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Software Risk Factors in Developing E-Governance Projects

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Abstract- Software application development is a complex process that goes through various stages. Huge investments are being made in developing such applications and if these are developed for government organizations and citizens of the country then the reliability becomes the foremost factor. The more critical the application is the more risks are there. This paper discusses the various risks related to various phases of software development life cycle. The challenges that are to be faced by the development team whether it is related to data capturing or testing and implementation of such applications need to be handled.

Keywords: E-Governance; software risk management; Information Technology; Software development cycle,

I. INTRODUCTION

The technological innovations and up gradations have led to the emergence of e-governance projects all over the world. In order to give citizens maximum comfort in availing the services and that too with minimum cost and effort, the government and other organizations are making use of ICT in developing such projects. They are investing huge amount of money in such projects so as to connect to citizens not only in urban but rural areas also in India. People living in rural areas are not technology savvy and their literacy rate is also low. Therefore, efforts are being made to uplift them by providing them necessary inputs as and when required with the help of Information and Communication Technology. Long queues in government offices like passport office, driving license office, etc, lot of documents in the form of physical files, registers, etc and many other issues pertaining to corruption and other aspects have been controlled with such e-governance applications and websites. Many IT companies like HCL, IBM, Infosys, etc are involved in this initiative of government in developing applications for various government departments thereby helping them in efficient functioning and handling of day-to-day operations.

The development of e-governance projects where lot of investment is required is not an easy task. Lot of members are involved in developing such applications, few of them are technical staff, departmental staff and sometimes third party consultants are also hired so as to give maximum out of these projects. The software development processes, metrics, testing and quality assurance tools and techniques being used are to be chosen in very efficient manner so as to reduce the maintenance cost and risk factor. The risks involved at each phase of software development life cycle need to be considered, evaluated and prioritized for the successful implementation of projects. Not only development processes but preparation of manuals and the documentation part are also very crucial for the maintenance of software applications. These risks can be both technical and non-technical risks. Proper feasibility should be conducted before initiating a particular project. The issues pertaining to technological feasibility, economic feasibility, operational and legal feasibility need to be considered. The evaluation should be done on each project and cost benefit analysis should be conducted along with SWOT analysis.

II. ANALYSIS RELATED RISK

The e-governance projects involve various types of risks which are discussed as follows:-

- Unclear problem definition – Unclear and improper definition of problem statement, goals and objectives of e-governance projects to be undertaken is a major risk in developing any kind of IT related projects.

- Ambiguity in understanding the goal and objective of the project – Various stakeholders might interpret the goals in a different way that might lead to conflicts in further stages of project development lifecycle.

- Inappropriate tools and methods of data gathering – Methodologies and techniques used for information gathering related to the project must be selected properly. Since the data required for such projects is very crucial and huge in volume so collecting such information requires appropriate methodologies to be used keeping in mind the security, political and legal aspect also.

- Lacunas in conducting operational, technical, economical and legal feasibility study – Such a huge investment is required in developing these applications so this aspect should be given utmost importance.

- Incomplete or inaccurate Software Requirement Specification (SRS) documentation – SRS works as an agreement between the development team and government department or organization for which the project is being developed. If this agreement is incomplete or inappropriate, the further development may not be correct and lead to failure of the project.

III. DESIGN RELATED RISKS

- Inefficient design model – The pictorial representation for depicting actors involved, processes, input-output, data flow among processes, etc should be made very clearly in order to increase the understanding of the system. Thus, data flow diagrams, entity relationship diagrams and other UML diagrams should be made keeping in mind all the factors involved in the project.

- Inconsistency in flow of data – The flow of data from one or more sources is being transformed into output or stored in data stores after processing is being done. Any inconsistency in flow of data and information may be risky and affect the success of the system.

- Inadequate designing of input screens/output reports – The format of data entry screens should be user friendly and the chances of wrong entry of data should be minimal. The selection of GUI controls being used in designing these screens should be done with utmost care. Like calendar controls can be used wherever date has to be accepted, timer control can be used wherever necessary, and so on. Similarly, the report format should also try to give the information in clear and precise terms that is easily understandable by the end user and would help the user in decision making also.

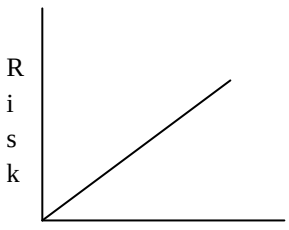
- Un-normalized database – The database design should be made keeping in mind all the aspects such as data redundancy, inconsistency, update or other anomalies, locking techniques and so on. The DBA must be able to handle this data in an efficient manner because the volume and confidentiality of this data is much more than other general applications.

IV. IMPLEMENTATION AND TESTING RELATED RISKS

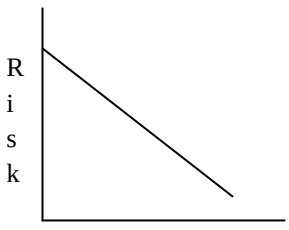
- Language barrier – India is a country with different states having different languages and cultures. So developing an application which can be used by all may require certain language translators. If these translators are not incorporated properly in these projects, then there might be a risk of its usage by only few sections of the society thereby overcoming the benefits with respect to investment done on such projects.

