End of AY 2016 Report for SIP

Project Title

Space Innovation Policy for Disaster Management Capabilities (SIPDMC)

Team

GSDM ID	Name	School	Department	Year (e.g. D1)	Leader/ member
15202	Budhaditya Pyne	Engineering	Electrical Engineering and Information Systems	D2	Leader
16111	Goutham Karthikeyan	Engineering	Aeronautics and Astronautics	D2	Leader
16114	Marc-Andre Chavy-Macdonald	Engineering	Systems Innovation	D2	Leader
16108	Giulio Coral	Engineering	Aeronautics and Astronautics	M2	Member
16201	Quentin Verspieren	Engineering	Aeronautics and Astronautics	M2	Member
16206	Hiya Roy	Engineering	Electrical Engineering and Information Systems	M2	Member
16118	Lee Hee-Woon	Public Policy	Law	M2	Member

Objective: Explain what social/global issues that this project tried to address and why the issue is important.

Over the last decade, with ever-increasing effects of Global Warming and Climate Change, there has been a worldwide upsurge in Natural Disasters, primarily in the hydrological cycle with rainfall variability and glacial melt contributing to floods, storms, and sea level rise. **Disaster Risk Reduction (DRR)** features as a cross-cutting issue in the United Nation's 2030 **Sustainable Development Goals (SDGs)**. Preparedness is arguably the most critical aspect of Disaster Risk Reduction which comprises of prevention, response and rehabilitation in its full cycle. Early warnings with swift actions and decisive strategies result in timely response which can save millions of lives. According to the United Nations Office for Disaster Risk Reduction (UNISDR) 2014 report, since 2004 natural hazards have amounted to **$1.4 trillion** in economic losses with **1.7 billion** people being affected out of which **0.7 million** have died.

Earth Observation satellite images are essential for monitoring natural disasters like typhoons, tornadoes, tsunamis and volcanic eruptions from space. With rapid growth in the space sector characterized by privatization and frequent launch of small satellites in the **Low Earth Orbit (LEO)** with project costs less than **$20 million**, space resources must be utilized with international collaboration among diverse stakeholders ranging from **governments**, **space agencies**, **universities** and **private companies** to improve existing preparedness levels.

The overall objective of our project is two-fold: **Part 1** aims to explore and exploit opportunities in the **'technology-push'** currently happening in the space sector and come up with a policy proposal for encouraging innovations in the space sector which will lead to improved technology and procurement for Earth Observation space systems applied to disaster management. **Part 2** concentrates on the **'market-pull'** and understanding customer requirements for a space-based disaster management system, and outputs a basic conceptual design and a proposed framework of international cooperation to enable it.

Method: Explain through what kind of approaches you tried to achieve the objective.

*About the list and details of the interview, add the appendix.

Asia-Pacific in particular fares poorly owing to a multitude of factors like geographical location, economic poverty and high density of population among others. As the most disaster-prone region in the world, it suffers nearly **40%** of the **global 'natural' catastrophes**. Thus, to begin with, we made a review of the existing space technology and international cooperation available for Disaster Risk Management (DRM) in South-East Asia, with special focus on the **Philippines**. We identified existing **tech-gaps** and **bottlenecks**. This constitutes our **Problem Definition Phase**.

Next, we reviewed **Innovation Policy** trends in the space sector and began working on a business model and policy proposal to utilize space assets for DRM. We broadened our focus from only infrastructure and data provider to further downstream, i.e. **Service Provider** and **End-user**. The **Solution Phase** is still ongoing.

Outcome: Explain what kind of results you obtained from this project and discuss how it addressed your focal social/global issues.

Summary of Achievements (List of Deliverables of AY 2016):

1. Poster Presentation in **UN-SPIDER Conference** on Space-Tech for DRM in Beijing, China, September, 2016.
2. Winners of **GraSPP Policy Challenge** (for **LESAT** and **Shelter 2.0**) in December 2016 and presentation in **SciencesPo Policy Challenge** in Paris, France in February, 2017.
3. Winners of **Hult Prize Regional Finals** (for **Shelter 2.0**) and presentation pitch in Dubai, UAE in March 2017.

Future Plan (Expected Deliverables for AY 2017):

1. **NewSpace Innovation Dynamics Journal** Publication (by June 2017)
2. Presentation in **International Astronautical Conference (IAC)** on "Utilization of Space Assets for DRM" in Adelaide, Australia, September 2017.

