Systematic Innovation Mounted Software Development Process and Intuitive Project Management Framework for Technology Startups

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ABSTRACT

Today, software products are required to be more innovative and attractive because of unique circumstances in the software industry. Markets are changing fast and customers want to have more innovative products immediately. This paper provides a new process which integrates an inventive problem solving method into one modern software development program, making it part of the software development process. The Systematic Innovation Mounted Software Development Process (SPI), a combination of Agile and Systematic Innovation, provides an alternative development process which is targeted to adapt idea generation into software products. The intuitive project management framework helps technology driven companies to manage their software projects more effectively. This new software development process and associated techniques could impact the current software development industry significantly, especially software startup companies, because these powerful tools can help reduce managerial workloads of the companies and give them more time to remain focused on their key technologies.

Keywords – Software development process; systematic innovation; agile process; software process improvement; TRIZ; TIPS; technology startup; project management; lean software development;

INTRODUCTION

The software industry is one of the most rapidly growing industry sectors, and software development startup companies in this industry are the main economic foundations of most countries in the world (Wang and King, 2000). Because of the above reasons, improvement of the software development process within a short product lifecycle under low costs has been targeted to maintain minimum quality. A software process framework is required to build high quality software (Pressman, 2001) even though it is also well known that there is no silver bullet software development method that fits for all (Sommerville, 2011). Software development companies have their own cultures, characteristics and target market for their products. Therefore, one software development process cannot be utilized for all predefined current development processes. Companies must adapt development processes according to their own protocol based on needs and contexts. In addition, there are natural conflicts between delivery time, the cost and quality that impact the software development process (Pressman, 2001). The modern software process still strives to maintain a certain level of quality over efficiency. Some research indicates that repairing after software product launch could cost a hundred times more than removing the
problem during the initial phase (Pressman, 2001). Therefore, software development processes need to be continuously refined and improved, and Software Process Improvement (SPI) could be one of practical solutions to achieve the software enhancement. SPI is a systematic procedure for enhancing the performance of the development process by changing the current process (Sommerville, 2011). It also includes driving the implementation of changes to that process to achieve specific goals such as increasing development speed, achieving higher product quality or reducing costs. Someone who leads SPI must understand the methodologies and the tools to be adapted within the current circumstance and understanding the state of practice and process improvement initiatives accordingly (Adolph, 2012). SPI has been applied to various areas of software development sectors. Electronic commerce software development has different requirements than a conventional system of software development (Gruhn and Schope, 2002). SPI can be applied to a highly integrative electronic commerce system development project, to avoid the danger of failing the entire project. SPI could include new activities in the development process, and removing some of them as well (Gruhn and Schope, 2002). Some researchers provide guidelines to engage software process improvement for small and medium companies by analyzing critical SPI requirements (Sulayman and et. al., 2014). Even though there is some research for SPI models targeted for small and medium companies, there are no dedicated SPI models for technology startup companies which have smaller numbers of employees who utilize a rapid software development cycle. In addition, the current SPI models are mostly targeted for large companies and these models are not fit to apply to small sized companies (less than ten persons) because these models are expensive and complicated (Kim, 2010). Recently, some researchers have contributed modified SPI models that apply to both small and large sized companies by a competitive advancement strategy (Cater-Steel, 2004). Lean has also been adopted into the software development process by using some main principles from the original Lean manufacturing process (Poppendieck, 2003) and it is suitable for the technology startup companies that developing software products.

As literature studies show, SPI implementation is an effective approach for software development process enhancement. In this recent environment of rapid change and development, the software industry generally requests that the development process should be more flexible to reflect changes during developments. Even though software development favors the Lean process, recent trends in the software sector indicate that products should be more innovative and appealing for consumers. Uniqueness of the software sector keeps changing due to competitive business environments, the organizations and cultures. Basically, it evolves within different development environments and the development process should evolve accordingly, which translates to more flexibility and innovation.

