BIG DATA FOR SOCIAL GOOD

Case Study :

Responding quickly and effectively to disasters in Japan

Designing The Future KDDI

The GSMA represents the interests of mobile operators worldwide, uniting more than 750 operators with over 350 companies in the broader mobile ecosystem, including; handset and device makers, software companies, equipment providers and internet companies, as well as organisations in adjacent industry sectors. The Big Data for Social Good initiative convenes public and private organisations to accelerate the mobile industry's impact against the UN SDGs.

Infectious diseases, pollution, earthquakes, floods and other disasters are among the greatest challenges the world faces today. Mobile operators can provide powerful and unique insights based on anonymised, aggregated network data to help solve these complex problems.

Mobile Big Data can help public health organisations to more effectively respond to epidemics and plan targeted health interventions. It can support emergency relief agencies to more accurately and efficiently direct their resources in times of crises whilst allowing governments to better understand the impact of pollution and climate change on citizens.

Through the GSMA, mobile operators and partners across geographies have come together to accelerate and scale the opportunity for Big Data for Social Good. The GSMA offers a unique platform to establish a common framework and best practice approaches, while respecting and protecting individuals' privacy.

Summary

Earthquakes, tsunamis, volcanic eruptions and landslides are just some of the 574 natural disasters that affected more than 108 million people and caused over US$70.3 billion in damages worldwide[1] in 2015.

Japan is located within the Pacific Ocean's ring of fire; an area that sees more earthquakes and volcanic eruptions than anywhere else in the world and therefore is especially prone to experiencing natural disasters. In 2018 alone, Japanese citizens suffered the effects of mudslides, heatwaves, severe flooding and record-strength typhoons.

Whilst the frequency of natural disasters has increased, the resources needed to respond have declined sharply. Now, more than ever, there is an urgent need to find efficient and cost-effective ways of strengthening disaster response measures to protect citizens.

In a significant cross-industry collaboration, KDDI, Toyota and OYO are demonstrating how the use of mobile big data and artificial intelligence is uniquely placed to support the Japanese local government's response efforts.

KDDI have developed an Information and Decision Support System (IDSS) that integrates information from sensors, Internet of Things (IoT) devices and mobile networks into an AI powered response system to help optimise national and local government response when hazardous events occur.

The IDSS is designed to increase the accuracy and speed of decision-making during natural disasters to ensure evacuation warnings are issued in a timely manner, traffic can be better regulated and safety and shelter for local citizens can be effectively prioritized. The partners started pilot testing in 2018 with deployment of the solution planned in 2019.

1. The International Federation of Red Cross and Red Crescent Societies (IFRC). "World Disasters Report 2016 - Resilience: saving lives today, investing for tomorrow". Web. 3 October 2018. https://www.ifrc.org/Global/Documents/Secretariat/201610/WDR%202016-FINAL_web.pdf

How Mobile Data Can Help

As leaders in one of the world's most tremor prone countries, it is essential for local governments and disaster management agencies in Japan to be able to evaluate impending disasters immediately and implement emergency response and recovery.

To enhance and accelerate precise decision-making for governments, KDDI partnered with Toyota and OYO to consolidate and cross-reference data from multiple sources into an AI dashboard. (see Figure 1).

To demonstrate how mobile big data could be used, KDDI used aggregated and anonymized historical data from the Northern Kyusu Rains disaster in July 2017. This information was obtained with consent from its customers' mobile phones and analysed alongside data gathered from devices connected in the Internet of Things (IoT). This amalgamated data is used to further inform the disaster response solutions for local governments and disaster management agencies.

