The ESA Project Office Cost Model

ICEAA – 2014 – Denver CO

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European Space Agency

Summary

- Rationale
- Space Segment PO cost model approach;
- Model Concepts and levels:
  - System level activities;
  - Sub-system level engineering;
  - Industrial Set Up and Sub-Contractors;
- Model graphic interface;
- Future development
- Q & A

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Rationale

Project office is a significant slice of a spacecraft industrial cost
(Typical > 20%)
Its weight increases further considering actual Cost at Completion
(schedule delays affect mainly the PO)

Importance of estimating the Project Office cost.
Models previously used were based on cost-to-cost relations at system level
with complexity correction factors

Need of a more detailed parametric model to define a reference manpower allocation to compare with industrial proposal

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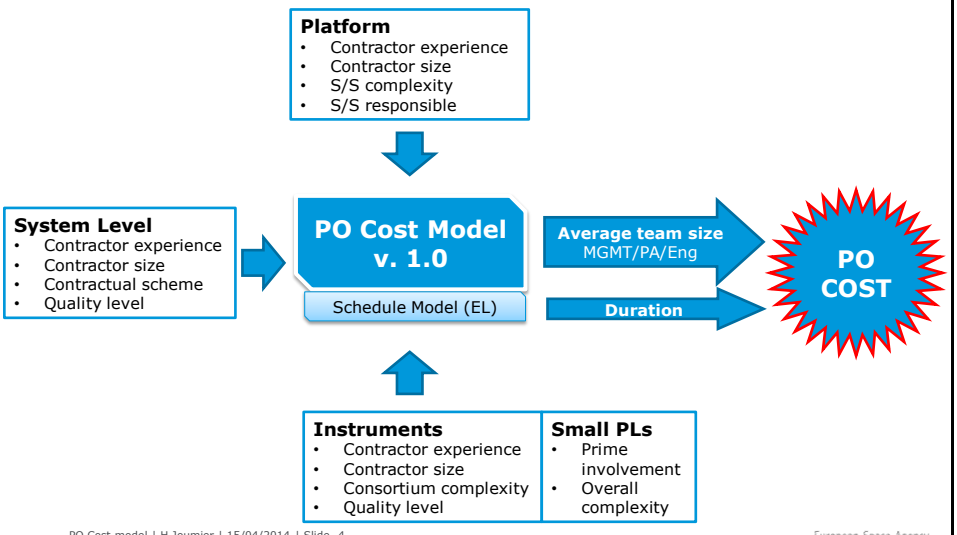
PO Cost Model Approach at a glance



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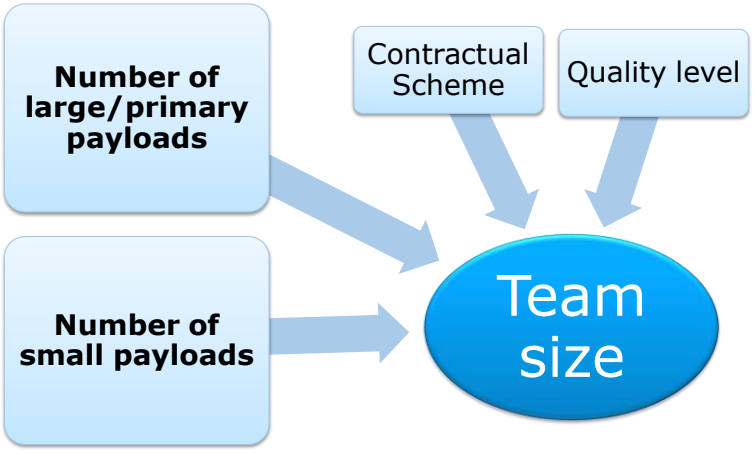
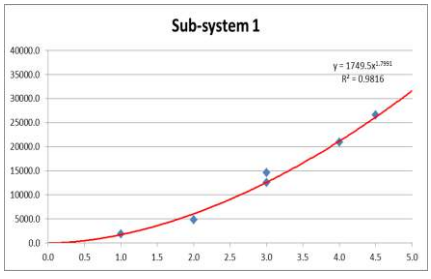
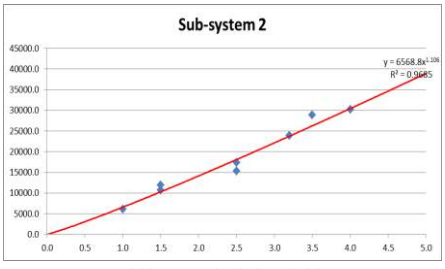
System Activities Concept
What influences team size?



