



AIRCRAFT AND SPACE VEHICLES / SPACE SYSTEMS AND OPERATIONS
Operations and Support Systems Working Group (WG3)
ISO TC20 / SC14 - WG3

WG3 #54 Spring 2020 Presentations & Brief Minutes [\[v1.c\]](#)

25, 26 and 28 May 2020 (WebEx)

Contact: andre.a.lacroix@ariane.group



WebEx Meeting Rules

- Speak slowly
- Speak up if you do not understand
- Ensure MUTE is selected when not speaking, to avoid background noise
- Use the CHAT area to raise questions or comments during presentations
 - Questions and responses will be documented in the meeting minutes

Participants asked to confirm their
attendance & contact data by email to:
andre.a.lacroix@ariane.group



Webex Meetings



AIRCRAFT AND SPACE VEHICLES / SPACE SYSTEMS AND OPERATIONS

Operations and Support Systems Working Group (WG3)

ISO TC20 / SC14 - WG3

Agenda DAY-1 (25-May-2020)

(see in [Attachment_01](#))

BST (*)	Agenda Item	Presenter
12:55	WebEx connection	All
13:00	Opening of the 53rd WG3 meeting, Welcome & Statement on meeting objectives Roll-call of delegates & self-introduction by participants Adoption of the agenda	André LACROIX
13:15	Review of the 53 rd WG3 meeting minutes (St. Petersburg, Nov-19) WG3 open action items review	All
13:30	SC14 work program status and progress within WG3 scope <ul style="list-style-type: none"> Active work program within WG3 scope Vote results, published standards, systematic reviews Open WG/SC review initiations 	André LACROIX
13:50	Revision 14625 Ground support equipment for use at launch, landing, or retrieval sites [checkout of LV EGSE at launch site]	Chen WENJING Juntong LIU
14:10	WD 22639 Design guidelines for multi-GEO satellites collocation	Zhao XIAOFANG & Zhaozhao GAO
14:30	SR 14619 Space experiments – General requirements	Alexey KHOKHLOV
14:50	SR 17400 Launch and integration site general test requirements	Anastasia RULENKOVA
15:10	SR 15860 Gas contamination – Measurements methods for field tests	Anastasia RULENKOVA
15:30	SR 26870 Launch pad and integration site operational	Anastasia RULENKOVA
15:40	SR/DIS 26900 Orbit data messages (ODM) WG3 liaison activities (if time permits)	Dan OLTROGGE
16:00	Closing – DAY-1	

(*) BST = British Summer Time



AIRCRAFT AND SPACE VEHICLES / SPACE SYSTEMS AND OPERATIONS

Operations and Support Systems Working Group (WG3)

ISO TC20 / SC14 - WG3

Agenda DAY-2 (26-May-2020) – Joint Session WG3/WG7

BST (*)	Agenda Item	Presenter
12:55	WebEx connection	All
13:00	pNWIP Large spacecraft constellations	Akira KATO & Dan OLTROGGE
13:20	pNWIP IGSO operation orbit & de-orbit area vs GEO protected region	Mari Yuzawa GOTOH
13:40	SR 16158 Avoiding collisions with orbiting objects	Mari Yuzawa GOTOH
14:00	pNWIP Launch collision avoidance (LCOLA)	Jun'ichi HORIKAWA
14:20	WD 24330 Rendezvous and Proximity Operations and On Orbit Servicing – Programmatic principles and practices	Fred SLANE
14:40	Space Traffic Management / Sustainability of Space Operations + IAF STM ToR • NWIP STCM Proposal + ECSS STMWG ToR	Dan OLTROGGE Christophe BONNAL Fleur LEFEVRE
15:20	Terminology – Harmonization of WG3/WG7 multiple defined terms	André LACROIX
15:40	Liaison activities (if time permits) • ECSS SDWG • IADC • CCSDS & status ISO/DIS 26900 (ODM) • UNCOPUOS, UNOOSA	Roberto DESTEFANIS Christophe BONNAL & Stijns LEMMENS Dan OLTROGGE Dan OLTROGGE
15:55	Date and location of Fall-2020 meeting	Hedley STOKES
16:00	Closing – DAY-2	

(*) BST = British Summer Time



AIRCRAFT AND SPACE VEHICLES / SPACE SYSTEMS AND OPERATIONS

Operations and Support Systems Working Group (WG3)

ISO TC20 / SC14 - WG3

Agenda DAY-3 (28-May-2020)

BST (*)	Agenda Item	Presenter
13:25	WebEx connection	All
13:30	(if any) items not sufficiently addressed on Day-1 or Day-2 Review of DAY-1, DAY-2 and WG7 outcomes Review of WG3 framework and Work Plan Further potential NWIPs (cybersecurity, cross-domain operations, formation-flying)	<ul style="list-style-type: none"> • All 14625 • 22639 • 26870 • 26900 • Large constellations • LCOLA
14:00	Peripheral items [WG2] NWIP Requirements of cryogenic LV propulsion system to GSE interfaces [WG4] 14200 Guide to process-based implementation of meteoroid & debris environmental models (orbital altitudes below GEO+2000km)	André LACROIX <ul style="list-style-type: none"> • (WG5) Cybersecurity
14:20	Report on SC14 Secretariat activities	André LACROIX
14:30	Any Other Business	All (*)
14:40	Wrap-up session & Meeting closure <ul style="list-style-type: none"> • Review of WG3 action items • Proposed SC14 resolutions • Date and Location of next meetings 	André LACROIX
15:00	Closing DAY-3	

(*) BST = British Summer Time



Attendance DAY-1

- (Brazil) DINIZ MERLADET, Antonio Vinicius
 - (China) GAO, Zhaozhao
 - (China) LIU, Juntong
 - (China) LIU, Xiaoxiang
 - (China) ZHAO, Xiaofang
 - (Europe/ESA) FLORER, Tim - **HOST**
 - (Europe/ESA) SIMINSKI, Jan
 - (France) DURAND-CARRIER, Franck
 - (France) LEFEVRE, Fleur
 - (Germany) LACROIX, Andre – **WG3 Convenor**
 - (Japan) GOTOH, Mari Yuzawa
 - (Japan) HORIKAWA, Jun'ichi
 - (Russia) KHOKHLOV, Alexey
 - (UK) DAVEY, John
 - (UK) SWINBURNE, Brian
 - (US) OLTROGGE, Dan
 - (US) SLANE, Fred
- **17 participants**
 - **08 delegations represented
(BR, CN, FR, GE, JP, RU, UK, US)**



AIRCRAFT AND SPACE VEHICLES / SPACE SYSTEMS AND OPERATIONS

Operations and Support Systems Working Group (WG3)

