
Cost Assurance And Analysis Service

Introduction to Software Obsolescence Cost Analysis Framework

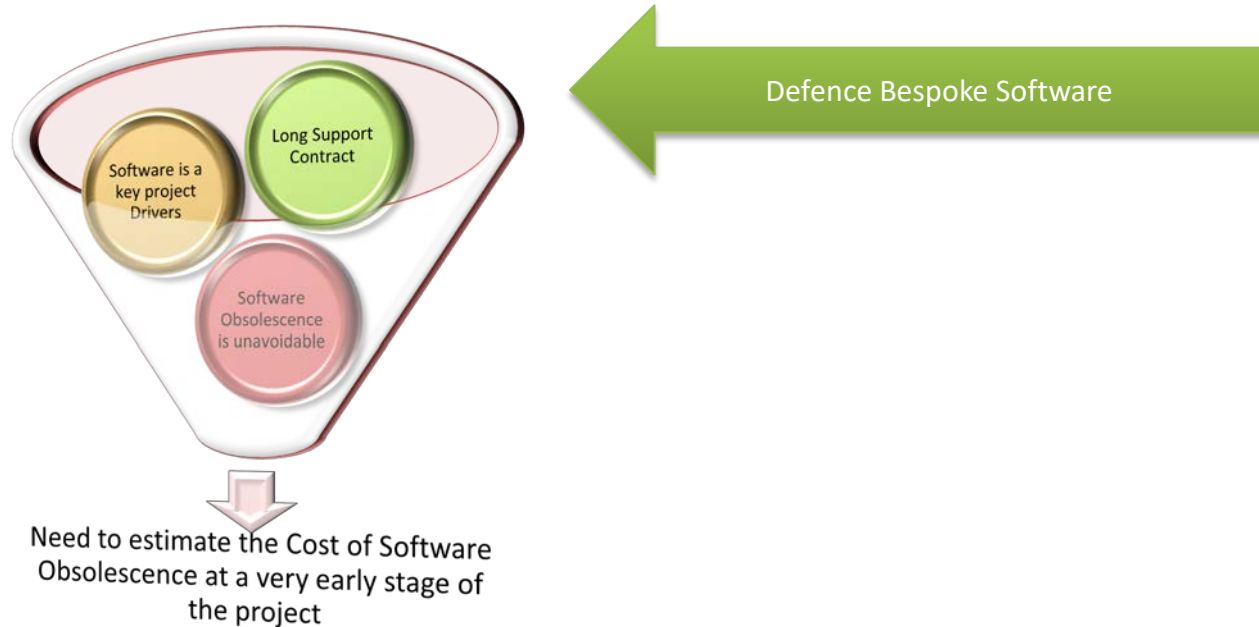
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Disclaimer: This is my personal views and not the views of Ministry of Defence

