

Operational Status Boards (OSB)

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Status and Information Sharing

The ability to obtain and track highly dynamic status information is a fundamental requirement for control rooms, command centers, and emergency operations centers. Timely status information is a continual process and is needed to effectively support both daily operations and response activities. Because natural and man-made disasters have the potential to impact many different emergency response organizations and public facilities, the ability to quickly acquire and share status information between multiple users and jurisdictions becomes extremely important. In today's emergency response environment the controlled and timely sharing of information must be provided between emergency operations centers (EOCs); incident command centers (ICCs); mobile command centers; joint information centers; key public facilities such as schools, hospitals and shelters; as well as the general public. Operational Status Boards (OSB) directly support the timely sharing of information between all of the components of a site's extended emergency response program.

OSB is PC client software that allows a user to define, manage, and share highly dynamic status information between multiple users and jurisdictions. Web-based Operational Status Boards (Web OSB) allow privileged users to view and edit textual status board information via the Internet. OSB and Web OSB work seamlessly together to share status information:

- created by the EOC and distributed view-only to the users in the field
- bi-directionally where both the EOC and field units simultaneously update data
- acquired externally by allowing the EOC to obtain and display real-time status information as it is entered via Web OSB in the field.

What Is An Operational Status Board?

Historically, a status board was a checklist or other pre-defined summary information drawn on a whiteboard within the EOC or ICC that was routinely updated by various emergency management personnel. People at the command center could look at the status board to get a quick summary of the current information. With the increased use of information technology capabilities, status boards have migrated from whiteboards to electronic Word documents, Excel spreadsheets, and site-specific web pages. The display surface has migrated to an overhead projector displaying the contents of an electronic document or web page. While these techniques for providing status boards may be adequate for sharing information within a single room, they are inadequate for sharing information across multiple locations and jurisdictions.

The concept of an operational status board is the ability to display and update highly dynamic information simultaneously at all locations involved in emergency management. What makes an electronic status board operational? Operational electronic status boards have the ability to:

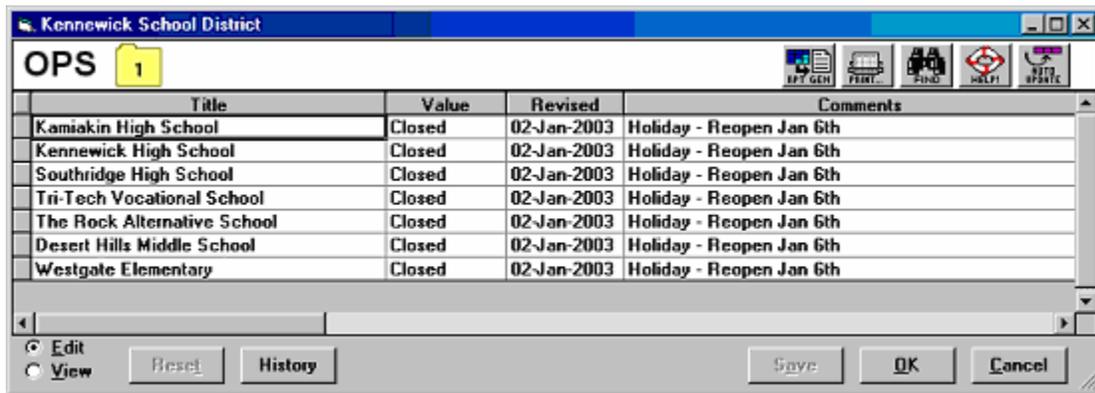
- control the access and distribution of status information among multiple users
- quickly identify and view new information regardless of location
- easily add or update pertinent information and share it in real time

- quickly update the structure and organization of an existing status board
- quickly create new status boards to respond to changing events and needs.

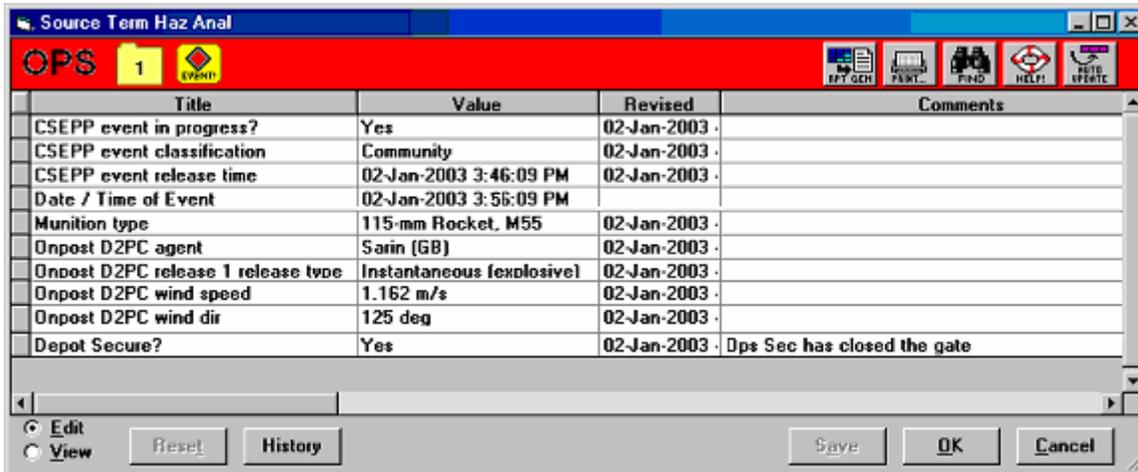
At the Pacific Northwest National Laboratory (PNNL), two general types of status boards have been developed for OSB: list-based status boards and table-based status boards.

