

# Chapter 81

## Business Continuity Management in Data Center Environments

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### **ABSTRACT**

*In this article, the authors discuss how business continuity methodologies can be used by data centers to respond to natural disasters, man-made disasters, and accidents. Because organizations depend on computing services, which may become unavailable when disasters strike, prudent risk management processes can provide for continuation and recovery of operations. With a focus on data centers, this article discusses the business continuity plan development process. This article also considers elements of a business continuity management plan, which includes strategy development, preparedness, mitigation, exercises, and response and recovery, and discuss business continuity strategies for colocation and cloud-based data center architectures. Finally, the authors discuss how the ordered weighted average (OWA) methodology can be used to incorporate a decision makers risk profile when confronted with decisions related to the processes discussed.*

### **1. INTRODUCTION**

Evolving business and customer requirements for ubiquitous computing, immediate access, and more data and data analytics have created new demands for instantaneous “always-available” information. This affects expectations for data centers, both during their regular operations and also when disasters and other disabling events strike. Disabling events include “logical intrusions”, such as when hackers steal information, lock up systems, or initiate denial of service attacks, and physical events, such as tornadoes, hurricanes, winter storms, fires, tsunamis, earthquakes, and power outages.

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Many recent high-profile incidents illustrate our exposure to natural disasters. For example, Miller et al. (2006) report how our growing reliance on computing and telecommunications technologies, exacerbate this vulnerability. Because computing and telecommunication technologies depend on data centers, data center risk is a particular concern. Examples of disasters affecting data centers include solar storms (Lloyds of London, 2013); hurricanes (Hardy and Wortham, 2012); earthquakes (Maerowitz, 2017); electrical surges (Gorman, 2013); and fires (Jones, 2012). To deal with these threats and ensuing disaster-related events, Engemann et al. (2005) provide a methodology for disaster management in information technology (IT). This methodology incorporates the relationship among threats, events, control alternatives and losses.

In this paper, we restrict our scope to physical exogenous events that affect data centers, such as those mentioned above. We will not focus on logical intrusions, and will mention information access and privacy only in passing. This is not to downplay their importance but only to sharpen the focus of our analysis.

The managerial approach to facilitating data center resilience in the face of natural events is to develop a Disaster Recovery Plan (DRP). This enables Information Technology (IT) to maintain or restore the systems and communication capabilities of the organization. Disaster recovery planning's traditional focus was to ensure that IT was resilient (for more on data center resiliency see Jayashankar, 2014; Mohamed, 2011; and Tam, 2011). A resilient system has a "bounce back" capability, when faced with a systemic shock, such as a natural disaster. Since providing services is systemic – depending on computer processing power but also on telecommunications, people, and other services – expanding the scope and implementing processes to include all critical areas of an organization is needed. This led to the expanded field of Business Continuity Management (BCM), which is a holistic management program that identifies potential events that threaten an organization, and provides a framework for building resilience (Engemann and Henderson 2012; Moore and Bone 2017; and Aronis and Stratopoulos 2016). BCM includes the processes and procedures that an organization must put in place to ensure that its mission-critical functions continue during and after crisis events. Because organizations depend on each other and coordinate with supply chain partners, when crisis events occur stakeholders and regulators also need to ensure that proper business continuity plans are in place. Satisfying these requirements means that an effective BCM process enables business function performance, both in the near and long terms.

BCM processes for data centers are particularly important, because all aspects of business depend on the free and fast flow of information. The importance of IT and of data center and data center architectures is illustrated in IT spending. A 2018 spending forecast from the Gartner, Inc. indicates that worldwide IT spending is projected to total \$3.7 trillion in 2018, an increase of 6.2 percent from 2017. For 2019, their forecast is \$3.8 trillion or a 2.8 percent growth over 2018. For data center systems the rate of growth is less. Gartner projects \$188 billion in data center systems spending for 2018 which is a 3.7 percent increase over 2017. For 2019 they project \$190 billion in data center systems spending, which is a 1.1 percent increase over 2018 (Gartner 2018).

A 2015 AFCOM survey of data center professionals (AFCOM 2015), identified many IT related trends. Quoting another Gartner study, the survey said that, "Global spending on IaaS (Infrastructure as a Service) is expected to reach almost \$16.5 billion in 2015, an increase of 32.8 percent from 2014, with a compound annual growth rate from 2014 to 2019 forecast at 29.1 percent, according to Gartner's latest data. It also shows that in 2014, the absolute growth of public cloud IaaS workloads surpassed the growth of on-premises workloads (of any type) for the first time. Gartner's 2015 CIO survey indicates that 83 percent of CIOs consider cloud IaaS as an infrastructure option, and 10 percent are already cloud-first with cloud IaaS as their default infrastructure choice."

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