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# **The Preparedness Continuum:**

## Key Performance Indicators for the Alberta Health Services Emergency/Disaster Management Program

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# EXECUTIVE SUMMARY

## INTRODUCTION

The Alberta Health Services (AHS) department of Emergency/Disaster Management (E/DM) has a mandate to ensure the organization is “well prepared for, and subsequently able to respond to and recover from, any major emergency or disaster” (AHS Insite, 2015). With Alberta’s health system being challenged by several large-scale disasters over the last decade, it has become increasingly important for the organization to ensure its preparedness efforts can effectively meet the challenges presented by emergency and disaster events in the future.

Performance measurement systems are designed to allow organizational entities to assess their progress in achieving goals and desired outcomes. The use and reporting of performance measures is widespread across the field of public health care and is required of each department within AHS. Measuring the performance of a health care emergency management program, however, is inherently challenging. The realization of emergency preparedness efforts only occurs in the aftermath of infrequent emergency and disaster events that unfold in complex, unpredictable ways, limiting the ability to link program performance to event outcomes.

Currently, AHS E/DM measures its performance by quantifying the elements of preparedness such as committees, plans and training in a set of Key Performance Indicators (KPIs). This report aims to expand the E/DM approach to performance measurement into measures of efficiency, effectiveness and the achievement of outcomes. The objectives of this research are to present recommendations for a new set of KPIs for AHS E/DM that will present a holistic view of the overall performance of the program, provide useful information to guide program priorities and improve performance and provide reliable and valid measures of program effectiveness and progress towards achieving desired outcomes. The KPIs of the program should be made up of its critical success factors, or the elements of performance that are essential for the program to achieve its goals. To this end, the primary research question addressed in this project is: What should the KPIs of the AHS E/DM program be?

## METHODOLOGY AND METHODS

This research employs a qualitative, case-study methodology. Research methods include a literature review and key informant interviews.

A literature review was conducted to: 1) examine the Balanced Scorecard and KPI approach to performance measurement endorsed by the organization, 2) examine challenges and current approaches to emergency management program performance measurement and, 3) explore specific measurement strategies in the literature for key E/DM program activities including planning, training/exercising and incident response.

Individual key informant interviews were conducted with 31 program stakeholders across three categories: internal stakeholders within E/DM, AHS stakeholders from other areas of the organization

and external stakeholders representing agencies outside of AHS. A Balanced Scorecard approach was used as a framework for these semi-structured interviews, asking stakeholders to reflect on their expectations for the program in terms of services and internal processes, how the program must learn and grow and how the program demonstrates financial success. Internal E/DM stakeholders were also asked to reflect on the current KPIs and provide recommendations from their experience for future consideration.

## **KEY FINDINGS**

The literature review revealed that there is no commonly accepted approach to performance measurement in emergency management programs and no existing framework has been developed that fully meets client needs. Despite the challenges inherent to performance measurement in emergency preparedness and management, several researchers and organizations have developed approaches that aim to apply performance measurement methods to this area. The literature shows a gradual shift away from the traditional industry standard and regulatory approach to emergency management performance measurement that looks only at the presence or absence of the elements of preparedness. Increasingly, more comprehensive systems of measurement are being employed that attempt to assess the level of capability developed by the emergency management program, along with tools that aim to assess the effectiveness of emergency management program components in relation to proxy outcomes established through emergency exercises. The literature review found that the application of these tools is still relatively new and untested, and significant adaptation is also required to align these tools with E/DM program objectives.

The findings of stakeholder interviews revealed that it is important to count the elements of preparedness, but there is also a need to standardize data collection and reporting to ensure accurate performance information. Some of the most important components of E/DM performance, such as engagement with internal and external partners, are not currently addressed in the program's KPIs. Further, stakeholders emphasized the concept of organizational preparedness occurring on a continuum. Each of the key program activities are linked together towards a broader goal of organizational preparedness. When a plan is implemented, a training session is delivered or an exercise is conducted, it does represent an end-state. These activities occur as part of a larger progression towards organizational preparedness and response capability, building on each successive component. As part of this preparedness continuum, stakeholders also emphasized the importance of learning from organizational experiences in simulated exercises and actual events. Although it is difficult to establish causal links between preparedness activities and the outcomes of an actual disaster event, stakeholders emphasized that the ultimate goal of the E/DM program is to reduce the consequences of actual incidents.

## **OPTIONS TO CONSIDER AND RECOMMENDATIONS**

This report presents the recommended key performance indicators for the AHS E/DM program within five adapted Balanced Scorecard perspectives:

1. **Elements of Preparedness:** The E/DM program builds capacity for preparedness through planning, education and exercising.
2. **Engagement:** E/DM engages with internal and external stakeholders to ensure the AHS emergency and disaster management program is implemented in coordination, collaboration and integration with others.
3. **Effectiveness and Capability:** E/DM planning, education and exercise programs build organizational capability to respond to and recover from emergency and disaster events.
4. **Consequence Reduction:** E/DM program initiatives reduce the consequences of emergency and disaster events.
5. **Continuous Improvement:** The E/DM program engages in a process of continuous improvement to learn from experiences in emergency exercises and events.

Each of the five Scorecard perspectives represents an aggregate KPI from which the organization can understand its performance in achieving the strategic goal of overall organizational preparedness. Taken together, these five perspectives form the preparedness continuum, beginning with the elements of preparedness, progressing to engagement, effectiveness and capability-production, consequence reduction and continuous improvement. For each perspective, a number of specific measures are recommended to quantify organizational performance in that area. Measuring performance in the elements of preparedness will focus on a standardized methodology for data collecting and reporting, incorporating all of the structural elements of preparedness. Measures of engagement will assess the reach and integration of the program with internal and external stakeholders by quantifying the key engagement activities of the program. Measures of effectiveness and capability-development will be newly incorporated into training and exercise evaluation in a systematic manner, allowing the program to better assess the impact of those programs. Measures of consequence reduction will be incorporated into post-incident evaluation to build meaningful data on how the E/DM program contributes to better outcomes in actual events. Finally, continuous improvement will be measured by implementing an ongoing, accountable tracking of the recommendations that arise from incidents and how they are addressed. To ensure feasibility, recommended data collection methods primarily build on existing program processes, such as provincial tracking of site preparedness implementation and training, post-exercise and post-incident evaluations.

It is recommended that all five perspectives be incorporated into the program's performance measurement system using a phased approach. A phased approach to implementation is recommended to allow for baseline performance levels to be established and targets to be set. An important characteristic of the proposed performance measurement framework is that it does not presuppose the program priorities in terms of the kinds of hazards the organization must prepare for. These priorities must be established and revised on an ongoing basis reflecting the level of risk. Regardless of the risks faced by the organization, the steps in the preparedness continuum should remain relevant.

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## **1. INTRODUCTION**

When emergencies and disasters occur, Albertans primarily depend on the provincial health system to provide essential health services. In recent years, Alberta has seen its health care facilities and services strained by floods, fires, tornadoes, and infectious diseases. These events have highlighted the importance of effective organizational emergency management. The AHS Department of Emergency/Disaster Management (E/DM) exists to ensure the organization is “well prepared for, and subsequently able to respond to and recover from, any major emergency or disaster” (AHS Insite, 2015). However, measuring how successful the E/DM program has been in achieving its mandate has proven challenging.

As a public sector health care organization, AHS is expected to demonstrate accountability through performance measurement. To achieve this, AHS has adopted a performance management system measuring 17 health care indicators based on the Alberta Quality Matrix for Health (Alberta Health Services, 2015c). Public reporting of organizational performance is based primarily on standard national benchmarks for key outcomes such as hospital mortality, emergency department wait times and surgery readmission rates. Internally, AHS has expanded the application of its core values of performance and accountability to all areas of the organization, including administrative and corporate services such as E/DM. The challenge for the E/DM program is that the kind of nationally recognized, evidence-based and outcome-focused performance measures that have become the norm for health care organizations do not yet exist for emergency management programs.

Emergency management is a relatively new profession, having only emerged as a separate field of study of public policy in the early 1980s (Comfort, Waugh, & Cigler, 2012, p. 539). Performance measurement for emergency management programs is even newer and still in the early stages of development. While a literature review reveals a number of diverse approaches to performance measurement in emergency management, there are no commonly accepted standards of how best to measure performance in this area (Birnbaum, 2006, p. 221; Canton, 2013, para. 4; Kaji, Langford, & Lewis, 2008, p. 195; Lazar, Cagliuso, & Gebbie, 2009, p. 58; Markenson & Krug, 2009, p. 232; Savoia, Agboola, & Biddinger, 2014, p. 9713; Tang, Fitzgerald, Hou, & Wu, 2014, p. 101). Because of the size of the organization and scope of services provided, the AHS E/DM program is well-positioned to implement a performance measurement system that will meet organizational requirements, support program development and accountability, and contribute to the literature in the field of health care emergency management.

### **1.1 PROJECT OBJECTIVES**

The purpose of this project is to develop a new set of Key Performance Indicators (KPIs) for the AHS E/DM program to demonstrate accountability and facilitate program performance improvement. These KPIs should provide useful information to the program regarding its progress in achieving key program goals and objectives. Taken together, the KPIs should present a holistic picture of the overall performance of the program. Where possible, the KPIs should incorporate measures of efficiency, effectiveness and achievement of outcomes. The recommended KPIs should also align with the broader

organizational system of performance measurement, industry standards and statutory regulations. Additionally, the KPIs should be reliable and valid to demonstrate accountability to key program stakeholders. The objective of this project is to develop a set of KPIs that achieve these aims and are also feasible for the client to implement with current resources.

The primary research question this project addresses is:

- What are the Key Performance Indicators (KPIs) of the Alberta Health Services department of Emergency/Disaster Management (E/DM)?

Within this primary research question, several secondary questions emerge:

- What current approaches to health care emergency management program performance measurement in the scholarly literature can be applied to the AHS E/DM program?
- What aspects of E/DM program performance are most valuable to internal and external stakeholders?
- What is feasible for the client in terms of performance measurement data collection and reporting?

## **1.2 BACKGROUND: ALBERTA HEALTH SERVICES EMERGENCY/DISASTER MANAGEMENT**

Alberta Health Services (AHS) is Canada's largest health system, delivering health services to over four million Albertans (Alberta Health Services, 2015a). The AHS department of Emergency/Disaster Management (E/DM) was established in 2009 with the amalgamation of the nine previous health regions into one provincial health service provider. With the formation of AHS, the emergency preparedness and emergency management programs from each of the former health regions were absorbed into the single provincial department of E/DM.

The department has about 35 full-time staff including an executive director, zone and provincial directors, emergency management officers, planners and special project leads and administrative staff. Currently, E/DM administers several province-wide initiatives intended to increase personal and organizational emergency preparedness including standardized emergency response codes and other contingency plans, staff training programs, drill and exercise programs, an incident management system and a site, zone and provincial E/DM committee and response structure.

## **1.3 BACKGROUND: PERFORMANCE MEASUREMENT IN AHS**

Across the organization, AHS has implemented performance measures "as the basis for assessing achievements" (Alberta Health Services, 2014b, p. 1). In 2011, AHS adopted the Health Quality Council of Alberta's Alberta Quality Matrix for Health (AQMH) as the broader performance measurement framework for the organization (Alberta Health Services, 2011b). The AQMH outlines six dimensions of quality: Acceptability; Safety; Accessibility; Appropriateness; Efficiency; and Effectiveness within four domains: Population Health; Health Services Delivery; Governance and Community Engagement; and Health System Sustainability (Alberta Health Services, 2015c). Using this framework, AHS reports publicly on 17 performance measures ranging from hand hygiene to cancer detection to stroke mortality.

Each AHS department is also expected to establish program-specific performance measures. Alberta Health Services (2011a) defines performance measures as “A unit of measurement used to quantify a characteristic; the dimensions, capacity or amount of something”. Organizational guidelines for establishing performance measures ask the program area to define and rationalize the performance measure and link it to the AQMH framework by identifying the domain to which it belongs and the dimension of health system quality that it represents (Alberta Health & Alberta Health Services, 2013, p. 2). Measures are divided into five categories: health system outcomes; strategic measures; emerging-strategic measures; tactical measures; and transactional measures and four types: inputs, processes, outputs and outcomes (Alberta Health & Alberta Health Services, 2013, pp. 2–3). Where possible, the measure should also be benchmarked to allow for comparison with other organizations (Alberta Health & Alberta Health Services, 2013, p. 5). The suite of performance measures that a program uses to track performance make up the program’s Key Performance Indicators (KPIs). In Alberta’s health system, KPIs are expected to be outcome-focused and become “tools that show communities, governments, health care organizations and providers where they’ve been, where they’ve headed, and where they need to improve” (Alberta Health, 2014, p. 16).

#### **1.4 BACKGROUND: PERFORMANCE MEASUREMENT IN AHS E/DM**

Emergency/Disaster Management (2015) has measured performance using program-specific KPIs for the past four fiscal years. These indicators are reported quarterly by the five E/DM zone directors.

Currently, the KPIs employed by E/DM include:

- the percentage of AHS sites that have established an E/DM committee
- the percentage of AHS sites that have developed site-specific plans for each emergency response code
- the percentage of AHS acute-care sites that have trained and equipped staff for chemical, biological, radiological, and nuclear (CBRN) and Hazardous Materials (HazMat) incidents
- the percentage of acute care sites that have completed an annual evacuation exercise
- the number of staff that have completed online E/DM courses

(Emergency/Disaster Management, 2015, p. 1)

Although not currently reflected in the program KPIs, AHS E/DM performance is also evaluated internally against three main industry standards:

- Alberta Occupational Health and Safety Code (Government of Alberta, 2009)
- Canadian Standards Association (2014) CSA Z1600: Emergency Management and Business Continuity Programs standard
- Accreditation Canada (2014) organizational leadership standards for emergency preparedness

## **1.5 PROJECT CLIENT**

The project client is Chris McKiernan who is the Director of Provincial Strategies and Performance for the Alberta Health Services department of Emergency/Disaster Management. Mr. McKiernan's portfolio includes responsibility to oversee performance measurement for the program.

## **1.6 DEFINING THE PROBLEM**

The current KPIs for the E/DM program were developed in the early stages of the program's development. As the E/DM program has matured, the client has identified a need to revisit the current KPIs to assess how well they are providing a holistic view of program performance and to what degree they are relevant and useful to the program.

This project also seeks to address two key problems that have been identified with the current suite of KPIs measured by the program. First, the current KPIs consist of leading indicators reflecting the structural elements of preparedness, with no effectiveness or outcome indicators. This is a problem because the organization is placing increasing emphasis on the use of outcome measures in all program areas within the health system. Secondly, the current KPIs primarily reflect shared accountabilities between the E/DM program and other areas of the organization. While measures reflecting shared accountabilities can and should be incorporated into the KPI suite, the client is also seeking measures that show how well the program is performing independent of external factors.

The role of the E/DM program is to prepare the organization for events that are, by definition, non-routine and often extraordinary. Unlike quantitative health system measures such as wait times and infection rates that receive a constant stream of data on efficiency and effectiveness, E/DM planning and preparedness initiatives may not be tested in a real event until months or years after implementation. Although the department currently collects data in the form of incident and after-action reports and recommendations, the qualitative, case-study nature of this information does not easily translate into performance trends.

The program also faces difficulties in defining and measuring outcomes of program activities. Broadly stated, the desired outcome of the E/DM program is an organization that is prepared for emergency and disaster events. The concept of preparedness, however, does not reflect an end state, but rather a cycle or continuum. It is particularly difficult to assess preparedness across an organization the size of AHS with more than 104,000 employees, nearly 600 sites and hundreds of program areas (Alberta Health Services, 2015a). At any given time, AHS programs and sites will vary greatly in terms of the level of implementation of E/DM initiatives.

Organizational emergency preparedness and, by extension, E/DM performance, is particularly affected by external factors. As the BC Ministry of Health (2006b) notes, a successful health emergency management program relies on several "key success factors" that are primarily outside of program control, including government, legislative and board and senior management support and allocation of sufficient resources to achieve program goals (p. 22). Ultimately, E/DM has a shared accountability with

the rest of the organization for emergency preparedness. The aim of this project is to propose a set of key performance indicators that reflect a fair balance between program and broader organizational performance so that the information provides accountability to stakeholders and is also useful to the program to facilitate performance improvement.

## **1.7 ORGANIZATION OF REPORT**

The remainder of this report is divided into six sections.

[Section 2](#) outlines the methodological approaches and research design of the project. This section provides a rationale for the methodology chosen and details the specific methods of data collection employed to answer the research question, including a literature review and key informant interviews. This section also includes a description of the sample selection and interview data collection methods. An overview of the project strengths, limitations and delimitations is also included in this section to provide context to the usefulness and applicability of the report and its findings. [Section 3](#) presents the conceptual framework employed to answer the research question, offering a visual representation of the overall research approach.

[Section 4](#) presents the findings of the literature review, beginning with an overview of performance measurement in the public and health care sectors and focusing on the Balanced Scorecard and KPI approaches. The literature review also explores current approaches to emergency management performance measurement and specific measurement strategies for key E/DM program activities.

[Section 5](#) presents the findings from the 31 stakeholder interviews conducted using a Balanced Scorecard approach. The findings include stakeholder views on how well the current KPIs reflect E/DM program performance, stakeholder reflections on the most important aspects of E/DM performance, how the program needs to learn grow and innovate, and how the program demonstrates financial value.

[Section 6](#) integrates the findings from both the literature review and stakeholder interviews into a discussion and analysis of the implications for the client in selecting KPIs for the program. [Section 7](#) presents five recommended Balanced Scorecard perspectives and corresponding objectives, measures and data sources for the client to consider. [Section 8](#) concludes the report and offers considerations for future research.

## 2. METHODOLOGY AND METHODS

This research is a qualitative study that includes a review and analysis of the scholarly literature and primary data collection through interviews. This section provides a detailed description of the methodology and methods employed to answer the research question.

### 2.1 METHODOLOGY

A case study research design was used to answer the primary research question seeking to identify the critical success factors and key performance indicators of the AHS E/DM program. A case study approach was chosen based on the criteria set out by Yin (2009). First, the research seeks to answer a “how” question of how the Balanced Scorecard approach to key performance indicator (KPI) development can best be applied to the “real-life context” of the AHS E/DM department (Yin, 2009, p. 2). Second, the purpose of the research is to better understand how performance is currently understood and demonstrated by the department and its stakeholders rather than seeking to change behaviours. The research uses a single case-study design with the E/DM department as the unit of analysis and multiple data sources including a literature review and semi-structured key-informant interviews.

