An “agile” approach to develop a crowdsourcing platform: the case of Cre@tive.biz

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Abstract. Globalization has a significant impact over economic and social development, thus it also influences the speed of developing new products, starting from the product idea to the Minimum Viable Product (MVP). The software industry is one of the industries which have to face tough and specific challenges within this highly dynamic context, playing a major role in defining the world’s data for businesses, with a direct impact on the competitiveness of various industries. According to Lynn Holmlund’s survey [1] of IT decision makers across a range of industries, 59 percent of respondents reported that improving the quality of decision making is the primary goal driving investments in data technologies.

In a world underpinned by ever-more powerful, affordable, and public digital technology platforms, software is fast becoming the key source of economic value and competitive advantage in business. As a result, software applications are redefining nearly every industry, and Agile methodologies are redefining the software development process. Understanding the demand for developing software applications on time and responding to the users’ needs and expectations are the first steps in using the Agile framework in product development and are even more important within the context of research projects, such as CRE@TIVE.BIZ, an ongoing project within the framework of the Romanian National Plan for Research, Development and Innovation 2014 – 2020 (PNCDI III).

The goal of the project is to develop an open collaboration and innovation platform, CRE@TIVE.BIZ, which will be an experimental model dedicated to create a community where all relevant stakeholders can meet, interact, gain access and share information, knowledge and resources.

The paper presents the platform development scenario, using a new and “agile” approach, namely Scrum, for product development based on continuous learning and optimization of development process, team involvement, prioritize the features – especially from the users’ perspective – and stakeholder’s involvement in describing the product, testing and acceptance. This new approach improves the delivery time and maximizes the results by using client’s involvement in each step of the process, describing more clearly the platform functionalities and shortening the decision-making process. The tangible result will be the road map for CRE@TIVE.BIZ platform development, specifying tasks, roles, milestones and outcomes.

1. Introduction
There are a few key components that “re-shape” the way of doing business today: a) the advance of new technologies, that enable companies open bidirectional communicational channels with their customers and to be present on every market, much faster and more competitive; b) the access to limitless digital resources available online and to a “crowd” of supplies via internet, resources that can bring low fees with no strings attached, fast delivery and unlimited creativity.

These assumptions are even more valid when it comes to the software industry and over the past years many companies have fundamentally changed the way they tackle challenges when it comes to online instruments and applications development and started to replace the traditional plan-driven approaches with Agile software development (ASD) [2].
2. An overview of the Agile framework, focus on Scrum Methodology

In this specific context, the big challenge for companies is to synchronize and manage all the resources needed to deliver the expected results. This can be done when all the stakeholders involved in the development and the delivery processes are on the same page and the agile framework is offering an approach to this challenge and align all the resources to deliver faster, better and more robust pieces of software.

According to Cunningham [3] the agile framework is based on and is promoting the following values: “Individuals and interactions over processes and tools; Working software over comprehensive documentation; Customer collaboration over contract negotiation; Responding to change over following a plan; That is, while there is value in the items on the right, we value the items on the left more”. The Agile framework recognizes five well-known processes like Extreme programing (XP), SCRUM, Feature Driven Development (FDD), Test Driven Development (TDD) and Lean Software Development. SCRUM is one of most used Agile methodologies in the software industry. The SBOK Guide [4] recognize 19 processes grouped into following five stages as presented in table 1.

| SCRUM Stages | Associated processes |
|--------------|----------------------|
| 1) Initiate, that include the processes related to initiation of the project | Create project Vision based on business case description and the Product Owner is identified; Identify Scrum Master and Stakeholder(s) using specific selection criteria; Form Scrum Team, by Product Owner and Scrum Master; Develop Epic(s) aligned with Project Vision statement and Project Business case; Create prioritized Product Backlog form by refined and elaborate epics with a specific priority. The definition of “done” is established; Conduct release planning is the process where the user stories are defined and the Release planning schedule is developed. The length of the sprint is also determined. |
| 2) Plan and Estimate, consists of processes related to planning and estimating tasks | Create User stories, is a process of creation of User stories and User Story Acceptance criteria. These are usually done by the Product Owner and are designed to ensure that the customer’s requirements are clearly depicted and can be fully understood by all stakeholders; Approve, Estimate and Commit User Stories. The approval of User stories for a sprint is done by Product owner and then the team estimate the effort required to develop the functionality described in each User story and also assign a number of story points to measure the complexity of the work and commit to deliver the customer requirements; Create tasks is part of the process where the development team decompose the User stories into specific tasks. Estimate tasks is done, also, by the Development team and represent the estimate effort required to accomplish each task; Create Sprint Backlog is done at the beginning of each sprint and include all the tasks to be done in the sprint. |
3) Implement – execution of the tasks and activities to create project’s product. these activities include creating the various deliverables.

