



# **GEOBIM SOLUTIONS FOR RESILIENT INFRASTRUCTURE**

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# Resilient Infrastructure

“Resilient Infrastructure is the ability of an asset to **resist, absorb, accommodate and recover** the disturbances caused by a hazard in a timely and efficient manner, and include the **preservation and restoration** of its essential basic structures and functions”

# Why is Infrastructure Resiliency imperative?

## 01 Infrastructure Disruptions Causes

- **Natural Shocks and Hazards**
- **Dense Urban Clusters**

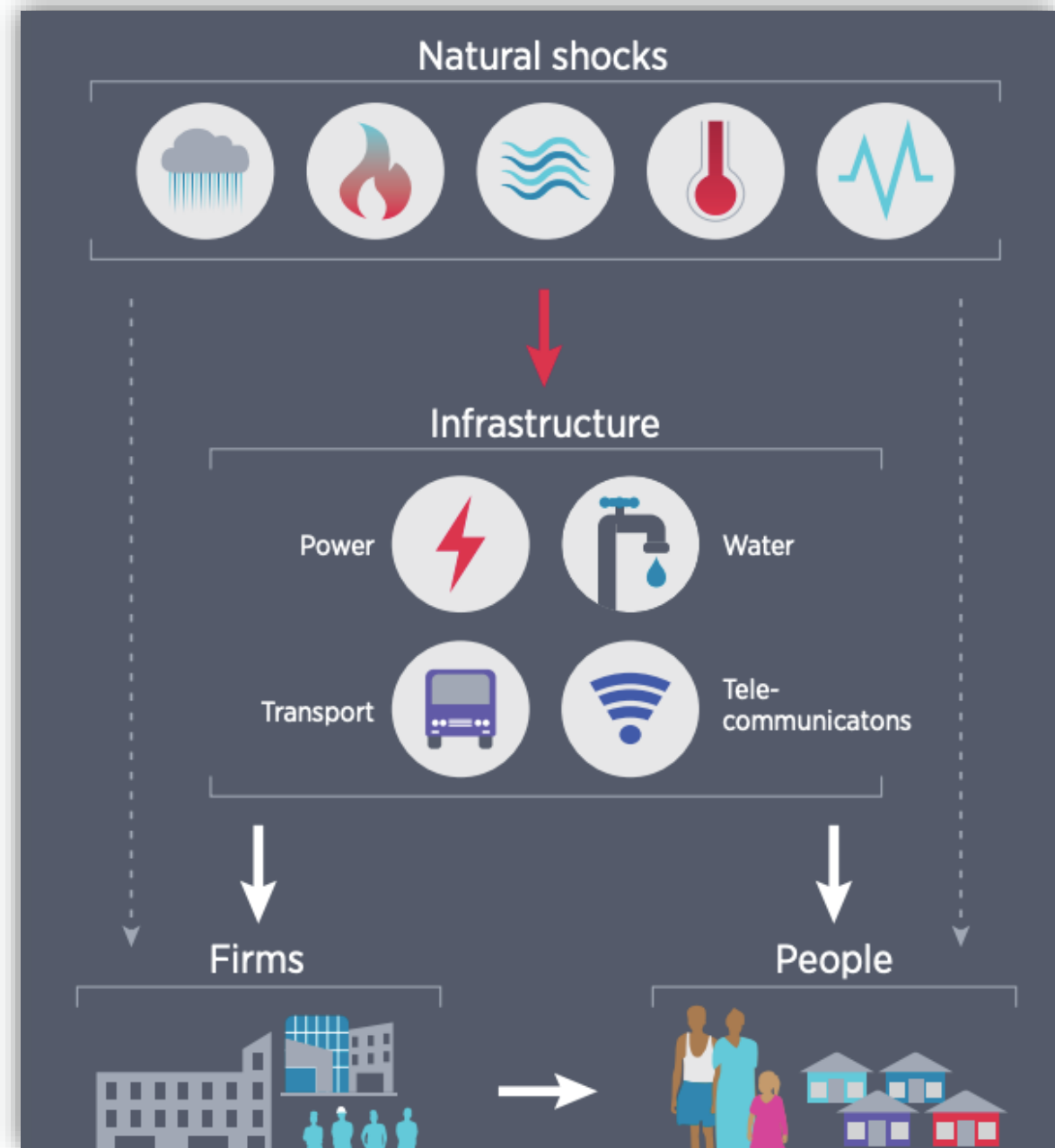
## 02 Infrastructure Disruption Costs

- **US\$ 18 billion** a year direct damage to power generation and transport infrastructure
- **US\$ 300 billion** a year direct impact on households and firms
- **US\$ 90 billion** a year direct impact on people and welfare of households

