Technology Change Management-Database

Submitted By

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15MCEI25

DEPARTMENT OF COMPUTER ENGINEERING

INSTITUTE OF TECHNOLOGY

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Technology Change Management-Database

Major Project

Submitted in partial fulfillment of the requirements

for the degree of

M.Tech. in Computer Science and Engineering, Information and Network Security

Submitted By

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May 2017

Certificate

This is to certify that the major project entitled **"Technology Change Management-Database"** submitted by **Utsav Shah (Roll No: 15MCEI25)**, towards the partial fulfillment of the requirements for the award of degree of Master of Technology in Computer Science and Engineering of Institute of Technology, Nirma University, Ahmedabad, is the record of work carried out by him under my supervision and guidance. In my opinion, the submitted work has reached a level required for being accepted for examination. The results embodied in this project, to the best of my knowledge, haven't been submitted to any other university or institution for award of any degree or diploma.

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Certificate

This to certify that **Mr. Utsav Shah (15MCEI25)**, a student of M.Tech CSE (Information and Network Security), Institute of Technology, Nirma University, Ahmedabad is working in this organization since 06/02/2016 and carried out his thesis work titled **"Technology Change Management-Database"**. He is working in Internal Audit,Morgan Stanley Advantage Services as intern under guidance of Mr. Sameer Hande (Mentor).He is working on his assigned work and is allowed to submit his dissertation report. The results embodied in this project, to the best of our knowledge, haven't been submitted to any other university or institution for award of any degree or diploma. We wish him all the success in future.

Mr. Sameer Hande
Project Manager and Mentor,
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Sign:

Statement of Originality

I, **Utsav Shah**, Roll. No. **15MCEI25**, give undertaking that the Major Project entitled "**Technology Change Management-Database**" submitted by me, towards the partial fulfillment of the requirements for the degree of Master of Technology in **Computer Science and Engineering, Information and Network Security** of Institute of Technology, Nirma University, Ahmedabad, contains no material that has been awarded for any degree or diploma in any university or school in any territory to the best of my knowledge. It is the original work carried out by me and I give assurance that no attempt of plagiarism has been made. It contains no material that is previously published or written, except where reference has been made. I understand that in the event of any similarity found subsequently with any published work or any dissertation work elsewhere; it will result in severe disciplinary action.

_____

Signature of Student

Date:

Place:

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Abstract

The evolving nature of the technology exposes it to various known vulnerabilities and hence it is necessary to update to update the underlying systems and infrastructure supporting the technology. To ensure appropriate implementation of these new technologies, appropriate change management process should be followed. The project provides an overview of key steps and processes that are covered as a part of standard SDLC process. Standard SDLC process incorporates phase wise development and implementation of the new solution that will help the current business process to function efficiently, additionally providing with the required securtiy parameters in order to sustain against the modern day attacks. Further the project also incorporates the cases were SDLC process was adhered and not adhered.

Abbreviations

IAD	Internal Audit
Apptech	Application Technology
RACF	Resource Access Control Facility
MNPI	Material Non-Public Information
IS	Information Security

Contents

Chapter 1

Introduction

1.1 About the Organization

Internal Audit part of Morgan Stanely Advantage Services plays an important role being third line of defense, helping the organization grow in a controlled manner, where business, Technology and DA auditors work under same roof.The auditors perform activities over the business and technology aspects adopted by the firm for the day to activities, finding exceptions, remediating them and improving the end results.

1.2 Project Overview

Technology Change Management- Database includes the change management procedure for the database starting from how the changes are initiated,what kind impact this change will have , remediating the negative impact , pre-implementation, testing and post implementation. Technology change management also includes SDLC (Software Development life cycle. The SDLC defines and incorporates the process of developing or upgrading a software with the aim of improving the productional efficiency hence resulting into the financial gains. Moreover SDLC controls are important from regulatory point of view as well.

- SDLC Standards
- SDLC Phases
- Litreture survey
- Good practices pertaining to SDLC for a sample implementation

- Auditor's Role
- Conclusion

1.3 SDLC Standards[1][2]

- ISO/IEC 15288: It is a standard to develop system and software. It incorporates a standard framework to design a system or software using the associated processes.
- ISO/IEC 12207: It uses a well defined terminology to design standard softwares. The defined teminology is used and applied during software acquisition, development, maintenance,operation and decommision of the software.

1.4 SDLC Phases

- Software Initiation
- Software Requirements Analysis
- Software Design
- Software Construction (Procurement)
- Software Testing and Acceptance
- Software Implementation
- Software Maintenance

1.4.1 Software Initiation phase

- A requirement is defined with the initial feasibility study and analysis conducted.
- Further a project charter incoporporating all the above details is documented.

