

## National Response System—US—Best Response Model\*

The success of a response is frequently measured in a variety of ways including initial reaction, public perception, physical and/or monetary damage to the environment, amount spent on the response, effectiveness of restoration efforts and other, often conflicting or contradictory measures. A recent review of responses since the *Exxon Valdez* reflected many positive organizational and technological advances as well as other areas with unsolved problems. Despite these innovations the authors have found no comprehensive system, agreed upon by the response community, that systematically evaluates the success of the response effort.

This appendix proposes a model for response evaluation that highlights six key areas that must be addressed to adequately define success before, during and after a response. The areas are: (1) human health and safety; (2) natural environment; (3) economic impact; (4) public communication; (5) stakeholder service and support; and (6) response organization. Each of these areas has critical success factors. By assessing these critical success factors, as part of a Balanced Response Scorecard, a response organization has the chance to modify actions during the response to ensure the best opportunity for success. Once fully integrated, the response evaluation model could influence the response process and community relations, and lead to increasingly effective response planning and operations.

Minimizing consequences of an incident requires not only a sound management system, good people, and equipment, but also goals that can be measured against agreed upon standards or criteria. This baseline, although driven by the subtleties of each geographic area, will provide the opportunity for response organizations and communities to reach consensus on success, thereby improving our ability to protect our national interests and building an increased sense of shared stewardship.

\* Kuchin, Joseph T. and L.L. Hereth 1999. Measuring Response: A Balanced Response Scorecard for Evaluating Success. In Proceedings of the 1999 International Oil Spill Conference, Seattle, Washington. American Petroleum Institute, Washington, DC, pp. 685–690.

## Introduction

For many years there has been an ongoing discussion of how to define success in emergency response. This appendix is an update of work in the US Coast Guard to identify the principal measures used to determine success in emergency response and to establish a methodology to evaluate effectiveness in each of those areas.

This appendix begins with a discussion of the US National Response System (NRS). It identifies the goal of that system and introduces the concept of “Best Response”. The “Best Response” model graphically represents the business of emergency response. It is followed by a description of the methodology used to develop a measurement plan. The measurement plan relies on the concepts of key business drivers, critical success factors and a survey instrument to evaluate the complex process of crisis response.

Although survey norms will evolve over time, three immediate benefits for the “Best Response” measurement scheme and survey are offered:

- To improve response community alignment;
- To serve as a guide or “Balanced Response Scorecard” during a response; and
- To serve as a post response self-evaluation tool.

The appendix elaborates on the use of these concepts during a response and proposes their use as part of a Balanced Response Scorecard. Using the “Best Response” measurement scheme, the suggested scorecard blends traditional operational details with an awareness of progress towards outcomes that benefit national interests. This broader view of success will have a beneficial impact on our ability to more effectively prepare for and deliver emergency response with positive, meaningful results.

## The US National Response System (NRS)

The US National Response System was established in the late 1960s. It was created in answer to a number of large-scale pollution incidents that highlighted the nation’s need to provide a mechanism to foster support, cooperation and collaboration among all response entities, both industry and government (federal, state, local) in order to provide the best possible response. Figure III.1 is a summary view of the National Response System. The foundation of the system is the components, or players—industry and government; the business of the system is “Best Response”; and the goal of the system is the protection of those elements of the National Interests summarized here as People, the Environment, Property and the Economy.

### *The Goal of the NRS*

“Minimize the Consequences of Pollution Incidents”—1999 US Coast Guard Performance Plan

