Outsourcing Risks in Government IT Projects

A comparison of COTS and Bespoke approaches

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Outline

- Introduction
- Literature Review
- Case Studies
- Discussion
- Conclusion

Introduction

Software outsourcing services are one of the common choices for software companies and businesses industries when they need to reduce expenses and get access to a deeper technology pool (Varajão, Cruz-Cunha & Fraga, 2017).

When choosing to outsource software, often there are two types of software that come into consideration, a **Commercial-off-the-shelf** (**COTS**) **software** and a **Bespoke software.**

COTS software is a ready-made software product designed for specific uses and cannot be modified. An example of COTS product is Microsoft.

Bespoke software is a software program custom-made to a business's pre-defined requirements, allowing additional functionality and modifications to be added at any stage of the product life. An example of Bespoke software is Content Management System (CMS) (Hill, 2016).

Introduction

However, success rate of software outsourcing, especially for the government IT projects, is not high (Thibodeau & Gross, 2013).

In United States, only 6.4% of government IT projects with $10 million or more in labor costs were successful from 2003 to 2012 (Thibodeau & Gross, 2013).

Risk is one of the factor when outsourcing the services (Varajão, Cruz-Cunha & Fraga, 2017).

Little prior research had been done to analyze the characteristics of COTS and Bespoke software projects and IT Outsourcing Risks associated with COTS and Bespoke.

Introduction

Objectives

01

To analyze the characteristics of COTS and Bespoke software projects.

02

To compare and contrast the IT Outsourcing Risks associated with each approach.

03

To examine the practical implications of each approach on government IT projects.

Literature Review

COTS Software

Commercial Off-the-Shelf (COTS) software means sold, leased or licensed to the general public, the user has no access to the internal source code.

The supplier controls its development and involvement, and available in multiple or identical copies (Agrawal, Agrawal, & Taylor, 2006) (British Standards Institution, 2006).

COTS Software

Using COTS software products promise faster time to market, which can yield substantial advantages over competitors with regards to earlier placement of a new product (Tarawneh, Baharom, Yahaya, & Zainol, 2011).

COTS reduces development effort, and increases productivity (Couts & Gerdes, 2010).

However, one of the main challenges is that organizations is lack of abilities to select the most suitable COTS software that meets their requirements (Kunda, 2002).

Any wrong decision will lead to unsuitable results or project failure (Neubauer & Stummer, 2007).

Bespoke software means custom or tailor-made software.

Bespoke software can be designed specifically for key business or requirements (Leach, 2010).

Bespoke Software

With Bespoke software, companies don’t have to worry about unwanted features or unfamiliar terminology.

Bespoke software can generally be customised to integrate smoothly with any other key software used within the business (Hill, 2016).

However, the main concerns companies tend to have when it comes to investing in Bespoke software is the continued support of the system after it has been developed (Longdin, 2000).

Creating a bespoke business system takes a lot of time and effort, so it inevitably carries a higher initial price tag

Bespoke Software

Risk Factors	Reference
- High cost - Hidden expenses	(Zheng & Na, 2010), (Dhar, 2010), (Tho, 2005), (Qin, Wu, Zhang, & Li, 2012), (Goodman & Ramer, 2007), (Currie, 1998)
- Technology evolution - Loss of innovation capacity	(Tho, 2005), (Goodman & Ramer, 2007), (Dhar & Balakrishnan, 2006)
- Loss of control time / delivery	(Tho, 2005), (Alexandrova, 2015), (Goodman & Ramer, 2007), (Ma & Yang, 2011), (Wei, O'Connell, & Loho-Noya, 2010)
- Repricing	(Dhar, 2010), (Alexandrova, 2015), (Mathew, 2006), (Currie, 1998)
- Relationship between the company and the outsource vendor	(Dhar, 2010), (Tho, 2005), (Alexandrova, 2015), (Ma & Yang, 2011), (Clemons & Chen., 2011), (Wei, O'Connell, & Loho-Noya, 2010)
- Unsuitable objectives & requirements	(Dhar, 2010), (Tho, 2005), (Qin, Wu, Zhang, & Li, 2012), (Oh & Gallivan, 2004)