Platform S/S Engineering Model Concepts

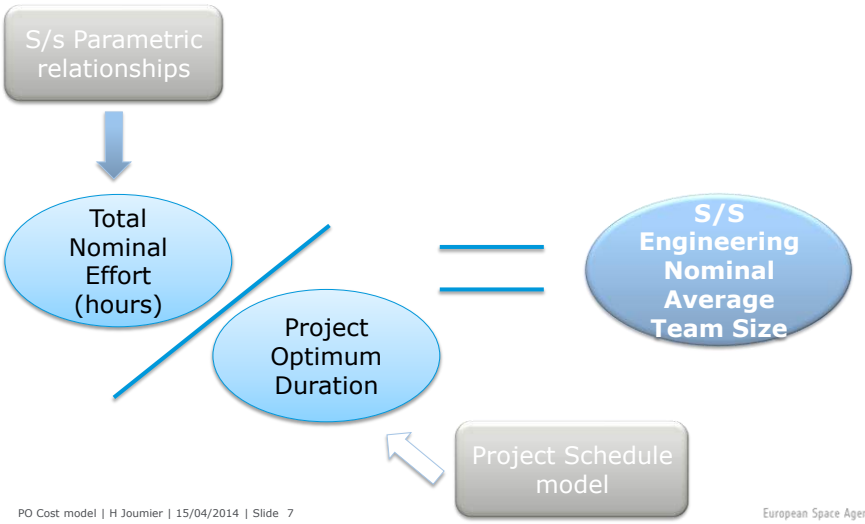
The S/S engineering team sizes should be based on the total effort required by the design (hours) spread over the available S/S time span





This data allowed to establish parametric relationships for each S/S between the total hours for the detailed design of the S/S and its Complexity

Platform S/S Engineering Model Concepts



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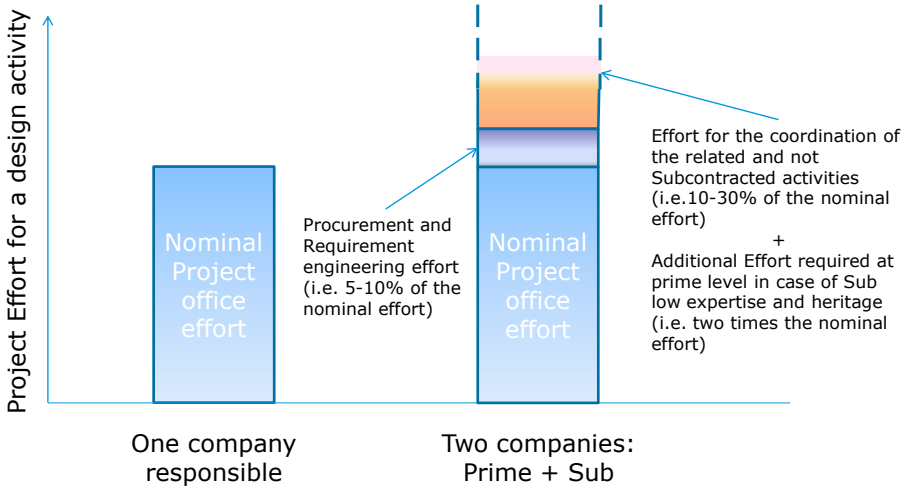
Sub Contractors Effect