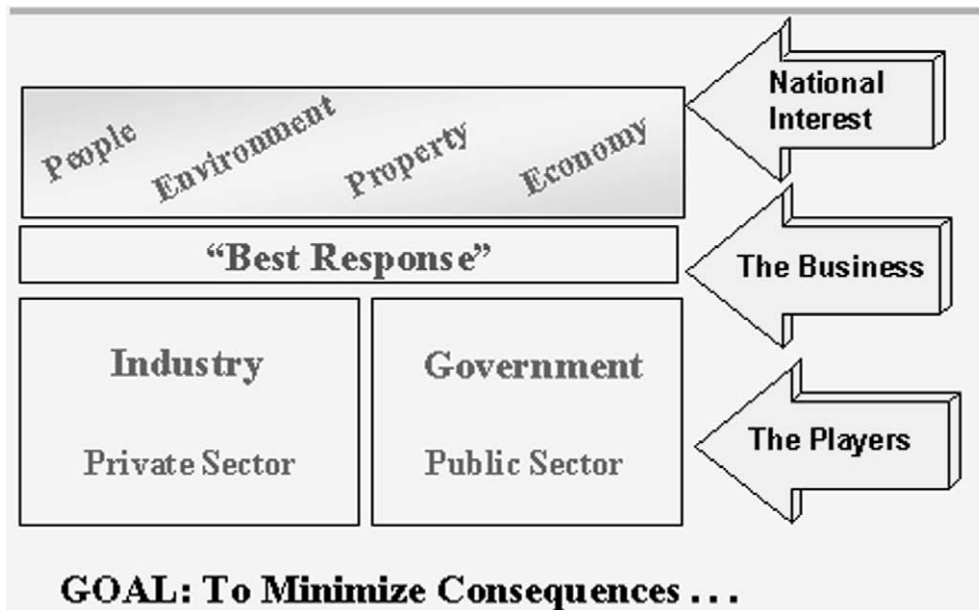


Fig. III.1. National response system (NRS).

This is the primary goal of the NRS when responding to oil and hazmat incidents. This simple statement focuses on the actual outcome that the NRS is chartered to deliver to the nation. It has been accepted by the US Coast Guard as its goal in the area of pollution response.

The four categories representing the National Interests are designed to be broad enough to include everything the response organization is trying to protect. These categories include:

- (1) *People*—people, their welfare and their interests (social, cultural, archeological and recreational);
- (2) *Environment*—the natural environment;
- (3) *Property*—the property people own; and
- (4) *Economy*—those economic systems that sustain local, regional or national interests.

#### *The Players of the NRS*

Figure III.1 shows that the response system includes both private and public sector representatives. In the US, the responsible party (supported by representatives or contractors) and designated government agencies (federal, state and local) each have jurisdiction and on-scene functional responsibilities. Therefore, management responsibilities are normally carried out using a Unified Command (UC) structure and an Incident Command System organization.

**The Business of the NRS—“Best Response”**

“Response to a major pollution emergency is like standing up, overnight, a multi-million dollar corporation with three (or more) partners (Unified Command) that don’t particularly want to be in business together.”

This statement captures and characterizes the essence of the challenge of responding to a major pollution emergency in the United States. The tremendous variety of entities (agencies, companies, organizations, individuals, etc.) that are partners, customers, suppliers and stakeholders in the business of emergency response have always posed huge challenges to emergency responders. Over the years, balancing their needs has spawned considerable debate and conflict as response managers wrestled with satisfying all legitimate interests in the midst of emergency response.

In an effort to establish a holistic view—a mental model—of this very complex business, and provide a single common view of what a response is and what it looks like, the Coast Guard measurement development team created a graphic to depict the business of response. Figure III.2, “Best Response (Coastal Maritime Oil Spill)” is that model. The model does not pretend to settle the historical conflict and debate over competing priorities; it simply presents them so as to encourage discussion. It does however, attempt to capture the essence of the response, providing a common focus for all segments of the response and stakeholder communities. If the model is accurate, then every major player and stakeholder should see his/her primary interest prominently represented in the row of arrows along the upper portion of the diagram. The model has the potential to enable all players and stakeholders to agree on the major functional activities with explicit acknowledgement that all interests are valued and important. As a result, the model can facilitate a more effective discussion focused on how to achieve the Best Response.

