A Survey of Software Development Practices in Sylhet Metropolitan Software Firms, Bangladesh

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Abstract-We report on the software development techniques used in the Sylhet Metropolitan area's software industry, paying particular attention to different phases of software development. We surveyed a selection of software companies with a general questionnaire. Our results show a wide variety in the kinds of companies undertaking software development, employing a wide range of software development techniques. Although our data are not sufficiently detailed to draw statistically significant conclusions, it appears that larger software development groups typically have more well-defined software development processes, spend proportionally more time on requirements gathering, and follow more rigorous testing regimes which represent the standards regarding the software engineering.

Keywords: **Survey, System Analysis, Software Development, Questioner, Statistical Analysis**

I. INTRODUCTION

The objective of the survey is the collection and publication of data necessary for the statistical analysis of the Software Development regarding general perspectives and software engineering. The information from the survey can be used by businesses and trade associations for market analysis and assessment of software industry performance, operating characteristics and trends by government to develop national and regional economic policies in software fields, by other users involved in research or policy making for maintaining important data input to the preparation of the launching new software industry or firm in Sylhet Metropolitan area. The main goal of the article is to represent the current situation of the software firms in Sylhet Metropolitan area regarding the standard parameters of software engineering. It is a self-financed project which is aimed at demonstrating how formal techniques of different phases can be used to improve the different phases of software development. The first part of the project, we have undertaken a modest survey of software development techniques used in the Sylhet Metropolitan software industry or firms. Later parts of the project will involve case studies to compare formal specification techniques with the techniques currently being used, and determining what kinds of tools and techniques would facilitate the uptake of formal techniques. The survey was primarily intended to provide a broad view of the Sylhet Metropolitan software industry, focusing on the requirements gathering, design and coding, testing, security, maintenances, software developer's education background etc. and determining the existing scenarios of

the software firms in Sylhet Metropolitan area in aggregate form. More specifically, we emphasized to find out the following aspects:

1. We have tried to find out that do the companies follow the software engineering concepts in system analysis and design, interface design and coding and other phases including testing, debugging, documentation to develop the software in Sylhet Metropolitan Area?
2. The participation of ratio of public and private universities in software firm in Sylhet metropolitan area.
3. The satisfactions of software developers regarding different situations including the local client's ICT literacy, Government initiation in favor to the software development etc.
4. Which types of programs are developed most in Sylhet Metropolitan area's software firms?

More generally, we wanted to obtain an overview of the kinds of environments that formal specification techniques would have to fit into in order to be used in practice. We also expected the survey would be of general interest, since we were not aware of any other such survey of the Sylhet Metropolitan area software industry. This report explains the method followed in conducting the survey (Section 2), presents the main findings (Sections 3 and 4), then discusses our interpretation of these findings, presents conclusions (Section 5) and the top page of our questioner in appendix (Section 7).

II. METHODS

Since this was very much an exploratory survey, we wanted to get a broad view of the industry as a whole, and a more detailed picture of a few companies. We therefore decided to conduct the survey using questioner method; we visited different companies and conducted with a printed form of different software firm related questions.

A. The initial firm's List

Our first step was to construct a list of companies that we considered to be suitable candidates for questioner's answers. Our main criteria for selecting these companies were that they must perform software development, or fully or partially related to software development, and operate in Sylhet Metropolitan area. In total, we had 20 companies on our contact list. We sent each of these companies a short letter introducing our project and explaining the goals of the survey, along with a two-page questioner based on

software development related jobs as background for the survey (included in [4]).

B. Questioner Format

We developed a set of questions to use as a basis for the questioner (included in [4]). The questions were designed to capture information of direct interest to our project (e.g. what software development methodologies and tools are used), plus other information that we felt might be of general interest and/or help us to identify patterns in the other data (e.g. the size of the company and the kinds of software developed etc.). The questions were intentionally open-ended and close-ended, so that each company could describe its practice in the most natural way as required. Open-ended questions lead inevitably to some difficulties in comparing the responses, and means that great care must be taken in interpreting the results. We got responses from 17 companies. The remaining companies were not actively developing software or software requirements specifications, did not wish to participate, or could not be contacted.

