JPL Tailoring Process

Quality Assurance Requirements Tailoring Agreement
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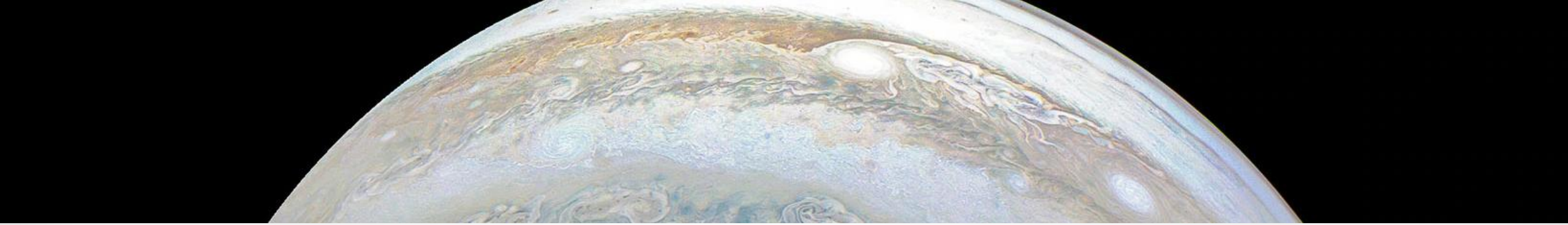


ROADMAP

Type II Process

- New Challenge
- Project Types
- Type II Process

QARTA Process

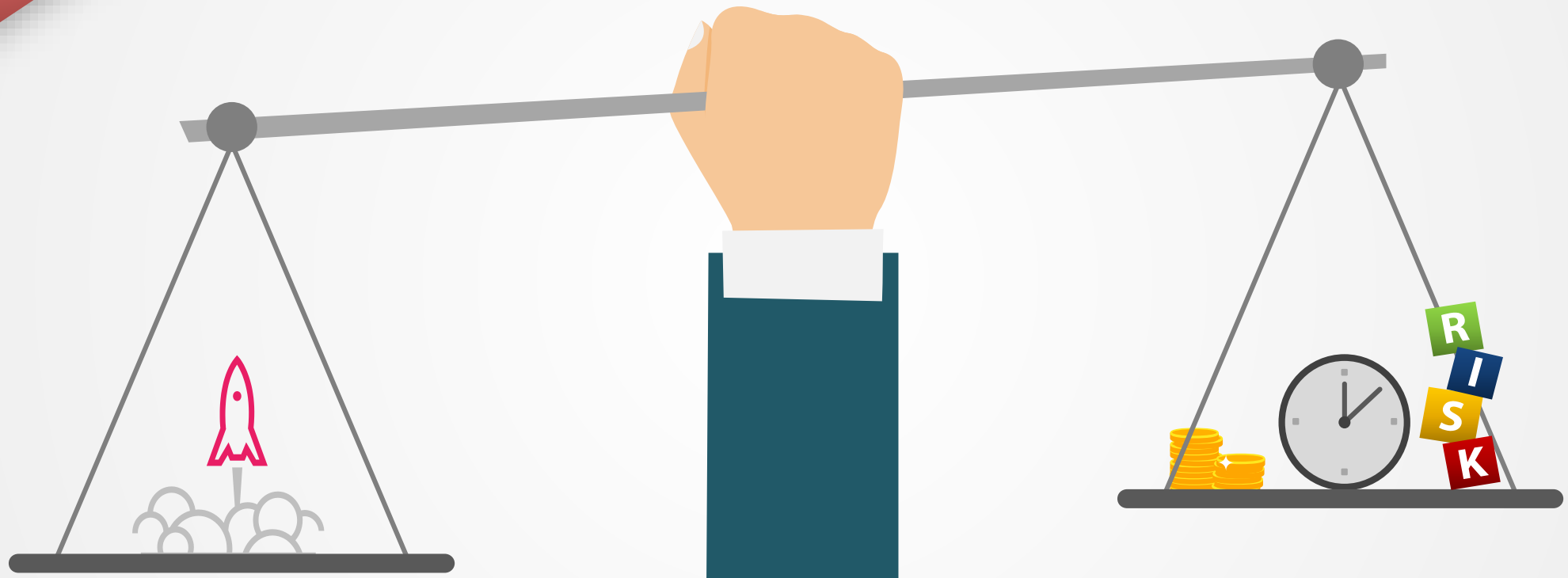
- QARTA Objectives
- Process
- QCI
- QCI Menu