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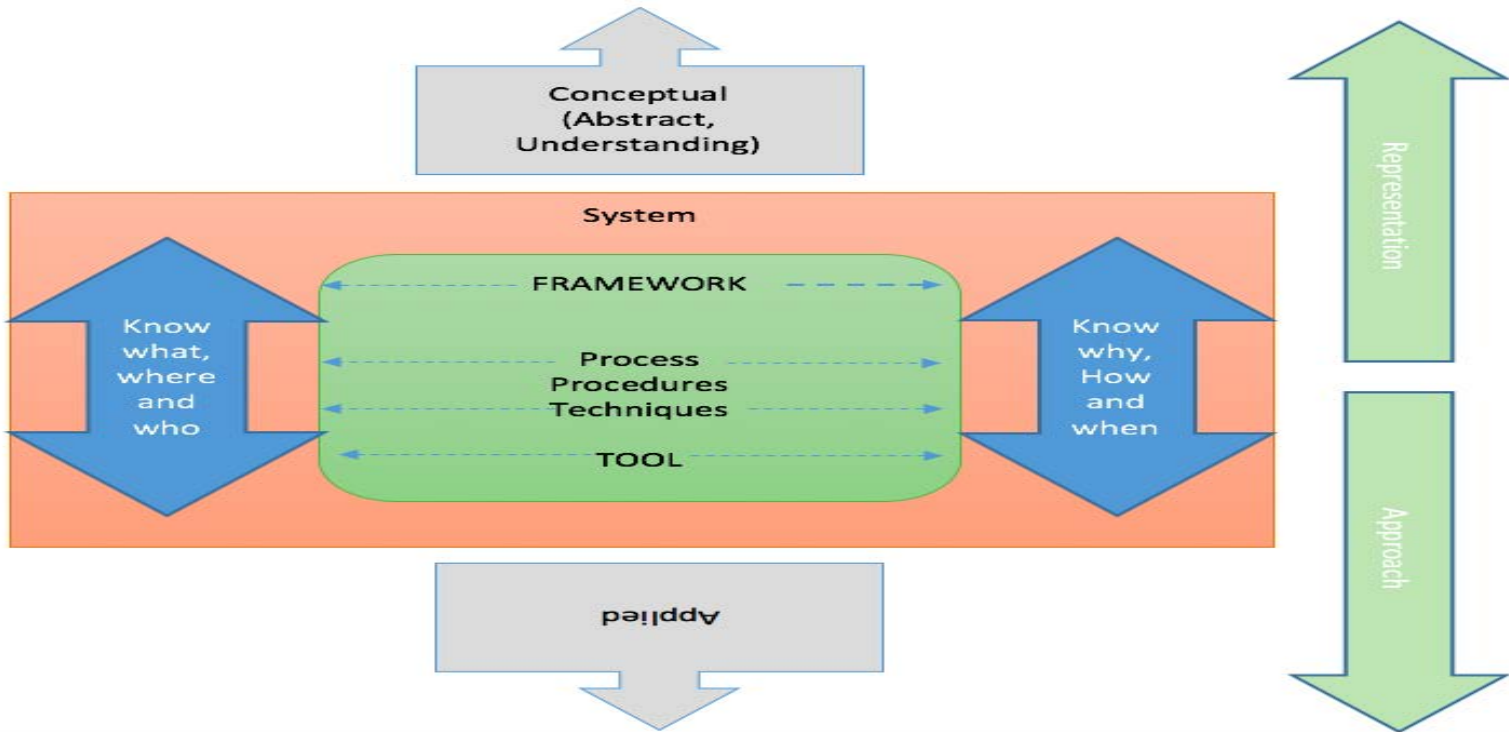
Introduction



Research Aim

To develop a framework to estimate the cost of Complex Real Time Defence Software Obsolescence Resolution at the early stage of the project life cycle

Research Approach



Software Obsolescence Definitions

Software Obsolescence is defined as “ What happens when the original developer and authorised third party ceases to provide support with regular update, upgrade, fixes or due to the change in the target environment, systems or hardware, which makes the software unusable”

- S Rajagopal (2014)

Software Maintenance

Software Maintenance is the process of managing software regularly by patching, bug fixing, updates and undertaking major upgrade during the productive lifecycle.