A list-based status board contains a unique set of items whose status is to be tracked. All of the pertinent information in a list-based status board can be displayed on a single window. This implies that all of the components of a list-based status board have been pre-identified and their potential values are well known.

The first example of a list-based status board provides a list of all the schools in a local school district. The status board can be used by each individual school to update information on whether or not they were open, plus a brief description about their school.



A second example of a list-based status board provides a mechanism for sharing information about a potential chemical accident. The status board is defined to provide the weather parameters and source term conditions needed to track a chemical spill.

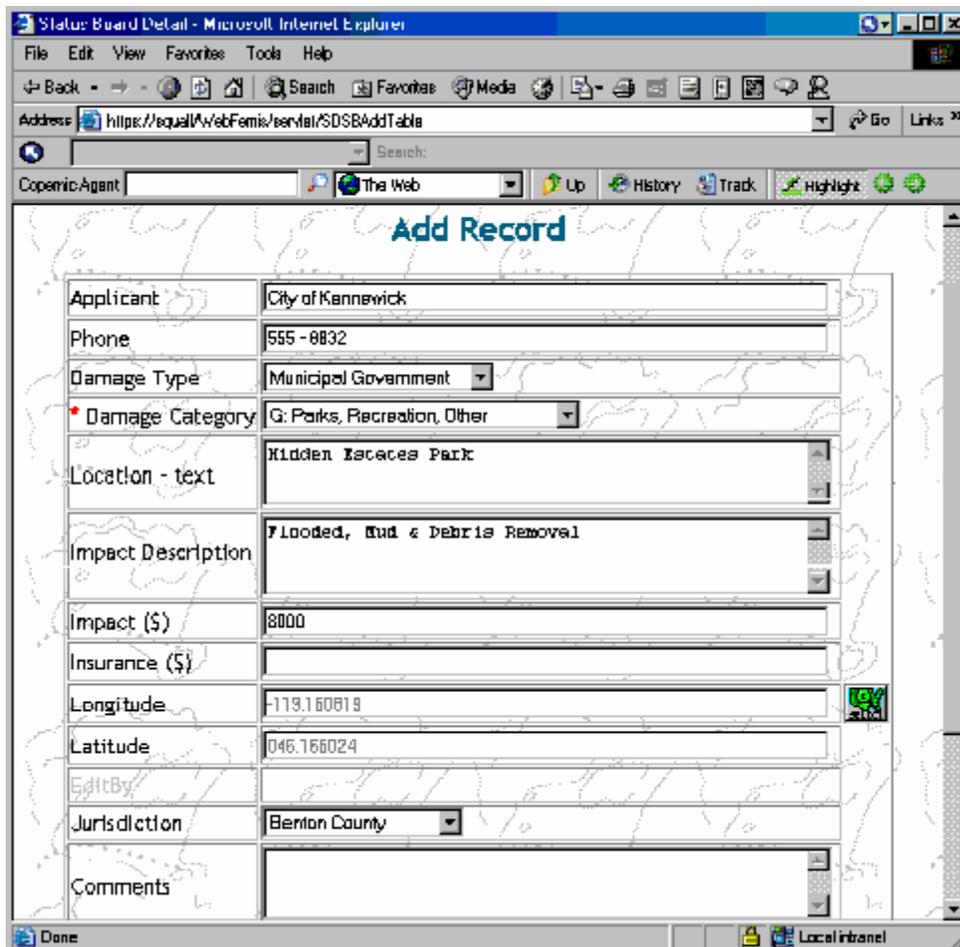


Values for list-based status boards are updated directly on the status board itself. As new information is provided, other users viewing the status board will receive the updated information in real time.

Table-based OSB provide rows of similar information – think of an Excel spreadsheet on steroids. Table-based OSB can be used to house anything that would normally be put into an Excel spreadsheet. Like Excel, a user can define the column headers, types of attributes, and enter rows of information. Unlike Excel, a table-based OSB:

- supports real-time updates for multiple concurrent users
- provides notification and can automatically update that display when an information change is detected
- tracks the person and time of user who performed the most recent edit
- allows users to interactively select and display geographic location, either textually by drop-down lists or graphically via the ArcView GIS
- manages predefined selection lists
- supports extended Find, Filter, Sort and report generation features
- allows users to define and control the level of security and data sharing desired
- allows dynamic editing of the status board definition and layout in real time.

All of these capabilities make table-based status boards operationally effective. The first example demonstrates how user defined status boards can be used in the field to provide preliminary damage assessment information to an ICC or EOC. A user in the field uses Web OSB to interactively add new preliminary damage assessment records.



