

# Disaster Management in India - An Analysis using COBIT 5 Principles

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**Abstract**—From a limited focus on post-disaster activities of response and recovery, disaster management frameworks have evolved over time to include pre-disaster activities of prevention and preparedness. Disaster risk governance, disaster risk reduction and resilience are core aspects of contemporary disaster management frameworks. India is one of the most disaster prone areas in the world with challenges aplenty in effective disaster management. Aligning with the Sendai Framework for Disaster Risk Reduction 2015-2030, India evolved the National Disaster Management Plan (NDMP) of 2016 as a comprehensive disaster management framework that proposes an integrated approach involving relevant stakeholders for addressing diverse natural and human-induced hazards. The five principles of ISACA's COBIT 5 framework, a widely accepted comprehensive IT governance and management framework for enterprise IT, is used to analyze the NDMP 2016 to identify areas for improvement.

**Keywords**— *Disaster Management; Disaster Risk Reduction; COBIT 5;*

## I. INTRODUCTION

According to a recent study by United Nations Office for Disaster Risk Reduction (UNISDR), India was ranked third amongst the top five most disaster-hit countries of the world in 2015 [1]. India faced around 19 natural disasters of varying intensity in the year 2015 alone, resulting in severe damages over \$3.30 billion. Given the stark differences in climatic conditions across its length and breadth, India continues to be vulnerable to multiple hazards such as avalanches, cyclones, droughts, earthquakes, floods, landslides and forest fires.

Disasters are natural or human-induced. Natural disasters are hazardous events resulting from natural processes occurring on Earth and include earthquakes, floods, volcanic eruptions, droughts, and tsunamis to name a few. Human-induced or man-made disasters include Chemical, Biological, Radiological and Nuclear (CBRN) emergencies. Driven by the frenetic pace of unscientific developmental activities, we are increasingly witnessing a third type of disaster - human-induced natural disaster. As per UNISDR, the aftermath of a disaster can have far-reaching consequences. It includes loss of life, injuries, diseases; and other undesirable effects on physical, mental and social well-being of mankind, damage to property, destruction of assets, loss of services, social and economic disruption and environmental degradation [1]. Most disasters have an immediate and negative fallout in the short

term; and in the absence of effective and timely intervention, compound in severity and duration, often delaying the road to recovery. The magnitude of disaster, location, and the overall efficiency and effectiveness of the disaster management processes play a major role in determining the overall impact of a disaster.

In the Indian context, there are challenges aplenty in effective disaster management. The primary responsibility for disaster management is entrusted with the government authorities, with representatives at national, state and district level. In addition to the government and its agencies, the military, NGOs and voluntary organizations play a major role in disaster relief and rescue activities. A key challenge is to ensure and achieve effective coordination and collaboration amongst these stakeholders. Given the significant risk as well as diversity of disasters, capacity building of various stakeholder groups is yet another formidable challenge. Providing right information at the right time to the concerned stakeholders, especially in the initial hours after a disaster is the cornerstone of an effective and efficient disaster management system. From relief and rehabilitation, the scope of disaster management has expanded over the years at a global level to include prevention, preparedness, response and recovery. The Hyogo Framework for Action (HFA) 2005-2015 focused on disaster resilience by attempting to reduce disaster losses [2].

In 2015, HFA was succeeded by the Sendai Framework for Disaster Risk Reduction 2015-2030 [3], a voluntary non-binding agreement that ensured continuity of activities already undertaken under HFA. This new framework incorporated many innovations to reflect the global trends and best practices. The outcome of the Sendai framework is to achieve “substantial reduction of disaster risk and losses in lives, livelihoods, and health and in the economic, physical, social, cultural, and environmental assets of persons, businesses, communities, and countries” [3]. To attain this outcome, the framework focuses on mitigating disaster risk through the implementation of integrated and inclusive steps that alleviate hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and strengthen resilience. These steps cover a broad spectrum of areas such as economic, structural, legal, social, health, cultural, educational, environmental, technological, political, and institutional. Towards realizing the proposed outcome and goal, seven global targets have been defined with appropriate country level indicators to support the assessment

of the global progress with respect to these targets. The Sendai framework revolves around four priority themes namely:

- 1) an understanding of disaster risk,
- 2) strengthening disaster risk governance to manage disaster risk,
- 3) investing in disaster risk reduction for resilience; and
- 4) enhancing disaster preparedness for effective response and to 'Build Back Better' in recovery, rehabilitation and reconstruction.

India has the unique distinction of being the first country in the world to announce a plan – the National Disaster Management Plan (NDMP) of 2016 [4], which seeks to implement the four priorities for action specified in the Sendai Framework and thereby contribute to the seven global targets set by Sendai framework. Interestingly, Disaster Risk Reduction (DRR) is now a common theme in three of the recent global agreements of 2015 viz., Sendai Framework, Sustainable Development Goals 2015 – 2030, and the UN COP21 Paris Climate Change agreement. Today, effective disaster management is considered to be an important driver of sustainable development.