Figure 1

Information and Decision Support System in Action
(Illustrated using data from the Kyusyu Rains in July 2017)

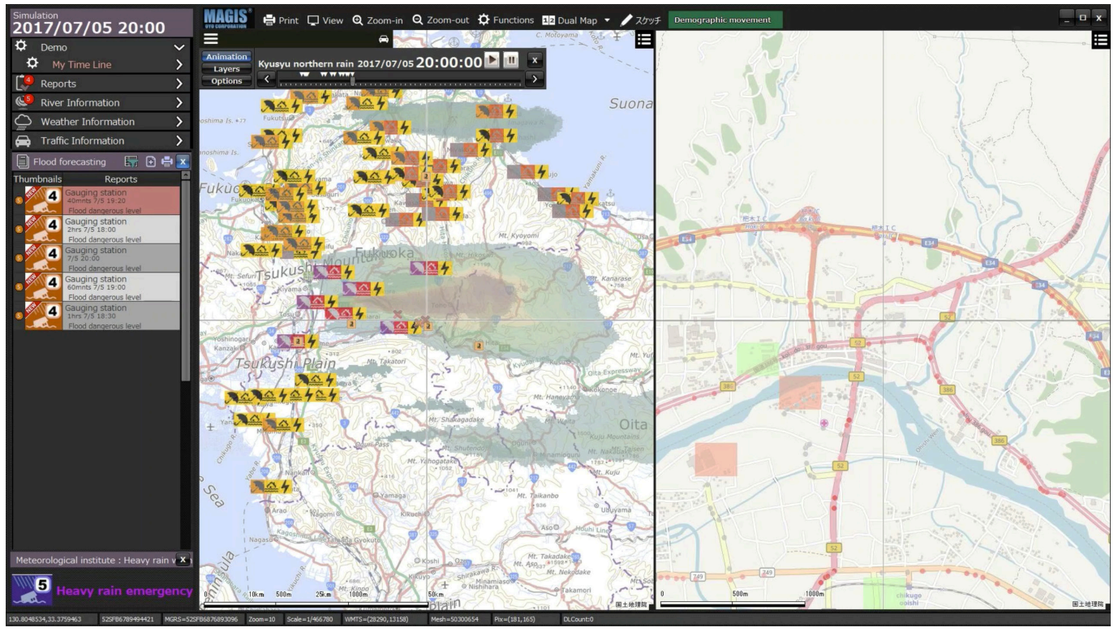


Figure 1 provides an illustrative example, using data from the Kyusyu rain disaster.

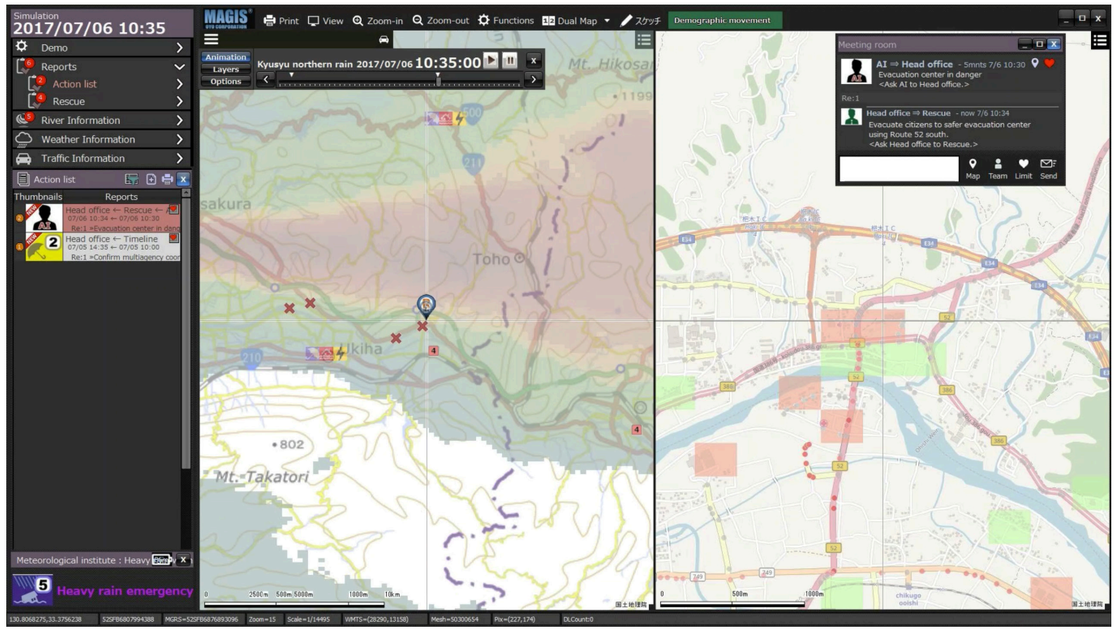
Toyota contributed data from consenting car owners, including traffic information probes, hazard lamps and sensors that measure outdoor air temperature. This data was aggregated and anonymized in its Mobility Services Platform; enabling a visualization of traffic conditions that can help with planning traffic flows during evacuations and to highlight areas where traffic may be congested after a disaster. In the right-hand side of Figure 1, the red dots charted along the pink roadway correspond to active vehicles on the road in real-time during the disaster. The grey dots plotted on the yellow roadway provide information on the location of vehicles inactive in the hours preceding the disaster.

