Operations planning concept overview

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Science Activity Plan

The Science Activity Plan (SAP) describes in a structured way all scientific activities to be carried out by the instruments throughout the cruise and nominal phases in order to fulfill the Science Requirements of the mission.

Top-level science objectives

↓

Detailed science objectives

↓

Specific Science Activities

↓

Science Orbits

Science Operations Planning Cycles

- *Mission-level Planning*
  - *Science Working Team (SWT) defines top-level science activities for the entire mission (Science Activity Plan, SAP), as well as detailed science goals for each orbit.*
- *Long-Term Planning (LTP)*
  - *Covers 6 months, planned ≥ 6 months before execution (~ 1 orbit; fixes ground stations allocation)*
  - *Given input from SWT, the Science Operations Working Group (SOWG) defines a coherent mission-level observing plan for a given orbit. They will be assisted by the SOC, which will provide detailed information on the resources available.*
- *Medium-Term Planning (MTP)*
  - *Covers 6 months, fixed 4 weeks before execution (defines top-level science operations per orbit: fixes S/C resources, instrument modes, default pointing)*
- *Short-Term Planning (STP)*
  - *Covers 1 week, planned ~1 week before execution (generates detailed schedules of commands for S/C and payload; last opportunity to modify instrument ops. modes)*
- *Very-Short-Term Planning (VSTP)*
  - *For subset of remote-sensing windows only: update S/C fine pointing to track features on solar disk*
  - *Opportunity for fine-pointing updates: once per 24h, time between pointing definition and execution ≤ 3 days*

How to build a SAP

How to build a mission-long SAP?

SolO's (sub)objectives

SOOPs

SOOP A

SOOP B

SOOP C

SOOP D

Step 1

Step 2
Strategy

EPD normal+burst
EUI/HRI AR mode
MAG Normal
Metis GLOBAL
PHI/HRT NOM 0
RPW normal+burst
…

10 instruments, many modes

- EPD
  - EPD Normal Mode
- EUI
  - EUI/FSI Synoptic mode (S)
  - EUI/FSI reference synoptic mode (R)
  - EUI/FSI Global eruptive event mode (G)
  - EUI/HRI Coronal hole mode (C)
  - EUI/HRI Quiet Sun mode (Q)
  - EUI/HRI Active Region mode (A)
  - EUI Beacon mode
  - EUI/HRI Eruptive Event mode (E)
  - EUI/HRI Discovery mode (D)
- MAG
  - MAG Burst Mode
  - MAG Normal Mode
- METIS
  - METIS standard modes
  - METIS special modes
  - METIS observing mode characteristics
- PHI
- RPW
- SoloHI
- SPICE
- STIX
- SWA

