THE CREDITED DEVELOPMENT PROCESS

A.1. Introduction

We sought to combine best practices of development processes from different but related disciplines: 1) decision aid development; 2) software development; 3) product management; and 4) project management. We reviewed a sample of relevant literature in each field and identified relevant best practices. We then integrated them to develop our CReDITED process.

A.2. Overview

We propose a 6-phase development process, CReDITED, that honors many of the principles embodied in the sources reviewed. As with any discovery-driven planning effort, the CReDITED process is iterative in nature. After each phase, developers may cycle back to any of the previous phases before moving forward to the next phase. Figure 1 shows the development process, which we will explain in greater detail below.

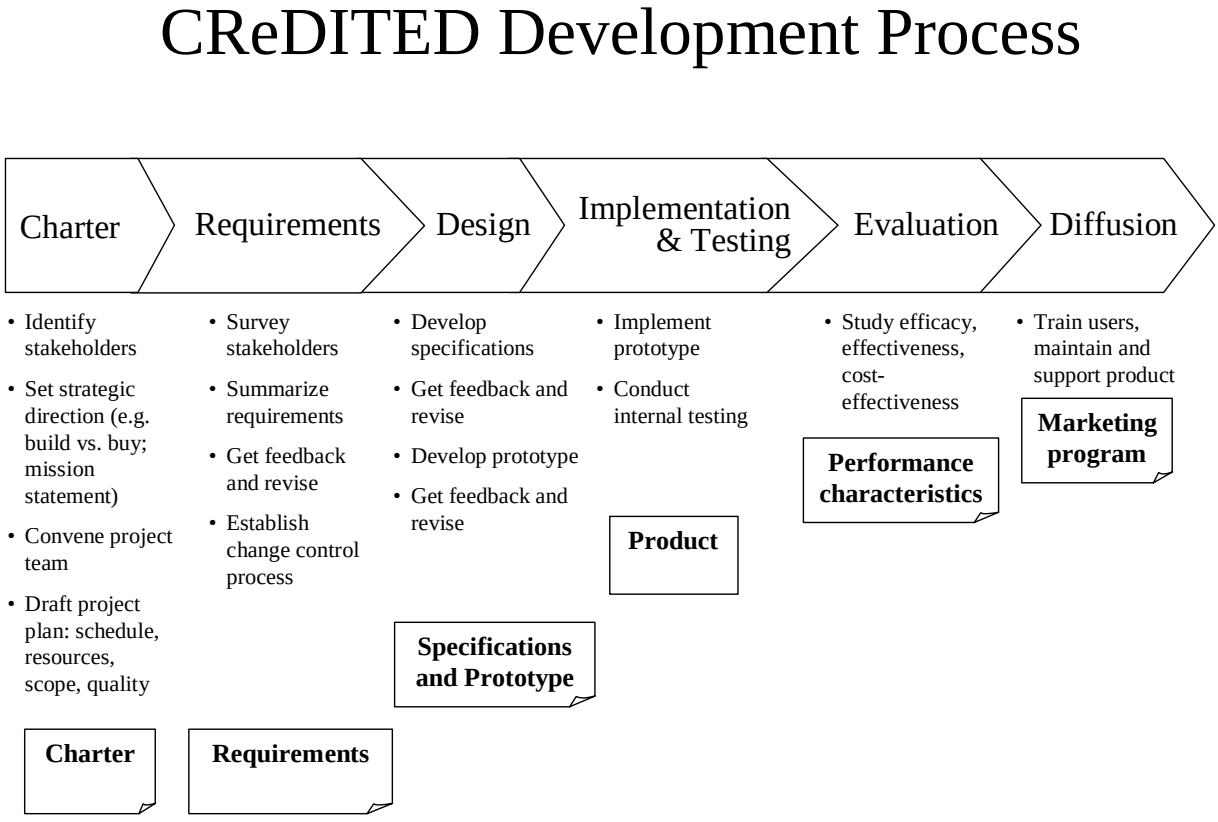

Figure 1: The CReDITED consists of six iterative phases: Charter-Requirements-Design-Implementation & Testing-Evaluation-Design. Under each heading are listed the key activities, culminating in the deliverables for that phase. Depending on the feedback received in each phase, developers may choose to proceed to the next phase, or cycle back to a previous phase.

A.3. Charter

In the first phase, the objective is to sketch the concept of a new product such as a decision aid. The deliverable is a charter document that describes the strategic direction, stakeholders, key roles, and rough project plan.

An initiator typically proposes the concept for a new product or service. What are the problems with the status quo? What needs are implied by these problems? Are these needs currently addressed by other offerings? If so, are the other offerings affordable? If not, the initiator should set a strategic direction for the new initiative, including a statement of purpose, vision, and mission. The initiator will also want to identify key stakeholders, and invite representatives to form a steering committee. The steering committee should be constituted in such a way that decisions can be made according to some easily implemented policy. At this point, the steering committee can also secure resources and form a project team under the direction of a manager.

