Research Paper Report

Choice of Software Development Methodologies – Do Project, Team and Organizational Characteristics Matter?

Authors - Leo R. Vijayasarathy and Charles W. Butler

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Group 16 members -

- Saharsh Gupta (202012016)
- Ayush Krishan Mohan (201801048)
- Udit Meena (201801095)

Group ID	Group 16	Name of Student /s	• Saharsh Gupta • Ayush Krishan Mohan • Udit Meena
Title of Paper		*Choice of Software Development Methodologies – Do Project, Team and Organizational Characteristics Matter?*	

Abstract of Paper (in your own words)	In today's software world, the organizations have several methodological options for software development ranging from traditional to agile approaches for different projects that they are working on. This research paper is an attempt to understand the different software development methodologies and how frequently they are used. This paper is a survey based research paper done for project managers and other team members about their use of various software development methods. The results show that while agile approaches such as agile unified process and scrum are more prevalent than 10 years ago, traditional methodologies including waterfall are still popular. Surprisingly, organizations are willing to adopt multiple methodologies on projects and are more often than not choosing to follow a hybrid approach to software development. It is also important to note that the organizations are making these choices of methodologies based upon some specific project, team and organizational characteristics which are further discussed in the paper.

Objectives of Paper	There were two main essential objectives of this research paper. **1.** Firstly, the study wanted to empirically assess the extent to which different software development methodologies including traditional, iterative, and agile are in use today. **2.** Secondly, the study wanted to determine if there are discernible associations between certain organizational, project, and team characteristics and the methodologies used.
Motivation of the Paper	**1.** Software development methodologies provide a framework for planning, executing, and managing the process of developing software systems. There are many software development methodologies including waterfall, prototyping, iterative, rapid, structured, object, and agile approaches. Each has its pros and cons. It motivated the authors to dig deep into this subject and quantitatively understand it. **2.** In 2003, IEEE Software published a special issue about the state of software engineering and software development. It offered insights into the international use of methodologies and reflected on the practices, techniques, and tools implemented in software projects. Since then, the use of agile and hybrid methodologies has grown, and it would be pertinent to discover which software development methodologies are used more frequently today and why a specific methodology is chosen. **3.** For individual teams or large organizations,

	determining the specific software development methodology to use for a given project is a critical decision. Sometimes, the decision to use a software development methodology perhaps depends upon marketing and literature bias which support new or industry supported practices. At other times, companies may rely on standards for consistency and repeatability. Therefore, a number of contextual factors including organizational, project, and team characteristics as well as market and operational forces are likely to be considered in the selection process. Therefore, guidelines drawn from empirical associations between methodologies used and key situational characteristics would be valuable for all organizations. This may fascinate new findings and breakthroughs in the field of software development. 4. The results of this paper would also help the organizations and companies to take an informed decision whenever they are going to start a new software project. They could easily refer to the statistical data and choose according to their requirements the software development method that best suits their project.
Important terms along with brief definition which got added to your existing subject	1. **Software development methodology** Software development methodology are structured processes that are used to develop software. We learned how different organizations use different methodologies the way they use them. We also found that organizations use different methodologies in one single project to get back on track and increase productivity. 2. **Traditional methodology** Traditional Methodology also known as Waterfall method can be defined as a linear approach in which the processes occur in a predictable manner. In the waterfall

knowledge after reading the paper	method , the project follows pre - planned steps with some assumptions like the budget and timeline can be changed and there is no change in the requirement part. **3. Hybrid software development approaches** Hybrid software development approach can be defined as the blend of agile or traditional methods. This blend is done by organization(project teams), by blending two or more different methodologies they try to build a new and better model which fits perfectly with their project needs and also ensure that development of the software goes faster and smoothly. **4. Projects characteristics** We learned about different project characteristics like budget, duration of the project , and different project profile. We came to know how organizations consider these factors to work on their software development. **5. Organizational and team characteristics** We also learned how organizations from different industries manage and work on their software projects, how factors like annual revenues and number of employees play a major role in selecting different methodologies to use in a project , selecting methodology for a project also depend on the size of team, the way the team works etc.for example small team size preferred agile and iterative methodology more,medium sized team chose traditional method more.
Key findings of the paper	**1. Project profile** ● Respondents worked on different project types,but