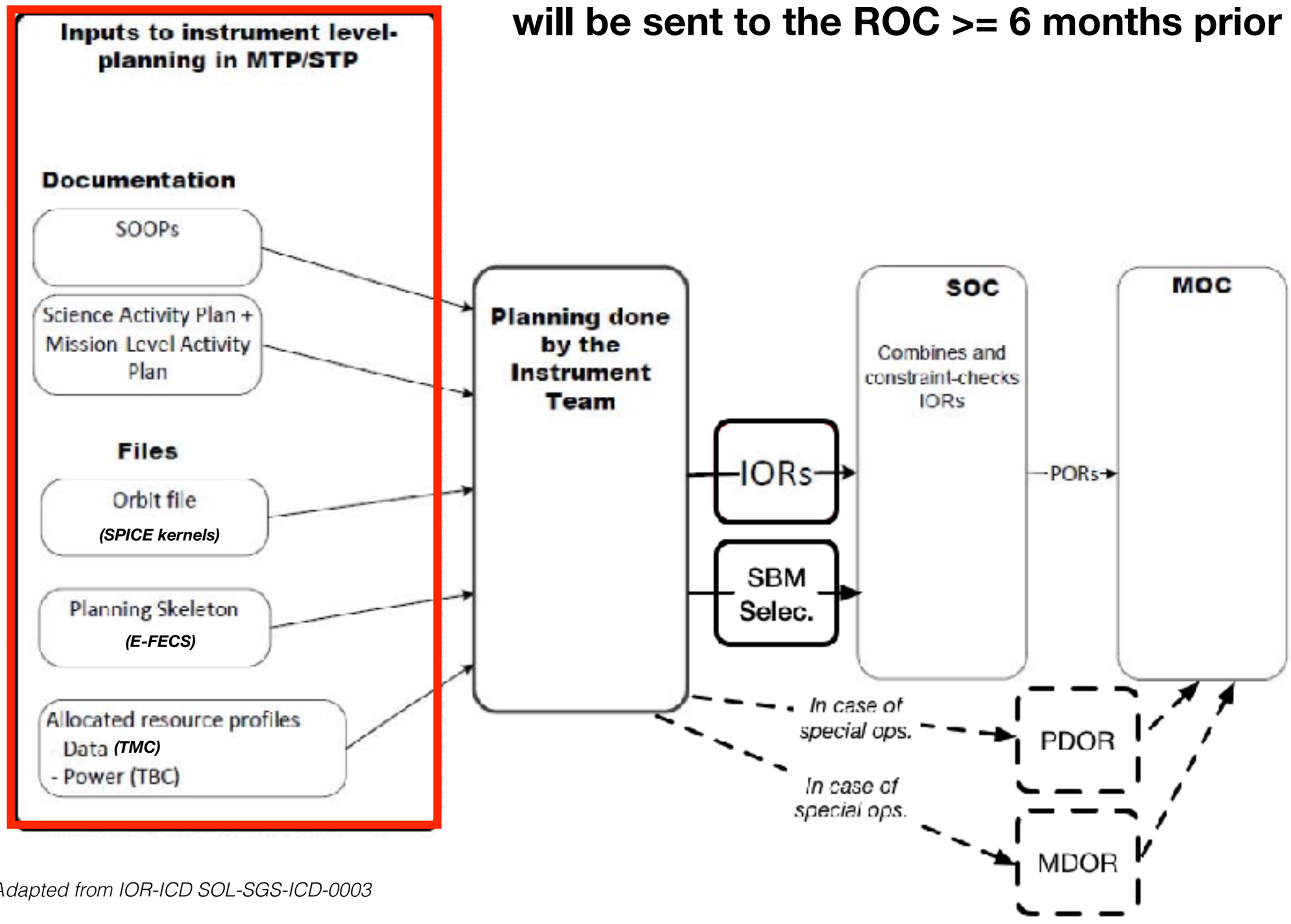
10 years mission timeline

To be checked against mission constraints

Step 3
Simulation

Operations inputs/outputs

Planned/Predictive operation inputs for the next MTP-cycle will be sent to the ROC >= 6 months prior to the execution



