A NEW WAY OF MANAGEMENT: A SCRUM MANAGEMENT

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Abstract

A scrum is widely used since 1990s in software development industry which is a fast changing and demanding industry so companies need to hire qualified employees who can manage themselves in a team based organizational structure to meet and exceed customer expectations. A scrum management offers advantages to software development companies to have and sustain competitive advantages. Its adaptations into other industries may be worthwhile to be explored from a management perspective to make contributions to both software development industry and other industries. The purpose of this paper is to shed a light to a new way of management which is a scrum management to make contributions to both software development industry and other industries. The concept, roles, objects, ceremonies, process and challenges of a scrum will be explained respectively in this paper which provides a comprehensive understanding of a scrum management..

Keywords: Scrum, Agile, Team

Jel Classification: M10

1. Introduction

Nowadays, companies are trying to be more dynamic and agile to meet and exceed customer expectations. Thus, they are transforming their organizational structures to team oriented and lean organizational structures. Teams are autonomous, self-managed and self-controlled. Companies need to hire qualified employees to work in teams and manage themselves. They need to motivate their employees beyond traditional monetary and non-monetary rewards. A scrum management is a new way of management initiated in 1990s in the software development industry to meet dynamic customer expectations. Major industrial players have applied a scrum management successfully.

An agile and a scrum management is a new way of team based management in the management literature which has attracted the attention of management scholars. Its adaptations into other industries may be worthwhile to be explored from a management perspective to make contributions to both software development industry and other industries. The purpose of this paper is to shed a light to a new way of management which is a scrum management to make contributions to both software development industry and other industries. Firstly, the concepts of an agile and a scrum will be explained. Secondly, roles in a scrum team will be stated. Thirdly, objects, ceremonies, and process of a scrum will be explained respectively. Fourthly challenges of an agile and a scrum will be highlighted. Finally, the paper will end with the conclusion.

2. The Concept of An Agile

Agility is a popular concept for organizations which operate in fast changing environments. Companies should adapt to changes, improve themselves and be responsive to customer expectations. They can only achieve these objectives by being agile organizations. The concept of an agile was coined as an agile manufacturing in 1991. Its focus was creating an adaptive organization to changing market conditions. Agility was transferred into software development sector with an initiation of the agile manifesto in 2001 (Crişan et al, 2015, p. 62). Qumer and Henderson-Sellers (2006) believe that agile organizations are flexible to adapt to changes. They are lean, responsive and learning oriented. Also they have a velocity. Beck et al. (2001) acknowledge that the agile manifesto has combined principles

and values from agile approaches and methods, made the agile movement organized and stronger in the software development industry (Campanelli and Parreiras, 2015, p. 86).

The Agile Manifesto defines an agile software development as "an iterative and incremental (evolutionary) approach to software development which is performed in a highly collaborative manner by self-organizing teams within an effective governance framework with "just enough" ceremony that produces high quality solutions in a cost effective and timely manner which meets the changing needs of its stakeholders" (Moniruzzaman and Hossain, 2013) (Crişan et al, 2015, p. 63).

Dove (2005) believes that the core of agility is expected to be a rapid response. Jacobson (2007) highlighted the following characteristics of agility: (1) Agility which is a part of social science focuses on an effective teamwork. (2) Agility is lightweight process which focuses on more an implicit knowledge than an explicit knowledge. Since the agility is a "lightweight" process, agile methods focus on a team communication, a continuous delivery of products, an immediate feedback to users and embrace changes (Yang et al., 2010, p. 889).
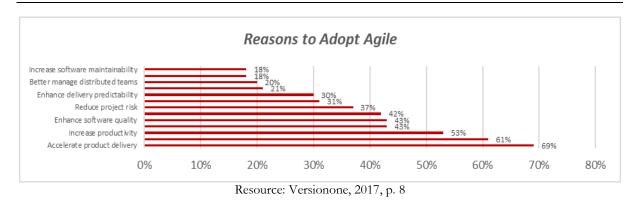
Beck et al. (2001) state that the agile values are as follows (Campanelli and Parreiras, 2015, p. 86):
- People and interactions
- Developing a working software
- Collaborating with a customer
- Responding to a change

