Possible benefits of a COTS-based process on a satellite remote sensing mission based on software industry results

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Abstract. *This work consisted of a brief review on the benefits of COTS items and COTS-based processes. It shows that considerations taken by software industry could be applied in space industry for the development of satellite remote sensing missions through an ad-hoc COTS-based process.*

Keywords: Remote Sensing; Satellites; COTS.

1. Introduction

Since 1990, the use of commercial off-the-shelf (COTS) products as elements of larger systems is becoming increasingly. That tendency has generated some modifications around the traditional development processes in order to develop a new development paradigm around COTS items [Morisio et al., 2002]. This work shows a brief review about the benefits of using COTS items and having a COTS-based development process. It presents some COTS-based approaches used in software and space industry, and finally, it is expected to show that some approaches made in software industry, could be useful for the development of a satellite remote sensing mission.

2. Results and Discussion

COTS is a term attributed to hardware and software that is commercially made and available to the general public and that requires little or no unique modifications to meet the needs of the customer [Gansler and Lucyshyn, 2008]. The benefit of COTS items is that they already exist, so there is no need of invent them [Larson, 2009]. As a result, in software industry, COTS based software development has been gaining force as an alternative strategy to in-house development as an effort to reduce implementation, operating, and maintenance cost and time [Lin et al., 2006]. A COTS based software development refers to a process that integrates pieces of prebuilt software (COTS packages) into a system to provide some functionality. On some traditional approach, selection of COTS (one of development process phases according to Morisio et al. [2002]) has been performed after the requirements gathering and the development of system architecture and design, and has presented two disadvantages: it narrows the search of suitable COTS products to a very limited few that only can fit within the anticipated design; and, it requires more time invested prior to proceeding with COTS products evaluation and selection [Lin et al., 2006].

In the space industry, the ECSS-Q-ST-20-10C standard describes activities for the off-the-shelf items utilization in space systems. It shows a selection process when a supplier realizes the possibility of using COTS, and defines that is necessary firstly to establish preliminary equipment specification. Then, each COTS candidate could be compared to the project requirements in order to have a preliminary make or buy decision. It is only at the Preliminary Design Review (PDR), that a final make-or-buy decision is taken and later it is when the procurement activities can begin [ECSS, 2010].

As an analogy to software development, COTS based satellite development could refer to a process that integrates pieces of prebuilt items (COTS equipments) into a system (satellite) to provide some functionality. From this analogy, and due to similarity on the moment that COTS selection is performed, disadvantages already described for software process can be extrapolated to the ECSS process.

Also in software industry, different approaches have been already proposed to avoid the described problems. In one of them [Lin et al., 2006], the COTS evaluation is performed earlier in the project just after requirements gathering and this allowed the exposure of new capabilities and technologies that could assist in improving the design and business practices. In other, the realization of COTS selection is done together with requirements analysis [Morisio et al., 2002]. Both processes, points to a common factor: performing the COTS analysis earlier in the development process.

Currently, several COTS options for components, subsystems, payloads, platforms or even satellites can be found on satellite remote sensing manufacturers' webpages (such as www.sstl.co.uk), so it seems that a customized process for the development of satellite remote sensing missions could bring the benefits that software industry have discovered.

3. Conclusion

Due to the advantages of the use of COTS items, the current availability of several COTS items at different levels in the satellite remote sensing market, and the disadvantages of the traditional development process, this paper proposes the creation of an ad-hoc process to be used in satellite remote sensing missions.

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