- Lack of experienced development team – The development team of such projects comprising of analysts, programmers, testers, quality analysts, etc must have expertise in the languages, tools and techniques being used in developing such projects

The risk factors involved in these projects may lead to further success or failure of the application. The more the preventive measures taken to avoid the risks, the less will be the chances of its failure. Risk can be correlated with two major software attributes: maintainability and reliability.



Maintenance Effort



Reliability

The more the risk assessment and preventive measures taken the more will be the reliability of the software. But if not done thoroughly it would be inversely proportional. Similarly if risks are more the maintenance will also become difficult. Thus risk factor is directly proportional to maintenance.

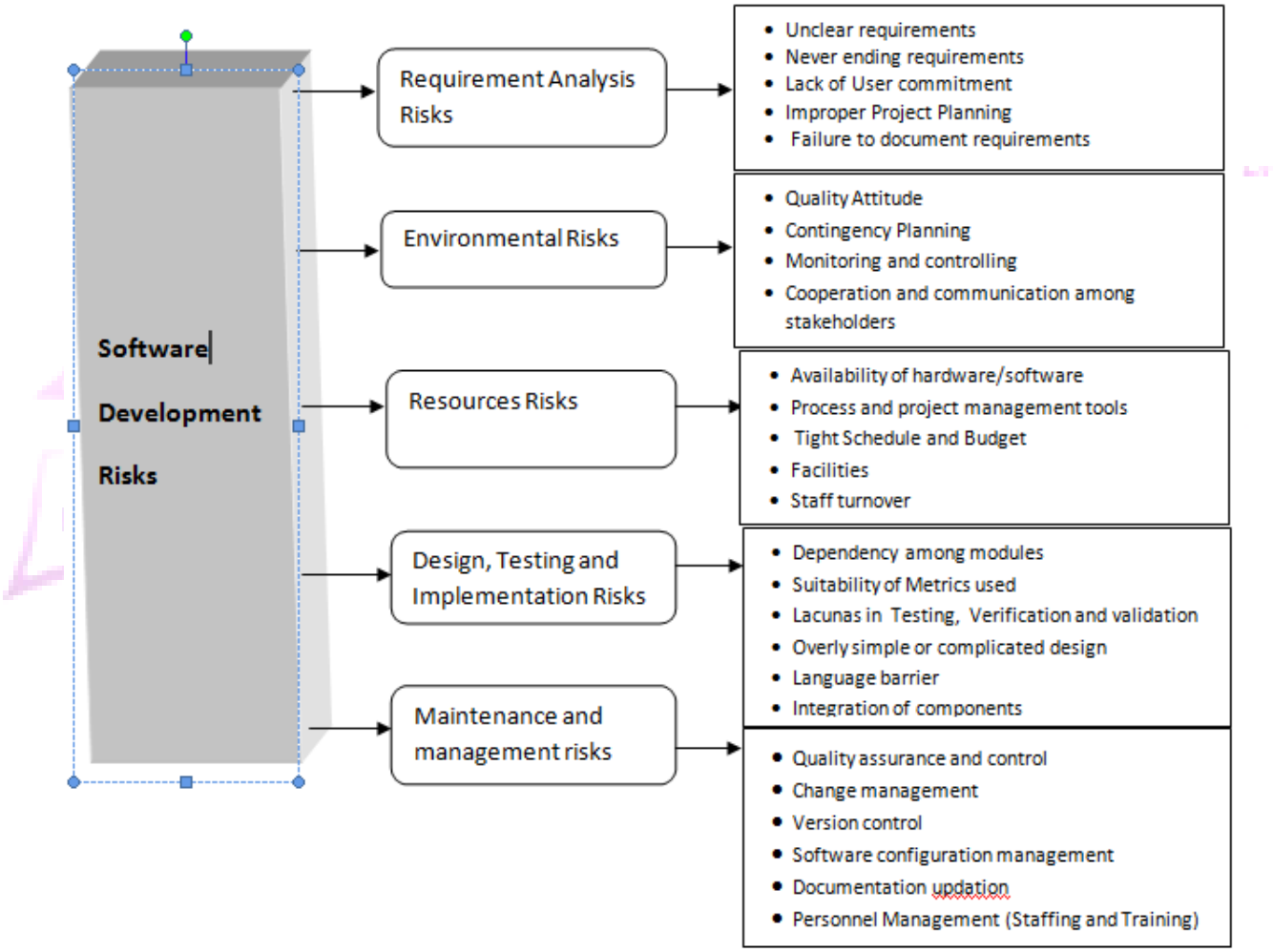


Fig 1: Categorization of software development risks

The main challenges in identifying the risks and doing the risk analysis are:-

i) Knowledge about the domain area

ii) Soft-gap between technology and governmental/political issues

iii) Availability of tools for measuring performance of such integrated applications.