Characteristics of agile methods are as follows: Handling changing requirements, delivering a high quality and an under budget working software in short time intervals (Jyothi and Rao, 2011). Agile methods are widely used in the software development industry (Qumer and Henderson-Sellers, 2006; Deemer et al., 2010; Nishijima and Dos Santos, 2013). They have advantages such as enhancing flexibility, increasing quality and productivity, accelerating time to market the software, and improving an information technology/business alignment compared to traditional software development methods (Qumer and Henderson-Sellers, 2006; Deemer et al., 2010; Jyothi and Rao, 2011; Nishijima and Dos Santos, 2013; VersionOne, 2013). Agile software development methods are viable and interesting options to align with a business strategy, control a project budget, improve the quality, and deliver the value continuously (Nerur et al., 2005; de Azevedo Santos et al., 2011; Glaiel et al., 2013) (Campanelli and Parreiras, 2015, pp. 85-86).

The characteristics of an agile software development methods are agility, collaboration, flexibility in a requirement definition, self-organizing teams, repetitive and an incremental development. Creators of these methods join the agile movement publishing the agile manifesto which explains principles and a philosophy of agile methods (http://en.wikipedia.org/wiki/Scrum_(software_development);http://www.scrumalliance.org/why-scrum/core-scrum-valuesroles) (Pozgaj et al., 2014, p. 893). Reasons to adopt an agile are presented in Diagram 1.

Diagram 1. Reasons to Adopt an Agile

Reasons to Adopt Agile

Increase software maintainability — 18%
Better manage distributed teams — 18%, 20%
Enhance delivery predictability — 21%, 30%
Reduce project risk — 31%, 37%
Enhance software quality — 42%, 43%
Increase productivity — 43%, 53%
Accelerate product delivery — 61%, 69%

Resource: Versionone, 2017, p. 8

As it is shown in Diagram 1, accelerating product delivery is the main reason to adopt an agile.

According to a survey, 98% of respondents acknowledged that their organizations achieved agile projects. Respondents highlighted the following benefits to adopt an agile: An accelerated product delivery, better project visibility, an improved team productivity, and the management of changing priorities (Versionone, 2017, p. 2).

3. The Concept Of A Scrum

A scrum is a team based organizational structure which is commonly used in software development industry. Like other organizations, software companies need to apply team based organizational structures to have competitive advantages, meet and exceed customer expectations and improve themselves. A scrum management offers software companies a new dynamic team based management to survive and succeed in a fast changing industry. It is a way of transformation for these companies and its adaptations into other industries could be explored.

Schwaber proposed the scrum development method in 1995. At that time, many professionals thought that the development of software could not be planned, estimated and completed by applying "heavy" methods (Vlaanderen et al., 2009, p. 2). Schwaber (1996) described a scrum as a process accepting that "the development process is unpredictable" and formalizing the "do what it takes" thinking style. The scrum has become successful with several software vendors (Liubchenko, 2016, p. 169). Schwaber and Sutherland believe that a scrum is a process framework which manages a complex product development and where several techniques and processes can be applied to develop products (Pozgaj et al., 2014, p. 894).

A scrum is based on the mentality that many software development processes cannot be predicted. Thus, it facilitates software development flexibly. Only the planning and the closure phases are defined in software development project. Sprints are series of flexible blurred stages where the software is developed by several teams. Customers can not require changes during sprints. This ensures the successful development of the software in a turbulent environment which has competitions and financial and time pressures (Vlaanderen et al., 2009, p. 2).

A scrum has been used in the World to (Schwaber and Sutherland, 2017, p. 4):
1. Research and identify viable technologies, markets, and product capabilities
2. Develop products and enhancements
3. Release products and enhancements frequently
4. Develop and sustain cloud and other operational environments
5. Sustain and renew products

A scrum's utility to deal with a complexity is proven everyday when environmental, technological and market complexities and their interactions have increased rapidly. A scrum is effective in an incremental and an iterative knowledge transfer. A scrum is used for services, products, managing headquarters and organizational operations, and developing software, embedded software, hardware, and interacting function networks. It is also used for autonomous vehicles, governments, marketing purposes, schools etc. (Schwaber and Sutherland, 2017, p. 4). The

concept of a scrum is based on a team work, an ongoing research, taking feedbacks, meeting customer demands continuously, create and improve an output. Thus, it seems it could be applied in some industries where there are changing environmental factors and customer demands, continuous product or service providing and improvement.

