

 **STRENGTHENING RESILIENCE OF DATA CENTRES TO DISASTERS AND CLIMATE CHANGE : EXPLORING THE ROLE OF TECHNICAL STANDARDS**

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Digital infrastructure plays a critical role in enabling services across power, transportation, health, water, telecom, etc. Across the digital infrastructure value chain, data centres are recognized as pivotal components. Extreme weather conditions and rapid increase in the number of data centres have brought into focus disaster resilience of this infrastructure.

Multiple standards, regulations and best practices apply to different layers of data centres such as building infrastructure resiliency, operations and management, energy efficiency and sustainability.

The DRI Dialogue on ‘**Strengthening Resilience of Data Centres to Disasters and Climate Change: Exploring the Role of Technical Standards**’ facilitated discussion among stakeholders to explore the role of technical standards for enhancing data centres’ resiliency. The session focused on identifying challenges in adoption of technical standards for data centres’ resiliency along with discerning actions for different stakeholders. Key recommendations were suggested for updating existing standards to enhance disaster resiliency.

DRI DIALOGUE

-  Coalition for Disaster Resilient Infrastructure (CDRI) is a global multi-stakeholder platform led and managed by national governments, UN agencies, multilateral development banks and financing mechanisms, the private sector and knowledge institutions that aims to promote disaster resilient infrastructure (DRI). In this context, CDRI’s Telecommunications Infrastructure Resilience Programme aims to mainstream principles of resilience in telecommunications infrastructure policy and planning; promote collaboration across stakeholder groups through knowledge sharing and capacity building; and develop the case for investment in resilient telecommunications infrastructure.
-  The CDRI-DRI Dialogues facilitate the engagement of thought leaders and practitioners across civil society, academia, government, and private sector on challenges and solutions for promoting resilience of existing and new infrastructure.



KEY DISCUSSION POINTS

1. Adapting current standards to incorporate disaster resilience

Extreme weather conditions are imposing new and severe physical risks to data centres. Droughts, heavy rains, flooding, etc., compromise the performance of existing data centres and those under construction.

Though there are standards and location-specific regulations, these need to be updated in light of emerging disaster risks. Therefore, there is a need to develop agile processes for formulation of standards at local and regional level for data centres.

Key challenges identified across existing standards, policies and governance measures towards data centre resiliency include:

 **Limited coherence in defining resilience metrics of data centres:** Technical standards for data centres are based on historical data. Considering present and future disaster and climate risks, data centres need to be designed to withstand scenarios such as over- or under-estimation of disaster and climate change impacts. Absence of such a resilience metrics based upon increasing challenges of disaster and climate change is, thus, a challenge.

 **Reliability of data centres affected by climatic and environmental factors:** Factors such as oxidation and moisture; dust and gaseous contamination; and temperature and thermal cycling affect the performance of data centres and their components. As such, the effects of climate change such as erratic weather conditions affect the reliability of data centre operations.

 **Barriers for scalability of data centres in respect to location-specific regulations:** Expanding to global scale of operation for data centres is a long and expensive process, requiring complex planning and coordination. Incorporating disaster resilience measures while adhering to country-specific rules, regulations and standards such as land acquisition laws, labour laws, etc., pose a barrier for scalability of data centres. Furthermore, as data residency is an integral part of regulations, it is a challenging task to protect data within the region, in the event of disasters.

2. Role of stakeholders for strengthening data centre resilience:

Data centres depend on supporting infrastructure sectors for business continuity such as power, cooling, transportation (roads for accessibility), etc. Thus, intersectoral dependencies require coordinated efforts across various stakeholders including governments, businesses and individuals for enhancing resilience.

 *You cannot be more resilient than the weakest component in your system.* 

Jacques Fluet, TIA

IDENTIFIED ACTION POINTS FOR VARIOUS STAKEHOLDERS

Stakeholders	Action Points
Standards setting organization	<ul style="list-style-type: none"> Bring consistency between global and regional standards Standards formulating organizations at both global and regional level must harmonize standards at multiple levels, to avoid duplicity and ensure a context-specific approach. Facilitate dialogues for holistic development of standards for resiliency Considering diverse geographical contexts, coordinated efforts are needed between national governments, regional and national standard setting organizations, along with academia. This may be achieved through participatory meetings, peer-to-peer learnings, etc.
Academia	<ul style="list-style-type: none"> Raise awareness on importance of technical standards Academia must 'invest' in human capital through education and extensive research to raise awareness on importance of technical standards in data centres resilience. Knowledge sharing and capacity building of individuals is paramount for careful planning and development of infrastructure.
Private sector institutions	<ul style="list-style-type: none"> Enable sharing of knowledge and standards For accelerating adoption and implementation of standards, private sector institutions should share knowledge gathered from best practices through open-source approaches. Thus, gaining a competitive edge in the industry by using state of art practices and ensuring safety of customers. Use of innovation and emerging technology in data centre operations To tackle challenges of expansion and regulation of data centres, innovative approaches such as self-contained and quickly deployable resilient data centres may be advocated instead of traditional methods of large-scale in-situ constructions.
International organizations	<ul style="list-style-type: none"> Support countries and facilitate processes for development of disaster resilient data centres In the context of disaster and climate risks and expansion of data centres in various countries, necessary support should be provided to public and private sectors to strengthen resiliency.

 *Standards are not rules that you must follow, in many cases standards are called toolbox that you can pick and use according to your need.* 

Hiroshi Ota, ITU

RECOMMENDATIONS

Updating design standards for data centres resiliency

- Resilience should be nuanced in terms of metrics, in line with principles derived from existing reliability and failure analysis. The metrics should also include taxonomy of resilience for classifying standards and achieving desired levels of resilience.
- Interdependencies and cross-sectoral coordination should be strengthened for data centre resiliency. This should include a lifecycle perspective for assessing the performance of data centres along with a micro view for monitoring of specific aspects in different phases.
- Owners, developers and operators of data centres need to look beyond historical climate data and update data points for location-specific risk assessments. Updated location-specific requirements should be incorporated in the within standards for data centres. These risk assessments should be based on predictive modelling of environmental conditions.

Collaborations for improved adoption of standards

- Most of the standards are developed by industry for themselves. The evolution of standards is driven by the emerging requirements of the industry. Inclusive adoption of standards can be achieved by participation of heterogeneous groups of experts from industry, academia and civil society.
- For integrated approach on adoption of standards for climate and disaster resilience of data centres, there should be coordination between utility providers, application providers, data centre providers, network providers, weather forecast and local disaster alert systems.

Using innovative approaches for data centre resiliency

- To develop cutting-edge standards for resiliency of data centres, automation and autonomy should be considered. This may include digital twins, open API, real-time orchestration, distributed resiliency, etc.
- Renewables are widely used for offsetting the carbon footprint of data centre operations. However, considering impact of climate change, fresh assessments should be undertaken to evaluate potential of renewables.
- Operators should learn and adopt sustainable practices through engagement with customers and industry for reducing waste, water usage, protecting ecosystems and resources at large.

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