CHAPTER 15:
AN EPSS DESIGN AND DEVELOPMENT PROCESS

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Introduction

Your client, be they internal or external, has come to you with a performance problem. You have worked with the client to perform a needs assessment, have defined the gap, and have established that one of the interventions required to close the gap is an electronic performance support system (EPSS). Your client is ecstatic and wants you to get started as soon as possible. So, how do you proceed?

Through EPSS, corporations can integrate all the resources needed to learn and complete job tasks and provide performers with all the tools they need to do their job accurately and efficiently. EPSS allows the learning to take place as employees solve real problems, real time. Work efficiency is increased through:

- minimization of disruptions and time scheduled away from work for training;
- reduction in errors and mistakes since all the support and information are immediately accessible;
- provision of immediate access to the most recent procedure, data, and regulatory information; and,
- desktop access to all the tools required to get the work done.

This chapter outlines a simple, straight-forward electronic performance support design and development process that will support you in achieving these benefits for your client.

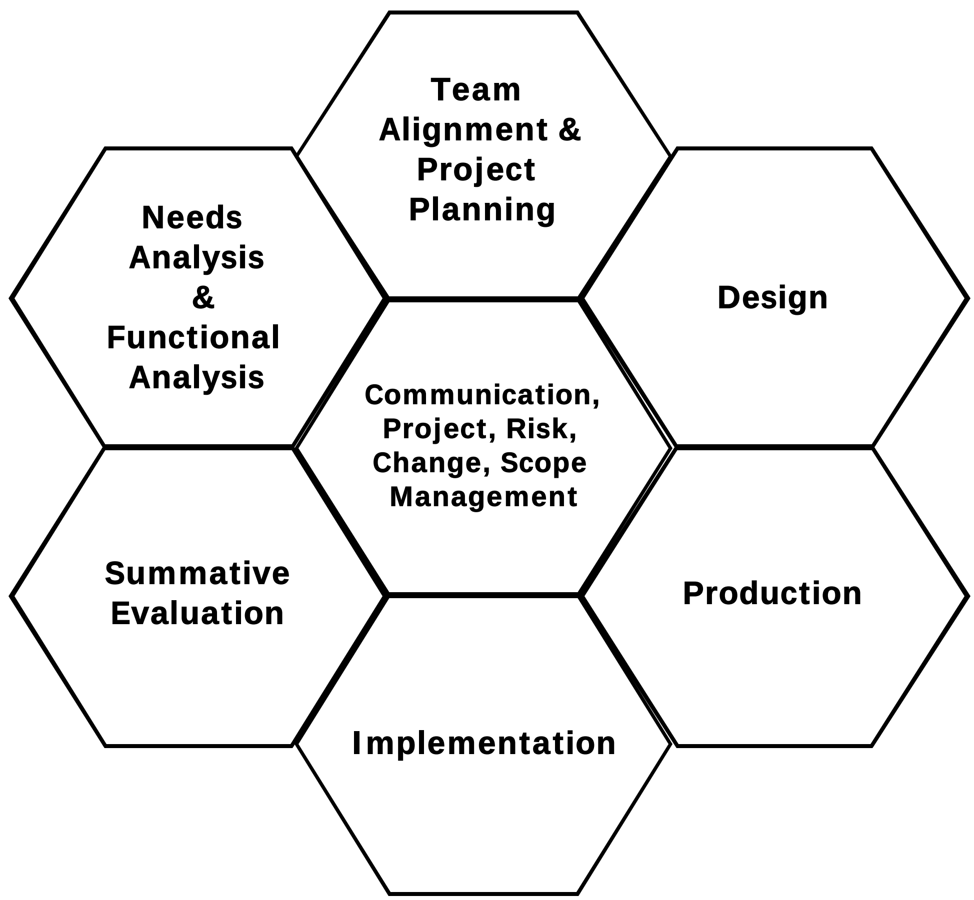
The Process

The design and development of Electronic Performance Support Systems requires a diverse set of skills not often found in one group or department. These projects are also resource intensive. Core to this process are strong team communication, project management, risk management, change and scope management approaches which will help ensure team issues are productively managed and projects are completed on time and on budget.

Joint Requirements Planning (JRP) at the beginning of the analysis phase leads to the creation of the very first, paper-based prototypes used to verify concepts and assumptions. These feed the Joint Application Design (JAD) sessions which result in more detailed and progressively more functional iterative prototypes. Each of the iterations goes through a form of usability testing called cognitive walkthroughs, before being reviewed by users, to ensure that any obvious problems have been identified and corrected prior to user review. By the time production is underway, the prototyping process has created validated templates for each interaction, navigation, feedback, and remediation strategy. This prototyping approach embeds the formative evaluation of materials and approaches in all phases of analysis, design, and production.