Obsolescence Definitions

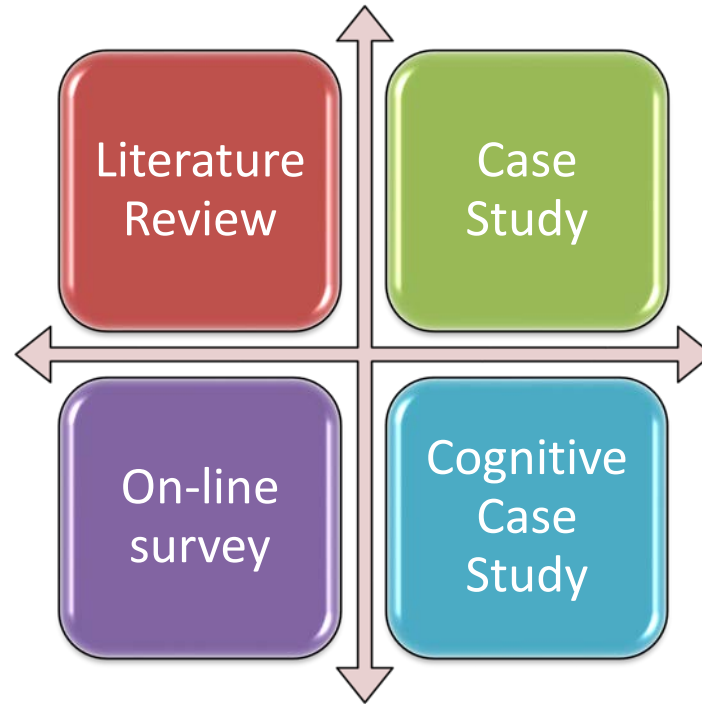
Mitigation Strategies

Action performed in order to reduce the risk or potential impact of obsolescence issues.

Resolution Approaches

- Actions carried out once an obsolescence issues arises and needs to be addressed.

Software Obsolescence Cost Analysis Framework



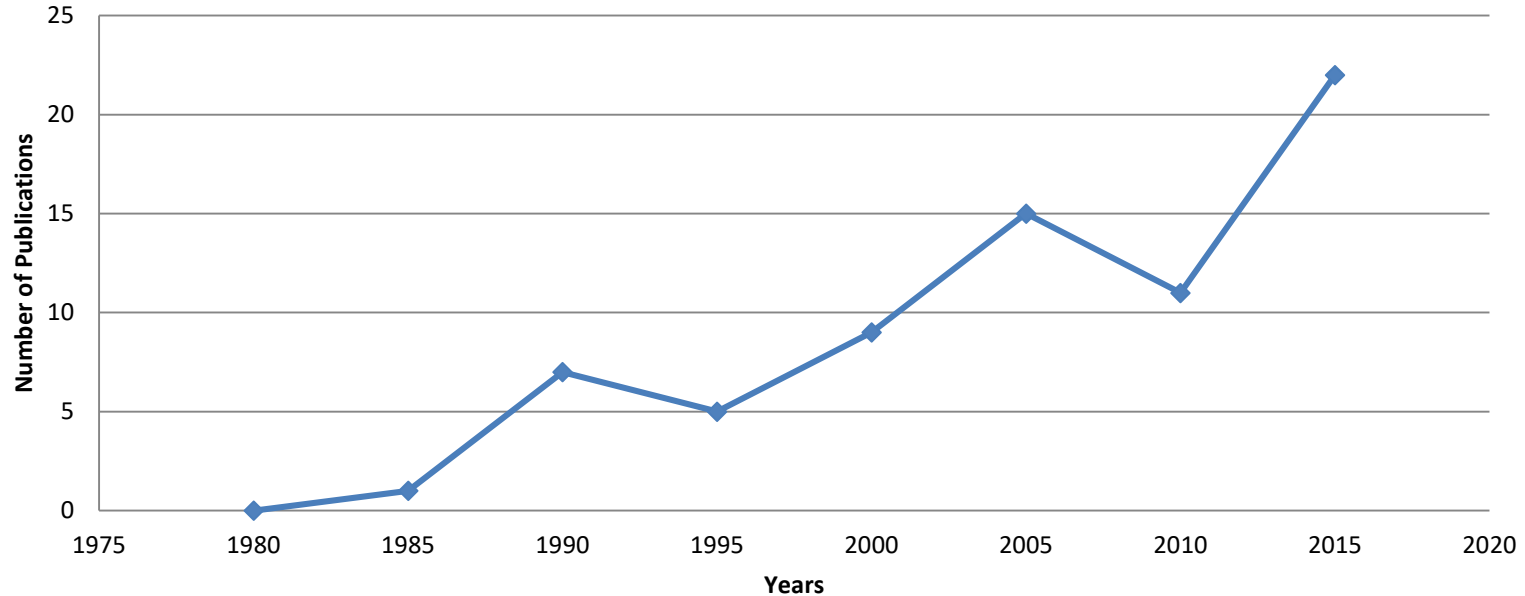
Literature Review

Keyword for literature search

- Software Obsolescence
- Software Maintenance
- Software Obsolescence and Design
- Software Reliability
- Legacy Software
- Obsolescence Management
- Software Obsolescence Management