A Balanced Scorecard (BSC) approach was used in key informant interviews to gain a holistic view of how performance is currently understood and demonstrated by the department and its stakeholders. The BSC approach was chosen for this project because it is already widely used and accepted across the public sector, health care sector and within Alberta Health Services. In describing how the organization will “Achieve Results” under the LEADS in a Caring Environment framework, AHS recommends the BSC as a tool for leaders “to assess and evaluate” achievements (Leaders for Life, 2010, p. 1). In 2015, it was announced that AHS will be adopting an organization-wide BSC approach to performance management beginning in April, 2017 (Planning and Performance, 2015). Some AHS departments have already incorporated the BSC into their performance management and quality improvement programs including the Patient and Family Centred Care (PFCC) measurement initiative (Alberta Health Services, 2015b, p. 14), Continuing Care (Alberta Health Services, 2014a) and Information Technology (Alberta Health Services, 2010, p. 1).

A BSC approach is also advocated in the organizational leadership standards set out by Accreditation Canada, the organization to which AHS submits for accreditation as a health care organization. Under the standard requiring that “The organization's leaders select management systems and tools to monitor and report on the implementation of operational plans”, Accreditation Canada (2014) suggests that measurement systems may include balanced scorecards and “ensuring process and outcomes measures are tied directly to strategic goals and objectives” (p. 20).

Niven’s (2008) step-by-step methodology for developing a Balanced Scorecard in the public and non-profit sector suggests that organizations start by establishing the mission, vision and values of the organization and then build the Balanced Scorecard based on the organization’s strategy. Niven (2008) argues that organizational strategy forms the “core” of the BSC, describing the Scorecard as “a tool for

translating a strategy into action through the development of performance objectives and measures” (p. 130). For this research, the mission, vision, values and organizational strategy already established by the AHS E/DM program form the basis of the proposed Balanced Scorecard. Strategy development was not included in the scope of this research. Using the existing organizational strategy, Scorecard perspectives were established based on the specific organizational context and data collected in stakeholder interviews. The objectives and specific measures for each perspective were further developed based on data collected in the literature review and in stakeholder interviews.

## **2.2 METHODS: LITERATURE REVIEW**

The purpose of the literature review was three-fold: first, to develop a broad understanding of current research and best practices in the area of Balanced Scorecard and KPI development in the healthcare and public sectors; second, to examine current approaches in the literature and common challenges to performance measurement in the field of emergency management; and third, to explore the literature around measuring the effectiveness and outcomes of key E/DM program activities.

The literature review includes data from the scholarly literature, government reports, industry publications and internal documents relating to the research question. Scholarly literature including journal articles and print books were primarily sourced through the University of Victoria Summon platform, print books, and Google searches. Internal and other government reports on the application of performance measurement systems to emergency management and related fields were collected through the AHS intranet and online from multiple jurisdictions. Many industry publications such as standards were available online and the client provided access to standards requiring payment to access.

Search terms used in the literature review included performance measurement, performance indicators, effectiveness, evaluation, assessment and variations thereof, in combination with contextual terms including public sector, government, health care, emergency management, emergency preparedness and disaster. The performance measurement frameworks, approaches and strategies found in the literature review were then assessed for applicability to client needs and ability to meet the challenges faced by the client in measuring E/DM performance.

## **2.3 METHODS: KEY INFORMANT INTERVIEWS**

Primary data was collected through 31 individual, semi-structured interviews with E/DM stakeholders. The purpose of the interviews was to gain a deeper understanding of how E/DM performance is currently viewed and how it can best be measured in a way that aligns with the needs and values of internal and external stakeholders.

Interviews were chosen as the best method to collect this data in order to gain in-depth information from a diverse stakeholder group representing several different program areas and multiple organizations. Considering the diversity of products and services provided by the AHS E/DM department, it was important that individual stakeholders had the opportunity to reflect on and explore

how E/DM program performance affects them and their area of responsibility specifically. Individual interviews also allowed participants to speak openly and honestly about more sensitive issues such as “gaming” and other perceived inadequacies of the current performance measurement system.

The interviews were semi-structured with 4-6 standardized questions which varied slightly based on the stakeholder category to ensure the question was relevant to the participant’s perspective (see [Appendix A: Interview Questions](#)). The questions were structured around the Balanced Scorecard approach to help ensure the interviews would produce a broad range of perspectives, balancing leading and lagging indicators and outcome and process indicators. Two initial pilot interviews were conducted to test and refine interview questions. Based on the Balanced Scorecard approach, participants were asked to consider E/DM performance from four perspectives: stakeholder/service-user; internal processes; learning and growth; and financial. Follow-up and exploratory questions were asked throughout the interviews.

The interview sample was selected in consultation with the client. The criteria for inclusion was that participants meet the definition of a stakeholder, which is defined as an individual who is affected by, involved in or whose interests are affected by the program (Project Management Institute, 2013, p. 394).

Three categories of stakeholders were interviewed:

1. **E/DM Stakeholders:** Eleven internal E/DM stakeholders were interviewed including the Executive Director, Zone Directors and Emergency Management Officers (EMOs). All of the Zone Directors were invited to participate in the research because of their responsibility for zone performance data collection and reporting. The EMOs were recruited based on their interest in the research subject. The client himself was excluded from the interview process.
2. **AHS Stakeholders:** Seventeen AHS stakeholders made up of operational leaders and program representatives from outside of the E/DM department were interviewed. Several stakeholders were recruited from the membership list of the provincial E/DM Steering Committee. This committee has a mandate to “provide organizational direction and leadership for all planning, preparedness, response and recovery activities” and its membership is intended to “represent the interests of key internal and external stakeholders in the AHS EDM function” (Emergency/Disaster Management, 2010). Additional AHS stakeholders from other operational areas were also identified in consultation with the project client based on their experience as operational leaders in previous AHS emergency and disaster events.
3. **External Stakeholders:** Three stakeholders external to AHS were interviewed representing organizations that work closely with the AHS E/DM department. This stakeholder group included a representative from Alberta Health, Covenant Health and a municipal Director of Emergency Management.

Thirty-one interviews were conducted. All interviews were scheduled for 30 minutes but interview duration ranged from 12 minutes to 64 minutes. Four interviews were conducted in-person and 27 interviews were conducted by phone or online using Microsoft Lync. All interviewees were provided with an 'interview primer' package which included background on E/DM performance measurement and the balanced scorecard approach as well as a list of the questions they would be asked (see [Appendix B: Interview Primer](#)).

## **2.4 INTERVIEW DATA ANALYSIS**

A thematic content analysis was conducted to analyze the data collected in stakeholder interviews. Guest, MacQueen and Namey's (2012) applied thematic analysis technique was adopted as the methodological framework for data analysis. As Guest et al. (2012) point out, "thematic analysis is still the most useful in capturing the complexities of meaning within a textual data set...It is also the most commonly used method of analysis in qualitative research" (p. 11). To help ensure rigour in the interview data analysis, Braun and Clarke's (2006) "15-point checklist of criteria for good thematic analysis" was employed throughout the data analysis process (p. 96).

All interviews were digitally recorded and the audio was then transcribed into a text document. The transcribed text was then segmented into individual statements or ideas with the researcher adding notes for context where necessary. Each statement was first categorized by the question to which it related and then coded by themes that emerged in the data. An interpretative qualitative approach was used to identify codes in the data. The researcher first reviewed all of the data relating to a specific question and then developed and refined theme code definitions as they emerged. Data segments that included multiple themes were separated so that each distinctive theme was coded individually.

Once all interview data was categorized and coded thematically, the data was further analyzed to identify themes that were most commonly mentioned in the various stakeholder categories as well as performance measure suggestions provided by stakeholders. Additionally, comments around specific topics and notable quotes were extracted using category and key word searches. Interview findings are presented in [section 5](#).

## **2.5 PROJECT STRENGTHS, LIMITATIONS AND DELIMITATIONS**

### **2.5.1 Strengths**

The qualitative, case-study research design brought a number of strengths to help meet research objectives. The use of semi-structured individual interviews allowed issues to be explored in-depth and in a more flexible manner than other methods would permit. The use of a case study approach allowed the researcher to collect data and present findings and recommendations specific to the unique context and challenges faced by the client, helping to ensure a tailored approach best suited to client needs.

### **2.5.2 Limitations**

The case study research design limits the generalizability of the research findings to other programs or organizations facing similar challenges in performance measurement. Although some of the findings

may be applicable in other settings, the goal of this research was to address the research problem identified by the client in a specific organizational context, limiting the generalizability of the findings.

Limitations of the primary data collection in interviews include the scope of the interviewee population, the number of interviews conducted and the interview response rate. The complexity of emergency preparedness and response means that the E/DM program has a vast contingent of stakeholders. Through client consultation, a list of “key” stakeholders was identified but the views of those who participated in the research are not necessarily representative of all E/DM stakeholders. Although the primary goal of the AHS E/DM program is to protect both staff and patients, interviews were not conducted to represent a patient stakeholder group due to recruitment feasibility challenges. Time and resource constraints of this project also limited the total number of interviews that could be conducted.

This research is also limited by the interview response rates in each stakeholder category identified for interviews. Thirty-one interviews (53%) were completed out of total 58 individuals invited to participate. In the internal E/DM stakeholder category, 11 out of 25 (or 44%) of individuals invited to participate were interviewed. In the AHS stakeholder category, 17 out of 29 (or 59%) of individuals invited to participate were interviewed. In the external stakeholder category, 3 out of 4 (or 75%) of individuals invited to participate were interviewed.

The vast majority (87%) of interviews were conducted online (audio only) or via telephone due to cost and time constraints. As Roller and Lavrakas (2015) point out, telephone interviews limit the ability of the interviewer to establish rapport and interpret “non-verbal, visual cues” during the interview (p. 59).

Although neither the interviewer nor the client has a power-over relationship with any of the individuals interviewed, as an E/DM employee the interviewer does have a working relationship with participants which could produce bias in interview responses. To mitigate this limitation, participants were informed that their responses would remain confidential and only be shared in the report in a manner that maintained their anonymity.

The semi-structured format of the interviews also allowed for a degree of interviewer bias in how responses were explored. Interviewer inconsistency in terms of the number and nature of exploratory and follow-up questions between different interviews may also limit the reliability of the data collected in the interviews.

### **2.5.3 Delimitations**

This project has been delimited by the researcher in several ways. The literature review was delimited to performance measurement frameworks and strategies in the public, healthcare and emergency management sectors. Studies used in the literature review were also delimited to English-language studies available in full-text online or available in local or university libraries.

Both the literature review and interviews were delimited to focus on measurement of E/DM program performance, rather than measurement of broader organizational performance in terms of emergency preparedness or disaster readiness. Elements of performance representing a shared accountability between E/DM and other entities were included in the research provided that E/DM plays a significant role in the activity process or achievement of an outcome. Elements of performance in AHS emergency preparedness that are primarily a broader organizational responsibility were excluded from the E/DM performance measurement framework. For example, while implementation of plans, training and exercises are primarily an E/DM responsibility, structural and resource elements such as organizational staffing levels, facility construction and maintenance and funding of E/DM-related initiatives are primarily the responsibility of the AHS Board and Executive Leadership Team.

This project was also delimited to the development of a framework and recommendations for a performance measurement framework for the AHS E/DM department. Recommendations concerning performance management strategies such as setting specific targets for achievement, how performance measurement data will be used and strategies to increase program performance achievements are beyond the scope of this project. Detailed implementation of the performance measurement framework and evaluation of its effectiveness was also not included within the scope of this project.

## **2.6 ETHICAL REVIEW**

The University of Victoria Human Research Ethics Board approved this research protocol on August 18, 2015, concluding that the research meets the appropriate standards of ethics as outlined by the University of Victoria Research Regulations Involving Human Participants. A copy of the consent form outlining the risks to participants and mitigating actions taken to protect anonymity and confidentiality is presented in [Appendix C: Participant Consent Form](#).

### 3. CONCEPTUAL FRAMEWORK

This research integrates three key elements to identify the key performance indicators of the AHS E/DM program. Organizational requirements and culture form the basis for performance measurement in the department and also impact the feasibility of recommended measurement strategies. The performance measurement framework incorporating KPIs within a Balanced Scorecard approach was employed based on organizational requirements and culture. The priorities for performance measurement were then identified through key informant interviews discussing stakeholder and service user needs and values. To ensure that the proposed performance measures are reliable, valid and reflective of industry best practice, the principles of emergency management best practice in the scholarly literature were then incorporated. This framework, presented in Figure 1, is intended to ensure the recommended KPIs represent a holistic view of program performance, reflecting the organizational context, current best practice and the values and needs of stakeholders and service users.

FIGURE 1: CONCEPTUAL FRAMEWORK FOR AHS E/DM KPI DEVELOPMENT



## 4. LITERATURE REVIEW

This literature review contains four primary sections, beginning with a high-level overview of the literature around key performance indicators and the Balanced Scorecard approach in the public sector. The next three sections of the literature review explore the application of performance measurement specifically in the field of emergency management, beginning with an outline of the challenges to emergency management performance measurement identified in the literature. Next, a focused literature review on current approaches to emergency management program performance measurement is presented, beginning with an overview of industry standards and regulations as performance measures, leading into capability and outcome-based measures. Finally, the literature around specific performance measurement strategies is reviewed for three key E/DM activities: planning, training/exercises and incident response.

### 4.1 PERFORMANCE MEASUREMENT

Performance measurement has been defined in several ways in the literature. Based on the client's intent for the performance measurement system, the definition offered by Radnor and Lovell (2003) has been adopted for this project: "information systems that managers use to track the implementation of business strategy by comparing actual results against...goals and objectives" (p. 175). This definition is broad enough to be adapted to the program level and also aligns with the results-oriented culture within AHS.

Performance measurement systems are generally implemented in the public and healthcare sector to demonstrate accountability and to facilitate performance and quality improvement (Goh, 2012, p. 32; Shelton, Nelson, McLees, Mumford, & Thomas, 2013, p. 374). The question of why performance measurement is important or useful, however, is less relevant for the client because of the organizational requirement for performance measurement. As a result, the focus of this literature review is not on *why* performance should be measured, but rather *how* it should be measured in the context of client needs and challenges.

The primary drivers of performance measurement for the client are two-fold. First, AHS is the arms-length health service provider for the Government of Alberta which has, in recent years, demonstrated an increased commitment to performance measurement in the area of health. This, in turn, has made performance measurement a priority for AHS (Government of Alberta, 2014). Second, as an entity operating within the Canadian health care system, AHS must also measure performance in collaboration with organizations like the Canadian Institute for Health Information (CIHI) and the Health Quality Council of Alberta (HQCA) (Alberta Health Services, 2015c).

The next two sections explore the literature around the Balanced Scorecard (BSC) approach and key performance indicator (KPI) development. First, the Balanced Scorecard is discussed in relation to how the literature shows it is adapted to organizational needs. Second, a review of the literature is presented around best practice in KPI development.

#### 4.1.1 The Balanced Scorecard

This research project uses a Balanced Scorecard (BSC) approach based on accepted organizational performance measurement practices within Alberta Health Services. Originally developed in the early 1990's by Harvard researchers Kaplan and Norton (1992) to expand corporate performance measurement beyond financial considerations, today, the BSC is cited as the most commonly used and widely researched performance measurement framework in both the public and private sectors (Chang, Lin, & Northcott, 2002, p. 345; Mackay, 2004, p. 2; Micheli & Kennerley, 2005, p. 131).

The basic framework of the BSC sets out four perspectives of performance: financial, customer, internal business process and learning and innovation, including both short and long-term objectives as well as measures, targets and initiatives aligning with each perspective (Kaplan & Norton, 1996, p. 76). Establishing causal relationships between the BSC perspectives is a key characteristic of the framework. As Chai (2009) explains, organizations must “make the relationships among objectives (ends) and measures (means) explicit by systematic analysis” in order to identify the key performance indicators (KPIs) that are critical to the success of the organization (pp. 22-23). The final BSC is made up of a collection of linked KPIs across multiple perspectives. Although the Balanced Scorecard provides a framework for identifying performance perspectives, it does not specify KPIs within each perspective, because these must necessarily be specific to organizational goals, objectives and strategies. The development of KPIs is discussed further in the next section.

One of the benefits of the BSC framework for the AHS E/DM program is its flexibility and adaptability. As Mackay (2004) points out, the BSC is “a well ‘thought through’ and designed framework that easily embraces a broad spectrum of traditional and innovative measures” (p. 44). Asbroek et al. (2004) argue that the dynamic political environment in which public sector organizations operate requires a performance measurement framework that “accommodates changing strategies” and “optimizes flexibility” (p. i67). Inamdar, Kaplan, and Bower (2002) suggests that the BSC approach is particularly useful for large, complex healthcare organizations because it does not impose a “narrow regulatory, clinical, or diagnostic” perspective and is instead “constructed to tell the story of an organization’s strategy and to guide its implementation” (p. 185). The literature shows that the BSC approach is well-suited to the performance measurement challenges faced by E/DM because of its flexibility and adaptability. As Micheli and Kennerley (2005) point out, a flexible approach to performance measurement design is especially important “where objectives are ambiguous and where there are unclear cause-and-effect relationships” (p. 132). The literature contains several examples of how the BSC has been successfully adapted to and implemented in the government, non-profit and healthcare sectors (Aidemark, 2001; Chang et al., 2002; Niven, 2008, pp. 26–28; Northcott & Taulapapa, 2012; Weir, d’Entremont, Stalker, Kurji, & Robinson, 2009). There are few examples, however, of application of the BSC approach to performance measurement in health care emergency management or emergency management in general.