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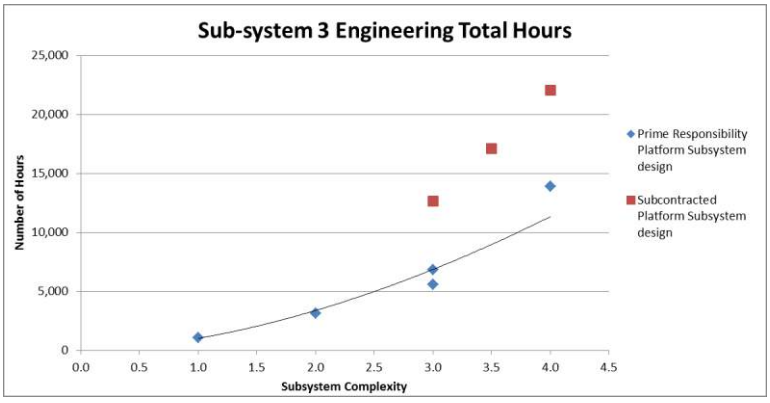
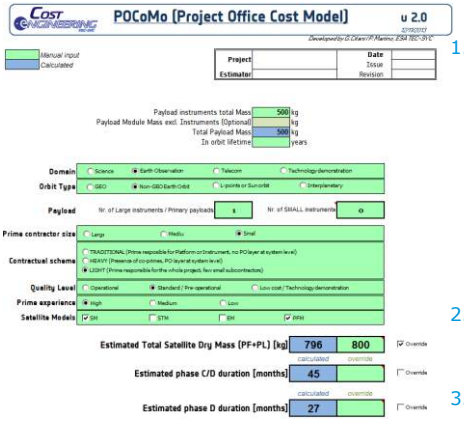
Subsystem Subcontracted example

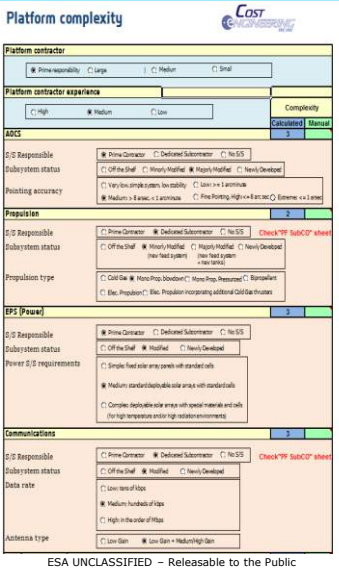


Main Menu



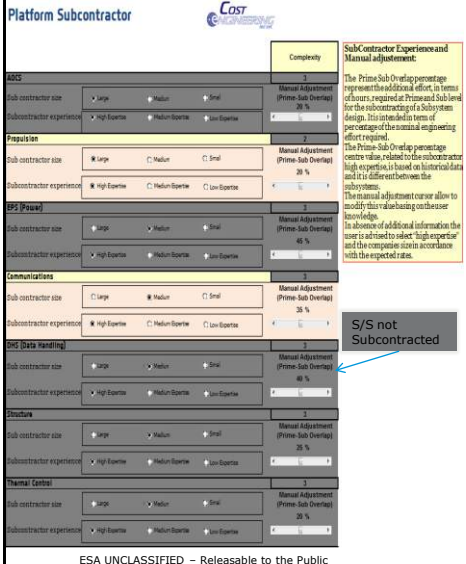
1. The user is driven through elementary choices covering the Project Office main cost drivers and modifiers such as:
   a. Domain, Orbit type
   b. Payload mass & characteristics
   c. Industrial team structure and experience
   d. Quality level and HW matrix
2. The model estimates the dry mass of the platform that provides an extensive parameter when needed.
3. The model performs an initial parametric estimate of the schedule duration to derive team sizes from man-hours