Publication about Software Obsolescence

Publication about Software Obsolescence



Literature Review –Research Gaps

- Lack of research that highlights the issues of software Obsolescence and resolution at a very early stage of the project.
- Lack of commonly accepted approaches to mitigates Software Obsolescence cost effectively.
- Lack of research in identifying cost of software resolution.
- Lack of research looking at the supply chain for software development.

Case Study

- 6 Case Studies with 15 Interviews with the Project teams within MoD.
- Projects from Air Platform, Sea Platform, Land and Weapons Systems, and ISS/ISTAR were approached for the Case Studies.
- Another 14 interviews with major stakeholders and subject matter experts from across Defence Industry and Academia was undertaken.

Online Survey – Background

- Over 162 responses from Defence and Costing Industries across UK and USA
- Survey was divided into following sections
 - Demographics
 - Obsolescence management
 - Software Obsolescence
 - Software Obsolescence Standards
 - Software Obsolescence Management and
 - Software Obsolescence Mitigation

Online Survey – Findings

- There is a lack of dedicated resources to deal with Software Obsolescence.
- There is no standard, process or mechanism in place to monitor Software Obsolescence.
- There is inconsistency in defining Software Obsolescence.
- Inconsistency in what needs to be in Software Obsolescence resolution activities.
- There is limited evidence to suggest that the Software Project Teams proactively engages to identify the Software Obsolescence.

Cognitive Case Study

The aim of the cognitive case study is to understand how the ***expert reason*** about Software Obsolescence during software design and development phase which could then inform the ***resolution approaches*** and strategies

Cognitive Case Study-Introduction

- This study methodology employs the “think aloud” technique to capture the cognitive actions of software developers.
- This requires the participant to literally say aloud everything that they think or do during a controlled experiment.
- Everything that is said will be recorded (video and audio), transcribed and then described as a “verbal protocol”.
- Anything that is written down by the participant during the experiment is collected and analysed as a “written protocol”.

Cognitive Case Study-Task

To complete this experiment each participant were given the following: -

- Software Development Database (Front-end and the database developed in LibreBase)
- Software Support and Maintenance Database (Front-end as web application in JavaScript with Tomcat Server connecting to MySQL Database)
- User Requirement Document(URD)
- Compilers such as Eclipse, Dreamweaver
- Software such as LibreBase, MySQL and Tomcat Server
- JDBC Database Connectors

Cognitive Case Study-Task

- The task was to integrate these two database together to a single database.
- A detailed User Requirement Document was produced to enable the participant to complete this experiment.
- For the purpose of this exercise both the software was developed in house by the researcher.
- The researches chose to develop this software in two different ways so as to replicate the actual process (Real life Situations) undertaken in the defence industries.

Cognitive Case Study-Coding Scheme

Experiment is based on three key principles

- Micro Strategies
 - Analysing the problem
 - Proposing a solutions
 - Analysing the solutions
 - Validation of the solutions
- Macro Strategies
 - Decomposing the problem
 - The approaches
 - Feedback and back tracking
- Key Performance Indicators
 - Low level Design
 - Standards
 - Development life Cycle
 - Systems Requirements
 - Validation
 - Maintenance

Cognitive Case Study-Analysis

| Participants | Level of Experience | Years of Experience |
|----------------|---------------------|---------------------|
| Participant 1 | Novice | 2 |
| Participant 2 | Expert | 15 |
| Participants 3 | Expert | 20 |
| Participants 4 | Expert | 8 |
| Participants 5 | Practitioner | 5 |

