

## **CHAPTER 3**

### **RESEARCH APPROACH**

The starting point for the current research is to obtain a realistic picture of the agile methodologies as currently practiced by various practitioners in India including individual variations of established methods. The initial information was based on a survey through a questionnaire. It was followed up with observation of collective functioning of agile groups, direct face to face interviews with the survey participants, communication through mail, telephone and social networking sites. The survey participants are all employees belonging to software development organizations in India who are currently following agile approach of development or planning to transition from a conventional practice of software development.

#### **3.1 IDENTIFYING SURVEY PARTICIPANTS**

Finding the exact set of participants was difficult at best and extremely challenging many times during the late 2008 and early 2009, as there were no known or profound user groups for agile practitioners that time. Individual agile development companies and practitioners were contacted, with limited success. During the later half of the year 2009 only, certain agile groups got formed and the information sharing among agile practitioners improved gradually.

As a result, practitioners in different organizational roles such as agile coach, developer, tester, business analyst, customer representative and senior management personnel as well as a few traditional developers who were keen in transitioning to agile development were approached.

### **3.2 DATA COLLECTION**

Armed with the terminology and established traditions of agile developers as found in published literature, the practitioners of agile methods were approached for getting responses to questionnaire. The questionnaire aimed at making use of the experience of developers who were involved in the successful outcome of their projects. Totally 45 questions were asked. These questions were classified into eleven different categories with their percentage share of total questions given in brackets. They are, organization or management (13%), projects executed (18%), team constitution or team structure (20%), distributed agile development (4%), requirements management (7%), change management (7%), project planning or release planning (18%), build management(4%), testing(4%), tools used (4%) and agile practices(2%). 68 participants working in agile software projects and 44 participants working in traditional projects responded to the survey. Idea of including traditional software development practitioners in this survey was to identify the potential for successful transition in their projects by adopting an agile approach.

### **3.3 OBSERVATIONS DURING SURVEY**

It was found that most of the agile practitioners in India were practicing either Scrum or XP or a combination of the two. All these practitioners were adopting fundamental agile practices such as iterative and incremental development (with varying iteration lengths), estimation and planning of user stories and tasks, status report meetings (such as daily standup), frequent release of working software, and retrospective meetings to make a review of the earlier iterations. When a project is distributed globally, the team faced cultural differences, variation in communication slang, geographical distances and its associated time differences. Several of the practitioners collaborate regularly with their customers. A few practitioners felt the heat in not getting clarity in their requirements. This is due to lack of customer involvement as most of their customers were remotely located.

### 3.4 OUTCOMES

Survey was followed up by interviews, interaction through face to face discussions, communication through telephone and emails, use of social networking sites and attending seminars and brainstorming sessions conducted by groups such as Software Process Improvement Network (SPIN) Chennai, Indian Scrum Enthusiastic Community (ISEC), Agile Tour of Chennai (conducted in 2010 and in 2011 respectively), and Agile Tour of Bengaluru (conducted in 2011). Out of the 68 agile development participants surveyed 60(88%) participants were knowledgeable in using agile practices. 55(81%) participants, who were working with agile projects after transitioning from conventional development projects in different sectors, were able to work better and come out with new ideas than 13(19%) participants who recently transitioned from traditional development. 49(72%) Participants who transitioned from traditional approach were mainly using Microsoft excel and Microsoft project, whereas others were bold enough to work with other tools like JIRA, Greenhopper and Mingle. Agile practitioners felt that agile practices worked better with smaller team size of 5–9 members and projects with medium duration of 5 to 12 months. Application domains of participants included banking, insurance, telecom, retail sales, education and e-commerce. Based on the discussion with survey participants, it was found that successfully completed agile projects were small in number compared to traditional projects. 61(90%) of agile practitioners felt that speed of project completion was faster than using traditional practice. 37(54%) felt that lack of top management support as a barrier in working with agile projects. 31(46%) participants felt non-availability of an effective agile coach was major cause for project failure.

Interaction with experienced agile developers enabled consolidation of many new ideas relevant to successful agile development. It paved way to make personal observations in their organizations which helped in identifying

the challenges faced by agile coach, activities of team members, involvement of customer and the support rendered by top management. All these ideas were combined together and common conclusions arrived at were taken as our recommendations to practitioners keen in transitioning to agile development. Recommendations were mailed to 6 agile experts who work as agile coaches for review and feedback.

Refined recommendations were circulated to 44 participants currently involved in traditional development and who were keen in transitioning to agile development. Out of these 33(75%) of them responded. Positive comments and appreciation mails on the recommendation were received from these organizations. All 33 appreciated the recommendations such as daily stand up, successful agile coach, activities of tester and the common mistakes made in the retrospective meeting. 16(48%) agreed to use the suggested rotation roles. 12(36%) claimed that they were able to perform well when adopting the retrospective recommendation which made them have an insight in sharing their experiences. 15(45%) welcomed the co-located scrum team recommendations. 2(6%) respondents who had their offices abroad welcomed the distributed scrum team recommendations.