AGILE SOFTWARE DEVELOPMENT PROCESS

The software development process is often considered as a subset of a systems development lifecycle (SDLC) for developing software products. There are several models for processes that describe approaches to a variety of tasks and activities that take place during the procedure. Generally, the system development lifecycle is a broader term and the software development process is a more specific term. The software lifecycle typically includes the following steps: requirements, analysis, design, construction (or coding), testing (validation), installation,
operation, and maintenance (Cohen and et. al, 2010). The international standard for software lifecycle (ISO, 2008) has mentioned that many software development processes fit the spiral lifecycle model from the system development lifecycle model. Agile software development is also adapting the spiral cycles (recursive, iterative) for enhancing the development process. Agile software development, based on iterative and incremental development, is practical for startup companies. Agile development processes were introduced in the 1990s, to minimize a process bureaucracy by removing unnecessary milestones because of the administrative workloads (Conboy and Morgan, 2011). Agile software development is targeted to deliver a software product quickly to consumers, who could also propose new business requirements into products. This philosophy behind agile methods is reflected in the Agile manifesto (Agilemanifest, 2001) which values individuals and interactions, working software, customer collaboration and responding to change (Conboy and Morgan, 2011). The philosophy of Agile Software Development is core in the reality of current markets. The emergence of agile software processes attempts to deal with issues introduced by rapidly changing and unpredictable markets (Highsmith and et. al, 2001). The manifesto of the agile software development process introduces four basic values of Agile: individual interaction, working software, customer collaboration, and responding to change. Exploring each value helps us to understand the philosophy of the agile process and activities to apply the philosophy, to enhance software development--aligning with the latest volatile markets. Feature Driven Development (Stephen and et. al., 2002), Scrum (Cohn, 2009), Extreme Programming, Crystal, Dynamic System Development Method (Stapleton, 2003) and Adaptive Software Development (Highsmith, 2000) are common software development methodologies that are aligned with the values of Agile Software Development (AL-Taani and Razali, 2013). In the view of organizations, agile development activities are suitable for small, co-located, dedicated and highly collaborative teams (Boehm, 2002; Nerur, et. al., 2005).

In general, agile development is regarded as the extreme opposite of Waterfall development. In the Agile process, a series of these processes are repeated, known as reputation development (Furugaki, 2007). There are some variances of the Agile development processes, which usually starts with Planning phase and defines Requirements, Design, Implementation, Testing (and Integration) and Evaluation (see Figure 1) phases. It has several recursive cycles (iterations) between Design and Testing and Integration phases. Once all requirements are determined as actual implementation during the Evolution phase, the project is completed (Product phase). The recursive cycle (Design; Implementation; Testing and Integration) is a minimum set of the development cycle, executed daily. A Daily-based Scum framework is commonly applied for this recursive cycle (Cohn, 2009). Scrum is a flexible and holistic development strategy that is an iterative and incremental agile software development framework where a development team works as one unit to reach a common goal (Cohn, 2009).
The Agile process introduces the idea of simplicity. The more effort needed to find required information, the more effort is needed to keep the information up to date (Nokes and et. al., 2007). Agile software development fits well in terms of flexibility to reflect the requirements from astute customers. The innovative properties of software products have become a mandatory factor for success in business under uncertain circumstances. Software companies need to think differently to generate new ideas that appeal to customers. Adapting distinct innovation processes that can be widely used by world-leading companies could be one way to move for delivering innovation into products. DeepDive (IDEO), Lead User Research (3M) and Design Thinking (Apple) are well known innovation processes that have been adapted and are being used by various companies. Integrating an innovation process into an existing software development process is not an easy task. The innovation process must be lean enough to avoid associated side effects, confusion, and overload during the integration. Consequently, the innovation processes mentioned above might be not applicable for software startup companies due to characteristics of the companies, which are small and lean.

**SYSTEMATIC INNOVATION MOUNTED SOFTWARE DEVELOPMENT PROCESS**

Systematic Innovations (SI) is a structured process and the set of practical tools for new idea generations and application to technical problems, including software implementation issues (Terninko and et. al, 1998). The tools of Systematic Innovation have been widely used for technical breakthroughs and system improvements (Petkovic and et. al, 2013).