III. THE RESULT OF QUESTIONER
A. Introduction

This section summarizes the results of the questioner we conducted to survey the software development techniques used in the Sylhet Metropolitan area software industries. It contains a description of the categories in which the interview data have been presented—this includes some abbreviations for the sake of tabulation. Some of these categories come directly from the questionnaire; the rest emerged as useful ways of summarizing the responses obtained. In both cases, the categories themselves are subjective in the sense that we have imposed our own interpretation of the data and our own ideas as to what are interesting points to bring out. This is of course usual and quite unavoidable when interpreting questionnaire results when the questions asked are of the fairly open-ended sort we have employed. Finally, we have not summarized all of the data that we gathered—we have concentrated just on those which serve our goal of seeing how requirements' gathering is currently done, the ratio of public-private universities students involved in software firms, the satisfactions of software developers regarding the Government initiation and local client's ICT literature knowledge. The remaining data on our completed questionnaires have been useful as context for the results reported here, have guided us in our choice of site-visits and have helped to shape the categories we chose for further analysis. Presented next, in Table 1, Table 2 and Table3, are the data in summary form and then Tables 4, 5, and 6 are used to suggest evidence of trends in the data.

B. The categorizes used

The interview information presented in this report is divided into eight categories, as follows:

1. *Size.*
   The number of people who are involved in software development within the organization. This is categorized into one of the three values: small (S) representing 1-5 personnel, medium (M) representing 5-10 personnel, or large (L) representing 11 or more personnel.

2. *Kind of development.*
   The types of software development projects undertaken by the organization. The differing projects found were grouped under the following categories:

   - Specific software products for customers.
     O: One-off contracts
     M: Mass production (Shrink wrapped)
     C: Customizing pre-developed software
     S: Service/support
   - Software clients are
     Lo: Local
     OS: Brought from outside source
     Bo: Both
   - Software product types
     SS: System software
     AS: Application software
     CS: Customized software
     ES: Embedded software

3. *Specification of requirements.*
   Indicates an estimated proportion of time spent on specifying requirements in a typical project. These are mostly very rough estimates, since accurate information was often not available, especially when there was no clear requirements specification phase. Many of the companies also indicated that this varies considerably among different projects. Requirements specification methods as follows
   1: Interviewing
   2: Sampling
   3: On site observation
   4: Questioners
   5: Others

4. *Testing carried out on developed software.*
   This is a rough classification of the types of testing performed into a level of rigour. An organization is rated at a given level if they use at least one of the methods pertaining to that level (and perhaps methods from a lower level). The levels are defined as follows:
   1: Testing by customers (after release); includes beta releases. Developers perform their own testing during development. Testing by eventual users before release); includes integration tests on site.

   2: Testing done by dedicated testers (not developers involved in the project). Test plans derived from the specification. This categorization is again somewhat subjective, and organizations may well use other testing methods that were not mentioned during the interview.

5. Tools and Languages used.

An indication of some of the tools, languages and development methods used by the organizations mentioned in Table1.

Table1. Data Summary 1

Size	Kind	Specification of requirements and methods	Testing and rate of testing	Tools and Languages
S	CS, Bo	60%, 3	2, 6	Php, MySql/Oracle
S	CS, Bo, S	40%, 1	1, 8	C, Php, Scripting languages
S	CS, Lo, S	40%, 1	1, 5	Visual Basic, MS Access
L	CS, Lo, S	20%, 3	1, 6	HTML, CSS, Java Script, MySQL
L	AS, Lo, S	40%, 1	2, 8	MySQL
M	CS, Lo	20%, 3	1, 5	HTML, CSS, Java Script, MySQL
L	AS, CS, S, Bo	60%, 5	1, 10	MySQL
L		80%, 1	2, *	HTML, CSS, Java script, Jquery, Ajax, Grid, MySQL
L	SS, S, Bo	60%, 5	2,10	HTML, CSS, MySQL
M	AS,S, Bo	40%, 1	1, 7	HTML, CSS, SQL Server 2005
S	AS, S, Bo	40%, 2	1, 8	Php, Java, MySQL
S	AS,OS	40%, 3	2,8	Java/Android, SQLite
S	CS, Bo	60%, 2	2, 10	Php, Python, MySQL/Oracle
S	CS, S, Bo	80%, 3	1, 8	Php, Python, C++, MySQL
L	SS, OS	40%, 1	1, 8	HTML, CSS, MySQL
L	CS, Bo	40%, 1,2	2, 8	Php, MySQL
L	OS CS	40%, 1,2	2, 7	Php. MySQL
				VB, Oracle, MS Access, Php

A * in this column indicates that we were not able to ascertain the relevant rate of testing from the data we gathered. Rate of testing is between 1 and 10 (1 is not enough and 10 is enough).