ISO TC20 / SC14 - WG3

Attendance DAY-2 – Joint WG3/WG7

- (Brazil) DINIZ MERLADET, Antonio Vinicius
- (Brazil) QUINTANILHA, Eduardo
- (China) GAO, Zhaozhao
- (China) LIU, Xiaoxiang
- (China) LIU, Junting
- (China) CHEN, Wenjing
- (China) QUAN, Haofang
- (China) TANG, Mingliang
- (China) ZHAO, Xiaofang
- (Europe/ESA) BASTIDA-VIRGILI, Benjamin
- (Europe/ESA) FLORER, Tim
- (Europe/ESA) LEMMENS, Stijn
- (Europe/ESA) NASCA, Rosario
- (Europe/ESA) SIMINSKI, Jan
- (Europe/ESA) VENTURA, Sergio
- **HOST**
- (France) BITETTI, Lorenzo
- (France) BONNAL, Christophe
- (France) BOUILLY, Jean-Marc
- (France) DURAND-CARRIER, Franck
- (France) JOURDAINNE, Laurent
- (France) LEFEVRE, Fleur
- (France) MOULIN, Jacques
- (France) OMALY, Pierre
- (Germany) GROSSER, Jan
- (Germany) METZ, Manuel
- (Germany) LACROIX, Andre
- **WG3 Convenor**
- (Italy) DESTEFANIS, Roberto
- (Japan) GOTOH, Mari Yuzawa
- (Japan) HINAGAWA, Hideaki
- (Japan) HORIKAWA, Jun'ichi
- (Japan) KATO, Akira
- (Japan) KOHEI, Fujimoto
- (Japan) MIKI, Masami
- (Japan) NAKAO, Shogo
- (Japan) NITTA, Kumi
- (Japan) SATOH, Kenichi
- (Japan) YOICHIRO, Uchida
- (Japan) YOSHIHARA, Toru
- (Russia) KUTOMANOV, Alexey
- (Russia) KHOKHLOV, Alexey
- (UK) CACIONI, Alessandro
- (UK) DAVEY, John
- (UK) FORSYTHE, Tony
- (UK) GEE, Alexander
- (UK) HOBBS, Steve
- (UK) STOKES, Hedley
- **WG7 Convenor**
- (UK) SWINBURNE, Brian
- (US) JIOU, Jer-Chyi
- (US) KIRSCHBAUM, Alan
- (US) OLTROGGE, Dan
- (US) OPIELA, John
- (US) RATLIFF, Martin
- (US) SLANE, Fred
- (US) SORGE, Marlon

■ **54 participants**

■ **09 delegations represented**

(BR, CN, FR, GE, IT, JP, RU, UK, US)

25/26/28 May 2020

WG3 #54 Spring 2020 Meeting



Attendance DAY-3

- (Brazil) DINIZ MERLADET, Antonio Vinicius
 - (China) CHEN, Wenjing
 - (China) GAO, Zhaozhao
 - (China) LI, Gang
 - (China) LIU, Junting
 - (China) LIU, Xiaoxiang
 - (China) TAO, Zhou
 - (China) WEI, Wie
 - (China) ZHAO, Xiaofang
 - (Europe/ESA) LEMMENS, Stijn
 - (Europe/ESA) VENTURA, Sergio - **HOST**
 - (Europe/ESA) SIMINSKI, Jan
 - (France) DURAND-CARRIER, Franck
 - (France) LEFEVRE, Fleur
 - (France) MOULIN, Jacques
 - (Germany) LACROIX, Andre – **WG3 Convenor**
 - (Japan) GOTOH, Mari Yuzawa
 - (Japan) HORIKAWA, Jun'ichi
 - (Russia) KHOKHLOV, Alexey
 - (UK) CACIONI, Alex
 - (UK) DAVEY, John
 - (UK) GEE, Alexander
 - (UK) STOKES, Hedley
 - (UK) SWINBURNE, Brian
 - (US) OLTROGGE, Dan
 - (US) SLANE, Fred
- **26 participants**
- **08 delegations represented**
(BR, CN, FR, GE, JP, RU, UK, US)



AIRCRAFT AND SPACE VEHICLES / SPACE SYSTEMS AND OPERATIONS

Operations and Support Systems Working Group (WG3)

ISO TC20 / SC14 - WG3

WG3 #54 May-20 Participants (1)

WG3 members and participants present in WG3 session

	Country / Region	Name	Organisation	Email address
D1+D2+D3	Germany - <i>Convenor</i>	Andre LACROIX	ArianeGroup	andre.a.lacroix@ariane.group
D1+D2+D3	Brazil	Antonio Vinicius DINIZ MERLADET	Industrial Fostering and Coordination Institute (IFI)	dinizavdm@ifi.cta.br
D2+D3	China	Wenjing CHEN	CASC - Beijing Aerospace Automatic Control Institute	lakemoon_chen@hotmail.com
D1+D2+D3	China	Zhaozhao GAO	China Academy of Space Technology (CAST)	gaozhaozhao_cast@sina.com
D1+D2+D3	China	Xiaofang ZHAO	China Academy of Space Technology (CAST)	zhaoxiaofang@live.com
D3	China	Wei WEI	CASC - Beijing Aerospace Automatic Control Institute	weiwei_std@163.com
D1+D2+D3	France	Franck DURAND-CARRIER	French Space Agency (CNES)	Franck.Durand-Carrier@cnes.fr
D1+D2+D3	France	Fleur LEFEVRE	French Space Agency (CNES)	Fleur.Lefevre@cnes.fr
D1+D2+D3	Japan	Mari Yuzawa GOTOH	Mitsubishi Electric Co.	Yuzawa.Mari@dn.MitsubishiElectric.co.jp
D1+D2+D3	Japan	Jun'ichi HORIKAWA	Mitsubishi Heavy Industries (MHI)	junichi_horikawa@mhi.co.jp
D1+D2+D3	Russian Federation	Alexey KHOKHLOV	TSNIIMASH	4112@tsniimash.ru
D1+D2+D3	UK	Brian SWINBURNE	Airbus Defence and Space	brian.swinburne@airbus.com
D1+D2+D3	USA	Dan OLTROGGE	Analytical Graphics Incorporated (AGI)	doltrogge@agi.com
D1+D2+D3	USA	Frederick SLANE	Space Infrastructure Foundation	freds@spacestandards.org



AIRCRAFT AND SPACE VEHICLES / SPACE SYSTEMS AND OPERATIONS

Operations and Support Systems Working Group (WG3)

