

# An Internet-Based Electronic Performance Support System for Systemic Change in K-12 Settings

Hasan Cakir, Hakan Tuzun, Charles M. Reigeluth

Indiana University Bloomington

## Abstract

We present an Internet-based Electronic Performance Support System (EPSS) called the Systemic Change EPSS. Systemic change facilitators can use this system to access the tools, resources, and information they need in the systemic change process. A general outline of the Systemic Change EPSS is introduced. Components of the Systemic Change EPSS and their interconnections are also explained, along with field test and usability test data.

## Introduction

The purpose of systemic change is to create a better educational system than what currently exists. Systemic change is a collective effort that should be fostered by school, community and student populations. Yet, the efforts of these people and organizations may not be effective or efficient without receiving enough guidance. Guidelines for these change efforts can be provided by experienced facilitators and researchers in the systemic change field. Jenlink, Reigeluth, Carr, and Nelson (1996) developed a systemic change guidebook to help facilitators create and sustain systemic change efforts.

The guidebook consists of 26 discrete events that occur at distinct points during the change effort. In addition to this, there are 18 continuous events that should be engaged in throughout the change process. Each discrete and continuous event is made up of several activities. Each of these activities is comprised of about 10 pages of detailed guidelines, considerations, and tools. Since the guidebook is so thick and heavy, it might not be practical to carry it to many meetings conducted during the systemic change effort. It would also be expensive to copy it for key participants' use. For these reasons, the authors of the guidebook decided to produce it in the form of an Electronic Performance Support System (EPSS), using hypermedia and the Internet. A team of designers and developers volunteered to accomplish this project.

An EPSS is a tool for just-in time performance support in the work place. An EPSS is a complete system or integration of performance support tools to achieve certain tasks in work settings. The goal of an EPSS is "to provide whatever is necessary to generate performance at the moment of the need" (Gery, 1995). Since the computer networks and especially the Internet have become ubiquitous, we have now opportunities to implement EPSSs which are universally available on demand at any time and any place.

The goal of the Internet-based Systemic Change EPSS is to provide the systemic change facilitators the tools, resources, and information they need in the process, and accessibility to the other facilitators and communities who are dealing with systemic change. The end product offers more functions than just being merely an electronic version of the guidebook.

## Functional Specifications of the Systemic Change EPSS

A well planned needs analysis can be used as an information-gathering tool by a wide range of organizations under a variety of conditions (Reviere et al., 1996). A qualitative development methodology using semi-structured interviews was used to address the needs of current and potential users of the systemic change EPSS.

Two systemic change facilitators were interviewed to figure out the functional specifications of the systemic change EPSS. Facilitators were selected with purposeful sampling. At the time of the interviews, the facilitators were dealing with systemic change efforts at an urban school district in Indianapolis, IN. Interviews took approximately an hour long and were audio recorded. The interviews occurred on different dates. The following interview questions were asked:

1. What are the main needs while the facilitator uses the EPSS guidebook?

2. What are the problems the facilitator encounters when following the EPSS guidebook?
3. What does the facilitator expect from the systemic change EPSS to solve these problems?
4. When and where does the facilitator expect to use the systemic change EPSS?
5. Are any materials other than the guidebook needed as resources for the change process?
6. What should the content of the systemic change guidebook be?
7. What other ideas does the facilitator have to add to the systemic change EPSS?

After the interviews, the interview notes were transcribed onto 3x5 index cards for each of the interview questions. These cards were analyzed and compared, and gradually categories emerged. Once the development team members agreed upon all the categories for each question, they carefully defined the categories. Next, the specific responses from the interviews were coded by category. At the end of this process several design specifications were established for the development of the systemic change EPSS.

The most important of these specifications is that the systemic change EPSS should make the facilitator aware that certain issues are important during the events of the systemic change effort. The next important specification is to give guidance on how to deal with those issues if the facilitator does not know how to deal with them. It was indicated that facilitators would use the systemic change EPSS before their meetings with the participants, rather than during the meetings.

Specifications related to the user interface, content, and tools are described below:

User interface related: The systemic change EPSS should be designed with the novice computer and Internet user in mind. The user interface should be simple. All pages should include functions to search for the information and to print the information. Navigation in the system should be easy and consistent, and transitions between the components should be fast. The interface should allow tracking previously accessed screens. The interface should inform the user about where the user is in the system.

Content related: The systemic change EPSS should provide a big picture of the systemic change effort, step-by-step advice for each of the 26 discrete events and the continuous events, information about systemic change, answers to the Frequently Asked Questions (FAQ), a glossary of systemic change, information about systemic change case studies, and interaction with other facilitators.