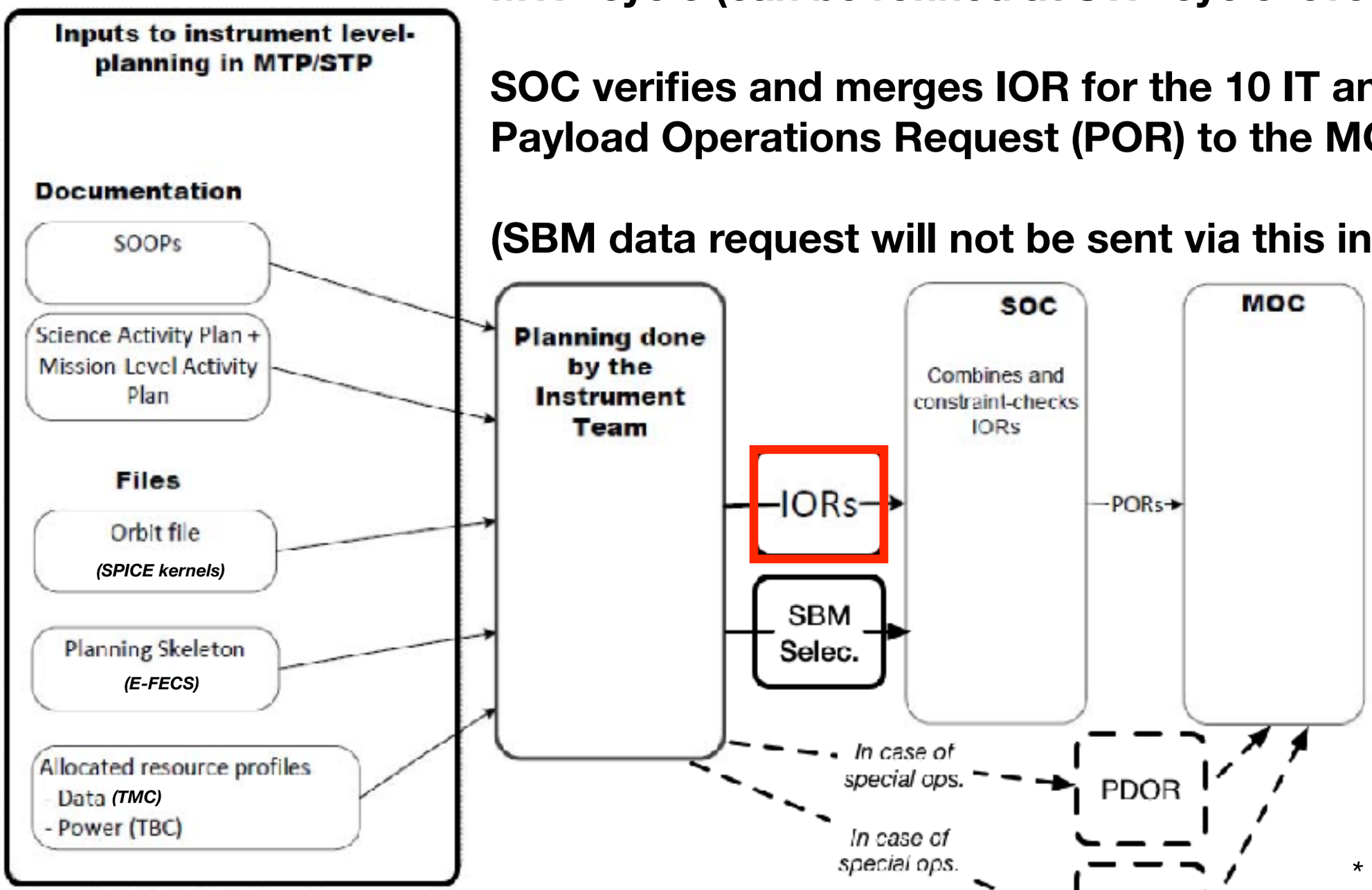
Adapted from IOR-ICD SOL-SGS-ICD-0003

Operations inputs/outputs

ROC will produce *Instrument Operations Requests* (IOR), containing the list of TC sequences* to run on-board for the MTP-cycle (can be refined at STP-cycle level)

SOC verifies and merges IOR for the 10 IT and send a Payload Operations Request (POR) to the MOC

(SBM data request will not be sent via this interface)

