

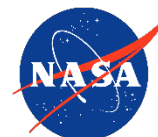


# Risk Management & Communication

Sammy Kayali

Director

Office of Safety and Mission Success



**Jet Propulsion Laboratory**  
California Institute of Technology

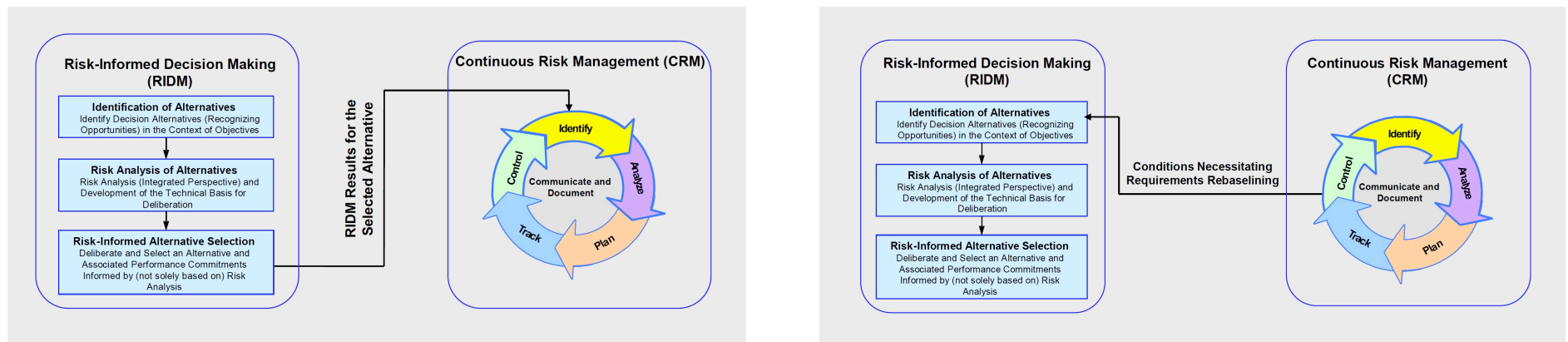
# Definitions

- **Risk:** The possibility of an undesirable event occurring coupled with the severity of the consequences of the occurrence.
- **Risk Management:** The identification, evaluation, and prioritization of risks followed by coordinated application of resources to minimize, monitor, and control the probability or impact of undesired events or to maximize the realization of opportunities.
- **Risk Communication:** The exchange of information, advice and opinions between experts and people facing a common threat to accomplishing a defined objective. The ultimate purpose of risk communication is to enable decision makers, or people at risk, to

