Template for comments and secretariat observations

Date: 30/04/2020	Document: WD 24330 (Jan 2020)	Project:		

MB/NC[1]	Line number (e.g. 17)	Clause/ Subclause (e.g. 3.1)	Paragraph/ Figure/ Table/ (e.g. Table 1)	Type of comment[2]	Comments	Proposed change	Observations of the secretariat
FR-01		1		ge	Is this standard limited to servicing operations on terrestrial orbit only? Or any orbit (e.g moon)? Is this standard focused only on cooperative and collaborative (prepared) RPO or it is intended and applicable to all RPO scenarios (e.g. non cooperative target)? Is the difference between prepared/unprepared customer S/C addressed?	Precision should be mentioned here.	The standard is aimed at industry (i.e., commercial) RPO/OOS. As this develops to cis-lunar, it may apply. Today we are limited to GEO. Empahsis is commercial, wherever it may exist. Today we are limited to GEO. The preferd language is « prepared and unprepared ». « Uncoopertive » may imply some type of hostile or unwilling CSO. This standard does not address such RPO/OOS. Any launguage implying such should be idenfieid and eliminated. We believe debris of unknow ownership is sufficinetly covered. No Change. Willing to discuss.
FR-03		4.1.2.3		ge	In some type of mission extension service, the new space object can be servicer+client space object (like MEV-1). This requirement should cover this type of service too.	In the case of a mission extension service (e.g., refueling or components replacement), the servicer and/or client shall verify that the client space object or new space object still meets ISO 24113 requirements despite its extension of the operation period.	Reject. Since 4.1.2 references Servicer responsibility for compliance with 24113, this point is covered. Thee Servicer is responsible for the stack.
FR-04		4.1.2		te	Client satellite not mentioned here on purpose or forgotten?	To add the fact that also client S/C should (ideally) comply to ISO 24113 and/or to clarify which OOS	It is the intent of the initial drafters of this standards that the Servicer is

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					Not clear whether a client space object originally not compliant to ISO 24113 (ex. because designed before the introduction of SDM standards) will have to comply to the requirements of this section or not. Which OOS mission could be authorized in these cases ? For instance, in case of Active Debris Removal of a S/C not complying to the ground casualty risk requirement, an uncontrolled re-entry could be accepted or a controlled one will be required ? For sure the servicer S/C will be very different in the two cases.	mission could be authorized for client S/C originally not meeting ISO 24133 requirements.	responsible for here. Not the Client.
FR-05		4.1.3		te	Communications in real-time	During a servicing operation, the servicer and client organizations shall establish and maintain effective real-time communications in support of safe and successful operations.	Reject. This is not physically possible. Time lag is a real factor. A future standard may address a best practice to address time delay tolerance.
FR-06		4.2.1		ge	Who are the relevant states? States of the servicer and the client? Is it enough?	All states of the OST should be informed	Reject. Current regulation do not address such an objective, and there is not a current means of informing all OST states. This standard will establish compliance with current applicable regulations
FR-07		4.2.5.1		te	Assessing the re-entry risk is not enough. In case of this type of mission (capture + re-entry), it should be added that the new space object (servicer+client space object) shall ensure compliance with ISO 24113.		Refer to 4.1.2

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FR-08		5.1.1		te	This chapter is written like if nothing already exists. (5.1.1 / 5.1.2 / 5.1.3) Development methods for these elements are well established.	Change to: Hardware provides guidance, navigation and control means for RPO and OOS operations. This includes sensors to determine the absolute orbit and the orbit relative to the client spacecraft as well as to determine its attitude (positioning systems, cameras, stellar sensors), actuators to control orbit and attitude (chemical or electrical propulsion, reaction wheels or CMGs). To ensure a reliable and sustainable system, development follows the current space standards : redundancies, modelling, simulations, component and system level testing, performance verification, configured documentation.	Willing to discuss. The operative sentence in this standard is the final one regarding certification. Certification is not a current reqruoement in a space standard. If there is desire to change informative language here, that is possible.
FR-09		5.1.2		te	As written, only autonomous activities are considered. Software development methods are well established.	Change to: Software provides all algorithms and function modes allowing to run the full set of planned RPO and OOS on board operations either with ground decision in the loop or with different levels of autonomy. Software is developed and tested according current space standards : modelling, simulations, component and system level testing, performance verification, configured documentation. The usual ability to update or patch the software in-flight shall be thoroughly checked to ensure full confidence in the mission correct execution.	Need to discuss. The operative sentences in this section are "should " and "shall"? How should this be adjusted?
FR-10		5.1.3		te	First sentence is written as we have never done that.	Change to: Concepts of operations (CONOPS) define the full set of scenarios, implementing the elements/components of the system architectures (ground and in flight) and techniques necessary to	Willing to discuss. The oerative sentence includes the word « shall ». What needs ot change ?

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					run the RPO and OOS ~~ground and board activities~~.		
FR-11		5.1.4		te	Procedures shall be reviewed and approved by both entities involved in the operations (servicer and client), in case of active client (see FR-01)	Change to: …shall be reviewed and tested by all actors, both on servicer and client sides….	Should be discussed. Approval implied some degreeof liablity. Tested directs verification. Difference ?
FR-12		5.1.5			Operators from both parties involved in the operation are enabling safety and mission success.	Change to: Servicer _and client_ spacecrafts operators are critical to flight safety and enabling mission success.	Accept
FR-13		5.1.5			Operators from both parties shall be trained together at some point , depending on the phases (far RDV, close RDV, docking/berthing, …, composit phases, …) of the mission	Suggestion	This is implied at this time, but not explicitly required. Does it need to be explicit?
FR-14		5.2.1			Same comment as FR-06 regarding communication to States	All states of the OST should be informed	Same response as FR-06.
FR-15		5.2.5.1			The Operations Control Volume is not described here. We could be more accurate and define 3 safety zones or volumes: - Meeting area in which the Servicer controls an orbital navigation relative to the Client S/C - Proximity_operations area in which the Servicer also controls the attitude of the Client S/C (not necessary control, but there is coordination of between the 2 control team) - Close_Proximity_operations area in which the Servicer performs final approach, capture and docking maneuvers on the Client S/C	Suggestion	Reject. Currently there is no "best practice" for OOS in this regard. However, this is a good idea that we might develop a future standard around.

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FR-16		5.2.6.2			…notice to the public: not clear enough.	All states?	Reject. To include such a requirement in a standard it must be implementable and verifiable. Those do not exist today.
FR-17		whole			There are several clauses in this document that refer to communication to "States ", "public" or "entities". Not clear enough.	Precisions should be made in the document	The issue is understandable, but there is not a means today to execute such a requirement. The intent is to be vague and state that communication with legal organizations satisfies the requirements.
FR-18		5.4.1		ge	Not fully clear/understood why ISO 42010 ''Systems and software engineering — Architecture description'' is mentioned here and how it will contribute to the development of Anomaly Resolution Standards	Please clarify this point and if the link with ISO 42010 is confirmed, this document should be added in section 2 Normative references	Partially accept. 5.4.1. is changed to show 42010 as an informative reference. 42010 is constructive in coordinating different architectures. Anomaly Resolution among multiple parties will hinge on how to answer the question, "Why did you do that?"

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