Challenges

- Challenges
- Results

Type II Process

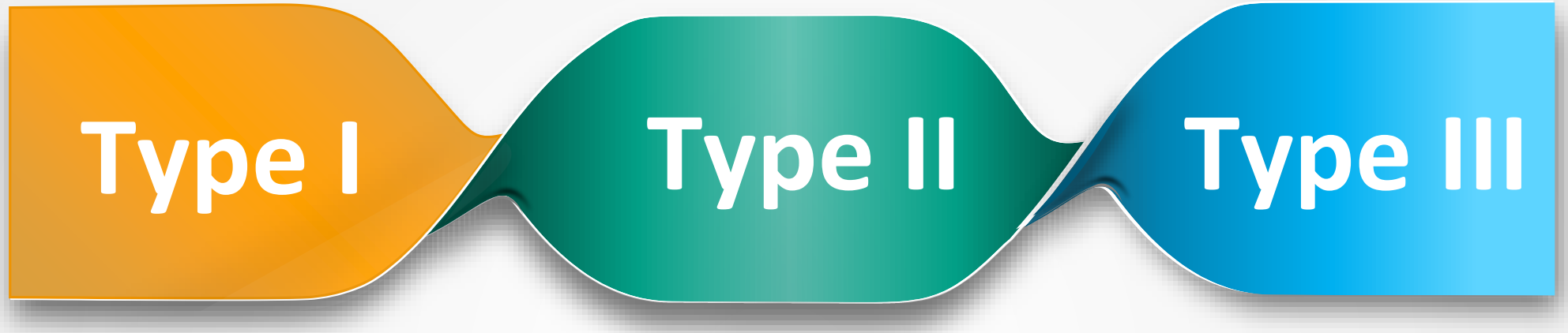
THE CHALLENGE



Mission Success

Reduced Cost
Compressed Schedule
Increased Technical Risk

WHAT IS A TYPE II PROJECT?



Full QA oversight of Flight, EM, Qual, and Proto-Flight Hardware

Primarily contains space flight projects with NPR 8705.4 **risk classifications A, B, & C**

Examples: M2020, SMAP, SWOT, NISAR, Grace-FO

Tailored QA oversight of Flight, EM, Qual, and Proto-Flight Hardware

Primarily contains **risk class D** space flight projects, or other space flight projects that do not get risk classified (e.g., NPR 7120.8)