In general, problem solving and innovation processes which include 6-sigma, Lean Thinking, IDEO process, ARIZ (Algorithm of Inventive Problem Solving) and SI (Systematic Innovation) usually contain one or several task blocks (also called phases) to generate and implement new ideas and solutions. This phase approach of innovation method provides check points to use
inventive problem solving tools more effectively. An 8-step phase approach is widely used in the systematic innovation process (C2C Solutions, 2016), however a 3-step phase process is used for mounting with the existing Agile processes in this research. This 3-step process for Systematic Innovation has recently been introduced for those who use complicated problem solving tools with ease. This 3-step process is simple and easy to use, even for beginners. A detailed description of each step for Systematic Innovation is as follows, adopted from Kim (2015):

**Step 1: Problem Identification:**
Throughout this step, users identify shortcomings in their idea generation and problem solving capabilities. This step identifies the What-I-Want (WIW) that is key for formulating the problem. This step is similar with the value identification in Lean Thinking (Womack and Jones, 1996). ENV model in OTSM-TRIZ (Khomenko, 2010) and RCA (Root Cause Analysis) are typical inventive problem solving (TRIZ) tools used during this step. In some business development problems, a good definition may lead to immediate identification of possible solutions. This step acts as a preliminary process for making the problem simple and clear, through the use of several systematic innovation tools.

**Step 2: Problem Solving:**
The problem-solving step moves to generate the concept solution starts from the formulated problem during the problem identification step. Most of TRIZ tools, such as the 40 Inventive Principles, Substance-Field model with 76 Standards (Domb, 2003) and ARIZ (Altshuller, 1989), are applied in the Problems Solving step. While the tools are mostly adapted from the TRIZ method, a user could adapt tools from other methods such as Lean Thinking and Six-Sigma.

**Step 3: Evaluation and Prototyping (Concept Design and Evaluation)**
This step helps idea generators to choose the most suitable solutions for implementation from among numerous possible solutions generated. Selection of the candidate solutions and actual implementation are in this last step. Based on the concept solutions, users can develop prototype solution to be applied in the problem situations.

The Systematic Innovation method can be iterative as it is a set of continuous evolving tools that improve the ability to solve problems. TRIZ (TIPS; Theory of Inventive Problem Solving) is the most powerful tool set for Systematic Innovations (Altshuller, 1996; Domb, 1999; Grace and et. al., 2001). In addition, the SI methods can be easily collaborated with Lean Thinking and Six-Sigma activities. For instance, tools in the *Problem Identification* phase can replace tools in the Value Identification phase during Lean Thinking activities (Womack and Jones, 1996), which is similar to the first phase of the agile development process. Tools in the *Problem-Solving* phase can also replace the tools for the Design (Optimize) phase in Design for Six Sigma (DFSS) activities (Breyfogle, 1999) (see Figure 2). Systematic Innovation is originally targeted to solve engineering problems but the method has expanded to various areas included in new software development (Kim, 2008; 2010; 2011; 2012; 2016).
Systematic Innovation can be adapted to the agile development process to implement the software innovatively. Systematic Innovation Mounted (software development) Process (SIM-Process) is a framework to help developers to generate more innovative ideas systematically.

The general procedure of a SIM-Process is like an Agile software development processes except for some phases in the agile process. Requirements, Design, and Implementation phases in the agile process are replaced with Problem Identification, Problem Solving, and Concept Design phases in the SI method (see Figure 3). Since parts of the systematic innovation are mounted, other parts of the software development are the same as the current agile development process. The SIM-Process can be executed under the exact same setups as Agile process requirements are currently running under, including the setups of human resources, time managements for daily scrum, the release and sprint plans, and development roadmap. SIM-based software development is newly introduced in this paper, but the systematic innovation process has been widely used for high level feature design and user experience design as part of software development (Kim, 2008; 2010; 2011; 2012; 2016). It is very practical for high level conceptual programming that mostly requires innovative ideas but it is rarely applied in practice because there is no integrated framework to merge various concepts and tools at once. This paper proposes newly integrated frameworks by using systematic innovation for software development and its project.
management, which has never been introduced before. The lean and compact SIM-Process to be integrated on the existing agile development process has no side effects or overload. Consequently, the Systematic Innovation process is suitable for software startup companies because the companies are small and lean.

INTUITIVE PROJECT MANAGEMENT FRAMEWORK FOR SOFTWARE DEVELOPMENT

The project management role is vital and project management for software development is also a critical factor for success. Project management is the process and activity of planning, organizing, motivating, and controlling resources, procedures, and protocols to achieve specific goals in scientific or daily problems (Meredith, 2011). A project is a temporary endeavor designed to produce a unique product, service or result with a defined beginning and end (usually time-constrained, and often constrained by funding or deliverables) (Nokes and et. al., 2007), undertaken to meet unique goals and objectives, typically to bring about beneficial change or added value (Dinsmore and et. al., 2005).