The most relevant adaptations of the BSC found in the literature were in the field of public health. As both Weir et al. (2009, para. 4) and Woodward, Manuel, and Goel (2004, p. 5) point out, public health

faces similar challenges in measuring performance, including limited availability of data and difficulties in making causal linkages between public health programs and outcomes. In examining BSC implementation in the field of public health, Woodward et al. (2004) argue that the lack of a clear cause-and-effect relationship between public health program performance and outcomes make the BSC an ideal performance measurement framework because it “does not aim to assess effectiveness of specific programs. Rather, it evaluates the alignment of goals, objectives, and strategies with structures, resources and activities” (p. 7). In 2004, the Institute for Clinical Evaluative Sciences (ICES) developed a performance measurement framework for public health that included four adapted perspectives: “Health determinants and status; Community engagement; Resources and services; and, Integration and responsiveness” (Woodward et al., 2004, p. 3). This framework was successfully adopted by York Region Public Health in 2007, with Weir et al (2009) finding that the adapted BSC model was appropriate with more work needed in development of relevant individual indicators (para. 23).

The literature around application of the BSC to emergency management outside of healthcare was even more limited, with only two studies found. Caudle (2005) suggests that the BSC approach can be adapted to homeland security by altering the perspectives to include “policy and resource stewardship,” “organizational roles and structure,” and “technological capabilities” (p. 368). Albright, Gerber, and Juras (2014) adapt the BSC to the field of naval aviation, replacing the financial and customer perspectives with a “Strike Group and Air Wing Readiness” perspective (p 24). The literature suggests that although the BSC has been widely adapted to a variety of settings, research on its application to emergency management programs is limited and its early stages.

#### **4.1.2 Key Performance Indicators (KPIs)**

Key performance indicators (KPIs) are defined as “a set of measures focusing on those aspects of organizational performance that are the most critical for the current and future success of the organization” (Parmenter, 2007, p. 3). What differentiates KPIs from any other measure of performance is that KPIs are made up of the mission-critical aspects of organizational performance and reflect how well an organization is achieving its strategic goals (Rozner, 2013, p. 3). The purpose of KPIs is to provide the organization and its stakeholders with meaningful information on how well the organization is performing relative to its strategic goals and objectives. As Rozner (2013) points out, “In and of themselves, KPIs cannot improve performance. However, they do provide ‘signposts’ that signal progress toward goals and objectives as well as opportunities for improvement” (p. 3). The emphasis in the literature around KPIs is that they must capture the most critical aspects organizational performance.

The literature shows a high degree of consensus regarding the desired characteristics of KPIs. One common theme is that KPIs must be easily understandable and meaningful to both internal and external stakeholders (Conference Board of Canada, 2001, p. 5; Office of the Auditor General of British Columbia, 2010, p. 8; Parmenter, 2007, p. 5). Both the Conference Board of Canada (2001, p. 5) and the Office of the Auditor General of British Columbia (2010) emphasize that KPIs must be relevant to the broader organizational goals (p.3). This is echoed by Parmenter (2007) in the private sector context, who

suggests that KPIs should have a significant and positive impact on the “critical success factors” of the organization (p. 5). Further, as the Institute for Crisis, Disaster and Risk Management (ICDRM) (2010) argues that KPIs should “align with the overall organizational objectives” (p.4-26). Both the Office of the Auditor General of British Columbia (2010) and the Canadian Comprehensive Audit Foundation (CCAF) (2002) emphasize the importance of performance measures focusing on the “few, critical aspects of performance” that demonstrate the big picture of organizational performance.

Both the Conference Board of Canada (2001, p. 5) and the Office of the Auditor General of British Columbia (2010, p. 3) emphasize the importance of KPIs reflecting industry standards and benchmarks to allow for comparison across organizations. On the other hand, Pricewaterhouse Coopers (2007) argues that organizations “should not feel compelled to create KPIs to match those reported by their peers” and instead should focus on ensuring the KPI is relevant for the specific organizational setting (p. 4). The concept of KPIs being actionable and influential on organizational decision-making is also frequently mentioned in the literature (ICDRM, 2010, pp. 4–26; Office of the Auditor General of British Columbia, 2010, p. 2; Parmenter, 2007, p. 5).

The use of SMART (specific, measurable, attainable, reliable and timely/time-bound) KPIs is also prevalent in the literature (Franceschini, Galetto, & Maisano, 2007, p. 168; Office of the Auditor General of British Columbia, 2010, p. 8; Rozner, 2013, p. 15). The literature also suggests that KPIs must also be feasible for the organization in terms of how quickly and easily the information can be obtained, and the resource cost to obtain the information (Conference Board of Canada, 2001, p. 5; ICDRM, 2010, pp. 4–26). Finally, recognizing that it may not be possible for all of these attributes to be present in every KPI, both the Office of the Auditor General of British Columbia (2010, p. 2) and the Conference Board of Canada (2001, p. 5) recommend balance between the indicators so that the various attributes are cumulatively represented.

In terms of the KPI development process, the literature emphasizes the importance of starting with organizational strategy. Parmenter (2007) outlines a detailed 12-step KPI development process aimed primarily at the private sector but adaptable to the public sector (pp. 38-100). The relevant steps include “identifying organization-wide critical success factors”, recording the performance measures, selecting “team-level” and “winning” KPIs, developing and facilitating the use and reporting of KPIs, and “refining KPIs to maintain their relevance” (Parmenter, 2007, pp. 38–100). The Office of the Auditor General of British Columbia (2010) presents a five step process for KPI development, suggesting that organizations create KPIs in the priority order of the recommended attributes: “related to your organization’s purpose and priorities”; “that link with your organization’s activities and the outcomes of those activities;” “that are consistent with widely used benchmarks, where appropriate;” and “that are meaningful and useful to key internal and external stakeholders” (p. 5). The literature around both the desired characteristics of KPIs and the KPI development process emphasizes the importance of linking KPIs to broader organizational strategy to show the big picture of organizational performance.

## 4.2 CHALLENGES TO EMERGENCY MANAGEMENT PERFORMANCE MEASUREMENT

The literature around performance measurement in the field of emergency management tends to focus on the challenges to measuring performance in this area. The discussion in the literature around challenges to performance measurement in the field of emergency management generally falls into one of two categories: lack of performance data due to infrequent events and difficulty assessing program outcomes.

Emergency and disaster events do not occur frequently enough to demonstrate continuous improvement quantitatively in the way that performance is measured in other areas of health care (Williams, Nocera, & Casteel, 2008, p. 220). As Shelton et al. (2013) point out, the only opportunity the organization has to measure the outcome of preparedness efforts is in response to “real large-scale emergencies, which fortunately are rare” (p. 373). This is echoed by the BC Ministry of Health (2013), which points out that the of “gold-standard randomized controlled trial” evidence base in clinical medicine is not possible in the fields of public health and emergency preparedness (p. 1). Furthermore, even as emergency and disaster events increase in number, each event has unique characteristics in terms of the type of hazard and its consequences, making it difficult to compare performance from one event to the next (Brown & Robinson, 2005, p. 3). Even when a jurisdiction faces similar events multiple times, or similar events occur across multiple jurisdictions, the inability to control for variables between events make performance data, particularly quantitative data, difficult to assess for performance indicators. As Davies and Chin (2010) point out, organizations seeking to measure performance in emergency preparedness are faced with a “limited evidence base for best practices” as a result of the infrequent and variable nature of emergency and disaster events (p. 30).

The desired outcome of the AHS E/DM program is preparedness for the organization, but as Falkenrath (2001) points out, “preparedness has meaning only in a specific context—that is, in the aftermath of an incident—because it is a measure of how well prepared one was to deal with an actual incident” (p. 172). Indeed, emergency management programs tend to operate under an assumption that preparedness processes such as planning, training and testing plans in exercises will increase organizational preparedness levels (Kadar, 2015, p. 242). The literature shows that there is weak evidence to suggest that these indicators of organizational capacity to respond to disaster are linked to improved outcomes in real disaster events (Markenson & Krug, 2009, p. 232; Shelton et al., 2013, p. 373). The difficulty is that positive or negative outcomes in a real disaster event are more likely to be correlated with “issues related to limiting conditions under which the emergency response system operated during the response” (Abrahamsson, Hassel, & Tehler, 2010, p. 15). Indeed, the impact on human health, property, the environment and the economy will certainly be more influenced by the type and scope of disaster than by the actions of responding organizations. Furthermore, the unpredictable and dissimilar nature of emergency and disaster events make it difficult to establish a causal relationship between preparedness processes and success or failure in managing actual events. Because broader outcomes of the E/DM program cannot easily be measured in terms of actual disaster response, it is necessary to adopt practices based on limited evidence as well as proxy measures intended to demonstrate performance in advance of an actual incident.

### **4.3 CURRENT APPROACHES TO EMERGENCY MANAGEMENT PERFORMANCE MEASUREMENT**

There is no consensus in the literature on how best to measure emergency management program performance, health system emergency preparedness, or organizational emergency preparedness in general (Asch et al., 2005, p. 539; Canton, 2013, para. 4; Djalali et al., 2014, p. 442; Jenkins, Kelen, Sauer, Fredericksen, & McCarthy, 2009, p. s87; Kaji et al., 2008, p. 195; Lazar et al., 2009, p. 60; Lurie, Wasserman, & Nelson, 2006, p. 941; Markenson & Krug, 2009, p. 234; Savoia et al., 2014, p. 9713; Tang et al., 2014, p. 101). Three broad approaches to emergency management program performance measurement were found in the literature review. The first approach, and the most common, is measuring emergency management program performance through compliance with industry standards that list a number of elements of emergency preparedness such as plans, equipment and trained personnel. This is differentiated from the second approach, capability measurement, which also measures the elements of emergency preparedness, but incorporates some form of quality assessment towards measuring the actual capability of an organization, such as in an emergency exercise. The third approach attempts to identify outcome measures in emergency preparedness, of which only two examples were found in the literature: response reliability assessment and principles-based measurement.

#### **4.3.1 Industry Standards and Regulations**

The most common approaches to performance measurement in emergency management focus on measuring a presence or absence of various elements of emergency preparedness. These elements of emergency preparedness are most often assessed in terms of adherence to widely accepted industry standards and regulations. Caudle (2005) defines standards as “a uniform set of measures, agreements, conditions, or specifications that establish benchmarks for performance” (p. 365). As Caudle (2005) explains, preparedness standards typically incorporate elements such as the existence of certain types of plans or procedures, staff training and equipment provided and emergency exercise frequency (p. 366). What differentiates this approach from other methods of performance measurement is that industry standards measure performance only in terms of whether the organization meets the criteria or not, with no further quality assessment. Jackson (2008) argues that standards “focus on counting resources and verifying that processes have been completed... ignoring the potential differences in *quality*” (p. 7). As Jackson (2008) points out, the drawback of this approach to performance measurement in emergency management is that standards “do not include detailed guidance to fully evaluate the results of those planning efforts and to assess whether or not an area is prepared” (p. 6). Despite the shortcomings of industry standards as a comprehensive system of performance measurement for emergency management, in some cases the client has a statutory obligation to adhere to these standards so there is significant value in incorporating at least some components of the most widely accepted industry standards into the proposed performance measurement framework. The sections below provide an overview of the three most relevant standards to the AHS E/DM program: the CSA Z1600-14 standard for Emergency and Continuity Management Programs, the Accreditation Canada standards for healthcare emergency preparedness, and the two legal regulations applicable to AHS

emergency preparedness: the Alberta Occupational Health and Safety Code and the Alberta Building Code.

#### **4.3.2 CSA Z1600-14: Emergency and Continuity Management Program**

The Canadian Standards Association (CSA) (2014) Z-1600 standard for Emergency and Continuity Management Programs provides the most comprehensive set of standards applicable to the AHS E/DM program. Closely based on the U.S. National Fire Protection Association (NFPA) 1600 standard by the same name, the CSA Z-1600 standard sets out 95 organizational requirements in five separate domains: program management; planning; implementation; program evaluation; and management review (Canadian Standards Association, 2014, p. 10). Although not specifically intended for health care, the standard is designed to be applicable to “to all types and sizes of organizations”, with the onus on the organization “to establish and implement a program that is appropriate to its needs” (Canadian Standards Association, 2014, p. 10).

The performance measurement framework set out by the CSA Z1600 standard consists of an assessment of conformity with the 95 required program elements and specific required program elements dealing with program evaluation and management review. The standard provides limited tools for an organization to assess its performance. Its supporting documents include a “Conformity Assessment Tool” which lists each program element in a table where the organization can check off either “conforming,” “partially conforming” or “nonconforming” (Canadian Standards Association, 2014, pp. 63–78). The program evaluation component is set out “to ensure that program goals and objectives are met” while the purpose of the management review is to “ensure the program’s continuing suitability, adequacy, and effectiveness” (Canadian Standards Association, 2014, pp. 23–24).

The standard sets out three avenues for emergency management program evaluation: exercises, tests of systems, equipment and technology, and audit and review procedures (Canadian Standards Association, 2014, p. 23). The standard provides an overview of when and why exercises and tests of systems, equipment should occur, but does not offer any specific measurement or assessment tools. The guidelines for audit and review procedures are even more cursory, requiring an annual evaluation of program performance and suggesting three approaches to achieve this: self-assessments, assessments by a third party (i.e. consultant) or third party certification (Canadian Standards Association, 2014, p. 62). Although the CSA Z1600 standard is comprehensive in terms of the detail in program elements listed, it offers little in the way of performance measurement tools to help an organization determine the usefulness or effectiveness of the emergency management program elements it has implemented.

#### **4.3.3 Accreditation Canada Leadership Standards for Emergency Management**

Alberta Health Services has achieved and continues to maintain accreditation as an Accredited Health Care Provider by Accreditation Canada. The standards for accreditation include an emergency preparedness component under the area of Leadership. These standards require that the organization develop and implement emergency response plans, provide education to support the plan, coordinate

with external agencies, regularly test the plan with drills and exercise, and evaluate the program using results from post-exercise or post-incident analysis (Accreditation Canada, 2014, pp. 43–46). To measure compliance with the standard, Accreditation Canada employs “senior health care professionals from accredited organizations” as expert peer reviewers on a surveyor team, who conduct an on-site survey to assess compliance with the standard (Accreditation Canada, 2013). The Accreditation Canada standard itself does not set out guidelines for measuring quality or effectiveness of the required emergency preparedness program elements, instead relying on subject matter experts to provide a fair assessment of compliance with the intent of the standard.

#### **4.3.4 Regulations**

There are two key legislative regulations that apply to the AHS E/DM program: the Alberta Occupational Health and Safety Code and the Alberta Fire Code. These regulations are relevant to AHS E/DM performance measurements because they are statutory codes to which the organization must adhere. It follows that incorporating the legal requirements of the organization into the performance measures for the organization would make sense from an efficiency perspective.

In terms of the specific requirements of the regulations, the Alberta Occupational Health and Safety Code requires that employers establish an emergency response plan and “involve affected workers in establishing the emergency response plan” (Government of Alberta, 2009, pp. 7–1). The Alberta Fire Code, section 2.8.1.2 sets out that “Supervisory staff shall be trained in the fire emergency procedures described in the fire safety plan before they are given any responsibility for fire safety” while section 2.8.2.5 sets out that “The fire safety plan shall be kept in the building for reference by the fire department, supervisory staff and other personnel” (*Alberta Fire Code*, 2006). Like the other standards discussed in this section, these regulations do not offer tools for assessing the quality or effectiveness of plans or training.

#### **4.3.5 Summary: Industry Standards and Regulations**

This section provided an overview of the most relevant standards and regulations for the AHS E/DM program. While they offer little in the way of performance measurement guidelines and tools, they do set out widely accepted benchmarks for the basic elements and statutory requirements for an emergency management program. These standards can be considered a starting point for the organization in terms of the structures and processes that should be in place to achieve program goals. The next section explores approaches to performance measurement in emergency management that shift towards measuring the effectiveness of emergency preparedness elements in terms of the organizational capability they produce.

### **4.4 CAPABILITY-BASED MEASUREMENT**

The emergency management program elements included in industry standards and regulations make up the essential building blocks of organizational emergency preparedness. As Djalali et al (2014) point out,

“a well-established preparedness program is a prerequisite for an effective response.” The structural elements of preparedness alone, however, do not guarantee that there are “sufficient conditions for successful operational capability” (p. 441). McCarthy et al. (2009) define a capability as “the ability to perform an action or generate an outcome” (p. s45). Savoia et al (2009) expand on this definition, suggesting that the capabilities of a system “its ability to undertake functional or operational actions to effectively identify, characterize, and respond to emergencies” (p. 139). For example, an organization may have the capacity to respond to an emergency because it has written emergency plans and provided staff training, but if there is no staff awareness of the plan, or if the training is not effective, the organization may not actually be capable of effective response.

The emphasis in capability-based measurement of emergency management performance is on the requirement for the organization to *demonstrate* its capability, generally through emergency exercises. This approach to performance measurement is employed in many large U.S. organizations including “the Veterans Health Administration (VHA), the Joint Commission (TJC), the Institute of Medicine (IOM), the Department of Homeland Security (DHS), and the Department of Health and Human Services (DHHS)” (McCarthy et al., 2009, p. s46). McCarthy et al. (2009) examined the capability frameworks of these five organizations listed above in the context of health care emergency management capabilities (HEMCs) (p. s45). In examining the capability frameworks of the five organizations listed above, the authors found a high level of consistency between the organizations in terms of the target capabilities identified (McCarthy et al., 2009, p. s47). Despite this, as McCarthy et al. (2009) point out, “there is no widely accepted, validated framework of health care emergency management capabilities” that can be applied across all health care organizations (p. s45).

The five organizations examined use various approaches to evaluating organizational performance in meeting the target capabilities. The VHA has the most robust evaluation process, using a “scheduled, onsite evaluation” that entails “interviews with key personnel, facility tours of functional units that are important to the emergency management program, review of key documents, 1 tabletop exercise, and several capability demonstrations” (McCarthy et al., 2009, p. s48). The IOM uses “multiple types of measures that can be collected from a variety of sources including peer review interviews, written documentation, surveys, and exercises” although as McCarthy et al. (2009) point out, there is no “system for grading the capabilities” (p. s49). The DHSS has developed a set of performance measures “based on data collected from site visits, surveys, and exercises to evaluate how well hospitals have achieved required capabilities (McCarthy et al., 2009, p. s49). McCarthy et al. (2009) argue that effectively measuring HEMCs requires both “a standardized approach” and the use of “multiple types of measures” in assessing performance (p. s49).