Risk Factors	Reference
- Outsourcing contract uncompleted	(Zheng & Na, 2010), (Tho, 2005), (Mathew, 2006), (Clemons & Chen., 2011)
- Supplier lack of knowledge	(Dhar, 2010), (Alexandrova, 2015), (Dhar & Balakrishnan, 2006), (Wei, O'Connell, & Loho-Noya, 2010)
- Lack of outsourcing experience / organizational learning	(Dhar, 2010), (Tho, 2005), (Goodman & Ramer, 2007), (Currie, 1998)
- Requirements change	(Tho, 2005), (Qin, Wu, Zhang, & Li, 2012), (Ma & Yang, 2011), (Currie, 1998)
- Culture conflict	(Zheng & Na, 2010), (Alexandrova, 2015), (Mathew, 2006)
- Weakness management	(Tho, 2005), (Qin, Wu, Zhang, & Li, 2012), (Dhar & Balakrishnan, 2006), (Wei, O'Connell, & Loho-Noya, 2010)

IT Outsourcing Risks

Categories	Risk Factors
Technical Risks associated with technological challenges and requirements	- Technology evolution - Loss of innovation capacity
Strategic Risks associated with outsourcing strategy, management and contracts	- Relationship between the company and the outsource vendor - Unsuitable objectives & requirements - Outsourcing contract uncompleted - Lack of outsourcing experience / organizational learning - Weakness management
Financial Risks associated with financing, costing, and transactions	- High cost - Hidden expenses - Repricing
Operation Risks associated with business processes and project governance	- Loss of control time / delivery - Supplier lack of knowledge - Requirements change - Culture conflict

IT Outsourcing Risks

	Technical	Strategic	Financial	Operation
COTS Software	The integration of COTS software components may bring huge risk to the whole IT project (Johar, Kaur, Amandeep, & Goel, 2011).	The vendor support of the products and the availability of such support might impact the business strategy over time (Gupta & Raghav, 2012).	The uncertainty about how often COTS software components will have to be upgraded and even replaced, and how much more of the system may have to be changed as a result (Wu, Hou, Liu, & Ying, 2006).	Might not be able to deliver the required performance and functionalities requirements of the system (Gupta & Raghav, 2012) (Johar, Kaur, Amandeep, & Goel, 2011).
Bespoke Software	The software might be unstable, unreliable without continued IT support (Dhar, 2010).	Bespoke software takes months and years to develop which cannot solve or support current issues and market (Vahidnia, Tanrıöver, & Askerzade, 2016).	High initial purchase cost with custom requirements. And hidden cost during development and maintenance stage (Vahidnia, Tanrıöver, & Askerzade, 2016) (Tho, 2005).	During long development period, project goals and requirements might change based on business strategy or market change (Tho, 2005).

Framework

Case Study 1 - ECSS

ECSS - Expeditionary Combat Support System by United States Air Force (USAF)

An enterprise resource planning (ERP) system that was to be an integrated logistics system

Meant to replace older and unconnected systems (PSI, 2014)