Table 2. Data Summary 2

Size	Kind	Employees Directly involved in S/W development regarding total employees	Graduate employees ratio of public and private universities	Graduate employees ratio of CS fields and other fields
S	CS, Bo	20%-40%	3:2	1:0
S	CS, Bo, S	60%-80%	3:2	3:2
S	CS, Lo, S	60%-80%	3:2	2:3
L	CS, Lo, S	60%-80%	2:3	3:2
L	AS, Lo, S	60%-80%	2:3	3:2
M	CS, Lo	80%-100%	1:4	4:1
L	AS, CS, S,	60%-80%	2:3	4:1
L	Bo	40%-60%	2:3	3:2
L	SS, S, Bo	60%-80%	2:3	2:3
M	AS,S, Bo	20%-40%	3:2	1:4
S	AS, S, Bo	80%-100%	1:0	4:1
S	AS,OS	20%-40%	2:3	2:3
S	CS, Bo	40%-60%	4:1	4:1
S	CS, S, Bo	80%-100%	3:2	1:4
L	SS, OS	60%-80%	4:1	3:2
L	CS, Bo	60%-80%	3:2	4:1
L	OS CS	60%-80%	2:3	3:2

S/W: Software, CS: Computer Science

Table 3 Data Summary3 – in order of satisfactions regarding local client's ICT literacy and Government initiation

Size	Kind	Client's ICT literacy	Government initiation
S	CS, Bo	*	*
S	CS, Bo, S	Yes	No
S	CS, Lo, S	Yes	No
L	CS, Lo, S	Yes	Yes
L	AS, Lo, S	Yes	Yes
M	CS, Lo	Yes	Yes
L	AS, CS, S, Bo	Yes	*
L		*	*
L	SS, S, Bo	*	*
M	AS,S, Bo	Yes	No
S	AS, S, Bo	Yes	Yes
S	AS,OS	Yes	Yes
S	CS, Bo	No	Yes
S	CS, S, Bo	No	No
L	SS, OS	Yes	*
L	CS, Bo	No	No
L	OS CS	Yes	Yes

A * represents no comments from the respective firm

IV. DISCUSSION

A. Table1: Data summary1 represents the overall scenario of different software firms in Sylhet Metropolitan area regarding size, kinds of jobs and activities, requirement specification and methods, testing and tools and languages. Size represents the number of employees available in each firm. The larger size shows the standard procedure of software development regarding testing, requirement specifications, etc. Most of the form uses word processor, spreadsheet to represents their system analysis phase and its corresponding findings. Table1 also shows that all of the software firms develop different kinds of software simultaneously. Some of the firms included different services including web hosting, browsing facilities, printing, etc. Table1 is discussed separately regarding different items below.

B. Table 2: Data summary2 shows the participation of the students of public and private universities in Sylhet Metropolitan area in software firms. In Bangladesh, private universities activities are started about two decades before and the performance of the private universities students at a glance is very optimistic for developing the country. This survey also shows the participation and their performance in the software firms in Sylhet Metropolitan area. After analyzing the collected data we found that in every firm except one or two firms, there are software developers who are graduated from private universities. This finding will encourage the students of private universities about their career in software firms.

C. Table3: Data summary3 Shows the satisfactions of the software firms (developers) regarding the local client's ICT literacy and the government initiations taken to the favor of

the software firms. In this case, we found that most of the firms are satisfied according to the local client's ICT literacy and the Government initiations. It is also remarkable that some of the firms are not conscious about this or they don't bother about this fact.

D. Table 4: Data summary4 shows the findings regarding the number of employees available in software firms in Sylhet Metropolitan area. It is remarkable that most of the software firms keep other services with software development. The time spent in system analysis and requirement specification is different one from other in the large firms where as the time spent in that phase is almost same in the small forms and that is 40% which is standard regarding the software engineering. Most of the large firms have their own testers for testing purposes which is realistic regarding their number of employees. The rate of testing of large firms is more than that of the medium and small firms.