The U.S. Centers for Disease Control and Prevention (CDC) Public Health Emergency Preparedness (PHEP) program has employed capabilities-based performance measurement since 2008 (Shelton et al., 2013, p. 373). Based on a literature review and stakeholder consultation, the CDC identified 15 essential preparedness capabilities for public health that are expected to be demonstrated in either exercises or actual incidents (CDC, 2012, p. 4). For each capability, performance measures and evaluation tools are provided. For example, the capability of “Emergency Operations Coordination” requires that the

organization demonstrate the ability to activate an emergency operations centre, develop an incident action plan, manage the response and then demobilize and evaluate the response ” (CDC, 2012, p. 32). The evaluation tools provided include quantitative measures such as the length of time it takes for staff to report for duty as well as evaluative yes/no questions regarding the demonstration of specific capability functions (CDC, 2012, p. 33). While the CDC capability evaluation tools show significant progress, their applicability to the AHS E/DM program is limited because of the public health focus, and the evaluation tools have not been tested in the literature for reliability and validity.

The shift towards capability-based measurement is a step forward for the field of emergency management from the traditional standards-based approaches. As the review conducted by McCarthy et al. (2009) found, however, there is still a lack of consensus in terms of what health care emergency management capabilities are essential, and what performance measurement tools are appropriate for their assessment. The current approaches outlined in this section tend to rely on subject matter experts to conduct capability assessments. As Caudle (2005) argues, this is challenging for some organizations because it requires that assessors are “comfortable, and have the skills, for example, to identify plausible scenarios, understand needed generic capabilities and operational challenges” (p. 372). Although the capability-based approach moves closer to the outcome-focused measures the client seeks in this project, it is important to consider the feasibility and costs of dedicating additional resources to complex performance measurement tools that have not been fully validated in the scholarly literature.

#### **4.4.1 Emergency Exercises as Performance Evaluation Tools**

As a result of the difficulty in identifying and measuring the “true” outcomes of emergency preparedness activities, emergency exercises and drills have been established as proxy measures for organizational capability in emergency management (Agboola, Bernard, Savoia, & Biddinger, 2015, p. 504; Jackson, 2008, p. 9; Savoia et al., 2014, p. 9713; Savoia, Biddinger, Burstein, & Stoto, 2010, p. 52). Emergency exercises can be used for multiple purposes including training, quality improvement and performance accountability (Savoia et al., 2014, p. 9716). The use of emergency exercises for training purposes is further discussed below in [section 4.5.2](#), while this section discusses emergency exercises for the purpose of performance measurement. As Biddinger et al. (2010) point out, exercises allow organizations to “accurately and reliably” assess their “performance capabilities and use these measures as part of quality improvement efforts to identify deficiencies and discover their root causes” (p. 101). Although emergency exercises have significant potential in measuring emergency management program performance, to do so effectively requires a standardized approach to measurement.

One challenge in using emergency exercises as performance measurement tools is that the type of data collected in exercise evaluation is “often narrative in form, rather than quantitative or standardized”(Savoia et al., 2014, p. 9719). This data, typically presented in an after-action report, is not well-suited for systematic, ongoing performance measurement. As Jackson (2008) points out, for organizations to be able to make “broader statements about preparedness outside the specific scenario” being tested in an exercise, it is essential that “standardized practices for extracting data from exercises” be established (p. 9). Unfortunately, as Agboola et al. (2015) point out, the literature still

shows a “lack of commonly accepted, valid, and reliable measurement processes to use when quantifying the individual elements of performance” in emergency exercises (p. 504).

A second challenge is that even if organizations are systematically collecting comparative, quantifiable data, the industry lacks “clear standards and transparent measures” against which organizations can measure their performance in exercises (Lurie et al., 2006, p. 942). To address this need, several instruments for evaluating organizational performance in emergency exercises have been presented in the literature. Three of these instruments are analyzed in-depth below: the Homeland Security Exercise and Evaluation Program (HSEEP) (FEMA, 2013); the Agency for Healthcare Research and Quality (2004) hospital disaster drill performance evaluation tool; and, the Harvard School of Public Health (2014) Emergency Preparedness Exercise Evaluation Toolkit. These instruments were selected for further analysis because of their prevalence in the literature and applicability to the AHS E/DM program.

Originally developed in 2007 and later revised in 2013, the Homeland Security Exercise and Evaluation Program (HSEEP) was developed to provide a “common approach to exercise program management, design and development, conduct, evaluation, and improvement planning” (FEMA, 2013, p. 1). The program emphasizes the importance of exercise planners building the evaluation around an exercise-specific evaluation guide that outlines the key objectives of the exercise, the core capabilities to be tested and the targets for those capabilities and the critical tasks that must be completed (FEMA, 2013, pp. 5–1). The guidelines presented by FEMA (2013) recommend that evaluators be selected based on “experience and subject matter expertise in their assigned functional area” and that additional training should be provided on the exercise evaluation guide and documents and the plans or procedures that are being tested in the exercise (p. 5-3). The HSEEP (n.d.) program toolkit includes exercise evaluation guide templates for 47 core capabilities for national preparedness. The exercise evaluation templates include a broad description of the aim of the target capability but the specific exercise objectives, target capabilities, and critical tasks must be customized by the exercise planner (HSEEP, n.d.). The evaluation guide also asks the organization to establish a target rating level for each organizational capability then rate actual exercise performance using the clearly defined 4-point rating scale (HSEEP, n.d.). The HSEEP toolkit also provides an after-action report template that incorporates all of the data elements collected in the evaluation form into a report format.

The HSEEP instrument offers both benefits and drawbacks for the AHS E/DM program. Because the program is designed to be broadly applicable to U.S. national preparedness, it is highly adaptable to specific organizational needs. Although it is not designed specifically for health care, several of the target capabilities for which exercise evaluation templates have been developed are based on health care capabilities such as mass care and public health. While the exercise evaluation templates attempt to integrate systematic data collection, they still rely largely on narrative descriptions and subjective observer evaluations of performance. Further, because organizations are required to develop their own exercise objectives, target capabilities and critical tasks, the relevance and quality of these elements will vary significantly depending on the expertise of the exercise planner. Finally, because the tool is so customizable, it has not been tested in the literature for reliability and validity.

One of the most commonly cited instruments for emergency exercise performance evaluation specific to health care is the hospital disaster drill performance evaluation tool developed by the Agency for Healthcare Research and Quality (AHRQ) and Johns Hopkins University Evidence-based Practice Center. This tool was initially developed in 2004 based on literature, best practice and industry expert input (Cosgrove, Jenckes, Wilson, Bass, & Hsu, 2007, p. 2). The evaluation tool consists of six modules that span from pre-drill to response phases to group debriefing and four addenda that can be applied to specific situations such as biological and radiological incidents (Agency for Healthcare Research and Quality, 2004). Each module has an evaluation form incorporating evaluative (yes/no and checklist), descriptive (asking observers to describe or provide comments) and illustrative (asking observers to draw a configuration) components (Agency for Healthcare Research and Quality, 2004). The evaluation forms are intended to be completed by observers who have been trained in the use of the evaluation modules and addenda as well as the physical layout of the exercise and equipment that is used (Agency for Healthcare Research and Quality, 2004). Kaji and Lewis (2008) tested this tool with exercises at six hospitals, finding a “high degree of internal reliability” but “substantial variability in interrater reliability” (p. 204). The authors fail to establish the validity of the instrument, arguing that reliability is a “first step in establishing the validity of an instrument” (Kaji & Lewis, 2008, p. 209). The usefulness of this tool for the AHS E/DM program is limited by both applicability and feasibility. In terms of applicability, the AHRQ modules are designed to evaluate a hospital drill based on a mass-casualty incident (with or without hazardous materials involvement), which is only one of many disaster scenarios exercised by the AHS E/DM program. The feasibility of the tool is limited by the training requirement for observers and the complexity of the module evaluations. If the modules are used in their entirety, observers would be required to collect more than 300 individual data elements, many of which involve descriptive or illustrative components. This is echoed by Savoia et al (2010), who describe the AHRQ tool as “too long,” adding that “it has been shown to have significant discordance” when applied to diverse health care settings (p. 56).

The third approach, and the most promising in terms of usefulness to the AHS E/DM program, is the Harvard School of Public Health (HSPH) (2014) Emergency Preparedness Exercise Evaluation Toolkit. The literature shows that this toolkit is the culmination of more than a decade of HSPH development, validation and refinement of exercise design and evaluation resources (Biddinger et al., 2010, p. 102; Savoia et al., 2009, 2010) . The toolkit, which is available online for free, allows users to develop their own “customized exercise evaluation form” by selecting the specific capabilities and response stages the exercise is intended to test (Harvard School of Public Health, 2014). The evaluation form produced by the online program lists all of the response elements associated with the selected capabilities and then collects performance information on each response element using four evaluative methods: a checklist of actions listing individual tasks required for each response element; fill-in-the-blanks for specific data elements, such as the time of plan activation; a 10-point Likert scale asking the evaluator to rate the overall performance on each response element; and, an open-ended response section for the evaluator to provide narrative commentary on factors such as successes, challenges and recommendations (Harvard School of Public Health, 2014). The HSPH toolkit database contains about 160 response elements and about 500 specific actions that can be incorporated into custom exercise evaluation forms (Agboola et al., 2015, p. 505). This instrument has been pilot tested and found to be reliable, valid and

practical to use (Agboola, McCarthy, Biddinger, & Daukiewicz, 2013, pp. 15–16). Agboola et al. (2015) conducted an evaluation of the feasibility and usefulness of this tool by interviewing exercise planners from 14 public health and health care organizations after they had conducted an exercise using the HSPH tool. The evaluation found that the “vast majority” of interviewees (93%) found the tool to be both useful and feasible, and also compared the HSPH tool favourably to other similar tools such as the Homeland Security Exercise Evaluation Program tool (Agboola et al., 2015, p. 506). The primary benefit of this tool in comparison to other exercise evaluation methods presented in the literature is that it allows exercise planners to tailor the tool to the specific exercise objectives and it has also been tested for reliability and validity in a variety of settings (Savoia et al., 2009, 2010). The HSPH tool also links each individual measure to nationally recognized industry standards which, as Agboola et al. (2015) note, “was cited by many interviewees as a valuable feature of the toolkit” (p. 506).

Although the tools presented above represent significant progress in research in this area, and also present useful guidance for the AHS E/DM program, the literature shows that there remain significant limitations to the use of emergency exercises to measure emergency management performance. There is limited evidence in the literature linking performance in exercises to other elements of emergency management program performance. Savoia et al. (2014) describe the literature around evaluation of emergency exercises as “inconsistent,” concluding that “there is little research to describe how data acquired from simulated emergencies actually supports conclusions about the quality of the public health emergency response system” (p. 9713). As Djalali et al. (2014) notes, research in this area is limited to measuring the relationship between exercise response performance and preparedness elements for specific events such as pandemic flu (pp. 443–444). Research has also been conducted specifically around response to hazardous materials incidents. In a study of 25 acute care hospitals, Agboola et al (2013) did find a positive relationship between hospital performance in a hazardous materials scenario evaluated using the HSPH tool and the number of exercises previously conducted by the hospital (p. 577). In a more general application, Kaji et al (2008) found no significant relationship between self-reported preparedness levels of six hospitals and their performance in disaster drills measured using the AHRQ instrument and “video analysis of teamwork behaviors” (p. 196). As Jackson (2008) points out, although emergency exercises are often assumed to provide a realistic demonstration of the expected performance of an organization in a real disaster event, “in practice, whether or not exercises are useful as a measure of preparedness depends on how they are designed” (p. 9). Considering this, it is important that the AHS E/DM program incorporate this best practice and take a deliberate and systematic approach to the use of emergency exercises as proxy outcome measures for emergency preparedness. As Falkenrath (2001) points out, while exercises “are not a panacea to the uncertainties of response,” they are one of the most effective means available that organizations can use to assess the effectiveness of preparedness activities (p. 177).

#### **4.4.2 Measuring the Outcomes Achieved by the E/DM Program**

This literature review found limited examples of outcome-based performance measurement in the field of emergency management. The Centers for Disease Control and Prevention (CDC) (2013) defines outcomes as “Changes or benefits resulting from program activities and outputs,” that are assessed by

asking the questions: “What results have been achieved from the program? To what extent can results be tied to program objectives and activities? [and] What is the impact within a population, system or other target of a program, due (at least in part) to program activities?” (pp. 2-3). As Asch et al. (2005) point out, “the basis for quality improvement is evidence that the action or capacity measured is effective in achieving a desired outcome” (p. 535). The challenge in evaluating outcomes from the AHS E/DM program, as discussed in [section 4.2](#) above, is that causal links between program activities and outcomes in terms of actual performance in disaster are difficult, if not impossible, to establish. Because of this challenge, all of the approaches found in the literature that attempt to establish outcome measures do so by using proxy measures that have been determined to predict effective disaster responses. As Savoia et al. (2009) point out, because outcomes are so difficult to ascertain in emergency management, “the most feasible methodological approach is to identify potential predictors or proxies of outcomes and to implement interventions that will improve the outcome measures of those predictors” (p. 146). The most common form of proxy measure used to assess outcomes of emergency management programs is evaluation of performance in emergency exercises, as discussed above. This section discusses the only two complete frameworks for emergency management outcome performance assessment: Jackson’s (2008) response reliability assessment framework and Jensen’s (2011) emergency management principle-based measurement framework.

Jackson (2008) argues that the outcome of an emergency management program is the reliability of the system, that is, the likelihood that the emergency response system can perform effectively in a disaster event (p. vii). The process of response reliability assessment advocated by Jackson (2008) entails mapping the response system and then “estimating the likelihood of breakdowns, identifying their impact on performance [and] determining if planning has accounted for them” (p. viii). The outcome measure produced in this process is a “quantitative estimate of response reliability,” which Jackson (2008) argues provides a distinct advantage for reporting performance in an easy to understand way (p. viii). Although the concept of being able to report, for example, that a response system is 95% reliable is useful for accountability reporting to policymakers, this approach has the same pitfalls as standards and capabilities-based measurement in that the quantification of subjective measures can create a false sense of certainty around the effectiveness of emergency preparedness activities. As Jackson (2008) himself admits, the response reliability framework relies to a great extent on “good-faith estimation” of how well a system will perform in a given incident (p. 16). Jackson (2008) suggests that more precise measurements may be achieved by borrowing techniques such as fault-tree and risk analysis from more technical fields, but also concedes that the human component of emergency response coupled with the “unpredictability of post-incident environments” make any level of precision of measurement difficult to achieve (p. 16). Additionally, this approach remains in the theoretical stage with no evidence found in the literature examining actual application in a real organization.

Jensen (2011) proposes an outcome-based performance measurement system based on the eight Principles of Emergency Management: “professionalism, being risk-driven, integration, flexibility, collaboration, coordination, comprehensiveness, and progressiveness” (p. 3). These principles were established in 2007 by “a group of emergency management practitioners and academics” and are now “backed by the buy-in of the emergency management community”, including all of the major emergency

management organizations (Jensen, 2011, p. 3). This framework is presented for the purpose of evaluating the Emergency Management Performance Grant (EMPG) program, a cost-sharing program between the U.S. federal government and local, tribal and state governments. Jensen (2011) argues that successful outcomes in emergency management can be linked back to these key principles that have been identified through experience with and study of emergency management. The purpose of her proposed measurement framework is to “demonstrate in a consistent, quantifiable, and meaningful way, how EMPG funding is contributing to preparedness throughout the nation” (Jensen, 2011, p. 3). The idea is that if organizations can achieve a demonstration of each of these principles in their program, it becomes a proxy measure for overall program success and value for the grant funding provided.

In this case, the “outcomes” provided are general statements that sum up the broad intent of each of the principles of emergency management. For example, for the principle “professional”, Jensen (2011) provides the outcome “The jurisdiction engages in preparedness actions guided by professional emergency managers and professional emergency management programs” (p. 18). There are two sample objectives associated with this outcome: “Local emergency managers are practicing professionals” and “The jurisdiction’s emergency management program is administered in keeping with standards for the profession” (Jensen, 2011, pp. 18–19). For each sample objective, a list of quantifiable sample measures are provided, such as the number of certified emergency managers in the jurisdiction or the number of industry standards achieved by the jurisdiction. Similar outcome statements, sample objectives and measures are provided for each of the eight Principles of Emergency Management: comprehensive, progressive, risk-driven, integrated, collaborative, coordinated and professional (Jensen, 2011, pp. 18–29). This is one of the stronger approaches found in the literature because it provides quantifiable performance measures that organizations can employ. Further research is required, however, to determine the correlation of performance within this framework with performance in disaster events as well as the reliability and validity of the specific measures.

#### **4.5 MEASURING THE EFFECTIVENESS OF E/DM PROGRAM ACTIVITIES**

The Donabedian (1983) model for health care quality improvement incorporates three components: structure, process and outcomes. Asch et al. (2005) argue that, ideally, performance measurement systems should incorporate all three of these categories (p. 535). The section above presents the most common approaches to measuring the structural components of emergency management programs, such as the number plans written, staff trained or exercises conducted. This section explores the best practice in the literature around measuring process performance measures for three key E/DM activities: plans, training and exercises, and incident response. As Asch et al. (2005) point out, while measuring structural elements is important, organizations should also incorporate process elements that measure the effectiveness of those structures or activities (p. 535).

#### **4.5.1 Measuring the Effectiveness of Emergency Plans**

The requirement for emergency plans tends to form the backbone of industry standards and regulations. Indeed, it is through the planning process that organizations identify how they will respond to emergencies and training, exercising and incident response activities built off of those plans. Current industry standards as outlined above focus on the existence of plans and plan elements, and do not typically incorporate a quality assessment. Generally, quality assessment for emergency plans relies on the expertise of emergency management professionals who are creating the plans. The more detailed industry standards such as CSA Z1600 provide guidance on the elements that should be contained in the plan such as roles and responsibilities, logistics and resource requirements and communication procedures (Canadian Standards Association, 2014). Others, such as the CDC (2013) specify that plans “should be linked to other activities such as risk assessment” (p. 14). There were no tools found in the literature for quality assessment of plans, although there is a significant volume of guidelines around the general components and characteristics of effective plans. In general, the literature around measuring emergency plan effectiveness suggests that the most effective evaluation of plans occurs in the context of training and exercising (Brand, Kerby, Elledge, Johnson, & Magas, 2006, p. 2; Joint Commission Resources, 2002, p. 35). Research conducted to study the relationship between the quality of plans and success in emergency exercises has revealed mixed results and is thus far limited to public health pandemic plans (Adini, Goldberg, Cohen, & Bar-Dayyan, 2008; Burstein, 2008). The literature on measuring plan effectiveness suggests that there is little utility in standalone assessments of plan quality and organizations should instead focus on assessing the effectiveness of the application of plans in training, exercises and actual incidents.