PF Complexity



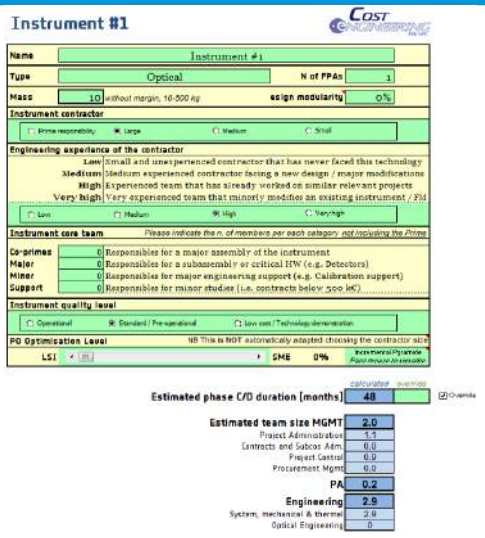
1. Platform contractor is characterized
   a. Contractor size
   b. Contractor experience
2. Sub-systems "profiling" determines a complexity factor for each the S/s Project Office sizing (expressed in man-hours)
   a. Performance parameters
   b. Development status
3. Make-or-Buy decision is made on each of the sub-systems.
   a. Contractors of Procured Sub-systems are further qualified (see next page)

Sub Contractors



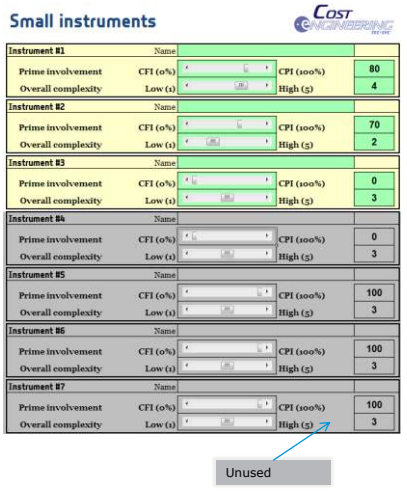
1. Greyed sub-system are directly handled by the Platform Prime contractor
2. Highlighted sub-systems are subcontracted with the following specifications:
   a. Sub-contractor size
   b. Sub-contractor experience
   c. Adjustment on the degree of overlap between the Platform prime and the sub contractor

Major Instruments



1. Project Office related to Main Instruments is also estimated based on:
    a. Instrument type, size, design repeat and modularity
    b. Instrument contractor experience and size
    c. Complexity of the Instrument Core Team
    d. Instrument Quality level
2. The model estimate the Project Office man-hours
3. The model provides an initial estimate of the schedule duration to determine Team size as a function of the man-hours

Small instruments



1. The secondary payloads (expected to be small instruments) are also identified and taken into account to adjust the Prime contractor Project Office sizing. The main parameters considered are:
2. The level of Prime Contractor involvement
    a. CFI : Company Furnished Instrument. The effort is limited to the I/F management and integration onto the Platform
    b. CPI: Company Procured Instrument. The Prime contractor holds the full responsibility for the development and integration of the Instrument.
3. The complexity of each of the Instruments

Results screen

POCoMo Class 4 Results

	Team Size (calculated / override)	Rate [€/h] (calculated / override)	Total Hours [h]	Total Cost [k€]	E.C. 2013
System Level	Resp: PRIME	Phase C/D duration: 45 months		Delay [months]	
Management	3	130	18,150	2360 k€	
Project Administration	1.1				
Contracts	0.6				
Project Control	0.8				
Procurement Mgmt	0.5				
Product Assurance	1.5	115	9,040	1040 k€	
Engineering	2	115	12,090	1390 k€	
Total PO			39280	4790 k€	
Satellite AIT	15.5	115	56,460	6500 k€	
AIT Coordination	4.2		15410.0		
SW/STM AIT	2.3		8290.0		
EM AIT	1.8		6420.0		
PFM AIT	7.2		26340.0		

Further Development

- Recurring Satellites and Constellations PO estimation capability;
- Class 5 model definition for very early design phases;
- Further develop AIT activities

Questions?