The diagram can also serve as a “shared mental model” for the entire response community. A shared model serves as a very practical alignment tool. It helps clarify the scope, complexity and interrelationships of the many important functions carried out in a crisis response. The upper portion of the graphic (the arrows) represents the major functions that must be performed effectively and efficiently to achieve Best Response. The arrows represent those major functions that directly impact the desired outcomes of the response. The use of arrows in the diagram to represent the primary functional areas was a deliberate, symbolic choice representing the fact that an effective response to a complex pollution emergency is a multi-functional event, with a wide variety of things that must be accomplished simultaneously. Each arrow is a complex, multi-organizational function that, by itself, will present significant challenges. It is incumbent on the response manager to ensure that all functions go forward simultaneously.

The lower portion, the foundation of the model, represents the response management system that must ensure that the response is carried out effectively and efficiently. That foundation is based on the National Interagency Incident Manage-

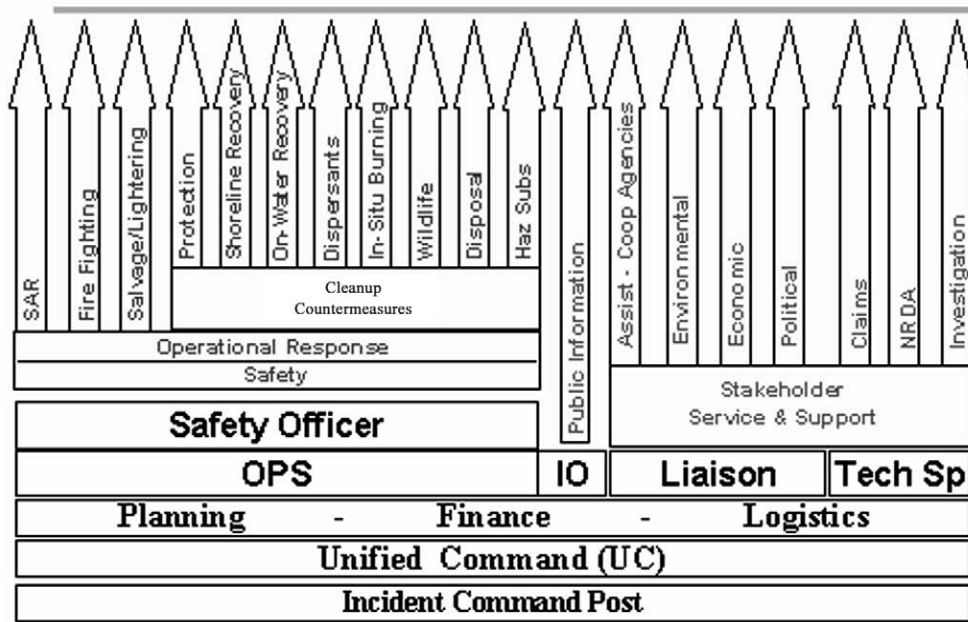


Fig. III.2. Best response (Coastal Maritime Oil Spill).

ment System (NIIMS) Incident Command System (ICS).

### Operational Response

The upper left section of arrows in Figure III.1 represents the Operational Response. Typically, a major maritime pollution emergency response begins with a distress call initiating a Search and Rescue (SAR) case. That is followed quickly by mounting operational responses, as needed, in the areas of firefighting, salvage and lightering, and pollution cleanup countermeasures. Countermeasures may include containment and protection; on water recovery; shoreline recovery and clean up; wildlife protection, recovery and rehabilitation; advanced countermeasures such as dispersant application or in-situ burning; disposal, and hazardous substance response. The arrows indicate parallel, simultaneous execution of these functions.

A block labeled safety is included supporting the entire “operational” complex. Each of the operational response measures, in and of themselves, is potentially extremely dangerous. Safety must be integral to all aspects of each operation.

### Public Information and Stakeholder Service and Support

Taken together, the functions of Public Information and Stakeholder Service and Support are the primary “Customer Service” functions provided by the emergency

manager. In the past, the primary customer in emergency response had been the “common good” or perhaps the “American people.” Certainly these generic customers benefit from the efforts of emergency responders; however, there are far more specific customer groups with more precise needs to be served and their needs merit direct attention.

“In a Crisis, Always Be the First and Best Source of Information”—Communications Council of America.