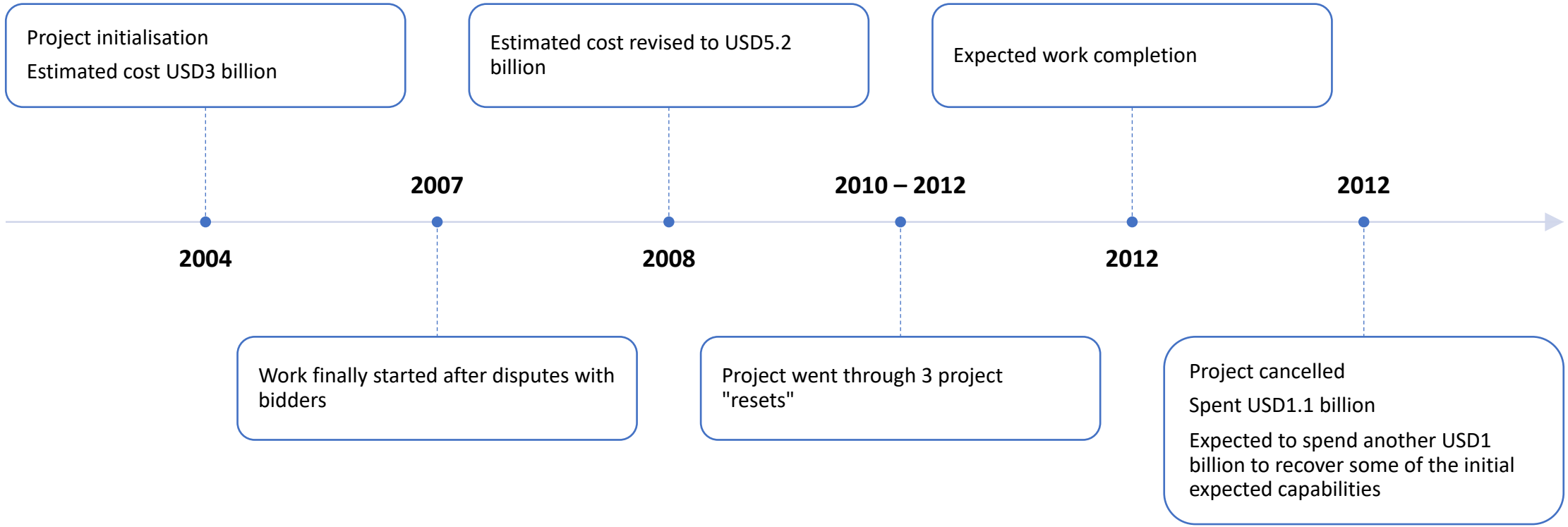
Case Study 1
ECSS (background)

Alternatives considered – modernize existing legacy systems, best of breed COTS, enterprise COTS (Lo, Chia, & Tey, 2006)

Enterprise COTS was evaluated to be least costly, meet all requirements, easiest to integrate, highest return of investment, shortest time required to complete (Cain, 2005)

It was thought no customization was required for COTS (PSI, 2014), but vendor was to integrate the COTS software into existing USAF infrastructure (CPI, 2017)

Case Study 1
ECSS (why COTS)



(GAO, 2008) (IDA, 2011) (Reuters, 2011)

Case Study 1
ECSS (timeline)

No timeline on when detailed information will be provided (McCain, 2014)

USAF didn’t know how many legacy systems it has (McCain, 2014)

No proper definition of requirements (McCain, 2014)

Failed to adhere to business process reengineering guidelines (PSI, 2014)

Risks was identified at the initial start of the project, but USAF didn’t address them (CPI, 2017)

Resistant to changes proposed by vendor (PSI, 2014)

Case Study 1
ECSS (issues)

Case Study 2 - GeBIZ

GeBIZ - Government Electronic Business (GeBIZ) of Singapore

E-procurement portal developed by Defence Science & Technology Agency (DSTA), in collaboration with Ministry of Finance(MoF) and Infocomm Development Authority of Singapore (IDA)

Vision - an integrated system that could support the entire procurement process between public sector (ministries and agencies) and suppliers electronically (CPI, 2016)