ISO TC20 / SC14 - WG3

WG3 #54 May-20 Participants (2)

Other WG3 members present in joint WG3/WG7 session only

	Country / Region	Name	Organisation	Email address
D2+D3	UK - WG7 liaison	Peter Hedley STOKES	PHS Space Ltd.	hedley_stokes@msn.com
D2+D3	Europe	Stijn LEMMENS	European Space Agency (ESA)	stijn.lemmens@esa.int
D2	France	Lorenzo BITETTI	Thales Alenia Space	lorenzo.bitetti@thalesaleniaspace.com
D2+D3	France	Jacques MOULIN	Airbus Defence and Space	jacques.moulin@airbus.com
D2	France	Pierre OMALY	French Space Agency (CNES)	Pierre.Omaly@cnes.fr
D2	Japan	Masami MIKI	Japan Manned Space Systems Corporation (JAMSS)	miki.masami@jamss.co.jp
D2	Russian Federation	Alexey KUTOMANOV	TSNIIMASH	kutomanov@mcc.rsa.ru
D2+D3	UK	Alex CACIONI	Inmarsat	ALEX.CACIONI@INMARSAT.COM
D2+D3	UK	John DAVEY	UK Head of Delegation ISO TC20 SC14	j.r.davey@btopenworld.com
D2	UK	Tony FORSYTHE	UK Space Agency (UKSA)	tony.forsythe@ukspaceagency.gov.uk
D2+D3	UK	Alexander GEE	UK Space Agency (UKSA)	Alexander.Gee@ukspaceagency.gov.uk

Other participants present in WG3 session (not registered in TC20/SC14-WG3 Roster)

	Country / Region	Name	Organisation	Email address
D3	China	Li GANG	CASC - Beijing Aerospace Automatic Control Institute	liganghit2016@163.com
D1+D2+D3	China	Junting LIU	CASC - Beijing Aerospace Automatic Control Institute	lenchodownload@126.com
D1+D2+D3	China	Xiaoxiang LIU	CASC - Beijing Aerospace Automatic Control Institute	monkeyfiona@163.com
D3	China	Zhou TAO	CASC - Beijing Aerospace Automatic Control Institute	zhoutao11424@163.com
D1+D2	Europe	Tim FLOHRER	European Space Agency (ESA)	tim.flohrer@esa.int
D1+D2+D3	Europe	Jan SIMINSKI	European Space Agency (ESA)	Jan.Siminski@esa.int
D2+D3	Europe	Sergio VENTURA	European Space Agency (ESA)	Sergio.Ventura@esa.int



ISO Global Directory Changes since Fall-19

- WG3 added committee members
 - (21-Dec-2019) Ms. Anastasia RULENKOVA (Russia)
 - (03-Jan-2020) Mr. Lorenzo BITETTI (France)

- WG3 removed committee members
 - None.



Review & Approval of WG3 Minutes Fall-19

- Issue 02 distributed Nov-19
 - Updated WG3 work plan, text reformatted (older minutes in grey colour)
- No further comments received

Decision: WG3 Fall 2019 minutes issue 02 approved.



WG3 Action Items Review (1)

Ref.	Action:	Actionee	Deadline	Status	Result
WG3 45-07	<p>Contact the ISO 14620-2 and 14620-3 project leaders (Stephan Bonk/DLR, Séverin Drogoul/WG5) for ensuring the liaison with WG3 during revision work of this standard series</p> <p>14620-3: "Space systems — Safety requirements — Part 3: Flight safety systems"</p>	WG3 convenor	Dec-2015	Open	<p>[Nov-19] 14620-2: DIS comments dispositioned and FDIS submitted to ISO for review. CLOSED</p> <p>[Nov-19] 14620-3: SR comments not yet dispositioned. WG5 will identify a new PL.</p> <p>[May-20] Waiting for disposition of comments SR/14620-3</p> <p><i>After meeting: new PL is WG5 convenor. Comments disposition now available. Several comments from JP and RU rejected.</i></p>
WG3 50-05	<p>Update ISO 17400 (Launch and integration site general test requirements) with the disposition of comments from the systematic review as discussed during WG3 meeting Jun-2018 (see attachment 08).</p> <p>Submit the updated document to the SC14 Secretariat for initiating the DIS review step.</p>	Mr. Alexey KHOKHLOV	<p>Nov-2018</p> <p>Jun-2019</p> <p>Nov-2019</p> <p>May-2020</p>	Open	<p>[Jun-19] Mr. Khokhlov stated that Russian documents are currently under revision and that the revised DIS/17400 document should be provided for review afterwards</p> <p>[Nov-19] A revised DIS/17400 draft has been established but not yet authorized for distribution to ISO</p> <p>[May-20] See Agenda item discussion DAY-1</p>



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WG3 Action Items Review (2)

Ref.	Action:	Actionee	Deadline	Status	Result
WG3 51-03 Reworded Nov-19	Ensure that WG3/WG7-relevant terms/definitions will be harmonized within the SC14 community: Step-1: WG3/WG7 members to review the WG3/WG7 terms with multiple definitions (May-2020) Step-2: with SC14 Manager to raise formal change requests on 10795 as well as on all SC14 impacted documents. By default, impacted SC14 documents should be updated in the frame of the systematic reviews.	WG3 Convenor with WG7 convenor	Jun-2019 Nov-2019 May-2020	Open	[Step-1: May-20 WG3/WG7 workshop Step-2: SC14 Plenary Spring-2020 [May-20] See Agenda item discussion DAY-2 (WG3/WG7 joint session)
WG3 52-01	In the frame of the systematic reviews starting soon, confirm the project leaders for the WG3 documents 14619, 15860 and 26870.	Mr. Alexey KHOKHLOV with the Russian delegation	Nov-2019 May-2020	Open	[Nov-19] 15860 & 26870: New PL is Ms. Anastasia RULENKOVA. 14619 OPEN: The decision to nominate a new PL shall depend from the outcomes of the systematic review. [May-20] See Agenda item discussion DAY-1



WG3 Action Items Review (3)

Ref.	Action:	Actionee	Deadline	Status	Result
WG3 53-01	To update WD 22639 as discussed during WG3 #53 Fall-2019 meeting and to distribute (to upload to KAVI) the revised technical report draft to WG3 members for further review and for decision, if the document is mature enough to progress to the CD phase.	Ms Zhao XIAOFANG & Mr Zhaozhao GAO	Before May-2020	Open	[May-20] See Agenda item discussion DAY-1
WG3 53-02	To provide Ms. Wenjing CHEN with current practice checklist information used for the checkout and maintenance of ground support equipment.	WG3 members	Feb.2020	Open	[May-20] See Agenda item discussion DAY-1
WG3 53-03	To provide Mr. HORIKAWA with public available documentation on LCOLA techniques.	WG3 & WG7 members	Feb.2020	Open	[May-20] See Agenda item discussion DAY-2 (WG3/WG7 joint session)
WG3 53-04	To provide Mr. OLTROGGE with available documentation on STM definition.	WG3 & WG7 members	Feb.2020	Open	[May-20] See Agenda item discussion DAY-2 (WG3/WG7 joint session)