Tools related: It was indicated that miscellaneous software tools for collecting qualitative data, for highlighting EPSS content and taking notes, and for making casual-loop diagrams are needed by systemic change facilitators.

### Components within the Systemic Change EPSS

There are six main design components in the system. They are consulting, e-guidebook, resources, community, glossary and frequently asked questions (FAQ). The consulting component of the system is structured as phase and event based. It provides a bird's eye view of the event to the facilitator. By implementing the consulting element, continuous events in the process are embedded in the discrete events, and the facilitator's consideration of continuous events is assured. As shown in Figure 1, the consulting element provides a direct linkage to resources, community and e-guidebook components of the system.

The e-guidebook component of the system is also structured as phase and event based. The facilitator accesses the content of this section either through the navigation system on the interface or through the link on the consulting page. The resources component of the system is structured according to the immediate needs of the facilitator during the analysis phase of the system. Due to low availability of the resources for each event, the resources section is grouped according to the phases in the change process. Community is another component that can be accessed immediately from the consulting page. In the community component of the system are directory and threaded discussion groups. From the consulting component, there are direct links to reach the community component as shown in Figure 1.

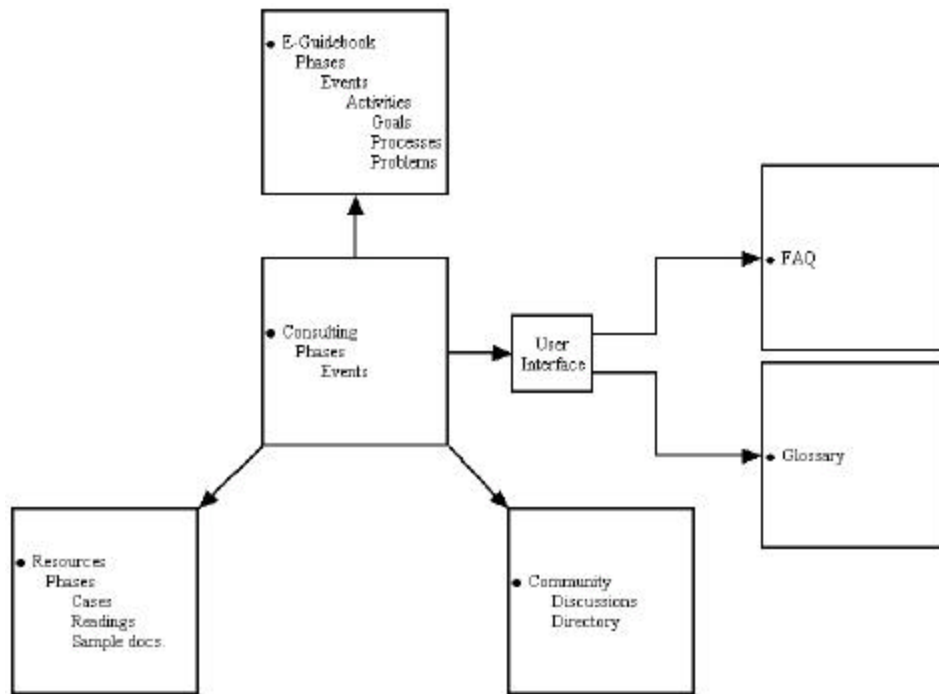


Figure 1. Interconnections between the Components

#### User Interface Related Components

The interface of the system is based on the frame feature of HTML. Using the frame feature enables designers to make changes on the interface independently from the content. Most of the web interface designers are against using frames on the interface. However, because of some technical reasons we have used frames in the system. The interface consists of two frames, a navigation frame on the left and a content frame on the right (Figure 2).

**1. Navigation Frame:** The navigation frame is on the left side of the interface. It is designed based on JavaScript from the <http://www.treemenu.com> site. Tree menu navigation has several advantages. Since it is independent menu software and it is placed in a frame, it is very easy to add new elements to the site. One of the fascinating features of the site is updating the navigation frame within a few seconds without changing any pages. The tracking method of the menu, which is opening the folders according to their level in the entire navigation system, provides the user a powerful navigation system. Opening the sections folder under a folder reduces the cognitive load of the users and provides a clear sense of location for them.

**2. Content frame:** The content frame is placed on the right side of the interface. This frame contains the formal decisions of our functional decisions. At the top of the page, the main title indicates the name of the site. Under the main title, functional buttons are placed. The search field is an indispensable feature for this site, since there are a huge number of pages in the site. Even though navigation is so clear and easy, sometimes finding specific information through the search field is easier. The “Save and Log out” button helps remind the users where they left the site when they come back. Each page has a print button, which generates a printer-friendly version of the page on the screen. Under the function buttons, the section title appears. Basically, the section title tells the users on which event they are. The content field contains the text from the guidebook. The text is formatted according to the format of the original text.