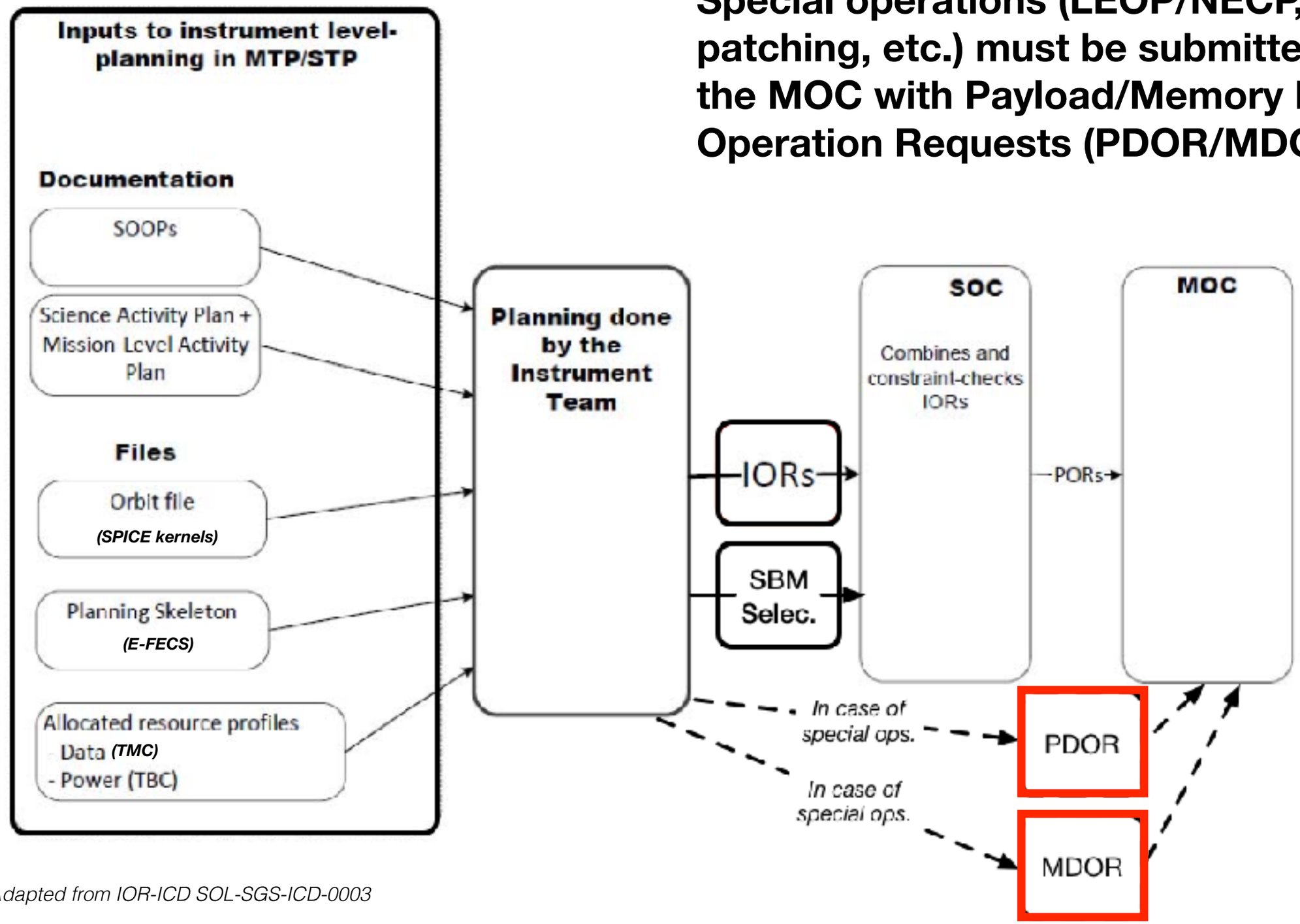


Adapted from IOR-ICD SOL-SGS-ICD-0003

** not binary TC packets, but the ID*

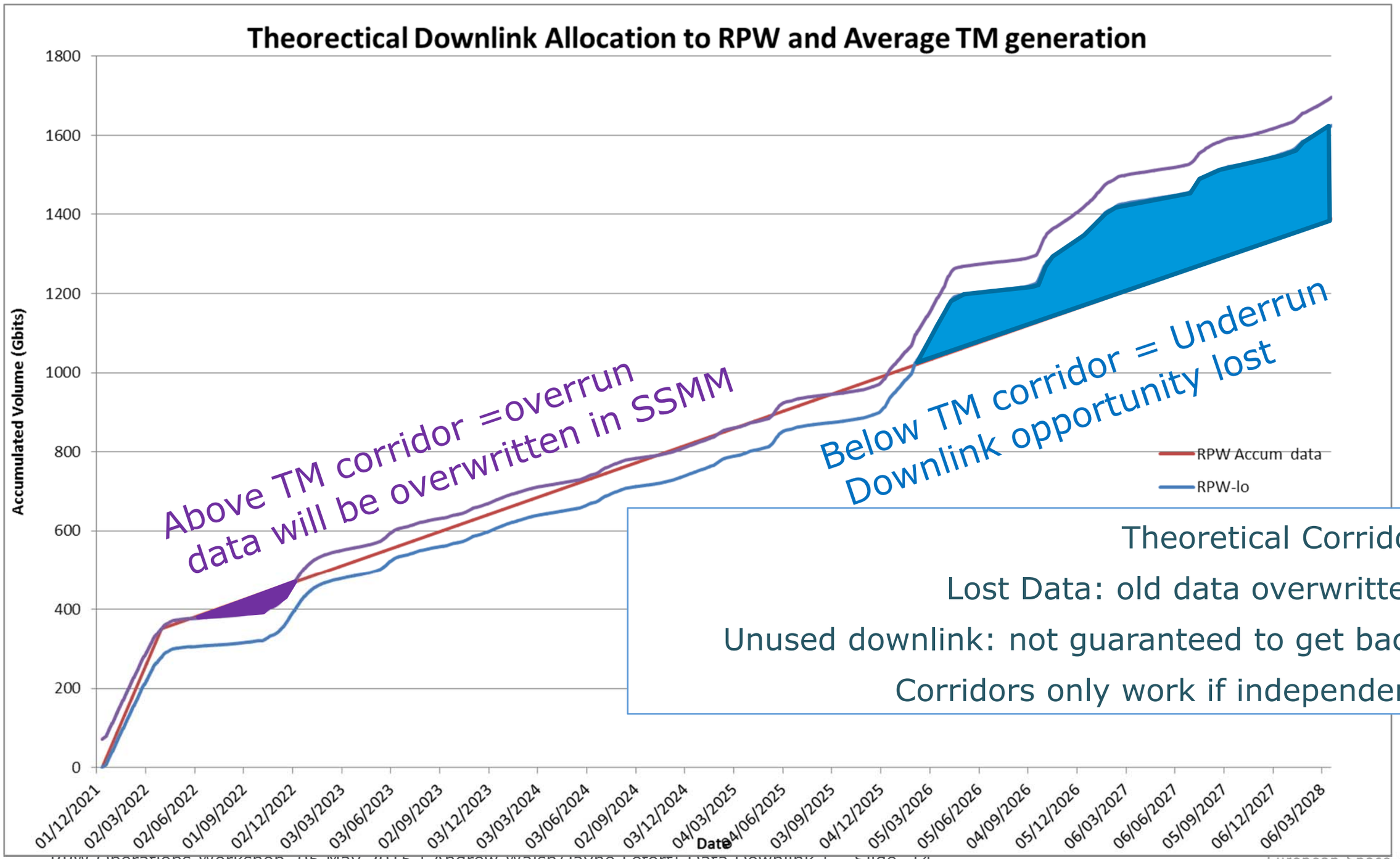
Operations inputs/outputs

Special operations (LEOP/NECP, flight patching, etc.) must be submitted directly to the MOC with Payload/Memory Direct Operation Requests (PDOR/MDOR)

