

## Research on Agile Project Management with Scrum method

HU Zhi-gen<sup>1</sup>, YUAN Quan<sup>2</sup>, ZHANG Xi<sup>3</sup>

(1. School of Water Resource and Hydropower, Wuhan University, Wuhan 430072, China; 2. Department of Management Science and Engineering, School of Economics and Management, Wuhan University, Wuhan 430072, China; 3. Hubei University of Technology, Wuhan 430072, China;  
Email: eminy\_yq@hotmail.com)

### Abstract

*Agile software developments are hotspots of software development field in foreign countries. Especially, Scrum will help us to manage the project more efficiently because it is an adaptive process. Scrum method is an iterative incremental process of Software development commonly used with Agile Software Development. According to the characteristics of agile environment and Scrum, an example is given to elaborate how to manage the project with Scrum agile management in this article.*

*Key words: agile management; Scrum; iterative process*

### 1. Introduction

In the manufacturing industry, agile manufacturing integrates together those parts which are flexible advanced manufacturing technology, workforce mastering the production skill and knowledge, and flexible management of enterprise internal and between enterprises. With the ever-changing market opportunities, agile manufacturing using information technology responds quickly in maximum to meet the needs of customers. These management ideas and methods greatly improve the efficiency of the manufacturing industry and the ability of functional agility. In recent years, the management thought was applied well in the IT industry, particularly software development industry, and through a lot of research and practice by academics and the industry, a series of values, principles and methods of software development agile management were established gradually, which is great impetus to the rapid development of the industry. In the current environment, with the rapid development of technology, the demand for the complexity and

uncertainty of the continuous increasing, there are more and more concerns and applications paid to agile management in a wide range.

### 2. The theory of agile management

#### 2.1. The definition of agile management

Agility that is flexibility, it is a state of dynamic, adapted to the specific circumstances, catering to the change and self-improvement. Agile project management is a software project management coping with constant change and uncertainty of the project. *Agile is an attitude rather than a process, is also an atmosphere rather than a way, of which a most important term is innovation.*

In the implementation of agile project management, project managers should pay attention: Adjusting its own team to adapt to change, being dedicated to the products, coordinating with customers and being focus on communication.

Agile project management integrating the values, guiding principles and practical practice, forms a collaborative development team. With the combination of 'systemic thought' and 'theory of constraints' and 'lean production', core principles of agile software methods are demonstrated, that is, incentive and full decentralization of staff management, quality first, small management size and short production cycle, mandatory release date, And using of best practices to reduce variables and uncertainties.

#### 2.2. The development methods of agile management

The common agile software methods include Crystal, ASD (Adaptive Software Development), FDD (Feature Driven Development), XP (Extreme Programming) and RUP (Rational Unified Process)

and Scrum, all of which have characteristics of flexibility, iterative stage, feedback and gradually approaching the target, as shown in Figure 1. In this paper, Scrum method will be emphatically introduced.

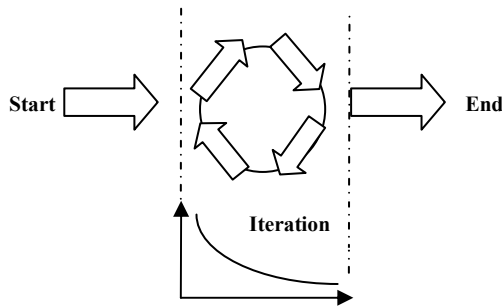


Figure1. Agile management thoughts

### 3. Scrum method

#### 3.1. The definition of Scrum

Scrum (an English-style football team), of which software development model is an agile development, gradually popular in the recent two years. According to Schwaber, Scrum is an agile, lightweight process that can be used to manage and control software and product development using iterative, incremental practices.

Scrum as agile methods in the important practice on software development, with characteristics of relatively flexible organization system, timely and interactive feedback, objective-oriented flat management and effective participation of members, can solve the difficulties faced by traditional open methods some to a large extent. Wrapping existing engineering practices including Extreme Programming and RUP, Scrum generates the benefits of agile development with the advantages of a simple implementation.

#### 3.2. Principles of Scrum method

1. Scrum team. It refers to the entire project team, including the full-time developing staff, and also external personnel affected by the software issue, such as marketing personnel and customers.

2. Backlog. Backlog is a task list, including Product Backlog and Sprint Backlog, to guide the direction of Scrum development. Sprint Backlog is a list with all features completed by Scrum team in the current Sprint. Sprint Backlog is actually a subset of Product Backlog, and continues to develop and enrich the Product Backlogs of whole project to perfection.

3. Sprint. Scrum development process comprises a series of iterative Sprint process, a number of sprint process carry on orderly until the risk assessment of products that can be delivered. Sprint is a series of development activities in limited time, including analysis, design, coding, testing etc. Usual it is 30-day iteration, each item of Backlog will be arranged in the Sprint, then the time required (hourly basis) will be estimated by team. After a Sprint, there must be the functions to deliver, and the completed contents must be demonstrated according to the established goals of Sprint Backlog in the team.