A good manager will articulate some key conceptual models that underwrite the development effort, especially those concerned with describing how the new offering fits into the current workflow of potential end-users. The project team may find it helpful to develop high-level use case scenarios for this purpose.

Around this time, the team should be ready to draft a project plan, outlining the scope of the project, the personnel and other resources available, and a preliminary schedule. Then the earnest work begins with outreach to all stakeholders to assess requirements.

A.4. Requirements

In this second phase, the main objective is to determine and describe what stakeholders need from the new offering. The deliverable is a requirements document that guides the design. The project team may make use of focus groups, structured interviews, observations, and record reviews in order to collect requirements. Various qualitative assessment techniques may be helpful here. They should be in the spirit of grounded theory, which seeks to identify themes from data without imposing too much structure. The Critical Incident Technique works very well. Project teams may fail here if they simply seek to confirm the previously-defined high-level use cases. Rather, the point is to capture the voice of the stakeholder with as little distortion as possible.

In most cases, stakeholders will identify requirements of form and function. Functionality requirements describe the outputs desired by the stakeholders. Presentation or interface requirements describe how the stakeholders would like to interact with the offering. The project team can ask stakeholders to prioritize their requirements. The simplest prioritization scheme is some variation on “have-to-haves,” or core requirements, versus “nice-to-haves.” The project team should circulate a draft requirements document and give each group of stakeholders separately the opportunity to iterate until they converge on some consensus regarding the core requirements. Often, some of the core requirements from different stakeholder groups will contain inherent conflicts or require trade-offs or compromises.

Once a working set of core requirements is agreed upon and documented, the project team should institute a change control process. This is needed in order to set expectations with stakeholders that the team is interested in their continued feedback but will also need to draw boundaries to limit the scope of the development effort. In most cases, the steering committee can serve as the arbiter for change control, voting on changes in requirements proposed by various stakeholders.

A.5. Design

In the Design phase, the main objective is to specify how the new offering will transform user inputs into desired outputs. The deliverables in this phase are a specifications document, followed by a disposable prototype.

A simple formula for developing specifications is to go through the list of core requirements and summarize, for each requirement, how it will be addressed by the new offering. Inevitably, one feature or function will address several requirements, while in other cases one requirement will necessitate several features or functions. The project team often must engage in iterative editing to cluster and organize the specifications so that the resulting document efficiently summarizes how the offering proposes to address requirements. The project team should then circulate the specifications document and obtain feedback, before settling on a working set of core specifications that are acceptable to stakeholders. Based on the specifications, the project team then develops a prototype. A prototype can be viewed as a low-cost draft that simulates the final end-product. The objective of a prototype is to represent the specifications in a more "real" form so that stakeholders have one final opportunity to comment on the form and function before final coding begins. The prototype may be just a "mock-up" (e.g., poster board detailing interfaces and functions) or a partial product (e.g., only one slice of the software application is fully functional).

As the final step in the Design phase, the project team gathers feedback about the prototype, for example observing how hypothetical or actual users interact with it, and recording their comments. The project team tracks, prioritizes, and executes revisions and improvements, subject to change control. Often, stakeholder reviews of the specifications document or prototype will lead to breakthroughs and require the steering committee to reformulate requirements, or even revisit the strategic direction of the project. The point is to get to these breakthroughs before investing in the expensive and time-consuming process of full-scale implementation and testing.

A.6. Implementation & Testing

The objective of the Implementation and Testing phase is to create a product ready for large scale, routine use. The deliverable of this phase is the product. For the creation of decision aids, the work in this phase can range from word processing or page layout to computer programming or video production. Implementation will often involve investments in hardware, software, storage, memory, and security. Ongoing internal testing should be performed for quality assurance. This may include technical reviews and testing such as code reading, design inspection, modular, integrated, system testing, and user case testing.

A.7. Evaluation

The objective of the Evaluation phase is to assess the efficacy, effectiveness, and cost-effectiveness of the new offering. The deliverable is a document summarizing the performance characteristics of the product or service in action. As with feedback on prototypes, the evaluation of a product or service by end-users may lead to breakthroughs in understanding the requirements or specifications, and may lead to substantial re-work.

First, the offering may be evaluated under controlled conditions, such as a laboratory or as part of a case study, for its efficacy in producing desired outcomes. Following this, project teams may want data on how the offering performs under realistic conditions in the field. In order to ethically promote diffusion of the new offering, teams will also want to learn the cost-effectiveness, or return-on-investment, of their new product or service.

A.8. Diffusion

Once the project team or other stakeholders have evaluated the new offering and found it worthy of diffusion, their focus becomes dissemination and maintenance. Key activities include training users, providing technical support, and issuing fixes for known or discovered defects. Project teams should also solicit continuous feedback to guide the next upgrade, which may require its own cycle through the CReDITED process.