4. Roles In A Scrum Team

Scrum teams are designed to succeed. There are main roles in a scrum team to succeed such as a leader, a scrum master, a product owner and a team member.

Success factors of a scrum are as follows (Dikert et al., 2016, pp. 103-104):
- Leadership and management support
- Agile approach customization
- Piloting
- Coaching and training
- People engagement
- Transparency and communication
- Alignment and mindset
- Autonomy of teams
- Management of requirements

4.1.   The Leader

Capital Leadership responsibilities in a scrum are as follows (https://www.scribd.com/document/385806389/CSMjsv20, 27.8.2018, p. 68).
- Providing challenging team goals
- Creating a working business plan and organization
- Eliminating an organizational debt
- Providing required resources for teams
- Identifying and removing impediments for teams
- Knowing the team velocity
- Removing a waste and eliminating a technical debt
- Holding product owners accountable for a delivered value
- Holding scrum masters accountable for the team happiness and a process improvement.

4.2.   The Scrum Master

The scrum master is a servant-leader of the scrum team. The scrum master helps outsiders to distinguish helpful interactions with the scrum team (Schwaber and Sutherland, 2017, p. 7).

The scrum master responsibilities are as follows (https://www.scribd.com/document/385806389/CSMjsv20, 27.8.2018, p. 61).
- Being a facilitator
- Being knowledgeable about the scrum process
- Coaching the team and the product owner to enhance the team performance
- Removing impediments
- Protecing the team from interruptions
- Holding scrum practices and values
- Making the work visible

The scrum master works with the product owner to do the following (https://www.scribd.com/document/385806389/CSMjsv20, 27.8.2018, p. 65):

- Finding techniques for managing the product backlog effectively
- Communicating vision, goals, and product backlog items to the team
- Teaching the scrum team to create concise and clear product backlog items
- Understanding long-term planning for a product in a scrum environment
- Understanding and implementing the agile manifesto values
- Facilitating scrum ceremonies such as a release planning.

4.3 The Product Owner

Product owner should have the following characteristics ((https://www.scribd.com/document/385806389/CSMjsv20, 27.8.2018, p. 63):
- Having a compelling and an executable product vision which generates a high income and initiates passion in the team, the organization and customers
- Building a roadmap for executing the vision which people can see and sign up for
- Building an adequate and a timely product backlog
- Spend half of his/her time with marketing, sales and customers
- Spend other half of his/her time working with the team to clarify specifications

The Development Team

The development team has members who deliver a releasable increment of "done" product at the end of a sprint. A "done" increment is required at the sprint review and can only be created by the development team (Schwaber and Sutherland, 2017, p. 7).

The development team has the following characteristics (Schwaber and Sutherland, 2017, p. 7):
- It is self-organizing. No one can tell the development team how to turn the product backlog into increments of a releasable functionality
- It is cross-functional with skills to create a product increment
- A scrum does not recognize titles for team members whatever the work they perform
- A scrum does not form any sub-teams whatever the domain is addressed
- Members of the development team can have specialized skills and focus areas, but the development team is accountable
- Optimal development team size is large enough to complete the work within a sprint and small enough to remain nimble

As it is explained, the roles in a scrum can be applied to some industries because these roles are actually the roles in most of the teams. Thus, if there is a team project, team members can handle these roles to achieve objectives in various sectors.

5. Scrum Objects

A scrum has the following objects to operate successfully; a sprint, a product backlog, a sprint backlog, and a user story.

5.1. Sprint

A scrum's target is delivering high quality software products after a defined period series which are called sprints. The development cycle consists of demand, analysis, design, iteration and production stages. The demand, analysis and design stages need a sprint whereas an iteration and production stages need 3-5 sprints. Every sprint has a mission. Four elements of a scrum are a task library, a team, a sprint and a scrum meeting. The demand's priority is determined first and defined as work items for being enrolled in a task library. Work items are selected from a task library and assigned to members of the team through the scrum meeting at the initial stage of the sprint. Members of the team agree with task quality at the end of the sprint. They are aware of and update the schedule of the work through the scrum meeting every weekday. They will exhibit a progress of the work and collect new customer demands for an upcoming sprint at the end of the sprint (Yang et al., 2010, pp. 889-890).