The heavy user involvement helps to ensure the creation of highly effective, user and performance-centered interventions. In implementation, the heavy user involvement pays off in yet another way since these same users are now ambassadors selling the intervention to their peers back on the work site.

FIGURE 1: DESIGN AND DEVELOPMENT



While we will be going through the steps of the process in a somewhat linear fashion, it is really a set of overlapping and concurrent phases which rely heavily on joint application design, iterative prototyping, cognitive walkthroughs, and continuous end-user involvement.

NEEDS ANALYSIS

During Needs Analysis you are clarifying and refining information gathered during the Needs Assessment. You are also performing some initial scoping and analysis to confirm that an electronic performance support system is an economically viable, organizationally feasible and instructionally valid intervention to address the identified gap. Joint Requirements Planning (JRP) sessions, an approach borrowed from software engineering (Villachica & Moore, 1997), are used to establish project viability and feasibility and to identify the business goals that the project must support, the project objectives, and the requirements against which the success of the project will be measured.

Two tools often used in conjunction with the JRP sessions are the Project Initiation Form and the Measurement Criteria Form (see figures 2 and 3).
The first one is used to gather information on the feasibility of the project including corporate, departmental, and project goals; the performance problem to be addressed; the project lifecycle; and, sponsorship.
The second one is used to identify how the project will be measured. Performance indicators are linked to business goals and the pre-EPSS measurements are recorded. Then, in summative evaluation, the post-EPSS measurements of the same performance indicators are recorded.

Figure 2: Project Initiation Form

	Date:
Sponsor:	
Client:	
Project Title:	
Estimated Life of EPSS being Developed:	
Performance Problem to be Addressed:	
Goals	**Description**
Corporate	
Department **Project**	
Target Population:	
Job Tasks & Activities Covered:	
Key Dates:	
Project Deadline:	

Figure 3: Measurement Criteria Form

Business Goals (corporate & departmental) that the EPSS is to address.	Performance Gap(s) identified for each goal.	What is the benefit to the company in closing the performance gap(s)?	How can the performance gap(s) be measured? What are the performance indicators?	What is the performance measurement before the EPSS?	What is the performance measurement after the EPSS is implemented?
Goal 1: **Corp___ Dept ____**					
Goal 2: **Corp___ Dept ____**					
Goal 3: **Corp___ Dept ____**					
Goal 4: **Corp___ Dept ____**					

JAD sessions follow closely on the heels of the JRP sessions. JAD sessions are made up of all the team members who meet together to work out all the major design issues. Working from the business needs that drive the project, the team reaches consensus on the project and instructional goals, the EPSS architecture, navigation, etc. Information from both the Needs Analysis and the Functional Analysis is required for these types of decisions to be made and these phases often occur concurrently.

During Needs Analysis you are also obtaining the next several levels of information required to design, produce and implement the EPSS by conducting the job analysis, task analysis, learner analysis, and context analysis. The very first, paper-based prototypes are created to validate assumptions and concepts.

Functional Analysis

Before you can design the EPSS, you must have a thorough understanding of the platform (mainframe, micro-computer, UNIX, networked, etc.), software, and connectivity constraints and opportunities. The location where, and the manner in which, users will access the EPSS must be examined in detail so that, at this time the human / machine interface issues can begin to be addressed. This information is a key to a solid design as that gathered on tasks and learners As previously mentioned, these activities often occur concurrent with Needs Analysis.