iv) Preparing risk analysis document

v) Incorporating change management into risk analysis and prevention

vi) Continuous monitoring, controlling of the progress and impelentation of such huge and complex projects.

vii) Time, resources and cost constraint

viii) Promoting the application and motivating the end user to take maximum benefit out of it

ix) Proper interpretation of user requirements and getting the consent of all government departments and other stakeholders

x) Security of confidential data and handling of privacy issues as per cyber laws

V. MEASURES TO MINIMIZE THE TECHNOLOGICAL RISKS

While developing the e-governance projects various issues need to be addressed at earlier stages of development only. The more preventive measures we will take the lesser the chances of failure. Both, the hard and soft gaps need to be taken care of because in reality the government organizations are more considered about the soft factors like people, politics, human culture, etc rather than the hard ideas related to technology, engineering and so on. Similarly, on the other hand IT application designers are more concerned about technologies and the government organization culture. So, in order to develop an e-governance application this gap has to mend and both sides perspective need to be understood.

The first and foremost thing that is very important is the quality of project documentation that is being developed throughout the software development life cycle. These documents are of utmost importance because all the stakeholders will be referring them every now and then whether they are the developers, testers, analysts, maintenance team or government officials and the end users. Each and every term, data field, code, etc used in the project must be defined in these manuals so that at the time of maintenance they could be referred and updations can be made easily. Moreover, if required, while integrating its components with some other projects, it becomes easier if well documented.

Second major issue that needs to be addressed is the priority setting in project building. All the features and functionalities must be prioritized in order to ensure that the most important functionalities are given utmost importance in terms of business value and risks and are also completed first. If this

aspect is neglected then the development team might increase the risk of failure as emphasis was given to the low priority features as compared to high priority functionalities. Priority Matrix can be built where the items of importance can be sorted in an order based on certain criteria and then the rating has to be done. While deciding the criteria and importance, the end users must also be involved. You can quantify particular criteria by giving them numerical rankings. But while prioritizing the things the constraints and other project drivers must be considered such as availability of resources, schedule, cost, expertise, etc.

Thirdly, the integration of software tools should be handled carefully. There tools available are of diverse technologies and methods and can be from the domain of compilers, code generators, configuration management tools, testing tools, documentation, etc. Sometimes these tools are from different vendors so integration of such tools becomes a difficult task. Moreover, it is not necessary that these tools are compatible with the available hardware and software resources. So while integrating these tools special measures should be taken regarding the standardisation and compatibility issues as well as the techniques to be used for testing such applications should be chosen with utmost care. Proper integration planning should be done and testing of these should be performed. Thus you must identify the best fit from the pool of applications available.

Fourthly, many challenges are there in prioritizing the risks also. For different stakeholders, the priority of a particular functionality might be different. So to resolve this priority conflict and come to a consensus is a major challenge for the development firm. Moreover, the requirements and functionalities of such large projects would be very large. Addressing all these will require maximum efforts and setting the priorities would be very difficult. Weighing them against all the criteria set will require time, resources and budget also which is generally a major constraint in almost all IT projects. Next in this technological era, the requirements change frequently and so do the functionalities so managing this change with respect to priority setting is very cumbersome. Lastly, in e-governance projects the prioritization that is to be done is highly influenced by government agencies and politics may also be involved so the only subjective and biased approached should not be there.

VI. CONCLUSION

In India, highly qualified expertise in the field of Information Technology is available but the challenges of e-governance projects requiring lot of investment and knowledge are too high. A customized approach has to be followed in developing these projects. Managing a project is not just writing of code rather proper integration of people, technology, business, risk and legal management. The identification of project risks is not the only task to be performed but analyzing the threats, challenges, consequences is equally important as preventive measures has to be planned accordingly only.

VII. References

[1] Yan Aihua, “Risk Management in Software Development: A Continuous Process”, IS 6840 Term Paper, Fall November 2008

[2] Firesmith Donald, “Prioritizing Requirements”, Journal of Object Technology, Volume 3, September-October 2004

[3] Bannerman, Paul L. "Risk and risk management in software projects: A reassessment." Journal of Systems and Software 81.12 (2008): 2118-2133.

[4] Boudry Elke, Verdegem Pieter, "The Challenge of Technology: Alignment Dynamics in Local Governments", The Electronic Journal of e-Government, Volume 10, Issue 2, December 2012

[5] United Nations e-Government Survey 2008 [Online], Available: http://unpan3.un.org/egovkb/portals/egovkb/Documents/un/2008-Survey/unpan028607.pdf

[6] Li, Jingyue, Odd Petter N. Slyngstad, and Maurizio Morisio. "A state-of-the-Practice Survey of Risk Management in Development with Off-the-Shelf Software Componenets." *IEEE Transactions on Software Engineering*, 2008: 271

[7]Subrahmanyam G.V., "Project Management in e-Governance", Manage India, Issue 6, November 2011