At the bottom of the page is the footer bar. The footer bar holds the contact information, sitemap and privacy links. Each link opens in a pre-sized window in order for the users to see only related information. The contact link contains sufficient information to contact the site administrators via phone, e-mail or mail. The site map presents a big picture of the site, and a privacy note explains the copyright issues related to the site. Below the footer bar, standard information about the page is provided, such as the page URL and update date, and since the site is sponsored by Indiana University, credit is given to the university.

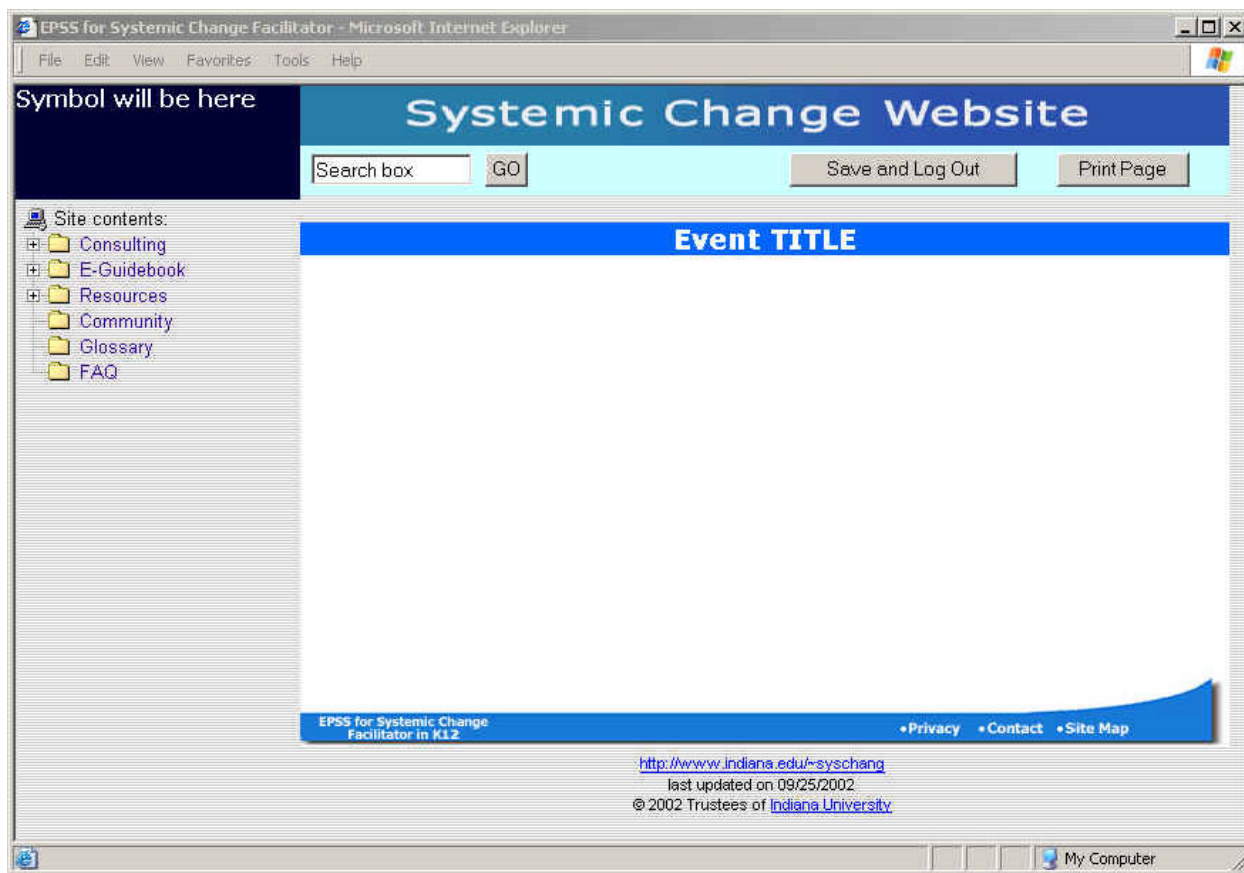


Figure 2. Systemic Change EPSS User Interface

#### Content and Tools Related Components

The Internet-based Systemic Change EPSS has 6 main components:

**1. Providing guidance to the facilitators:** This component constitutes the nutshell or kernel of the system (see Figure 3). This component is event based. The facilitator sees a big picture of the event and also the important issues about the event. It gives a kind of bird's eye view to the facilitator of what is going to take place in this event, what issues are important, and the place of the event in the whole systemic change process. The facilitator is able to access to the other parts of the system from this component.

