1. Executive summary

Busan, South Korea, was one of five cities selected to receive a Smarter Cities Challenge grant in 2017 as part of IBM's citizenship efforts to build a Smarter Planet. During three weeks in October and November 2017, a team of five IBM experts worked to deliver recommendations on a key challenge identified by the City:

To build a smarter disaster management system, establish prevention and remediation strategies for high-priority natural disasters, and address technological, organizational, process and human resource considerations.

Busan, South Korea's largest international trading port, is a city with a size of 769.82 km^2 and a population of 3,546,887 (including 48,358 foreigners) as of 31 December 2016. Due to its location on the paths of typhoons passing the Korean Peninsula, Busan suffers repeated damage caused by heavy rainfall and tidal waves every summer. Following the earthquake in Gyeongju on 12 September 2016, the attitude of citizens regarding earthquakes have been rapidly changing. The 'Safe City' was one of Suh Byung-soo, the 6th Mayor of Busan's main election pledges, and he has laid the foundation of his administration on the philosophy of administrative policy focused on safety.

To achieve the vision of "Safe City", Busan has implemented the "Smart Big Board" (SBB), and continues to focus on smart and systematic disaster response. The Smart Big Board in Busan is the first implementation of a consolidated disaster management monitoring system in South Korea, which has received much attention and been used as a benchmark by other cities. The survey result of Future Strategy for Busan (Oct 2016) has shown that the attention of Busan citizens is moving towards safety. For these reasons, it is necessary to:

1. Establish standards on those types of disasters and emergencies that might occur in Busan
2. Implement a system for end-to-end disaster management

The focus of this project is to establish prevention and remediation strategies for high-priority natural disasters (e.g. floods, typhoons, landslides, earthquakes and fires) that might impact Busan, and to address technological, organizational, process and human resource considerations. During the three-week period of the Smarter City Challenge for the City of Busan, our team interviewed over 50 stakeholders within the disaster ecosystem, covering local, district and central government agencies, first responders, academic institutions and citizens. Findings from the interviews and various documents shared with the IBM team were reviewed.

The IBM team organized the various findings into four dimensions:

- Information Technology Systems
- Operational Infrastructure and Technology
- Organization and Governance
- Citizen Engagement

Furthermore, seven key distinct recommendations were put together and aligned to the four dimensions. Recommendation seven is an overarching recommendation that applies to all the four dimensions.

In addition to the seven recommendations, IBM also developed an initial assessment based on the UNISDR Preliminary Scorecard in Appendix F. We recommend that the City reviews this scorecard and runs a detailed report to help them get started with this initiative. In parallel, the IBM teams recommends that the City engage an IT consulting team to help define the scope, budget and implementation plans for the recommendations. The City should follow best practices, starting with limited scope pilots.

Domain	Findings	Recommendations	
Information Technology System	• Use Smart Big Board as a sound foundation • Lack of Predictive and Cognitive capabilities • Missing end-to-end architecture and Data intergrations • Skills and experience shortage	1. Expand the scope of Disaster Management Systems to include Predictive and Cognitive Capabilities	7. Establish an Innovation Center for City Resiliency
	• Multiple IT Systems running independently	2. Deploy a unified collaborative and transactional platform for better control of exchanges between all stakeholders	
Operational Technology and Infrastructure	• Good CCTV and sensor infrastructure • CCTV not used as a sensor • Additional and varied sensors needed • Need for an IoT platform enabling video analytics	3. Upgrade the current CCTV / Sensor infrastructure to embrace the full power of IoT	
	• Lack of vulnerability assessment for infrastructure grids	4. Strengthen the resiliency of existing critical operational infrastructures	
Organization and Governance	• Disaster management center in place • Siloed agencies would be tested in case of a disaster • Opportunities for a better work culture • Willingness to collaborate between organizations	5. Enhance Public Safety Organization and Governance to increase effectiveness	
Citizen Engagement	• Communications capability using multiple channels • One-Way broadcast communication, not facilitating engagement • Communication not personalized based on demographics and location • Information is not impact-based • Active education effort, but may not be viewed as compelling to engage	6. Develop a comprehensive strategy and plan to improve citizen engagement	

Figure 1: Summary of findings and associated recommendations