Elevating User Experience Across Your Software Organization: A Guide to UX Maturity Models for Software Teams

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Abstract: As digital transformation becomes the main theme and driver of many industries, software organizations face significant challenges requiring increased attention to the user experience. However, commonly adopted software process capability/maturity models (SPCMMs) like CMMI or ISO/IEC 15504 do not explicitly cover user-centered design (UCD) processes, raising the question of whether SPCMMs exist that focus explicitly on UCD and usability. We conducted a literature review on usability capability/maturity models (UCMMs), identifying and analyzing published models. Understanding how software organizations can consider UCD processes within their software development lifecycle can lead to Increased productivity and quality, reduced cycle time, and more accurate and predictable schedules and budgets.

I. Introduction

Motivation: As software development becomes a critical industry, software users become more sophisticated, and their needs require more than "good enough" functionality. "The Business Value of Design" report (McKinsey, 2018) studied the effect of good design on financial performance. More than two million pieces of financial data and 100,000 design actions were used to develop the McKinsey Design Index (MDI) that demonstrated a strong correlation between high MDI scores and superior business performance.

Problem Definition: Products and services should not only satisfy but exceed customers' needs by applying the latest technologies and delivering new products that fit new business models (SaaS, PaaS, etc.…). Traditional software development companies are functionality-driven rather than user-driven, often requiring significant post-production rework. Improving and developing the usability capability of software development organizations can change that metric.

Level	Characteristics
1: Unrecognized	UX not considered
A wake-up call is needed
2: Initial	Low/late user involvement
Individuals perform UX processes
Ad-hoc management of UX
Unpredictable quality of products (processes often changes)
3: Tactical	Insufficient support from top executives
UCD is accepted, but sometimes traded off for development
Lack of formal UX literacy
4: Strategical	Full understanding of UX ROI
UX ROI is linked to the business goals
UX is controlled and predictable
5: Optimal	Continuous improvement of UX processes
UX culture established
The leadership is user-centered

Figure 1. UX maturity Levels

Rukonić, L., Kervyn de Meerendré, V. and Kieffer, S. (2019) 'Measuring UX capability and maturity in organizations', Design, User Experience, and Usability: Practice and Case Studies, pp. 346–365. doi:10.1007/978-3-030-23535-2_26.

	Characteristic	Description
Model related	Origin	A solid basis for the model.
	Scope	Specification of the domain of concern (software, health devices, telecommunication, products, agile).
	Documentation	Adequate documentation of the model.
	Unambiguity	Easy to understand; constructs and relationships should be defined and described unambiguously and consistently.
	Flexibility	Model can be flexibly used in different situations and organizations.
	Coverage	Model broadly covers the relevant issues that might impact the usability capability.
	Practicality [Concrete Guidance]	Extent to which the model provides details for how to use it
	Validation [Empirical Evidence]	Extent to which the model is confirmed with research evidence and how it is evaluated.
	Cost of application	Amount of resources/cost required to apply the model and follow its recommendations.
	Assessment method	Self assessment vs. assessment done by internal staff vs. third party or certified assessor needed to execute and monitor the assessment.
Process related	User-centeredness	Extent to which the development process incorporates the activities and follows the principles of user-centered design.
	Execution	Extent to which user-centered design activities are carried out with appropriate procedures, methods, tools and technology.
	Influence	Extent to which the results from user-centered activities have an impact in the design of the product.
Team/people related	Skills	Extent to which there are user-centered design skills available in the project.
	Commitment	Extent to which the development team is committed to user-centered design.

Figure 2. Characteristics to consider while choosing among UCMMs

II. Approach

Proposed Solution:

A. The first step in an improvement process is to understand the current status: What are the strengths and weaknesses of user-centered design in the organization?. Such current state analyses are often called 'capability maturity assessments.' Capability refers to the ability to achieve the required goals of a process. while maturity: refers to the ability to consistently implement processes. Capability maturity models (CMMs) models have their roots in quality management, but have been proposed for a range of other activities, such as: research and development effectiveness, product development, innovation and product design.

- **CMMs may be concerned with any of three dimensions:**
  - **Process maturity:** the extent to which a specific process is explicitly defined, managed, measured, controlled, and effective
  - **Object/technology maturity:** the extent to which a particular object (like a software product, a machine or similar) reaches a predefined level of sophistication
  - **People**: the extent to which the workforce can enable knowledge creation and enhance proficiency
- **CMMs include:** a process reference model (PRM) [best practices] and a process assessment model (PAM) [ways to measure the performance, management and quality of the UCD activities against best practices].
- **CMMs** can be **descriptive** (model diagnoses current capabilities), **prescriptive** (model suggests specific actions for improvement) or **comparative (**model enables benchmarking with similar organizations).
- **UCMMs** determine the ability of a development organization to perform effective user-centered design and develop usable products. UCMMs include five or six levels that describe the level of capability/maturity of a process (Figure 1).

Some UCMMs:
- Trillium by Bell Canada; Usability Leadership Maturity Model by IBM (US); HumanWare Process Assessment model by Philips (Netherlands); User-Centered Design Maturity by Loughborough University (UK); UMM-HCS (developed in the European INUSE project); Human factors integration process risk assessment (HFIPRA) (developed in UK government projects); KESSU (developed at Oulu University in Finland); Jakob Nielsen UX maturity model, ISO 9241 -220 & 221.

III. Conclusion

While there are many UCMMs to choose from, listed in Figure 2 about 15 characteristic that can guide organizations while choosing the best fit UCMM. Any software organization must pass through four steps to incorporate UCD activities into the software development process: Select model, prepare deployment, apply the model and take corrective actions. To deliver high usability products or services. Companies must have business management committed to usability as a competitive asset, infrastructure consisting of skilled resources (usability experts) and tools (usability labs), and management of implementation of user-centered design activities in development projects.