Public Information speaks to the responsibility for keeping the public informed. It is incumbent upon the emergency manager to keep the public fully advised so they feel confident that the response is being carried out correctly. Public confidence is important for the perceived success of the crisis response effort. It is noteworthy that a prime mover for the US Government Performance and Results Act (GPRA) was the seriously eroded public confidence in government. Large crises are one of the situations the public absolutely wants to feel confident that their government (and everyone else) is properly handling. The Public Information function carries the responsibility of ensuring that the public is fully aware of progress and has every opportunity to conclude that the incident is being handled properly. The explicit intent is that the public will have full access to the good and the bad. There is no implied intent that the emergency responders will report anything but the truth.

Stakeholder Service and Support represents the responsibility to keep all stakeholders fully advised about the status of the response. This is important because stakeholders have been impacted by the spill or have a vested interest in the outcome of the response. In an ICS organization, the Liaison Officer routinely deals with assisting and cooperating agencies, organizations or companies. In addition, there are six other categories of stakeholders that must be addressed:

| <i>General</i>    | <i>Specific</i>  |
|-------------------|--|
| (1) Environmental | (4) Claimants  |
| (2) Economic      | (5) Natural Resource Damage Assessment Representatives |
| (3) Political     | (6) Investigators                                      |

Appropriate Stakeholder Service & Support includes the idea that the response leadership actively seeks out the stakeholders, keeps them informed, and actively receives input from them. This ensures that, where possible, the management of the crisis will take into account their interests.

Public Information and Stakeholder Service and Support, taken together represent the “Customer Service” side of emergency response and are critical to the overall final judgment of the quality and the success of the response.

#### *The Response Management System—NIIMS ICS*

The next section of the model, the bottom half of the diagram, represents the Response

Management System. This diagram is arranged to provide a functional representation of how NIIMS ICS interacts and aligns with the major functions—the arrows. The Safety Officer and Operations Section work primarily in support of the Operational Response; the Information Officer (IO) is responsible for Public Information; and the Liaison Officer (LO), supported by Technical Specialists (TS), is responsible for Stakeholder Service and Support.

The supporting layer of organization is shown in the diagram as the Planning, Finance, and Logistics Sections. Their responsibilities spread throughout all areas of the functional response. Similarly, Unified Command carries responsibility for and, therefore, supports all aspects of the response.

### *The Incident Command Post*

The bottom layer of the model—the Incident Command Post—has been placed in the diagram underpinning the entire system. This emphasizes that, in a complex pollution response, the leadership and management of the response will be facilitated by a properly equipped and configured Command Post. Integration of response resources and co-location of the principals will help improve the efficiency and the effectiveness of the response.

### **“Best Response” Summary**

Best Response is the highly complex and challenging business of the US National Response System and emergency response in general. It is very important to understand and to be able to accomplish if we are to reach our national goal to minimize the consequences of pollution incidents to people, the environment, property and the economy.

The Best Response model clarifies and helps us focus our efforts in several ways:

- It depicts the multi-faceted activities occurring in a crisis response.
- It establishes a whole system, graphical view of what emergency response leaders need to provide.
- It adds clarity and common perspective, enabling every participant to better grasp, appreciate, and agree on the length and breadth of all that the response system is required to deliver.
- It serves as a very practical alignment tool, enabling the response community to have a “shared mental model” of the scope, complexity and interrelationships of the many important functions carried out in a crisis response.
- It is useful as a checklist for reviewing readiness.
- It is useful as a checklist for setting objectives during a response.

- It provides the ability to quickly and visually represent to the uninformed the magnitude of the challenge presented by a major pollution response and may serve as a good communication tool.

A general understanding and consensus on the Best Response model serves as the basic framework for the measurement scheme proposed in the remainder of this appendix.

## Measuring the Success of a Crisis Response

### *Why Important?*

The next challenge is to identify and to measure the actual outcomes of the response effort. The historical focus has typically been on measuring activities such as: speed in responding; feet of boom deployed; and gallons spilled and recovered rather than the actual impact of those activities. While traditional metrics are important matters in the response, they are largely reflective of processes and activities being carried out in the response and do not always directly relate to the overall outcomes. The intent is to measure outcomes that directly relate to minimizing consequences to people, the environment, property and the economy. Ideally, we want specific information that will relate to the value provided by our response efforts (i.e., through reduced consequences).