Active work program within WG3 scope

- The current latest status of ISO/TC20/SC14 work program (excel file) sent by the SC14 Secretariat (Nick Tongson), is dated May 2020 (see in [Attachment_02](#)).
- The active work program overview within WG3 scope is today as follows:

	NWIP	WD	CD	DIS	FDIS	IS	SR	Cancelled	Total
WG3	0	2	3	1	1	23	4+4'+[+4]	10	25
(ISO ref.)		22639 24330	14625 16158 17400 (DTR)	26900	27875 Amd.1		11233 14619 15860 26870 [16164] [16679] [16699] [19473]		



On-going WG3 work program activities

- Completed (Published or Reaffirmed) since 2018 Plenary
 - **15860** Gas contamination – Measurements methods for field tests
- Stages (progress of items proposed or under development)
 - **SR 11233** Orbit determination and estimation — Process for describing techniques
 - **SR 14619** Space experiments — General requirements
 - **SR 26870** Launch pad and integration site operational documents
 - **WD 22639** Design guidelines for multi-GEO satellites collocation
 - **WD 24330** Rendezvous and Proximity Operations (RPO) and On Orbit Servicing (OOS) Programmatic principles and practices
 - **CD 14625** Ground support equipment for use at launch, landing, or retrieval sites – General requirements
 - **CD 16158** Avoiding collisions with orbiting objects
 - **CD 17400** Launch and integration site general test requirements
 - **DIS 26900** Orbit data messages [*\[joint project with SC13/CCSDS NAV WG\]*](#)
 - **DAM 27875** Re-entry risk management for unmanned S/C and LV orbital stages



WG3 Systematic Reviews Planned in 2020

WG3 Review (3-years after TR publication)

- (Jun-20, CN) 19473 (Best practices for orbit elements at payload-LV separation)

SC14 systematic reviews (5-years)

- (Jul-20, UK) 16164 (Disposal of satellites operating in or crossing Low Earth Orbit)
- (Sep-20, CN) 16679 (Relative motion analysis elements after LV/SC separation)
- (Nov-20, US) 16699 (Disposal of orbital launch stages)

Discussion WG3 – **DAY-1:**

- 19473 confirmed, 16679 SR to start, 16164/16699 cancel SR (consolidation on-going)

[Proposed Resolution text for ISO TC20/SC14 \(meeting 11-Jun-2020\):](#)

TC20/SC14 to resolve to re-confirm ISO 16164 (Space systems – Disposal of satellites operating in or crossing Low Earth Orbit) published in July 2015 and ISO 16699 (Space systems – Disposal of orbital launch stages) published in November 2015 for the next 5-year period without systematic review. This is justified by the fact that there are the consolidation projects 23312 and 20893 under work (both coordinated in WG7) and which will incorporate the content of ISO 16164 and ISO 16699 (resolutions 400 and 401 from May 2016).



Report on SC14 Secretariat activities

- ISO Directive Part 1 update 2020 (<https://www.iso.org/sites/directives/current/part1/index.xhtml>)
 - E.g. convenors may invite specific guests to a meeting (P-member to be notified)
 - E.g. meeting notice for virtual meeting at least 4 weeks in advance
 - E.g. minutes to be distributed within 4 weeks after the meeting
- SC14 Resolution 479 from 2019 (reminder):

Resolution 479

TC20/SC14 **resolves** to explore the Topic Working Group (TWG) construct. Once a new work item is proposed, the CAG will establish a TWG by soliciting appropriate members from different SC14 WGs. The members will be subject matter experts. This will ensure the standard in development has the widest possible expertise from SC14 participating in its development. The TWG will help the primary developer(s) with:

- Technical expertise,
- Establishing market needs,
- Ensuring no conflict with terminology and resolving conflicts should they arise, and
- Participation in the resolution of comments with impartiality and using subject matter expertise.

The TWG will follow their assigned standard through the entire ISO process until the standard is issued, after which the TWG is no longer active. The TWG will be reactivated to perform the same functions when revision of the standard is due.



Revision 14625 Ground support equipment for use at launch, landing, or retrieval sites

- Project Leader (Ms. Wenjing CHEN) supported by Mr. Junting LIU.
 - See presentation & revised CD ([attachment_03 – with revised CD „DAY-3“](#))
 - Discussion WG3 – **DAY-1:**
 - §6.2.6: The §6 is addressing characteristics, not comments. The proposed requirements should be moved to §11 or §14.
 - §11.5: The requirement “...halted by failure GSE...” as formulated is not achievable and should be reviewed/revised.
 - §11.6: ISO 18238 is referenced but not listed in §2
 - §14.2: This table does not contain clear measurable requirements, only “check and maintain” sentences. Recommend to delete (what is added value?) or revise.
 - Discussion WG3 – **DAY-3:** A revised CD has been distributed incl. comments DAY-1
- ACTION:** [WG3 members to review and comment the proposed changes until 30-Jun-2020. Members are also invited to provide editorial comments in order to improve/align the used vocabulary. Afterwards, received comments will be resolved, and the updated document will be registered for CD/V vote.](#)



Project 22639 – ISO Rules: max. 48 Months (1)

The project 22639, approved in 2017, is today extended to 48 months (publication 2021).

There is still time to finalize. WG3 members could agree a resolution to skip the CD/C stage and go directly to CD/V. The SC14 manager would then need the CD/V draft just after the meeting (early June 2020):

- CD/V review starting in June-2020 (until September 2020)
- If CD/V approved, the disposition and DIS draft must be ready in October 2020
- DIS review starting in November 2020 (until February 2021)

If all of this is not possible, the project must be cancelled and re-started when the CD draft will be ready (a resolution will be required).

WG3 could also agree a resolution to convert the project from an International Standard (IS) to a Technical Specification (TS) or a Technical Report (TR) with a resolution to be approved by P-members. For a TS, one DTS (Draft Technical Specification) review is required with a 2/3 majority(!) vote for publication.