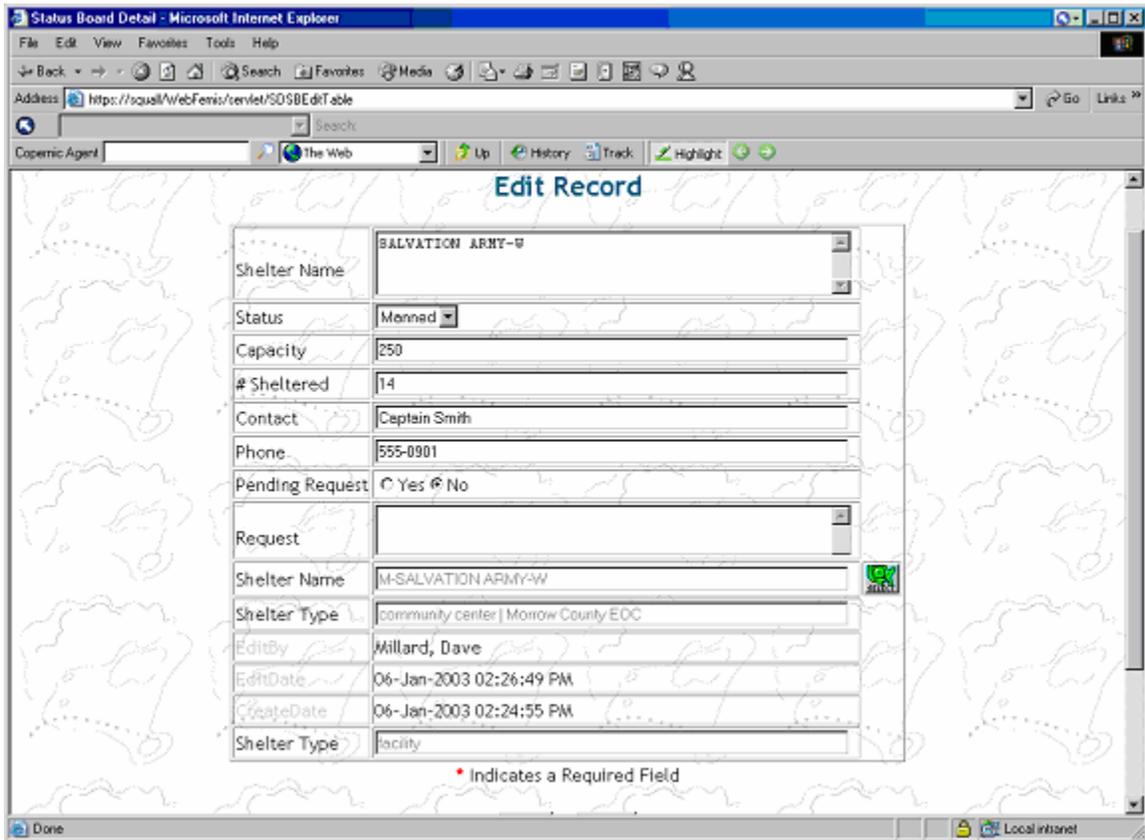
The damage assessment information can be concurrently viewed at the ICC in real time via Web OSB and back at the EOC via OSB. The EOC can use the table-based information to quickly determine if there is enough financial impact to have the State request a National Disaster declaration from the Federal Emergency Management Agency (FEMA).

	Applicant	Phone	Damage Type	Damage Category	Location - text	Impact Description
1	County Roads	509-555-2244	County Government	A: Debris Removal	7000 Block 15th, Kenn	Slide from Canal Bre.
2	John Doe	509-555-1234	County Government	C: Roads & Bridges	Coffin Rd Bridge	Embankment underm
3	Tom Connell	509-555-2356	Municipal Government	A: Debris Removal	W 15th St	
4	City of Kennewick	555-8345	Municipal Government	D: Water Control Facilities	Irrigation Canal	Break
5	City of Kennewick	555-8345	Municipal Government	F: Public Utilities	Storm Drain on 12th	Blocked

The second example demonstrates how site-defined status boards can be used to share information between the EOC, the ICC, and multiple shelters. The Shelter Activation status board is pre-populated to contain the name, location, contact, and status information about schools, churches, and fire stations that could become shelters during an emergency.

	Shelter Name	Status	Capacity	# Sheltered	Contact	Phone	Pend
1	Desert Hills Middle School	Closed	250	0	Jane Doe	555-1242	N
2	Horse Heaven Hills Middle	Closed	175	0	Pricipal Skinner	555-8392	N
3	Plymouth School	Manned	100	17	Pricipal Dwither	555-0070	N
4	Paterson School	Manned	250	25	Priciple Paterson	555-2546	N
5	Hermiston Police Station	Manned	50	0	Sgt Walker / Sgt Harris	555-9111	N

During an emergency, this same status board can be updated via Web OSB by each individual shelter to give a real-time status, the number of people at the shelter, as well as any outstanding requests for assistance.