The new framework in this paper suggests modules for project management, and the whole project consists of building blocks as unit modules. Unlike existing project management, the resources of each task such as duration of the task, number of human resources and costs are defined into the unit module. So, the project manager can determine workloads by counting number of the unit modules in the project diagram. One unit module is either an Agile process which contains a whole cycle of the development process or a SIM-Process which contains a whole process for idea generations. The resource usage (duration, human resource, and cost) of one SIM-Process module is assumed to be the same as what an applied agile process module is (see Figure 4). For instance, the project manager determines one agile process module of five daily iterations as one unit, which means one unit module is completed within one week (assume one week as five working days; \( \alpha = 5 \)). Sometimes the project manager needs to split the project into several sub-projects (splitter) and vice versa (integrator). The project manager may need to reconsider the whole project even if in the middle of the development (checker) phase because of changing requirements. This set of new project management planning requirements is built, based on various circumstances of the software development process (see Table 1). Each module
is one single block and a project manager can build up the software development process by adding these modules (see Table 1).

| Module       | Symbol | Text Symbol | Variable | Description                                                                 |
|--------------|--------|-------------|----------|-----------------------------------------------------------------------------|
| Agile Process|        | #           | X: one recursive (iteration) cycle Y: process duration                    | Module of Agile software development process                        |
| SI Mounted Process| | *       | X: one recursive (iteration) cycle Y: process duration | Module of Systematic Innovation mounted software development process |
| Integrator   |        | }           | Z: integration duration depend on nodes                                   | Module for Integration of the development modules                     |
| Splitter     |        | {           | X: split duration                                                         |                                                                              |
| Checker      |        | C           | X: check durations                                                        | Checksum and reconsidering the whole project (the project could be terminated) |
| Start/End    |        | @           | N/A                                                                     | Start and end of the project                                           |

**Table 1. Module set of software development project**

**GENERAL WEB BASED SERVICE**

Online shopping services are one of many typical web-based services that are popular targets for small sized startup companies as service providers, because a lot of commercial and free web hosting servers are available and the development toolkits are well-supported, even for individual software developers. Many applications for smartphones and Internet (web-based applications) have been launched and are growing very fast in the current high tech industry. These web-based services include online shopping malls, blog services, social network services and even official company websites. Since these types of service (or software) developments are well established, a typical development process for web based software (i.e., web pages with multiple applications on a hosting server side) could be observed as an industry practice and its project planning can be visually represented as the following (see Figure 5):
One of the difficulties as a project manager, (duration and resources of a project is already hard to be determined until the planning for each task is completed) is to accurately evaluate needs and timeframe for each task, because each task has different resource usages and different size of workloads. Project managers are required to use additional skills and tools on the top of managing a project. A unique attribute of modern software development is how quickly the process moves and how short the product life cycle is, like web service applications, for example. Requirements are constantly changing, even in the middle of development and small groups (less than ten persons) may be involved in the whole project--especially in startup companies. The general web-based service development plan could be described by using an intuitive project management framework. A project manager determines the unit of modules and two (Y and α) or four variables (X, Y, Z and α) for project initiation. One unit duration of an agile module is one week (Y=1[week] which is equivalent to 5 days) and contains five daily scrums (X=1[day]), and one week contains five working days (α=5) with two to three members as one unit. Based on the above setup, the development process diagram could be as follows:

*) Based on the pre-defined functions (Table 2),
***) Assume the human resources are not limited

**Figure 5.** General Web based software development plan

**Figure 6.** Project diagram by using the intuitive project management framework
As an industry practice, it is assumed that each member in the project is a highly-skilled programmer and each module might have different members. The diagram in Figure 6 shows the project takes 4 weeks and 1 day (=1+1+0*+1**+1*+0) with 12 developers (3 members 4 exclusive modules). The duration of all modules is calculated based on the predefined functions in Table 2.