**2. Electronic version of the systemic change guidebook:** The guidebook is designed hierarchically in phases, events and activities. The book has 6 phases, each of which contains a number of events, and each event has activities. This component provides information about the events, such as things that should be done in order to accomplish the objectives of the event. In this section, the electronic version of the guidebook is provided as the main source of information. Objectives, procedures and activities are accessible through this component of the system.

Symbol will be here

# Systemic Change Website

Search box

CONSULTING

Site contents:

- [-] Consulting
  - [-] Phase 1
    - [-] Event 1
    - [-] Event 2
    - [-] Event 3
    - [-] Event 4
  - [-] Phase 2
  - [-] Phase 3
  - [-] Phase 4
  - [-] Phase 5
- [-] E-Guidebook
  - [-] Phase 1
    - [-] Event 1
      - [-] Activity 1.1
        - [-] Goals
        - [-] Process
        - [-] Problems
        - [-] Prerequisites
        - [-] Capabilities
      - [-] Event 2
      - [-] Event 3
      - [-] Event 4
    - [-] Phase 2
    - [-] Phase 3
    - [-] Phase 4
    - [-] Phase 5
  - [-] Resources
    - [-] Sample Docs
      - [-] Phase 1
      - [-] Phase 2
      - [-] Phase 3
      - [-] Phase 4
      - [-] Phase 5
    - [-] Readings
    - [-] Video Conferences
    - [-] Case Studies
    - [-] Software Tools
  - [-] Community
    - [-] Directory
    - [-] Discussion
  - [-] Glossary
    - [-] Terms
    - [-] Article
  - [-] FAQ
    - [-] Terms
    - [-] Article

## Event 2 Establish Or Redefine Your Relationship With A School District

### Why this event is important

Without a personal relationship with key people in the district, you will not be able to be effective in your work with the district. Also, if you already have a relationship in which you are not perceived as being competent in systemic change and not viewed as completely neutral with respect to all stakeholder groups, your work on systemic change will be jeopardized.

### Why this event is sequenced here

All subsequent events rely on your having a good working relationship with key people in the district and your being viewed as completely neutral and fair regarding all stakeholder groups.

### Little reminders

- As you work on building relationships, try to learn what makes the superintendent and other key people "tick"-what are their major motivations and goals. Also, try to make clear your motivations and goals. You need to find important common ground upon which to build your mutual relationship.
- Try to assess how comfortable you are personally with the superintendent and other key people. This is important for building two-way trust.
- Try to assess how enthusiastic the superintendent and other key people are about the need for and nature of systemic change when you discuss those issues. Ask probing questions to help you assess this.
- If you are an internal facilitator, try to assess how difficult it will be for all stakeholders to view you as neutral.

### Next event is Event 3

### Tasks

#### Resource related tasks

- I want to review [Event 2 reading list](#)
- I want to review [Event 2 video recording list](#)
- I want to review [Event 2 documents](#) added by Systemic Change people
- I want to review [Event 2 case study samples](#)

#### Community related tasks

- I want to read [Event 2 related discussions](#) -> to threaded discussion
- I want to comment on [Event 2 -> to threaded discussion](#)
- I want to [add a document to Event 2](#)

Figure 3. The View from Systemic Change EPSS for Consulting Page for Event 2

**3. Resources:** This component of the site holds the resources that are needed to enhance facilitators' skills needed in the systemic change effort. These resources are categorized as readings, videos, case studies, sample documents and software tools. The site coordinator maintains these resources and updates them as required. Facilitators are not currently able to add to the resources.

**4. Community:** This component's objective is to bring people involved in systemic change all over the country together in one virtual place. The community component enables people to share their experiences, questions, concerns, resources, and documents related to their systemic change efforts. It has a directory of people who are facilitating different systemic change projects in order to introduce the members to each other. The component also enables school districts to find a facilitator who has experience with similar contexts. One powerful feature of this component is the threaded discussion groups that keep the questions and their answers together. The discussion software can be customized according to the topics' needs.

**5. Glossary:** This component provides a brief summary of the process of systemic change. It is for novice users who want to learn more about the systemic change process and related terms. The component has two sections: terms and the article about systemic change by Jenlink et al. (1996). The terms section provides a glossary of concepts in the systemic change process.