Project 22639 – ISO Rules: max. 48 Months (2)

In principle, there are the following options to progress without cancellation:

- see <https://www.iso.org/sites/directives/current/part1/index.xhtml> §3.1

OPTION-1: “fast track IS”

- skip CD/C stage with a resolution & start in June the CD/V review and DIS in Nov.
- Outcome: international standard (IS)

OPTION-2: “TS”

- change to technical specification with a resolution and start the DTS review in 2020
- Outcome: technical specification (TS)
- Review after 3 years - can then be transformed with or without change in IS

OPTION 3: “TR”

- change to technical report with a resolution and start the DTR review in 2020
- Outcome: technical report (TR) – no requirement (“shall”) allowed in the document

OPTION 4: “PAS”

- P-member to propose a “publicly available specification” for review
- Outcome: publicly available specification (PAS)
- Valid 3 years - can then be transformed with or without change in TS or IS
- Can be extended once (i.e. 6 years max. lifetime before withdrawal)



WD 22639 Design guidelines for multi-GEO satellites collocation (1) DAY-1

- See presentation/comments disposition/revised draft from Ms. Xiaofang ZHAO & Mr. Zhaozhao GAO ([attachment_04](#))
- Discussion WG3 – **DAY-1:**
 - The document in its current form would be more appropriate as technical report, e.g. useful for raising the awareness of new operators. However, the document as proposed will be of low interest for established operators for all the reasons as discussed in the previous WG3 meetings.
 - A technical specification makes possibly less sense at this stage, because WG3 members have doubt that agreement for an IS can be achieved within 3 years.

ACTION (at end of DAY-1) PL to decide the way forward. If confirmed, the WG3 convenor will propose a related resolution to SC14 P-members (< 11-Jun-2020)



WD 22639 Design guidelines for multi-GEO **satellites** collocation (2) DAY-3

■ Discussion WG3 – **DAY-3:**

- Ms. Xiaofang ZHAO confirmed by email that the project shall become a TR.
- The terms “satellite(s)” will be replaced by “spacecraft” in the title as well as in the whole document in order to ensure harmonization with the other SC14 documents.
- To comply with the ISO directive rules, all “shall” will be replaced by “should” (see also ISO Directive Part 1 §3.1)
- The WG3 convenor will propose a combined resolution to SC14 to be resolved during the SC14 meeting planned on 11-Jun-2020. The CD/V voting (DTR review) can be initiated just afterwards.

Proposed Resolution text for ISO TC20/SC14 (meeting 11-Jun-2020):

TC20/SC14 to resolve to convert the project 22639 from an IS to a TR with the changed title “Space systems – Design guidelines for multi-GEO spacecraft collocation” and with unchanged scope, unchanged PL (Zhaozhao GAO from CN) and starting at the CD/V stage (DTR review) without change of timeframe. The title shall be changed in order to harmonize with SC14 terminology.



SR 14619 Space experiments – General requirements

- Mr. Alexey KHOKHLOV presented the results of the systematic review distributed Dec-19 by SC14 (N1719) ([attachment_05](#))
- Discussion WG3 – **DAY-1:**
 - 5 P-members recommended the confirmation, 1 the revision (only 3 P-members are using the document i.e. a withdrawal ballot could be initiated)
 - The Russian delegation will propose a revision of the standard and the SR comments (3 from Japan and 1 from US) will be dispositioned. The revised draft will highlight all proposed changes and is expected before Aug-2020.
 - A new project leader has been identified. The new PL name has however not yet been provided to SC14 (SC14 work plan and KAVI to be updated).

[ACTION-1](#): Clarify the nomination of the new project leader (Jun-20)

[ACTION-2](#): WG3 convenor to propose a resolution to revise 14619 (< 11-Jul-20)

[ACTION-3](#): Distribute the proposed changes and SR comments disposition to WG3 (Aug-20)



SR 17400 Space launch complexes, integration sites and other facilities - General testing guidelines

- Project Leader (Ms. Anastasia RULENKOVA) absent.
 - See documents provided by the RU delegation on 22-May-2020: Disposition of comments 2018 & comments 2019 ([attachment_06](#))
 - The title of 17400 has been corrected by SC14 secretariat and a DTR has been distributed Mar-20 (N1758, cancelled).

Discussion WG3 – DAY-1:

- Comment 2018/1 (§3.1) is accepted and N1758 will be updated.
- Comment 2018/2 (§5.1) is rejected (change of clause title). The PL will clarify if the additional NOTE as proposed in 2018 is also rejected or accepted.
- Comment 2019/5 (§4.1.3): The term “must” will be replaced by “should”.
- The PL will ensure that the new DTR version will highlight (e.g. with revision tracking or with different colour) all made changes.

ACTION: WG3 members to review the “comments 2019” until 30-Jun-2020. By default, these changes are accepted by WG3 participants. The DTR due date is 04 July 2020.



SR 26870 Launch pad and integration site operational

- Project Leader (Ms. Anastasia RULENKOVA) absent.
 - See presentation provided by the RU delegation on 22-May-2020 ([attachment_07](#))
- Discussion WG3 – **DAY-1:**
 - WG3 participants recommend that ISO 26870 “Launch pad and integration site operational” be reconfirmed without technical change.
- Discussion WG3 – **DAY-3:**
 - The terminology should be harmonized with ISO 10795 (terms “customer”, “hazard analysis”) and with ECSS (term “preventive maintenance”).
 - To harmonize the terms will require a revision project, because the ISO Central Secretary considers the terms and definitions section as “technical content”.

[Proposed Resolution text for ISO TC20/SC14 \(meeting 11-Jun-2020\):](#)

[TC20/SC14 to resolve to revise ISO 26870 \(Launch pad and integration site operational\) starting at the DIS stage in order to harmonize terminology, with unchanged title, unchanged scope and unchanged project lead, and with a planned revision duration of 12 months.](#)



pNWIP Design, Testing and Operation Standard for large spacecraft constellation (1)

- See Form 4 and working draft presented by Mr. Dr. Akira KATO ([attachment_08](#))
- Discussion WG3/WG7 – **DAY-2**:
 - The work is proposed to be developed in WG1, with joint coordination WG3/WG7 and co-lead JPN/US. **The appropriate way forward should be to propose a „Topic WG“** in compliance with the SC14 resolution 479 decided during 2019 SC14 Plenary.
 - A TR was proposed Nov-19 as way forward. What are we heading for today? There is a time element to consider as there are already many constellations in development. What is particularly important could eventually be included in existing standards.
 - Whatever the decision to integrate in other standards or to establish a TR or IS, it's important to make the subject more stable. There are e.g. assertions which are not all validated as of today. There are also a wide range of issues for design (LV, SC, mission control...). Assembling all in one unique document might become complex.