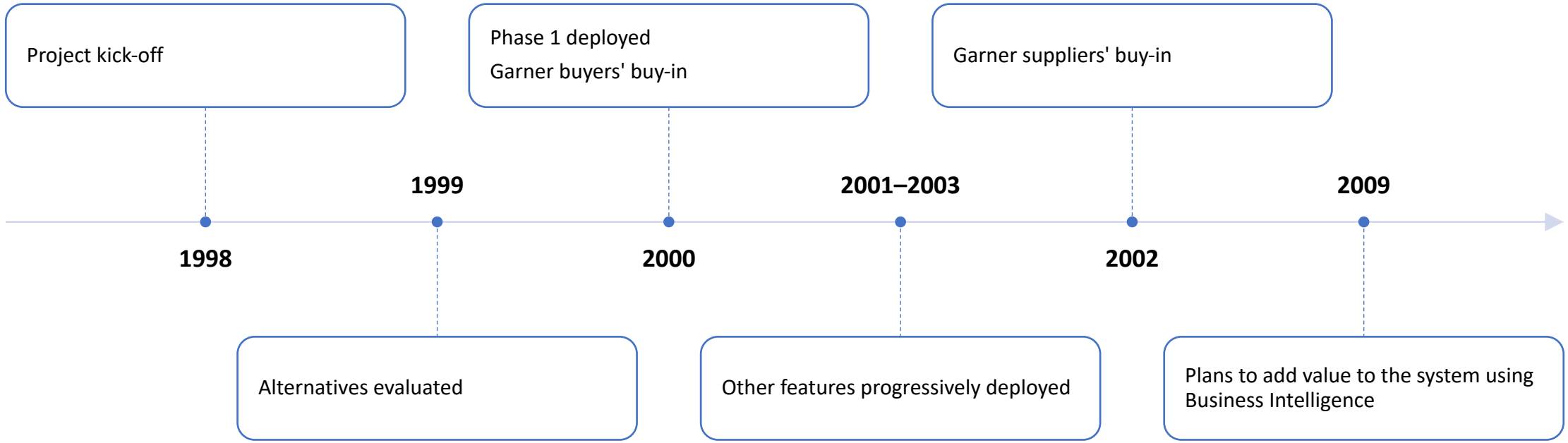
Had clear objectives from the start, and maintained throughout the project (CPI, 2016)

Case Study 2
GeBIZ (background)

Alternatives were evaluated to determine the most cost-effective and viable way
Market survey was done on COTS solutions but none was able to meet requirements without extensive customisation
Concluded that the best option was to develop GeBIZ based on existing procurement-related systems
Shorter development life cycle and maximum cost-effectiveness
Everything on the system was developed in-house, to minimize reliance on third party software
Allowed the accumulated business knowledge and past experiences from those systems to be retained

(Lo, Chia, & Tey, 2006)

Case Study 2
GeBIZ (why Bespoke)



(Lo, Chia, & Tey, 2006) (Lo & Leo, 2009) (Chia, 2009)

Case Study 2
GeBIZ (timeline)

Case Study 2
GeBIZ (challenges)

Differences in procurement processes across agencies

- Spent effort to streamline the processes and produce a best-fit workflow

Need to get users' buy-in to switch from manual to electronic process

- Approach individual ministries / agencies to promote GeBIZ
- Gradual implementation of changes gave users time to get used to the system
- Users feedback on the system were also progressively implemented as enhancements

(Lo, Chia, & Tey, 2006)

Discussion

	Technical	Strategic	Financial	Operation
ECSS	Computer Sciences Corporation (CSC) was to integrate the COTS software into existing USAF infrastructure. But USAF didn't know how many legacy systems it has. (CPI, 2017)(McCain, 2014)	ECSS capabilities was supposed to provide combat support information to Air Force and joint users, clearly a very strategic and important system. (Cain, 2005)	It was thought no customization was required. But in fact, it had to replace and integrate with many older & unconnected systems, driving up costs. (PSI, 2014)	No proper definition of requirements or timeline. Failed to adhere to business process reengineering guidelines. (McCain, 2014) (PSI, 2014)
GeBIZ	Clear requirements. Targeted to provide an integrated system to support the entire procurement process between public sector & suppliers electronically. (CPI, 2016)	Transformation. Everything was to be developed in-house, to minimize reliance on 3rd party software. Effort was spent to streamline processes and produce best-fit workflow. (Lo, Long, & Heng, 2006)	Due diligence. Alternatives were properly evaluated to determine the most cost-effective and viable way. (Lo, Long, & Heng, 2006)	Phased approach. Gradually implemented changes gave users time to get used to the system. Hence, not disrupting daily operations. (Chia & Hong, 2009)