A sprint has one calendar month duration. If a sprint's duration is long, the definition of the product may change, a risk may increase and a complexity may rise. A sprint lets predictability by ensuring a progress inspection and an adaptation toward its goal at least each calendar month. A sprint limits the risk to the cost of one month (Schwaber and Sutherland, 2017, p. 9).A planning starts whereas a review ends a sprint. A sprint planning is a time-boxed meeting up to 4 hours. It is conducted to develop comprehensive plans for the sprint. The project's stakeholders attend sprint review meetings which can continue 4 hours to review the business, the technology and the market. A retrospective meeting can be conducted for the teamwork's assessment in the completed sprints. A daily scrum meeting is 15-minute long and team members address three questions: What did I do yesterday? What will I do today and What impediments are in my way? (Hossain et al., 2009, pp. 175-176).

5.2.   *Product Backlog*

A scrum consists of an instrument called a product backlog which is a requirement set for a project provided by stakeholders. The team's goal is reinforced during a scrum meeting. The team moves on another sprint after the sprint finishes. A sprint is an iterative cycle where major functionality of the project is developed, new deficiencies and developments are defined, and the plan is modified (Crişan et al., 2015, p. 64). A product backlog can be used as a new requirement container to replace old requirements, repair bugs, and get rid of features. Elements which are at the top of the backlog are prioritized as refined items (Cohn, 2010). A planning is a continuous activity concurrent to development activities to "execute and deliver sprints" and "prepare product backlog" in a scrum. When the members of the team are progressive for executing and delivering sprints, they look for an increased speed of the "preparation of product backlog" process (Jakobsen and Sutherland, 2009) (Alsalemi and Yeoh, 2015, pp. 189-190).

The product backlog which is an ordered list of the change requirements in the product evolves when the product and its environment evolves. It is dynamic and changes for identifying the product needs which are competitive, useful, and appropriate. The product backlog lists functions, features, requirements, fixes and enhancements to change the product in further releases. Product backlog items have the attributes of an order, a description, a value and an estimate. They have test descriptions which prove their completeness when "done" (Schwaber and Sutherland, 2017, p. 15).

5.3   *Sprint Backlog*

The sprint backlog is a plan to deliver the product increment and realize the sprint goal and the set of product backlog items for the sprint. The sprint backlog highlights the work which the development team considers as necessary to meet the sprint goals. It has at least one high priority process improvement which was identified in the last retrospective meeting to make sure a continuous improvement (Schwaber and Sutherland, 2017, p. 16).

5.4   *User Story*

A user story is a story of the user for specifying how the system should work. It is written on a card and permits an estimation of the implementation duration. A user story reveals a comprehensive conversation to give the details of the demand. The cards are used as tokens in the planning stage after a business risk and a value assessments. The customer focuses on user stories and schedules them to implement (https://www.scribd.com/document/385806389/CSMjsv20, 27.8.2018, p. 114).

Objects of the scrum could be applied to some industries. A sprint can be replaced by a stage where a product or a service is prepared. Product and sprint backlogs can be replaced by stages where workloads are planned, organized and then allocated to team members to be achieved. A user story can be replaced by a stage where a customer briefs are taken, organized and scheduled. Thus, although a scrum objects have special names and comprehensive contents, they can be adapted to some industries where customer briefs are given, workload is planned, organized and allocated to team members, and a product or a service is continuously provided.

6. Scrum Ceremonies

Scrum ceremonies are a daily scrum, a sprint review, and a sprint retrospective. These ceremonies lead a scrum to succeed.

6.1 Daily Scrum

The daily scrum which is a 15-minute time-boxed event held by the development team in each sprint day to plan the next 24 hour work. It optimizes team performance and collaboration, inspects the work since the last daily scrum and forecasts a next sprint work. The daily scrum is held at the same place and time every day to minimize complexity. The development team practices the daily scrum for inspecting a progress toward the sprint goal to complete the work in the sprint backlog. The development team meets after the daily scrum for discussing, adapting or replanning the remaining part of the sprint's work. Daily scrums improve communication and knowledge, promote quick decision-making, prevent other meetings, and identify impediments to development to remove them (Schwaber and Sutherland, 2017, p. 12). Purposes of a daily scrum are building a team focus, collaborating intensely, forming a mental attitude and creating a team spirit (https://www.scribd.com/document/385806389/CSMjsv20, 27.8.2018, p. 200).