| Variable | Meaning | Unit | Default Function |
|----------|---------|------|-----------------|
| $X$      | Duration of recursive period (Unit period) | [day], [week] | N/A, constant |
| $Y$      | Duration for completion of one module process | [week], [month], [year] | $Y(X, \alpha) = \text{Round} \left( \frac{X}{\alpha} \right)$ |
| $Z$      | Duration of integrating the module | [week], [month], [year] | $Z(X, \alpha, n) = \text{Round} \left( \frac{X \cdot n(n-1)}{2 \cdot \alpha} \right)$ |
| $n$      | Number of nodes for integration | N/A | N/A |
| $\alpha$ | Duration unit between the cycle and module (i.e., number of cycles for one module process) | N/A | $\alpha = \begin{cases} \frac{5\text{[day]}}{1\text{[week]}} = 5 & \text{or} \\ \frac{4\text{[week]}}{1\text{[month]}} = 4 & \end{cases}$ |

Table 2. Parameters and pre-defined functions for the module set

The duration of both SIM-Process modules and Agile process modules is 1 week (i.e., the value of $Y$). There are two integrators in the diagram (see Figure 6) and the duration of each integrator is calculated as the following:

$$Z_1(1,5,3) = \text{Round} \left( 1 \cdot \frac{3 \cdot (3 - 1)}{2 \cdot 5} \right) = \text{Round} \left( \frac{3}{5} \right) = 1,$$

$$Z_2(1,5,2) = \text{Round} \left( 1 \cdot \frac{2 \cdot (2 - 1)}{2 \cdot 5} \right) = \text{Round} \left( \frac{1}{5} \right) = 0.$$

The duration of first integrator ($Z_1$) which has 3 nodes is one week (five days) and the duration of second integrator ($Z_2$) which has 2 nodes takes 1 day (noted as 0*). The values of the parameters ($X$, $Y$, $Z$ and $\alpha$) could also be determined independently by the project manager but it requires additional workloads just for planning. The position of the checker is the moment to evaluate whether or not the project is worthy to complete based on the current plan. In the worst case, the project might be terminated or the project may be significantly changed. It may not be applicable for general project plans such as construction or automotive manufacturing, but it is
very practical for software development projects, especially consumer-targeted applications by small-sized companies.

Even though technology driven startup companies may begin as a small group which has less than ten persons, project management is still one of the mandatory skills for business success. In a typical startup company, one person might have multiple roles as a developer, project manager and marketer at the same time. These companies usually do not have enough human resources for assigning project management roles independently, however effective management of projects is as critical as product development. This framework provides the building blocks for intuitive project planning, especially for software development projects. It provides the flexibilities of innovative software development by using the SIM-Process.

**COM2US: ACTION PUZZLE FAMILY**

Com2uS has been a leader of the mobile game industry since its inception in 1998 and the company built its reputation as the number one mobile games provider in South Korea (Kim, 2014). Com2uS was a successful developer of many premium titles. The name of Com2uS remains as the leader in the mobile game industry even though the company merged with Gamevil in 2013.

Action Puzzle Family (AFP) is in the form of delightful classical easy puzzle games. This game title has been known as one of the popular Freemium casual games, which has more than six million users of eight puzzle games (Com2uS, 2014). The goal of the game is collecting all puzzle pieces to move the family into a house with wacky features and each one of the eight eccentric puzzle games has a different theme. The AFP game project started in June, 2006 with 10 members, including a producer and software developers that lasted until the end of the project, August 2007. The APF was developed by a small group (less than ten people in total) and the process was flexible than the general Com2uS development process (Figure 7).

![Figure 7. Development plan for Action Puzzle Family](image)

According to Com2uS case research (Kim, 2014), idea generation and graphic design phases are required for generating the new and fresh ideas; the SIM-Process module might be suitable for this process. In the general Com2uS development process, bug-fix tasks before starting alpha and beta testing phases are mandatory. The APF project could be described by using the intuitive project management framework more effectively (see Figure 8).
Based on the pre-defined functions (Table 2), assume the human resources are not limited.

Figure 8. Institutive AFP project planning diagram

The APF producer could determine the unit of modules and four parameters (X, Y, Z and α) during the project initiation. The values of the parameters (X, Y, Z and α) are as follows:

- X = 1 [week]
- Y = 1 [month]
- α = 4 [weeks/month].