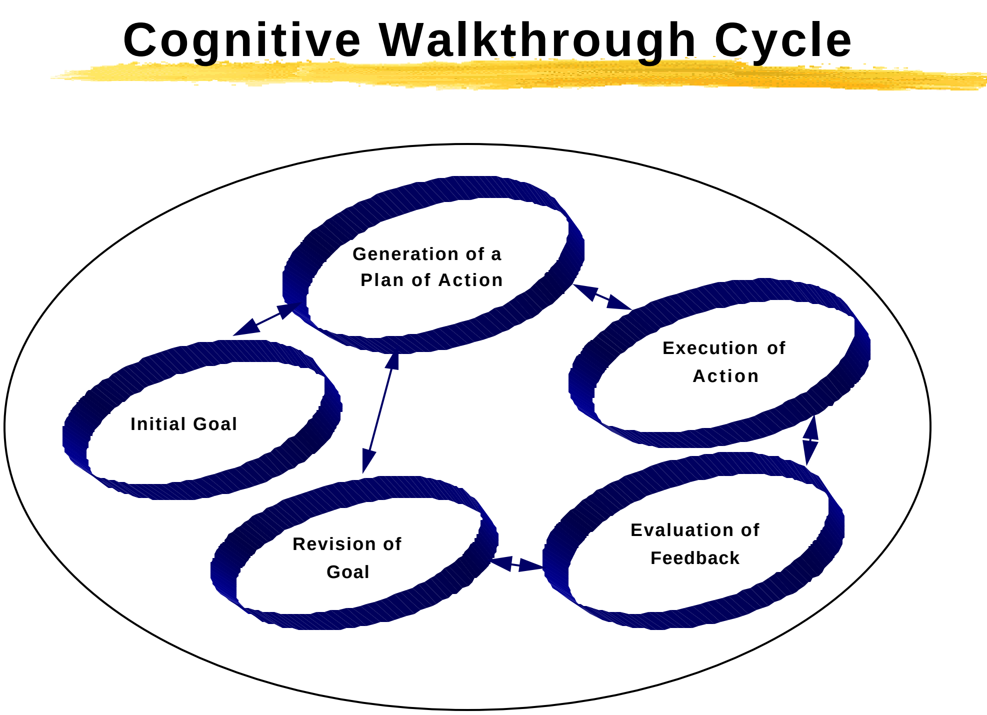
During Functional Analysis you are going to choose the authoring tool you will use to both prototype and create the EPSS. Once this is chosen, you will move to creating the first electronic prototypes taking a first cut at the interface, navigation, and basic layout concepts. Before showing these prototypes to the end users, you and your team should perform a cognitive walkthrough of the prototypes.

Cognitive Walkthrough

Cognitive walkthroughs use a detailed review of sequences of actions to evaluate the effectiveness of an interface without formal training. It is a simplified methodology which places usability testing earlier in the design phase when interface problems are still fixable at minimal cost.

The cognitive walkthrough method of usability testing combines software walkthroughs with cognitive models of learning by exploration. It is a theoretically structured evaluation process in the form of a set of questions that focus the designers' attention on individual aspects of an interface and that make explicit important design decisions made in creating the interface and the implications of these decisions for the problem-solving process. This methodology stresses that usability testing should take place as early as possible in the design phase, optimally in conjunction with early prototypes. This allows for the evaluation of early mock-ups quickly and supports developers in the upstream activities of identifying and refining requirements and specifications. The cycle is shown in Figure 4.

Figure 4: Cognitive Walkthrough Cycle



Team Alignment & Project Planning

The other phase that overlaps significantly with the analyses is Team Alignment and Project Planning. The main activities of this phase are:

- Identifying the skill sets required for the project
- Selecting the team members based on the skills required
- Determining and documenting communication protocols

- Determining and documenting team member roles and responsibilities
- Determining and documenting the change and scope management processes
- Identifying risks to the project, determining how likely each risk is to occur, deciding what impact that risk could have on the project, and developing and documenting strategies to mitigate the risk.
- Deciding on the project management tool and process to be followed
- Drafting the first project plan and time line.

Many of these activities must be accomplished prior to the first JAD session. Team members must have been chosen, the roles and responsibilities of each assigned and accepted, communication protocol established, and a first cut taken at the project plan. The remaining activities must also be handled shortly after the first JAD session, if not before.

Some key tools for this phase are the Risk Table (see Figure 5) and the RASCI chart (see Figure 6). These tools help to force issues surrounding communications, hidden agendas, and commitment out into the open, right at the start of the project. This can save considerable time and frustration later.

The risk table is used to identify and document potential risks associated with each project phase. The group then agrees on how likely the risk is to occur, the consequences of the risk occurring, and comes up with ways to avoid encountering the risks and how to mitigate the negative effects of each risk, should it occur.

Figure 5: The Risk Table

Phase / Task	Risk	Likelihood H= High M = Medium L = Low	Consequences S = Serious M = Moderate N = Negligible	Ways to Mitigate (lessen or remove) Risk
Feasibility Evaluation				
1. identification of business objectives				
2. identification of project objectives 3. application of feasibility analysis model				
4. identification of evaluative criteria				
Needs Analysis				
1. context analysis				
2. job & task analysis				
3. learner analysis				
4. development of Level 1 prototype				

FIGURE 6: THE RASCI CHART

Legend

- **R: Responsible:** **Performs tasks**
- **A: Approves:** **Determines that task is completed and meets standards and/or gives authorization to continue project**
- **S: Supports:** **Provides resources enabling completion of task**
- **C: Consults:** **Provides advice or expertise**
- **I: Informed:** **Is notified that a task is in progress and/or completed**