## 03 Infrastructure Resilience Investment Benefits

- **US\$ 4.2 trillion** – Net benefit of investing in Resilient Infrastructure
- **US\$ 4 benefit** for every US\$ 1 invested

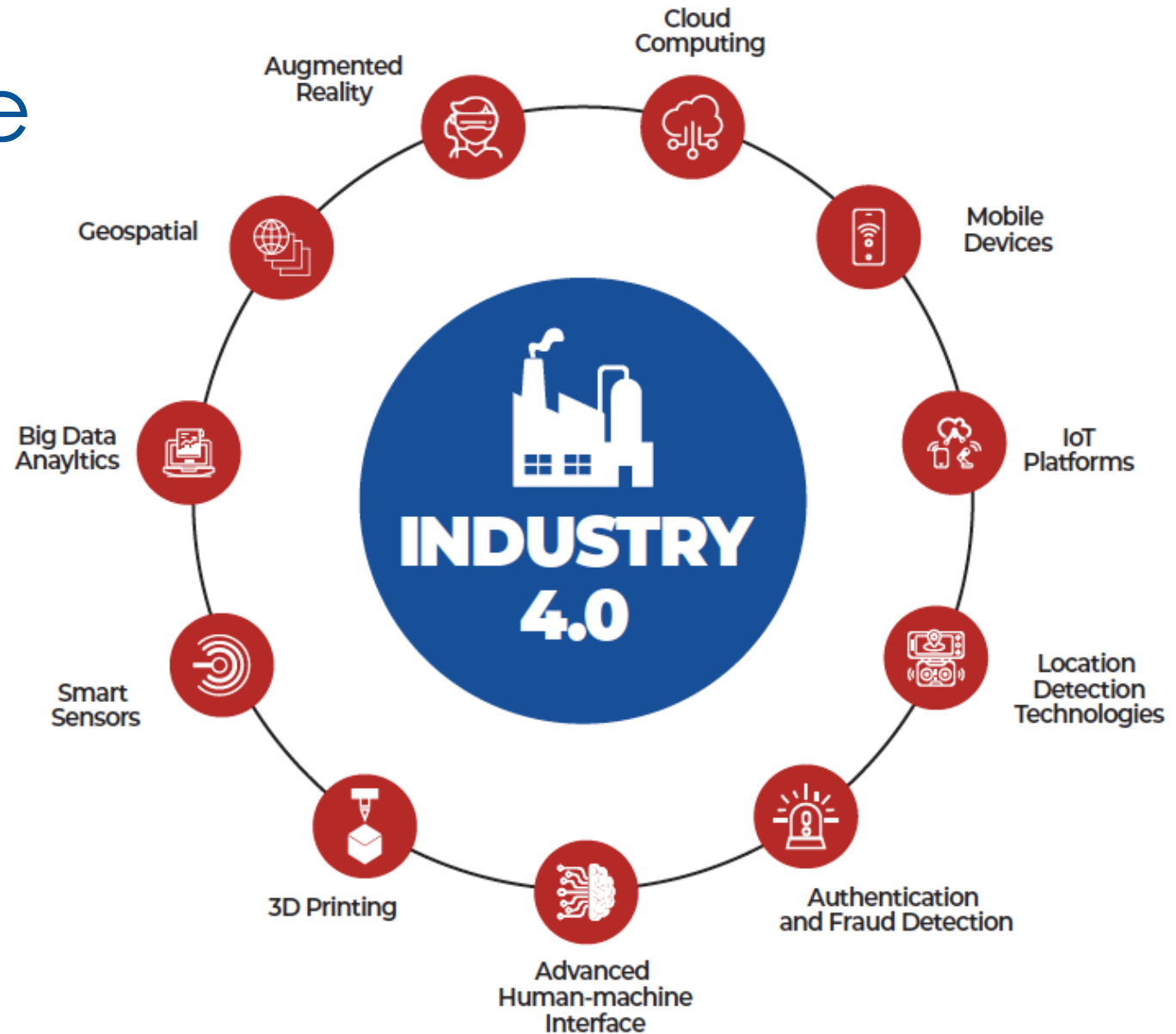
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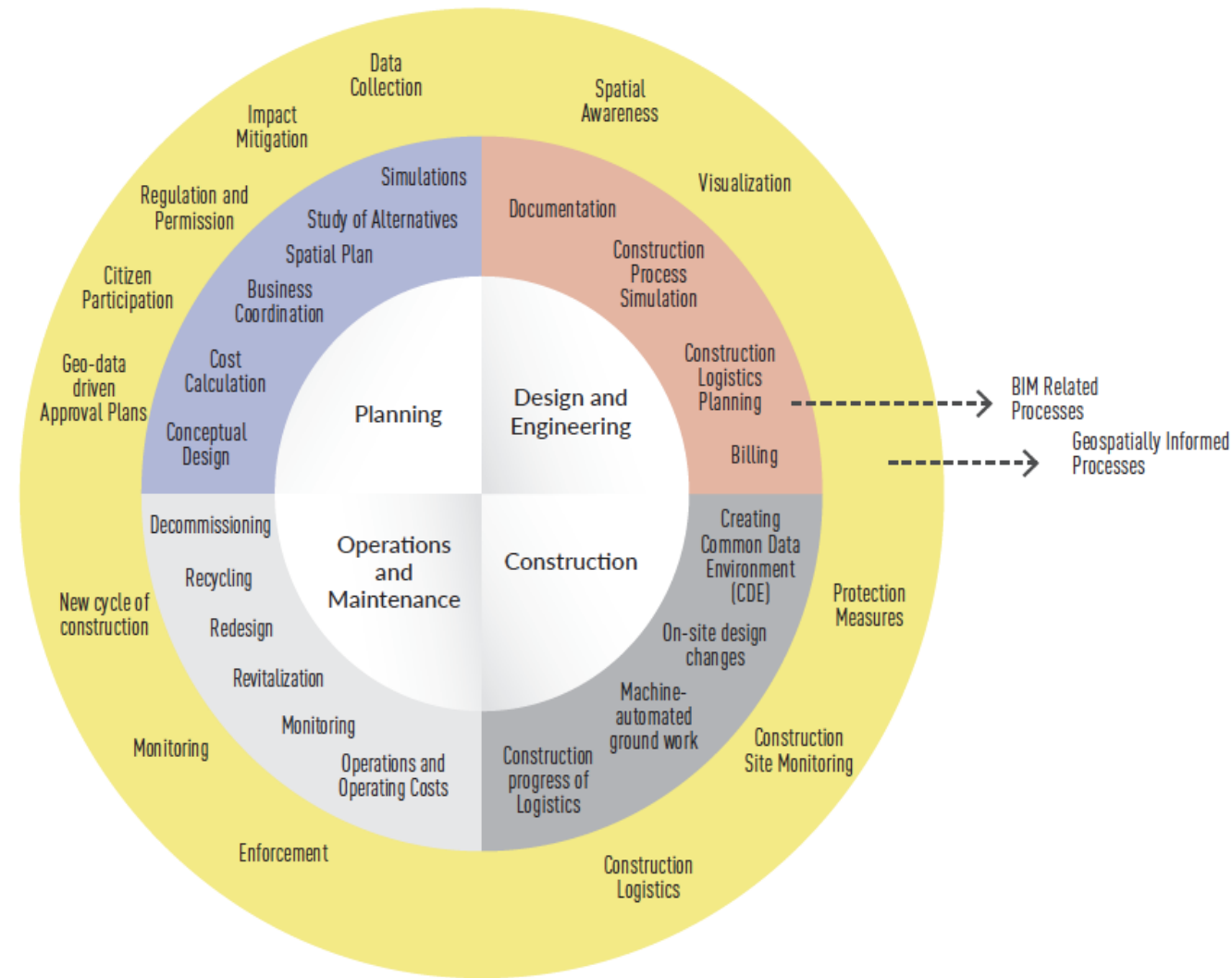
# 4IR Technologies for Resilient Infrastructure

- **Industry 4.0** - a path-breaking force to ensure sustainable and resilient infrastructure
- Critical to steer resilient development and mitigate climate change by enabling local authorities to integrate their data for spatially informed planning and infrastructure prioritization
- Plays a collective role in understanding the vulnerabilities associated with disasters and prepare accordingly