4. Scrum meeting. Scrum meeting is an effective means of Scrum project management, divided into two types: Sprint meeting and Daily meeting. Sprint meeting take place in the end of the current sprint to discuss and decide sprint Backlog of the next sprint, whose time cycle follows Sprint.

Daily meeting, also called as Daily Scrum, is a day during the regular meeting every day during Scrum, which is the greatest difference between the traditional ways. All members attend Scrum meeting of 15-20 minutes every day at the same time and the same room. In this 15-minute meeting, Scrum Master will ask three questions to each member:

- 1) What you have done in the day since the last meeting, and what is the completion percentage of your current mandate?
- 2) Which difficulties were encountered in your work, and what kind of help is needed to provide from other members?
- 3) What will you do in the day from now on to the next meeting?

The time each member had taken on Backlog items will be recorded in the Sprint backlog, Scrum Master propose immediate solutions or guidance to the issues at the meeting, promoting the team toward goal continuously. Different from traditional software development methods that rely on the regular meeting of a few hours one week to monitor the project progress, it is simpler and more humanized and easy to detect and correct problems through Scrum Meeting to manage the project.

Generally speaking, Scrum is a fast, lightweight practice with the iterative increase model, combining the advantages of XP and RUP, which is a great help to improve the software efficiency. The development flow of Scrum is shown as Figure 2.

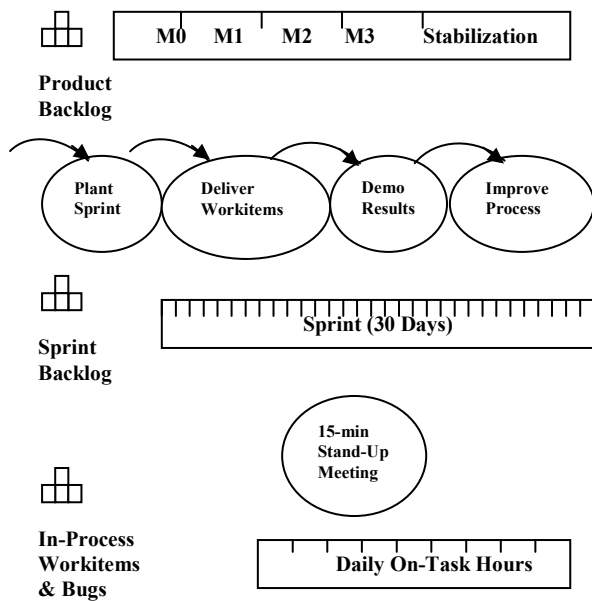


Figure 2 Development flow of Scrum

## 4. Case study

Now let us analyze Scrum method in an example of developing internally a software project of land-use system. The system based on land-use survey, can be information management integrating approval of remote land-use and exploitation and reclamation business, in order to achieve graphical management, properties management and mutual inquiry of graphics and text of land-use planning information. As the specialty of this project, for internal software, the demand for the product is identified, and the customers are internal sectors in the Lands Authority and the subordinate local Lands Authority. Therefore, the software product need to meet the requirement of available information, comprehensive data and accurate call at any time, following the principles of operability, Security, compatibility and graph-text integration.

### 4.1. Scrum organization structure stage

The above-mentioned process of Scrum method is actually a general division in theory. As Scrum method has inherent features of agility in all agile development methods, in the operation it can be carried out in accordance with different needs, of which the key is to maintain its essence: a relatively short Sprint period, daily Scrum meetings and timely review. In Figure 3, it is given the details of the development process of the land-use system.

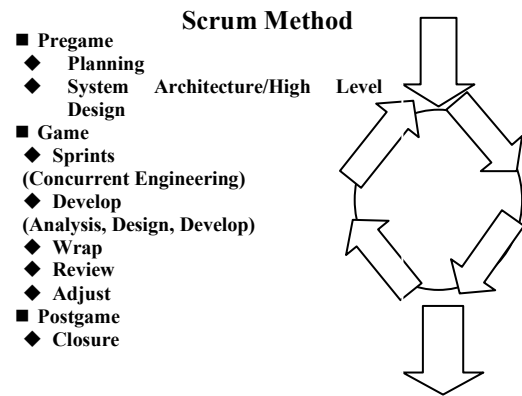


Figure 3 Development process

### 4.2. Sprint cycle management procedures

In a Sprint period, the members have their own independent process management and logs. This phase of the Sprint management process is as follows:

Scrum members: small-scale development team and a lead.

Stage goal: relatively clear to demonstrate in the end of stage.

Important dates: the dates of beginning, intermediate scrutiny and the end demo.

The task list: subdivide the stage goal into small independent task, and allocate to the team members, then according to completion of distribution, assign them to the "start" and "allocated" and "completed" in the category respectively.