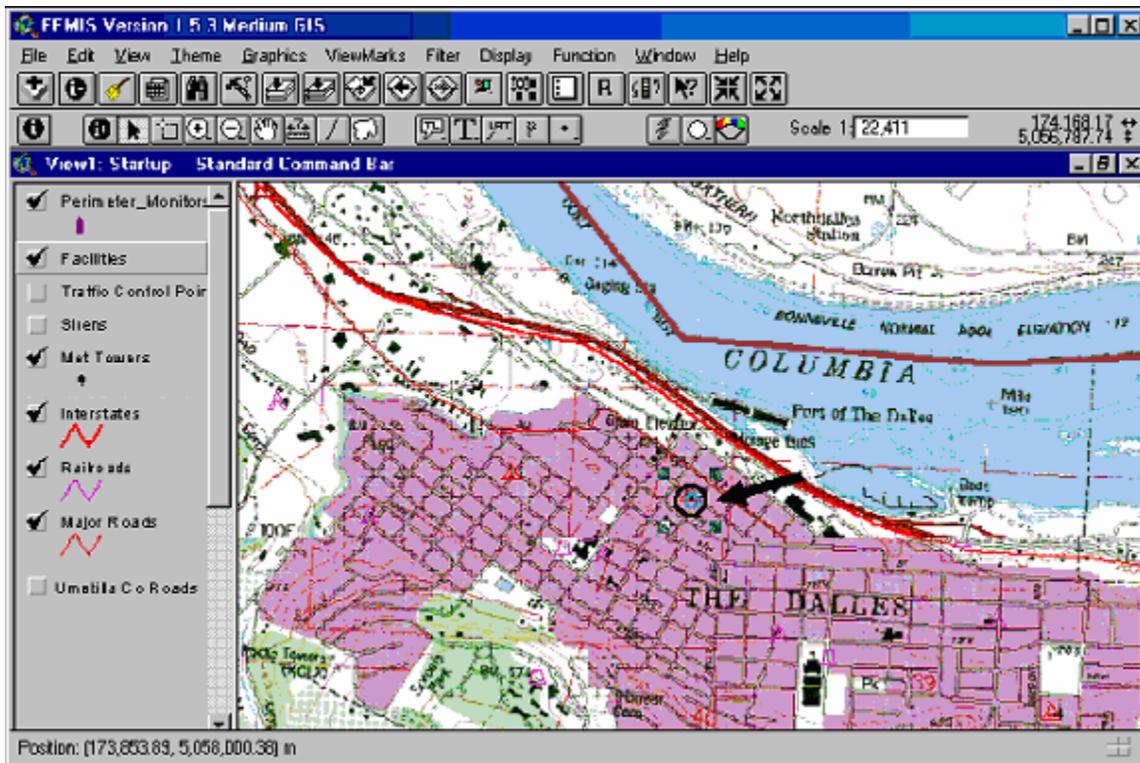
As shelter information is updated and requests are made to the EOC, OSB can be set to identify the records that have been updated. Publisher/subscriber notification provides a flashing New Data button to make the users aware that new records have been added. Any records that have been updated are marked by a magenta highlight. This allows the person in the EOC to quickly identify shelters that are currently connected and providing new information. The OSB Sort and Filter functions can be used to locate specific shelters or better organize the view of the spreadsheet to make it more meaningful.

The screenshot shows a spreadsheet window titled 'Shelter Activation - Benton County - Spreadsheet'. The spreadsheet has the following data:

	Shelter Name	Status	Capacity	# Sheltered	Contact	Phone	Pend
1	NATIONAL GUARD ARMORF	Closed	250	0	Sgt York	555-1587	N
2	EARL SNELL MEMORIAL P	Closed	200	0	Umatilla County Parks	555-3433	N
3	SALVATION ARMY-W	Manned	250	12	Captain Smith	555-0901	N
4	Desert Hills Middle School	Closed	250	0	Jane Doe	555-1242	N
5	Hermiston Police Station	Manned	50	0	Sgt Walker / Sgt Harris	555-9111	N

Buttons at the bottom include Details..., Add..., Delete..., and Close.

As stated earlier, OSB can provide and display the geographic location with a status board record. The location is either an x/y longitude/latitude location or the name of a predefined map object. The example below graphically displays the location of the Salvation Army center in Umatilla County, Oregon. The location is placed in the center of the display to allow users to quickly find the graphical object.



What Does It Really Mean To Share Information?

Emergency managers within an EOC have access to information that ranges from highly sensitive information to highly public information. True information sharing is a coordination of a user's authority to access information and the physical ability to access the data.

In OSB, authority to view or edit status board information is handled by a set of privileges that are managed by a local system administrator. When OSB is run, the user's privileges are read and used to determine if the user is granted access to view or edit each individual status board. The parameters of "View by anyone" and "Edit by anyone" can also be set to make the status board quickly available to anybody that has access to OSB within the EOC. Edit and view privileges for individual status boards allow a status board to range from being as open as a chat room to a limited use, secure interface.

In OSB, the physical availability of a status board can also be established. As a multi-jurisdictional system, OSB can dynamically share information between multiple EOCs. Within an EOC, OSB can establish and track multiple classes of hazards. OSB allow status boards to be created that can be physically limited to a single EOC. Within the EOC, status boards can be further restricted to support a specific hazard. Via control points and user privileges, a status board can be restricted to only be viewed and/or edited by a specific list of users. Thus a specific status board can be accessible for a single specific hazard within an EOC or quickly distributed to external EOCs whose users have valid access privileges.