A personal involvement with an image storage optimization project using the above recommendations provided added confidence. A project that lingered for more than a year and a half got successfully completed in six months after transitioning to the agile approach.

### **3.5 INFORMATION CONSOLIDATION**

Critical scrutiny of responses to questionnaire was carried out using structured information enabling reasonable generalization. Opinions, personal experience narrations gathered during interactions were made use of to derive significant conclusions.

**Table 3.1 Practitioners and their roles**

| Serial Number of Team | Practitioners Involved | Practitioner's Designation                      | Method used    | Type of project distribution | Domain             | Project months | Average Duration of each iteration (in weeks) |
|-----------------------|------------------------|---|----------------|------------------------------|--------------------|----------------|---|
| 1                     | Prac 1 – Prac 7        | 1 SM, 3 Dev,<br>1 Tester,<br>1 Cust Rep<br>1 BA | Scrum          | Distributed                  | Banking            | 7              | 2   |
| 2                     | Prac 8 – Prac 13       | 4 Dev, 1 SM,<br>1 Tester                        | Scrum          | Co-located                   | Insurance          | 9              | 2   |
| 3                     | Prac 14 – Prac 19      | 4 Dev, 1 AC,<br>1 SM                            | Scrum and XP   | Co-located                   | Health care        | 12             | 4   |
| 4                     | Prac 20 – Prac 25      | 3 Dev, 1 SM,<br>1 BA, 1 Tester                  | Scrum and XP   | Distributed                  | Telecom            | 9              | 4   |
| 5                     | Prac 26 – Prac 29      | 3 Dev, 1 SM                                     | DSDM and Scrum | Co-located                   | Finance            | 7              | 2   |
| 6                     | Prac 30 – Prac 33      | 3 Dev, 1 SM                                     | Scrum          | Co-located                   | Banking            | 8              | 2   |
| 7                     | Prac 34 – Prac 41      | 4 Dev, 1 SM,<br>1 BA, 1 Tester,<br>1 Cust. Rep. | Scrum and XP   | Distributed                  | Retail Sales       | 12             | 2   |
| 8                     | Prac 42 – Prac 44      | 3 AC  | Scrum and XP   | Co-located                   | Training           | 5              | 4   |
| 9                     | Prac 45 – Prac 48      | 2 Dev, 1 VP,<br>1 AC                            | XP             | Co-located                   | Health care        | 7              | 4   |
| 10                    | Prac 49 – Prac 52      | 2 Dev, 1 SM,<br>1 Tester                        | Scrum and XP   | Co-located                   | E-Commerce         | 6              | 2   |
| 11                    | Prac 53 – Prac 56      | 3 Dev, 1 SM                                     | Scrum          | Co-located                   | Media              | 6              | 2   |
| 12                    | Prac 57 – Prac 60      | 2 Dev, 1 SM,<br>1 Tester                        | Scrum and XP   | Co-located                   | Education          | 8              | 2   |
| 13                    | Prac 61 – Prac 65      | 3 Dev, 1 SM,<br>1 Tester                        | Scrum and XP   | Co-located                   | Insurance          | 9              | 2   |
| 14                    | Prac 66 – Prac 68      | 3 Web Designer                                  | Scrum          | Co-located                   | Web based services | 6              | 2   |

Prac – Practitioner, SM – Scrum Master, Dev – Developer, AC – Agile coach, Tester - Tester,  
Cust. Rep – Customer Representative, BA – Business Analyst, VP– Vice President

Most of the agile practitioners in India were practicing either scrum or extreme programming or a combination of Scrum and XP. All practitioners were practicing fundamental agile practices such as iterative and incremental development (with varying iteration lengths), iteration planning, estimation and planning with user stories and tasks identified. Status report meetings (such as daily standup), testing and frequent release of working software, as well as retrospective meetings to make a review of the earlier iterations were quite common. A majority of the participants are also engaged in pair programming and test driven development. Some participants were certified Scrum Masters. Several practitioners were active participants in agile groups and communities contributing significantly in the conferences and webinars relating to agile development.

The practitioners had varied levels of expertise and exposure in working on agile projects. While some were newcomers to agile development projects, some others had experience working on a number of agile projects. Several of the practitioners collaborate directly and regularly with their customers. A few practitioners feel the heat of not getting clarity in their requirements. This is caused due to lack of customer involvement. In a few cases, the customers provided representatives who were not able to clarify the queries raised by the members of the agile development team.

