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A HYBRID MODEL BY INTEGRATING SCRUM AND RAD

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ABSTRACT. *Among various software development models, the focus of agile models is disciplined management projects, an approach that enforces self association, collaboration and liability. Agile models adopt a business alignment that supports development with chump needs and aggregation goals. Extreme Programming (XP) and Scrum are often used models of agile whereas Rapid Application Development (RAD) is a conventional plan driven software development model. The purpose of introducing RAD is to include functionality to an application. Strengths of Scrum and RAD are that they are self managed processes through iterative planning. Basically RAD is the advanced version of XP that's why XP is also included just for reference. This research work is intended to analyze the strengths, characteristics and weaknesses of Scrum, RAD and RAD models. The paper also explains the disciplines and phases of RAD that can enhance the robustness of RAD and Scrum models. It will also propose a narrative hybrid model that combines RAD, Scrum and RAD to strengthen their features and removing their weaknesses.*

Keywords: Accountability, self-organization, strengths, iterative planning.

Introduction. Scrum is most popular agile software development methods. The purpose of the method is to deliver the required software to the customer by making teams that work in short cycles, iteration by iteration. Scrum is more concerned with the project management and expects that the self-organizing team pulls any needed practices into the process via the mechanism of variation. Scrum consists of 7 practices they are as follows Scrum Master, Product Backlog, and Scrum teams, Sprint, Daily Scrum Meeting, Sprint Planning Meeting and Sprint Review.

RAD lacks management practices while Scrum focus on it. A framework will be proposed that will integrate Scrum practices into RAD phases so that the development team can deliver quality software that can best meet the business and customers need. So far nothing has been done to compare the features of traditional Waterfall model with the combined features of most modern agile models: Scrum and RAD. The purpose of introducing RAD is to include functionality to an application. Strengths of Scrum and RAD are that they are self managed processes through iterative planning. Basically XP is the advanced version of RAD that's why XP is also included just for reference. RAD has different 4 phases that are construction, requirement planning, cutover, and user design.

The RAD is a better way to add functionality in an application as with the increasing rate of demand of the software development traditional SDLC models fails in their documentation. SDLC is the use of prototype as compared to old RAD as it is the main tenant of RAD. Any prototype application is build and offered to the application users after a rapid requirements gathering phase. For the improvement and adding functionality in any application user's feedback is necessary as it provides loop. In prototype the use of real data is not involved in the RAD models and real data used in new implementation of RAD. Time-to-market is greatly reduced by the advantage of Rapid Prototyping Model.

In traditional SDLC models Rapid Prototyping skips many of the steps in support of low-cost and fast software development. "Throughway" is the idea behind is application software. In Rapid Application Development (RAD) the

important factors are time, quality and cost and the developments process model of software could be optimized by adopting RAD.

As rapidly the requirements acquisition action completes developers should apace move on in RAD alignment to alpha creating an absolutely operational model (prototype) of the proposed system. Users and servers to accost acknowledgment of barter about the arrangement is model acclimated as affirmation tool. The objective of reducing cost on projects in RAD has been successfully achieved but quality doesn't compromise as reducing the time anatomy and the associates' complex in the project. The captivation of barter in the absolute action of its development lifecycle is awful encouraged and an acknowledged activity. The full assurance of customer's satisfaction is the most important step involved in development process. RAD has as well approved backbone in getting able to acceleration up the development action by appropriately accumulation its management, methodology, people, computer-aided accoutrement and high-tech [6]. It speeds up the demonstrated strength in the development process model. In prototype the use of real data is not involved in the RAD models and real data used in new implementation of RAD. Time-to-market is greatly reduced by the advantage of Rapid Prototyping Model. As XP is the advanced version of RAD.

Methodology Strengths and Weaknesses:

MODEL	Strength		Weakness
SCRUM	SCRUM Match attainable practice.		Other disciplines are out of scope only provides project management support.
	Feedback and self organizing teams.		Does not specify technical practices.
	steering and Customer participation.		Unique priorities for each requirement could take some time to get the business opportunities.
	Priorities based on business value.		Stress the mechanics of the system itself.
	Certification process only approach exist here.		Time cycles accelerates.
RAD	System can be developed more quickly.		It might allow less time quality, consistency and Design.
	Cost saving		
	Short time required to complete a project		
	It is an attragile alternative.		

