

AGILE_{UX}Model – Towards a Reference Model on Integrating UX in Developing Software using Agile Methodologies

Angela Peres¹, Tiago Da Silva³, Fernando Selleri Silva¹, Felipe Furtado Soares^{1,2}, Carlos Rosemberg⁴, Silvio Meira^{1,2}

¹Universidade Federal de Pernambuco (UFPE), Brasil

²C.E.S.A.R - Centro de Estudos e Sistemas Avançados do Recife

³UNIFESP - Universidade Federal de São Paulo, Brasil

⁴Instituto Atlântico, Fortaleza, Brasil

Abstract—This paper presents a maturity model for integrating agile methods and user experience in the software development cycle that may be suitable for small companies. The proposal is in line with CMMI, MPS.BR and ISO18529. The model focuses on the first level of maturity where seeks to establish a standard process within an organization by defining agile practices, principles, techniques and artifacts of user experience. It also offers guidelines on how to integrate practices that are important for the evolution of maturity in order to evolve to more advanced levels. The preliminary model was verified by panels of experts. Future studies will be conducted so as to extend the model and do so by detailing other process levels and conducting action research at companies with experience in the maturation of process of integrating user experience into the software development cycle with CMMI and/or MPS.BR certifications.

Keywords— Maturity models; CMMI; User experience; Agile methodologies.

I. INTRODUCTION

Seeking solutions for increasingly complex demands, specially those with volatile requirements, tight deadlines and budgets, agile methodologies are successfully being adopted in many software development organizations all over the world [1,2]. Recent studies have been devoted to proposing solutions for integrating agile practices into maturity models [3,4]. Maturity models have been developed for, specifically, address the inclusion of user experience in the software development cycle[5]. However, few researchers have been proposed about maturity models or processes which include practices, recommendations, techniques and artifacts of agile methodologies in combination with user experience[6-10]. A maturity model can establish a reference model in order to have a vision of goals to be achieved and how to achieve them [11,12]. Studies have demonstrated that this reference is especially important to small- and medium-sized enterprises (SME) that have limited budgets, finances and human resources [13-16]. This proposal is based on a literature reviews on: user experience maturity models including those for SME and user experience processes which integrate agile methodologies. The proposal sets out guidelines aligned to CMMI (Capability Maturity Model Integration), MPS.BR (Brazilian Maturity Model for Software Improvement) and ISO18529 (International Standard related to user centered design). The first ones plays an important role in the software

development scenario globally and in Brazil and the last one is an important reference on user experience [11,12,17].

The paper is structured as follows: Section two discusses the history and evolution of maturity models related to user experience and presents processes and practices of user experience integrated with agile methodologies; section three presents a summary of AGILE_{UX}MODEL – the maturity model on integrating user experience into the software development cycle; finally section four discusses expected contribution and evaluation plans.

II. BACKGROUND

Maturity Models in User experience have been proposed and analyzed in recent decades [5]. One of the first published models, which is related to usability is the one by Earthy [18]. A checklist with sets of related practices associated with each of these stages enables to assess the maturity level of a given organization. The emergence of ISO 18529 complementing ISO 13407 stands out with respect to user-centered processes. This standard is also used as base to user experience models developed by industrial and academic scenarios [18-20]. The recent models have evolved in detailing the dimensions to be managed which includes: integration of user experience practices on development cycle; formalized strategy; corporate design standards; knowledge database of successful cases; education and training; budget and dedicated staffing. The HFI model is an important reference about these refined and actual dimensions that is used by a large community of usability practitioners [21,22]. The most actual user experience maturity models emphasize the strategic importance of user experience [23-27]. Although, minor companies has been considered at this level of usability maturity, some practices could be incorporated into the initial levels like: usability measurements associated to strategic business values and usability knowledge database that motivates the reuse of patterns [21-27].

In order to suit the circumstances of small and medium-sized companies which use agile methodologies, other important research used in this study consists in the model of [29] that suggests the use of SCRUM to make incremental and successive refinements in the integration of practices while observing the critical and priority resources of the organization and a reference model.

Another important aspect for SMEs consists in providing more detail on how to implement a reference process[14-16]. Da Silva [7] conducts an extensive review of the tools and techniques used in the industry and academics. Salah [6], Da Silva [7], Sy [8], Ratcliffe, McNeill [9] and Brown [10] suggests practices and recommendations for integrating user experience in companies using agile methodologies. These studies suggests a number of agile principles and recommendations, practices, techniques and artifacts that should be used to promote the development of the user experience at AGILE_{UX}MODEL.

III. AGILE_{UX} MODEL

The reference model uses the practices, recommendations, suggested techniques and artifacts recommended for user experience which were mapped on previous studies (section II). The focus of this research is on CMMI level 2 in which the standard process of the organization is being defined. Level 2 maturity can be achieved in one or more cycles of improvement depending on the organization and its resources. A summary is available at Table 1.