	the most common project profile accounted for 38.6% was ‘new software development’. ● 24.2% of respondents chose software enhancement. ● 22.9% were the projects that had a purpose of customization, integration and maintenance. ● This indicates that half of the projects were related to software development. **2. Project duration** ● In the figure of project duration, 76.4% of projects had a duration of less than 12 months. ● From this 43.1% of the project was completed in less than 6 months. ● 16.4% of the projects were completed within the time duration of 24 months. ● Only 7.2% of the project had a duration of more than 24 months ● 92.8% projects were completed within 24 months or less, which shows that short duration projects were popular among the respondents. **3. Software Development Methodologies** Respondents were asked the type of development methodologies used in their projects ● Waterfall was the most popular methodology used with a percentage of 32%. ● Other used methodologies are Scrum, Test -driven development and agile unified process were cited at 20.3% ,28.1% and 19.6%. ● The least popular methodology was DSDM with only 1.3%. **4. Approach to software development** The most important key finding that was found in the paper was that multiple methodologies were used during

	the development of a project. This finding led to categorizing the project on the basis of software development approach rather than individual software development . ● Agile approach comprises AUP, scrum, TDD, FDD, ASD, XP, etc. and it has 33.1% share. ● Iterative approach consists of RUP, spiral, RAD, etc and it has its share at 7.7%. ● Traditional represent projects that adopted methodologies that are plan driven and are sequential in nature. The basic example is waterfall. They have 13.8 % share. ● Hybrid cluster includes projects that have blended methodologies from two or more of the first three clusters, its share is the highest with 45.3%. **5. Software development methodology indicators** Paper investigated whether there are significant relationships between the software development approach and relevant contextual factors related to the organization, project and team ➔ Organization Factor ● Three organizational factors, industry, annual revenues and number of employees, were analyzed for possible associations with the software development approach used. ● Industry was not statistically significant. ● One thing to notice in the bar chart of annual revenue: 55.6% of the companies that used traditional methodologies were high revenue companies.(revenues > US$1B). ● Companies with high count of the employees used the traditional methods more as compared to the ● Companies with low employee count used

	agile and iterative methodology more. ➔ Project Factors The paper explore two project related factors 1. Budget 2. Project Criticality ● Projects that used an agile approach, 50% had a budget of less than US $250K. ● Projects that used iterative methodologies, a strong majority (70%) had budgets between US$200K and US$1M. ● Among projects that adopted a hybrid approach, a sizable percentage (45.8%) had mid-sized budgets ranging from US$200K and US$1M ● Projects that favored traditional methodologies, 44.4% had budgets in excess of US$1M. ● When the project is critical organizations tend to use traditional methodologies for the development. ➔ Team Factor We explore two team related factors 1. Number of team 2. Team size ● Projects that used agile and iterative methodologies, 48.8% and 50.0% were composed of a single team. ● Projects with 4 or more teams were more prominent within the traditional approach which accounts for 55.6% and hybrid approach with 40.7%. ● Both factors had significant relationships with the development approaches.
Lessons learned	The knowledge gained from this research can help identify the best frameworks for planning, executing, and

through the paper	managing software systems under different contextual settings. However, More empirical work is needed to examine the role of other factors such as the degree of business and technology dynamism, uncertainty and risk, but also to ascertain the optimal fit between contingent factors and methodologies.
Concluding Remarks	Three of the top four most commonly referenced software development approaches are scrum, agile, and test-driven development. Agile techniques have an observably high degree of usage as a group, and their usage is noticeably higher than in 2003, when less than 5% cited an agile methodology. There are a few characteristics that are strongly linked to the approaches used: **Agile:** organizations with moderate revenues and small number of employees; projects with low budgets and medium to high project criticality; one team and small team size. **Traditional:** organizations with high revenues and large number of employees; projects with high budgets and high project criticality; multiple teams and medium team size. **Iterative:** organizations with small number of employees; projects with medium budgets and medium to high criticality; one team and small team size. **Hybrid:** organizational size does not matter, projects with medium budgets and high project criticality; small team size.