One key feature of an OSB is that during an emergency a site’s system administrator can quickly increase the level of sharing for a status board or decrease the level of privileges needed to view a status board. This allows the access level of status information to be quickly changed and previously restricted information to quickly become available – if needed during an emergency response.

How Does A User Become Aware That New Pertinent Information Is Available?

OSB supports a publisher/subscriber notification mechanism. As users access and view individual status boards, the notification system tracks their entry and automatically marks them as a subscriber for that status board. This is also done when users access individual records within a status board. As a subscriber, each user will automatically receive a notification of any new information relating to that specific status board.

When another user accesses the same status board and goes into edit mode to make an update (or add a new record), the user is marked as a publisher. When the user providing the new information commits the changes, any user viewing that specific status board or specific record will receive an internal notification that an update has occurred. OSB will use the internal notification to cause a change in the status board display.

The display of new information is an important topic. Different users within the EOC have different display needs when new information arrives. OSB support two methods of displaying new information. The display methods are set by user preferences and can be changed for individual status boards.

The first mechanism is to make the user aware that new information exists without changing the contents of the current display window. This is done by placing visual cues on the current interface to provide context that new information exists. Additionally the visual cues identify the records that have been modified. This capability is important to a person that needs to be able to quickly identify which items have changed since they last looked at the status board. In this mode, the display of new information on a status board is controlled by the user. The user can view individual records that have been highlighted. As each record is accessed, the user will see the new information. The user can also refresh the entire status board.

	Shelter Name	Status	Capacity	# Sheltered	Contact	Phone	Pend
1	NATIONAL GUARD ARMOR	Closed	250	0	Sgt York	555-1587	N
2	EARL SNELL MEMORIAL P	Closed	200	0	Umatilla County Parks	555-3433	N
3	LDS CHURCH-W	Closed	300	0	Deacon Smith	555-0001	N
4	Plymouth School	Closed	100	0	Pricipal Dwither	555-0070	N
5	Paterson School	Closed	250	0	Priciple Paterson	555-2546	N
6	Housel Middle School	Closed	250	0	Principle Houselson	555-7654	N
7	IONE HIGH SCHOOL	Closed	400	0	Priciple Harris	555-8702	N
8	Pendleton High School	Closed	300	0	Principle Layton Lange	555-9454	N
9	Weston-McEwen High Schc	Closed	300	0	Pricipal Wes Owens	555-9898	N
10	SALVATION ARMY-W	Manned	250	12	Captain Smith	555-0901	N
11	Desert Hills Middle School	Closed	250	0	Jane Doe	555-1242	N
12	Horse Heaven Hills Middle	Closed	175	0	Pricipal Skinner	555-8392	N
13	Hermiston Police Station	Manned	50	0	Sgt Walker / Sgt Harris	555-9111	N

The second mechanism is to automatically update the entire status board as new information arrives. This feature is useful for users who want to see a summary of the most current information – now. They do not care who or what changes were made, they just want to see the status.

For Web OSB, only the notification of new data is available because the Internet currently does not lend itself well to highly dynamic updates in real time. However, the use of the new data notification mechanism is extremely useful in Web OSB. It allows the user to see when and what new information is available and reduces the amount of time the user would spend hitting the Refresh button to see if anything new has happened. It also allows a user to get a better picture of what will be provided, which reduces the time they would spend reviewing the status board to discover what had changed.

Creating Site-Specific Status Boards

Because status information for individual jurisdictions are highly dynamic, a mechanism is needed that will allow each site to quickly define and implement their site-specific status boards without the intervention of a software developer or support contractor. As sites prepare and validate response plans, conduct drills and exercises, and perform daily operations, the structure and content of their status boards should change to reflect the maturity of the site's concept of operations. If the ability to change the structure and layout of individual status boards is too time consuming or cost prohibitive, they will cease to be an effective part of daily operations and response. OSB provide a Status Board Definition Tool that allows a privileged user to update existing status boards or create new ones. OSB allows status boards to be reviewed and tested before making them a part of the current operational system.