Create deliverables is the direct results of resolve the tasks committed. A Scrum board is used to track the work among the team.

Conducting Daily Standup Meetings are organized by Scrum Master to update the progress of each member of development team and any impediments that they are faced. These are time boxed – 15 minutes – and highly focused every day meetings.

Groom the Product Backlog is an updated Product’s Backlog process by resolving and closing tasks from the sprint. Convene Scrum of Scrums is designed to synchronize the Scrum teams into a large project only.

Demonstrate and Validate Sprint is an important step in the process when the Scrum team demonstrate the sprint deliverables to the Product owner and relevant stakeholders. This is done into a Sprint review meeting and the purpose is to secure acceptance for sprint deliverables.

Retrospect sprint it’s a sprint revising meeting when the Scrum team is invited to evaluate the sprint discuss and capture any lesson learned throughout the sprint into a documentaries system and for improve the future work.

4) Review and retrospect which include is concerning with reviewing the deliverables and the work that has been done and determining ways to improve the practices and methods used to do project work.

5) Release is the phase that emphasizes on delivering the Accepted Deliverables to the customer and identifying, documenting and internalizing the lessons learned during the project.

Ship Deliverables is the process of transferring the accepted deliverables to the relevant stakeholders.

Retrospect Project is a formal meeting with the Scrum Team where different project’s implementation aspects are discussed, document and internalize to improve implementation of futures projects.

The Scrum methodology recognize three process’s essential elements (figure 1 - Scrum’s essential process): 1) Ceremonies – all the meetings held by the team, time boxed usually meant to improve the process, 2) Artifacts – any piece of documentation produced by Scrum team to document the process, and 3) Scrum Team – covering three most important roles in the Scrum Methodology – Product Owner represent the Stakeholders interests in the project; Scrum Master is responsible with Scrum adoption in the team and Scrum Team – consist of professionals who are self-organizing and cross-functional.

There are following Ceremonies in Scrum: 1) Sprint Planning Meeting is time boxed and gather the whole Scrum team (Product Owner, Scrum Master and Development team) to decide what is to be developed in the next sprint based on Product Backlog and how the Sprint goal it will be delivered and that will happened when all necessary tasks will be delivered. Depending of the length of the sprint the meeting could take 2 to 4 hours; 2) Daily Scrum Meeting is a 15 minute daily meeting during Project lifespan, at same time in a day, in same place of the office, when each member of the Development team explains what do they accomplished since last meeting, what they are going...
to do until next meeting and if they meet any obstacles in their work; 3) Sprint Review/Demonstration Meeting it’s a meeting held at the end of each sprint to demonstrate that the sprint goal was achieved and all the deliverables are done according with definition of “done”. The Product owner review and accept the sprint; 4) Sprint Retrospection Meeting, is the meeting where entire scrum team revises the way of work in that particular sprint to make it more efficient. If Sprint review focused on the results of the sprint, Sprint retrospection focus on process of doing the deliverable to improve.

The Scrum Artifacts are: 1) The Product Backlog is an ordered list of everything that should be needed in the product and a single source of requirements for the project. All that information is presented here as Epics, User stories, Tasks create from decomposing the Project requirements, from top to bottom at the level of tasks or Bugs resulting from testing scenarios run for all the implemented items. All the changes are documented and included here. It’s a living document in property of Product Owner. 2) Sprint Backlog it’s a set of Product Backlog items selected for the Sprint by the Development team and commit to be delivered to achieve the Sprint goal; 3) Product Increment is resulting from the work of development team that meet the condition of definition of “done” assumed by Scrum Team and consist of thoroughly tested code that has been built into an executable.