Phases / Tasks	Project Sponsor	Client	Instructional Technologists	Subject Matter Experts	Consultant	Animation / Video Specialists	Information Systems
Feasibility Evaluation							
⇒ identification of business objectives							
⇒ identification of project objectives							
⇒ application of feasibility analysis model							
⇒ identification of evaluative criteria							
Needs Analysis							
⇒ context analysis							
⇒ job & task analysis							
⇒ learner analysis ⇒ development of Level 1 prototype							

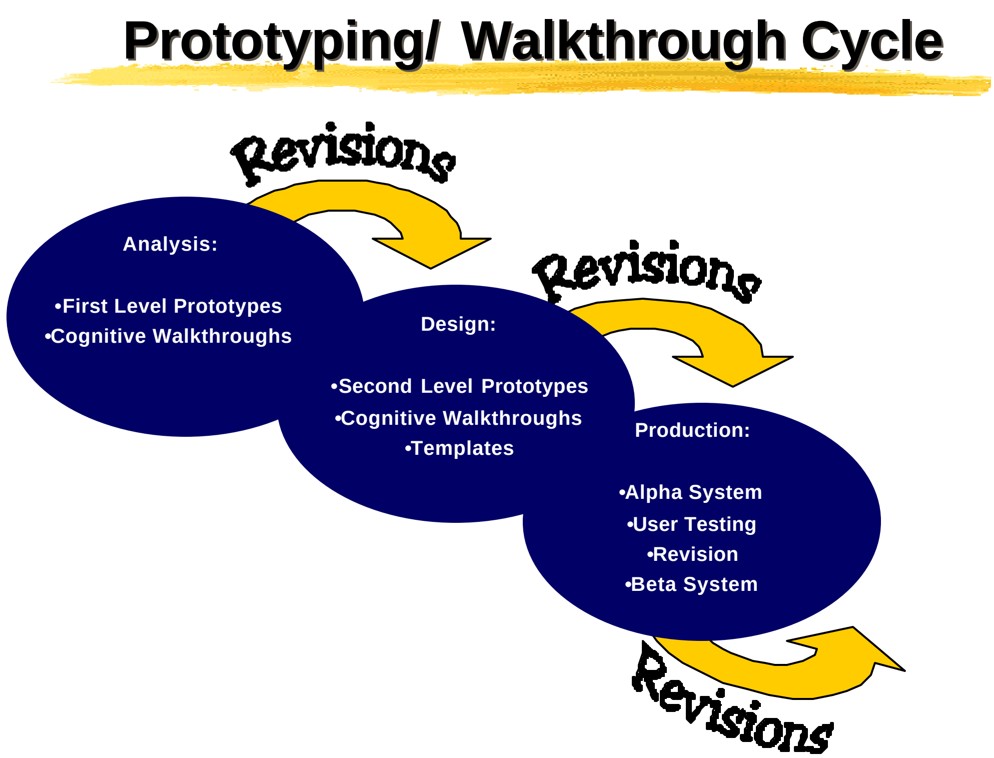
The RASCI chart is used to record who the team members are and what each of their roles is. Who actually performs the work for each phase and step, who approves the work, who provides the resources, who the consultants are, and who has to be kept informed. The acronym RASCI stands for: *Responsible for, Approves, Supports, Consults, and Informed*

The success of your project rests on the ability of the team to pull together creatively and practically. Managing the project phases and activities and managing the communications requires a strong, flexible, project manager who is able to handle the people as well as the paperwork.

Design & Production

Design is accomplished through several iterations of the prototyping / cognitive walkthrough cycle (see Figure 7) requiring heavy input and review from the end-users. Each and every type of functionality, interaction, and component is prototyped during design. Each prototype undergoes usability testing in the form of a cognitive walkthrough and is revised. This revised prototype is reviewed by the users and then is further revised based on their comments. While this extends the time required for the design phase, it also serves to overlap design with production and shortens the overall development cycle while providing a superior product. If the same tool is used for prototyping as will be used to develop the actual components, designing through joint application design, prototyping, and usability testing will result in templates which can be used to quickly generate components.

FIGURE 7: PROTOTYPING / WALKTHROUGH CYCLE



As each prototype is approved by the users obtain sign-off using a sign-off sheet (see Figure 8). While this does not mean that changes will not occur, it does make it clear that any changes after that point may result in a change in deadline or an increase in the project cost. Used in conjunction with a Change in Scope form (Diagram #9) to record changes to the project scope or schedule, this form includes a descriptions of the requested change, an estimate of the hours and dollars it will take to make the changes, and any impact on schedules and budget. Each change item is approved individually by the client, forcing them to realize and share the responsibility for deliverables.

