Aerospace
Content Standards Council

Old name - SSDCSC
(Space System Design Content Standards Council)

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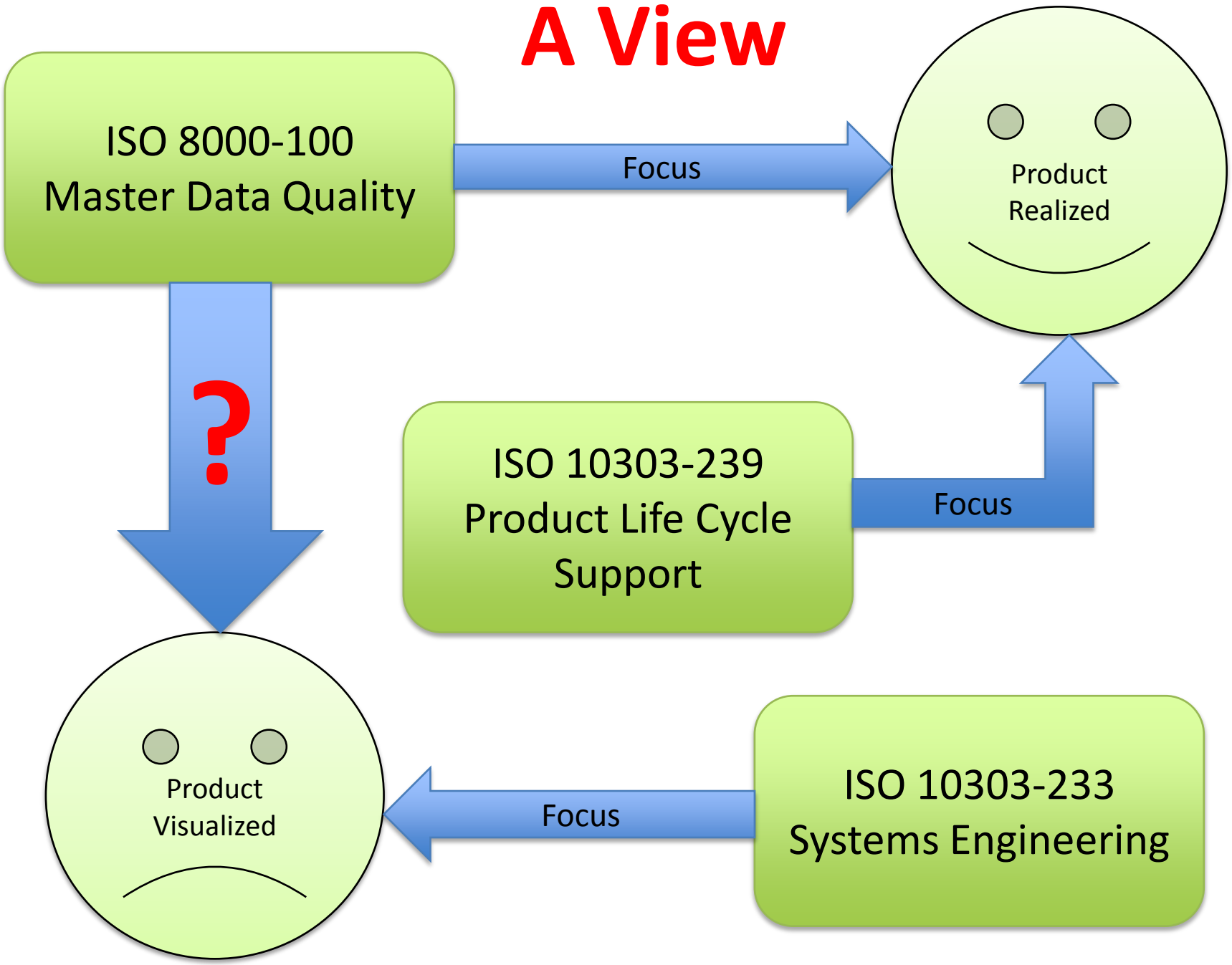
(Systems Engineering)

Why Me?

- Background (NASA Space systems)
  - 30+ years Develop computational design analysis tools
    - Dynamics, structures, controls, elasticity, thermal
    - Multi-disciplinary analysis tools and infrastructure
  - 10+ years Systems Engineering
    - ISO 10303 AP233 → definition, creation, delivery
  - Concurrently 40+ years
    - Background experience – non-aerospace applications
      - Man-machine interaction dynamics and performance
      - Land based vehicles – life time prediction & fatigue
      - Integrated Analysis – control, structure, thermal, optics, data
      - Molecular dynamics
      - Neuroethology – insect inspired control
      - Information capture & reuse – ISO 10303
      - Various ontology applications
      - New - Immunology (cancer, melanoma) – A great application of some very old NASA tools
  - New
    - ISO-8000 supports a need - across EVERYTHING I've encountered

Where do we start?