1.4.2 Software Requirement Analysis phase

- End user requirements and needs are defined.
- Functional requirements are documented in detail.
- Security requirements are defined and documented.
- Business requirement document (BRD) is prepared incorporating the above.

1.4.3 Software Design phase

- The requirements defined in the BRD are implemented.
- The operations of the designed software are defined in detail.
- A final design review is done to ensure the design addresses all the key requirements mentioned in the BRD.

1.4.4 Software Construction (Procurement)

- The design defined in the software design phase is developed in this phase.
- Manual and automated testing is perfomed at a module level in this phase.
- A third party vendor option is also considered if the proposed solution best fits the user requirements.

1.4.5 Software Testing and Acceptance

- This phase validates that the developed software meet all the operational requirements defined in software requirement analysis phase.
- The quality analysis testing are conducted from users part of the development team and user acceptance testing are performed by users part of end user team.
- Security assessment testing is conducted in this phase.
- Testing results documented in this phase should match with the outcome of the system requirements phase.

1.4.6 Software Implementation

- The software is now moved from QA to production environment.
- The developers' access to the software is removed.
- Users are trained prior to this phase.

1.4.7 Software Maintenace

- This phase is ongoing till the software is decomissioned.
- Penetration testing is conducted throughout in this phase.
- A dedicated operations group to support the software should be in place.

Chapter 2

Literature Survey

2.1 Motivation[3]

With the software upgrade release, the software is enhanced to handle more complex processes, support multi users instances, is user friendly and enhances fast computation. In order to meet these requirements complying with the regulations, organizations follow a standard framework in order to implement and use the software effectively. These standard framework for developing or upgrading a software is done using SDLC (software development life cycle) process. SDLC helps with the following:-

- Planned and strategic approach to achieve the quality.
- The end goal of SDLC is to achieve systematicity.
- Main focus on security functionality.

2.2 Significance

The following are discussed case studies incorporating instances in which organizations did not adhere to SDLC process. In the next chapter we shall discuss about the instance and advantages in which an organization adhered to the SDLC process.

2.2.1 Instances where SDLC process was not adhered[4]

Case study 1 : Avis failure

- Avis one of the leading Europe car rental company took a huge Euro 45 to 50 million loss.

- The main reason behind the loss is implementation of new ERP system.
- There was a delay in developing and further implementing the ERP system, which resulted in shutting down the credit hire business.
- Later the management decided not to onboard the ERP system in order to avoid further loss.

Case study 2: Big Ford Failure

- In 1999, in order to automate the business processes incorporating the sales transactions, quotation requests, shipment notice and purchase order, Ford motors joined hands with Oracle to rollout a new software.
- System's Web interface would enable customers to manage transactions across globe.
- The project failed due to the wrong choice for vendor. Oracle lacks integration and hence the expected result was not implemented.
- The project was over ambitious and thus was not impossible to complete that in one go.
- The cost estimation was incorrect. The initial estimation for the project was USD 200 million, which got raised upto 400 million.

Case study 3: TAURUS

- Due to immense growth in stock trading during 1980, the paper work became difficult.
- In order to automate this process, TAURUS was initiated to replace the manual process.
- It was initially decided to import a system supporting the software from United States. But post installation it was know that a lot of changes would be required as the system should comply with the British regulations.
- This proved to be much more difficult than anticipated.

- 70 percentage of the code was required to be changed which resulted into no. of delays and as result of which the project was scrapped in 1993.
- The main reason of failure was differing in the interest among the stake holders.

Chapter 3

Case Study - Instance where organization has adhered to SDLC process[5]

3.1 SDLC process followed

In this section a detail example of SDLC process followed and advantages pertaining to each phase is described in detail. This will help to understand the key points that should be included as part of SDLC process.

3.1.1 Problem definition phase

- The current software in place for health portion of generalised hospital is not efficient and hence it cannot incorporate all the growing requirements in the requested environment.
- As a result the management decided to upgrade the software. Thus making the system efficient in incorporating all the requirements.
- The sole reason behind upgrading the software is:-
  - To upgrade the opearations with the current technology.
  - To provide the best of care available to the patients.

Advantage:

- The detailed description of the problem definition give a clear picture of the required solution in the first instance.
- This description makes work easy for the Planning and Governance which is part of System Initiation phase.