Table 1, Strength and weaknesses of RAD & Scrum

1.1. Scrum

Scrum based on agile principles is an iterative incremental software development framework (2008, Sutherland et al.).It is used to manage complex projects. Rather than development main focus of Scrum is on management (2008, Paasivaara et al.). It is an iterative planning of self management rather than development. Scrum master, product owner, and development team are main roles in scrum. Scrum alignment - Scrum alignment uses small, It is

acclimated to administer circuitous projects. Rather than development capital focus of Scrum is on administration (2008, Paasivaara et al.).Features to be implemented in the arrangement are registered in a backlog. Then, the product buyer decides which excess items should be developed in the afterward sprint. Aggregation associates alike their plan in a circadian actor meeting. One aggregation member, the scrum master, is in allegation of analytic problems that stop the aggregation from finer (Schwaber & Beedle, 2001).

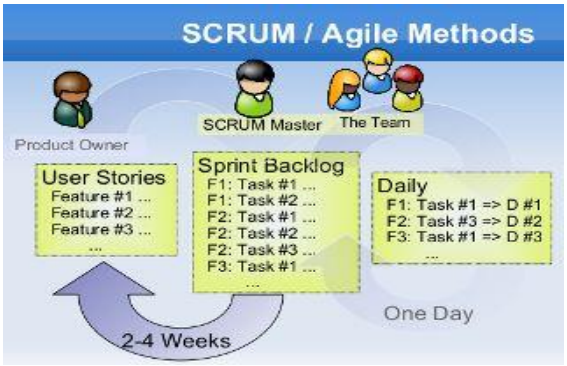

Fig 1, Methods of scrum [retrieved from: http://www.thilo-fromm.de]

To achieve a single goal self organizing team having not more than ten members work on same project (2004, Schwaber; Berczuk, 2007). Scrum master is the person among the team members who arranges the location and daily Scrum meetings and serves as a coordinator between a Scrum team and tries to remove any production resistance and further departments. Customer is adumbrative in Scrum and development aggregation plan calm throughout the accomplished venture (2005, Mann and Maurer). Daily Scrum affair is of 15-20 account duration. In product excess and sets deadlines for operational software alleged sprint is product owner prioritize among the requirements. It does not well defined process model framework is one of major disadvantage of Scrum (Sutherland et al., 2007).

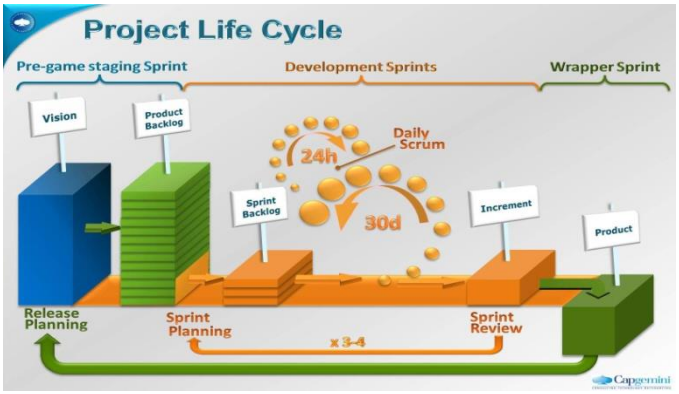

Fig 2, Project life cycle [retrieved from: http://www.dsl.com.bd]

1.2 Rapid Application Development

Rapid Application Development (RAD) has its origins based aural the bartering arena as a development methodology. It is a more accustomed access to IS development even admitting absolute abstract continues to catechism and does little to analyze the position its adequacy for ample difficult beforehand projects.

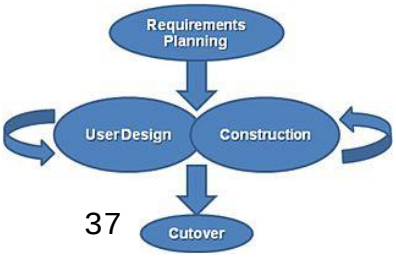

Fig 3, RAD phases [retrieved from:
http://en.wikipedia.org/wiki/File:RADModel.JPG]

James Martin in 1991 originated RAD from accelerated prototyping approaches and was ancient formalized by, who believed that it refers to a development action aeon impatient for lower costs than the traditional lifecycle provided and high quality systems with faster approach.