TABLE I. SUMMARY OF AGILE_{UX}MODEL - Practices, Recommendations, Techniques and Artifacts - RELATED TO CMMI LEVEL 2 (PROCESS AREAS) ALIGNED TO ISO18529 BASED ON HFI DIMENSIONS and UPA MEASUREMENTS

HOW TO DO: Iterative cycles based on [29].Plan execution of improvement sprint; Improvement sprint meeting and review; Improvement sprint retrospective.			
DIMENSIONS TO BE OBSERVED AT EACH CYCLE OF SOFTWARE IMPROVEMENT: integration of user experience practices on development cycle; formalized strategy; corporate design standards; knowledge database of successful cases; education and training; budget and dedicated staffing [21, 22]			
Process Area[11]	Suggested Practices	Recommendations	Techniques and Artifacts [7,8,9]
RM	Adopting, when while surveying requirements, agile tools and methods which allow a design over time, granularity and display formats suitable for agile methods; Using faster, lower fidelity and evolutionary design both in the phase of defining the scope as well as in the following phases with a view of fostering and facilitating requirements management. Involving users, when while gathering and validating requirements, who can elucidate the views of the different areas of the system.	It is has been recommended that user experience designers always work one or more sprints ahead of other developers. Designers should conduct research (LDUF) before development, work on the current sprint and take note of new information to be researched and should support developers; and in the finalized sprint, they should evaluate the final interaction of whatever is going to will be delivered. Users' stories can be derived from the scenarios of usability. Promoting, throughout the project cycle, the shared vision of goals of the business objectives of the design and development of each requirement.	Suggested Artifacts: personae, sketches, prototypes of low, medium and high fidelity; mockups; story cards, conceptual models, wireframes, wikis and storyboards. Suggested techniques: interviewing users; observations and contextual inquiries; focus groups; brainstorming; informal cognitive walkthroughs; card sorting, peer review design
PP&PM	Planning strategies which facilitate the effective participation of the stakeholders/users who will be affected by the system, or their representatives. When planning the project, being careful and trying to maintain a constant level of usability activities throughout the project cycle with the focus on the user's experience. Promoting actions that enable the business strategy to be aligned with the design requirements, thus making it possible to have a better understanding of how each requirement contributes to business success.	Teams must be physically near each other so as to enhance the communication and exchange of agile documents. Fostering the view that the usability and development of the product are seen as inseparable parts of a quality product that will be delivered. Whenever possible, using the market value and ROI of each software delivery to prioritize the requirements to be delivered.	Suggested Techniques: Workshops, Focus Groups, Brainstorming.
PPQA	Running user tests throughout the development cycle from design to product delivery. When designing, prototype may be used. As the design progresses, the importance of more interactive prototypes is accentuated, and at the end of each release, so are testing with real users or representatives of real users of the product. Integrating usability aspects as criteria for acceptance of the software. Using measures that ensure that the process can be visible and understood throughout the organization.	Foresting the idea that customization can occur throughout the cycle. making improvements in processes in an evolutionary, incremental and iterative way in order to enable important and/or critical practices to the organization to be prioritized. Promoting the storage of knowledge acquired in the project for reuse in future projects.	Suggested artifacts: personae, sketches, prototypes of low, medium and high fidelity, mockups, user story cards, wireframes, storyboards. Suggested techniques: interviewing users; focus groups; brainstorming; informal cognitive walkthroughs; simplified think-aloud; heuristic evaluation; peer review design; card sorting; user testing (recommended: RITE - Rapid Iterative Testing and Evaluation).
M&A	Collecting and managing measurement that enable to evaluate the quality of interaction. Evaluating the strategy, methods, techniques and devices used (benefits and limitations in the context used).	---	Suggested artifacts: specifications, database and tools to collect and analyze base and derived measures.
SUGGESTED MEASUREMENTS [28]: improving productivity when using the product; reducing support and training costs; improvements in sales and revenues; reducing time and costs when developing the product; reducing maintenance costs; improvements in attracting and retaining customers; improvements in satisfaction with the interaction; investment and infrastructure			

The retrospective prescribed by SCRUM at each sprint, should also be adopted for each cycle of process improvement initiative that should finish with collecting the measurements, discussing the lessons learned, storing knowledge acquired in the project for reuse in future projects, and identifying the critical problems found in the cycle just ended by observing dimensions and practices proposed on the AGILE_{UX}MODEL [29]. The dimensions are: integration of user experience practices in the development cycle; strategy formalization; developing corporate design standards and a knowledge database of successful cases; education and training; dedicated budget, and dedicated staffing [21,22]. There is a need to reflect the skills acquisition and the necessary training, the infrastructure of tools, the human and finance resources, and the commitment of senior levels of organizational management on the quality of the process [21,22].

IV. EXPECTED CONTRIBUTION AND EVALUATION PLANS

The expected contributions of the model are: the possibility of making improvements in processes in an evolutionary, incremental, and iterative way in order to enable practices which are important and/or critical for the organization to be prioritized; suggesting agile recommendations, practices, techniques and artifacts; aligning with CMMI, MPS.BR, ISO18529. This is a preliminary model revised by a panel of specialists as suggested by [30]. Future work will enable the model to be extended and refined by: detailing other process levels; increasing the number of evaluators; executing action research at companies with experience in the maturity of process of integrating user experience into the software development cycle with CMMI and MPS.BR certifications

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