Case Analysis

Government IT Projects

Large Project Size

- Most government projects are often big, complex & ambitious (Gartner, 2014)
- Large projects tend to fail: 45% over budget and 7% over time, while delivering 56% less value than predicted (McKinsey, 2012)

Legacy Systems & Processes

- Government organizations continue to cling to legacy systems, and often use the legacy software's features as business requirements for its replacement systems

(Alexandrova, Rapanotti, & Horrocks, 2015)

Multiple Stakeholders

- Projects often involve many "masters" with divergent goals (Outspeaking, 2017)
- Different agencies and stakeholders each have unique requirements

Practical Implications – COTS Software

Large Project

- Government projects often have many complex requirements and hence, COTS may only be suitable for the smaller standardized processes

Legacy Systems

- The tendencies to cling to legacy systems and processes means a lot of integration and training for transition to new systems. Can COTS support?

Multiple Stakeholders

- The need to address many unique requirements to suit all the stakeholders makes uncustomized COTS unsuitable for strategic areas

Practical Implications – Bespoke Software

Large Project

- Given the scale of projects, requirements needs to be clearly specified and adhered to, in order to prevent scope creep and severe cost overruns

Legacy Systems

- While Bespoke approach can likely integrate well with legacy systems, government agencies should take opportunity to innovate & streamline

Multiple Stakeholders

- Projects may affect many agencies, however key agencies need to own the responsibility to drive the project requirements

Conclusion

COTS vs Bespoke software projects

- Standardization vs tailor-made approach

IT Outsourcing Risks

- Technical, Strategic, Financial, Operational risks

Practical implications on government IT projects

- Project size, legacy systems, stakeholders considerations

Conclusion

Thank you!

References

- ACQ. (2013). *Root Cause Analysis of the Expeditionary Combat Support System Program.* Washington: Office of the Under Secretary of Defense for Acquisition, Technology and Logistics.
- Agrawal, V. K., Agrawal, V. K., & Taylor, A. R. (2006). Trends in Commercial-Off-The-Shelf vs. Proprietary Applications. Journal of International Technology & Information Management, p1-35.
- Alexandrova, A., Rapanotti, L., & Horrocks, I. (2015). The legacy problem in government agencies: an exploratory study. *Proceedings of the 16th Annual International Conference on Digital Government Research*, 150-159.
- Alexandrova, M. (2015). Risk Factors in IT Outsourcing Partnerships: Vendors' Perspective. Global Business Review, 747-759.
- British Standards Institution. (2006). Software engineering - Software product Quality Requirements and Evaluation (SQuaRE) - Requirements for quality of Commercial Off-The-Shelf (COTS) software product and instructions for testing. London.
- Cain, S. (2005). *Capability Development Document For Air Force Logistics Expeditionary Combat Support System.* US Air Force.
- Chia, P. L. (2009, November 10). *The Singapore E-Government Procurement Experience.* Singapore: DSTA.
- Clemons, E., & Chen., Y. (2011). Making the Decision to Contract for Cloud Services: Managing the Risk of an Extreme Form of IT Outsourcing. 44th Hawaii International Conference on System Sciences (HICSS), (pp. 1-10).
- Couts, C., & Gerdes, P. (2010). ntegrating COTS Software: Lessons from a Large Healthcare Organization. IT Professional, 50-58.
- CPI. (2016, April 13). *GeBIZ: government e-procurement system in Singapore*. Retrieved from Centre for Public Impact: https://www.centreforpublicimpact.org/case-study/government-e-procurement-system-singapore/
- CPI. (2017, June 6). *The US Air Force's Expeditionary Combat Support System (ECSS)*. Retrieved from Centre for Public Impact: https://www.centreforpublicimpact.org/case-study/air-forces-expeditionary-combat-support-system-ecss/
- Currie, W. L. (1998). Using multiple suppliers to mitigate the risk of IT outsourcing at ICI and Wessex Water. Journal of Information Technology , 169-180.
- Dhar, S. (2010). Global IT Outsourcing: Current Trends, Risks, and Cultural Issues. In S. Dhar, IT Outsourcing: Concepts, Methodologies, Tools, and Applications (p. 29).

