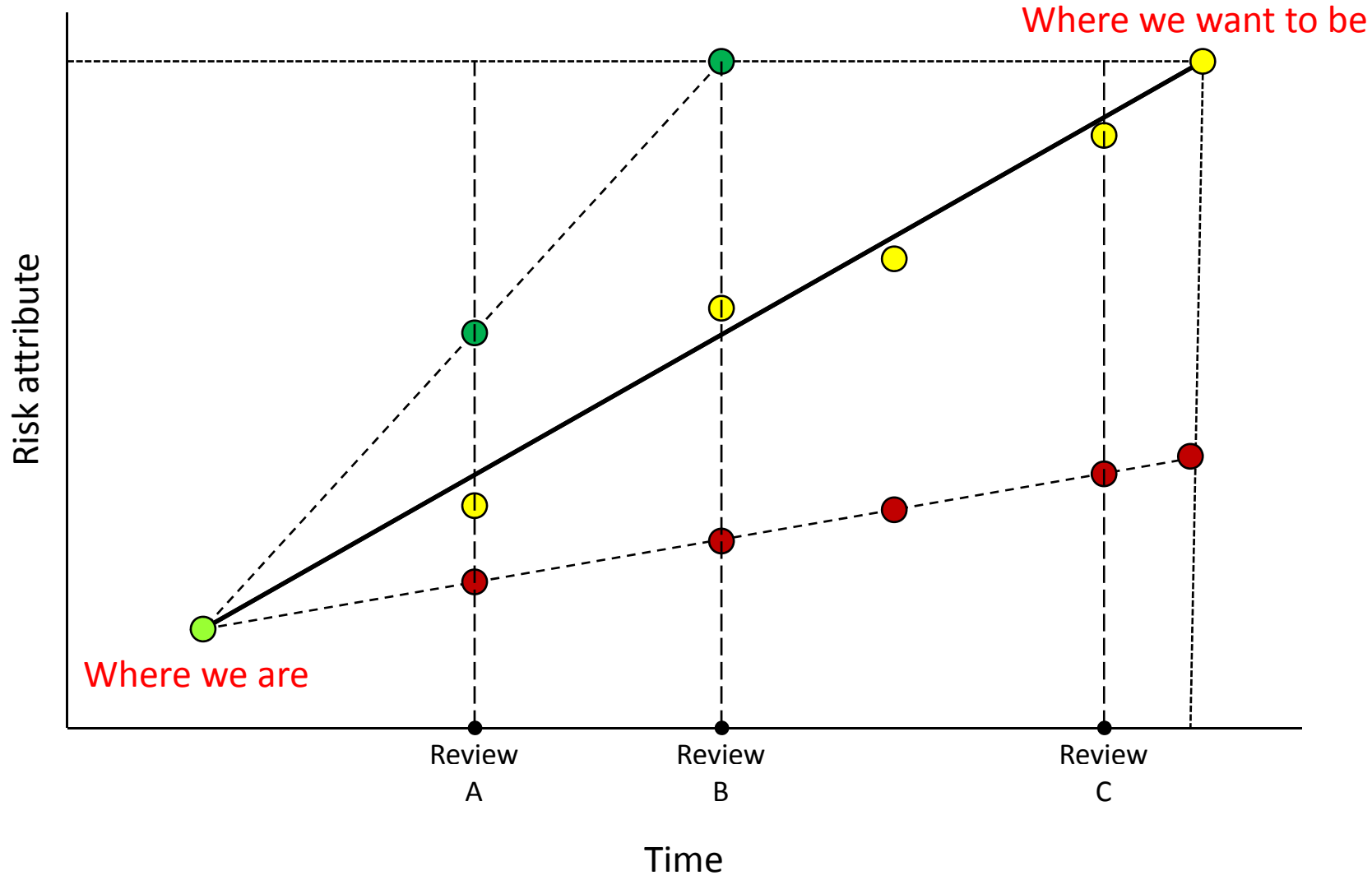
SPDO



Risk management

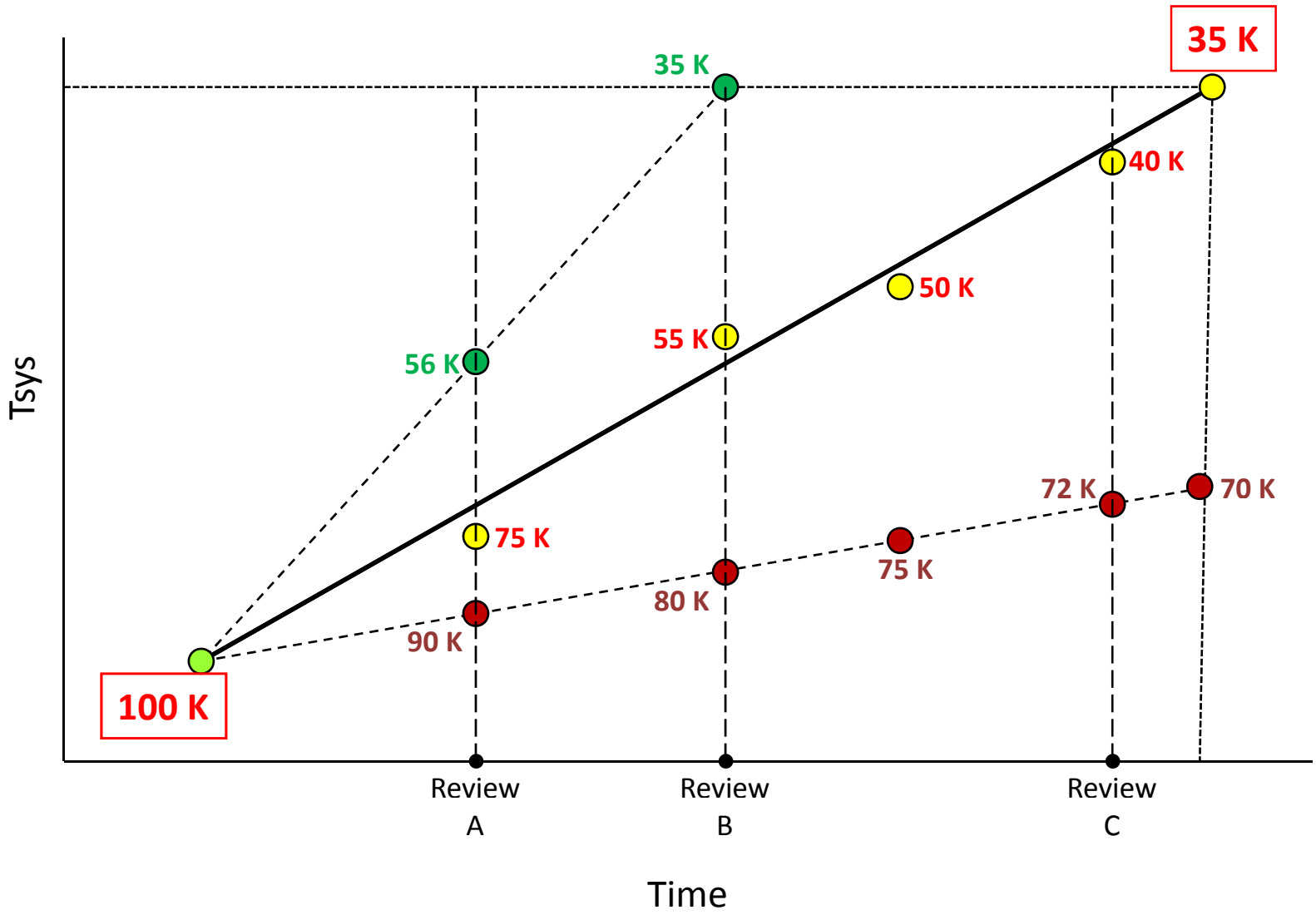
- Forms an integral part of the process with a comprehensive risk management program across the project to be established and maintained throughout the life cycle
- Verification (risk mitigation) programmes in each domain
  - Building of complete/representative prototypes
  - Paper designs and analysis
  - Testing of samples
- Risk management is applicable to all hierarchical levels
  - Not all the risks needs to be visible at the higher level
  - Rolled up