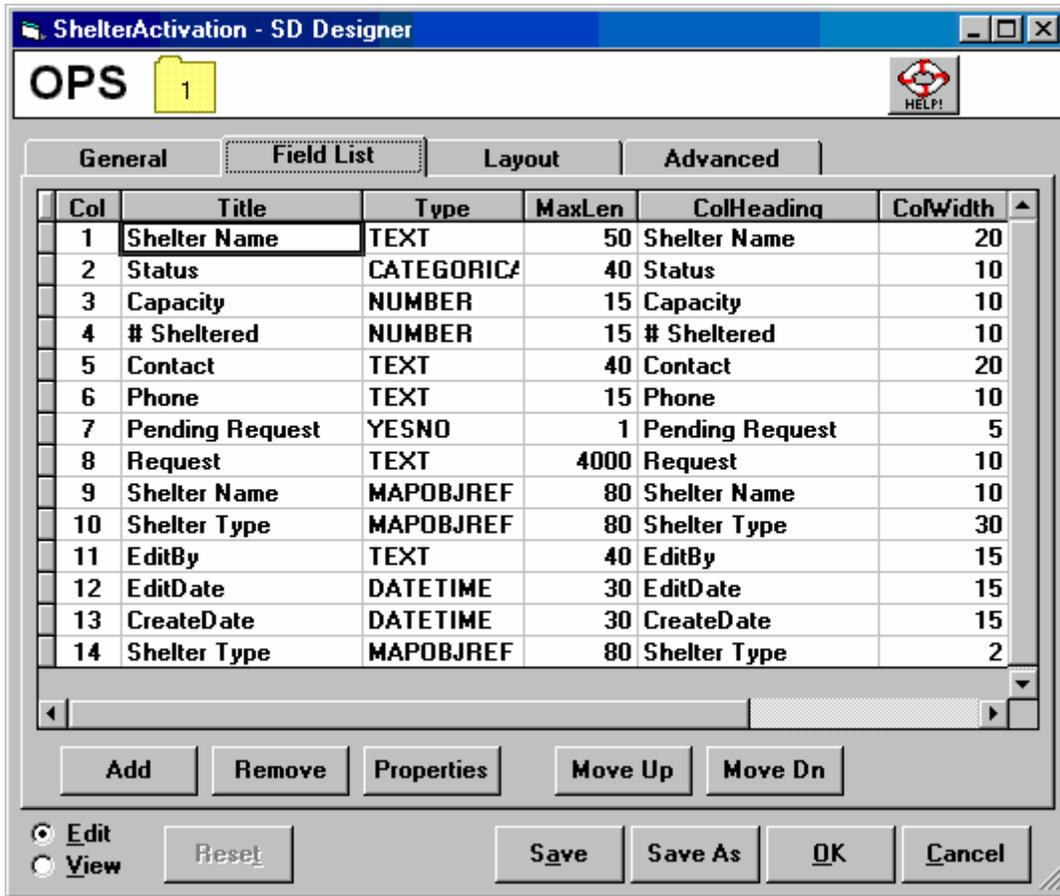
Information on the General tab is used to control who is allowed to access, view, and edit individual status boards.

The screenshot shows a software window titled "ShelterActivation - SD Designer". The window has a blue title bar and a menu bar with "OPS" and a "HELP" icon. Below the menu bar are four tabs: "General", "Field List", "Layout", and "Advanced". The "General" tab is selected and contains the following fields and controls:

- Name:** ShelterActivation
- Type:** Table
- Title:** Shelter Activation - Benton County
- Description:** (Empty text area)
- Access Control:**
 - Control Point:** General (with a "Browse" button)
 - Let anyone view data
 - Let anyone edit data

At the bottom of the window, there are radio buttons for "Edit" (selected) and "View", and buttons for "Reset", "Save", "Save As", "OK", and "Cancel".

The Field List tab identifies the type, order, and display of the attributes in the status board.



Updating (Adding) Status Boards During Operations and Emergencies

A military officer is credited with the saying “No battle plan ever survives the first encounter with the enemy.” This is also true for emergency response plans. Although many sites spend a great deal of time developing response plans, they cannot foresee or prepare for every side effect of every potential disaster at every potential location – it is impossible. During an emergency, the ability to quickly update or create a new operational status board can become mission critical. The OSB Designer allows a privileged user to update the definition of a status board to add new elements or modify the existing layout. When the updated status board definition is saved the status board is updated, retains previously acquired status information, and creates an empty placeholder for new elements. When a user updates or redisplay a status board in the field, both the new definition and the data are provided in real time. This means that during an emergency, a status board can be updated or created and applied in the field in just a few minutes. OSB allows users to update or create and implement a status board in real time—users can share more meaningful, highly dynamic status information within the half-life of an emergency.

A previously defined status board is used to share the status of shelters during an emergency. Many shelters have been added and real-world information is being provided.