ACTION: WG3/WG7 members to provide (technical & development schedule) comments on the proposal until 30-Jun-2020. Specific discussion will be held in July to address urgent issues and best way forward to reduce development time. NWIP submission afterwards.



pNWIP Design, Testing and Operation Standard for large spacecraft constellation (2)

■ Discussion WG3 – DAY-3:

- Dr. Kato clarified on 27-May by email that he provided during “DAY-2” only a status report and that this matter has already been **submitted to WG1** and that the NWIP decision is therefore WG1 decision.
- Dr. Kato also requested to have further technical discussion in written form by email exchanges because webex meeting require high English speaking ability as well as immediate responses i.e. not always allowing sufficient deep consideration.

DECISION: The WG3 convenor will report this discussion at the coming SC14 meeting (planned 11-Jun-2020). WG3 recommends the urgent decision of a SC14-transverse ad-hoc working group (e.g. “Topic WG” or similar) to clarify priorities and to decide the NWIP contents.

Meanwhile, exchange of technical comments in written form with the PL co-leaders is the recommended way forward.



pNWIP IGSO operation orbit & de-orbit area vs GEO protected region

- See presentation from Ms. Mari Yuzawa GOTOH ([attachment_09](#))
- Discussion WG3/WG7 – **DAY-2:**
 - How many spacecraft operate at IGSO? About 10? The Russian TUNDRA S/C is also operating in this orbit.
 - There is some urgency to publish the results due to QZSS and BEIDU. Updating 23312 might be faster. An update and full agreement of 24113 would certainly take one year.
 - Re-entry human casualty risk is another factor to be considered.
 - The question of what is an acceptable dwell time has wider implications.
 - 24113 should only address high level prescriptive requirements for protected region. And the more detailed solution-oriented and safety-case requirements should be moved to 23312 (e.g. the GEO equation). For GNSS zone protection, the NASA and other similar requirements should also be included in 23312.

ACTION: The proposal to change 23312 shall be provided through the official P-member voting in the frame of the CD/V review currently on-going (**SC14 due date is 31-Jul-2020**).



SR 16158 Avoiding collisions with orbiting objects

- See presentation from Ms. Mari Yuzawa GOTOH ([attachment_10](#))
- Discussion WG3/WG7 – **DAY-2**:
 - Participants agree that the DTR can be initiated.
 - A resolution is also needed to formalize the decided change of PL from US to Japan.

[Proposed Resolution text for ISO TC20/SC14 \(meeting 11-Jun-2020\):](#)

[TC20/SC14 to resolve to revise ISO 16158 \(Space systems – Avoiding collisions with orbiting objects\) confirmed in January 2019, with the same scope and changed Project Lead \(co-leads Dan OLTROGGE from US and Mari Yuzawa GOTOH from JP\) starting at the CD/V stage \(DTR\) for a 24-month development period in order to implement the comments received during systematic review.](#)



pNWIP Launch collision avoidance (LCOLA) (1) DAY-2

- See presentation from Mr. Jun'ichi HORIKAWA ([attachment_11 – updated “DAY-3”](#))
- Discussion WG3/WG7 – **DAY-2 & DAY-3**:
 - LCOLA survey answers from Roscosmos have been received on 22-May-2020. The presentation will be updated after the DAY-2 meeting.
 - In the US, there are several LCOLA approaches.
 - Participants noted the value of the effort to collect LCOLA data. Some data need to be completed (e.g. duration information).
 - A TR is intended to be prepared with the associated NWIP Form 4 until the next WG3/WG7 Fall-20 meeting. Afterwards there will be opportunity to discuss all the associated technical questions on the observed differences and reasons behind.

ACTION: WG3/WG7 members (countries) to review the survey outcomes and to provide the missing information until 30-Jun-2020. A draft TR and associated NWIP Form 4 will be prepared by end of Aug-20 and circulated to WG3/WG7 members for one-month review. Decision to initiate NWIP vote will be taken during the joint WG3/WG7 Fall-20 session.



WD 24330 Rendezvous and Proximity Operations and On Orbit Servicing – Programmatic principles and practices

- See presentation and revised WD from Mr. Frederick SLANE ([attachment_12](#))
- Discussion WG3/WG7 – **DAY-2 & DAY-3**:
 - Participants noted that the specific use of convex envelope as proposed is restrictive. E.g. passively safe trajectories can be based on conjunctions with the keep-out zone.
 - Participants noted that the mission phases are informative and not normative. There is a detailed discussion in the CONFERS on mission phases and risks which may lead to more detailed standards work.
 - Participants agree that more time is needed for dedicated discussion before passing next stage. The PL reminded that a writing team has been set up to work on the WD. After writing team consensus, wider comments will be collected during CD review.

Decision: The PL will organize specific working sessions with comment holders to confirm the disposition of comments. After validation by the writing team, the CD/C review will be initiated.

ACTION: The framework of lower-level envisaged standards to support 24330 shall be distributed to WG3/WG7 members until Oct-20 and then discussed at the Fall-20 meeting.



Space Traffic Management (STM) Liaison activities – ECSS STMWG

- See presentation from Ms. Fleur LEFEVRE ([attachment_13](#))
- Discussion WG3/WG7 – **DAY-2**:
 - Participants noted the presentation.
 - ECSS created the STM working group in the last few months in order to create and support harmonization of STM related standardisation.

Purpose of the Space Traffic Management Working Group is to provide ECSS contribution to the development of worldwide STM implementation standards in the framework of the ISO/TC20/SC14-WG 3 (Operations & Support Systems). ECSS is the natural forum to harmonise the European position for what concerns upstream standards. It shall function as an ECSS-ISO Mirror Working Group for development and adoption of international standards.
 - The ECSS-STMWG Convenor will represent the ECSS position in SC14 discussions for STM aspects (similar to ECSS-SDWG for space debris aspects).