Risk mitigation objectives



Risk mitigation objectives - Example

SPDO



Risk mitigation objectives - Example

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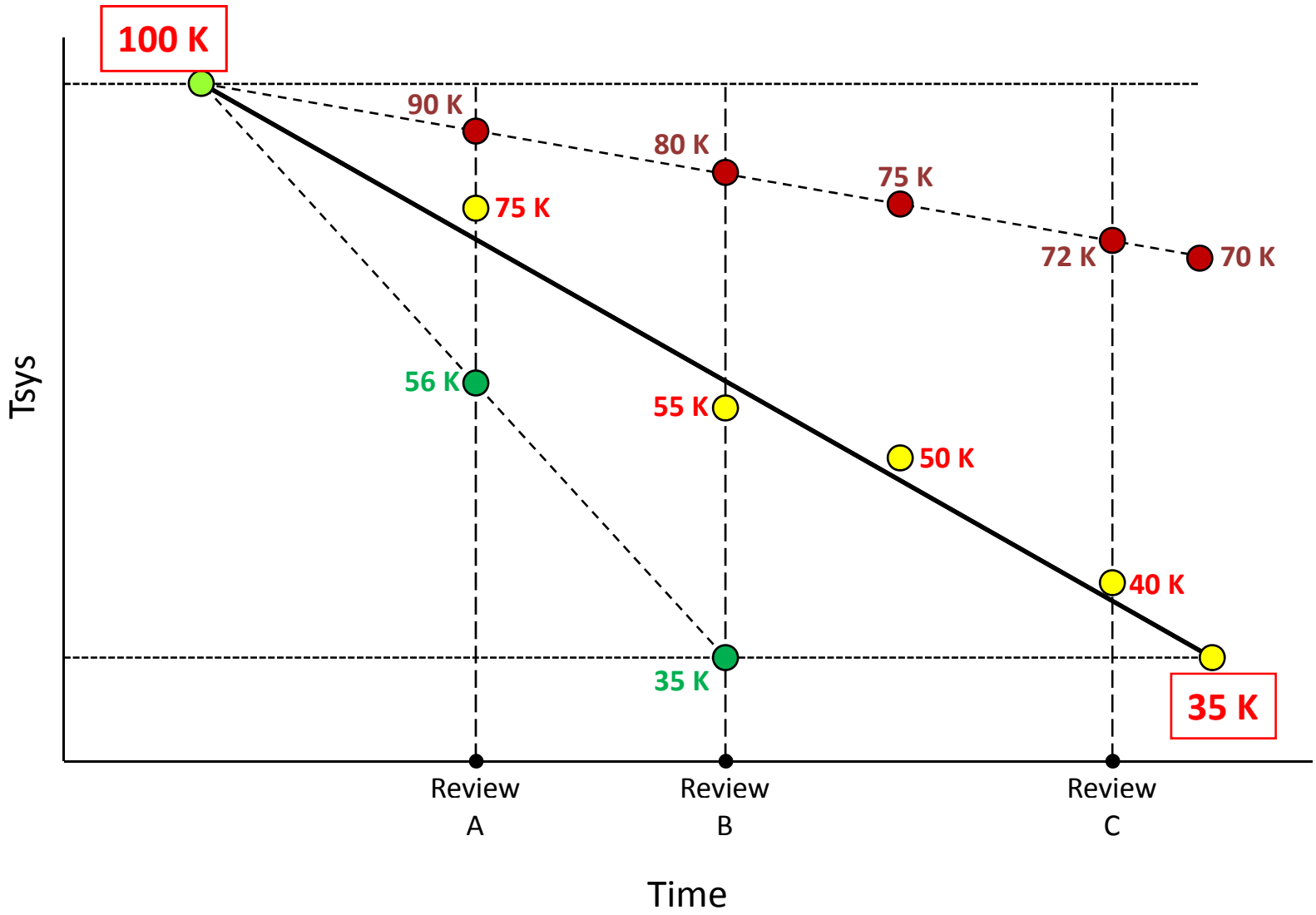