The duration of the integrator before the strategic decision meeting is calculated as follows:

\[ Z(X, \alpha, n) = Z(1,4,2) = \text{Round} \left( 1 \cdot \frac{2 \cdot (2 - 1)}{2 \cdot 4} \right) = 0 \]

and duration of the integration completion is less than one month (0*; 1 week). Three checkers of the project include, the moment to check if the APF project is worthy enough to complete based on the current plan (the project could be dropped at this moment). The APF project planning was also assumed that each member in the project was a highly-skilled programmer or engineer and each task may have different members. The APF project diagram (Figure 8) instantly shows that the project would takes 6 months and 1 week with 14 developers (2 members 7 exclusive tasks) by simply counting the number of 1s and 0*s (5 months and 5 weeks = 1+0*+1+1+0*+0*+1+0*+1+0*).
CONCLUSION

The software development process is becoming more complicated because customers want more innovative and attractive products. The Systematic Innovation model helps to generate new ideas and innovative ways to solve problems. The SIM-Process provides alternative approaches to create new ideas for adapting to innovative software products. In addition, the new project management framework helps technology driven companies to manage their projects intuitively. Unfortunately, to apply this new framework, each individual member requires having enough knowledge of either one of processes (Agile or Systematic Innovation) and project leaders might be advised to understand the minimum skill sets for project management. Otherwise, each module in the project may not be completed on time, which could lead to project delays. Two practical study cases, which could adopt the SIM-Process and the intuitive project management framework, demonstrate how these innovative methods can be applied into real project management scenarios. Actual adaptation of the SIM-Process with managing a whole project by using the institutional framework could be future research topics. The practical techniques in this paper could impact the current software development industry significantly, especially for software startup companies, because these powerful weapons could effectively lean down the managerial workloads of companies and make them stay focused on their core assets.