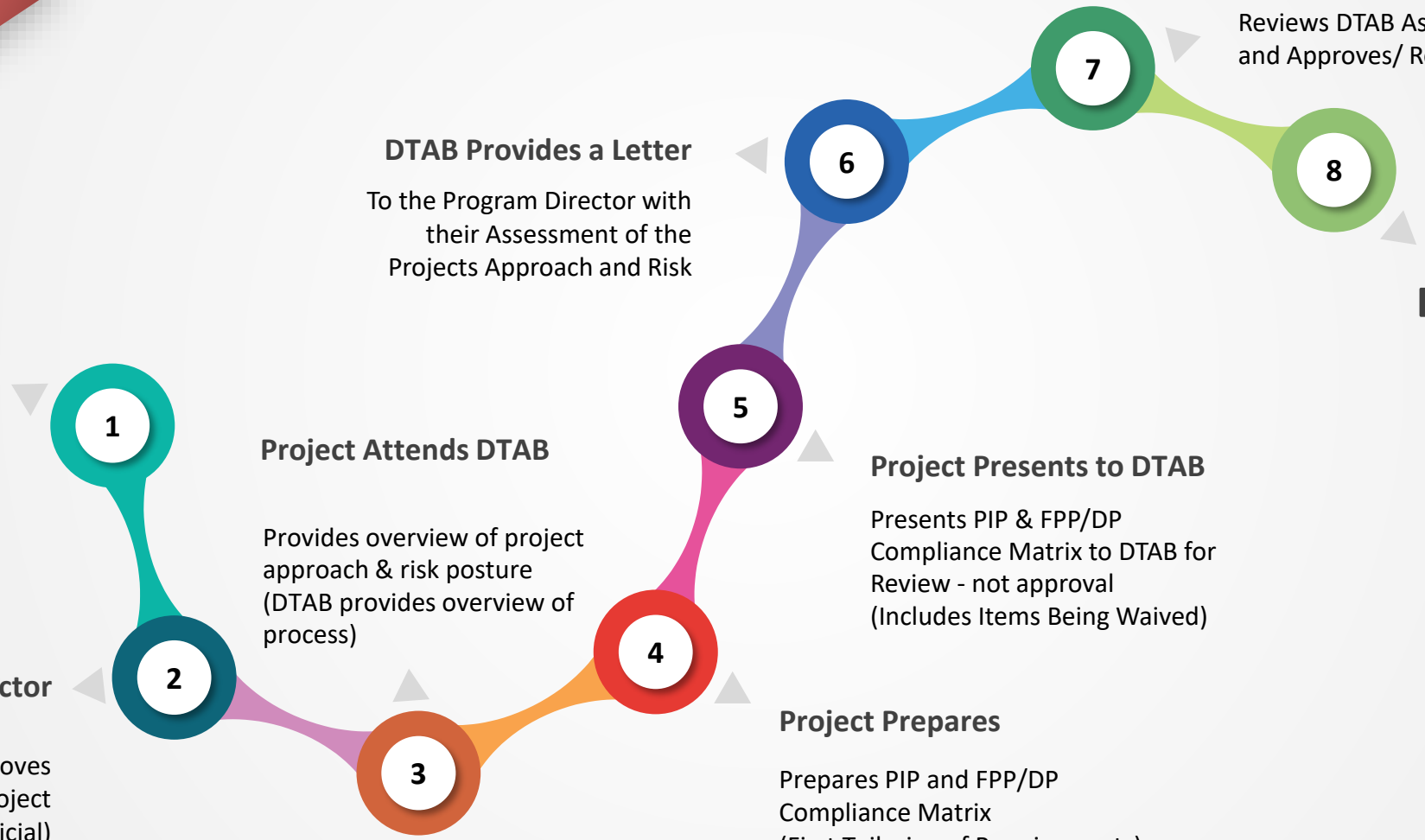
Examples: CAL, ECOSTRESS, COWVR, ASTERIA, RainCubE

Historically no QA oversight, Currently being updated to include QA

Primarily contains projects that do not go into space (i.e., sounding rockets, balloons, aircraft payloads, and ground based projects)

Type II Process

REQUIREMENTS PROCESS



Program Director

Recommends Project as Type II

Flight Project Director

Reviews and approves as Type II Project (Designation Official)

Project Attends DTAB

Provides overview of project approach & risk posture (DTAB provides overview of process)

Project Prepares

Prepares PIP and FPP/DP Compliance Matrix (First Tailoring of Requirements)

Project Presents to DTAB

Presents PIP & FPP/DP Compliance Matrix to DTAB for Review - not approval (Includes Items Being Waived)