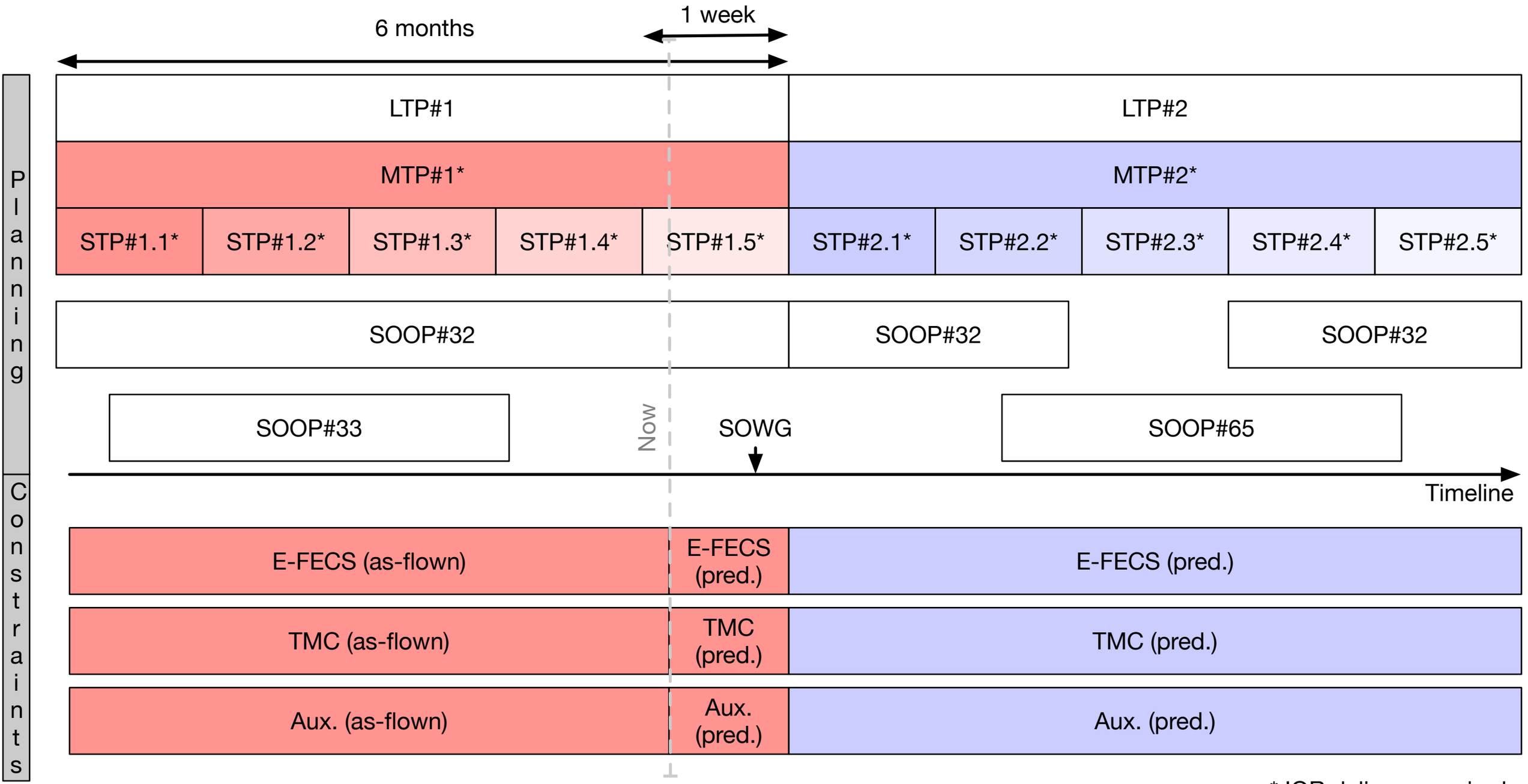


Adapted from IOR-ICD SOL-SGS-ICD-0003

Downlink & Storage limitations



Operation timeline example



* IOR delivery required

ROC MTP-cycle operations planning nominal use case

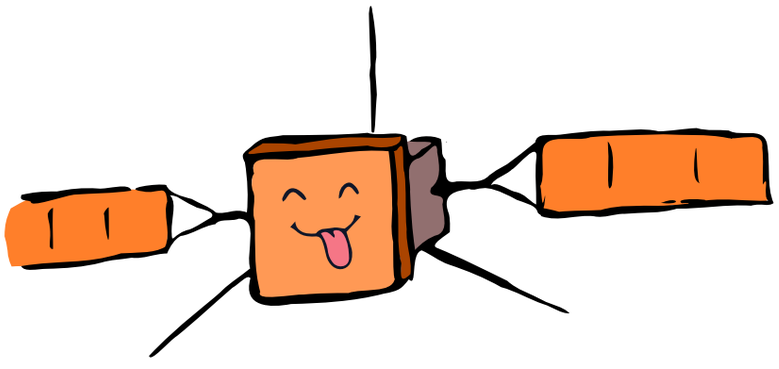
>= -6 m: Discuss MTP operations at LTP level (SWT, SOWG)