Space Traffic Management (STM) Liaison activities – IAF STM WG

- See presentation from Mr. Christophe BONNAL ([attachment_14](#))
- Discussion WG3/WG7 – **DAY-2**:
 - Participants noted the presentation.
 - The IAF Space Traffic Management Working Group (IAF STM WG) was founded following a joint action between IAA (International Academy of Astronautics), IISL (International Institute of Space Law), and IAF (International Astronautical Federation).
 - IAF STM WG aim is to target the key decision makers at international levels, to serve as a platform for exchanges among experts from diverse affiliations and backgrounds.
 - Scope is not to duplicate existing efforts but covering the world to consolidate STM information and clarify discrepancies
 - The terms of reference are currently under revision in order to integrate all the received comments. The updated ToR document is expected in Summer 2020.
 - Membership is open for active participation only (way of working with small groups).



pNWIP Space Traffic Coordination & Management (STCM)

- See presentation, Form 4 and NWIP-Draft from Mr. Daniel OLTROGGE ([attachment_15](#))
- Discussion WG3/WG7 – **DAY-2**:
 - STCM work shall be complementary to IAF STM WG activities.
 - During last 2019 meeting, members agreed that the STM subject is not yet mature enough to propose a standard. For STC aspects there is however already some maturity available which is intended to be assembled for this project.
 - STCM will address both manoeuvrable and non-manoevrable spacecraft. People have different opinion of what means STM. Some STM differences deal with e.g. Near Earth Objects, other do not... SDA (space domain awareness) has been introduced recently for wider SSA aspects. The new term STCM will cover all aspects of STM.
 - The proposal looks logical, well-structured and already quite complete.
 - The NWIP will be finalized and submitted in the next month or two. Following submittal, the Comment Review process will proceed under the normal process.
 - **ACTION**: [WG3/WG7 members to provide comments on the STCM proposal until 30-Jun-2020](#). Afterwards, the proposal will be revised & submitted to SC14 for formal NWIP vote.



Terminology – Harmonization of WG3/WG7 multiple defined terms

- See list of SC14 terms (15-May) provided by the Ukrainian delegation ([attachment_16](#)) and presentation on WG3/WG7 term issues from Mr. André LACROIX ([attachment_17](#))
- Discussion WG3/WG7 – **DAY-2**:
 - SC14 terminology should be hosted by electronic means such as sanaregistry.org so that ALL standards may have their terminology updated at same time and not diverge.
 - Several discrepancies are due to documents with updated definitions (for which some other SC14 documents are still using the definition of the previous version).
 - Some definitions could be removed as not needed (to be confirmed).
 - When SC14 documents are cancelled, need to verify that none of its definitions are used by other SC14 standards

ACTION: WG3/WG7 members to provide comments on the proposed terminology harmonisation until 30-Jun-2020. Afterwards, the WG3 and WG7 convenors will review together the comments and submit the WG3/WG7 joint recommendations to SC14 for further decision of the way forward.



Liaison activities – ECSS SDWG

- See ECSS status presentation ([attachment_18](#))
- Discussion WG3/WG7 – **DAY-2**:
 - Key discussion is focusing on 24113 adoption options, on 24113 mid-level and low-level implementation standards and also on WD24330 RPO/OOS and related ECSS position.
 - Concerns were expressed on the future scenarios, with large constellations and small SC, which is rapidly evolving and may need fast-track discussion of potential new debris mitigation requirements



Liaison activities – IADC

- See presentation from Mr Stijn LEMMENS ([attachment_19](#))
- Discussion WG3/WG7 – **DAY-2**:
 - IADC guidelines will be updated
 - Advanced discussion on large constellations, altitude & orbit determination aids, MEO disposal
 - Active research on disposal options for highly inclined GEO, re-entry survivability comparison, Space Environment Index



Liaison activities – UN (COPUOS, UNOOSA)

- See presentation from Mr Daniel OLTROGGE ([attachment_20](#))
- Discussion WG3/WG7 – **DAY-2**:
 - WG3 and WG7 brochures distributed at the World Space Forum Nov-19
 - The basic building blocks to space sustainability are clear. E.g. avoid predictable collisions, minimize creation of new debris, remove massive derelict LEO objects...
 - STSC discussion Jan/Feb-20: The needed LTS WG bureau could not be elected.
 - GA meeting Jun-20 cancelled. Virtual meeting eventually, but only for critical matters.



Liaison activities – CCSDS

- See presentation from Mr Daniel OLTROGGE ([attachment_21](#))
- Discussion WG3/WG7 – **DAY-2**:
 - Bilateral agreements SC14 with SC13 and CCSDS now formally approved. SC14 contact points are Fred SLANE and Dan OLTROGGE
 - Initiative to develop a shared SC13/SC14 reference architecture
 - Initiative to harmonize terminology, both within and across SC13 and SC14, using the SANA Registry



SR/DIS 26900 Orbit data messages (ODM)

- See presentation and new draft from Mr Daniel OLTROGGE ([attachment_22](#))
- Discussion WG3/WG7 – **DAY-2 & DAY-3**:
 - Significant progress. ODM test plan under preparation.
 - Many ICD references (entries not contained in SANA registry) have been reduced. Mutual agreements between operators are necessary.
 - Catalogue space objects can be encapsulated in “multiple objects” message
 - The Air Force SSC numbering scheme will change from 5 to 9 digits
 - Duplicate ephemeris time tags: the ability to use separate blocks to represent “interpolatable” segments is retained. Even so, “ringing” effect must be prevented.
 - Many organizations are improperly interpolating covariance matrices. The draft Orbit Data Message includes and defines processes to properly interpolate covariance matrices.
 - A new version 2.40 will be distributed in the coming week(s) for comments.

[ACTION](#): To distribute the new draft version 2.40 to WG3/WG7 members for review.



[WG2] NWIP Requirements of cryogenic LV propulsion system to GSE interfaces

- See presentation provided May-20 to WG2 ([attachment_23](#))
- Discussion WG3 – **DAY-3**:
 - New title proposed: „Requirements of LV Propulsion System to GSE Interfaces“ in order to make possible the extension to other types of propellants.
 - Draft is not yet ready, however an outline is provided in the presentation.

[ACTION](#): To distribute the outline to WG3 members for review.



[WG4] 14200 Guide to process-based implementation of meteoroid & debris environmental models (orbital altitudes below GEO+2000km)

- See DIS enquiry initiated by WG4 on 06-Apr-20 with due date 29-Jun-20 ([attachment_24](#))
- Discussion WG3 – **DAY-3**:
 - DIS enquiry initiated without previous involvement of WG3/WG7.
 - ISO 14200 underwent a Systematic Review which resulted in a decision to review the document. For reasons which are not entirely clear, WG4 resolved that the revised text should go directly to DIS.
 - The proposed DIS is inadequate and partially out of date: e.g. terminology has not been aligned with 24113, 11227 and 10795 (GEO, LV orbital stage, meteoroid, space debris, spacecraft), details of known models have not been included (e.g. SOLEM, SDEEM – see also comments submitted Nov-19 have not been included).

ACTION: WG3 and WG7 members are encouraged to review DIS/14200 and to verify if the proposed document is sufficiently adequate and mature enough, and in case of comments to consider their national position on the document.