DTAB Provides a Letter

To the Program Director with their Assessment of the Projects Approach and Risk

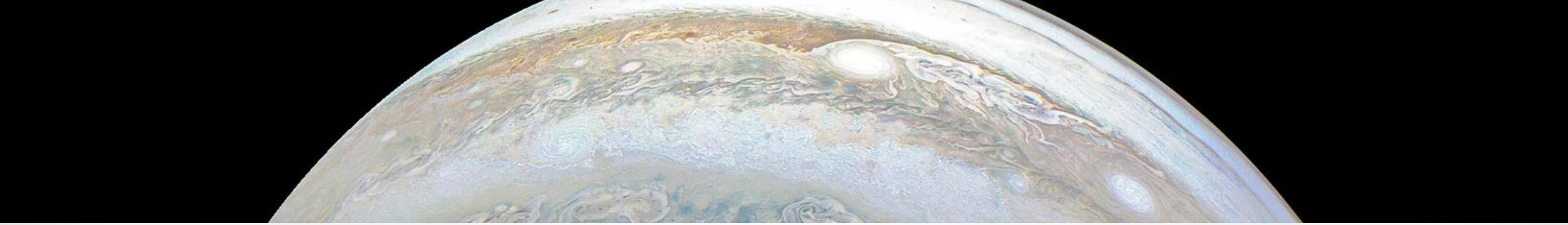
Program Director Reviews

Reviews DTAB Assessment and Approves/ Rejects PIP

QARTA IS DEVELOPED

Acronym Glossary

- *DTAB: Class D/Technology Acceptance Board*
- *PIP: Project Implementation Plan (Includes Mission Assurance and QA Plan)*
- *FPP: Flight Projects Practices*
- *DP: Design Practices*
- *QARTA: Quality Assurance Requirements Tailoring Agreement*



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QARTA Process

THE QARTA DOCUMENT

QUALITY ASSURANCE REQUIREMENTS TAILORING AGREEMENT

Objective

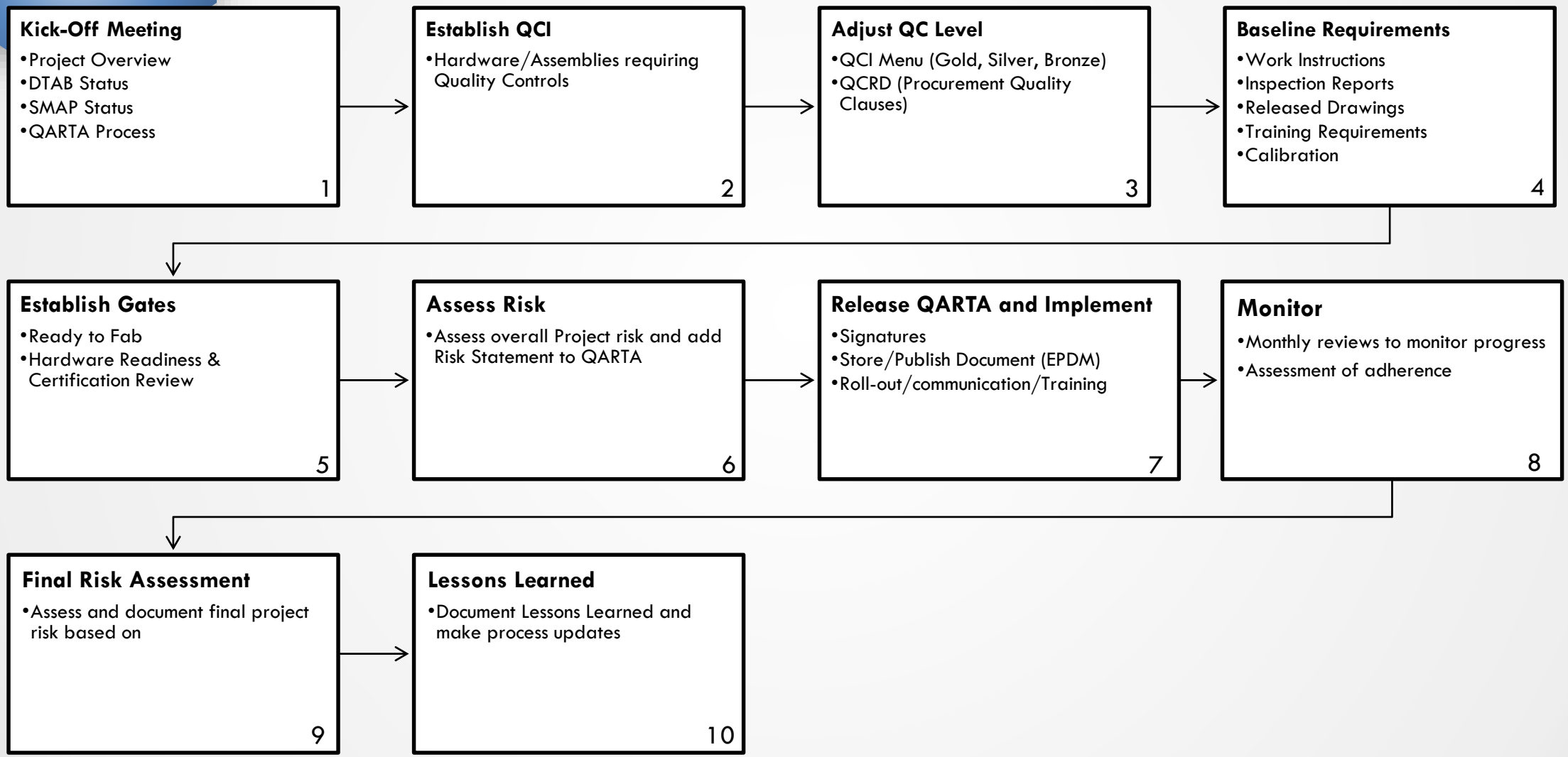
Partner with Type II Projects to tailor QA requirements for more agile and cost effective project execution