### *Leading vs. Lagging Indicators*

There are two general categories of measurements: leading indicators and lagging indicators. Both are valuable to the manager in evaluating progress. The literature suggests that, whenever possible, a measurement plan should include both.

The Leading Indicator for emergency response must center on the response organization's capability to minimize consequences. The indicator should measure the degree of preparedness, i.e., the *apparent* ability to minimize the consequences. The Coast Guard's leading indicator will involve: (1) a detailed assessment of required response plans; and (2) an assessment of apparent capability to respond successfully in a variety of functional areas.

The capability assessment will look at such things as: resources available, systems support, policies, procedures, training levels and exercise participation. The assessments will be principally self-evaluative, but must be useful at the local, regional and national level. The leading indicator will be validated by the lagging indicator proposed below.

The Lagging Indicator will measure the actual outcomes based on the national goal. This means measuring how effective the response organization was at minimizing the consequences of a pollution incident. The primary emphasis during the past

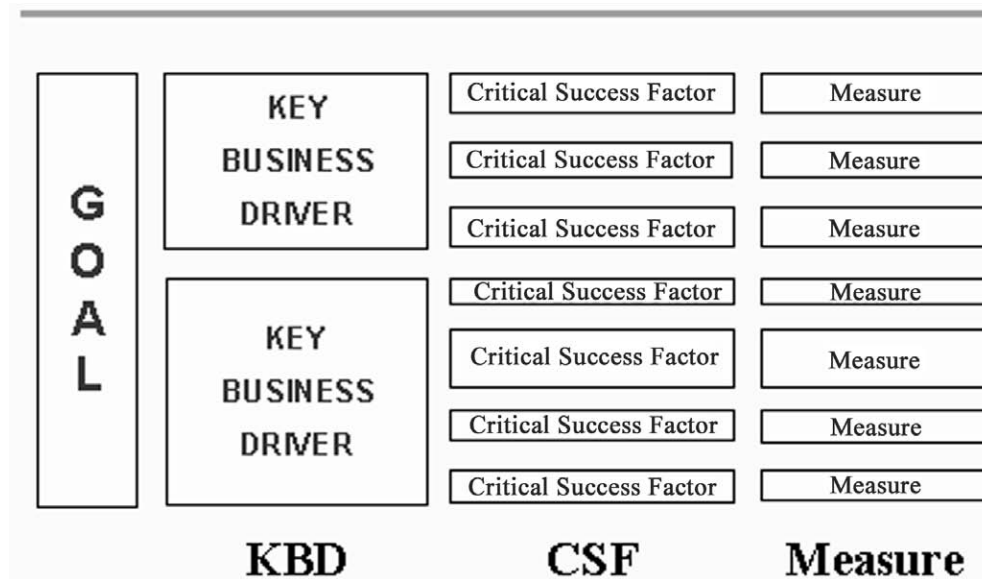


Fig. III.3. Measurement methodology.

year has been on developing a plan to measure the Lagging Indicator—the actual measure of what a response accomplishes relative to minimizing consequences. This is the focus of the rest of this appendix.

### The Measurement Framework

The process used to develop measures of outcomes is depicted in Figure III.3.

Step 1: Identify the goal: “Minimize the consequences of a pollution incident”.

Step 2: Identify the key business drivers (KBD) that must be accomplished in order to reach the goal: KBDs should link to those national interests (people, environment, property, economy) we are trying to benefit by minimizing the consequences of a pollution incident. The assumption is that there are several KBDs that must each be addressed to realize success. The final judgement of success will be an aggregate score based on the relative success in each of the KBDs.

Step 3: Identify the critical success factors (CSF) for each KBD: Each CSF is something that must go well or be done right in order for the KBD to be protected or receive some benefit (Rockhard, 1981). Again, the entering assumption is that there will be several CSFs that must be accomplished in order to ensure success in each KBD. The final ability to judge success in a KBD will be based on an aggregate of the success in each of the relevant CSFs.