This chapter discusses the answers obtained from the questionnaire that was circulated to many practitioners with various designations and were involved in software development projects with traditional and / or agile software development approaches. Out of the 140 questionnaires circulated, one hundred and twelve filled in the answers. The questions in the questionnaire were classified in to eleven different categories, namely, Organization or Management, nature of the project, team or team structure, special issues in distributed agile development, requirements management,

change management, project release planning, build management, test automation and use of tools in software development.

### 3.6 FINDINGS FROM THE SURVEY

The survey results obtained from questionnaire, face to face discussion, interviews and through social networking sites are given. Graphical representations of the tabular columns are listed in the Appendix 10 of this thesis.

#### 3.6.1 Questions Categorized In the Questionnaire

Totally there were forty five questions. All these questions were placed under any of the eleven different categories. Table 3.2 shows the percentage of questions that is been classified under each category of the questionnaire.

**Table 3.2 Percentage of questions classified under each category of the questionnaire**

| Category                             | No. of Questions | Percentage (%) |
|--------------------------------------|------------------|----------------|
| Organization and Management          | 6                | 13             |
| Projects Executed                    | 8                | 18             |
| Team or Team Structure               | 9                | 20             |
| Distributed agile Development        | 2                | 4              |
| Requirements Management              | 3                | 7              |
| Change Management                    | 3                | 7              |
| Project planning or Release Planning | 8                | 18             |
| Build management                     | 2                | 4              |
| Testing                              | 2                | 4              |
| Tools Used                           | 2                | 4              |
| Agile Practices                      | 1                | 2              |

### 3.6.2 Practitioners Working for Agile Software Projects versus Traditional Software Projects

Survey results were obtained from 112 participants. Out of which 68 participants were working with agile software development and 44 participants were working with traditional software development. Table 3.3 shows the percentage of survey participants who were working in software projects pertaining to traditional and agile software development.

**Table 3.3 Practitioners working under agile software projects versus traditional software projects**

| <b>Practitioner's details</b>                                | <b>Head count</b> | <b>% of overall turnover of the Head count</b> |
|--|-------------------|--|
| Practitioners working under agile software development       | 68                | 61%  |
| Practitioners working under traditional software development | 44                | 39%  |
| Total  | 112               | 100%   |

### 3.6.3 Transitioning Towards Agile Development

Participants who were working in different domains other than the software field before transitioning to agile software development were able to come out with new ideas and take bold decisions when compared to the participants who transition themselves from traditional software development. Table 3.4 shows the style of working when the practitioners transition themselves from different domain area of expertise.

**Table 3.4 Style of working in agile development**

| <b>Domain Expertise</b>                            | <b>Head Count</b> | <b>Percentage</b> |
|--|-------------------|-------------------|
| Transitioned from different domain                 | 55                | 81                |
| Transitioned from traditional software development | 13                | 19                |

### **3.6.4 Experience Level of Traditional Development Practitioners**

Table 3.5 shows the experience level of traditional development practitioners. From the survey made, it was found that most of the survey participants have an experience ranging from fresher to ten years.

**Table 3.5 Experience with traditional development practices**

| <b>Experience levels</b> | <b>Head count</b> | <b>% of overall turnover of the Head count</b> |
|--------------------------|-------------------|--|
| 0-5 Years                | 16                | 36%  |
| 5-10 Years               | 15                | 34%  |
| 10-15 Years              | 11                | 25%  |
| > 15 years               | 2                 | 5%   |
| Total                    | 44                | 100%   |

### **3.6.5 List of Frequently used Traditional Methods by Survey Participants**

It was found from the survey that most of the traditional survey participants were using Waterfall approach as a traditional model. Table 3.6 shows the various models used by the traditional developers.

**Table 3.6 List of traditional methods used by survey participants**

| Method    | Head Count |
|-----------|------------|
| Waterfall | 31         |
| Prototype | 2          |
| Unified   | 5          |
| Spiral    | 4          |
| Others    | 2          |
| Total     | 44         |

### 3.6.6 Number of Successful Traditional Projects Completed

Table 3.7 shows the completion status of projects by the traditional developers.

**Table 3.7 Number of successful traditional projects completed**

| Criteria       | Head Count |
|----------------|------------|
| 1-5 projects   | 17         |
| 6-10 projects  | 13         |
| 11-50 projects | 10         |
| >50 projects   | 4          |
| Total          | 44         |

### 3.6.7 Experience of Agile Development Practitioners

From the survey it was found that 59 out of 68 agile participants had experience ranging from one to five years in agile software development. Table 3.8 shows this.

**Table 3.8 Experience with agile development practices**

| <b>Experience in years</b> | <b>Head count</b> | <b>% of overall turnover of the Head count</b> |
|----------------------------|-------------------|--|
| 0-1 year                   | 23                | 34%  |
| 1-5 years                  | 36                | 53%  |
| 5-10 years                 | 6                 | 9%   |
| > 10 years                 | 3                 | 4%   |
| Total                      | 68                | 100%   |

### **3.6.8 Claim of Knowledge**

Out of the 68 employees answered in the agile methods section, all the team members claim to have knowledge in terms of working with agile software development. Table 3.9 shows the knowledge level in agile software development.