CLARIFY PROJECT EXPECTATIONS:

- Define the level of QA support
- Associated QA costs at each level of support
- Define descending levels of QA support (Gold, Silver, Bronze)
- Present the value of QA support at each activity
- Communicate risks associated with QA Tailoring
- Ensure proper flow-down of tailored requirements to all product providers, in-house and/or suppliers

QARTA Process

QARTA PROCESS OVERVIEW



QARTA Process

QCI HARDWARE

QUALITY CRITICAL ITEMS

TYPICAL CONSIDERATIONS FOR DESIGNING HARDWARE AS QCI OR NOT:

- Mission Risk Posture
- Engineering design margin
- Criticality of hardware to mission/project success
- Component/System redundancy
- Process complexity
- Is testing sufficient to verify design / workmanship
- Critical interfaces
- Lack of complexity (e.g.: passive components)

QARTA Process

QA LEVELS FOR QCI

- The Type-I “gold standard” for QA involvement
- Established in current JPL Rules! Directive documents (FPP, 35120, JMIPs, etc.)

- QA involvement is defined in QARTA “QCI Menu”
- Tailored lower than Type-I involvement
- Agreed upon by the Project and QA

- QA involvement is defined in QARTA “QCI Menu”
- Tailored lower than Silver involvement
- Agreed upon by the Project and QA
- Considered to be the minimum level needed to support SMA TA approval at delivery review(s)

QARTA Process

QA LEVELS FOR NON-QCI

Pay by the Drink

- Level of QA involvement is not predetermined by the QCI Menu in the QARTA
- Allows the Project to acquire QA support (for non-QCI hardware), as necessary, at the discretion of the Project, based on Project need.

QA is not involved with the Project for non-QCI hardware.

QARTA Process

THE QCI MENU

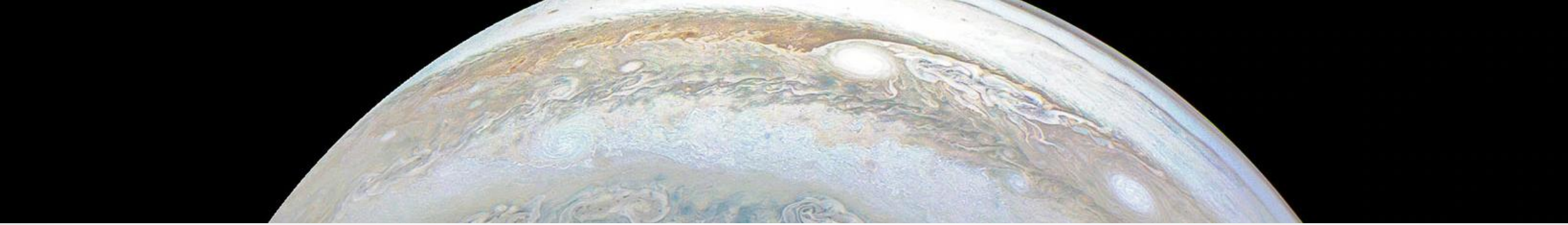
Defines the QA activity for QCI hardware & processes