#### **4.5.2 Measuring the Effectiveness of Training and Exercises**

Staff training is an important component of any emergency management program. Training is important to ensure that individuals are aware of their roles and responsibilities within a plan and have the knowledge and practical skills necessary to carry out plan procedures. Although emergency exercises can be used as tools for performance measurement as discussed above, they are also useful tools for staff training. This section discusses the literature around assessing the effectiveness of training and exercise programs and the challenges and limitations to evaluating training.

Training is a common requirement in industry standards and regulations. The CSA Z1600 standard requires that organizations “implement a plan to provide a competency-based training and educational curriculum to support the plan” (Canadian Standards Association, 2014, sec. 6.2.8.2). There are few guidelines in the literature, however, addressing how organizations should assess the effectiveness of emergency and disaster training programs. Sinclair et al. (2012) argue that it is essential to incorporate evaluation into the planning and delivery of training initiatives to ensure the program is achieving its objectives and providing a “return on investment” (p. 508). In evaluating the effectiveness of training, the framework presented by Kirkpatrick is commonly used (Brand et al., 2006, p. 1). Kirkpatrick’s framework incorporates four levels of evaluation: self-assessment of initial reactions, objective

assessment of knowledge growth, assessment of behaviour and performance changes, and assessment of outcomes or broad results (Brand et al., 2006, p. 1).

Brand et al. (2006) also suggest that the evaluation of training should include an objective assessment of staff knowledge of factual components of the plan (pp. 12-13). Another key concept in assessing the effectiveness of staff training in disaster response is incorporating a pre-test and post-test research design to establish a baseline of knowledge or competency to show the impact of the training or exercise program (Brand et al., 2006, pp. 1–2). The feasibility of this kind of evaluation is limited in health care organizations because of the additional time and resources required to conduct multiple evaluations.

There is limited evidence in the literature assessing the relationship between training and outcomes such as improved performance in emergency exercises or incident response. Williams et al. (2008) conducted a systematic literature review on the most effective training methods for health care staff, finding the evidence to be too “inconclusive” to endorse any particular method (p. 211). In a review of 21 studies examining the effectiveness of hospital disaster drills, Hsu et al. (2004) found that disaster drills are generally successful in increasing staff familiarity with disaster plans and procedures (p.198). As Hsu et al. (2004) point out, the literature in this area presents “little objective data” incorporating pre- and post-test or statistical research designs (p.198). Interestingly, in their study testing the HSPH exercise evaluation tool, Agboola, McCarthy, Biddinger, et al. (2013) found that the number of exercises previously completed had a significant impact on staff performance in emergency exercises, but staff experience or level of training had no correlation with exercise performance (p. 9).

Lacking the ability to link training and exercises to actual outcomes, the literature suggests that it is important to assess the effectiveness of these initiatives against the objectives set out for the activity (Sinclair et al., 2012, p. 512). The ICDRM (2010) suggests that “program documentation itself should be used to develop the metrics in the evaluation process” to ensure that the evaluation results provide an accurate representation of what the program set out to achieve (p. 4-27). Brand et al (2006) expand on this concept, proposing a model for assessing the effectiveness of emergency management training that links training objectives to specific emergency plan components. The literature shows that while there is inherent difficulty in establishing causal links between program activities and outcomes of emergency preparedness, organizations can produce valuable performance information by linking the different components of preparedness such as plans and training to other components such as exercises.

#### **4.5.3 Measuring the Effectiveness of Incident Response**

The unexpected and infrequent nature of actual emergency and disaster incidents make it difficult to measure program performance in actual incidents in a systematic manner. The outcomes of a disaster in terms of factors such as number of casualties, extent of property damage and duration of outages are typically more related to the nature and scale of the disaster rather than the actions of response organizations (BC Ministry of Health, 2006a, p. i). As Owen, Brooks and Bearman (2015) point out, “bad outcomes can occur despite good operational processes and good outcomes can occur despite bad

operational processes” (p. 1). Jackson (2008) argues that in analyzing emergency management program performance in disaster, “the right question is not ‘could more have been done? but ‘how well did the system perform given what was expected from it?’” (p. 2). This approach is echoed by Brown and Robinson (2005), who argue that measuring performance in emergency response should focus on the “effectiveness of the responders in completing their mission” rather than the outcomes that occurred as a result of the disaster (p. 5). According to the BC Ministry of Health, (2006a), “there are some common elements that appear to be critical in supporting effective responses” such as effective plans, training and exercises leading up to the event, incident management, collaboration, coordination and communication systems (p. i). As Birnbaum (2006) points out, post-incident analyses tend to focus on the “errors and inadequacies” of incident responses, but there is significant value in identifying the positive “practices and responses” that led to more effective management of the incident (p. 222). Quarantelli (1997) suggests three key questions to assess the adequacy of disaster response: “Was the need for the function recognized early?” “Was the function carried out without too many problems?” and “Were the recipients (i.e., the disaster victims) satisfied with the function provided?” (p. 21). Quarantelli (1997) also suggests that organizations should assess “the adequacy of information flow in a disaster” by evaluating to what degree the public and organizations were able to get the information they needed (p. 24). Owen et al. (2015) conducted a survey of fire and emergency services leaders to determine the common factors indicating successful emergency management. Several key indicators of success were identified including whether incident management and stakeholder engagement was maintained through the incident, if stakeholders retained confidence in and satisfaction with the actions of responders, if the community was able to recover from the incident and if the community had the ability to learn and grow as a result of the incident (Owen et al., 2015, p. 5)

The importance of stakeholder engagement prior to and during incident responses is a common theme in the literature. In their evidence review of successful practices in public health emergency management, the BC Ministry of Health (2013) found that pre-existing relationships and communication networks were essential to effective emergency response (p. 15). This was also found in an earlier evidence review of successful practices in broader health care emergency management, in which the authors concluded that the evidence points to “the primary importance of collaboration, coordination and communication among all relevant sectors, organizations and agencies” (BC Ministry of Health, 2006a, p. 14). Research has shown a link between stakeholder engagement and improved performance in emergency exercises. Lurie et al. (2006) found that “efforts to integrate preparedness” with other agencies was linked to stronger performance in emergency exercises, while “less-well-integrated health departments tended to perform poorly on tabletop exercises or reported other challenges in responding to real events” (p. 940). Although stakeholder engagement is frequently cited in the literature as essential to successful emergency management, as Kun et al. (2014) point out, it remains an “elusive concept” in terms of measurement (p. e6). The CDC (2013) addresses this in its public health emergency preparedness assessment by attempting to define “meaningful engagement,” which they describe as “serving on committees or workgroups...contributing language to the document, clearing certain information for release [or] providing subject-matter expertise on content” (p. 14). Woodward et al. (2004) added a community engagement perspective to their Balanced Scorecard for public health, noting that the “level of integration into the community, ability to work with other health care sectors

and community agencies” is a key component of effective emergency response (p. 12). In adapting this Balanced Scorecard, Weir et al. (2009) suggest that client satisfaction surveys can be used as a tool to “invite input and feedback” and measure performance in the area of stakeholder engagement (para. 17).

The literature shows that several attempts have been made to incorporate systematic data collection into incident response evaluation in order to produce meaningful performance information. The Public Health Emergency Preparedness performance measurement guidelines include an evaluation tool for response to actual incidents (CDC, 2013). Using this instrument, evaluators are asked to provide information on the type of incident the health outcomes such as number of ill, injured or exposed and answers to several questions assessing the quality of the response asking questions such as whether or not a response plan was in place, if staff were trained and had conducted an exercise leading up to the incident, the level of engagement with community partners prior to the incident and the level of disruption to routine services as a result of the incident (CDC, 2013, pp. 19–23).

Lynch and Cox (Lynch & Cox, 2006) present the Health Emergency Management (HEM) Best Practices Matrix that lists several best practices associated with emergency management and corresponding performance indicators (pp. 106-107). The limitations of this tool is that the sample performance indicators are often general and subjective, such as the indicator of whether or not a “generic approach toward disaster planning developed in collaboration with outside stakeholder interests” (Lynch & Cox, 2006, p. 108). Additionally, this tool offers no scoring system and does not establish performance benchmarks.

Piltch-Loeb et al. (2014) field tested an alternative to the traditional post-incident after-action evaluation that uses a peer assessment protocol incorporating elements of root cause analysis and a facilitated look-back approach and found that this approach is “applicable and leads to more in-depth analyses than some other current methods” (p. 33). The peer assessment protocol brings together the key plays in an incident to identify the contributing factors to the event (both modifiable and unmodifiable), immediate causes of response challenges, adaptations and solutions that were implemented and lessons learned from the incident (Piltch-Loeb et al., 2014, p. 31). This protocol appears to be a feasible alternative to the traditional ad hoc approach to post-incident evaluation.

## 5. FINDINGS: INTERVIEWS

This section presents the findings of 31 interviews conducted with E/DM stakeholders including internal stakeholders (E/DM staff and leadership), AHS stakeholders (operational leaders and representatives from other areas of the organization) and external stakeholders (representing organizations outside of AHS). The first two sections provide stakeholder input on the benefits and drawbacks of the current KPIs used by the AHS E/DM program, as well as considerations for the development of KPIs in this project. The remaining three sections use the Balanced Scorecard approach to explore stakeholder perceptions on the most valuable activities and outcomes of the E/DM program, how the program needs to learn, grow and innovate and how the program demonstrates financial value to the organization.

### 5.1 CURRENT KEY PERFORMANCE INDICATORS

All internal E/DM stakeholders were asked to share their thoughts on the current Key Performance Indicators (KPIs) used by the department. Two questions were asked around the current KPIs: “How well do you think the current KPIs accurately reflect E/DM program performance?” and “What would you change?” All internal E/DM stakeholders are familiar with the current KPIs because of the requirement for data collection and reporting on the measures at the employee level. Other stakeholder groups were not asked specifically to comment on the current KPIs used by the department because it is unlikely that they would be familiar enough with them to comment on their relevance, usefulness or feasibility. Some individuals from other stakeholder groups did provide unsolicited comments on the current KPIs because a list of the current KPIs was contained in the stakeholder briefing for background information. This section provides a summary of the responses to this question and other comments regarding the current KPIs employed by E/DM. Table 1 below presents an overview of the frequency of themes mentioned in relation to the current KPIs.

**TABLE 1: REOCCURRING THEMES REGARDING CURRENT KPIS**

| Theme: The current KPIs...   | Frequency |
|--|-----------|
| are not specific or standardized enough to be consistently applied across the province | 9         |
| reflect factors that are outside of EDM control  | 8         |
| only reflect a small part of the overall program                                       | 5         |
| reflect program goals/industry standards   | 5         |
| are too focused on quantitative factors  | 4         |
| are too focused on a limited number or type of site                                    | 3         |
| do not reflect the amount of work that goes into achieving completion                  | 3         |
| fail to guide program quality improvement  | 2         |
| reflect an outcome of E/DM activities (i.e. engagement)                                | 2         |

The majority of E/DM stakeholders stated that they did not think the current KPIs accurately reflected program performance. The most common theme that emerged in response to this question was that the

KPIs were not specific or standardized enough to be applied consistently across the province. This theme emerged most frequently in relation to the KPI around implementation of site-specific emergency response code plans. Many interviewees felt that clarity was lacking around how recent and how tailored a plan needed to be to achieve completion of the KPI. This issue was also brought up in relation to the KPIs around establishing a site E/DM committee and conducting an exercise, arguing that the measure should differentiate between an inactive and highly active committee, or between a simple tabletop drill and a full-scale exercise. A separate but related theme emerged around how the KPIs often do not reflect the amount of work that goes into achieving its completion between sites of varying size and complexity. Others felt that the KPIs did not capture the full continuum of the ongoing preparedness process at a site. As one interviewee remarked, once a committee or plan is implemented, “that work doesn’t stop.”

Another common theme that emerged around this question was that the current KPIs reflect factors outside of E/DM’s control. As one interviewee commented, “key performance indicators need to be based on what we have control over, not what other people have control over.” Another argued that in reporting on KPIs outside of E/DM control, “technically it sets us up to fail.” Several interviewees suggested that E/DM is limited by site willingness and ability to implement initiatives. One interviewee described challenges in achieving the KPIs because of “the realities that we face in some of the sites in terms of the resources that are available and the time commitments.” This came up specifically regarding conducting emergency exercises and in implementing and maintaining the Chemical, Biological, Radiological and Nuclear and Hazardous Materials (CBRN/HazMat) program. This theme also emerged around the KPI for the number of employees that have completed E/DM e-learning courses with one interviewee suggesting that whether or not employees complete the e-learning modules is only “reflective of what’s been directed to the employees at the site” and not within E/DM control.

Some interviewees pointed out that E/DM is limited by the lack of organizational policy requiring sites to have KPI elements in place, so there is no authority granted to E/DM staff to “enforce” non-compliance with the KPIs. As another interviewee argued, if sites “choose not to do it, we don’t have any leverage at this point because we don’t have a policy.”

In defending the current KPIs, several interviewees argued that the measures are appropriate because they reflect the primary program goals and industry standards that AHS is obligated to achieve. Many E/DM stakeholders also pointed out that while E/DM does not have complete accountability for achievement of the current KPIs, the department does play a significant role in facilitating the process and promoting E/DM initiatives at the site level. For example, as one interviewee pointed out regarding emergency response code (ERC) implementation, “we promote and advise and educate, but they’re the ones that have to uptake it.” Although most interviewees felt that E/DM lacked complete control over achievement of KPIs, others argued that success from a KPI perspective reflected an outcome of E/DM success in engagement with a site. As one interviewee remarked, “A site manager has 50 things to do today, and you’re just another one of them. If you don’t have that trust and relationship and aren’t viewed as a credible resource, they’re going to move on.”

Several other themes were identified by multiple participants regarding the current KPIs. Some pointed out that the KPIs are highly acute-care site based and do not reflect the full breadth of program activities in other organizational areas. The focus on quantitative measurement in the current KPIs was also criticized. As one interviewee lamented, the KPIs fall short “when you look at everything you’ve achieved in a year in all the stuff outside of the KPIs.” Finally, the usefulness of the KPIs in terms of quality improvement was questioned, with one interviewee arguing that the KPIs fail to provide “guidance or direction in terms of how we can actually improve our program.”

## **5.2 CONSIDERATIONS FOR FUTURE KEY PERFORMANCE INDICATORS**

All internal E/DM stakeholders were asked additional questions regarding what they would change about the current KPIs, if there was any additional performance information they are currently collecting that should be included in a new performance measurement framework, and if there was any kind of information that would not be feasible to collect under a new performance measurement framework. Comments provided by other stakeholders regarding these topics were also included in this analysis.

In terms of what internal E/DM stakeholders would change about the current KPIs, nearly all E/DM stakeholders suggested various types of additional or more extensive information that they would like to see tracked such as number of staff trained in classroom training, number of E/DM committee meetings and number and scope of exercises. Several interviewees also commented that they would like to see some form of satisfaction survey used in the KPIs to better incorporate the qualitative aspects of E/DM program activities. Others suggested that the KPIs better incorporate the full site preparedness continuum beginning with establishing a site E/DM committee, then having that committee develop and implement the emergency response code plans, then conducting staff training and awareness programs, exercising the plans and revising the plans.

Multiple stakeholders expressed ways in which performance measures should provide value to the program. Examples provided included assisting the organization in meeting legislative requirements and industry standards, sharing best practice between zones within the E/DM program and monitoring zone and individual performance.

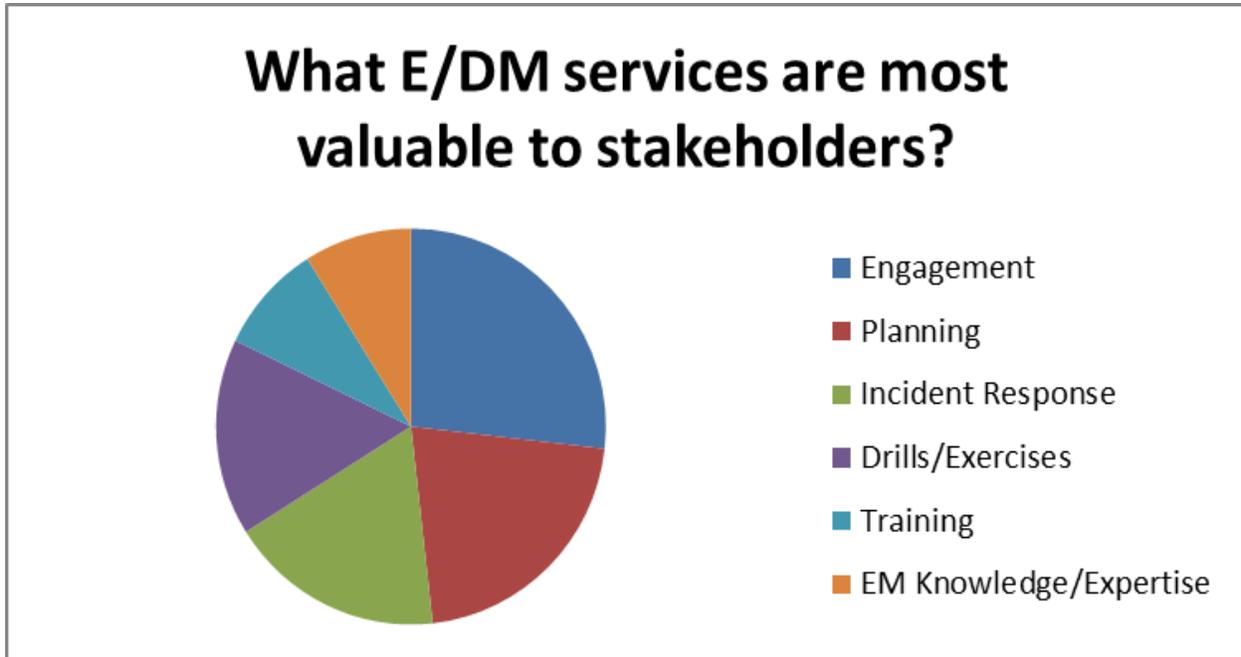
Some interviewees commented on the technical side of the KPIs, suggesting that a dashboard or more user-friendly database would enable more efficient data collection and reporting. Others suggested that linking in with existing data collection tools used by other departments, such as the Workplace Health and Safety (WHS) MySafetyNet program or using an online portal for reporting would be useful.