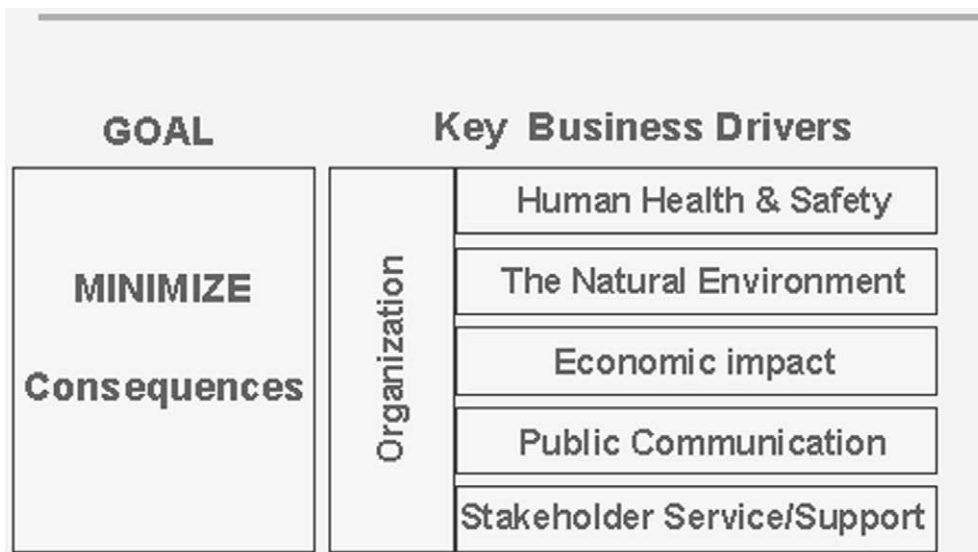


Fig. III.4. Measurement of response.

Step 4: Identify measures for the CSFs.

#### *Identifying Key Business Drivers*

Identifying the Key Business Drivers (see Figure III.4), began with a review of the research done over the past twenty years as well as extensive use of a variety of case studies and reviews by a group of experienced responders. As a result, six key business drivers were identified as critical to goal accomplishment. From the outcome measurement perspective, five of the six meet the “outcome” test in that they deal directly with the consequences of the event that we are attempting to address.

The sixth KBD, “Response Organization,” is a process outcome that is essential to achieving our desired goal. Because organization figures so prominently in a successful response, it was included as a key business driver. Ideally, the response organization will become so automatic to the responders that eventually it would not even be an issue during a response. Currently, however, our Incident Command System model (or any other crisis management organizational model) is a very challenging and critical aspect of successful response.

The Key Business Drivers (see Figure III.4) are:

Operational Outcomes:

- Human Health and Safety: Injury, illness and death to responders and the general public are minimized.
- Natural Environment: Damage to the natural environment is minimized.
- Economic Impact: Damage to property and the economy is minimized.