### 4.3. Scrum application

1. Eight persons in the team, acted as Project Manager, Architect, Developer, Tester, as well as Release manager. The project background provided a good practice soil for Scrum;

2. Small version of iteration: started from the beginning of the project, using the stage plan up to three weeks, each stage released the version within the system;

3. In each stage planning: the functional requirements, bugs, defects, the improvements of users and technological upgrading etc., which were collected first from the members in summary to become the project tasks, then taking a half day as a unit, estimated workload; secondly, group discussions identified priority, then ranked workload and removed low-priority task was removed. In the period, through the method of Site Development, customers can see it as clear as possible every day and propose amendments.

4. In the end of each stage planning: when a Sprint stage finished, the project manager usually held a stage demonstration of all team members to display the results of this stage, let everyone know the successful conclusion of the stage. The task completion of individuals and whole team, also the self-assessment satisfaction of members in the last stage were recorded, and the statistical curves would be drawn in a longer period. The curves can be used as reference of project performance, also can clearly reflect various issues of project plan and progress control, from which, relatively short-term results can be seen, usually it will be greatly encouraged to the project team members.

5. A number of communication every week: every morning a 10-minute face-to-face Scrum regular meeting took place, so that members shared the progress each other, and updated the completed mandates to 'completed' list, from 'start' list chose a new mandate updating to 'allocated' list.

In a regular meeting every Friday, in addition to the communication of work, surveys on feeling index and pressure index, and the entertainment concerning over every member of the emotion and satisfaction would be on. At the same time technical exchanges for 30 minutes were added to the Friday meeting, there were some members spontaneously declare themselves experience this week in a brief, the information requested access to knowledge base after the meeting.

6. For the core tasks or critical paths of the project, more compact on daily progress were taken: instead of only carried on for the milestone tasks and new members. It is not 'stand-up meetings' in form, but a more random face-to-face chat or instant messaging, individual or team work log.

7. Personnel management as the core: that is role identification, personality assortment, technical capacity assortment, technology and capacity development goals of team members, and timely communication. For the project manager, goal determination must start from fillips, such as in aspect of roles, developing as technology management role, as integrator and quality assurance role, or as management role. Such real development goals, everyone can see their progress soon.

8. Continuous improvement: In general after 3-5 stages, the next item 'new process' would be coming, on this occasion, we collected all previous statistics on progress, member satisfaction, the tracking problems and technical issues, analyzed and concluded to determine the improvement measures and targets of the next stage.

There was a very important aspect in the summery, which is member management. In this longer stage, some has very fast progress, some has undertaken core tasks, some was always rush in progress, while some

delayed more, and so on. In view of these, formal or optional interviews and communication are inevitable. Does not solve the personnel problem, not the back there are many controllable risk. There would be lots of uncontrollable risk without well solution to the personnel problems.

## 5. Conclusions

Scrum is an excellent agile methodology to release the software product rapidly and correctly. It gives all team members the new management responsibilities. The process of the project management is visible and controllable. The Scrum Master and Product Owner don't need to write the redundant documents and draw up the unrealistic project plan. The team members become more active due to self-organizing and self-managing. It makes not only the smooth development of software, but also the entire development process easy and fun.

## 6. References

- [1] Jim Highsmith. Agile Project Management[M]. Qinghua Publishing House, 2005, 7.
- [2] SCRUM Home Page, 2005, <http://www.controlchaos.com>, accessed May 19th, 2005.
- [3] Y. Monden, Toyota Production System, 2nd Ed., Industrial Engineering and Management Press, Norcross, GA, 1993.
- [4] Hohmann, Luke, Beyond Software Architecture: Creating and Sustaining Winning Solutions[C]. Boston: Addison-Wesley, 2003.
- [5] Cockburn, Alistair. Writing Effective Use Cases[C]. Boston: Addison-Wesley, 2001.
- [6] Ambler, Scott. Agile Modeling: Effective Practices for Extreme Programming and the Unified Report 4[R], No.4(April 2001).
- [7] Rueping, Andreas. Agile Documentation: A Pattern Guide to Producing Lightweight Documents for Software Projects[C]. New York: John Wiley & Sons, 2003.
- [8] Schwaber, Ken, and Mike Beedle. Agile Software Development with Scrum[M]. Upper Saddle River, NJ: Prentice Hall, 2002.
- [9] Verzuh, Eric. The Fast Forward MBA in Project Management[C]. New York: John Wiley & Sons, 1999.
- [10] Project Management Institute. A Guide to the Project Management Body of Knowledge[R]. 2000 ed. New Square. PA: Project Management Institute, 2000.
- [11] Cockburn, Alistair. Surviving Object-Oriented Project[C]. Boston: Addison-Wesley, 1998.
- [12] Lencioni, Patrick. The Five Dysfunctions of a Team[C]. San Francisco: Jossey-Bass, 2002.
- [13] R.H. Hayes, S.C. Wheelwright, K.B. Clark, Dynamic Manufacturing: Creating the Learning Organization, Free Press, New York, 1988.