**6. Frequently asked questions (FAQs):** This component has questions that are asked over and over again, and their answers are provided by experts in the field. The content for this component is compiled from the community's discussion section and from questions asked directly through e-mail messages to the site manager.

### Benefits of the System

The Internet-based EPSS for systemic change facilitators provides more knowledge to its users than a regular website. With a very simplistic view, it may seem to be similar to any regular web site. However, it differs from static websites in several aspects. The important feature of the site is that it provides guidelines for each event in the website. Under the consultation link, event-specific guideline pages are provided. These pages contain all information related to the events that the facilitators need. A second aspect is that the EPSS has community building tools, such as threaded discussion groups and a members' directory. These tools add value to the EPSS and give power to the users to reach each other easily and to share their knowledge. Also, by gathering the knowledge from facilitators who are using the website, it provides an invaluable knowledge base for the community.

Since the system is using online technology and disseminates its knowledge via the Internet, maintenance and update costs are relatively low in comparison to printed or optic media. The technology behind the site allows the administrators to maintain and update the site without much software knowledge and programming skills. The interface design of the site allows the administrators to change it easily. Even drastic changes can be implemented within minutes as long as the two frames are preserved. The infrastructure of the site uses DHTML and basic HTML, thus it does not require downloading high-end browser plug-ins such as Flash player or Shockwave.

### Usability Tests and Results

Usability testing involves observing people attempting to achieve specific goals within a specific context. Design problems that hinder the ability of facilitators to use the Systemic Change EPSS may also hinder the adoption of this system. Therefore, to figure out such design problems and to improve the usability of the system, several usability tests were conducted on one facilitator and two non-facilitator users.

#### Setting

The usability tests were conducted with one tester, one computer and one participant. The tester was one of the designers of the system. The screen resolution was 1024x768 and the browser was Microsoft Internet Explorer 5.5. The tests were conducted in a private place, where the users could spend as much time as they wanted on the tasks.

## Procedure

Before the test was conducted, the goals of the test and background information were explained to the user. Also the users were advised that they could terminate the test at any time. Then pre-prepared tasks were given to the user and the user performed the tasks in the given order. While the test was conducted, the tester only observed and took notes. After the test, the tester conducted a follow-up interview with the user.

## Tasks

During the test, a pre-prepared task list was given to the user. The list included a variety of common tasks that a facilitator would do while using the system. Some of the tasks in the list were: starting with the guidance page and continuing to an event or activity, finding a specific activity, finding the contact information of the designer and posting a message to the threaded discussion group.

## Results

Most of the pre-prepared tasks were completed by the users in a reasonable time. In the follow-up interviews, the users were asked about the quality of the interface and to what degree they felt comfortable using the system. Most of the users stated that the interface provided a clear sense of navigation. They did not feel ambiguity while navigating through. It was stated that all the tools needed were on the interface and one click away from them. All users stated that they would prefer a different font type and font size for the content part.

## Conclusion

Improving the quality of education is always an objective for any educational system. The guidebook provides a guide for facilitators to transform their educational system in a school district. In order to provide more convenient and up-to-date knowledge for the facilitators and to establish a community among them, an EPSS was designed by a team in the Instructional Systems Technology department at Indiana University. The distinctive features of this Systemic Change EPSS are to provide more guidance, to provide an electronic version of the guidebook, to allow the users to share documents and to have a directory of facilitators.

The system consists of six main sections: guidance, electronic version of the guidebook, resources, community, glossary and frequently asked questions. The guidance section provides a general picture of the events, event-specific tips and guidance for the users about utilization of the event. The electronic version of the guidebook provides the book contents to the users. Resources are the documents and tools that are useful to facilitators. In the community section, a directory of members and threaded discussion groups are provided. The glossary and frequently asked questions sections provide auxiliary information about the transformation process.

The system adds several benefits to the guidebook. Since it is Internet-based, the facilitators can reach it anywhere in the world, and updating the guidebook is easy at anytime and at low cost. Systemic change of educational systems requires experience and knowledge accumulation. The Systemic Change EPSS provides this knowledge and experience accumulation and it disseminates the knowledge to people who need it.

## References

- Gery, G. J. (1995). *Electronic performance support systems: How and why to remake the workplace through the strategic application of technology*. Tolland, MA: Gery Performance Press.
- Jenlink, P. M., Reigeluth, C. M., Carr, A. A., & Nelson, L. M. (1996). An expedition for change: Facilitating the systemic change process in school districts. *TechTrends*, 41(1), 21-30.
- Reviere, R., Berkowitz, S., Carter, C., & Ferguson, C. (1996). *Needs assessment: A creative and practical guide for social scientists*. Washington, D.C.: Taylor & Francis.