~ -6 m: Retrieve and display the operations inputs sent by the SOC

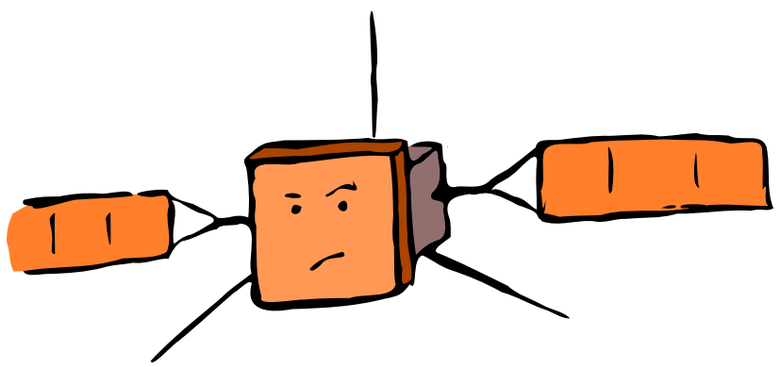
-6/-4 m: Prepare the MTP-cycle timeline in terms of RPW operations (according to the science and operations constraints defined at mission level)

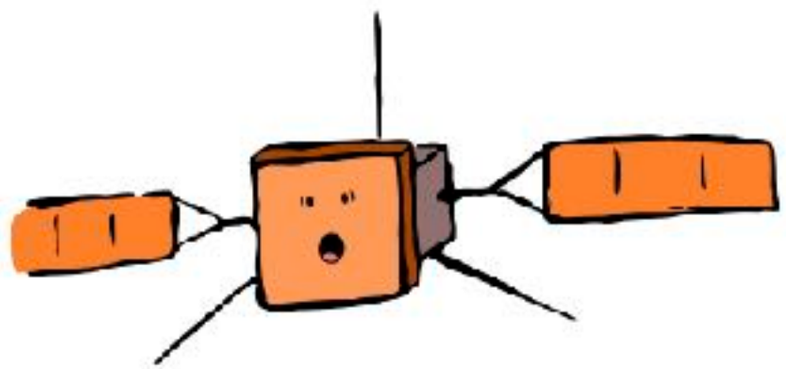
-4 m: Generate and submit to the final MTP-cycle IOR containing the list of TC sequences

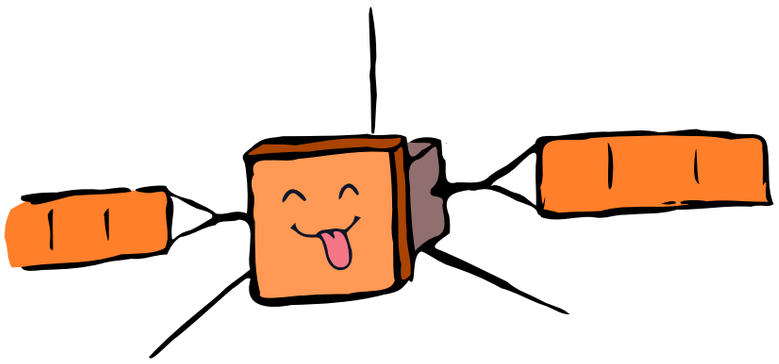
0+6m: Control execution and refine operations at STP level