The majority of comments regarding feasibility of data collection were positive, with interviewees stating that as long as E/DM had ready access to the information, data could feasibly be collected and reported. Concerns that were raised regarding feasibility included the need for zone administrative support to assist, and ensuring that data could be collected in an efficient way using existing tools such as site E/DM committee minutes and post-exercise reports.

### 5.3 STAKEHOLDER NEEDS AND VALUES

All stakeholder groups were asked to reflect on the services E/DM provides and describe what they perceived to be the most valuable. Several common themes emerged in response to this question with the most popular being engagement, planning, drills/exercises and incident response (see Figure 2 below). Follow-up questions were then asked about each element of E/DM performance to determine the specific internal processes required to meet stakeholder expectations.

FIGURE 2: TOP REOCCURRING THEMES REGARDING STAKEHOLDER EXPECTATIONS AND VALUES



Engagement with internal and external stakeholders was a predominant theme identified as the most valuable service E/DM provides. Both AHS and external stakeholders spoke of the linkages E/DM provides within the health system and between the health system and external partners such as municipalities, government and industry. Stakeholders described E/DM as providing a connection function across AHS through its own formal committees such as the E/DM Steering Committee, Zone E/DM Committees and ad hoc planning groups. As one AHS stakeholder noted, “facilitating those meetings and ensuring that those committees exist and that we’re meeting at an appropriate interval is valuable for me in terms of keeping me up to speed.” Stakeholders also suggested that E/DM representation on site committees and committees led by other program areas in AHS provided valuable opportunities for collaboration with E/DM. Externally, E/DM was described as “the face of AHS” on many municipal and industry emergency management committees. As one stakeholder pointed out, E/DM provides “the linkage into AHS and the larger organization” for external entities.

Stakeholders suggested that a key outcome of this internal and external engagement was the linking and integrating of various plans and capabilities. Additionally, both formal and formal engagement mechanisms provide opportunities for information sharing in both preparedness and incident response.

As one stakeholder argued, when an incident occurs, “E/DM is really the link into the clinical and operational side from a notification perspective.” Another stakeholder pointed out, “they’ve got the relationships built already...so they provide the connection point and we can take it from there.” Stakeholders also expressed that E/DM engagement and connections within and outside the organization aided in incident response capability. As one stakeholder expressed regarding their role as administrator on-call, “if something happens under my watch, [E/DM] is the area I know that I can rely on to help me to bring together all the necessary parts and pieces depending on what the incident is.” The various engagement functions E/DM performs were consistently cited as some of the most valuable elements of E/DM performance overall.

Although it is often a product of engagement, many stakeholders specifically mentioned E/DM planning functions as valuable services provided by the department. Examples of valuable E/DM planning work included emergency response code template and site-specific plan development, pandemic/communicable disease planning, incident management planning and business continuity planning. “That’s top of mind,” one stakeholder explained, “how are we prepared to respond and do we have appropriate plans in place to respond?” Interviewees described several internal processes necessary to meet stakeholder needs in planning including providing templates and expertise in tailoring plans, facilitating committee meetings and working groups, as well as dissemination and ongoing maintenance of the plans. In terms of how success in planning could be measured, stakeholders felt that performance in simulated exercises and actual incidents were the best indicators. As one internal E/DM stakeholder pointed out, “I see that as a sign of success that we’ve put the plan in place and they actually used it when there was an event.”

Many stakeholders described the services provided by E/DM in incident response as highly valuable. Several pointed to the incident management structure provided by E/DM through the provincial incident management system including site command posts, zone emergency operations centres (ZEOCs) and the provincial emergency coordination centre (ECC). As one stakeholder pointed out, “being able to respond in an organization-wide approach is quite key.” Common themes that emerged in the discussion around E/DM’s role in incident response included coordination and communication as well as guiding leaders through the incident management process. As one internal E/DM stakeholder pointed out, “we supply the structure and [the operational leaders] work within it, they continue to do what they know best in their roles.” Stakeholders suggested that E/DM structures help leaders to effectively manage incidents. “It gives people a sense of comfort, confidence and an effective way of approaching the circumstances,” one stakeholder pointed out, adding that it allows operational leaders to “work through complexity [and] challenging circumstances that they need to deal with.” As another stakeholder expressed in relation to a specific incident, E/DM “kept everything moving forward, whereas left to ourselves we would have had to figure out how to make all these things happen.” Providing a conduit and mechanism for communication was also cited as a key role of the E/DM incident management system. As one stakeholder argued, it is important to “have a channel for providing updates but also requesting resources and having that communication in that urgent situation.” When asked about measuring the outcomes of E/DM incident response, stakeholders suggested that debriefings can be used to evaluate the effectiveness the incident management system and supporting structures. As one stakeholder

suggested, “the real outcome is did we manage this thing well, minimize harm and have the organization respond appropriately and well to get things back on track as quickly as possible?” Stakeholders reported that ultimately, we must assess “were we successful in what we were set up to do?” While many stakeholders reported that it is difficult to objectively measure success in incident response, they felt strongly that the E/DM incident management system plays a valuable role. “It gets answers and results, there’s no other way to do it,” one stakeholder said, “It’s province-wide, it’s efficient and uniform and there’s no way anybody can say they didn’t know the answer because everyone is there.”

Another area of value identified by many stakeholders was E/DM support in conducting drills and exercises. Several stakeholders described drills and exercises as an extension of E/DM planning work. “It takes the planning to the next level” one stakeholder suggested. When an exercise takes place, another stakeholder pointed out, “it becomes real at that point to people, they see it actually work.” In terms of the outcomes achieved by drills and exercises, stakeholders felt that staff awareness of the plan was of utmost importance. As one stakeholder said, “It’s ensuring that everybody in the room knows what their role is, and supporting that, and communicating that.” Others suggested that drills and exercises were effective tools for staff engagement and increasing confidence in organizational capability. Another benefit of drills and exercises that stakeholders suggested was their role in facilitating engagement between multiple departments and organizations. Although drills and exercises are not necessarily led by E/DM staff, many stakeholders suggested that E/DM provides a valuable service in the exercises it does lead. “You have to have those expert eyes there,” one stakeholder said, pointing out that E/DM involvement in exercises “would help us to think about things we hadn’t anticipated or thought about, or other people we hadn’t considered.” Another echoed this, saying “you need someone with the experience to be leading that piece.” In terms of measuring the success or outcomes of exercises, stakeholders suggested that the benefit of an exercise was most apparent with performance in a subsequent exercise or an actual incident. As one stakeholder pointed out, after conducting an exercise, “next time you have a real event or an exercise they know what to do, they’re more familiar, they’re more confident.” Others suggested that the results of the exercise debriefing were an important outcome of exercises. “I think the debriefing is the most productive part of it,” one stakeholder argued, “it’s where you can get together and we can talk about what worked well [and] what could have worked better.” Similar thoughts were expressed by other stakeholders, who provided examples of learnings and recommendations that came out of exercise that otherwise may not have been discovered.

Other areas of value identified by multiple stakeholders, although to a lesser extent, included training programs and advocacy within the organization for emergency preparedness and risk management. In terms of training, stakeholders mentioned the E/DM e-learning courses, code-of-the-month training, incident command system (ICS) training and CBRN training. When asked about the desired outcomes of training, stakeholders suggested that the usefulness of training could be assessed in exercises or after actual incidents. As one stakeholder pointed out, the question is “how well did our training programs support the incident?” Others suggested that tools could be used to measure knowledge and compliance with training procedures, such as post-training evaluations.

#### 5.4 LEARNING, GROWTH AND INNOVATION

All stakeholders were asked to consider how the E/DM program and its staff demonstrate learning, growth and innovation. The most common response to this question was that the program and its staff demonstrate learning and growth by staying current on best practice, literature and research in the field of emergency management. “There’s no doubt that they understand what the best practices are and that they’ve done research,” one stakeholder observed. Many also pointed to the importance of the program engaging in a process of continuous quality improvement. As one stakeholder pointed out, “they’re constantly looking at their own processes with a view to, how do we make it more efficient and how do we improve the way we do work?” This came up specifically in relation to how the program learns and grows after an incident. “Any time there is some sort of activation,” one stakeholder explained, “the whole program looks at it to say, what do we need to do differently?” In terms of how E/DM demonstrates continuous quality improvement, stakeholders suggested that this is demonstrated through the revisions that take place based on best practice and learnings from exercises and events. As one E/DM stakeholder pointed out, “when we’re able to critique something and come back and offer meaningful suggestions for improvement, I think that is a measure of not only our expertise but the learnings that we have along the way.”

Stakeholders suggested that from a learning perspective, the diversity of backgrounds, knowledge and experience among E/DM staff provides a major opportunity for the program. Some suggested that this breadth of knowledge could be better capitalized on. “We have a lot of silos in place” one stakeholder pointed out. The importance of capturing and sharing learnings across the province was also emphasized. “We’ve got to share that information so that everybody is understanding it moving forward,” one stakeholder stressed, “that, to me, is continuous improvement.”

Formal education and industry certifications were less commonly mentioned by stakeholders. Some formal certifications and courses were suggested as being particularly valuable to E/DM staff including incident command system (ICS) courses, advanced CBRN courses, instructional certifications and other emergency management specific education. However, concerns were raised about measuring E/DM performance in learning according to a specific path. As one stakeholder pointed out, considering the diversity of expertise and interests among E/DM staff, a one-size-fits-all approach to learning in the department may hinder broader program development.

When asked about the type of knowledge necessary for individuals in the E/DM program to be successful in their roles, the most common response was organizational awareness. As one stakeholder pointed out, “you have one of the biggest organizations in Alberta so you need to have a really good understanding of its inner workings.” Some stakeholders suggested that organizational awareness was demonstrated through E/DM engagement processes. “They’re really good at identifying who needs to be engaged within AHS and where the proper lines of communication lie,” one stakeholder pointed out. Stakeholders also suggested that E/DM staff should have a high level of political and disaster-risk awareness. “We need to be continuing to look ahead,” one stakeholder suggested, “because that’s what

preparedness is all about: what is the next biggest thing? What are the risks? What is the highest likelihood? How can we prepare the organization?”

Communication and relationship-building skills were also identified as key abilities for E/DM staff. As one stakeholder suggested, to be successful E/DM staff require “a good ability to develop relationships and collaborate with people across the organization.” For many stakeholders, this was expressed as a product of good communication skills. As one stakeholder explained, “one of the key pieces of this job is the ability to communicate...and that’s both ways – able to articulate a position and a stance and a direction, but also able to listen to and understand.” The concept of responsiveness to stakeholder needs, as well as openness and flexibility also emerged as key themes. One stakeholder expressed the importance of E/DM staff having “the ability to listen, to be inclusive [and] to communicate and confirm that our input has been considered properly.” This theme came up in relation to both the planning process and during incident management. As one stakeholder emphasized, “I think they’re very responsive and I think good listeners,” adding, “that’s really made a difference I think in the organization.”

In terms of program innovation, stakeholders suggested that the program demonstrates innovation by conducting innovative emergency exercises and through innovative programs like e-learning courses and the forthcoming business continuity program. Stakeholders suggested that the level of organizational awareness and uptake on these initiatives would be a good indicator of success. Stakeholders also pointed to innovation in some of the day-to-day E/DM processes like planning, which has evolved from hazard-specific to more all-hazards planning, or in updating plans to reflect best practice. As one stakeholder pointed out, “that is a prime example of how we are learning all the time.” The value of E/DM innovation in this context was frequently mentioned by stakeholders, with one declaring: “if we do not have the very best of plans and people continuously keeping us sharp on this, we’d be a system without one of its arms.”

## **5.5 FINANCIAL VALUE**

All stakeholders were asked how the E/DM program demonstrates financial value. Operating within a public sector organization, the primary objectives of the program are not financial. However, in an era of increasing public sector accountability, demonstrating financial value is important. One of the most common themes that emerged in response to this question was comments regarding the difficulty of measuring financial outcomes for the E/DM program. As one stakeholder pointed out, “you can never prove what you prevent really and that makes it really tough to prove your value.” Others expressed similar opinions, suggesting that the financial value of the E/DM program is in risk reduction. The bigger question, one stakeholder pointed out, is “What’s the risk of not having training, not having staff engagement, not having standardized processes? That’s hard to put a number on.” Despite the challenges expressed around measurement, three primary themes emerged around how the program demonstrates financial value: consequence reduction, cost avoidance and efficiency savings.

Several stakeholders suggested that financial value is demonstrated in how the E/DM program reduces the consequences of emergency and disaster events for the organization. As one stakeholder pointed out, “By having a system in place that allows a prompt response to incidents, they don’t grow and become larger than they necessarily had to be.” As another stakeholder noted, as a result of E/DM program initiatives, when an emergency or disaster occurs, “that effect on business and that effect on patient care is lessened because they are actually prepared and they have a plan and they know what to do and where to go.” Stakeholders identified several aspects of consequence reduction achieved by the E/DM program, including reduced financial consequences, but also reduced impacts to patient care and organizational reputation. “Our first priority is our patients,” one stakeholder emphasized, “minimizing the costs and our impact to them is where we can demonstrate the most.” This was echoed by another stakeholder, who noted, “We can save money, but let’s reduce the impact to patients and residents, because that’s where the real impact for us is.” Others pointed to the reduction of consequences in terms of reputation. As one stakeholder pointed out, a major component of consequence reduction is “perception and confidence in AHS.” Another stakeholder echoed this, noting that “we can measure the financial part, but it pales to preventing the political, or optics or loss of confidence part.”

Many stakeholders suggested that E/DM program results in significant cost avoidance for the organization. This was expressed most commonly by AHS stakeholders, who pointed out that without E/DM, operational areas would need to conduct their own incident management functions. As one stakeholder pointed out, if this was the case “I would say to you that we couldn’t do it anywhere near as efficient as what has been set up [by E/DM]”. As another stakeholder suggested, by having E/DM services available, “I can worry about my operation and if I need EDM support it’s there, I don’t have to go do it myself.” The common theme was that during times of emergency and disaster, E/DM incident management functions allow operational leaders to focus on leading their areas instead of having to bring together all of the emergency management components.

Some stakeholders suggested that E/DM demonstrates its financial value in streamlining operations which results in efficiency savings. Many stakeholders suggested that a standardized, provincial emergency management program avoids duplication of effort and provides financial value through province-wide initiatives like stockpiling emergency supplies. As one stakeholder emphasized, “it makes it much more efficient if there’s one central body doing this for the entire organization.” Another stakeholder echoed this, arguing that standardized processes across the province result in “quantifiable savings.” One stakeholder suggested that the E/DM incident management system provides the most value by “ensuring that we’ve got the most efficient response in the situation.” As another stakeholder emphasized, “The cost of the response does depend on how well we’re organized. If we do it really well we might have a minimal cost compared to what the alternative could have been.”

In talking about the financial value of the program, several stakeholders mentioned the high level of fiscal responsibility within the program. “The structure is as lean as possible,” one stakeholder pointed out, in fact, “the structure may be too lean.” This was a common theme in both the E/DM and AHS stakeholder categories, expressing that in terms of workload and output, the E/DM program “punches above its weight.” As one stakeholder remarked, “we’re definitely pinching the pennies,” and this has

been demonstrated in the achievements of the program compared to the budget dollars spent on the program.

Some stakeholders recommended potential financial measures or approaches to measurement in the area of financial value. Some stakeholders brought up benchmarking financial measures against other organizations, although commentary was mixed regarding the potential value of benchmarking for the E/DM program. Others expressed that there would be value in doing some post-incident analysis around what the potential costs of the response could have been without E/DM support.

## **6. DISCUSSION AND ANALYSIS**

The purpose of this research was to develop a set of key performance indicators within a Balanced Scorecard for the AHS E/DM program to accurately convey overall program performance and support performance improvement. To achieve this, stakeholder interviews were conducted to identify what aspects of E/DM performance are most important to measure and improve from a stakeholder and service user perspective, and to capture feedback on the current KPIs. Data collected in the literature review was also used to determine how performance in those key areas can be measured using commonly accepted, reliable and valid approaches according to industry best practice and the most current research.

### **6.1 ADAPTATION OF THE BALANCED SCORECARD APPROACH**

The literature review found that although performance measurement is increasingly common in government and healthcare, there is still limited research showing how emergency management program performance should be measured. Lacking a standardized, commonly accepted performance measurement framework, a Balanced Scorecard approach was chosen as a starting point to identify the performance priorities for the program. The literature review around the application of the Balanced Scorecard to similar settings such as public health found that the highly adaptable, flexible nature of the BSC approach make it well suited to unique program needs. Stakeholder interview questions were based on the traditional four BSC perspectives: customer, internal process, learning and growth and financial. Although the BSC approach provided a useful starting point for the discussion with stakeholders about how E/DM program performance manifests and how it can be measured, the traditional four quadrants were not easily adapted to the AHS E/DM organizational context. The findings of the stakeholder interviews showed that the customer and learning and growth perspectives are not easily separated from the internal business process perspective because of the integrated nature of emergency management activities. Further, stakeholders struggled to identify indicators of the financial success of the E/DM program, suggesting that this perspective is less relevant to the program. This is echoed in the literature as one of the key challenges to performance measurement in emergency management: it is difficult to link outcomes in terms of lives saved or costs avoided directly with emergency management program activities. Although it is difficult to establish direct measures of financial success for the E/DM program, stakeholders expressed that this is primarily demonstrated through consequence reduction when incidents occur. To reflect the findings of stakeholder interviews, it was necessary to adapt the four traditional Balanced Scorecard perspectives into five AHS E/DM-specific perspectives. Although the scorecard perspectives were adapted, the other key characteristics of the BSC approach were retained, including the focus on the linkage between each perspective and the organizational strategy, and the concept of causal linkages between each perspective.