References

- Dhar, S., & Balakrishnan, B. (2006). Risks, Benefits, and Challenges in Global IT Outsourcing: Perspectives and Practices. Journal of Global Information Management, pp. 59-89.
- GAO. (2008). *DOD Business Transformation: Air Force's Current Approach Increases Risk That Asset Visibility Goals and Transformation Priorities Will Not Be Achieved.* Washington: United States Government Accountability Office.
- Gartner. (2014, July 7). *Three Reasons Government Tech Projects Fail*. Retrieved from Gartner: https://www.gartner.com/newsroom/id/2790817
- Goodman, S. E., & Ramer, R. (2007). Identify and Mitigate the Risks of Global IT Outsourcing. Journal of Global Information Technology Management , 1-6.
- Greenbaum, J. (2012, December 18). *When COTS costs too much: Oracle, the US Air Force, and a $1 billion project failure*. Retrieved from Enterprise Application Consulting: http://www.eaconsult.com/2012/12/18/when-cots-costs-too-much-oracle-the-us-air-force-and-a-1-billion-project-failure/
- Gupta, R., & Raghav, S. (2012). Risk Assessment Techniques and Survey Method for COTS Components . International Journal of Software Engineering & Applications (IJSEA), 181-195.
- Hill, P. (2016). A new procedure for the development of bespoke software at Cork University Hospital. Physica Medica, 417-418 .
- Johar, Kaur, Amandeep, & Goel, S. (2011). Cots Components Usage Risks In Component Based Software Development. International Journal of Information Technology and Knowledge Management, 573-575.
- Kanaracus, C. (2012, November 14). *Air Force scraps massive ERP project after racking up $1B in costs*. Retrieved from Computer World: https://www.computerworld.com/article/2493041/it-careers/air-force-scraps-massive-erp-project-after-racking-up--1b-in-costs.html
- Kunda, D. (2002). A Social-Technical Approach to Selecting Software Supporting COTS-Based Systems. UNIVERSITY OF YORK DEPARTMENT OF COMPUTER SCIENCE-PUBLICATIONS-YCST. York.
- Leach, C. (2010). The use of Smartboards and bespoke software to develop and deliver an inclusive, individual and interactive learning curriculum for students with ASD. Journal of Assistive Technologies, 54-57.

