XTCE (XML Telemetric and Command Exchange) Standard Making It Work at NASA. Can It Work For You?



OMG and CCSDS Standard



About:

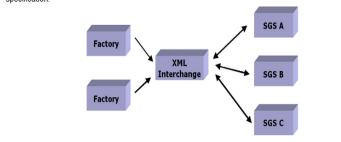
- Published by OMG in 2006
- XML Schema
- CCSDS Adopted as Blue Book 2008
- Used at NASA Centers, ESA, CNES, DLR, Harris, Boeing, Northrup Grumman and others
- Intended for exchange of operations databases but some using as their native operations database
- Supported by many COTS packages

XML Telemetric & Command Exchange (XTCE)

This specification is an information model for spacecraft telemetry and commanding data. For a given miss there are a number of lifecycle phases that are supported by a variety of systems and organizations. Additionally, many of these organizations support multiple heterogeneous missions using a common ground segment infrastructure. Telemetry and command definitions must be exchanged among all of these phases, systems, an organizations. This is made difficult and costly because there is no standard method for exchanging this information. The lack of standardization currently requires custom ingestion of the telemetry and commandin information. This customization is inherently error-prone, resulting in the need to revalidate at each step in the lifecycle.

A typical example of this process is between the spacecraft manufacturer and spacecraft-operating agency. The spacecraft manufacturer defines the telemetry and command data in a format that is much different than the one used in the ground segment. This creates the need for database translation, increased testing, software customization, and increased probability of error. Standardization of the command and telemetry data definitio format will streamline the process allowing dissimilar systems to communicate without the need for the development of mission specific database import/export tools.

Ideally, a spacecraft operator should be able to transition from one ground system to another by simply moving an already existing command and telemetry database compliant with this command and telemetry database specification