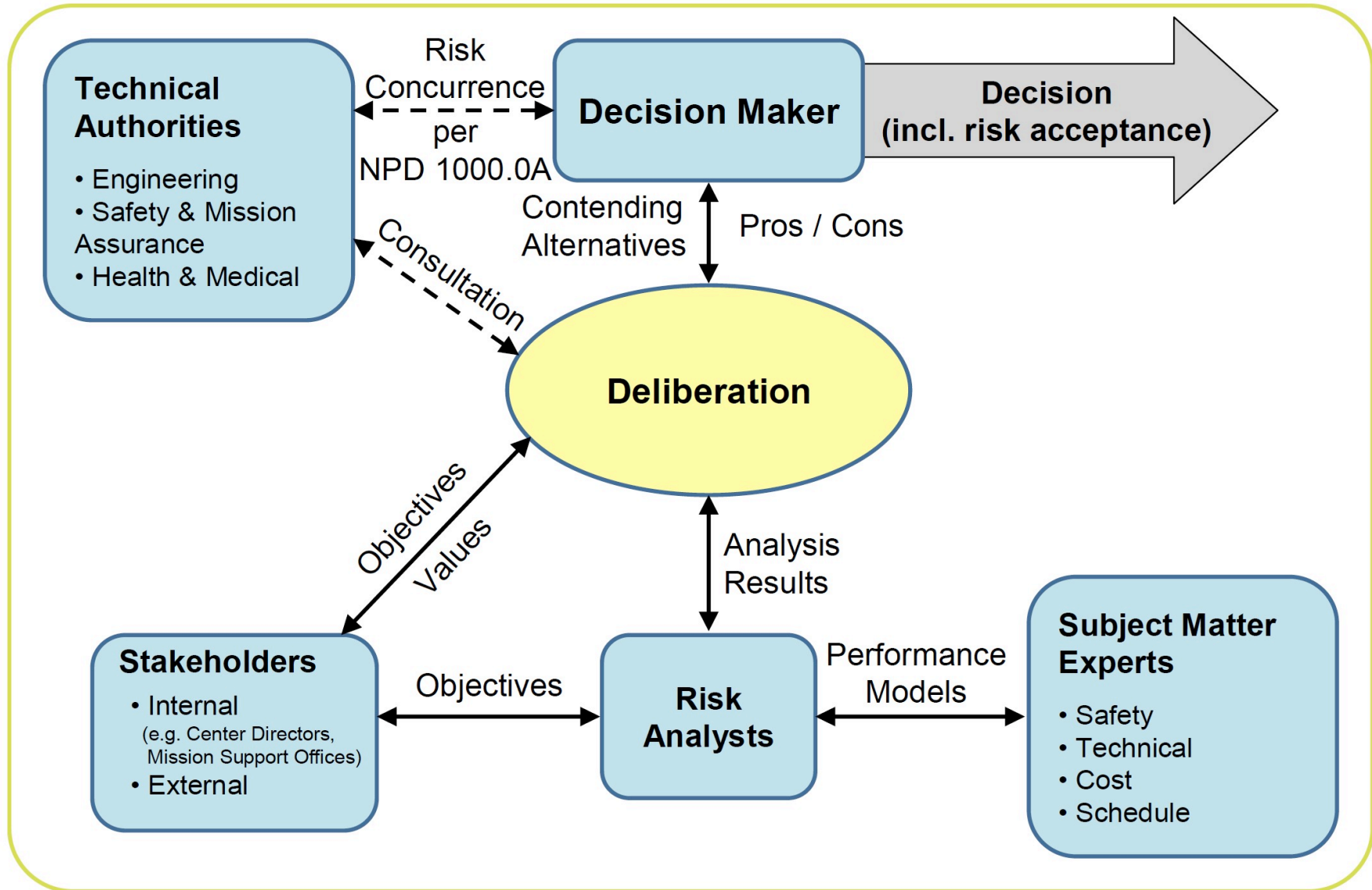
# Risk Management

JPL utilizes Risk Informed Decision Making (RIDM) and Continuous Risk Management (CRM) techniques in implementing and managing our missions. Each project applies the RIDM process to decide how to meet objectives and applies the CRM process to manage risks associated with implementation

- Fosters proactive risk management
- Improves informed decision making through better use of risk information
- More effectively manages implementation risks by focusing the CRM process on the baseline performance requirements emerging from the RIDM process