Defines level of QA involvement: Gold, Silver, Bronze

Identifies Benefits of QA at each activity

Identifies Risks of reducing QA involvement

Process	Benefit of QA Activity	Gold	Silver	Risk	Bronze	Risk
Receiving Inspection - Electrical CAL - Silver	Legal supplier-document stating compliance to the JPL contract.	Certificate of Compliance	Certificate of Compliance	1. No Dimensional - Risk of improper fit at the time of assembly; potential schedule delay. 2. No Trace to the OCM - Possible counterfeit components received. Need to discuss with the proejct on Electrical Test and XRF. Since trace to the OCM is not required, the risk of counterfeit increases. At minimum, the project will need to at least select one verification step to increase confidence of authenticity.	Certificate of Compliance	1. No Dimensional - Risk of improper fit at the time of assembly; potential schedule delay. 2. No Electrical Test - Wrong parts or poor performing components received. 3. No Quality Clause Verification - The risk will vary depending on the quality clause imposed. 4. No Trace to the OCM - Possible counterfeit components received. 5. No XRF - These materials can grow whiskers (i.e. pure tin, pure zinc) that can short the instrument. Other materials (Cadmium, Mercury) tend to outgass in a vacuum environment, which may degrade the instrument's performance.
	Verification of quantity.	Count	Count		Count	
	Assures proper fit and form.	Dimensional	~~Dimensional~~		~~Dimensional~~	
	Assures performance on passive components only.	Electrical Test (e.g. resistance)	~~Electrical Test (e.g. resistance)~~		~~Electrical Test (e.g. resistance)~~	
	Receipt of the correct part.	ID	ID		ID	
	Verification of compliance to project and/or Institutional requirements.	Quality Clause Verification	Quality Clause Verification		~~Quality Clause Verification~~	
	Reduces the risk of receiving a counterfeit component and establishes the supply chain line for use in failures.	Traceability to the Original Component Manufacturer (OCM)	~~Traceability to the Original Component Manufacturer (OCM)~~		~~Traceability to the Original Component Manufacturer (OCM)~~	
	Verification of hardware integrity.	Workmanship (Visual)	Workmanship (Visual)		Workmanship (Visual)	
	Verification that prohbited materials are not present, whcih can degrade the mission success.	XRF	XRF		~~XRF~~	



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Challenges

Typical challenges seen on Type II Projects with tailoring

- Desire for over-tailoring
  - Need to be clear on the risks
  - Helps to be clear on the activities, time required, benefit, and cost
- Lack of understanding of the process
  - Providing projects an overview up front and using a communication rollout plans have been helpful
- Implementation difficulties (Actuals do not meet plan)
  - Performing gap assessments monthly, reporting at MMRs, and adjusting
  - Added a QARTA Hot Line for questions
- Can be tough on QA personnel to stop doing certain things –
  - Need to find people are want to be on these projects, have a good amount of experience, and right demeanor
- Slippery Slope effect – what worked on the last project should be ok for next project
  - Instituted Baseline Requirements

History

Count	QARTA Date	Launch Date	Project	Project Success?
1	2013	2014	RACE	Failure (Launch)
2	2013	2014	RapidScat	Success
3	2015	2018	ECOSTRESS	Success
4	2016	2017	ASTERIA	Success
5	2016	2017	SHFT-A (a.k.a. DHFR)	Failure (Partner's deliverable)
6	2016	2018	CAL	Success
7	2016	2018	RainCube	Success
8	2016	2018	SHFT-B (a.k.a. DHFR)	Failure (Partner's deliverable)
9	2016	2018	TEMPEST-D	Success
10	2016	2020	MOXIE (Mars 2020 Instrument)	TBD
11	2019	2020	Mars Helicopter (a.k.a. Leonardo)	TBD

Project In Development

Count	QARTA Date	Launch Date	Project	Project Success?
12	2014	In Development	COWVR	TBD
13	2016	In Development	NEAScout Context Camera	TBD
14	2017	In Development	ITB	TBD
15	2017	In Development	Lunar Flashlight	TBD
16	2019	In Development	DSOC	TBD
17	2019	In Development	NTS-3	TBD
18	2020	In Development	PREFIRE	TBD
19	2020	In Development	Roman-CGI	TBD
20	2020	In Development	SunRISE	TBD


Any
Questions

Jet Propulsion Laboratory
California Institute of Technology