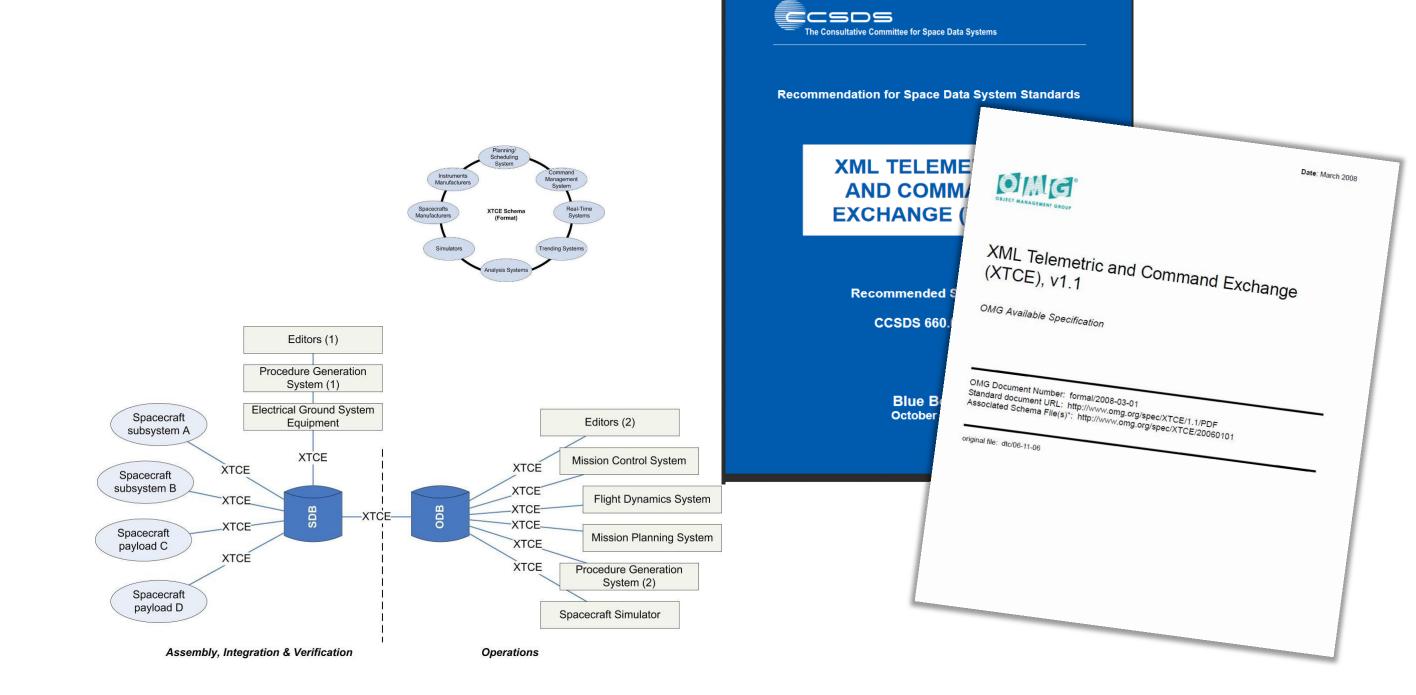


Documentation

Informative Specification

XML Schema - Normative Specificatio

PowerPoint Tutorial

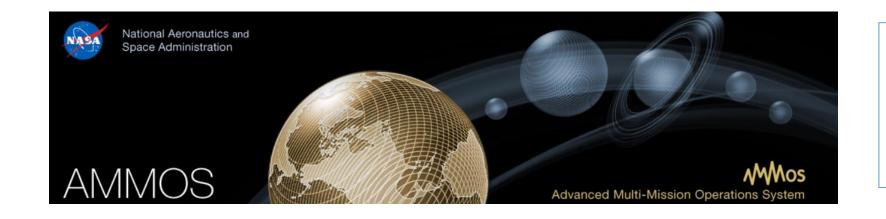


http://www.omg.org/space/xtce/

https://public.ccsds.org/Pubs/660x0b1.pdf

Version 1.2 now in approval cycle

Example Telemetry & Command Systems Use Cases Considered



- Multiple mission control center
- Many JPL missions supported
- XML based ops database
- Compatibility with XTCE tested



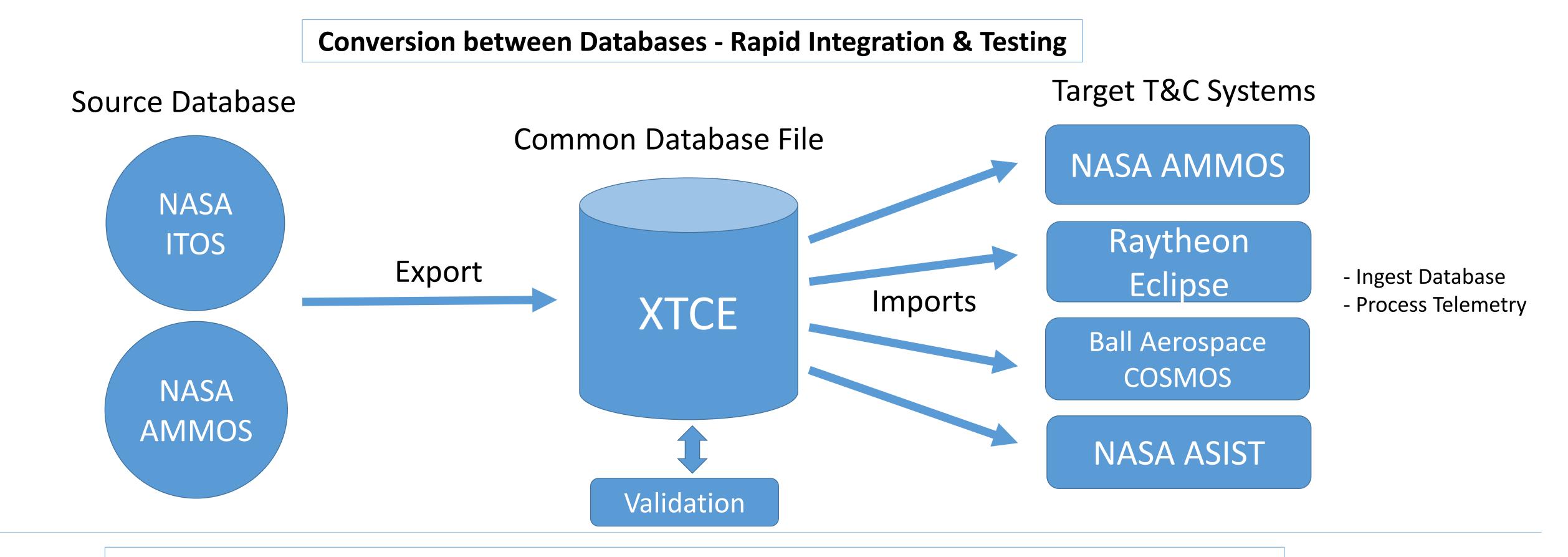
- Native ops database
 - Compatibility with XTCE tested