# GEOBIM Solutions for Resilient Infrastructure

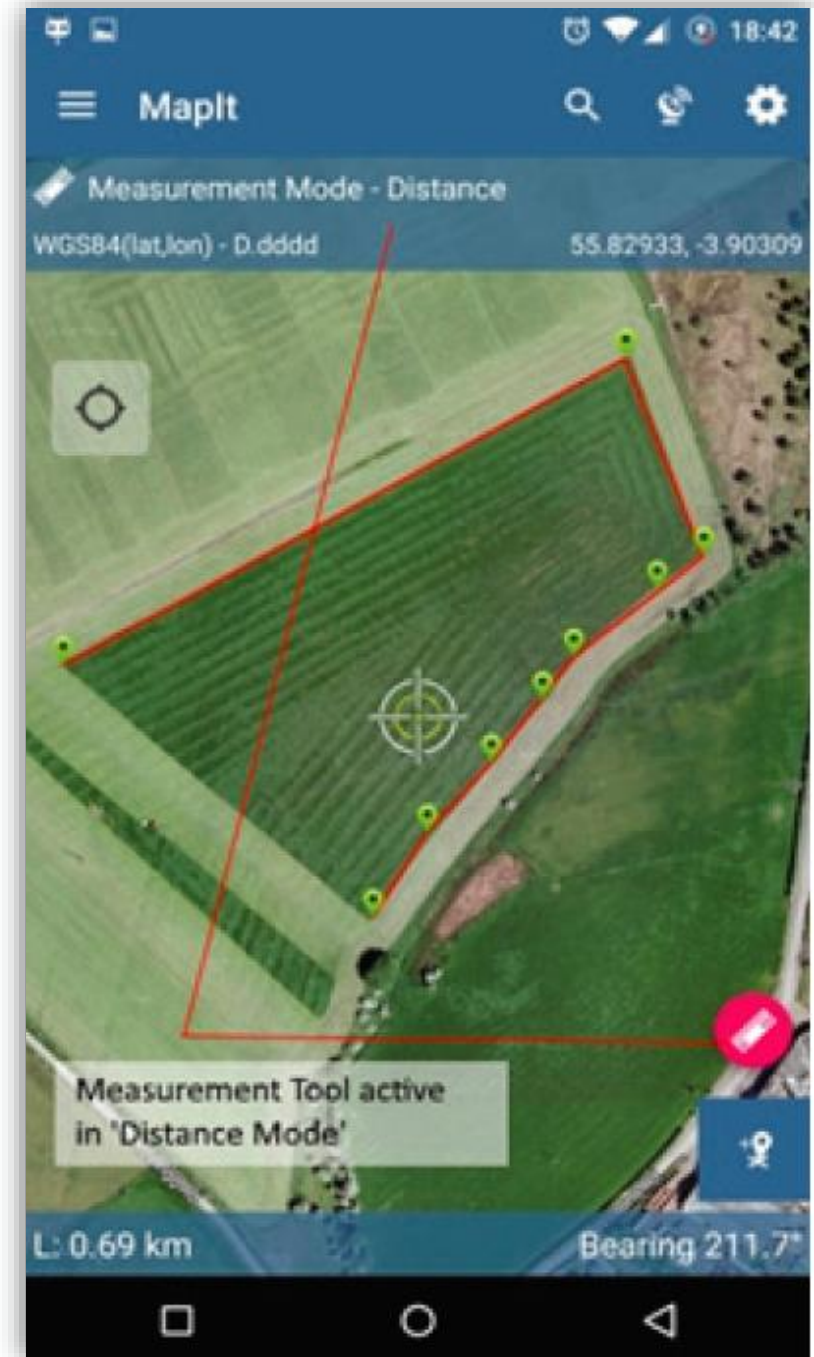
- To maintain structural integrity of physical infrastructure in extreme situations
- To formulate protocols of actions and strategies for smart planning and smart construction
- To intelligently model ageing and urban infrastructure
- To provide spatial and 3D context for better design and construction and maximize long-term value to solve sustainability and resiliency issues