OYO brought significant expertise in disaster prevention and mitigation to the partnership via seismographs, water level monitoring, slope indicators and inundation sensors to monitor and predict the risk of natural disasters around the clock. In the left-hand side of Figure 2, flood reports from OYO sensors are being synthesised (under the 'Action list'). The red, yellow, green, and blue topography shading on this side of the graphic indicates the volume of ground water saturation present. The red colour near the centre reflects where the volume of water is highest and therefore an area most at risk of experiencing sedimentary flows that can cause landslides.

All of these data points were layered with public records and statistics from national government entities with disaster preparedness and response duties. The product of this aggregation was a system featuring a cognitive AI support bot (see Figure 2) that analyses and expands the information available to local governments before, during and after natural disasters.

Figure 2

Information and Decision Support System Use of AI to Support Government Decision-Making



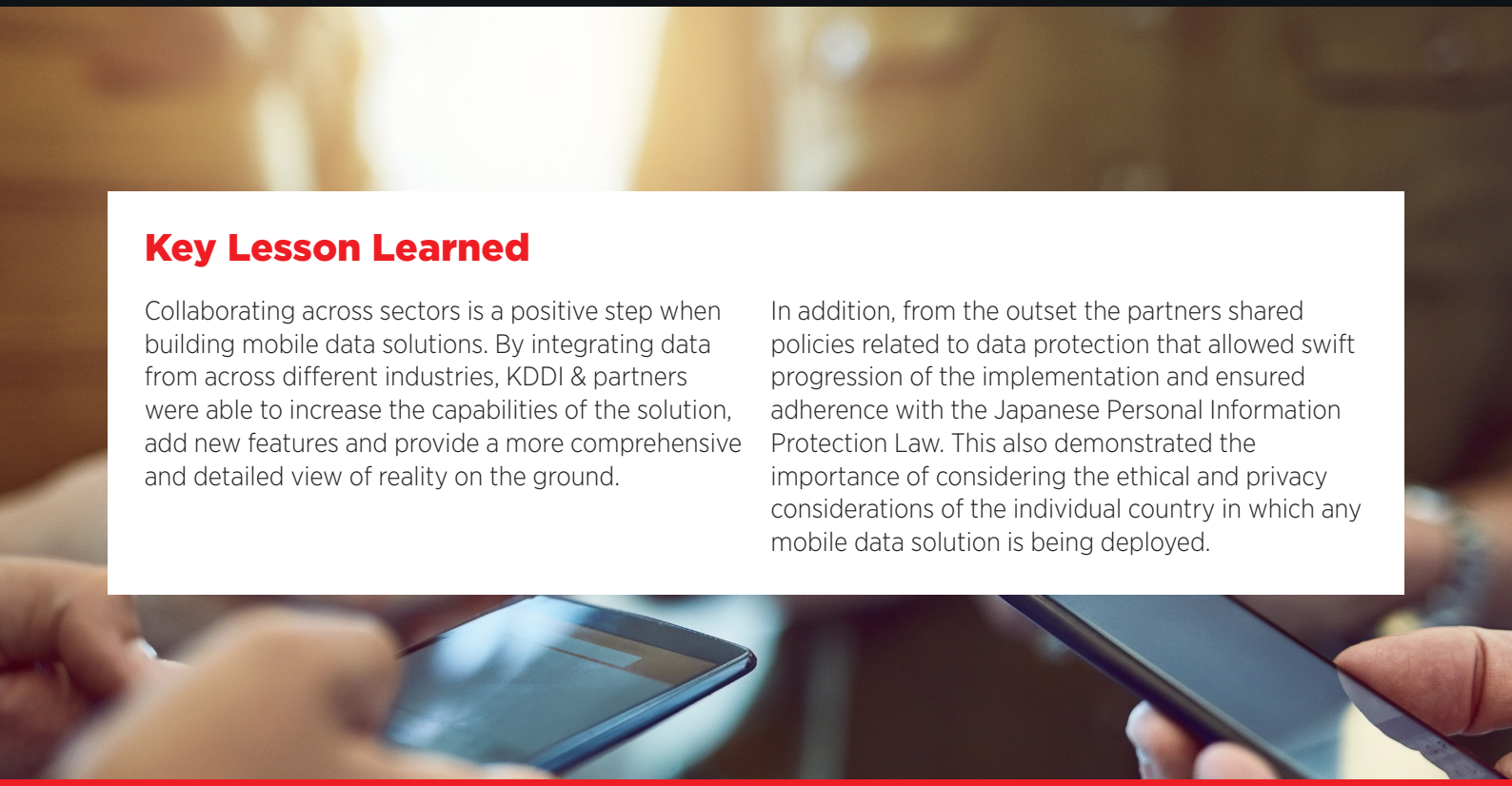
The information shown in Figure 2 illustrates an exchange between a government head office and the AI bot. AI has processed data that reveals that the evacuation centre where citizens are currently gathered, is in danger from impending flooding or mudslide. This helps the government decide whether to initiate an evacuation, leading to the deployment of a rescue team to move the citizens to a secure location.

Together, the data used transforms the AI-powered dashboard into a resource with essential time-sensitive information that can support local government officials in charge of disaster preparedness and response.

Impact of the mobile data solution

The IDSS demonstrates how mobile big data accelerates the government's ability to implement disaster prevention measures such as traffic regulation, evacuation warnings and on-site safety confirmation. In comparison with existing response capabilities, the mobile data solution provides the following;