- **Rule of Gold**
  - **You provide support → You define direction**
- Kind of Items - re. ISO 8000-100 **(Product as realized)**
  - There are three distinct categories of items, each with its own kind of identifiers:
    - physical objects: asset tracking numbers and serial numbers;
    - items of production: part or model numbers;
    - items of supply: stock numbers.
  - This isn't my world (I've never used these numbers); but, your need is my need.
- Kind of items - My background experience **(Product as visualized)**
  - Item is a concept model
    - Has low fidelity characterization
  - Item is a design model
    - Has high fidelity characterization
  - Item has data (worse case situation)
    - Identifiers – none
    - Name - ambiguous
    - Definitions – implicit
    - Characterization measures = properties – minimal traceability
- My opinion
  - Worse case practitioners need help – Must be low cost
    - No good data – no data reuse
    - No good data – no good information capture
    - No good information capture – no good knowledge capture
    - No good data/information/knowledge capture → **Dumb**


A View
ISO 8000-100
Master Data Quality
Focus
Product
Realized
?
ISO 10303-239
Product Life Cycle
Support
Focus
Product
Visualized
Focus
ISO 10303-233
Systems Engineering

Low cost Excel "hyperlink" interface support for Data achieving and reuse

Item has data (worse case Excel spreadsheets)

Identifiers – none
Name - ambiguous
Definitions – implicit
Characterization measures = properties – minimal traceability

Product Visualized has:

Master Equipment List that has:
Items that have:
Identifier, Name, Definition
Work Breakdown List that is has
Items that have:
Identifier, Name, Definition,

Characterization measures have:

Global and/or Local definitions
Values that change as product evolves
Provenance, Accuracy, Completeness
Dependency
Protection

Design Item Mass Properties

Looks good but totally ambiguous

(x,y, z) implies a reference frame

Non provided

How do we handle “Relative” properties

(Vectors & Tensors)

Property	Minimum	Baseline Allocation	Measured	Predicts	Maximum
Mass (kg) Includes Propellant	1880	1946	1914	1906	2000
Center of Gravity (m)					
X	0.95	1.02		1.02	1.09
Y	-0.13	-0.09		-0.08	-0.05
Z	-0.05	-0.01		-0.01	0.03
Moment of Inertia (kg-m^2)					
Ixx	725.4	732.7		768.8	825.2
Iyy	3197.6	3289.3		3247.9	3955.9
Izz	3416.5	3508.8		3480.2	4174.6
Products of Inertia (kg-m^2)					
Ixy	-41.6	-230.8		-217.7	-405
Iyz	74.0	27.7		24.2	-19.0
Izx	83.2	-100.3		-95.7	-280.4

SUBSYSTEM	CBE	ALLOC	BUILT	% BUILT
ACS	60.71	61.51	60.49	99.6%
Battery	36.41	37.00	36.42	100.0%
C&DH	22.94	23.20	22.95	100.0%
Harness	68.35	96.59	33.47	49.0%
High Gain Assy.	55.53	61.90	27.09	48.8%
Ka Comm	8.38	8.78	4.52	54.0%
PDE	9.40	9.50	9.40	100.0%
Propulsion (Dry Mass)	111.22	113.80	110.75	99.6%
Power (PSE)	15.41	15.50	15.41	100.0%
S/C Bus Structure	280.12	285.74	204.35	73.0%
S Comm	9.54	9.23	5.62	58.9%
Solar Array Assy.	117.84	120.00	78.87	66.9%
LRA	0.50	0.50	0.00	0.0%
Purge System	3.40	4.00	0.00	0.0%
Thermal	80.01	98.66	41.60	52.0%

Can we create:

- Design element mass
- Design element cost
- Design element power
- Design element xxxx

Associated properties become
Hyperlinks for table columns

Misc Constants		
deltaT	0.016666667hours	
bat_cap_18mths_ah	85.34A-hr	
bat_cap_24mths_ah	83.28A-hr	
bat_cap_lnch_ah	91.53A-hr	
bat_cap_maxEclps_ah	80.50A-hr	
bat_itrnlR_r	0.02Ohms	
bat_maxChrgCrnt_i	30.00amps	20 C
bat_maxSetpoint_v	33.60volts	
bat_NmnL_v	32.00volts	
bat_NmnlOffset_v	1.6volts	
hrns_ldHtng_w	6.00watts	
pse_hrns_r	0.00ohms	
sa_design_v	33.60volts	
sa_diode_loss_w	32.00watts	
sa_diodeDrp_v	0.60volts	
sa_hrnsLdHtng_w	32.00watts	
sa_pwr_atBol_w	2120.00watts	
sa_pwr_eclps_w	1975.47watts	
sa_pwr_eol_w	1849.00watts	
pwrIn_Bol_w	2050.00watts	
bat_sfty_ls1_v	29.50volts	
bat_sfty_ls2_v	28.00volts	
pwrsrv_deratingFactor	0.90-	0.1
pwrsrv_voltage_v	35.00volts	