The main focus of the Scrum process is the team which consists of a Product Owner, the Development Team, and a Scrum Master. Scrum Teams choose how best to accomplish their work, rather than being directed by others outside the team. At the same time, cross-functional teams have all competencies needed to accomplish the work without depending on others not part of the team. Cunningham [3] affirm that the team model in Scrum is designed to optimize flexibility, creativity and productivity. In SCRUM the team consists of professionals who do the work of delivering a potentially releasable Increment of “done” product at the end of each Sprint. In each sprint the development team assumes a number of User stories to be done to the end of it and it’s the Product Owner’s responsibility to describe the functionality needed by customers as clear as possible. These functionalities could be done in one or more sprints and consist in one or more User stories but the important part is that Development team understand these requirements and is able to deliver the right piece of software for it.

It’s important for the development team to define the concept of “done” for their work – usually the work is considered done when all the code is implemented, is tested and the bugs resulted from the tests are resolved. This concept will guide the Development team to decide if a User Story is finished and can be deliver, form their point of view. In this moment the development team evaluates their work for themselves which consist in a better approach for implication of the team in the whole process of software development. A better definition for “Done” will be conceived when the team fully understand the requirements of the client. It’s the Product Owner’s responsibility to create and maintain the Product Backlog, meaning to decompose the requirements into Epics and User Story, to describe how they are related on the big pictures of functionalities, and the accuracy of the description will impact the work of the team. Because user story descriptions are traditionally hand-written on paper note cards, Ron Jeffries [5] has named these three aspects with the wonderful alliteration of Card, Conversation, and Confirmation. The Card may be the most visible manifestation of a user story, but it is not the most important. Cohn [6] added that while the card may contain the text of the story, the details are worked out in the Conversation and recorded in the Confirmation. The development team will spend less time to clarify the specifications and more time in optimize the technical solution; less time to refine the product into refinement meetings and more time to interact each other and test the product, and, never the last, the estimations will be more accurate in terms of time and complexity (velocity) which bring more accuracy about team capabilities and project’s feasibility and predictability. Like the “done” concept, the concept of “Ready” is defined, and usually the description of the work is ready when the development team understands all the requirements and it’s clear for them what is needed to be done. That’s the moment when the whole team commit for the work to be done in the current sprint.

It’s important to mention that in Scrum, and all the Agile framework, not all the requirements are well known at the beginning of the project. The Agile methodologies recognize that the high-level requirements and validation of critical assumptions would be enough to start a project and that the value-
added of the business will be increased by early delivery on the market of a new product than a perfect product, launched too late. This approach is more open to launch quick new products and test new ideas than to create a perfect and complete piece of software with more not-needed features, give time and space to innovation in software industry through spend much energy in relation with the customers and end user, understand their needs, their business, educate their expectations, optimize the product, deliver only important piece of software for the client not just get paid, impact the way of client is doing business not only by the software delivered but by the new and optimized processes included. SBOK [7] mention some of the key benefits of using Scrum in any project: 1) Adaptability—Empirical process control and iterative delivery make projects adaptable and open to incorporating change; 2) Transparency—All information radiators like a Scrum board and Sprint Burndown Chart are shared, leading to an open work environment; 3) Continuous Feedback—Continuous feedback is provided through the Conduct Daily Standup, and Demonstrate and Validate Sprint processes; 4) Continuous Improvement—The deliverables are improved progressively Sprint by Sprint, through the Groom Prioritized Product Backlog process; 5) Continuous Delivery of Value—Iterative processes enable the continuous delivery of value through the Ship Deliverables process as frequently as the customer requires; 6) Sustainable Pace—Scrum processes are designed such that the people involved can work at a sustainable pace that they can, in theory, continue indefinitely; 7) Early Delivery of High Value—The Create Prioritized Product Backlog process ensures that the highest value requirements of the customer are satisfied first; 8) Efficient Development Process—Time-boxing and minimizing non-essential work leads to higher efficiency levels; 9) Motivation—The Conduct Daily Standup and Retrospect Sprint processes lead to greater levels of motivation among employees; 10) Faster Problem Resolution—Collaboration and colocation of cross-functional teams lead to faster problem solving; 11) Effective Deliverables—The Create Prioritized Product Backlog process and regular reviews after creating deliverables ensures effective deliverables to the customer; 12) Customer Centric—Emphasis on business value and having a collaborative approach to stakeholders ensures a customer-oriented framework; 13) High Trust Environment—Conduct Daily Standup and Retrospect Sprint processes promote transparency and collaboration, leading to a high trust work environment ensuring low friction among employees; 14) Collective Ownership—The Approve, Estimate, and Commit User Stories process allows team members to take ownership of the project and their work leading to better quality; 15) High Velocity—A collaborative framework enables highly skilled cross-functional teams to achieve their full potential and high velocity; 16) Innovative Environment—The Retrospect Sprint and Retrospect Project processes create an environment of introspection, learning, and adaptability leading to an innovative and creative work environment.