In this paper, after an initial discussion of the various aspects of the National Disaster Management Plan (NDMP) of 2016 adopted by India, we provide an overview of COBIT 5, a comprehensive ISACA framework for governance and management of enterprise IT. Subsequently, an analysis of NDMP 2016 based on the five principles of COBIT 5 is discussed and areas for improvement are identified.

## II. DISASTER MANAGEMENT PLAN

Towards realizing the goal of effective Disaster Management (DM), The Disaster Management Act, 2005 (DM Act 2005), laid down institutional, legal, financial and coordination mechanisms at the National, State, District and Local levels. A multi-tiered institutional system consisting of the National Disaster Management Authority (NDMA) headed by the Prime Minister, the State Disaster Management Authorities (SDMAs) headed by the respective Chief Ministers and the District Disaster Management Authorities (DDMAs) headed by the District Collectors and co-chaired by Chairpersons of the local bodies forms the backbone of this plan. In terms of outlook, this act marked a paradigm shift from a reactive approach that had originally focused on post-disaster dimensions of relief and rehabilitation, to a broader and proactive approach that underscores the pre-disaster dimensions of preparedness, prevention and mitigation.

Based on the Sendai framework, the National Disaster Management Plan (NDMP) of 2016 [5] is a comprehensive framework addressing multiple hazards and proposes an integrated approach involving multiple stakeholders. The NDMP is aligned broadly with the goals set out in the Sendai Framework for DRR and incorporates the four priorities for action specified in the Sendai Framework. NDMP effectively covers all aspects of the disaster management cycle - from risk mitigation (prevention and reduction) and preparedness at the pre-disaster stage; to response and recovery at the post-disaster stage; while factoring the long-term vision of

sustainable development. The NDMP emphasizes disaster risk education, disaster resilient infrastructure, improved disaster preparedness and building back better in recovery, rehabilitation and reconstruction, with an inherent focus on DRR and promotion of resilience to disasters. Realizing the vital role of reliable information, the NDMP emphasizes the importance of information dissemination, education and training and early warning communications at the community level. Checklists for responding to a disaster address key areas such as medical care, fuel, transportation, search and rescue, and evacuation. These checklists are readily available for agencies to coordinate and calibrate their response. Another very important aspect of NDMP is the clear assignment of roles and responsibilities of various stakeholders. In this regard, NDMP introduces a responsibility matrix that assigns accountability and thus reduces ambiguities.

Depending on the severity of the disaster, central agencies provide assistance proactively or on request. The central agencies take the lead in updating and aligning DM systems and practices as per global trends and define the blueprint for planning, preparedness and capacity building. As part of DM planning, actions envisaged for risk reduction of each hazard have been listed under five thematic areas for action, each thematic area closely following one of the four priorities themes of the Sendai Framework. The five thematic areas of action under NDMP are

- 1) Understanding Risk
- 2) Inter-Agency Coordination
- 3) Investing in DRR – Structural Measures
- 4) Investing in DRR – Non-Structural Measures
- 5) Capacity Development

## III. OVERVIEW OF COBIT 5 FRAMEWORK

The COBIT 5 framework from ISACA is a widely accepted comprehensive enterprise framework for the governance and management of enterprise IT [6]. Since its initial release as an IT audit framework in 1996 by ISACA, the scope of COBIT framework has continuously expanded over the past two decades. Today, COBIT 5 is an end-to-end framework that integrates related frameworks such as Val IT and Risk IT under a single umbrella and is aligned with existing best practices and frameworks such as IT Infrastructure Library (ITIL), and The Open Governance Architecture Framework (TOGAF). By sustaining a balance between benefit realization, risk optimization and resource utilization, COBIT 5 framework helps enterprises create optimal value from IT. Governance and management of IT using COBIT 5 takes a holistic view of the enterprise factoring the IT related interests of internal and external stakeholders across the business and IT functional areas. The COBIT 5 framework is designed to be generic and useful for enterprises of all sizes, whether commercial, not-for-profit or in the public sector. At an enterprise level, implementation of COBIT 5 is a continuous improvement cycle and involves varying degrees of customization to fit the unique context that exists within each organization. The COBIT 5 implementation guidance by ISACA not only highlights the non-prescriptive nature of this comprehensive framework but

also projects this as a framework promoting good practices that drive successful outcomes, while avoiding typical mistakes [7]. As a good-practice framework, COBIT 5 assimilates many widely accepted concepts and theories from general management and academic IT literature [8]. COBIT 5 espouses 5 principles, which are based on generally accepted governance and management practices.

Although related work pertaining to applications of COBIT in the area of disaster management are limited, this article takes inspiration from a COBIT based framework towards flood management in Malaysia [9] and focuses on the larger picture of disaster management in the Indian context with reference to the recently formulated NDMP 2016. This paper primarily revolves around an analysis the NDMP 2016 based on the 5 principles of COBIT 5 framework.

#### IV. ANALYSIS OF NDMP USING COBIT 5 PRINCIPLES

##### A. Principle 1: Meeting stakeholder needs

Financed by the Central government, the goal of NDMP is to have an effective disaster management mechanism in place addressing prevention, preparation, response and recovery through coordination and collaboration amongst multiple stakeholders operating at different levels - government agencies, relevant organizations, private sector participants, and local communities. Given the diversity of stakeholders, the mandate of NDMP spans diverse sectors such as economic, structural, legal, social, health, cultural, educational, environmental, technological, political, and institutional.