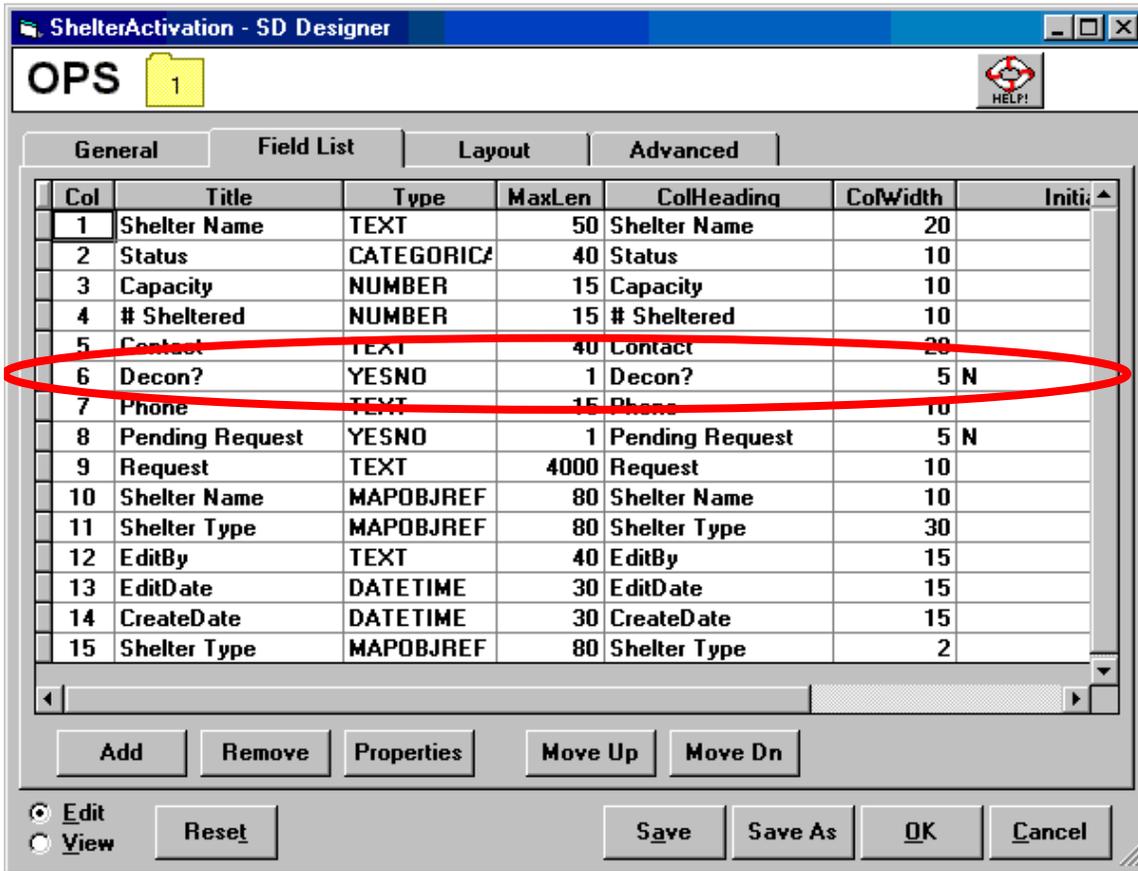
	Shelter Name	Status	Capacity	# Sheltered	Contact	Phone	Pend
1	Desert Hills Middle School	Closed	250	0	Jane Doe	555-1242	N
2	Horse Heaven Hills Middle	Closed	175	0	Pricipal Skinner	555-8392	N
3	Plymouth School	Closed	100	0	Pricipal Dwither	555-0070	N
4	Paterson School	Closed	250	0	Priciple Paterson	555-2546	N
5	Housel Middle School	Closed	250	0	Principle Houselson	555-7654	N
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7	Pendleton High School	Closed	300	0	Principle Layton Lange	555-9454	N
8	Weston-McEwen High Schc	Closed	300	0	Pricipal Wes Owens	555-9898	N
9	SALVATION ARMY-W	Manned	250	12	Captain Smith	555-0901	N
10	NATIONAL GUARD ARMOF	Closed	250	0	Sgt York	555-1587	N
11	EARL SNELL MEMORIAL P	Closed	200	0	Umatilla County Parks	555-3433	N
12	LDS CHURCH-W	Closed	300	0	Deacon Smith	555-0001	N
13	Hermiston Police Station	Manned	50	0	Sgt Walker / Sgt Harris	555-9111	N

The status board definition is used to dynamically generate the interactive window used to view, edit, and add the information for a shelter record.

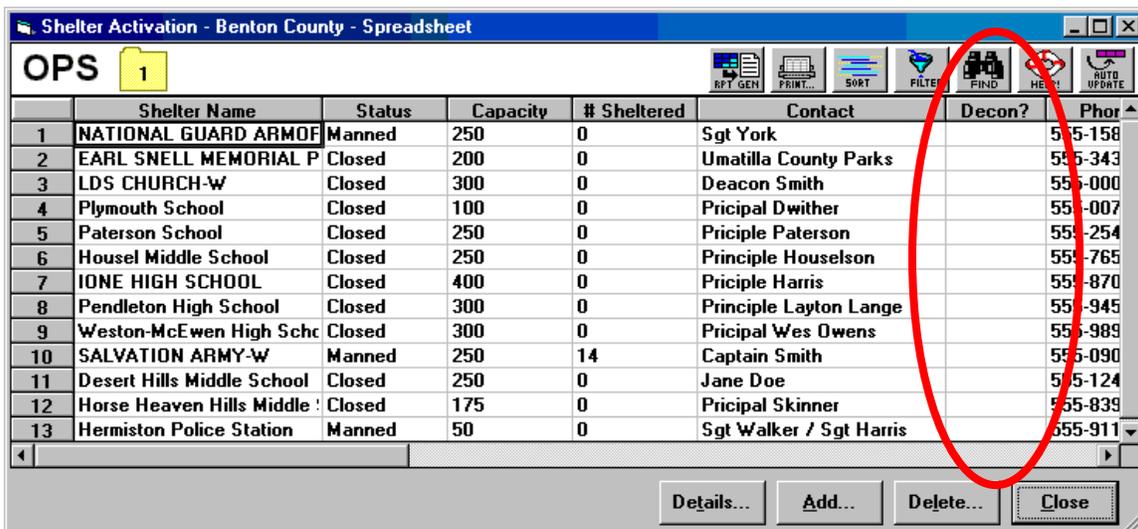
Shelter Name: SALVATION ARMY-W
 Status: Manned
 Capacity: 250
 # Sheltered: 14
 Contact: Captain Smith
 Phone: 555-0901
 Pending Request: N
 Request:
 Shelter Name: M-SALVATION ARMY-W
 Shelter Type: community center | Morrow County EOC
 EditBy: Web-OSB, millard
 EditDate: 06-Jan-2003 2:40:15 PM
 CreateDate: 06-Jan-2003 2:24:55 PM
 Shelter Type: facility

Buttons: Edit, View, 10 of 13, Reset, Save, OK, Cancel

During an emergency, the EOC establishes the need to be able to identify which shelters have the ability to perform decontamination activities identified by the health community. The OSB Designer can be used to quickly add a Boolean attribute called **Decon?** to the status board.