Many NASA GSFC missions supported

NASA GSFC GOTS

Six Different Use Cases Considered

- 1. A spacecraft/Instrument provider delivers mission specifications for AMMOS use
- 2. Another Center provides XTCE file to allow an AMMOS system to provide backup Mission **Operations Center capabilities**
- 3. XTCE specification is received to allow AMMOS system to monitor selected data sets (e.g. a single instrument)
- 4. AMMOS provides XTCE files to allow other tools to be easily configured
- 5. AMMOS provides an XTCE file to another Center and they provide backup Mission **Operations Center capabilities**
- 6. XTCE specification is provided to allow another system to monitor selected data sets (e.g. **Goddard monitors a JPL instrument)**



Multiple End User Operations

Perspectives

Telemetry Processing One XTCE Database, Four Telemetry and Command Processing Systems

- Multiple tool chains
- Multiple tool vendors
- Technology refresh

						lulti-Track: Ion 15May06					
Satellite	Az	E1	LatN	LonW	Range I	Satellite	Az	E1	LatN	LonW	Range
0SCAR-7	271	-45	-6	172	10911 D	RS-20	147	-58	-62	355	11669
OSCAR-11	275	-70	-28	210	12659 D	RS-22	193	-57	-73	117	11480 I
PACSAT	300	-56	4	203	11463 D	PCSAT	47	+4	53	45	2846 [
LUSAT	115	-33	-8	13	8151 D	HAMSAT	85	-57	-14	319	11463
ITAMSAT	335	-49	31	225	10715 D	OSCAR-57	327	-32	53	195	8217 [
OSCAR-27	133	+3	22	55	2998 D	OSCAR-58	249	-31	-3	136	7798 [
OSCAR-29	240	-75	-49	216	13643 D	NOAA-14	28	-15	69	1	5473 [
OSCAR-32	207	-65	-70	181	12449 D	N0AA-15	278	-73	-29	217	13027 [
OSCAR-50	342	-32	64	212	7804 D	N0AA-17	189	-67	-81	211	12608 I
OSCAR-51	209	-66	-68	182	12385 D	UARS	311	-28	48	165	6757 [
CUTE-1	131	-34	-20	23	8429 D	HUBBLE	28	-68	-1	273	12424
RS-15	336	-53	19	232	12710 D	ISS	285	-30	27	153	7002 [
					Upcoming	Passes					
Sun		ISS on Mon 15May06 20:02:43 UTC						Moon			
253.8	9 Az		cu			lay06 20:02 lay06 20:06				41.48	Az

AMMOS Display

Eclipse Display

interfaces	Target	s Cmd Packets	Tim Packets	Routers	Logging) Status				
Interface		Connect/Disconnect	Connected?	Clients	Tx Q Size	Rx Q Size	Bytes Tx	Bytes Rx	Cmd Pkts	TIm Pkts
INST_INT		Disconnect	true	0	0	0	616	1389056	44	18215
INST2_INT		Disconnect	true	0	0	0	0	1389056	0	18215
EXAMPLE_INT		Connect	false	0	0	0	0	0	0	0
TEMPLATED_INT		Connect	false	0	0	0	0	0	0	0
COSMOS_INT		Disconnect	true	0	0	0	0	0	0	1047
016/08/22 14:5 016/08/22 14:5 016/08/22 14:5 016/08/22 14:5 016/08/22 14:5 016/08/22 14:5 016/08/22 14:5 016/08/22 14:5 016/08/22 14:5 016/08/22 14:5	51:24.3 51:24.3 51:24.3 51:25.3 51:25.3 51:25.3 51:28.3 51:28.3 51:28.3	214 WARN: INST2 HEAL 212 ERROR: INST HEAL 212 INFO: cmd(TINST CC 215 ERROR: INST2 HEA 215 INFO: cmd(TINST CC 212 INFO: INST HEALT 211 INFO: INST HEALT 211 INFO: INST HEALT 211 INFO: INST HEALT 214 INFO: INST HEALT 214 INFO: INST HEALT 214 INFO: INST2 HEALT	IH_STATUS TEM DLLECT with TYI LTH_STATUS TE DLLECT with TYI L_STATUS TEMP. H_STATUS TEMP. L_STATUS GROL L_STATUS GROL H_STATUS GROL	191 = 82. PE NORM MP1 = 82 PE NORM 2 = 7.749 P2 = 7.74 IND1STAT IND1STAT UND1STAT	9298500000 AL, DURATIC .929850000 AL, DURATIC 3039062500 9303906250 9303906250 US = CONNE US = CONNE TUS = CONNE	0002 is RED_ 0002 is RED 00002 is RED 00 5.0, OPCC 006 is GREEN 0006 is GREEN 0006 is GREEN ECTED is GREI ECTED is GREI JECTED is GREI	HIGH DE 0xAB, TEM _HIGH DE 0xAB, TEM J EN EN EN EEN	,		

Ball COSMOS Display

