A-1: MAINTENANCE SURVEY

We are working to improve the software maintenance process for development industry. Please give us your valuable suggestions that you realize for enhancements in maintenance process based on your experiences towards software development. Tick mark in the choices or fill values in specified range, as the case may be.

Project Category that you have worked on:
- □ Simple
- □ Average
- □ Complex

Project Nature:
- □ Web
- □ Window
- □ Any other (please specify) ……

What type of maintenance was required in your project?
- □ Corrective
- □ Adaptive
- □ Perfective
- □ Preventive
- □ Purely reengineering project
- □ Any other (please specify) ……

Which maintenance model/ approach was adopted for maintenance project?
- □ Ad-hoc technique
- □ Spiral
□ Any other please specify ........

What were maintenance phases/activities that were followed for the maintenance project?
1) 
2) 
3) 
4) 
5) 

What was the duration of the maintenance project?
……………………………… ………………… (Years, months, weeks)

Time spent in each phase to be filled below:

<table>
<thead>
<tr>
<th>Phase name</th>
<th>Estimated Time duration</th>
<th>Actual Time duration</th>
<th>Estimated Effort in % (total=100)</th>
<th>Actual Effort in % (total=100)</th>
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</table>

What was the status of project completion under maintenance?
□ Fail
□ Successfully installed
- Partial implemented
- Abandoned

**What was the application experience of programmers on maintenance project?**
- Fresher
- 2-3 year experience
- Highly experienced

**What technology/ tools were used in your maintenance project?**
- Structured
- Object oriented
- Component
- Any other (please specify) ...

**Which extreme programming practice was adopted for maintenance project?**
- The planning game
- Small releases
- Metaphor
- Simple design
- Refactoring
- Pair programming
- Collective ownership
- 40-hour week
- On-site customers
- Coding standards
- Test driven development
- Continuous integration

**Which extreme programming practice you would refer/ suggest for future maintenance project?**
- The planning game
- Small releases
Which are the most effort affecting factors in the maintenance projects? (Please fill 1 to 10 accordingly)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Affecting Factors</th>
<th>Points (1-10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Application type</td>
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<td>2.</td>
<td>System novelty</td>
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<tr>
<td>3.</td>
<td>Design quality</td>
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<td>4.</td>
<td>Documentation quality</td>
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<td>5.</td>
<td>Testing quality</td>
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<td>6.</td>
<td>Code quality</td>
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<td>7.</td>
<td>Depending on changing environment</td>
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<td>8.</td>
<td>Hardware characteristics</td>
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<td>9.</td>
<td>Turnover and maintenance staff</td>
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<tr>
<td>10.</td>
<td>System life span</td>
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</tbody>
</table>

Any suggestion/ question/ information regarding software maintenance (if any)

Comment (if any)

Thanks
B-1: CODE QUALITY EVALUATION SHEET

Software maintenance needs have been increasing day-by-day. The quality of source codes in such projects is an important challenge for practitioners. Therefore, this sheet is prepared to evaluate the code quality of a maintenance project. Please complete the evaluation by putting tick mark or the case may be. Your inputs are valuable for us.

Title of the valuing project: __________________________

Maintainability of code
□ 1 - Very hard
□ 2 - Hard
□ 3 - Average
□ 4 - Easy
□ 5 - Very easy

Extensibility of code
□ 1 - Very hard
□ 2 - Hard
□ 3 - Average
□ 4 - Easy
□ 5 - Very easy

Reusability of code
□ 1 - Very hard
□ 2 - Hard
□ 3 - Average
□ 4 - Easy
□ 5 - Very easy
Understandability/ Comprehensibility of code
- 1 - Very hard
- 2 - Hard
- 3 - Average
- 4 - Easy
- 5 - Very easy

Integration of code
- 1 - Very hard
- 2 - Hard
- 3 - Average
- 4 - Easy
- 5 - Very easy

Testability of code
- 1 - Very hard
- 2 - Hard
- 3 - Average
- 4 - Easy
- 5 - Very easy

Robustness of code
- 1 - Very hard
- 2 - Hard
- 3 - Average
- 4 - Easy
- 5 - Very easy

Overall design quality of code
- 1 - Very hard
- 2 - Hard
- 3 - Average
- 4 - Easy
- 5 - Very easy
Teaching Experience (in years)

☐ 3 to 5
☐ 6 to 10
☐ 11 to 20

Industry Experience (in years)

☐ 3 to 5
☐ 6 to 10
☐ 11 to 20

Qualifications:

Any other suggestions/ comments:

Thank you for your valuable insight.
APPENDIX-C

C-1: INITIAL SURVEY

In the controlled experiment, maintenance teams are formed for both XP based and traditional maintenance approach on the basis of this initial survey that ensures the teams were reasonably balanced. Tick mark in the choices or fill values in specified range, as the case may be.