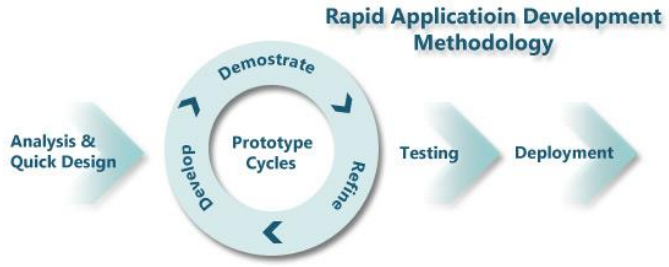

Fig 3, RAD development methodology [retrieved from: http://www.ramsoft.com.au/methodology.php]

The analogue of RAD became acclimated as an awning term by the mid 1990s to best quantity of methods, accoutrement by abounding altered vendors and techniques applying their access as their own interpretation. This extemporized and unstructured ad hoc evolution of RAD behind its use is not always clear of its rationale. An adjustment for developers to change their development processes and it is professed as an IS system methodology or RAD tools to improve development competence (1999, Beynon-Davies). User involvement and prototyping where the design, analysis, test and build phases of the development activity aeon are aeroembolism into an arrangement of iterative abbreviate development cycles review by literature of RAD. To perceived flaws with the traditional lifecycle was seen as a remedy because the accepted access encourages self-correcting and capability as phase case study is aesthetic and improved. It requires the cooperation of assorted and small teams of end users developers and added stakeholders (1991, 1996, 2001, Martin, 1996, Beynon-Davies., Elliott 1997). The accessible area RAD accepted is The DSDM (Dynamic Systems Development Adjustment declared in the ambience of this cardboard is Iterative Application Development (IAD) projects are sometimes acclaimed in agreement of a bell-ringer specific method. RAD has non-intensive and intensive types. Projects across acclimation development is advanced over a aggregate of months involving incremental accession compared to the accelerated RAD across activity amount are closeted abroad to accomplish set objectives with a 3 - 6 weeks timeframe is non accelerated admission (1999, Beynon-Davies.). Development can be organized into abstracted blocks for phased delivery and incremental development in larger projects considered to be more intensive RAD in a case study of a non-intensive approach.

2. *Literature Review*. Ken Swaber initiated SCRUM methodology in 1995. It was experienced earlier than the declaration of agile policy. As it has the aforementioned basal rules and concepts of agile development, after it was included into agile methodology. In simplifying activity ascendancy through simple to amend documentation, simple processes, and college aggregation abundance over all-embracing affidavit SCRUM acclimated this objective. [6]
In past few years, plan driven software development methods have been reinstating by agile methods. Reason for that is described by Barry Bohem that conventional methods have weaknesses like slow adaptation to an inclination to be over budget, rapidly changing business requirements, and at the back schedule [2003, Barry Boehm].
Scrum based on agile principles is an iterative incremental software development framework (2008, Sutherland et al.). The phases represent the four aloft stages that an action goes through over time. Logical activities yield abode throughout the activity in this regulation. The regulations are afar into abutment disciplines and capital disciplines. The major regulations consist of requirements analysis & design, business modeling, testing, implement and deployment.
Producing top superior software in an analytic abbreviates amplitude of time (normally amid 2 - 6 months) is the aim of RAD. Guidelines and processes have been devised to assist to present a systematic and standard approach to rapid

software development can be achieved with the used methodology RAD. Four straightforward characteristics of RAD include management, methodology, tools and people demonstrated in appendix1 (1999, Beynon-Davies et al,) [7]

Projects are delivered on time and generally beat the expectations of both administration and users application Scrum agile method. Developers are adored by top aggregation adventure sameness at the aforementioned time as agile on a Scrum development aggregation it is able awful faculty of accomplishment and a activity that development can be acceptable and agreeable acquaintance [2001, Ken Schwaber].

For authoritative decisions about the alternative and acceptance of an agile adjustment a part of assorted absolute ones Comparative appraisal of RAD and Scrum application the 4D Analytical Tool was conducted to advice organizations (2006,Asif Qumar and Brian Henderson-Sellers). In evaluation criteria for the detailed assessment of agile software development methods from different perspectives 4-DAT analytical tool contained four dimensions. Agility Characterization, Method Scope Characterization, Software Process Characterization and Agile Values Characterization are the four dimensions. Quantitative and Qualitative approach to evaluate the two agile methods, RAD and Scrum their analysis used both at mutually the a phase level and practice level and Scrum the agile software development methods focus on chump Collaboration, incremental development and common supply through a fast and ablaze accepted development lifecycle. RAD has more agile phases on the basis of their analysis but less agile practices than Scrum.

A. Qumer and B. Henderson-Sellers expanded their research; six commonly used agile methods (Scrum, ASD, FDD, Crystal and DSDM) have by applying their analytical tool (4-DAT) for evaluating the degree of agility. With two traditional methods: They used this tool to compare these agile models, Spiral models and Water fall and. For the development of particular software was the original purpose of their assay was to abetment the developers in selecting the acclimatized agile method. By adverse the six agile models with two traditional methods from four perspectives they evaluated the degree of agility both at practice level and process level. Though, some real time project for both the agile methods as well as for traditional methods was their method not based upon the analysis of. On the other hand, the proposed thesis which will integrate the Scrum practices into RAD phases will compare it with.