To ensure that NDMP achieves effective risk reduction, response and recovery, this COBIT principle could be applied to balance the needs of various stakeholders with respect to benefits, risk and resources. It is interesting to note that, Disaster Risk Reduction (DRR), an important aspect of NDMP is defined in the broad context of sustainable development [10].

##### B. Principle 2: Covering the enterprise end-to-end

The NDMP features an integrated approach with extensive coordination and collaboration between multiple stakeholders, each with specific roles and responsibilities. For each potential hazard, themes of action are presented in a separate responsibility matrix, assigning roles and responsibilities for each of the 5 thematic area of action, at central and state level. The Sendai framework to which the NDMP is aligned, assigns the primary responsibility to alleviate disaster risk with the central and state governments. However, it also envisages a greater role for local governments, private sector and other relevant entities and encourages responsibility sharing amongst these all stakeholders.

Using RACI charts (Responsible, Accountable, Consulted and Informed), COBIT 5 provides detailed roles, activities and relationships between all stakeholders for each key process, so as to have clear idea of accountability and responsibility and thus avoid confusions. NDMP currently focuses mostly on responsibilities. Expanding the current responsibility matrix into a RACI chart has the potential to

add greater clarity amongst the stakeholders and further boost the overall effectiveness of NDMP.

##### C. Principle 3: Applying a single integrated framework

The NDMP is a comprehensive disaster management framework providing an integrated approach involving multiple stakeholders with key emphasis on disaster risk governance. Improving disaster risk governance is an indispensable aspect of efforts to understand, reduce and manage risks in global practices [3].

COBIT 5 framework is an overarching end-to-end integrated framework that embodies a sound and comprehensive reference base of good practices in governance and management and could be applied to further improve the NDMP.

##### D. Principle 4: Enabling a holistic approach

In order to achieve effective and efficient implementation of governance and management, COBIT 5 underscores the need for a holistic approach, factoring multiple interacting 'enablers' viz., principles, policies and framework; processes; organizational structures; culture, ethics and behavior; information; services, infrastructure and applications; people, skills and competencies. Each of these seven enablers has four dimensions, viz., stakeholders, goals, life cycle and good practices. Enabler performance management involves defining metrics for achievement of goals as well as application of good practices. Metrics can be used to monitor progress toward realization of goals.

Most of the seven enablers find a mention or elaboration in some form or other in the NDMP. Soft dimensions improves the overall efficiency and effectiveness of recovery and rehabilitation [11]. Hence an elaboration of these soft dimensions in NDMP is highly desirable. Additionally, incorporating the notion of metrics across different enablers of NDMP could yield greater insights and could potentially enhance the overall performance of this disaster management framework.

##### E. Principle 5: Separating governance from management

There exists a clear distinction between the two disciplines of governance and management in the COBIT 5 framework as they serve different purposes, encompass different types of activities and require different organizational structures. Governance involves evaluating stakeholder needs, conditions and options; deciding on balanced, agreed-on enterprise objectives; and setting the direction for the enterprise as well as monitoring the performance and compliance against agreed-on direction and objectives. Accordingly COBIT 5 has five distinct governance processes under the domain of EDM (Evaluate, Direct and Monitor).

The management discipline plans, builds, runs and monitors activities in accordance with the direction set by the governance body to achieve the enterprise objectives. These domains can be elaborated as:

Plan - APO (Align, Plan and Organize)

Build - BAI (Build, Acquire and Implement)

Run - DSS (Deliver, Service and Support)

Monitor - MEA (Monitor, Evaluate and Assess)

Together, these four domains have a total of 32 management processes and each process has a link with IT-related goals, clearly defined goals and metrics, RACI charts, management practices, input/outputs and activities [12].

Distinct governance and management roles can be identified in the existing institutional framework created by the DM Act of 2005 at multiple levels - national, state and district levels. However detailed governance and management processes are yet to explicitly defined as in COBIT 5. We believe that formalization of governance and management practice as in COBIT 5 has the potential to further enhance overall effectiveness of the NDMP 2016.

## V. CONCLUSIONS AND FUTURE WORK

In this paper, we have analyzed the National Disaster Management Plan (NDMP) of 2016 using the five principles of COBIT 5 framework and identified some of the areas for improvement. An immediate action that could be undertaken is to recast the existing responsibility matrices as RACI charts to provide greater role clarity amongst the stakeholders and thereby boost the overall utility of the NDMP. While this paper is limited to a high-level analysis of the NDMP 2016 using the 5 principles of COBIT 5, the implementation framework of COBIT 5 can be used for restructuring the description of the individual processes in NDMP, identifying the actual base practices within each of these process and elaborating on the key activities within each of these base practices [13]. To realize the outcomes and goals envisaged in the Sendai framework, NDMP 2016 can benefit from a COBIT 5 approach to realize a disaster governance framework comprised of good governance practices for disaster management, a management system for the continuous improvement of disaster management activities, and a process model with baseline practices [14].

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