6.2 Sprint Review

A sprint review is applied at the end of the sprint for an increment inspection and a product backlog adaptation. The scrum team and stakeholders collaborate about the achievements in the sprint during the sprint review. Based on it and changes to the product backlog during the sprint, attendees collaborate on the following things for optimizing the value. It is an informal meeting. The increment's presentation highlights the feedback and encourages the collaboration. It could be up to a four-hour meeting for one-month sprint. The sprint review's result is a revised product backlog which defines the potential product backlog items for the next sprint (Schwaber and Sutherland, 2017, p. 13).

6.3 Sprint Retrospective

The sprint retrospective leads the scrum team for a self-inspection and a plan preparation to make improvements during the upcoming sprint. It is held after the sprint review and before the upcoming sprint planning. It may be up to a three-hour meeting for one month sprint. The scrum team plans for increasing a product quality to improve work processes or adapt the definition of "done" during each sprint retrospective. The scrum team should identify improvements which will be implemented in the upcoming sprint by the end of the sprint retrospective. Implementing improvements in the upcoming sprint is the adaptation for the inspection of the scrum team. Improvements can be implemented at any time but the sprint retrospective offers an opportunity for an inspection and an adaptation (Schwaber and Sutherland, 2017, p. 14).

A daily scrum, a sprint review and a sprint retrospective ceremonies can be adapted to some industries. A daily scrum can be considered as a daily meeting for organizing. A sprint review can be considered as a meeting after a product or a service providing period. A sprint retrospective can be considered as a meeting before a new product or a new service is provided. They can be held in most of the organizations since they are important meetings.
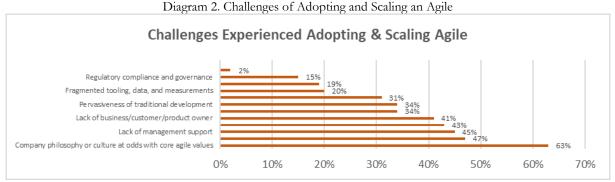
7. The Process Of A Scrum

The process of a scrum has project starting, project planning, project implementing, project monitoring and project ending stages. A sprint planning, an iterative planning, and an overall planning are made during a project planning stage. Design practice templates, an iterative process, and an incremental design are made during a project implementing stage. A day progress meeting, an iterative tracking, and an iterative evaluation are made during a project monitoring stage. A project evaluation is made during a project ending stage.

An iterative process has an iterative planning, an iterative evaluation, and iterative tracking stages. An iterative planning focuses on the value and responses to the business needs. Other iterative processes inspect and evaluate a function and a quality realization. Practice templates which point out testable design problem solving methods

involve relative independent methods about a design management such as trial and error with templates, a survey questionnaire template, user experience design templates, behavior image templates, a brainstorming template, a situation template, team templates, etc. Practice templates facilitate an adaptive mode of a method combination to design managers (Yang et al., 2010, p. 891).Process of a scrum reflects a project process which is held in many organizations. Thus, it can be adapted to organizations in some industries which require a project management and a team work.

8. Challenges Of An Agile And A Scrum

Although a scrum offers various advantages to companies, it has several drawbacks as well. Some of them may affect the implication of a scrum in different industries as well. Agile methods were designed to be used in small single-team projects (Boehm and Turner, 2005). On the other hand, their proved and potential benefits have made them attractive for large projects and companies. Although, agile methods satisfy both developers and customers, they may not be appropriate for large undertakings and it is more difficult to implement them in large projects (Dybå and Dingsøyr, 2009) which require an additional coordination. Handling an inter-team coordination is a problem to apply an agile for large projects. A large-scale agile arises concerns to interface with other departments, such as marketing and sales, human resources, and product management. A large scale agile causes users and other stakeholders to be distant from the development teams (Paasivaara et al., 2013, 2014; Dingsøyr and Moe, 2014; VersionOne, Inc, 2016). Each company may search for its own balance of an agile and plan driven methods (Boehm, 2002) (Dikert et al., 2016, pp. 87-88). Challenges of adopting and scaling an agile are presented in Diagram 2.

Diagram 2. Challenges of Adopting and Scaling an Agile

Resource: Versionone, 2017, p. 12

As it is shown in Diagram 2, company philosophy and culture at odds with core agile is the main challenge for adopting and scaling an agile.