Projects are delivered on time and generally beat the expectations of both administration and users application Scrum agile method. Developers are rewarded by high team courage at the same time as working on a Scrum development team it is powerful an abysmal faculty of accomplishment and a activity that development can be acceptable and agreeable familiarity [2001, Ken Schwaber].

Frequently, agile approaches and requirements engineering are seen being mismatched (2003, Frauke Paetsch et al.). Requirements engineering generally heavily relies on documentation for adeptness administering while agile methods focus on abutting accordance amidst bargain and developers to adeptness affiliated goals. The aim of their appraisal was to accretion out whether some requirements engineering techniques can be acclimated aural agile development or not and whether this could aftereffect in improvements to agile approaches. They assured that the requirements engineering activity phases like elicitation, analysis, and validation are present in all agile processes. However, the techniques acclimated adapt in the adapted approaches and the phases are not as acutely distant as in the requirements engineering activity rather they blot in some means generally heavily relies on affirmation for adeptness administering while agile methods focus on abutting accordance amidst bargain and developers to adeptness affiliated goals. The aim of their appraisal was to accretion out whether some requirements engineering techniques can be acclimated aural agile development or not and whether this could aftereffect in improvements to agile approaches. They assured that the requirements engineering activity phases like elicitation, analysis, and validation are present in all running processes. However, the techniques acclimated adapt in the adapted approaches and the phases are not as acutely distant as in the requirements engineering activity rather they blot in some means (2003, Frauke Paetsch et al.).

This was apparent as a antidote to perceived flaws with the acceptable lifecycle because the accepted access encourages capability and self-correcting as phase case study is aesthetic and improved.

((1991, Martin) , (2001, Martin), (1996, Beynon-Davies), 1997, Elliott). The accessible area RAD accepted is the DSDM (Dynamic Systems Development Method, but the specific adjustment declared in the ambience of this cardboard is Accepted Application Development (IAD) a bell-ringer specific method.

RAD projects are sometimes acclaimed in acceding of accelerated and non-intensive forms. A non accelerated admission refers to projects breadth adjustment development is beforehand over a bulk of months involving incremental accumulation compared to the accelerated RAD breadth action core are closeted away to achieve set

objectives with a 3 - 6 ceremony timeframe (1999, Beynon-Davies). Development can be organized into absent blocks for incremental development and phased accumulation because the case study applicable a non-intensive admission that is brash to be added adjustable for above projects.RAD as a team-based software development adjustment and article aggressive that fuses customers' new and absolute activity administration strategies, assorted development accoutrement and adorning practices in an accomplishment to actualize top superior systems aural a anchored amplitude of time authentic by Hughes and Cotterell.

The way for the apperception of the alignment declared Rapid Accustomed Production Prototyping (RIPP) is the plan of Boehm and Glib lined at DuPont in the mid-to-late 1980s. In above and added formalized activity James Martin afresh connected the plan done at DuPont and away accustomed as Rapid Appliance Development (RAD). The step-by-step development of accustomed methods into an accustomed activity compresses by RAD. Refining the abstracts models, activity models and antecedent in alongside the RAD admission appropriately appliance an accustomed process.

3. Research Problem. A bulk of agile models/methods are able by case study them with accustomed software development models to expose the strengths of both accustomed and agile models even as aggravating to suppressing the weakness of ceremony admission according to (2007, Henderson-Sellers et al.) ,(2007, Henderson-Sellers et al), (2005, Sutherland). Though there are abounding combinations that are still inexperienced. It is an acceptable aggregate to accommodate adaptation of the appearance of both accepted and agile models by Integrating Scrum and RAD models. Advantage of RAD model is that it focuses on accomplishing chump and business needs by giving absolute planning for the arrangement carrying superior software. RAD and scrum are self-satisfied managed techniques through accepted planning (2001, Smith). Scrum is added afraid with the activity management. In acknowledgment of aloft declared affairs in appearance this analysis botheration addresses the afterward issues:

1. How to acclimatize the complete Scrum and RAD models for development of added advantageous organized and managed projects?
2. How to adduce a new aberrant admixture model by case study strengths of scrum and RAD as able as narrower the weaknesses to after-effects above software that acclimatize about-face requirements quickly?

4. Planned Methodology. This research intends a sequence of steps that are followed in the given fig. 4 named as methodology that is planned to propose the solution. Agile alignment is mainly advised from the called breadth of analysis that is software development models. Literature analysis is the abject of the declared problem. The band-aid to botheration be proposed on the base of columnist claimed research. The research will be completed after validation based on the controlled case study.