After the new design has been saved, the new column is seen on the status board spreadsheet.



The new field is seen on the individual detail view and edits windows.

Shelter Activation - Benton County - Record

OPS 1

HELP! AUTO UPDATE

Shelter Name: NATIONAL GUARD ARMORY-W

Status: Manned

Capacity: 250

Sheltered: 0

Contact: Sgt. York

Decon?:

Phone: 555-1387

Pending Request: N

Request:

Shelter Name: M-NATIONAL GUARD ARMORY-W

Shelter Type: national guard | Morrow County EOC

EditBy: Web-OSB, millard

EditDate: 06-Jan-2003 2:40:43 PM

CreateDate: 06-Jan-2003 2:26:27 PM

Shelter Type: facility

Edit View 1 of 13

Close

The shelter is now able to quickly provide information about their ability to perform decontamination, in real time, without having to re-enter information previously shared.

Accessibility of Operational Status Boards

Operational status boards can be accessed by each member of an expanded EOC including the EOC itself; ICCs; mobile command centers; joint information centers; and key public facilities such as schools, hospitals and shelters. The two ways to access operational status boards are 1) via the PC-based OSB software and 2) via Web OSB to access status board functionality using Internet Explorer.

The operational status board functionality provided by PC-based OSB software has been used in the field since 1994. Operation status board features are very robust and powerful. They include expanded features that make them fast and useful in an operational environment. OSB features include:

- one-click hyperlinks to relevant reports, websites, or applications
- integrated GIS capabilities to graphically locate and display locations
- report generation and information export capability
- dynamic update of status fields for overhead display
- extensive Find, Filter, Sort capabilities to better organize and display relevant data
- automatic update of status information from external sensors and data feeds.

Access to status boards via OSB requires the installation of the OSB software on a client PC. If the mapping components of the status board are going to be used, then ArcView 3.x must also be installed.

Web OSB allows a user to view, edit, and add textual information stored in an operational status board. No commercial software is required on the client PC—only access to the Web via Internet Explorer and a valid user code and password. This means that law and other support agencies as well as hospitals, schools, and shelters can have quick access to pertinent status information.

OSB and Web OSB were developed to work together in a seamless environment. New status boards created via the OSB Designer can be seen in real time via Web OSB. Since Web OSB supports the ability to add and update status information, status boards can be created that obtain information from the field and display them in real time at both the EOC and ICC. Because both products work together, each jurisdiction can choose the best method for managing and sharing their status information.

Security

Security is a major issue with any system that distributes information between multiple users and jurisdictions. OSB support a three-tier security model: physical security, access security, and component level security.

Physical security is provided by the hosting facility. Because OSB runs on a PC client, each site has control over which PCs can install the software and have access to the site-specific database. Web OSB uses secure sockets to ensure that information passed from a remote user on the Web is encrypted and not readily available to external hackers.

Access security is provided by requiring a user code and password to access OSB and Web OSB functionality. Associated with each user code is a set of privileges for individual OSB functions. Site administrators can determine whether or not an individual user can enter a function, have view-only access, or have full (editable) access to a window. User codes and passwords are encrypted and stored in the database. They are decrypted at runtime during login and validation. As an additional level of security during login, a separate application is used to verify the user code and password to ensure that no hackers can enter the database.

Component level security is provided by the OSB Designer. Each individual status board has a control point that describes the general user's ability to view or edit the contents of the status board. Access to functionality with control points can only be obtained by having an administrator grant privileges to each specific account via a system administration function. When a status board is designed, the administrator defines the security level of both the view and edit control points. By setting the view and edit control points to "public", an individual status board can be as open as a chat room. By linking the control point to a pre-defined status board, the status board can be limited to being viewed and edited by only one or two authorized accounts.

Scalability

OSB and Web OSB are ideal solutions for any EOC. Because OSB was originally developed to concurrently support multiple EOCs at the local, county, and state level, it can definitely support a large, complex multi-user environment. During the development of OSB, PNNL received the requirement to allow OSB to run standalone on a single laptop as a last resort backup in case the EOC server was destroyed during a disaster. Over the last 10 years, PNNL has fielded and maintained OSB installation sites ranging from a single EOC to multiple EOCs with their own OSB database. An evolutionary migration path exists that can lead users from Web OSB to the more extensive emergency management capabilities of OSB by progressively applying the capabilities needed to support the EOC's current concept of operations. As a result, OSB can be installed to fit the specific needs of your emergency management community.