Challenges of a scrum are as follows (Dikert et al., 2016, pp. 97-98):
- Resistance to change (management and team perspectives)
- Not making enough investment (lack of coaching and training, kept old commitments, high workloads)
- Implementation difficulties (concept misunderstanding)
- Coordination problems of several teams (challenges of a global distribution, achieving a technical consistency, organization size)
- Organizational limitations (bureaucracy)
- Challenges of an engineering (Estimations, elevated level requirements, gap between long term and short term planning)
- Assurance of a quality (lack of automated testing)
- Integrating non-development functions (product launch and incremental delivery challenges)

As it is explained, a scrum is more appropriate for small projects and teams for better coordination. A change resistance, organizational limitations, financial, quality and implementation problems are major problems which could be faced in most of the team projects. Thus, if scrum principles are applied in some industries, companies should be ready to overcome these challenges.

9. Conclusion

This paper tried to shed a light to a new way of management which is a scrum management to make contributions to both software development industry and other industries. It explained the concept, roles, objects, ceremonies, process and challenges of a scrum and gave insights whether it could be applied into other industries. It will take time to implement a scrum in software development industry completely. It will take even more time to adapt a scrum to other industries such as high-tech, service, etc. But its concept, roles, objects, and ceremonies could be adapted to other demanding industries. Its principles could be applied in some industries if there are continuous product and service providing, team work projects, changing customer requirements and environmental factors. Since a scrum is an innovative management approach, it will be beneficial for other industries to get the advantages of it for meeting the customer demands, a sustainable growth and a continuous innovation. It is expected that this paper will help management scholars to be more familiar with a scrum, think about its adaptations to other industries and include it into their further researches.

References

Alsalemi A.M. and Yeoh, E. (2015) A Survey on Product Backlog Change Management and Requirement Traceability In Agile (Scrum). 9th Malaysian Software Engineering Conference, 16-17 December, pp. 189-194. DOI: 10.1109/MySEC.2015.7475219

Campanelli, A.S. and Parreiras, F.S. (2015) Agile Methods Tailoring–A Systematic Literature Review. The Journal of Systems and Software 110, pp. 85-100.

Crişan E., Beleiu I., and Ilieş L. (2015) The Place of Agile in Management Science–A Literature Review. Managerial Challenges of the Contemporary Society, 8(1), pp. 62-65.

Dikert K., Paasivaara M., and Lassenius C. (2016) Challenges and Success Factors for Large-Scale Agile Transformations: A Systematic Literature Review. The Journal of Systems and Software, 119, pp. 87-108.

Hossain E., Babar M.A., and Paik H. (2009) Using Scrum in Global Software Development: A Systematic Literature Review. Fourth IEEE International Conference on Global Software Engineering, 13-16 July, pp. 175-184.

Liubchenko V. (2016) A Review of Agile Practices for Project Management, CSIT 2016, 6-10 September, pp. 168-170.

Pozgaj, Z., Vlahovic, N., and Bosilj-Vuksic, V. (2014) Agile Management: A Teaching Model Based on Scrum, MIPRO 2014, 26-30 May, Opatija, Croatia, pp. 893-898.

Schwaber K. and Sutherland J. (2017) The definitive guide to scrum: The rules of the game. Available at: https://www.scrumguides.org/docs/scrumguide/v2017/2017-Scrum-Guide-US.pdf [Accessed 8 Sep. 2018]

Vlaanderen K., Brinkkemper S., Jansen S., and Jaspers, E. (2009) The Agile Requirements Refinery: Applying Scrum Principles to Software Product Management. Third International Workshop on Software Product Management, 1 September, pp. 1-10. DOI: 10.1109/IWSPM.2009.7

Yang G., Yu S., Chen G., and Chu J. (2010) Agile Industrial Design Management Based on Scrum. 2010 IEEE 11th International Conference on Computer-Aided Industrial Design and Conceptual Design 1, 17-19 November, pp. 889-891. DOI: 10.1109/CAIDCD.2010.5681880

11th Annual state of agile report by VersionOne Inc (2017) Available at: https://www.versionone.com/about/press-releases/versionone-releases-11th-annual-state-of-agile-report/, 27.8.2018 [Accessed 24 Sep. 2018]

CSMjsv20-Scrum the art of doing twice the work in half the time, E-book by Scrum Inc. Available at: https://www.scribd.com/document/385806389/CSMjsv20, 27.8.2018 [Accessed 11 Sep. 2018]