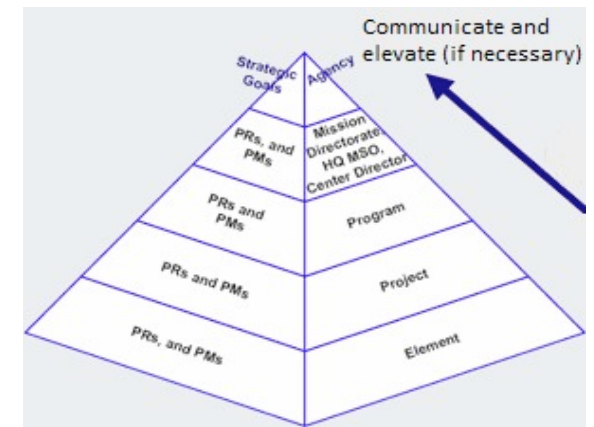


# The Risk Management & Communication Process

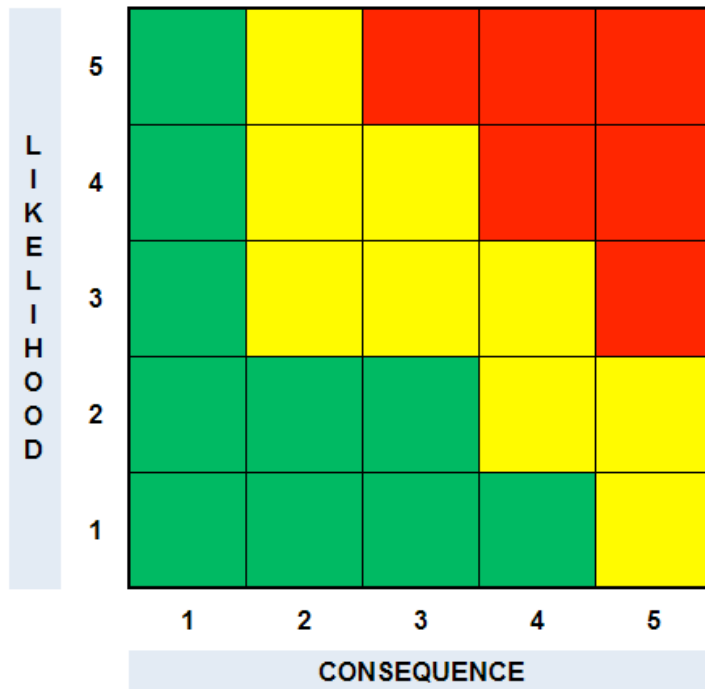


# Work Risks at the Lowest Possible Level in the Project

- Input risks at the initiating level of work and
- Communicate Risks
  - Within working groups
  - Using the 5x5 at periodic reviews and status meetings
- Elevate (as necessary)
  - Risks rising to a “project risk” are reported using the 5x5 at all project reviews
  - The Engineering Technical Authority has authority on engineering risks
  - The Project Manager has authority on programmatic risks
  - The Mission Assurance Manager provides independent



# Risk Reporting Structure & Likelihood



Likelihood Definitions		
Level	Likelihood	Certainty
5	Very high	Almost Certain >90%
4	High	More likely than not 50-90%
3	Moderate	Significant likelihood 10-50%
2	Low	Unlikely 1-10%
1	Very low	Very Unlikely <1%

- Projects utilize a standard risk management process and may tailor the consequence and likelihood definition to better reflect the specific mission conditions.
- Risks are managed throughout the project lifecycle

# The 5 x 5 Consequence Section

## Implementation Risk Consequence Definitions

Level	JPL Implementation Risk Level Definition	Specimen Criteria
5	Overrun budget and contingency, cannot meet launch with current resources	Overrun of budget reserves and/or more than remaining launch window slack
4	Consume all contingency, budget or schedule	All remaining reserves and/or all remaining schedule slack
3	Significant reduction in contingency or launch slack	50% loss of reserves and/or schedule slack
2	Small reduction in contingency or launch slack	10% loss of reserves and/or schedule slack
1	Minimal reduction in contingency or launch slack	1% loss of reserves and/or schedule slack

## Mission Risk Consequence Definitions

Level	JPL Mission Risk Level Definitions	Project-specific clarification related to Level-1 Requirements
5	Mission Failure	Does not acquire significant mission science (or objectives)
4	Significant reduction in mission return	Acquires significant science (or objectives) but does not achieve minimum mission success per project Level-1 requirements
3	Moderate reduction in mission return	Achieves minimum mission but does not achieve baseline success per project Level-1 requirements
2	Small reduction in mission return	Achieves baseline mission success per project Level-1 requirements
1	Minimal reduction in mission return	Only minor loss of mission science (or objectives)

# Aggregate Risk

- Aggregate risk refers to the accumulation of project risk from individual scenarios that lead to a shortfall in system performance at a high level: e.g., an excessively high probability of loss of science, loss of mission, planetary contamination, etc.
- It is important for Projects to not only focus on the management of individual risks but also manage aggregate risk. Without an understanding of the aggregate risk drivers, it is not reasonable to expect that the mission will achieve programmatic objectives



# Summary

- An established and standardized process is necessary to manage risks across a spectrum of missions.
- It is recognized that not all sources of risk are amenable to precise quantitative analysis and that the use of qualitative approaches and bounding estimates may be appropriate for those risk sources.
- The use of qualitative methods
- Risk communication must occur frequently and at every level.



# **Jet Propulsion Laboratory**

## California Institute of Technology