3. The case of Cre@tive.biz platform development
Scrum’s best fit is for software project but all the results on software project can be used and apply for any type of project, as long as the main principles are kept. Following the Scrum methodology describe we have translated the Cre@tive.biz project to be implemented by this methodology:

- Initiate the project.

The project proposal aim for Cre@tive.biz is to create an innovation platform, sustained by a community with relevant stakeholders, with three components: crowdsourcing, where the visitors and also the users can address questions and find answers, share creative ideas in order to receive feedback, find solutions to different problems, interact with third parties form the same industry, share and find opportunities, find partners and collaborators, etc.; marketplace for finding relevant providers of products or services needed, addressing a targeted market (for the providers), buying and selling products and services related to creative industry and e-shop for presenting the products/services and selling them to a wider online market; promoting products and services from creative industries. All these components should address the needs and wants of our target groups, namely entrepreneurs from specific creative industries. In our project there would be two distinct phases of the project lifecycle: 1) Academic research phase where the project team survey the crowdsources and open innovation phenomena and extract valuable results. Based on that the second phases start 2) The Cre@tive.biz
platform is build based on research’s findings and conclusions. Base on that the project team will be split in two parts to covers those two phases of the project. In the first half of the team the researchers will develop the Project Vision of the project and the Product Backlog form by items related with research activity but also the Users stories with development items need to be implement for witch the results of research activities are the input. The user stories will be prioritizing to meet the research methodology and deliver high academic results. In this case the Product Backlog will be create and maintained by project director, who knows best the project. The definition of done will consist in any valuable results comes applying the correct academic research methodology. For second half of the team, form by professionals who can implement the software to deliver Cre@tive.biz platform required. They will start the project later but, to save time, they will have a valuable input in describing the hypothesis of technical approach to the end users. Involve them in early stages of the project may avoid problems caused by technical challenges that may occur. The Scrum Master will be assigned from the beginning to assure accuracy of the process. The Product Owner will be appointed in this stage and will cover both implementation phases of the project.

- Plan and Estimate

The project already inherit time constrains from its proposals that Scrum team need to taking care of in process of planning the releases of results. The important part here, to have accurate estimations, is to describe as god is possible the customer’s requirements into User stories and decompose into well-defined pieces of work. For research part the estimation activity will taking into consideration the complexity of methodology that will be used, the number of researchers, the experience that may have, the expected results to validate the process, any other stakeholders that may be contribute to the results or the process. All the methodology will be split into small activities that must be made to respect the process and returns expected results and then all those pieces are linked one to another, prioritize and estimate in time. If the time will not be enough the number of the member of the team will be raised. Based on estimated time calculate we will consider to run 2 weeks Sprint for both phases of the project: research phase & implementation phase. The estimation for implementation phase will be done with development team, incrementally when the tasks are clear and definition of done, in place.

- Implement

There are two kind of deliverables that will be produced in the project:

Research methodology; Quantitative and qualitative research instruments; Quantitative research reports (statistical analysis); Qualitative research reports (Focus groups and interviews) as a results of research phase of the project, and

1. In-house testing version of the Cre@tive.biz platform; User Manuals for each type of account available on the platform (SMEs and freelancers from creative industries, product and services suppliers, potential clients); Testing reports as a result of development and testing the code used to create the platform.

