Tasks
of
WP5300: Third Party Evaluation of Approach for Reuse

- To evaluate which cost savings might be obtained when in a project using OBOSS instead of developing a new data handling system

- To evaluate the effect OBOSS would have had on the software development in a data handling system already developed.
  Selected software: Central On-Board Software (COBS) of the Solar and Heliospheric Observatory (SOHO)

Two scenarios are compared:

Scenario A - “Reuse”:

OBOSS is reused; possible modification and additions are made

Scenario B - “New”:

All software is developed in-house; no part of OBOSS is reused

Prerequisites:

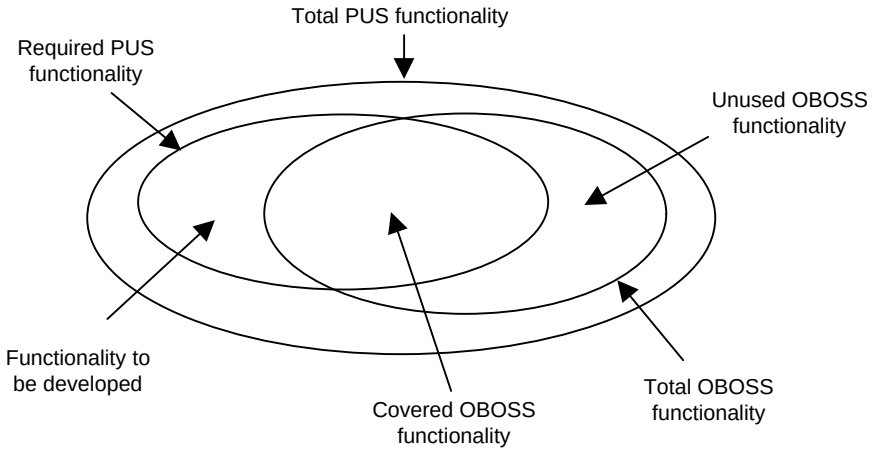
SC data handling system (DHS) shall comply with PUS

The customer provides a specification of DHS

A supplier provides OBOSS to the DHS developer

The software is coded in Ada

The development shall comply with PSS-05-0 or ECSS-E40


Total PUS functionality
Required PUS functionality
Unused OBOSS functionality
Functionality to be developed
Covered OBOSS functionality
Total OBOSS functionality

Cost savings in the SW development process (1)

Requirements Analysis & Definition:

The number of activities is probably the same; the amount of work per activity is dependent on the customer's specification.

Design:

The cost savings is approximately proportional to the amount of reused units

The amount of design work is dependent on the number of modified/new units

Coding:

The cost savings is approximately proportional to the amount of reused units

The amount of coding work is dependent on the number of modified/new units

Testing:

UT: Testing reused units should be removed

IT: Due to already tested "reuse" units, this activity should be faster to execute

ST: Full testing must be performed

Possible cost savings are strongly related to test suites provided by the OBOSS supplier.

Cost savings in the SW development process (2)

Maintenance:

The corrective maintenance should be lower for the “reuse” case.

Management:

Based on other “reuse” projects run by SES, no significant cost savings are expected when software is reused.

Quality Assurance & Control:

The cost savings are expected for those activities related to reused software

Cost savings in the SW development process (3)

Prerequisites to “maximise” cost savings:

- **The customer must “harmonise” his specification to PUS and OBOSS.**
- **The activities required for the reused software must be clearly defined before the start of the project.**

COBS / OBOSS (1)

Correspondence between PUS services and COBS functions

Service Type	PUS Service	OBOSS support	COBS equivalent exists	Remarks on the COBS functions
1	Telecommand Verification	✓	✓	Execution acknowledge/rejection reports, counters, error info, log
2	Device Level Commanding	✓	✓	Interrogation level commanding; single and list
3	HK & Diagnostic Reporting	✓	✓	Periodic, fixed report formats (as described above)
4	Parameter Statistics Reporting		✓	Min/max recording
5	Event Reporting	✓	✓	Anomaly reporting, anomalies log
6	Memory Management	✓	✓	Load, dump, checksum
7	Task Management			Execution profiles for LP processes are controllable
8	Function Management	✓	✓	Numerous application functions with related TCs and status information
9	Time Management			Adjustment and distribution within spacecraft is managed by COBS
10	Time Reporting		✓	Fixed period
11	Onboard Scheduling	✓	✓	Enbl/Dsbl, Insert/Delete
12	Onboard Monitoring	✓	✓	No validity parameter, but mask and a connected “macro” (OBDH interrogation list) to be executed
13	Large Data Transfer			
14	Packet Transmission Control		✓	Minimum capability for science data sources
15	Onboard Storage & Retrieval	✓		Tape recorders reside at TM stream level; logs are held on TC execution and anomalies
16	Onboard Traffic Management	✓	✓	TC and OBDH links status is provided; OBDH has “switchable channels” enabling ground to select between redundant OBDH addresses for some channels
17	Test		✓	Memory tests; XIO execution

COBS / OBOSS (2)

Amount of software developed

In short, OBOSS would be expected to reduce the amount of own developed software by 35 - 40 % in our example project, but also itself contribute with somewhat more reused software.

COBS / OBOSS (3)

Saving for reused parts

Activity	Part of project	Subject to cost reduction when using OBOSS	Saving for software parts implemented by OBOSS
Requirements analysis & definition	13%	0%	0%
Software design	18%	100%	18%
Coding	15%	100%	15%
Unit testing	11%	60%	7%
Integration and system test, development	17%	0%	0%
Integration and system test, execution	12%	50%	6%
Other (management, QA)	14%	30%	4%
Total	100%		**50%**

Who is interested in reuse?

- The developer is always interested of reusing units, etc from other projects.
- Is the customer interested in reuse?