REFERENCES

Adolph, S. and et. al., 2012, "Reconciling perspectives: A grounded theory of how people manage the process of software development", Journal of Systems and Software 85:6, pp 1269-1286
Agilemanifest, 2001, The Manifesto for Agile Software Development, (online) http://agilemanifesto.org/
Altshuller, G., 1989, "Algorithm of Inventive Problem Solving (ARIZ-85C)", Rules of a Game Without Rules (Russian), Karelia, Petrozavodsk, pp 11-50
Altshuller, G., 1996, And Suddenly the Inventor Appeared: TRIZ, the Theory of Inventive Problem Solving, Technical Innovation Center, Worcester, MA.
AL-Taani, R. H., Razali, R., 2013, "Prioritizing Requirements in Agile Development: A Conceptual Framework", Procedia Technology 11, pp 733-739
Boehm, B., 2002, "Get ready for agile methods, with care", IEEE Computer 35:1, pp 64-69
Breyfogle, F., 1999, Implementing Six Sigma, John Wiley and Sons, Inc., New York, NY.
Cater-Steel, A., 2004, "An Evaluation Of Software Development Practice And Assessment-Based Process Improvement In Small Software Development Firms", Ph.D. Dissertation, Sch.,Com. Info. Tech, Griffith University, Australia.
C2C Solution, 2016, Systematic innovation intro, (online) http://c2c-solutions.com/
Com2uS, 2014, "Action Puzzle Family", Google Play Store, (online) http://bit.ly/1pfPv9
Cohen, S. and et. al., 2010, "A Software System Development Life Cycle Model for Improved Stakeholders' Communication and Collaboration", Int. Journal of Computers, Communications & Control 5:1, pp 20-41.
Cohn, M., 2009, Succeeding with agile: software development using Scrum, Addison-Wesley Professional, New York, NY.
Conboy, M. and Morgan, L., 2011, "Beyond the customer: Opening the agile systems development process", Information and Software Technology 53:5, pp 535-542
Dinsmore, P. C. and et. al., 2005, The right projects done right, John Wiley and Sons, New York, NY.
Domb, E., 1999, "The Seventy-Six Standard Solutions: How They Relate to the 40 Principles of Inventive Problem Solving", TRIZ Journal, May
Domb, E., 2003, "Using the 76 Standard Solutions: A case study for improving the world food supply", TRIZ Journal, April
Furugaki, K. and et al., 2007, "Innovation in Software Development Process by Introducing Toyota Production System", Fujitsu Science Technology Journal 43:1, pp 143-150
Grace, F. and et al., 2001, "A New TRIZ Practitioner's Experience for Solving an Industrial Problem using ARIZ 85C", TRIZ Journal, January.
Gruhn, V. and Schope, L., 2002, "Software processes for the development of electronic commerce systems", Information and Software Technology 44:14, pp 891-901.
Highsmith, J. A., 2000, Adaptive Software Development: A Collaborative Approach to Managing Complex System, Dorset House, New York, NY.
Highsmith, J. A. and Cockburn, A., 2001, "Agile Software Development: The Business of Innovation", IEEE Computer 34:9, pp 120-122.
International Organization for Standardization (ISO), 2008, Systems and software engineering - Software life cycle processes 12207:2008 (ISO/IEC 12207:2008)
Khomenko, N., 2010, "General Theory of Powerful Thinking (OTSM): A methodology addressing to large and complex problems involving technologies, society, and humans together", paper presented at The 6th TRIZ Symposium in Japan, 9-11 September, Kanagawa, Japan.
Kim, S.-K., 2008, "Design of Event Driven Digital Right Management by Using Theory of Inventive Problem Solving", IEEE Proceedings of IEM, pp 935-938.
Kim, S.-K., 2010, "Enhanced User Experience Design based on User Behavior Data by Using Theory of Inventive Problem Solving", IEEE Proceedings of IEM, pp 2076-2079
Kim, S.-K., 2011, "Mobile Terminal and Message Transmitting/Receiving Method for Adaptive Converged IP Messaging", US Patent 8,050,269 B2, Issued.
Kim, S.-K., 2012, "Effective Wi-Fi Setting User Experience Design by Using Systematic Innovation Method", IEEE Proceedings of IEM, pp 643-646.
Kim, S.-K., 2014, "Com2uS Mobile Game Development", Journal of Information Technology Case and Application Research 16:3-4, pp 155-167.
Kim, S.-K., 2015, Innovative Design Guidebook for Game Changers: Three Step Innovation Process for New Business Developments, Bookboon (http://bookboon.com/)
Kim, S.-K., 2016, "Systematic Innovation Practice for Enhanced Mobile Advertisement Protocol Design", International Journal of Social Science and Humanity 6:3, pp 235-238.
Meredith, J. and et al., 2011, Project Management: A Managerial Approach, John Wiley and Sons, Inc., New York NY.
Mishra, D. and Mishra, A., 2009, "Software Process Improvement In SMEs: A Comparative View", Computer Science and Information Systems 6, pp 111-140
Nerur, S. and et al. 2005, "Challenges of migrating to agile methodologies", Communications of the ACM 48:5, pp 72-78.
Nokes, S. and et. al. (2007), The Definitive Guide to Project Management 2nd Edition, Prentice Hall, London, UK.
Petkovic, D. and et. al., 2013, "Application of the TRIZ creativity enhancement approach to the design of a passively adaptive compliant robotic gripper", Assembly Automation 33:3, pp 231-239.
Poppendeick, M. and Poppendeick, T. (2003), Lean Software Development: An Agile Toolkit, Addison-Wesley, Boston, MA
Planbox, 2012, Agile Project Management, (online) https://commons.wikimedia.org/wiki/File:Agile_Project_Management_by_Planbox.png
Pressman, R. S., 2001, Software Engineering a Practitioner's Approach, McGraw Hill, New York, NY
Sommerville, I., 2011, Software Engineering, 9th ed., Harlow, England: Person Education Limited.
Stephen R. and et. al., 2002, A Practical Guide to Feature-Driven Development, Prentice Hall, London, UK
Stampleton, J., 2003, DSDM: Business focused development, Addison-Wesley Professional, New York, NY
Sulayman, M. and et. al., 2014, "Towards a theoretical framework of SPI success factors for small and medium web companies", Information and Software Technology 56:7, pp 807-820
Terninko, J. and et. al., 1998, Systematic Innovation: An Introduction to Theory of Inventing Problem Solving, CRC Press, Boca Raton, FL.
Wang, Y. and King, G., 2000, Software Engineering Processes: Principles and Applications, CRC Press LLC, Boca Raton, FL, USA
Wenderoff, P., 2002, An Essential Distinction of Agile Software Development Processes Based on Systems Thinking in Software Engineering Management, (online) http://www.agilealliance.org/
Womack, J. and Jones, D. T., 1996, Lean Thinking, Free Press, New York, NY.