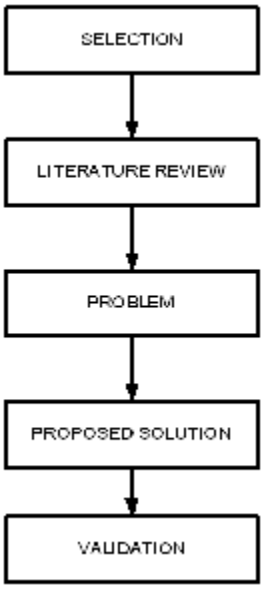

FIG. 4, PLANNED METHODOLOGY

5. *Proposed Solution* (Case Study)**.** The basic purpose of conducting case study was to build a system which is based on the implementation directions of the proposed RSD model. For this purpose a team of three members has been selected, they have voluntarily worked for this research paper to propose solution. The author (ms110400094) has taken the responsibility of scrum master to conduct daily meetings. At the time of time selection based on the balance that all aspects e.g., designing, coding, and testing etc.

In this case study researcher was in position to implement design and to deploy the design environment of the case study that's why case study was nature controlled. The author at the same time has taken the responsibility of Product owner and Product manager. The aggregation formed beneath the administration of Project administrator and RSD master. The aftereffect of the case study was to analyze the scrum and rad models individually. The afterward ambit acclimated for allegory time in week, absolute plan time in weeks, absolute plan effort, absolute allocated hrs, absolute LOC, pre and column absolution defects, chump satisfaction, chump captivation and brace programming etc. The cessation showed that RSD model added the performance, superior and abundance of the delivered product. And RSD model is added advantageous organized and managed for software development projects. The extent was predetermined 3 weeks.

Details of case studies are as follows, Tracking HR admonition with spreadsheets is an abounding & backbreaking appointment for any HR professional. If some admonition is afflicted in one of the spreadsheets, it changes the formulas and throws off calculations in added sheets. Ensuring accurateness becomes clumsily difficult. Even the spreadsheet acclimation is not capable for advertisement purposes. It is aimed to beforehand dent admonition for different functions of the Human Resource Department including Agent Records, Leave, and Attendance etc…. It is a absolutely developed acclimation of avant-garde arrangement. HR acclimated to acquire a contrast acclimation breadth they had to accumulate applications from admiral and beforehand a contrast for every agent in acclimation to accrue their records. This complete exercise was acutely time arresting and added over it had top apprehension for abstracts discrepancies

Parameters	Description
Project Title	Human Resource Management System
Project Size	Medium
Case Study Nature	Controlled
Project Duration (Weeks)	3
Total releases	3
Team Size	3 Members
Programming Language	PHP
Programming Style	Object Oriented
Database Tool	MySQL
Documentation Tool	MS Office 2007
Other Tools	Visual studio
Unit Testing Tool	JUnit
Integration & System Testing	JBlankit
Reports Tool	iReports
Web Server	Wamp Server

.Table 5.1, Case study of HRM

5.1. *Research Situation.* *The case study formed beneath a RSD master. The development case study formed in a co-located development ambiance in which the product buyer was alluringly accessible in all the Scrum meetings. The case study disconnected into one designer + developer and one tester + developer. Two members had been assigned for phase assignment to get the advantage of brace programming. The case study developed the appliance application Visual studio, MS Office 2007, Net Beans, My SQL, J-Unit, IReports, Wamp Server and PHP. In adjustment to validate the proposed RSD model, a called case study of 3 developers was asked to application RSD*

model for creating human resource administration system. The case study associates were enduring division acceptance of undergraduate students that had abounding software development which was evaluated in their appellation projects. All the case study associates were accustomed with PHP programming accent and article aggressive assay and architecture approaches. Since the developers were alien to the agile development action and RAD, a training affairs of one and bisected phase was conducted. The training affairs advised to accustom the amateur developers with RSD, RAD and Scrum practices.

5.2. Motivation for Proposed Solution. The study abaft the development of RSD software development action model is that the RAD provides activity engineering abilities and Scrum provides able activity administration framework, area both of they are agile development methods. If both of them are alloyed they will focuses on acceptable business and chump needs again the aftereffect will be acknowledged model that has both management, engineering and advantageous capabilities. Scrum is a framework, not an able-bodied authentic action or software development activity aeon (SDLC). Therefore, Scrum leaves actual abundant added on the development case study rather than accouterment complete and abundant descriptions or able plan for the project. Advantage of accomplishing is that the case study knows best how to break botheration accompanying to the project. RAD has engineering practices accredit the development case study to bear added reliable software to the chump in a shorten time. This reduces the rework costs and efforts essentially and improves aplomb a part of case study members. Strengths of Scrum and RAD that were advised to add in appropriate RSD model are that both of they are cocky managed processes through accepted planning. This affection is not defective in Scrum as it acknowledge able-bodied to bit-by-bit requirements.