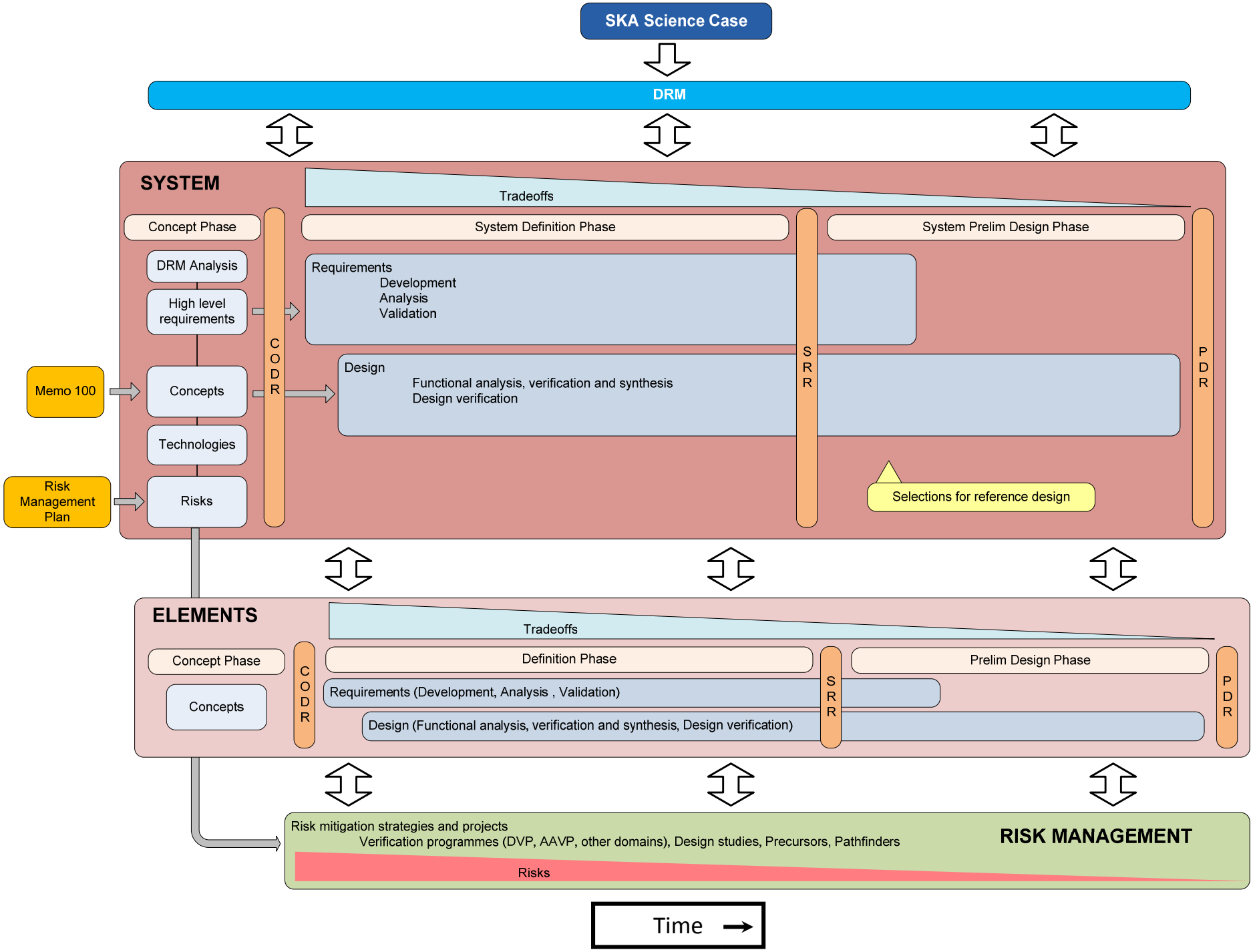
SKA Science Case
DRM
SYSTEM
Tradeoffs
Concept Phase
System Definition Phase
System Prelim Design Phase
DRM Analysis
High level requirements
Requirements
Development
Analysis
Validation
C O D R
S R R
P D R
Memo 100
Concepts
Design
Functional analysis, verification and synthesis
Design verification
Technologies
Risk Management Plan
Risks
Selections for reference design
ELEMENTS
Tradeoffs
Concept Phase
Concepts
C O D R
Definition Phase
Prelim Design Phase
Requirements (Development, Analysis , Validation)
Design (Functional analysis, verification and synthesis, Design verification)
S R R
P D R
Risk mitigation strategies and projects
Verification programmes (DVP, AAVP, other domains), Design studies, Precursors, Pathfinders
RISK MANAGEMENT
Risks
Time

Thank you