In terms of recommendations for KPI development, the results of both the literature review and stakeholder interviews found that it was important to ensure the KPIs reflect key program goals, present useful information to program leaders for decision making and performance improvement, reflect industry standards and best practice and be feasible in terms of data collection and reporting. Stakeholder interviews revealed that many of the challenges inherent to measuring performance in

emergency management are reflected in the current KPIs used by the program. The challenge of shared accountability in achieving positive outcomes for emergency management was also reflected in both the literature and in stakeholder interviews. Stakeholders emphasized the importance of identifying the specific accountabilities of the E/DM program, while the literature focused on the importance of establishing the relationship between program activities and outcomes (or proxy outcomes) through systematic methods of data collection. Although many E/DM stakeholders expressed that they wanted performance measures for the program to be exclusively within program control, others argued that achieving shared outcomes in partnership with others is the primary goal of the program so these elements should not be excluded from program KPIs. This theme was also reflected in the literature, which frequently pointed out that simply generating the structural elements of emergency preparedness does not prepare an organization for disaster. The structural elements of preparedness must be considered in terms a broader continuum of organizational preparedness including stakeholder engagement, and then assessed for effectiveness and the organizational capability and consequence reduction they enable. A discussion and analysis of each of these components is presented in the sections below.

## **6.2 MEASURING PERFORMANCE IN THE STRUCTURAL ELEMENTS OF PREPAREDNESS**

The literature review showed that measurement of structural elements of emergency preparedness according to industry standards or regulations is the most common approach to performance measurement in emergency management. Indeed, the current KPIs used by the E/DM program focus on these structural elements of preparedness. Both the literature review and stakeholder interviews found that measuring these elements of preparedness is an important starting point for emergency management program performance because they form the building blocks of further capability, effectiveness and outcome measures. In measuring program performance towards implementation of these elements, however, stakeholders emphasized that measures should incorporate additional descriptive factors such as frequency of meetings, plan revisions, training and exercises and quality assessments of plans. Incorporating these factors is also addressed in industry standards such as the CSA Z1600 standard and Accreditation Canada standards that set out requirements for plan revision, training and exercise frequency. Furthermore, many of these factors are already set out in E/DM policy but have not previously been reflected in data collection for performance measures.

The literature shows that organizational preparedness occurs on a continuum, beginning with the structural elements of preparedness, then establishing partnerships, then training and exercising to increase awareness of the plan and ensure continuous improvement. This was echoed by stakeholders who pointed out that the existence of plans alone mean little for preparedness unless occurring on a continuum that involves staff engagement, training and testing of the plans through exercises. The findings from both the literature review and stakeholder interviews suggest that the E/DM program should continue to measure the implementation of structural elements of preparedness, but more information should be collected to demonstrate and facilitate incremental improvements in performance over time.

### **6.3 MEASURING THE PROCESS AND CAPABILITY ELEMENTS OF E/DM ACTIVITIES**

Both E/DM stakeholders and the literature pointed out the limitations of a performance measurement system that looks *only* at the structural components of program performance discussed above. As was frequently mentioned in the literature, the existence of these elements alone does not necessarily mean the organization has increased its capability to respond to emergency and disaster events. The literature shows that approaches to emergency management performance measurement are gradually shifting from measuring the structural elements of preparedness through industry standards and regulations, toward measuring the capabilities produced by those elements of preparedness.

When measuring the capabilities produced by emergency preparedness training, the literature suggests that it is useful to incorporate the four levels of evaluation presented in the Kirkpatrick framework for learning, including initial reactions, knowledge increases, changes in behaviour and performance and achievement of desired outcomes. For its training programs, E/DM currently collects data on the initial reactions of learners through post-training evaluation forms, while knowledge checks are built into the training courses in a variety of forms. To assess the impact of the training in terms of changes in behaviour and performance, both the literature and stakeholders agreed that the most effective way to assess this is through emergency exercises or actual events. Stakeholders emphasized that the most important outcome of E/DM training programs is that staff is able to apply the skills and knowledge they gained in the training to an actual event or an exercise simulating an actual event. Stakeholders also reported that the relevance, usefulness and feasibility of emergency response and contingency plans only become apparent in when tested in exercises and actual events. For those organizations that are shifting towards measuring the capability produced by their emergency management program activities, organizational performance in emergency exercises has emerged as the most important proxy measure of the success of the program. In stakeholder interviews, drills and exercises also emerged as a common theme when stakeholders were asked to describe the most valuable services provided by E/DM towards organizational emergency preparedness. This is echoed in the literature, which suggests that exercises are valuable tools for staff training, to build organizational capability and to measure performance. It is emphasized in the literature, however, that using emergency exercises as performance measurement tools requires reliable, valid and systematic evaluation procedures, some of which are further analyzed in the literature review and incorporated into the final recommendations.

### **6.4 MEASURING E/DM ENGAGEMENT WITH INTERNAL AND EXTERNAL STAKEHOLDERS**

Interviews found that engagement with internal and external stakeholders was reported to be the most valuable aspect of E/DM performance. The literature also identified engagement with stakeholders as one of the most important success factors in effective incident response. When asked how the E/DM program demonstrates engagement with stakeholders, the most common response was through leadership of and membership in committees and working groups and participation in community exercises that bring together multiple stakeholder groups. While the literature shows stakeholder engagement is essential to effective emergency management, there were few examples of how this can be effectively measured. E/DM stakeholders suggested that the scope and frequency of this engagement in terms of the number of committees, groups and external exercises that E/DM program

staff participates in would be a good measure of the level of engagement. There were no examples found in the literature, however, to validate this approach.

## **6.5 MEASURING THE OUTCOMES OF E/DM ACTIVITIES IN INCIDENT RESPONSE**

Both stakeholders and the literature emphasized the importance of learning from organizational experiences in actual responses to incidents. The literature points out that it is problematic to assess the performance of the organization in relation to the *consequences* of disaster, but it is important to assess how well the system performed in the way it was expected. This was echoed by stakeholders who also suggested that the outcomes of emergency preparedness efforts can be assessed in relation to what degree plans, training and exercises were useful in the actual event and allowed the organization to minimize harm and reduce the consequences of the disaster event. As stakeholders pointed out, valuable post-incident information of this nature is already being collected in routine post-incident debriefings, a process that stakeholders emphasized was valuable to program learning and growth. Currently, the E/DM program collects this information in a narrative form that makes it difficult to establish comparability and assess performance trends over time. The literature review showed that this is common practice among many organizations, and there has only recently been a greater shift towards systematic collection of comparable post-incident information. The literature suggests that organizations can gather valuable post-incident performance information by assessing to what degree the organization demonstrated common elements of success in emergency management such as adherence to the Incident Command System, communication, and coordination with stakeholders. This aligns with the factors identified by E/DM stakeholders as being important to successful incident response. Additionally, the E/DM program can borrow from techniques such as root-cause-analysis to collect more systematic performance information while still maintaining the overall format of the incident debriefing process that E/DM stakeholders currently value.

When asked to comment on the outcomes of key E/DM activities from a financial perspective, the majority of interviewees suggested that the program shows value by reducing the consequences of disasters. This reflects financial cost reduction but also, and more importantly, reflects reduced impact on patients and staff and the reputation of the organization. Although the literature shows that there are no existing reliable and valid tools to objectively measure disaster consequence reduction, financial or otherwise, the prevalence of this theme in stakeholder interviews suggests that it is something that should be incorporated into routine post-incident analysis.

## **6.6 MEASURING LEARNING, GROWTH AND INNOVATION**

One of the primary Balanced Scorecard perspectives centres on learning and growth, asking, “to achieve our vision, how will we sustain our ability to change and improve?” (Kaplan & Norton, 1996, p. 76). Many stakeholders provided input on the necessary learning and growth of individual E/DM staff members. Several common themes emerged in terms of the qualities, skills and characteristics necessary to achieve E/DM goals, including communication and relationship building skills, organizational awareness, openness and flexibility. To a lesser extent, stakeholders suggested that the program might measure emergency management-specific knowledge and skills through formal

education and certifications. The individual qualities suggested by stakeholders align with the literature in terms of the elements of success in emergency management programs, particularly around communication and engagement. It was noted in stakeholder interviews, however, that learning goals and objectives at the individual level are already incorporated into the employee performance appraisal process. Additionally, the ability of the program to support employee learning and growth is limited by budgetary constraints, making it problematic to include it as part of the performance measures for the program. The findings of the stakeholder interviews in this area, however, should be useful to the program in terms of strategic planning for its priorities in internal education and training.

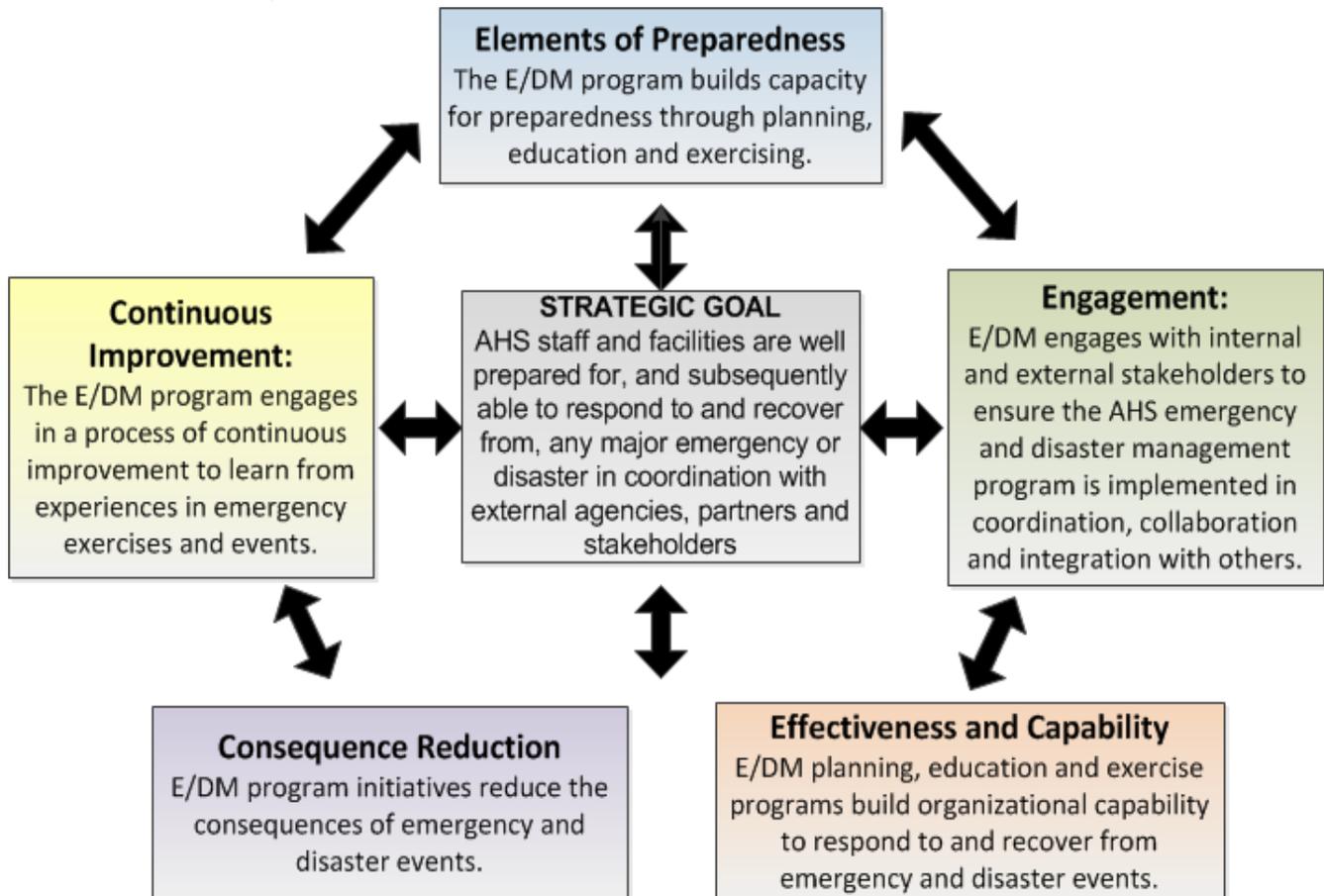
In terms of learning, growth and innovation for the broader program, most E/DM stakeholders reported that the program achieves this through knowledge of and adherence to the most recent best practice according to research and industry standards. To a large degree, this is already built into E/DM program practices. For example, the emergency response code templates that are used in all AHS sites are reviewed on a biennial basis using an approval process that is designed to ensure adherence to most recent best practice (Emergency/Disaster Management, 2014). Although the literature also emphasizes the importance of building an emergency management program that builds on industry best practice, this is likely an area that is best managed through policy rather than performance measurement. Performance measures, instead, should focus on measuring the effectiveness of and capabilities produced by program outputs and facilitating performance improvement over time.

Another area that stakeholders felt reflected program growth was in learning from exercises and incidents. This is also reflected in the literature as part of the preparedness continuum whereby the emergency management program engages in a process of continuous improvement to ensure that each exercise and incident builds on the successes of the response and leads to positive changes to improve future responses. As stakeholders pointed out, one of the ways in which E/DM currently engages in this process is by developing post-exercise and post-incident recommendations addressing the strengths and weaknesses of the response. Although this is not addressed in the literature, incorporating the number of accepted recommendations from E/DM-led exercises and events, or the percentage of completed E/DM-accountable recommendations could be an important indicator of how well the program is learning and growing.

## 7. RECOMMENDATIONS

The intent of the Balanced Scorecard approach to performance measurement is to link the different perspectives of organizational performance to the achievement of broader organizational goals. Analysis of the findings in stakeholder interviews showed that the traditional four quadrants of the Balanced Scorecard approach required adaptation to reflect achievement of E/DM strategic goals. Figure 3 below presents the recommended adapted Balanced Scorecard framework for the E/DM program, incorporating five adapted perspectives. Taken together, these perspectives are intended to be understood as a continuum of overarching preparedness, beginning with the elements of preparedness; then integrating those elements of preparedness through a process of stakeholder engagement; then assessing the effectiveness and capability produced by the program; then assessing the level of consequence reduction achieved by the program and finally; measuring progress in terms of continuous program improvement. [Section 7.1](#) below then explores each perspective in-depth, identifying the corresponding objectives, measures and supporting data required to assess performance in each area.

FIGURE 3: PROPOSED E/DM BALANCED SCORECARD



## 7.1 KEY PERFORMANCE INDICATORS WITHIN THE E/DM BALANCED SCORECARD

### Perspective # 1 – Elements of Preparedness: The E/DM program builds capacity for preparedness through planning, education and exercising.

This scorecard perspective measures performance in terms of the progression of E/DM implementation of the structural elements of preparedness in sites or program areas. The measures within this perspective assess performance incrementally at a site or service level, incorporating site demographic factors such as type and size of site. Information is collected on data elements such as site/service E/DM committee meeting frequency, plan implementation and revision dates as well as frequency and scope of training and exercises. Data collected should reflect the full breadth of program activities across the organization, but it is expected that the program will establish annual priorities based on risk assessments and organizational needs to determine the specific elements that will be incorporated into the annual dashboard. Although the primary focus of this perspective is accountability, it is expected that these measures will also support program decision-making for resource allocation to enable performance improvement.

**TABLE 2: ELEMENTS OF PREPAREDNESS KPI**

| Objective  | Measures  | Supporting Data  |
|--|---|--|
| Sites/services have active E/DM committees providing leadership in support of Emergency Preparedness initiatives | % of sites/services with E/DM committees established  | <ul style="list-style-type: none"> <li>Terms of reference and membership list</li> </ul>                                     |
|  | % of sites/services with active E/DM committees   | <ul style="list-style-type: none"> <li>Meeting minutes within last quarter (as per TORs)</li> </ul>                          |
| Sites/services have up-to-date, site/service-specific emergency response code and contingency plans              | % of sites/services with X plan implemented and current   | <ul style="list-style-type: none"> <li>Site-specific ERC posted to website (date of revision within last 2 years)</li> </ul> |
|  |   | <ul style="list-style-type: none"> <li>Site committee meeting minutes within last 2 years showing plan approval</li> </ul>   |
| Staff have been trained in site/service-specific ERC /contingency plan procedures                                | % of sites/services that have provided annual training on each emergency response code/contingency plan           | <ul style="list-style-type: none"> <li>Training attendance record</li> </ul>   |
|  |   | <ul style="list-style-type: none"> <li>Training evaluation</li> </ul>  |
| Staff have practiced site/service-specific ERC /contingency plan procedures in drills and exercises              | % of sites/services that have conducted an annual drill/exercise on each emergency response code/contingency plan | <ul style="list-style-type: none"> <li>Exercise evaluation</li> </ul>  |
| Staff are trained in emergency management procedures   | Number of staff that have completed each E/DM e-learning module   | <ul style="list-style-type: none"> <li>My Learning Link records</li> </ul>   |

**Perspective # 2 - Engagement:** E/DM engages with internal and external stakeholders to ensure the AHS emergency and disaster management program is implemented in coordination, collaboration and integration with others.

This scorecard perspective measures E/DM performance in terms of its engagement with internal and external stakeholders. Objectives include engagement with both internal and external stakeholders, recognizing that both are essential to emergency management program performance. Data collected to provide evidence on the achievement of measures will include terms of reference and membership lists as well as meeting minutes. Performance improvement in this area will be enabled by establishing targets for improvement and priority areas for engagement, such as isolated rural or First Nation communities.

If feasible in the future, the client may also want to consider incorporating stakeholder engagement satisfaction survey results as a measurement tool for this perspective. This would allow the program to collect feedback on levels of stakeholder satisfaction with E/DM engagement initiatives and also allow the program to collect further recommendations from stakeholders on how the program can improve its performance in the engagement perspective.

**TABLE 3: ENGAGEMENT KPI**

| Objective   | Measures  | Supporting Data   |
|---|---|---|
| E/DM engages with internal stakeholders on organizational initiatives related to emergency preparedness planning and response | Number of standing committee memberships  | <ul style="list-style-type: none"> <li>▪ Terms of Reference/ Membership List</li> <li>▪ Meeting minutes (within the last year)</li> </ul> |
|   | Number of working group/ad hoc committee memberships                                    |   |
| E/DM engages with external stakeholders on organizational initiatives related to emergency preparedness planning and response | Number of standing committee memberships  | <ul style="list-style-type: none"> <li>▪ Terms of Reference/ Membership List</li> <li>▪ Meeting minutes (within the last year)</li> </ul> |
|   | Number of working group/ad hoc committee memberships                                    |   |
|   | Number of presentations to external stakeholders (ex. post-secondary, community groups) | <ul style="list-style-type: none"> <li>▪ Presentation slides/summary</li> </ul>   |

**Perspective # 3 - Effectiveness and Capability:** E/DM planning, education and exercise programs build organizational capability to respond to and recover from emergency and disaster events.