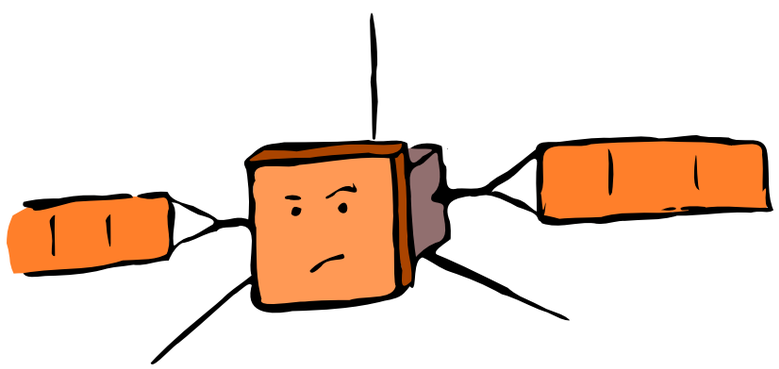
To be continued…

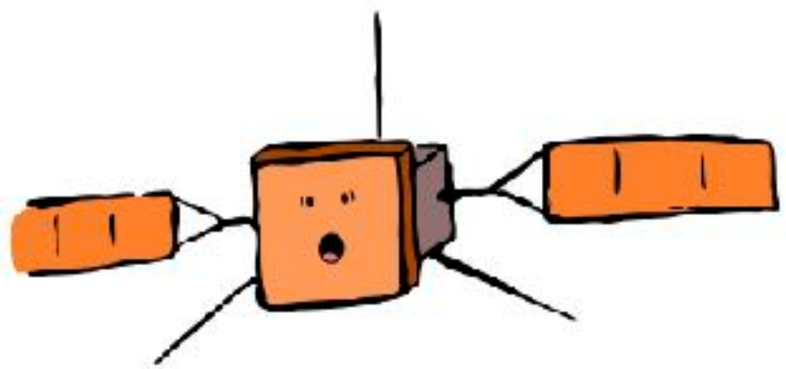






Extra slide





IOR format

- IOR is XML file containing the list of TC sequences with the time of execution (UTC)
- TC sequences are defined in the flight procedures to be delivered to MOC
- Validated procedure added into the Flight Operation Plan (FOP)

```
<sequence name="AIWF031A">
    <observationID>SRPW006000000000</observationID>
    <source>SRPW</source>
    <destination>R</destination>
    <executionTime>
        <actionTime>2022-010T01:00:47Z</actionTime>
    </executionTime>
</sequence>
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    <observationID>SRPW006000000000</observationID>
    <source>SRPW</source>
    <destination>R</destination>
    <executionTime>
        <actionTime>2022-010T01:01:00Z</actionTime>
    </executionTime>
</sequence>
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    <source>SRPW</source>
    <destination>R</destination>
    <executionTime>
        <actionTime>2022-010T01:01:12Z</actionTime>
    </executionTime>
</sequence>
```

Example of XML IOR (IOR_S_M03S02F01_IW_V1_1.SOL)

Procédures (contenant les séquences de TC)

One file
One Procedure
N Sequences
N Steps
N Statements

Stmt_nr	Step_nr	Stmt_type	Stmt_id	Blk_flag	Time_tag	info		Param_val_int_tm	Param_val_tm	Proforma	Packet	Manual_Dispatch
1	1	CMT				Purpose of the procedure: configuration of TDS, LFR, TNR-HFR for NORMAL MODE						
2	1	CMT				Purpose of step 1 is the configuration of TDS						
3	1	CMT				FIRST TC	TC_TDS_LOAD_NORMAL_PAR"					
4	1	CMD	ZIW00098		00:00:00	Send TDS_LOAD_NORMAL_PAR						Y
5	1	PKT	YIW00190			RPW TM Packet with parameters details (Using PKT Params sheet)	TM_TDS_TC_ACC_SUCCESS					
6	1	PKT	YIW00206			RPW TM Packet with parameters details (Using PKT Params sheet)	TM_TDS_TC_EXE_SUCCESS					
7	2	CMT				Purpose of step 2 is the configuration of LFR						
8	2	CMT				SECOND TC (executing 1 sec after FIRST TC)	TC_LFR_LOAD_NORMAL_PAR					
9	2	CMD	ZIW00078		00:00:01	Send LFR_LOAD_NORMAL_PAR						Y
10	2	PKT	YIW00123			RPW TM Packet with parameters details (Using PKT Params sheet)	TM_LFR_TC_ACC_SUCCESS					
11	2	PKT	YIW00139			RPW TM Packet with parameters details (Using PKT Params sheet)	TM_LFR_TC_EXE_SUCCESS					
12	3	CMT				Purpose of step 3 is the configuration of THR						
13	3	CMT				THIRD TC (executing 1 sec after SECOND TC)	TC_THR_LOAD_NORMAL_PAR_1					
14	3	CMD	ZIW00112		00:00:01	Send THR_LOAD_NORMAL_PAR_1						Y
15	3	PKT	YIW00240			RPW TM Packet with parameters details (Using PKT Params sheet)	TM_THR_TC_ACC_SUCCESS					
16	3	PKT	YIW00248			RPW TM Packet with parameters details (Using PKT Params sheet)	TM_THR_TC_EXE_SUCCESS					

From IW-FCP-030.xls