To produce those results the teams will be organized into Scrum teams for two weeks sprint. All the work must be done is included in Product/Sprint Backlog. The Product Owner will clarify all the aspects related with stakeholder’s expectation, the sprint goal and document the changes and the Scrum Master will ensure that the process if followed. There will held daily meetings and sprints reviews at the end of each sprint to capture and implement the process adjustments that may be needed. We will use a digital and online Scrum board for whole team where the Product Backlog will be held. All the resolved and closed tasks will be shown into Product backlog and a burndown chart will be generate automatically to capture the progress of the sprint/project.
There is no document created after daily meetings because all the tasks are in Sprint backlog and each member of the team describe the status of the tasks: new, active, resolved or closed. The way of record the progress of the development is showed into Burndown chart example where the team can see the cumulative results of the development for one sprint. The blue area represents the workload for entire sprint, expressed in hours and spread it on three and a half weeks long Sprint. The two lines in the chart represent the team allocated for the sprint spread along sprint interval. The green one represents the total amount of hours allocate for this sprint by the whole team: development, documentation, testing, etc.; the blue line indicate how many hours are for development only in this sprint. Depending on the lifespan of the project those two lines could be much closed or very far – it’s about the type of the resource needed in one very moment. Often, at the beginning of the project there are more developers than testers and, at the end is other way around. In this specific example the project encountered some changes so that the first week has only documentation tasks.

2. Review and retrospect
   At the end of each sprint a sprint review meeting will be held by Scrum team to show to Product Owner the results of the sprint work. Only the tasks that meet the definition of done is presenting at this meeting. Any lessons learn will be discussed and documented to be included in the implementations process of the project. To have an overview of whole project the team can use another representation – Cumulative flow (figure 2) showing how much effort was spend in the project. The different colors represent the different stage of tasks in the project: green (Closed) – all closed tasks (developed, tested and accepted); dark blue (Resolved) – all the resolved bugs; light blue (Active) – the active tasks, in development and grey (Active) – all the tasks that are new and not started yet. These meetings are very important for the team in any phase of the Cre@tive.biz project to assure the team that the deliverables meet the expectations and the development process is follow with customer’s expectations delivered.

3. Release
   The platform will be implemented and accepted by Product Owner. There will be an intermediary step in delivering the platform to the end users – the acceptance testing step. For that an acceptance test environment will be setup by development team for Product owner and another relevant stakeholder to test requirements and release acceptance tests to the Development team. The final product will be

![Cumulative flow](image)

Figure 2. Cumulative flow of work into a project; an example of how a 6 months project look like.
delivered in live environment when all the tests on acceptance environment are done and with good results, the project required documents are done and a maintenance schedule is setup and agreed with project stakeholders.

4. Conclusions

Cre@tive.biz platform will be built for all professionals from creative industries that what to work together and find innovative ways of collaborate and expand the knowledge, bring new a sustainable idea, contribute to the industry that they are part of. For those reasons, using Scrum methodology to develop the digital platform is best way to do it knowing that all processes are focused on most important need of the customers, validate the results with stakeholders at the end of each sprint to be align with customer’s requirements, go live on early stages, enable initiative throughout team’s member, adapt the quickly changes in the development stages, bring business values to the customers using new and innovative technologies, develop team capabilities enabling access to new technologies, enhance the communications among team members, etc. The best way to build a Cre@tive.biz platform for creative professionals is using an Agile – customer centered – methodologies.

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5. References

[1] Holmlund L 2014 CEOs Call for Big Data and IT Continues to Lead Investment Decisions, Economic impact of software Report, The software alliance p 11
[2] Dyba T and Dingsøyr T 2008 Empirical studies of agile software development: A systematic review Information and Software Technology 50(9-10) 833–859
[3] Cunningham W 2001 Retrieved from Manifesto for Agile Software Development: http://www.agilemanifesto.org/
[4] SCRUM study 2014 SBOK Guide (Pheonix, Arizona: SCRUMstudy) p 35
[5] Jeffries R 2001 Essential XP: Card, Conversation, and Confirmation XP Magazine.
[6] Cohn M 2004 User Stories Applied for Agile Software Development (Boston: Addison-Wesley)
[7] SCRUMstudy 2014 SBOK Guide (Pheonix, Arizona: SCRUMstudy) p 23 - 24