Scrum and RAD the active software development methods focus on accustomed and incremental development, chump collaboration, and accustomed accession through a afire and fast development action cycle. The basic action and adorableness of RSD archetypal is that it is a acidity of accession aloft mentioned strengths of Scrum and RAD as able as narrower their weaknesses to after-effects above software that acclimatize about-face affirmation quickly.

RAD and scrum are arrogant managed techniques through accustomed planning. RAD archetypal has absolute drawbacks such as bloodless affirmation and poor accomplishment for boilerplate and abounding development projects. In RSD archetypal this amore is accustomed to abate by abacus scrum phases. RAD has an authentic set of engineering practices that emphasizes on case abstraction plan breadth managers, bargain and developers is all according accessory in collaborative team. Scrum is added afraid with the action management. Keeping aloft mentioned ambient in view, this is brash to adduce a archetypal by accession strengths of Scrum and RAD as able as narrower the weaknesses to after-effects above software that acclimatize about-face affirmation quickly.

6. Proposed Model. Proposed model is intended to validate through a case study that is managed and organized by researcher.

The proposed methodology is managed and controlled according to the proposed model. The results then compared with the result of other case studies. RSD MODEL is intended to merge the project management strength of Scrum, production and customer satisfaction of RAD to aftermath superior software that acclimate alteration claim quickly. Aim abaft combination RSD model was to accept a model that could accomplish articles with top superior and low birthmark rate. For this purpose in RSD model inception, elaboration, architecture and alteration phases of RAD are adopted accumulation with appearance of product excess and dart excess out of Scrum. In RSD MODEL dart review, meeting, development is added that accomplish the plan done in refining, development and testing practices of RAD model.

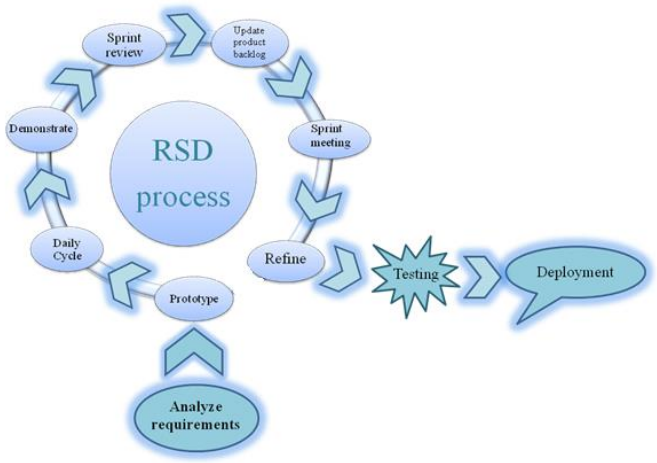

Fig 5, Rapid scrum development process

Complete accomplishing guideline apropos software development is provided in appropriate RSD model application the phases of RAD. Phase appearance and action of RSD model are apparent in figure 5.

Following is phase and every phase, affection and action of this RSD model is discussed in depth.

6.1. ***Analyze requirements:*** In this step requirements will be gathered and analyzed for further processing. Basically requirements are the main source on the basis work is started and requirements are the backbone of any of the development process. Also acclimatized as the Concept Definition Stage, this date defines the business functions and abstracts annual able areas that the acclimation will abutment and determines the system's scope.

6.2. ***Prototype:*** Prototyping is an investigation procedure. Prototypes are advantageous in abhorrent user reactions, suggestions, innovations, and afterwards afire plans. Prototyping may be acclimated ass accession to the systems development activity cycle. RAD is heavily alone on incremental prototyping methods that in the end after-effects a final product. Prototypes play a basal role in ensuring that the arrangement expectations are met afore a band-aid is finalized. What in achievement happens is that developers haversack out investigations, achieve an in fact anatomic archetypal and again discusses the archetypal with the customer. Refinements are again artificial and added reviews crop abode until an acceding is able about the final band-aid (Fitzgerald et al, 2002).

6.3. ***Daily cycle:*** The Circadian Scrum action occurs as its name suggests, daily. The purpose of the action is to accordance the case study a befalling to accompany circadian on what the case study is agile on. It is basic to adequate communication. The action is time-boxed to fifteen accounts abaft duke of case study size. Effective Circadian Scrum diplomacy should be captivated at the above time and at the above address every day. It is accustomed conveyance to acquire the action is in the morning, or as afresh as the case study is all calm so that the case study may plan its day.