Source: Geospatial Media Analysis

# CASE STUDY #1: CITY RESILIENCE FROM NATURAL DISASTERS

<b>SDG Goals</b>	<ul style="list-style-type: none"><li>• Goal 9: Industry Innovation and Infrastructure</li><li>• Goal 11: Sustainable Cities and Communities</li></ul>
<b>Impact Objective</b>	To implement enterprise-wide GIS while putting a strong focus on standards and centralization to make cities more resilient
<b>Technology Use</b>	<ul style="list-style-type: none"><li>• GIS</li></ul>
<b>Benefits</b>	<ul style="list-style-type: none"><li>• Streamlines data collection processes</li><li>• Enables collaboration, communication and analysis</li><li>• Map, monitor and repair infrastructure damage and recover funds</li></ul>



# CASE STUDY #2: GORKHA, NEPAL - EARTHQUAKE

<b>SDG Goals</b>	<ul style="list-style-type: none"><li>• Goal 9: Industry Innovation and Infrastructure</li><li>• Goal 11: Sustainable Cities and Communities</li></ul>
<b>Impact Objective</b>	Radically transform how governments and homeowners build disaster resilient housing using technology to reduce deaths, injuries and economic losses caused by housing and school collapses due to earthquakes and typhoons in developing countries
<b>Technology Use</b>	<ul style="list-style-type: none"><li>• LiDAR and satellite-based remote sensing solutions</li><li>• Building Information Modelling (BIM)</li></ul>
<b>Benefits</b>	<ul style="list-style-type: none"><li>• Improve structural workflows</li><li>• Refine construction models</li><li>• Obtain insights into how buildings will perform (resilience)</li><li>• Develop better quality designs</li><li>• Improve project quality/delivery to make more resilient and profitable</li></ul>





# CASE STUDY #3: LOWERING CLIMATE CHANGE RISKS WITH MACHINE CONTROL IN FAROE ISLANDS

<b>SDG Goals</b>	Goal 13: Climate Action
<b>Impact Objective</b>	To minimize carbon footprint in a green and efficient way by way of reducing fuel consumption
<b>Technology Use</b>	<ul style="list-style-type: none"><li>• GNSS based Machine Control Systems (Hybrid Excavator)</li><li>• GIS</li><li>• BIM</li><li>• Energy Analysis Software</li></ul>
<b>Benefits</b>	<ul style="list-style-type: none"><li>• Data modelling to save time, costs and fuel</li><li>• 3D model/Digital Terrain model for location sharing</li><li>• Precise positioning and real-time monitoring</li></ul>



Johannes Hellisdal in his new hybrid excavator equipped with iXE3 solution



# Way Forward

## GOVERNANCE AND INSTITUTIONS /LEGAL AND POLICY

- GEOBIM solutions should be incorporated as a policy/guideline at a national level
- Mandate smart technologies (4IR, geospatial, BIM, immersive solutions) and open data sharing

## DATA, INNOVATIONS AND STANDARDS

- Resilience using new technologies should be made part of asset development and design phase of infrastructure projects
- Formulate layered plans and use a range of adaptation strategies to mitigate climate-related asset risks

## PARTNERSHIPS, CAPACITY & EDUCATION, AND ENGAGEMENT

- Associations like WFEO, WGIC to play a pivotal role in enabling collaboration among stakeholders
- Jointly develop GEOBIM solutions as part of elective/main courses and short-term orientation courses
- Develop /present successful case studies on the value-proposition and return on investment in GEOBIM solutions

## FINANCIALS AND PARTNERSHIPS

- Rethink and plan infrastructure investments to mitigate climate change and its risks towards lower-carbon, resilient options
- Build a forward-looking investment model and accelerate investment in green infrastructure, and smart technologies for robust and flexible infrastructure systems

## Collaboration and Partnership between

**World Geospatial Industry Council (WGIC), the World Federation of Engineering Organizations (WFEO) and the United Nations Global Geospatial Information Management (UNGGIM)** is imperative to demonstrate the pathways and success stories for the implementation of a wide range of geospatial technologies and BIM solutions for resilient infrastructure.

The confluence of the three organizations is crucial for bridging the geospatial digital divide to create awareness, improve services to citizens, build capacity for using geospatial technology, enhance government decision making processes, and undertake practices to achieve a digital transformation.



UN-GGIM  
UNITED NATIONS INITIATIVE ON  
GLOBAL GEOSPATIAL  
INFORMATION MANAGEMENT



World Federation of Engineering Organizations  
Fédération Mondiale des Organisations d'Ingénieurs



World Geospatial Industry Council

# THANK YOU!

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