This scorecard perspective looks at the effectiveness of key E/DM program components including education/training, exercises and emergency response plans. When measuring the effectiveness of training, the post-training evaluation should reflect the stated learning objectives of the course. The information collected in post-training evaluation can then be used not only to assess the performance of

the program in that training area, but also to facilitate improvements to the design and delivery of training to strengthen performance in the future.

The effectiveness of E/DM planning and training should then be assessed in relation to the capability these program elements produce. To assess capability production, both plans and training programs should set out specific objectives for what they intend to achieve, and the achievement of these objectives should be routinely tested in planned emergency exercises. It is recommended that exercise evaluation include evaluation by trained observers and by staff participating in the exercise. To assess plan and training effectiveness, the exercise evaluation should include an observer assessment of the adherence to and applicability of the plan and training, and the participant evaluation should ask participants how useful and relevant the corresponding plan and training was to their role in the exercise. To measure the effectiveness and capability produced by exercises, the exercise evaluation must also include the stated objectives of the exercise. Performance information collected within this perspective will be particularly useful to the program in determining which plans and training programs are the most effective in building capability and which others may require modification, leading to improvements in program performance over time.

All of the supporting data required for the measures in this perspective is collected through training and exercise evaluation processes that are already in current use, but the tools and specific questions will need to be modified to meet measurement objectives.

**TABLE 4: EFFECTIVENESS AND CAPABILITY KPI**

| <b>Objective</b>   | <b>Measures</b>  | <b>Supporting Data</b>  |
|--|--|---|
| E/DM education programs increase staff knowledge and confidence in target training areas                         | % of learners who rate a course/training activity as having achieved the stated learning objectives  | <ul style="list-style-type: none"> <li>▪ Training evaluation</li> </ul> |
| AHS sites and services are capable of carrying out emergency response procedures according to plans and training | % of exercise objectives achieved (objectives based on plan components)  | <ul style="list-style-type: none"> <li>▪ Exercise evaluation</li> </ul> |
| Plans and training are relevant and useful in application to emergency exercises                                 | % of exercise participants who indicate that the corresponding plan(s) and or/training were relevant and useful to their role in the exercise. | <ul style="list-style-type: none"> <li>▪ Exercise evaluation</li> </ul> |
| Exercises conducted by E/DM increase staff knowledge of plans/ procedures/ roles / responsibilities              | % of exercise participants who rate an exercise as having increased their capability in carrying out plans/procedures/roles/ responsibilities  | <ul style="list-style-type: none"> <li>▪ Exercise evaluation</li> </ul> |

**Perspective # 4 – Consequence Reduction:** E/DM program initiatives reduce the consequences of emergency and disaster events.

This perspective measures E/DM performance in the context of the post-incident assessment of stakeholders regarding the level of consequence reduction achieved through key E/DM program initiatives, including plans, education and exercises. The desired outcome of E/DM program components is that they will be relevant and useful to the organization in an actual event, helping to reduce the consequences of emergencies and disasters. To assess the level of consequence reduction achieved by E/DM program initiatives, questions will be incorporated into post-incident evaluation forms evaluating how well plans, education and exercises supported the roles of individuals involved the incident. The performance information collected in this perspective will be useful for accountability purposes in terms of demonstrating the value of E/DM program initiatives in actual incidents. The measures in this perspective will allow the program to strengthen organizational preparedness by identifying successes to build on and areas for future improvement.

The E/DM program already routinely collects post-incident evaluation information through a debriefing process with key incident personnel that often includes evaluation forms and surveys. The recommended measurement tools for this perspective will maintain this process but incorporate a consistent methodology and set of evaluation tools to allow for systematic performance measurement over time across multiple incidents.

**TABLE 5: CONSEQUENCE REDUCTION KPI**

| <b>Objective</b>  | <b>Measures</b>  | <b>Supporting Data</b>   |
|---|--|--|
| E/DM plans and training are relevant and useful in application to emergency and disaster events                     | % of debriefing participants who indicate that the corresponding emergency response plan was relevant and useful to their role in the event      | <ul style="list-style-type: none"> <li>▪ Post-incident evaluation</li> </ul> |
| E/DM engagement with internal and external stakeholders leads to positive outcomes in emergency and disaster events | % of debriefing participants who indicate that E/DM engagement with internal and external stakeholders influenced positive outcomes in the event | <ul style="list-style-type: none"> <li>▪ Post-incident evaluation</li> </ul> |
| E/DM education programs are relevant and useful in application to emergency and disaster events                     | % of debriefing participants who indicate that the corresponding training program was relevant and useful to their role in the event             | <ul style="list-style-type: none"> <li>▪ Post-incident evaluation</li> </ul> |
| E/DM drills and exercises are relevant and useful in application to emergency and disaster events                   | % of debriefing participants who indicate that a corresponding exercise (if applicable) was relevant and useful to their role in the event       | <ul style="list-style-type: none"> <li>▪ Post-incident evaluation</li> </ul> |

**Perspective # 5 - Continuous Improvement:** The E/DM program engages in a process of continuous improvement to learn from experiences in emergency exercises and events.

This perspective measures how well the E/DM program enables organizational learning from emergency and disaster events by assessing both the quantity of recommendations issued as a result of E/DM debriefings and the percentage of post-incident and post-exercise recommendations that are accepted by the accountable individual or entity. Although E/DM cannot enforce the completion of recommendations, whether or not the recommendation is accepted indicates that it is valid, relevant and useful and is thus contributing to organizational learning from incidents and exercises. This perspective also assesses continuous improvement within the E/DM program by measuring completion of post-incident and post-exercise recommendations for which the E/DM program is accountable. These measures rely primarily on a responsibility assignment matrix as supporting data to track recommendations from acceptance to implementation. Responsibility assignment matrices are already routinely used by E/DM as part of the post-incident debriefing process and incorporate a due date and ongoing tracking of the status of recommendations.

**TABLE 6: CONTINUOUS IMPROVEMENT KPI**

| Objective   | Measures   | Supporting Data   |
|---|--|---|
| E/DM develops post-incident and post-exercise recommendations that are useful to the organization   | Total number of post-incident recommendations (E/DM-led debriefings)                               | <ul style="list-style-type: none"> <li>▪ Post-incident reports</li> </ul>   |
|   | Total number of post-exercise recommendations (E/DM-led debriefings)                               | <ul style="list-style-type: none"> <li>▪ Exercise reports</li> </ul>  |
|   | % of total post-incident recommendations accepted by accountable entity                            | <ul style="list-style-type: none"> <li>▪ Responsibility assignment matrix (signed off by accountable individual)</li> </ul> |
|   | % of post-exercise recommendations accepted by accountable entity                                  | <ul style="list-style-type: none"> <li>▪ Responsibility assignment matrix (signed off by accountable individual)</li> </ul> |
| E/DM engages in continuous improvement by completing the post-incident and post-exercise recommendations for which the program is accountable | % of post-incident recommendations from previous fiscal year completed, in progress or not started | <ul style="list-style-type: none"> <li>▪ Responsibility assignment matrix</li> </ul>  |
|   | % of post-exercise recommendations from previous fiscal year completed, in progress or not started | <ul style="list-style-type: none"> <li>▪ Responsibility assignment matrix</li> </ul>  |

## 7.2 RECOMMENDATIONS FOR IMPLEMENTATION

The Balanced Scorecard perspectives and corresponding KPIs presented in the preceding section may be implemented in whole or in part. To align with stakeholder feedback and the literature, it is recommended that the client adopt performance measures within all five perspectives using a phased approach over the next 1-2 fiscal years. A phased approach is required because establishing targets for each of the measures first requires an understanding of the baseline levels of performance. Data should first be collected for one or more quarters to establish baseline levels of performance. Targets should then be set in proportion to baseline levels and realistic expectations for performance improvement.

In implementing the proposed framework, it is also important to recognize that the individual measures within each perspective will likely need to be reassessed and revised on an ongoing basis to ensure they are accurately reflecting organizational performance in that area. It is recommended that the E/DM program maintain its existing process for KPI review which includes formal approval by the provincial E/DM Steering Committee. Additionally, it is recommended that the E/DM program formalize the annual internal program review of KPIs to ensure broad consensus as this will be essential to maintain internal stakeholder buy-in in terms of data collection and reporting across the program.

Although changes to individual measures are expected on an ongoing basis, the broader framework has been developed with the intention for it to grow and evolve along with the program. The importance or weighting of each perspective is expected to shift along with organizational priorities for preparedness and response. For example, in periods where the E/DM program is responding to multiple, large-scale events, the weighting of the consequence reduction and continuous improvement perspectives would increase, while the weighting of preparedness efforts would decrease. It is also expected that target areas of measurement, such as particular plans to be implemented, trained and exercised, will shift along with organizational priorities. For example, within the elements of preparedness perspective, the client may choose to focus on measuring implementation of a particular type of plan based on current risk assessments.

To ensure feasibility, the supporting data required for the recommended measures is based on existing data collection methods within the E/DM program. Program staff and leadership are already collecting information on their sites regarding site committee status, plan implementation, training and exercises. The systematic collection of data for measures within the elements of preparedness perspective will facilitate consistent reporting between zones to allow for comparability and to track performance trends over time. Collecting data for the measures in the other perspectives will require implementation of standardized, province-wide training, exercise and post-incident evaluation forms. Although exercise and incident evaluations already occur, it is recommended that these evaluation forms be revised to include descriptive factors such as an indication of what plan elements were used as well as specific evaluative components such as how well incident objectives were achieved. This will not result in significant increases to resource requirements because it will only be replacing existing tools that are already being used by the program in various forms.

It is recommended that the E/DM program use existing available tools such as Microsoft Sharepoint to facilitate data entry and reporting. Internal stakeholders support the use of an online dashboard for reporting so that information on the status of preparedness can be shared more readily between zones and with stakeholders. The dashboard should reflect the performance priorities of the program and create a visual representation of the program's progress towards its strategic goals.

## **8. CONCLUSION**

The objective of this project was to develop a set of key performance indicators for the AHS E/DM program that would be useful for both quality improvement and accountability purposes. A review of the literature, industry best practice and consultation with stakeholders revealed that while there are significant challenges associated with measuring emergency management program performance, it is possible to implement reliable, valid and outcome-focused measures through the use of proxy measures and systematic data collection procedures.

The proposed KPIs presented in this report are based on stakeholder feedback and an interpretation of scholarly literature and industry best practice adapted to client needs. The emphasis of this approach is adapting current best practice to the specific organizational context and needs of the client. Further study is needed to establish the reliability and validity of these tools. Implementation of these tools, however, will represent an important first step for the client towards effectiveness and outcome-focused performance measurement.

With further study, the client is uniquely positioned to contribute to the literature in the area of health care emergency management. The size of Alberta Health Services, the scope of services provided by E/DM in terms of the number of sites and programs it supports and the number of incidents affecting the organization on an annual basis all represent a valuable pool of potential data. By systematically collecting performance information across the province, the AHS E/DM program can build a large database of valuable information showing, for example, the relationship between a site's status on the preparedness continuum and its performance in exercises or events. Data collected will also be able to show how variables such as size or type of site and percentage of staff trained in a particular E/DM program influence outcomes in exercises and events. Considering the lack of current evidence in this area, this represents a key opportunity for the client in the coming years.

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## 10. APPENDICES

## APPENDIX A: INTERVIEW QUESTIONS

### Interview Questions for E/DM Stakeholders:

1. How well do you think the current KPIs reflect E/DM program performance? What would you change?
2. Thinking of the services E/DM provides, which do you think are the most valuable to our service users and stakeholders? Consider emergency response codes, contingency plans, drills and exercises, staff training (e-Learning and others), CBRN program, incident response and coordination, incident debriefing, stakeholder engagement, etc.
  - a) What are the specific internal processes that we must excel at to provide those services? For example, internal processes for ERCs would include template development, assisting in making plans site-specific, code of the month program, etc. internal processes for incident response would include E/DM on-call, Sit.Rep. development, ZEOC/ECC activation and staffing, incident debriefing
3. How do you think the E/DM program and its staff demonstrate learning, innovation and continuous improvement?
4. How do you think E/DM demonstrates financial value? If you were asked to justify the cost of the program, what financial measures would you use?
5. Are you currently collecting performance data that is not reflected in the current KPIs?
6. What kind of performance data would not be feasible for you/your zone to collect with current staffing/resources? Consider type of data and frequency of data collection or reporting.

### Interview Questions for AHS and external stakeholders:

1. Thinking of the services E/DM provides, which are the most valuable to you/your area of responsibility? Consider emergency response codes (ERCs), contingency plans, drills and exercises, staff training (e-Learning and others), CBRN/HazMat program (chemical, biological, radiological, nuclear and hazardous materials), incident response and coordination, incident debriefing, stakeholder engagement
  - a) What are the specific internal processes that we must excel at to provide those services? For example, internal processes for ERCs would include template development, assisting in making plans site-specific, code of the month program, etc. internal processes for incident response would include E/DM on-call, Sit.Rep. development, ZEOC/ECC activation and staffing, incident debriefing
2. How do you think the E/DM program and its staff demonstrate learning, innovation and continuous improvement?
3. How do you think E/DM demonstrates financial value? If you were asked to justify the cost of the program, what financial measures would you use?

## APPENDIX B: INTERVIEW PRIMER

### What is the purpose of this project?

This project is being conducted by Bethany Moore as part of the requirements for a Master of Public Administration degree in the department of Public Administration at the University of Victoria. The purpose of this project is to develop a performance measurement system for the AHS E/DM program that will allow E/DM and its stakeholders to accurately assess how well E/DM is achieving its mandate:

*To ensure AHS facilities and staff are well prepared for, and subsequently able to respond to and recover from, any major emergency or disaster in coordination with external agencies, partners and stakeholders.*

### How does E/DM currently measure performance?

E/DM currently tracks and reports on the following Key Performance Indicators (KPIs):

- Percentage of AHS sites that have established site E/DM committees
- Percentage of AHS sites with site-specific emergency response codes (ERCs)
- Percentage of acute care sites trained/equipped for CBRN/HazMat incidents
- Number of E/DM e-Learning courses successfully completed
- Number of sites that have conducted an annual evacuation exercise

### What is the purpose of the interview?

[E/DM Stakeholders] You are being interviewed as a key internal stakeholder of the AHS E/DM program. In this interview, I hope to gain a deeper understanding of what aspects of E/DM performance are most important to measure, and what indicators can realistically be measured. To develop the performance measurement system, I am using a balanced scorecard approach that aims to examine program performance from multiple perspectives. As a starting point we are asking you to consider E/DM performance from the following perspectives: stakeholder/service-user, internal processes, learning and growth and financial.

[AHS/External Stakeholders] You are being interviewed as a key service user and/or stakeholder of the AHS E/DM program. In this interview, I hope to gain a deeper understanding of what aspects of E/DM performance are most valuable to you as a service user/stakeholder. To develop the performance measurement system, I am using a balanced scorecard approach that aims to examine program performance from multiple perspectives. As a starting point we are asking you to consider E/DM performance from the following perspectives: stakeholder/service-user, internal processes, learning and growth and financial.

### What questions will I be asked?

[See Appendix A for interview questions by stakeholder group]

## *Participant Consent Form*

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### **A Balanced Scorecard for the Alberta Health Services Department of Emergency/Disaster Management**

You are invited to participate in a study entitled “A Balanced Scorecard for the Alberta Health Services Department of Emergency/Disaster Management.” This research is being conducted by Bethany Moore as part of the requirements for a Master of Public Administration degree in the department of Public Administration at the University of Victoria.

If you have any questions about this research, you may contact Bethany Moore by phone at 780-342-0138 or e-mail at [Bethanym@uvic.ca](mailto:Bethanym@uvic.ca). This research is being conducted under the academic supervision of Dr. Kimberly Speers. You may contact Dr. Speers at [kspeers@uvic.ca](mailto:kspeers@uvic.ca) or 250-721-8057.

This research is being conducted on behalf of the Alberta Health Services department of Emergency/Disaster Management. If you have any further questions, you may also contact Chris McKiernan, Director of Provincial Strategies and Performance, Emergency/Disaster Management at 403-943-1275 or [Chris.McKiernan@albertahealthservices.ca](mailto:Chris.McKiernan@albertahealthservices.ca)

### **Purpose and Objectives**

The purpose of this research is to develop a performance measurement system framework for the Alberta Health Services department of Emergency/Disaster Management (AHS/E/DM). The primary research question to be addressed in this project is: How can AHS E/DM best measure program performance?

### **Importance of this Research**

Research of this type is important because the field of emergency management lacks standardized, reliable and valid performance measures to assess program success in emergency preparedness. This research will help AHS E/DM develop a robust performance measurement system that will meet stakeholder needs.

### **Participants Selection**

You are being asked to participate in this study because you are a key stakeholder in one of the following roles:

- 1) E/DM staff providing E/DM services and collecting performance data
- 2) Internal (AHS) stakeholders such as operational leaders responsible for emergency/disaster management response
- 3) External stakeholders relying on AHS for emergency response capability

### **What is Involved?**

If you consent to voluntarily participate in this research, your participation will include a 30-minute interview conducted in-person, via telephone or Microsoft Lync, on a date and time that is convenient for you. Follow-up may be required which is expected to take minimal use of your time.

Audio recordings and written notes will be taken of the interviews to create a written transcript. If you prefer, recording of the interview may be through written notes only.

### **Inconvenience**

Participation in this study may cause some inconvenience to you taking the time to participate in an interview.

### **Risks**

There are no known or anticipated risks to you by participating in this research.

### **Benefits**

As a participant, you may benefit by having an opportunity to contribute to and influence the AHS E/DM performance measurement system. The result of this research will benefit Albertans overall by helping to ensure that the provincial health system is prepared for disasters and that taxpayer funds are being spent responsibly by AHS in this area. Participation will also benefit the state of knowledge in the field of health care emergency management by providing a best practice for similar organizations.