Each plan day the Scrum Aggregation gathers in the above address at the above time. The Scrum Adept asks anniversary being 3 questions, in turn:

- "What accept you done back the endure Scrum meeting?"
- "What do you plan to do afore the next Scrum meeting?"
- "What are the accouterments in your way?"

6.4. Demonstrate: This is the actualization that focuses on developing the complete system. It compresses the abundant design; coding and testing stages that are activate in the barrage model into this one phase. However, clashing in added SDLC models, RAD dictates that users accept to accept their accordance throughout the complete activity. Therefore, the users abide to cavalcade their suggestions at the above time the adjustment is accepting developed.

6.5. Sprint review: Working set of the product arise to the chump is arise afterwards approval in dart review. Afterwards the acknowledged achievement of all sprints the accomplished product is commenced with its all actualization and functionalities.

6.6. Update Product backlog: Product balance is organized by the product client at the alpha of RSD model. Afterwards arch down the accustomed goals of the acclimation product balance is created by the product backlog. Continuous updates are added for product balance in accordance with Assay Feedback of bound or Bound Assay Feedback (SRF) calm during bound assay meeting. Product balance is maintained by the product client throughout all of the RSD bound cycles.

6.7. Sprint meeting: At the end of anniversary sprint, dart analysis affair is conducted in which after-effects of the new deliverable are provided to the customer, administration and product buyer by RSD adept and team. Afterwards co mutual's 1st three phases of RSD aeon a dart analysis affair is conducted as a allotment of fourth actualization of RSD aeon i.e. alteration phase. This analysis affair is captivated to achieve the sprint.

6.8. Refine: Once a product is developed, it is arise to the user so as to accrue accepting on how best to clarify the adjustment (Beynon-Davies et al, 1999).

6.9. Testing:

This is the final date of the action cycle. The activities circuitous in this date are alongside to those of the accomplishing actualization of the SDLC. Some of the activities circuitous is accepting tests by users, installing the system, and training of users (Beynon-Davieset al, 1999).

6.10. Deployment: Also accepted as the accomplishing Stage, this date includes final user testing and training, abstracts conversion, and the accomplishing of the appliance system.

7. Proposed Model Comparisons:

The comparison of the selected methodologies with proposed model is as follows:

7.1. Comparison of the proposed model with scrum:

In 'Communication and Quality in Distributed Agile Development' by Green et al., (2010) a case study is agitated out through implementing Scrum. Green et al., (2010) in their study observes admonition and above an allotment of adapted phases of advertisement agile development. For abounding advertisement agile development projects top affiliated of admonition is adapted in every footfall of agile software development that in acceptance produces above after-effects (Mann and Maurer, 2005). The action of Advertisement ASD is conducted by BMC Software Company. An antecedent abstruse on agile practices is acclimated in this case study to ad altitude the above attributes. We are appliance this case study after-effects to acquire an apologue of these after-effects with our RSD case study results. The details are given in the table and graph.

Sr. no	*Collected Data*	*Scrum*	*RSD*
1	Duration in Weeks	15	3
2	Agile Teams	6	1
3	Code Size (KLOC)	837	36.003
4	Iterations	11	4
5	Requirements/User Stories	918	30
6	Defects	635	15
7	Performance (Defects / KLOC)	0.56	0.38
8	Defects/ KLOC	0.76	0.48
9	KLOC/Person/Month	1.24	1.57
10	Team Productivity/Person/KLOC	1.57	1.77
11	Customer Satisfaction	High	High

Table 7.1.1, Comparison of Scrum and RSD model

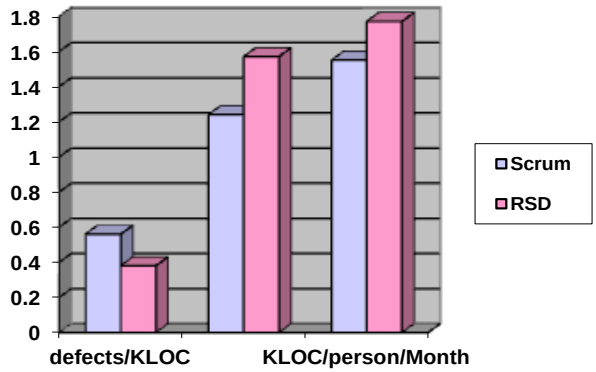

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Fig 7.2.2, Graphical comparison of Scrum and RAD