**Table 3.9 Knowledge level in agile development**

| <b>Knowledge Level</b>     | <b>Head count</b> |
|----------------------------|-------------------|
| Highly knowledgeable       | 3                 |
| Moderately knowledgeable   | 60                |
| knowledgeable to an extent | 5                 |
| Total                      | 68                |

### **3.6.9 List of Agile Methods used by Survey Participants**

It was found from the survey conducted from the Indian participants that they were working with scrum framework and XP methodology. Table 3.10 shows the agile method used by the survey participants.

**Table 3.10 List of agile methods used by survey participants**

| <b>Method</b> | <b>Head Count</b> |
|---------------|-------------------|
| XP            | 24                |
| Scrum         | 29                |
| XP + Scrum    | 14                |
| Others        | 1                 |
| Total         | 68                |

### **3.6.10 List of Most Frequently Used Agile Tools by Survey Participants**

It was found from the survey that 37 out of 68 practitioners were using Microsoft Excel as their most frequently used agile tool. Table 3.11 describes this.

**Table 3.11 List of agile tools used by survey participants**

| <b>Most frequently used Tools</b> | <b>Head Count</b> |
|-----------------------------------|-------------------|
| Microsoft Excel                   | 37                |
| Microsoft project                 | 12                |
| JIRA + Greenhopper                | 10                |
| Mingle                            | 2                 |
| XPlanner                          | 2                 |
| Bugzilla                          | 1                 |
| VersionOne                        | 2                 |
| Others                            | 2                 |
| Total                             | 68                |

### 3.6.11 Organization Size that Implements Agile Projects

It was found from the survey that agile software development was carried out in organizations where the organization size ranges from one five hundred employees. Table 3.12 illustrates this scenario.

**Table 3.12 Organization size that implements agile projects**

| Organization size | Head count |
|-------------------|------------|
| 1-50              | 15         |
| 51-100            | 32         |
| 101-500           | 19         |
| >500              | 2          |
| Total             | 68         |

### 3.6.12 Number of Successful Agile Projects Completed

From the survey conducted, it was found that 28 out of 68 participants were working for their first project and 34 out of 68 have completed one to five agile projects. This paved way to suggest the research recommendations to the participants. Table 3.13 lists the same.

**Table 3.13 Number of successful agile projects completed**

| Criteria                             | Head Count |
|--------------------------------------|------------|
| Working with the first agile project | 28         |
| 1-5 agile projects                   | 34         |
| 6-10 agile projects                  | 4          |
| >10 agile projects                   | 2          |
| Total                                | 68         |

### 3.6.13 Speed of Execution of Agile Projects

From the survey it was found that 61 out of 68 participants claimed the speed of execution in working with agile methods is proved to be faster and the other five survey participants have not given their decision as it was their first agile project development. Table 3.14 illustrates this scenario.

**Table 3.14 Speed of execution**

| Speed of execution                 | Number of survey participants |
|------------------------------------|-------------------------------|
| Faster                             | 61                            |
| Same as traditional method         | 2                             |
| Not completed an agile project yet | 5                             |

### 3.6.14 Barriers in Transitioning Towards Agile Software Development

From the answers obtained from the experienced agile developers, it was found that the major barrier in transitioning towards agile development is either due to lack of top management support or due to lack of proper training.

**Table 3.15 Barriers in transitioning towards agile software development**

| Causes   | Number of consent from the participants | Percentage |
|--|---|------------|
| Unwillingness in changing the organizational culture / No proper funding by top management | 37                                      | 54%        |
| No proper trainers/coaches   | 31                                      | 46%        |

### 3.6.15 Appreciation Received

Refined recommendations were sent to forty four survey participants. Table 3.16 shows the appreciation mails and positive comments received from the traditional developers.

**Table 3.16 Appreciation received**

| <b>No. of Responses</b>                           | <b>Head Count</b> | <b>Percentage</b> |
|---|-------------------|-------------------|
| Number of traditional developers responded        | 33                | 75                |
| No. of traditional developers who did not respond | 11                | 25                |

### 3.6.16 Response from Potential Beneficiaries

Table 3.17 shows the various responses received from the potential beneficiaries. It was found that 16 out of 44 participants liked and used the rotation of roles.

**Table 3.17 Responses obtained from potential beneficiaries**

| <b>Most appreciated Responses</b> | <b>Head Count</b> | <b>Percentage</b> |
|-----------------------------------|-------------------|-------------------|
| Rotation of roles                 | 16                | 48                |
| Retrospective meetings            | 12                | 36                |
| Working in co-located team        | 14                | 42                |
| Working in distributed team       | 02                | 6                 |