3.1.2 Requirement Analysis phase

This phase is divided into three sub categories:

- Technical: Is the company/organization has required infrastructure and resources to support the required change?
- Operational: Are there SMEs (subject matter expert) available who can train personnel on the software?
- Economics: Is comapny having sufficient fund to support the requirement financially?

Advantage:

- Specifying the requirement in the initial phase, makes the overall estimation for financial and operational requirements accurate.
- In this case the Director of Technology passed dollar 2,50,000 for the project confirming on all the Operational, Technical and Manpower requirements in place defined as part of System requirement Analysis phase.

3.1.3 Meeting the objectives for system requirements

Meeting with the Stake holders to finalize the software design in BRD so as to meet the end users requirements. The agenda of the meeting is to have a conclusion on the following in the present case:

- System compatibility
- Flow of data
- User friendly

Advantage:

- Having a conclusion on the software design and documenting that in BRD makes easy for developer to meet the end user requirements.
- In the current scenario 3 requirements have already been defined in the BRD post discussion with the stake holders as part of Software Design Phase.

3.1.4 Potential Vendor Options

- The developers met with the primary stakeholders of General Hospitals health division.
- Post meeting with 5 potential vendors identified by the stakeholders, it was decided that Vendor B will be given the contract for developing the desired solution for the hospital.

Advantage:

- Having a vendor option in place makes it easy to implement the solution in the estimated timeline.
- In this scenario Vendor B was selected as a potential vendor because of their core competency to design and test the software incorporated as part of software Construction, Testing and Acceptance Phase.

3.1.5 Implementation

- The selection of the method of implementation is very important as the implementation of the solution should not affect the current business process.
- The new solution can be implemented as:
  - Direct installation
  - Parallel installation
  - Single location installation
  - Phase installation

Advantage:

- In the current Home care unit of the hospital decide to implement the solution using Parallel Installation method.
- Clinicians will have to double enter the data in both systems until the old system is replaced by new system as part of Software Implementation phase.

Maintenance and Support

- This phase is in place till the software is decommissioned.
- There is a defined period in which software upgrades are performed.
- Moreover there is a support team in place to monitor the overall performance and also train the end users with the skill set required to operate the upgraded software.

Advantage:

- The maintenance and support phase enables to resolve all the issues once the software goes live.
- In the current scenario the software upgrade is performed every 2 weeks as part of Software Maintenance phase.

Chapter 4

Good practices pertaining to SDLC for a sample implementation

4.1 Introduction

An organization wanted to incorporate SPL (Special purpose ledger) into the current SAP platform and as a result the management decided to approach a vendor for the software solution and implementation. The vendor agreed to complete the integration of the software within the SAP within 113 working days. The below section describes about SPL and the duration defined for each phase.

4.2 SPL for SAP

- Special purpose ledger (SPL) are used for reporting purpose.
- The special purpose ledgers available enables to collect, analyze , create and modify the information.
- The flow of information to this SPL is from SAP applications and other external softwares.

4.3 Key Milestones followed for implementing the project

The SDLC process should incorporate the following milestone:-

- Milestone 1: Project preparation and blue print
- Milestone 2: Realization
- Milestone 3: Development and Testing
- Milestone 4: Final preparation and go live
- Milestone 5: Maintenance

In the further sections will give a detail view about the processes that should be incorporated as part of each phase with a definitie time line defined for each process.

4.3.1 Project preparation and blue print

Sr. No.	Process	No. of days
1	Project preparation and blue print	3 days
2	Business blue print	6 days

4.3.2 Realization

Sr No.	Process	No. of days
1	Collection of data	5
2	Configuration	7
3	SPL configuration in development	5
4	Migrate config objects to quality server	1
5	User manual	1
6	Training to user	1
7	Authorization matrix preparation	2

4.3.3 Development and Testing

Sr No.	Process	No. of days
1	Development	15
2	Testing	12
3	Data extraction to SPL in development	2
4	Data extraction to SPL in quality	1
5	Unit testing in development	5
6	Unit testing in quality	2
7	Integration test in quality	5
8	Unit testing in QA server	2
9	Issue resolution after unit testing	1
10	Final integration testing	3
11	Integration test Issue resolution	1
12	Test authorization	0.5
13	Review and approve final integration testing	0.5
14	Establish authorizations	2
15	Data migration and cut over planning	2
16	Realization and phase sign off	5

4.3.4 Final preparation and Go-live

Sr No.	Process	No. of days
1	Final Preparation	6
2	Go-live	6

4.3.5 Hypercare

Sr No.	Process	No. of days
1	Hypercare	11

4.4 Reason behind successful implementation of the project

Since each and every activity for the implementation was clearly documented and divided into no. of days required, the project was successful. There were no suprises in between

the project regarding the timeliness, cost, resources etc.

