

# Integrated Risk & Knowledge Management Systems

Exploration Systems Mission Directorate (ESMD)  
<https://ice.exploration.nasa.gov/confluence/display/ESMDRiskAndKM/Home>

IR&KMS maps

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**P2.0**  
Process 2.0  
<https://ice.exploration.nasa.gov/ice/site/km/process/>



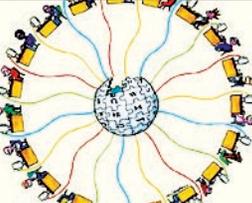
**CRM**  
Continuous Risk Management  
<https://ice.exploration.nasa.gov/confluence/display/ESMDRiskAndKM/Continuous+Risk+Management>



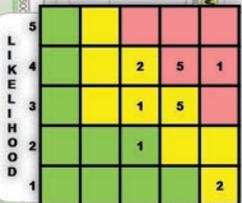
**KNOWLEDGE CAPTURE & TRANSFER**  
<https://ice.exploration.nasa.gov/confluence/display/ESMDEngTmg/Mitigate+Risk>



**KBRs**  
Knowledge-Based Risks  
<https://ice.exploration.nasa.gov/ice/site/km/kbr/>

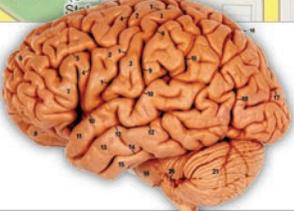


**WIKI-ENABLED TEAMS**  
<https://ice.exploration.nasa.gov/confluence/dashboard.action>

5	Green	Yellow	Red	Red	Red	
4	Yellow	2	5	1		
3	Green	1	5	Red		
2	Green	1	Yellow			
1	Green			2		
		1	2	3	4	5

**RISK MANAGEMENT CASE STUDIES**  
<https://ice.exploration.nasa.gov/ice/site/km/cs/>



**DECISION SUPPORT**  
[https://ice.exploration.nasa.gov/ice/site/iceportal/thinktank\\_help/](https://ice.exploration.nasa.gov/ice/site/iceportal/thinktank_help/)



**RISKAPEDIA**  
<https://ice.exploration.nasa.gov/confluence/display/ESMDEngTmg/Welcome+to+Riskapedia>

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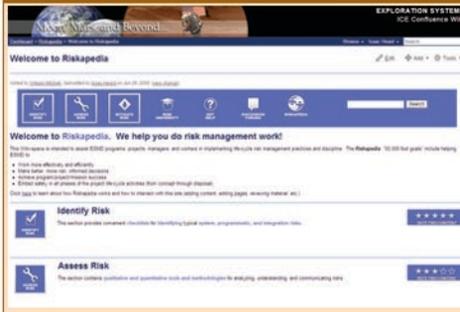
**ENABLING RESOURCES SUPPORTING ESMD**

## PROCESS 2.0



P2.0 events use: critical process mapping, structured brainstorming techniques, and Process Failure Modes Analysis to identify and address work process issues. The result? -- rapid, transparent, team-authored process improvement.

## RISKAPEDIA



Riskapedia is a wiki-based risk management (RM) resource that provides extensive content (tools, techniques, best practices, videos, and lessons learned) addressing the fundamental blocking and tackling skills of RM: Risk Identification, Risk Analysis and Risk Control and Mitigation Planning.

## KNOWLEDGE-BASED RISKS

**Closing an Architecture with Adequate Margins**  
**Risk Statement:** Given the preliminary performance analysis results for Orion, Ares I, Altair, and Ares V, there is a possibility that CxP will not be able to meet total performance requirements and program objectives for lunar capability.

**Video:**  
 Closing an Architecture - KBR 6268  
 2.0 Systems Engineering

**Transcript:**  
**Closing an Architecture with Adequate Margins - Identification of Risk**  
 The objective of Constellation is to return humans to get humans beyond low-Earth orbit -- to build new vehicles, new launch vehicles, new human-carrying vehicles -- first up to space station and then as soon as we can, onto the Moon, and from there we're looking at Mars. So the system is overall looking toward expanding human presence through exploration, you know, outside low-Earth orbit.

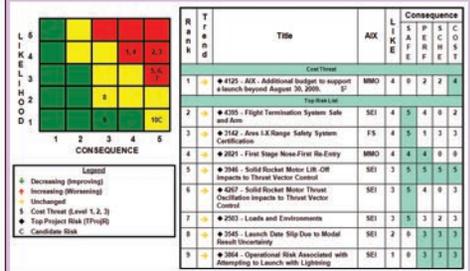
I think I really started with an ESAS study (which was almost 3 years ago now), and that study was really looking to solve that problem -- how do we now return humans to the moon and beyond? But to do that for a long duration: to go from a 3-day Apollo stay to a week-to-2 weeks, to 6 months. And ultimately, if we're going to go to Mars, that's going to be a 3-year mission.

ESAS pretty much covered the entire range of elements that would be needed to take humans beyond low-Earth orbit. No new vehicles, new crew-vehicles, vehicles, new

Muirhead, Brian  
 Runtime: 4:20

ESMD Risk Records provide the context for KBRs - web-based, multi-media, "knowledge bundles" that provide users with expert advice on risk control and mitigation strategies for specific technical risks. Examples include J2X Nozzle Extension, Nutation Time Constant, Tin Whiskers, and EVA Glove Punctures.

## CONTINUOUS RISK MANAGEMENT



ESMD employs an integrated suite of risk-management tools that provide day-to-day risk management functionality to IPTs, program/project managers, technology developers, scientists, and engineers. Risk analyses from the CRM activity provides the framework for and heavily informs the ESMD Integrated Risk and Knowledge Management agenda.

## RISK MANAGEMENT CASE STUDIES

**Space Shuttle Overview**

On September 1982 Martin Marietta delivered the Lightweight Tank with a weight of ~65,000 lbs.

The new Super Lightweight Tank called for an additional 7,500 lbs reduction which presented a significant engineering challenge since all the 'easy' solutions had already been implemented.

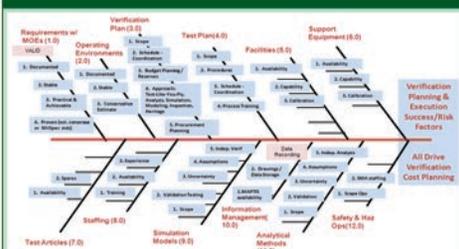
ESMD Risk Records illuminate top engineering management and technical issues. Case Studies provide insight into how similar problems have been addressed in past NASA programs. Each multi-media case has learning objectives and exercises that include risk identification and risk mitigation planning.

## WIKI-ENABLED TEAMS



Over 350 Wikis provide a multi-functional, web-based, collaboration environment for ESMD teams to accomplish work. Wiki implementation is supported by rapid business process analysis to assist in developing the team charter, core --stakeholder membership and knowledge architecture.

## KNOWLEDGE CAPTURE & TRANSFER



Knowledge Capture and Transfer activities are designed to document project execution lessons learned and best practices in a contextual manner using a conversation-based format. Project risk records are used to frame the interviews. Individual issues are synopsized, aggregated, and a composite analysis is provided. Results are provided to stakeholders using a variety of communication modalities.

## DECISION SUPPORT



Decision support services include Decision Tree Analysis, Uncertainty Modeling, and expert elicitation. In addition, ESMD is developing a cadre of trained facilitators to assist teams in using the Think Tank decision support technology. This web-based tool provides powerful support for team brainstorming, prioritization, and alternative analysis.