[WG5] pNWIP Cybersecurity Management – Guidelines

- See Form4/Outline information from WG5 ([attachment_25](#))
- Discussion WG3 – **DAY-3**:
 - CCSDS is already working on cybersecurity, with representatives from all P-member countries. **The better way forward should rather be a joint SC13/SC14 initiative.**
 - WG3 members already discussed in previous meetings the interest for addressing cyber-protection and cybersecurity of critical space infrastructure and support systems, and if it would be worth having a cybersecurity standard specific for space operations, or if this should be covered in the frame of more general programme management and/or systems engineering requirements for spacecraft.
 - What are the commercial arguments, the business case? What are cybersecurity specific requirements related to space systems and operations needs? This should be clarified before deciding a formal NWIP.
 - In case of confirmed interest by WG1 and WG5, WG3 aspects could be added in a further step.

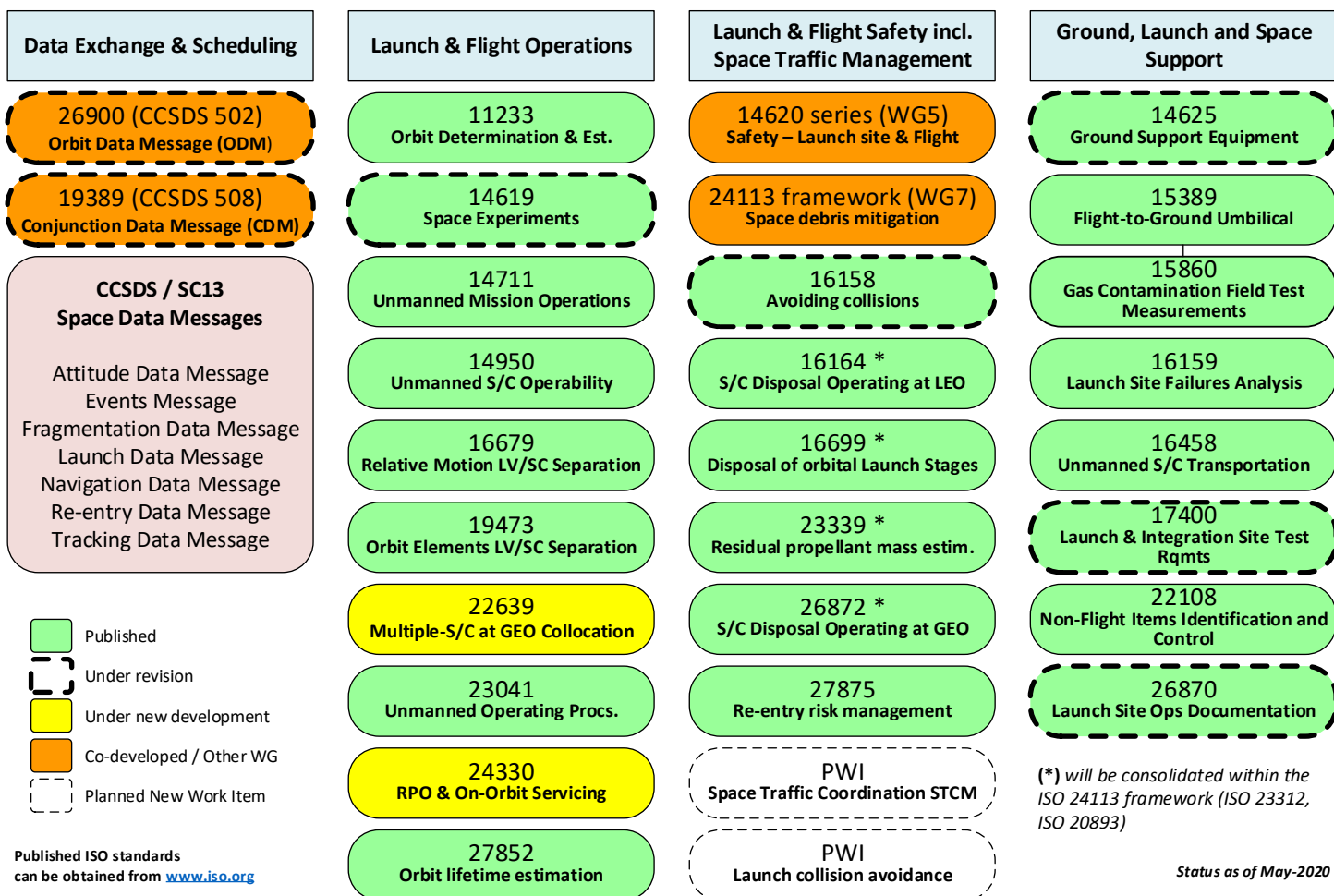


AIRCRAFT AND SPACE VEHICLES / SPACE SYSTEMS AND OPERATIONS

Operations and Support Systems Working Group (WG3)

ISO TC20 / SC14 - WG3

WG3 Structure of Documents [as of May-20]





WG3 Brochure

Communication within SC14 and external bodies

- Very successful distribution at international conferences (e.g. IOC 2019)
(thank you, Dan!)
- Both WG3 and WG7 brochures used a similar format. This template could be helpful for the other SC14 WGs to communicate their works in a similar way...
- The SC14 brochures should be published on the SC14 homepage, but also on homepages of organizations in liaison with WG3/WG7...



Wrap-up session

- Review of WG3 action items
 - [see previous slides](#)
- Proposed SC14 resolutions
 - [see previous slides](#)
- Date and Location of next meetings
 - WG3 #55: No decision yet, if a physical meeting will be possible or not for the Fall-2020 meeting in Oct/Nov-20. If possible, WG7 would prefer to hold the meeting in UK or Europe.
 - WG3 #56: SC14 Plenary week 2021 planned in Potsdam/Germany.



Virtual meeting – Return of experience

- PRO: discipline of participants allowing an effective meeting: all items could be addressed (advanced information, micros on mute, use of the chat function to comment and raise questions...)
- PRO: more than the usual number of attendees
- CON: limited amount of time available for discussion
- CON: discussions cannot flow freely. This can be frustrating at times.
- CON: virtual meetings cannot compare to the productivity and cultural cross-pollination and exchange of in-person meetings
- Future physical meetings:
 - At least for the yearly Plenary week, to have a hybrid solution in place (e.g. micros, visio/webinar) to allow virtual attendance to the fullest extent possible
 - A virtual attendance option will help ensure that visa, travel, scheduling or financial limitations do not prevent relevant organizations from attending



Meeting Closure –THANK YOU!

- Thanks to all for a very efficient meeting these last 3/4 days...
- Thanks to ESA for setting up hosting virtually very efficient WebEx meetings, allowing fruitful and dense meeting sessions!
- Take care on you! Stay safe!