Chapter 5

Audit process[3]

Before going into the further details about the requirements to audit the SDLC project, we should have a proper knowledge how an audit is performed and what we are looking for. The below section describes about the audit process in detail.

5.1 Risk Entity

Risk entities refers to key risks associated in a business and which needs to be audited, to verify for the inherent risk associated with the process. Risk entities are identified from top to bottom flow for Risk management framework documented as part of ISO 31000. Basis on this the framework constitutes the following:

- First line of defense
- Second line of defense
- Third line of defense

5.1.1 First line of defense

The first line of defense includes the below key risk indicators:-

- Heat report constituting the High and critical risks reported for each risk entity.
- Contol mapped with each risk.
- Outstanding or overdue internal/external audit actions

5.1.2 Second line of defense

Second line of defense participates in the business risks groups. The main function of this committee is ensure that reports obtained from first line of defense are compliant to regulatory policies. The below are to be questioned during crises:

- Updated risk metrics to be reported in case of emergency
- Resources availability
- Monitoring and further reporting risks to the respective business units
- Risk committee and governace approach during the crises
- Sufficient fund available during crises
- Risk tolerance associated with each process

5.1.3 Third line of defense

The third line of defense consist of internal or external auditors. This team have to test and verify that, inherent risk rating associated with the process have been remediated or not. This follows the PRC flow which is explained in the next section.

5.2 PRC flow

Let us understand PRC flow with an example. There is process in place through which operational and production department personnel has access to the mainframe database. The application is used for trading business. The database is mapped with the RACF groups through which only traders have access to the PII data. Due to some malfunction, the application dint respond and as a result the vendor was asked to fix the bug.Post analysis vendor suggested that the current version of the software is not compatible to incorporate all the complex processes and hence they proposed a software upgrade for the application. Post the upgrade, internal audit team performed an audit for the SDLC process to upgtrade the application and verify whether the SDLC standards have been followed.

- Process: Software upgrade for the application.

- Risk: If SDLC Standards not followed, may miss the timeline which might have adverse affect on business and can result into financial loss.
- Control: Timeliness, Governance, Monitoring and Implementation.

An IS Auditor will check that the controls in place are able to mitigate the inherent risk associated with the process. Post testing the overall risk rating for the process, inherent risk should decrease. If not, then the audit will be marked as unsatisfactory.

Chapter 6

Auditor's Role and check list

6.1 Auditor's to dos[3]

In assessing controls around SDLC and verify that the Inherent risk associated with the process has been mitigated.

6.2 Auditor's check list

An auditor has below to-dos in scope for his review:

- Stratergy of implementation
- Business Required Document (BRD) sign off
- Quality Assurance and User Acceptance testing
- Logs are created during implementation and Issues regarding it
- Appropriate control during migration process when solution goes live
- Post monitoring when the solution is on boarded to production

6.3 Documents check list for Auditor

6.3.1 Project planning phase

- Evidence of the documents incorporating the blue print of the project.
- Evidence incorporating the minutes of meeting and emails in order to track the progress of the project.

- Evidence incorporating the information about the authorized personnel.

6.3.2 Project execution phase

- Evidence incorporating the detailed documents of the business processes and sign off on BRD by authorized personnel.
- Evidence incorporating the specifications of the technological function developed.
- Technology change request document sign off.
- Evidence incorporating the minutes of meeting about the key steps taken to mitigate the risks identified.
- Evidence incorporating the documents about quality management and assurance.

6.3.3 Pre go-live phase

- Evidence of the documents incorporating the detailed test plan and schedule for performing the test.
- Evidence of the documents incorporating the test results,user acceptance testing logs and sign off on the test results by authorized personnel.
- Documents incorporating Issues logs during integration and it's sign off by authorized personnel.
- Evidence incorporating minutes of meeting for go live decision approved by management.
- Evidence incorporating the manual used during the trainning.

6.3.4 Post implementation support phase

- Document of the Issues logs post the solution goes live into production
- Evidence incorporating the minutes of the meeting for the solution to be implemented for the Issues identified.

Chapter 7

Conclusion

7.1 Good practices to be followed for effective implementation of SDLC process:-

- Priortitizing the most appropriate solution.
- Post priortizing, implementing the solution phase wise.
- Training the end users so as they can get adapt to the new solution.
- Planning each phase of the project and defining definite timelin for each process.
- Selecting the best vendor available for the solution to be implemented.
- Getting prior sign offs by authorize personnel.

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