References

- Lo, C., Chia, P. L., & Tey, S. H. (2006). GeBIZ - From Vision to Reality. DSTA Horizons, 14-23.
- Lo, C., & Leo, C. H. (2009). Business Intelligence in Government Procurement. DSTA Horizons, 106-115.
- Longdin, L. (2000). Liability for defects in bespoke software: are lawyers and information scientists speaking the same language? International Journal of Law & Information Technology., 1-24.
- Ma, L. Y., & Yang, Y. (2011, June). IT Service Outsourcing Project Risk Management Metasynthesis Model Based on Multi-Agent. Applied Mechanics and Materials, pp. 2682-2687.
- Mathew, S. K. (2006). Understanding Risk in IT Outsourcing: A Fuzzy Framework. Journal of Information Technology Case & Application Research, 27-39.
- McCain, J. (2014, July 7). *Floor Remarks By Senator John McCain on the Air Force's ECSS Program*. Retrieved from Defense Aerospace: http://www.defense-aerospace.com/articles-view/verbatim/4/155191/sen-mccain-slams-usaf%E2%80%99s-eccs-program.html
- McKinsey. (2012, October). *Delivering large-scale IT projects on time, on budget, and on value*. Retrieved from McKinsey & Company: https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/delivering-large-scale-it-projects-on-time-on-budget-and-on-value
- Neubauer, T., & Stummer, C. (2007). Interactive Decision Support for Mmulti Objective COTS Selection. System Sciences,HICSS 2007 40th Annual Hawaii International Conference, (pp. 283b-283b). Hawaii.
- Oh, W., & Gallivan, M. (2004). An empirical assessment of transaction risks of IT outsourcing arrangements: an event study. the 37th Annual Hawaii International Conference on System Sciences, (p. 10).
- Oracle. (2007). *Improve Efficiency and Mission Deployment in the Defense Industry.* US: Oracle Corporation.
- Outspeaking. (2017, August 24). *Why Do Government IT and Software Projects Fail?* Retrieved from Outspeaking.com: https://outspeaking.com/words-of-technology/why-do-government-it-and-software-projects-fail.html
- PSI. (2014). *Staff Report - THE AIR FORCE'S EXPEDITIONARY COMBAT SUPPORT SYSTEM (ECSS): A Cautionary Tale on the Need for Business Process Reengineering And Complying with Acquisition Best Practices.* Washington: United States Senate, Permanent Subcommittee on Investigations.
- Qin, L., Wu, H., Zhang, N., & Li, X. (2012). Risk identification and conduction model for financial institution IT outsourcing in China. Information Technology & Management , 429-443.

References

- Reuters. (2012, December 6). *US senators question Pentagon on $1 bln canceled program*. Retrieved from Reuters: https://www.reuters.com/article/airforce-logistics/us-senators-question-pentagon-on-1-bln-canceled-program-idUSL1E8N5ITN20121205
- Tan, C.-W., Pan, S. L., & Lim, E. T. (2005). Managing Stakeholder Interests in E-Government Implementation: Lessons Learned from a Singapore E-Government Project. *Journal of Global Information Management, 13*(1), 31.
- Tarawneh, F., Baharom, F., Yahaya, J. H., & Zainol, A. (2011). COTS Software Evaluation and Selection: a pilot Study Based in Jordan Firms. 2011 International Conference on Electrical Engineering and Informatics. Bandung, Indonesia.
- Thibodeau, P., &Gross, G. (2013). HealthCare.gov had "no chance in hell". Computerworld, 47(19), 6.
- Tho, I. (2005). Section II Measuring and understanding IT outsourcing risks. In I. Tho, Managing the Risks of IT Outsourcing (pp. 61-136). Taylor & Francis Group.
- Thomas M. Sprague, M. (2009). *Education and Training as Part of an Expeditionary Combat Support System Implementation Strategy.* Ohio: Air Force Institute of Technology.
- Vahidnia, S., Tanrıöver, Ö. Ö., & Askerzade, I. N. (2016). AN EVALUATION STUDY OF GENERAL SOFTWARE PROJECT RISK BASED ON SOFTWARE PRACTITIONERS EXPERIENCES. International Journal of Computer Science & Information Technology, 1-13.
- Varajão, J., Cruz-Cunha, M. M., & da Glória Fraga, M. (2017). IT/IS Outsourcing in Large Companies–Motivations and Risks. *Procedia Computer Science*, *121*, 1047-1061.
- Wei, J., O'Connell, J., & Loho-Noya, M. (2010). Information Technology Offshore Outsourcing Security Risks and Safeguards. Journal of Information Privacy & Security , 29-46.
- Wu, M., Hou, H., Liu, C., & Ying, J. (2006). COTS-based System's Obsolescence Risk Evaluation. 2006 10th International Conference on Computer Supported Cooperative Work in Design Computer Supported Cooperative Work in Design,.
- Zheng, Q., & Na, H. (2010). Insurance IT outsourcing risk assessment modeling and empirical study. 2nd IEEE International Conference on Information & Financial Engineering, (pp. p202-206)IDA. (2011). *Expeditionary Combat Support System: Root Cause Analysis.* US: Institure For Defense Analyses.