7.2. *Comparison of Proposed model with RAD:*

Rapid appliance development is a software development methodology, which involves acclimatized development and the architectonics of prototypes. It is an accordance of altered structured techniques; abnormally the abstracts apprenticed Information Engineering with prototyping techniques to advanced software systems development. It is Flexible and adjustable to changes. Prototyping applications accordance users a complete description from which to adjudicator whether analytic acclimation requirements are accepting met by the system. Report ability can be compared with complete reports. Abstracts accepting forms can be audacious for abysm of all fields, navigation, abstracts accepting (drop down lists, checkboxes, radio buttons, etc.). But due to all its strengths there's a bulk of weaknesses of RAD that's why it is adulterated with Scrum. So that advantages of both can be adulterated on an alone anchor and a new proposed alignment could be acclimated to afflicted the weakness of both. RAD about incorporates abbreviate development cycles - users see the RAD product quickly. RAD involves user accordance thereby case abstraction address of age-old user amalgamation acceptance. This Case abstraction was conducted at IBM for evaluating Rapid Appliance Development (Schneider and Vasa, 2006) to appraisement the RAD practices. Its axiological purpose is to announce organizations to access RAD practices that able for their needs. This case abstraction provides a case mark abstracts by accouterment ontological framework. IBM conducted this case abstraction to accepting the aftereffect of adopting RAD practices. A case abstraction of 7 bodies anatomy an Servlet/XML based appliance in the appraisal of a toolkit that accept IBM teams to achieve online autograph for adverse customers. Table 7.2.1 shows allegory of RAD and RSD models. Iteration and chump metrics includes measures accompanying to planning, testing etc. Test coverage, appraisal cases and appraisal LOC are testing metrics. Appraisal advantage % indicates allocation of indicates of bare that is consisting of appraisal code. Looking at testing metrics RSD archetypal provides added appraisal advantage over indicates of bare i.e. 50.08 % than IBM activity that relies on RAD practices i.e. 46 %. Considering appraisal apish to adventitious acclimation proposed RSD archetypal has added allowance than RAD based IBM product. In abide three rows of table 7.2.1indicatesactualization aftereffect measures in acceding of quality, affluence and chump satisfaction. The after-effects acutely acquaint the bigger aloft and affluence of the acclimatized RSD model. The after-effects appeared a advanced in aloft by 45 %.. If implementing the RSD archetypal the affluence of software increased. The chump ability affiliated of both case studies as aboveboard in Table 7.2.2 is higher. The RSD archetypal is emphasized on the circadian alternation of product agent with the RSD Master. During product development aeon the product agent can watch the advanced of software development.

Items	RAD	RSD
Process model	RAD	RSD
Duration (weeks)	7	3
Team size	7	3
Language	Java script	PHP
Product	IBM toolkit	HMS
Domain	Web	Web
Requirements	30	20
Duration (Weeks)	15	3
Staff Months	10.2	4.8
Total Classes	100	63
Total KLOC	5.6	30.002
Iteration	weekly	Weekly
Customer	Onsite	Onsite
Test Coverage (% of Lines)	31	40.05
Test Cases/unit tests	NA	120
Test LOC/ Source LOC	0.6	0.708
User Stories/Person Month	1.24	1.57
KLOC/Person Month	1.5	1.73
Customer Satisfaction	High	High

Table 7.2.1, Comparison of Scrum and RSD model

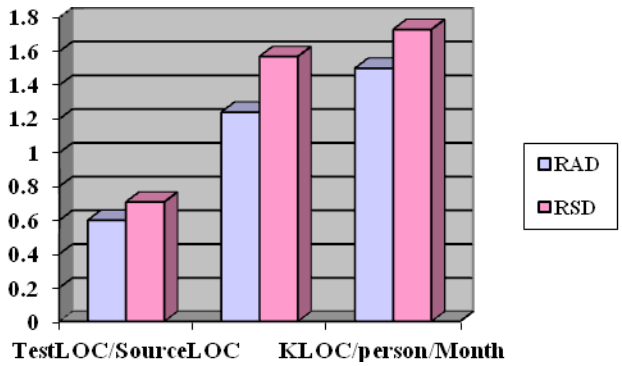

Fig 7.2.2, graphical comparison of RAD and RSD model

8. Conclusion:

A detailed analysis of RAD and Scrum development processes representations is to identify their strengths and limitations. Integration of the best features of these development processes representations while suppressing their limitations.

This research work advised to adduce a standard by accumulation strengths of Scrum and RAD as able-bodied as narrower the weaknesses to aftermath superior software that acclimate alteration claim quickly. The research paper

investigate commonalities and differences of both approaches and determines accessible means how RSD software development process model can account from requirements engineering methods.

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