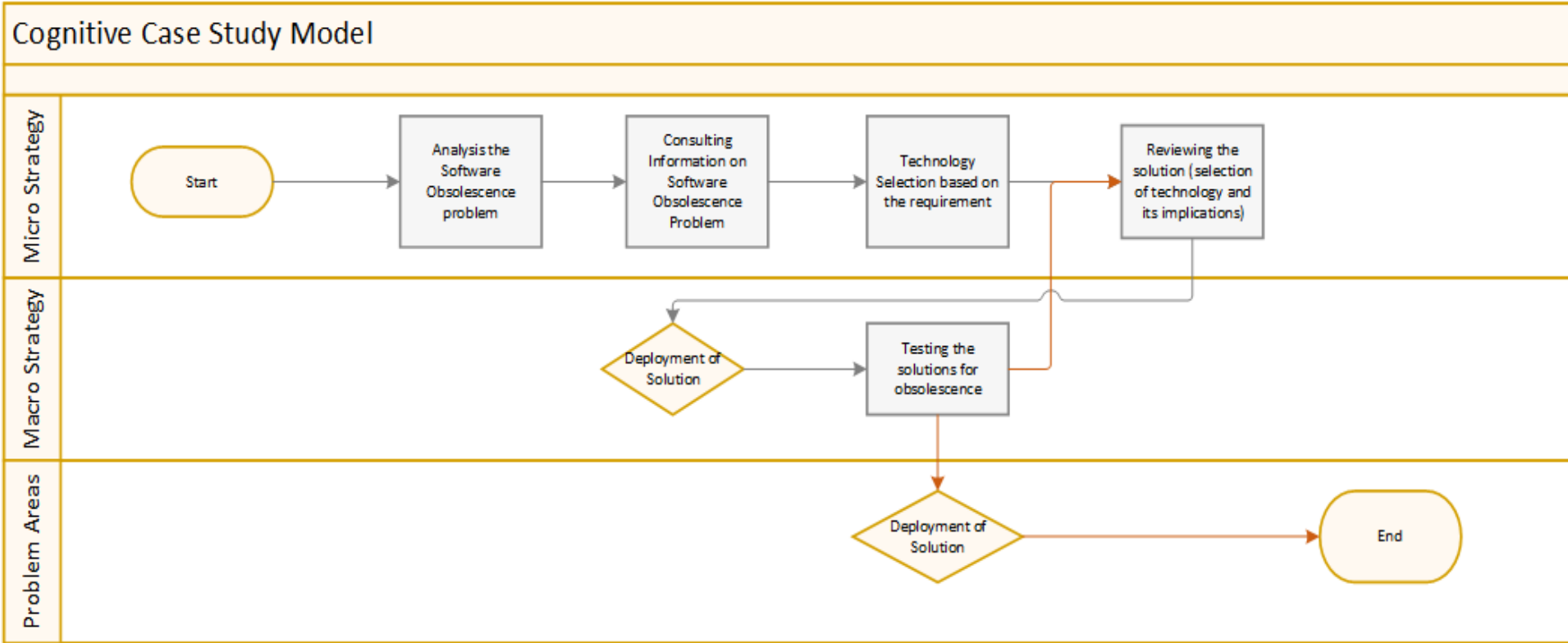
Cognitive Case Study-Analysis

- Participant 1 ***“I will use this technology so that it is readily available for the maintainers to use it in future”***
- Participant 2 ***“I am using this approach (Technology selection) in order to reduce the obsolescence as this technology is independent of changes in hardware”***
- Participant 3 ***“I am using this technology because I am certain that in next 10 years there will not be a change in the hardware or system in Mod that will make this technology selection an obsolete one”***

Cognitive Case Study-Analysis

- The test concluded that cognitive behaviour of programmers is highly motivated and dictated by the
 - availability and selection of technologies
 - Software Complexity
 - Software Dependencies
- This dictates the technological, functional or logistical resolution approach required to mitigate any future Obsolescence issues.