FIGURE 8: SIGN OFF SHEET

Project Name:

Items to be reviewed: These could be items such as prototypes, storyboards, component content matrices, etc. Lis t all items submitted for review here.

Date items were submitted for review:	Enter the date you submitted the items to be reviewed.
Deadline for completion of review and return of materials:	Enter the date the materials must be returned, with comments, changes, etc.
Name of person(s) reviewing the materials:	Who is reviewing the materials?

General Comments:

____
____
____
____
____

Specific Comments are Supplied on the Attached:

Indicate how many items and what type of items are attached (pages of paper, storyboards, graphics, etc.)
____
____
____

Approval:

I have reviewed and approved the following items:
____
____
____
____

Approved by: ________________________ **Date:** ______________________________

Production continues on from Design with the production of all of the components required to support the performance. Because of the templates which have been developed, production is rapid. As each component is

Figure 9: Change in Scope Form

Change Number	Requested Change	Work Estimate	Approval
1	Clearly and concisely describe the change which has been requested. Make sure to include what deliverable is being changed, how; whether there will be a resultant change in the deadline, if so how; and, any other important factors. **Requested by:** Enter name of person requesting the change	Enter the hours and costs to make the requested change. **Estimated hours:** **Estimated cost:** $ **Will the deadline be affected:** **Yes**___ **No**____	**Change Approved:** **Yes** ____ **No** _____ **Approved up to: $** **Signature:** ___________________________ **Date:** _______________________________
2	**Requested by:**	**Estimated hours:** **Estimated cost:** $ **Will the deadline be affected:** **Yes**___ **No**____	**Change Approved:** **Yes** ____ **No** _____ **Approved up to: $** **Signature:** ___________________________ **Date:** _______________________________
3	**Requested by:**	**Estimated hours:** **Estimated cost:** $ **Will the deadline be affected:** **Yes**___ **No**____	**Change Approved:** **Yes** ____ **No** _____ **Approved up to: $** **Signature:** ___________________________ **Date:** _______________________________

completed it should go through user testing. Naïve users (not previously involved with the project) should test each component to ensure it will be a tool they can and will use. Once the components are integrated into a whole support system, this should go through user testing to ensure that all the pieces work well together, are easy and intuitive to use, and fit seamlessly into the job context.

IMPLEMENTATION

Heavy end user involvement through the successive prototyping serves to overlap Design and Production with Implementation since the very people who will be using the EPSS have been intimately involved with its inception and become advocates of it among their peers. During implementation you review and revise the implementation plan and schedule, train the implementors, roll-out the EPSS, prepare a post-implementation report, and act on the results. Ensure that any attendant support items are rolled-out with the EPSS.

EVALUATION

In the Needs Analysis phase we identified performance measurements against which the success of the project will be judged. Here is where we find out whether those criteria were met. All four of Kirkpatrick's evaluative levels can be applied to EPSS projects. (see Figure 10)

FIGURE 10: PERFORMANCE MEASURES FOR SUCCESS

First Level Evaluation	During implementation	• Learner and implementor reactions to the structure and content of the EPSS.
Second Level Evaluation	During implementation	• Acquisition of skill, knowledge, and attitudes is measured against the project objectives. Can the target population effectively use the EPSS to perform the job tasks required.
Third Level Evaluation	Six months after implementation	• Usage and effectiveness of the EPSS are measured as well as transfer of knowledge to the job.
Fourth Level Evaluation	One year after implementation	• Improvements in productivity, decreases in errors, etc., as well as any other performance measurements identified and measured during Needs Analysis, are measured.;

While the activities in this phase sound pretty basic – conduct the evaluation and act on the results, very few organizations actually do fourth level evaluations. Levels one and two are quite common; almost all organizations routinely do them. Level three is sometimes conducted. Level four rarely. Level four evaluations are time consuming and costly. All too often other projects have moved into a priority position by the time it is appropriate to conduct a fourth level evaluation. Unless the client is pushing for one, and willing to pay for it, they simply fall off the table.

Conclusion

So, that is it in a nutshell. Developing EPSS can be straight forward and achievable. As long as there is strong project management, a skilled team, effective project, risk, change management, and scope management processes in place; and, as long as you employ joint application design, prototyping, usability, and templating techniques your project will be an exciting and successful experience.

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