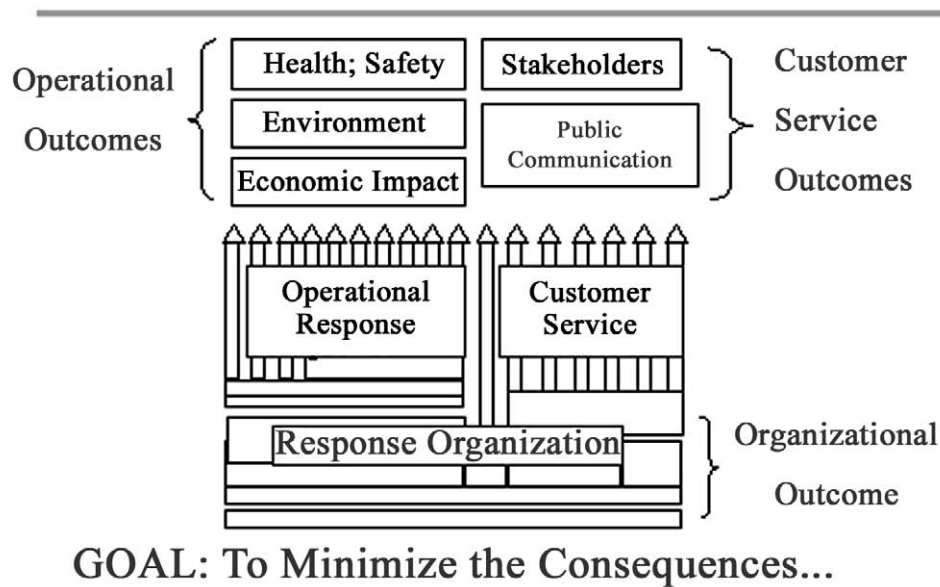


Fig. III.5. “Best response” vs. key business drivers.

Customer Service Outcomes:

- Public Communication: The public and the media perceive the response as successful.
- Stakeholder Service and Support: All stakeholders perceive the response as successful.

Organizational Outcome:

- The Response Organization: The response organization effectively and efficiently responds to the incident.

Figure III.5 depicts the relationship between the major response management functions (shown as arrows) and the key business drivers.

#### *Identifying Critical Success Factors (CSFs)*

CSFs for pollution response were identified by Harrald (1994) and consolidated by Walker, et al. (1994). The Coast Guard measurement work group struggled with how those factors might be measured. They were particularly concerned that the methodology chosen would clearly show whether or not desired outcomes had been reached. The intent was to create an evaluation tool that would challenge the response organization to meet high standards, with the accompanying assurance that, by meeting those standards, we could confidently predict success—success being defined as accom-

plishing our goal to minimize the consequences of an incident to people, environment, property and the economy.

Given the intent to build a measurement/evaluation tool, and the clear necessity for the CSFs to focus on outcomes and align with the Key Business Drivers (KBDs), the CSFs identified in the earlier works mentioned above were extensively reviewed, revised and reworked based upon the following factors:

- Participant's experience
- ICS implementation experience
- Incident Specific Pollution Reports (ISPRs)
- Lessons learned database
- Job task analysis
- Response management job aids

As the list of CSFs was completed and the work began to center on building measures for each CSF, the group concluded that a survey instrument to measure CSF accomplishment was the most practical first step. It was felt that a survey could be used to establish expectations for response and to capture the qualitative assessments of those directly involved in the incident, either as responders or stakeholders.

### *The Survey*

In building the survey instrument, each CSF was transformed into the form of a statement describing in positive terms the accomplishment of the aspect of the response addressed by the CSF. Because the questions are based on CSFs, the expectation is that doing a good job on the CSF will directly impact accomplishment of the KBD and, in turn, success in accomplishing the goal of minimizing consequences. The survey questions created were grouped according to the six KBDs.

### *Survey Details*

The survey is designed to use the judgment of those closest to the event to measure success and judge how well the response organization has done in each KBD. Therefore, only those individuals with good knowledge of or involvement with the response will be asked to fill out KBD surveys. A minimum number of responders and those affected by the incident will be targeted. Each person completing the survey will be asked to fill out a demographics page and then one or more of the appropriate KBD surveys depending on their involvement in the incident. Each Key Business Driver survey is on average 1 page or less. The methodology of the survey is that the person completing the survey is asked to read each "CSF" statement, and then conclude his/her level of agreement or disagreement that the statement reflects performance in the response being evaluated. A scale of from 1 to 7 affords the respondent choices ranging from "strongly agree" to "strongly disagree".

The target population of spills to be measured is tentatively set at 10,000 gallons and over (about 35 per year in the US). A detailed survey protocol—who should complete it, how many, who decides, etc.—is under development. The survey data will be collected by the US Coast Guard National Strike Force Coordination Center (NSFCC), Elizabeth City, NC using standard survey practices. The data will be used in two ways:

- *NRS Feedback*: The survey data will also be analyzed, looking for potential areas to provide feedback to the response community for improvements, either regionally or nationally.
- *Government Performance and Results Act*: GPRA requires outcome-based measures of effectiveness to substantiate the value (and thus, continued funding) of a program. The survey data will show that response organizations throughout the US are meeting consensus-based national success measures, i.e., the CSFs in the survey.