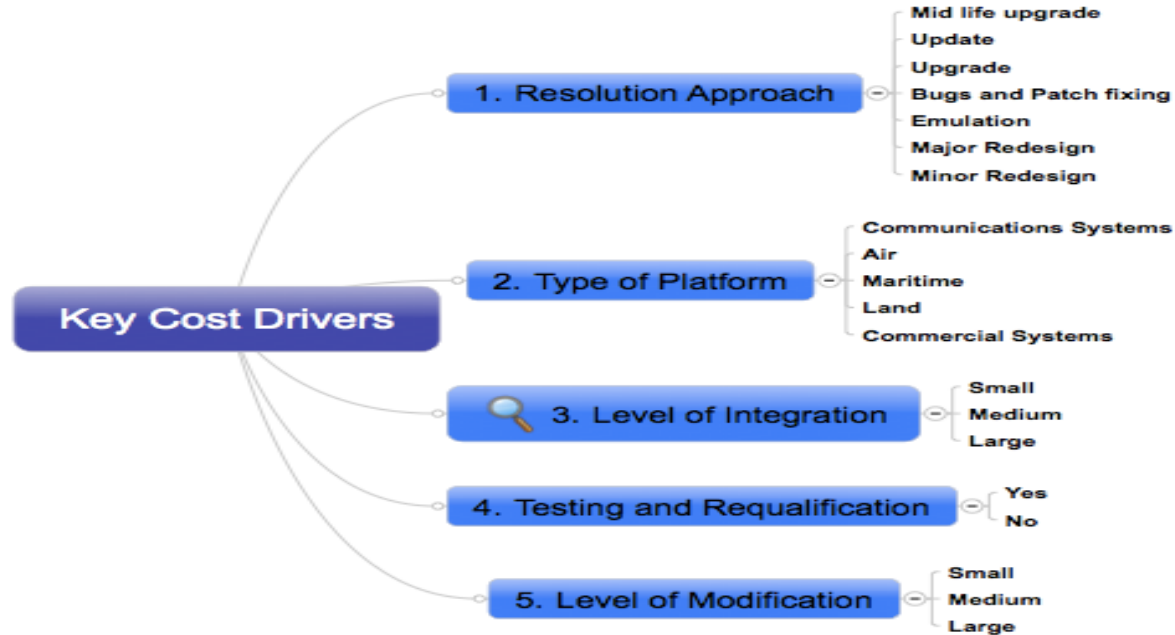
Cognitive Case Study-Model



Software Obsolescence Cost Analysis Framework

- This framework is at the early stages of its development.
- It is however will undergo a incremental development process through out this research and a final version will be released after validation.
- However an initial validation was undertaken at the International Institute Of Obsolescence Management Conference and with BAe Systems where this framework was presented for early feedback.
- The feedback thus obtained has now been incorporated in to the current version of the framework.

Software Obsolescence Key Cost Drivers



Software Obsolescence Key Cost Drivers

- Software Complexity
- Software Dependency
- Number of Applications
- Software Environment
- Support Contract
- Software Language
- Software Development environment
- Software Development lifecycle

What's Next

- Validate Software Obsolescence Cost Analysis Framework
- Develop Mean Time Between Software Obsolescence
- Test run a software project using the Framework
- Create CER based on the framework.
- Test and validate the CER
- Develop Risk and Uncertainty model to incorporate in the Framework

Summary

- This research is to develop a framework to estimate the cost of Software Obsolescence Resolution Cost of Bespoke Defence Software
- This framework is in its early stage of its development
- This framework looks into several aspects of the costing of software obsolescence such as:-
 - Software Obsolescence Management
 - Identification of Software Obsolescence Issues
 - Software Obsolescence Resolution Profile
 - Software Obsolescence Key Cost Drivers
 - Mean Time Between Software Obsolescence

Questions ?