- Seamlessly combines data from a wide range of sources to provide powerful insights that enable emergency services to take action and significantly reduce response times.
- Intelligently process' information in real time, enabling the government to flag potential hazards and take pre-emptive action that could save lives.
- Markedly reduces the risk of governments under-estimating the severity of disasters, ensuring that the most vulnerable civilians in emergencies are given the right relief supplies to survive.
- Effectively enables local administrations to provide citizens with critical guidance when evacuations become necessary.



Key Lesson Learned

Collaborating across sectors is a positive step when building mobile data solutions. By integrating data from across different industries, KDDI & partners were able to increase the capabilities of the solution, add new features and provide a more comprehensive and detailed view of reality on the ground.

In addition, from the outset the partners shared policies related to data protection that allowed swift progression of the implementation and ensured adherence with the Japanese Personal Information Protection Law. This also demonstrated the importance of considering the ethical and privacy considerations of the individual country in which any mobile data solution is being deployed.

Going forward

Following the successful testing phase in 2018, the IDSS has been adopted by the Cabinet Office Strategic Innovation Program. In 2019, the system will be built up and phased in 1,700 local city, town and village communities with feature upgrades to strengthen national resilience.

In the years to follow this launch, KDDI have announced their ambition to work with other companies and organisations involved in disaster preparedness and response work, by adding further data points for analysis.

Watch our video, learn about the initiative and contact us for more information: **bd4sg@gsma.com**

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