The survey is not presented here due to space limitations but is available to interested parties from the NSFCC.

As survey results are obtained, they will be reviewed and analyzed for qualitative and quantitative relationships. Such findings are expected to evolve and change with the growing body of survey data. It is anticipated that the response community will be able to develop norms and factors for assessment of a response's success. We may see such norms differentiated by geographical locale, type or volume of spill or other parameters assisting us in better coming to terms with the concept of "Best Response".

### *Survey Benefits*

The assessment of regional and national performance trends based on post-incident surveys will evolve as surveys are conducted. This may take several years. Nevertheless, the survey, with its embedded KBD framework and specific CSFs will immediately serve three very important needs:

(1) *As an alignment tool before the response;*

The survey serves as an alignment tool before the response. Such a tool develops a "shared mental model" clarifying expectations for all players. Such a common understanding of goals, methods, roles and procedures can substantially contribute to improving the effectiveness and efficiency of operations. People that understand and buy into the desired outcomes are more likely to work creatively to achieve them with less direction from management.

(2) *As a guide—i.e., a "Balanced Resonse Scorecard"—during the response; and*

Using the survey parameters as a guide or checklist during the response is also very helpful. There are a variety of factors that impact on success in any undertaking. The

prudent manager, especially in the complex realm of emergency response, should make it their business to identify those factors and establish a means to monitor progress in meeting them as the enterprise unfolds. This should include details about progress in the key business driver areas, in addition to the traditional operational details. The complete array of information that the response manager needs may be considered a Balanced Response Scorecard and should include the following:

*Operational Details*

Incident Status—“*What’s the problem?*” and “*What are we doing about it?*”

- A. Situation status—describes incident and area of impact
- B. Resource status—describes people and equipment assignments
- C. Financial status—describes sources and uses of funds

*Key Business Driver Details:*

Key Business Driver Survey—“*Will we reach our desired outcomes?*”

- A. Operational Outcomes:
  - 1. Human Health & Safety Impact
  - 2. Natural Environmental Impact
  - 3. Economic Impact
- B. Customer Service Outcomes:
  - 4. Public & Media Communication
  - 5. Stakeholder Service and Support
- C. Organizational Outcome:
  - 1. Response Organization Status

(1) *Finally, as a consistent, post-response, self-evaluation tool.*

The KBD survey, with its CSFs provides a consistent, simplified method for evaluating the hundreds of smaller incidents that will not be formally surveyed. The response manager can be assured that all key success areas are being reviewed and may use the format to determine lessons learned or best practices from the response.

## Summary

We began with a simplified, whole system view of the National Response System, identifying the players, the business and the goal. We described the NRS as a partnership of the public and private sectors. Each entity works to deliver Best Response in order to meet our goal of minimizing consequences.

We then discussed a measurement plan designed around our goal to minimize consequences and identified six key business drivers. Each business driver had a series of critical success factors proposed as details in a survey. This format enabled

the measurement of a complex pollution response through qualitative assessments by responders or stakeholders.

Provided we can obtain consensus—in itself not a simple task—and validate the tools used, this measurement model will be a key performance improvement element for crisis response. It takes a major step towards setting performance expectations by describing what a successful response looks like. It will also provide for more consistent evaluations that will be useful at the local, regional and national levels.

Beyond the benefits of the formal measurement model, we suggested that the survey, with its embedded KBD framework and specific CSFs could serve three other very important needs:

- As an *alignment tool* before the response;
- As a *guide or Balanced Response Scorecard* during the response; and
- As a consistent, post response, *self-evaluation tool* for those hundreds of incidents that will not be formally surveyed.

The proposed Balanced Response Scorecard blends the traditional operational detail focus with an awareness of progress towards desired outcomes (by reference to the KBD survey). The authors encourage this broader crisis management perspective. Establishing it as our expectation holds great potential to help our entire response system get a better focus on what the country really wants and needs from a crisis response.

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