E.Table5: Data summary 5 shows the outputs regarding the average time spent on system analysis and specification. In this case, most of the software firms in Sylhet Metropolitan spend 40% time of total time schedule for this purpose. Then the second most of the firms spend 60% time of the total time. According to the software engineering, the time consumption in system analysis and specification should be 40% which is followed by most of the firms in Sylhet Metropolitan area.

F. Table6: Data summary 6 shows the outputs of our survey with respect to testing. We consider either the testing is tested by the customer, developers or the testing is done by the dedicated testers. In this case we found that most of the firms have their own testers for testing and the most of the large firms have their own testers. The small and medium firms perform software testing by the developers and/or customers since their number of employees are limited.

V. CONCLUSION

In conclusion, we say that this was a modest survey with modest aims, and that great care must be taken in interpreting the results. While this form of survey was quite appropriate for our purposes, to get more reliable/significant results would require a more focused survey, concentrating on a smaller range of companies, with more narrowly worded questions and more tightly defined response categories. We hope that the results presented here would provide useful background to the government or the private investors in ICT sector specially in software firms in Sylhet Metropolitan area.

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APPENDIX

A survey of software development practices in Sylhet metropolitan software firms, Bangladesh

Objectives

The survey objective is the collection and publication of data necessary for the statistical analysis of the Software Development regarding general perspectives and software engineering. The information from the survey can be used by businesses and trade associations for market analysis and assessment of software industry performance, operating characteristics and trends by government to develop national and regional economic policies in software fields, by other users involved in research or policy making for maintaining important data input to the preparation of the launching new software industry or firm.

Confidentiality

The data reported on this questionnaire will be treated in strict confidence, used for statistical purposes, and published in aggregate form only.

Question

If you have any questions or require assistance in completing this questionnaire please email to

awal_sust**@yahoo.co.in** and a representative will gladly answer your queries.

Signature: …   **Reporting Date: ……**

Firm's name:

Address (number and street):

C/O:

Name of contact:

Designation:

City: **Survey Period: August and September, 2013**

Country: Bangladesh

Table3 Data Summary3 – in order of satisfactions regarding local client's ICT literacy and Government initiation

Size	Kind	Client's ICT literacy	Government initiation
S	CS, Bo	*	*
S	CS, Bo, S	Yes	No
S	CS, Lo, S	Yes	No
L	CS, Lo, S	Yes	Yes
L	AS, Lo, S	Yes	Yes
M	CS, Lo	Yes	Yes
L	AS, CS, S, Bo	Yes	*
L	SS, S, Bo	*	*
L	AS,S, Bo	*	*
M	AS, S, Bo	Yes	No
S	AS,OS	Yes	Yes
S	CS, Bo	Yes	Yes
S	CS, S, Bo	No	Yes
S	SS, OS	No	No
L	CS, Bo	Yes	*
L	OS	No	No
L	CS	Yes	Yes

A * represents no comments from the respective firm

Table 4. Data Summary4 – in order of software team size

Size	Kind of development	Specifications of requirements	Requirement specification method	Testing	Rate of testing
S M L	O M C S Lo OS Bo SS AS CS ES	20%◄──►80%	1 2 3 4 5	1 2	1 2 3 4 5 6 7 8 9 10
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*	* * *	*	*	*	*
*	* * *	*	*	*	*
*	* *	*	*	*	*
*	* *	*	*	*	*
*	* * *	*	*	*	*
*	* *	*	*	*	*

A ---------------------- means not mention the rate of testing

Table5. Data Summary5 – in order of average time spent on analysis/specification

Size	Kind of development	Spent Time Specifications of requirements	Requirement specification method	Testing	Rate of testing
S M L	O M C S Lo OS Bo SS AS CS ES	20% ◄──►80%	1 2 3 4 5	1 2	1 2 3 4 5 6 7 8 9 10
*	* * *	*	*	*	-----------------------
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Table 6.Data Summary6 – in order of testing procedures

Size	Kind of development	Spent Time Specifications of requirements	Requirement specification method	Testing	Rate of testing
S M L	O M C S Lo OS Bo SS AS CS ES	20% ◄──►80%	1 2 3 4 5	1 2	1 2 3 4 5 6 7 8 9 10
*	* * *	*	*	*	-----------------------
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