What is your enrollment number in the university?

______________

Specify your gender?

□ Male
□ Female

How old are you as on date?

□ 18 to 22 years
□ 23 to 26 years
□ 27 to 35 years
□ over 35 years

Name of the degree completed at graduation level?

□ BCA
□ B.Sc.(CS/IT)
□ BE (CS/IT)
□ Other, please specify _____

What is your marks in % at graduation level?

______________%
What is your Cumulative Grade Pointer Average (CGPA) in current course?
- □ 9.0 – 10.0
- □ 8.0 – 9.0
- □ 7.0 – 8.0
- □ 6.0 – 7.0
- □ 5.0 – 6.0
- □ 4.0 – 5.0

How many programming languages have you read at graduation level?
- □ 0
- □ 1
- □ 2
- □ 3
- □ 4 or more

How many programming languages have you read at school level?
- □ 0
- □ 1
- □ 2
- □ 3
- □ 4 or more

Specify your own level of proficiency with the following programming languages?
<table>
<thead>
<tr>
<th>Programming Language</th>
<th>Tools Used</th>
<th>No. of Programs Write</th>
<th>No. of Projects Developed</th>
<th>Last Program Written Before</th>
<th>Overall Rating (1-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
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<tr>
<td>C++</td>
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<td>Java</td>
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<td>J2EE</td>
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<td>PHP</td>
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<tr>
<td>JavaScript</td>
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<td>Any other (please specify below)</td>
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</table>

Specify your own level of proficiency with the following XP practices?

<table>
<thead>
<tr>
<th>XP Practice</th>
<th>Tools Used</th>
<th>Last Use Before</th>
<th>Overall Rating (1-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning game</td>
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<td>Small releases</td>
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<tr>
<td>Metaphor</td>
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<tr>
<td>Simple design</td>
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<tr>
<td>Refactoring</td>
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<tr>
<td>Pair programming</td>
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<tr>
<td>Collective ownership</td>
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<tr>
<td>40-hour week</td>
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<tr>
<td>On-site customers</td>
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</tbody>
</table>
If you had a choice of writing/ modifying code with traditional or XP practices based approach, which would you choose?

□ Traditional
□ XP practices based approach

Why above approach is selected?

Additional Comments:

Thanks for providing valuable information.
C-2: FINAL SURVEY

This final survey is conducted after completion of experiment that reveals confidence in the code developed by teams and their experience. Tick mark in the choices or fill values in specified range, as the case may be.

What is your enrollment number in the university?

Title of the maintenance project:

Number of members in your project team:

Which maintenance approach is used?
   □ Traditional maintenance
   □ XP practices based maintenance

How many hours your team has spent in writing/ modifying the code?

__________________(in hours)

Specify your role in maintenance project?

Problems faced during maintenance of a system, which is developed by others?
Rate your confidence that the code you wrote/modified for maintenance project is correct.

☐ 1 - Very low
☐ 2 - Low
☐ 3 - Average
☐ 4 - High
☐ 5 - Very high

Rate your confidence that the code you wrote/modified for maintenance project is easily comprehensible.

☐ 1 - Very low
☐ 2 - Low
☐ 3 - Average
☐ 4 - High
☐ 5 - Very high

Rate your confidence that anybody can make changes to the code without breaking it.

☐ 1 - Very low
☐ 2 - Low
☐ 3 - Average
☐ 4 - High
☐ 5 - Very high

Rate your confidence that anybody can easily reuse the code in another project.

☐ 1 - Very low
☐ 2 - Low
☐ 3 - Average
☐ 4 - High
☐ 5 - Very high
If you were given a choice of writing/ modifying code with
traditional or XP practices based approach, which would you
choose?

☐ Traditional
☐ XP practices based approach

Why above approach is selected?

Additional comments:

Thanks for sparing crucial time to fill the questionnaire.
C-2.1: QUESTIONNAIRE FOR XPM TEAM MEMBERS

This part of final survey is conducted after completion of experiment that reveals experience of XP practices in maintenance. Tick mark in the choices or fill values in specified range, as the case may be.

What advantages and disadvantages you found after applying following XP practices during maintenance?

Pair programming

Advantage:

Disadvantage:

Refactoring

Advantage:

Disadvantage:
Test driven development

Advantage:

Disadvantage:

Continuous integration

Advantage:

Disadvantage:

On-site customers

Advantage:

Disadvantage:
Small releases

Advantage:

Disadvantage:

Planning game

Advantage:

Disadvantage:

Additional Comments:

Thank you for giving time to complete the questionnaire.