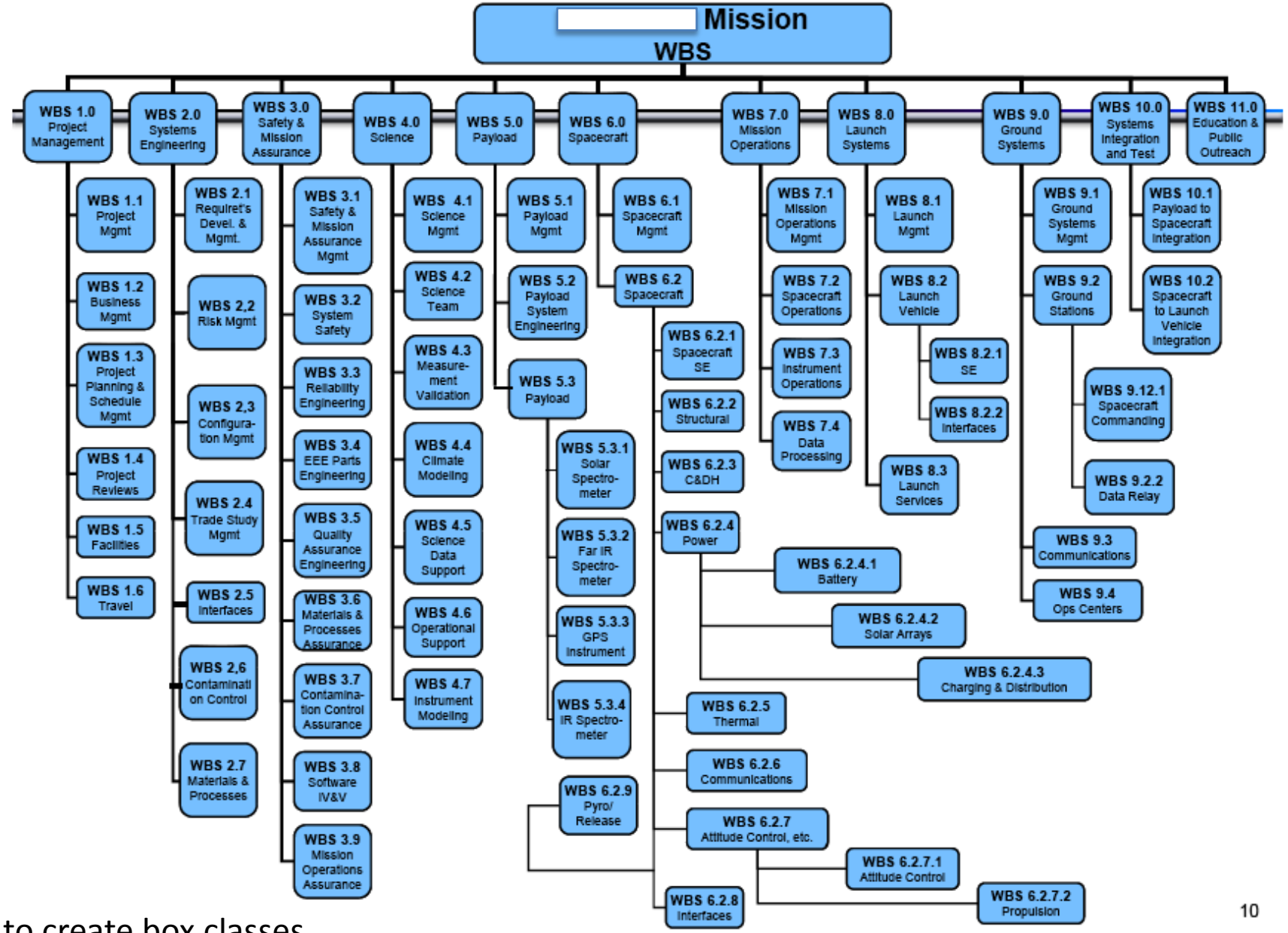
Need to support property lists for:

- Design requirements
- Operational environment

Associated properties become Hyperlinks for table row

Can we create domain property classes:

- Cost
- Power
- Electrical
- Optical
- Mechanical
- Communication
- Computation
- Thermal
- Etc.



Need to create box classes
With associated properties