Some of our members visited several reputed international organizations like **NASA, SpaceX, World Bank, Space Policy Institute, United Nations, ERIA, Philippines Institute of Developmental Studies (PIDS)** and **Indian Space Research Organization (ISRO)** during **GSDM International Field Workshops (IFW)** to discuss issues regarding sharing satellite data for DRM. We got very useful feedback in the **UN-SPIDER Conference** in Beijing regarding the importance of awareness and capacity building to understand satellite data for DRM. We also participated as student panelists in the **GSDM International Symposium on Space Technology and Policy Making** in February 2017 and discussed with guest panelists representing **NASA, Axelspace** and **governments** of **United States, Japan** and **India** regarding the utilization of private-public-partnerships in the space sector to improve DRM capabilities.

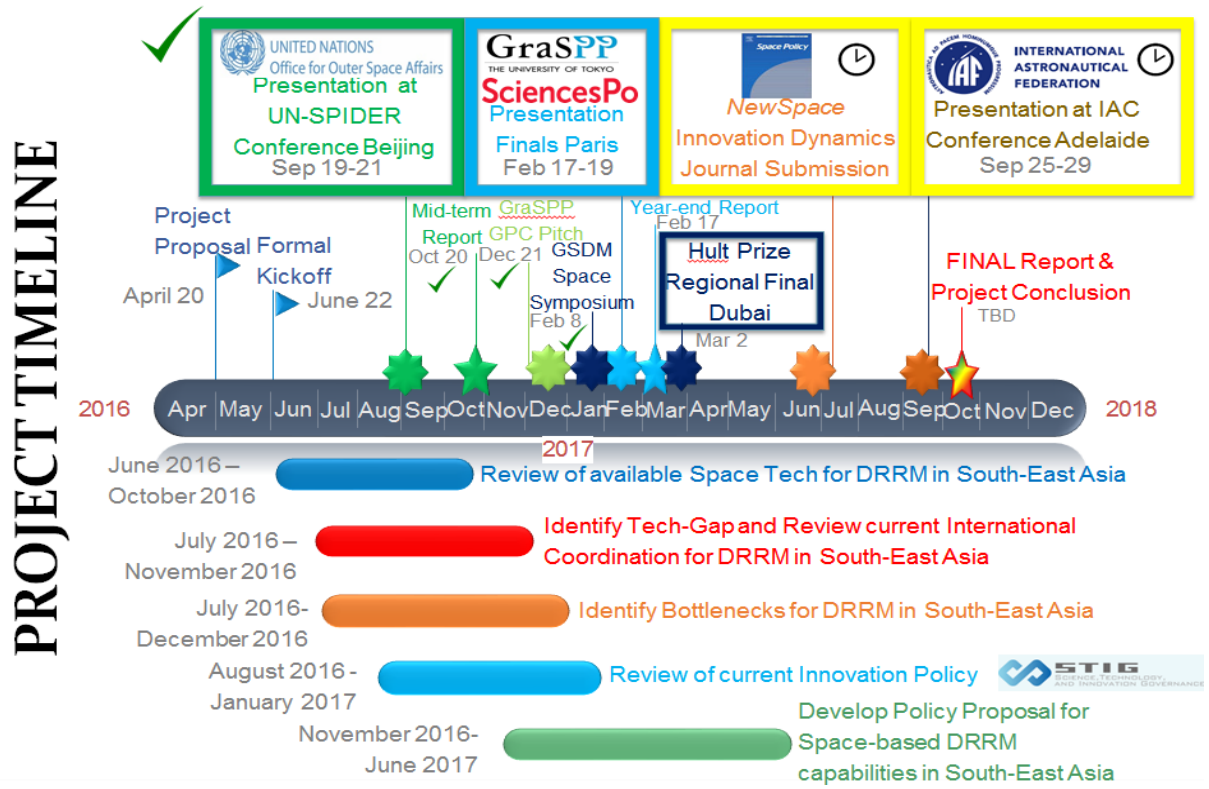
Based on our research and received feedback, we came up with two concepts: viz. **LESAT** and **Shelter 2.0**.
'LESAT' stands for **Location-based Emergency Shelter Awareness and Training**. It is a smartphone application that uses space-based location data (e.g. GPS) and additional space-based geographic data (e.g. land elevation, water levels, radar imagery) in order to provide personalized training to each individual to make them better aware of the potential risks of disasters in their current habitats and also the location of the **nearest emergency evacuation shelters**. **"Sit 'n' See"** is a passive mode which utilizes socio-technological behaviour to raise awareness regarding evacuation shelters using location awareness capability (**GPS**) present in all smartphones. **"Play 'n' Go"** is an active mode where emergency evacuation shelters are made into GPS markers and the user needs to physically reach there to get in-game incentives (like Pokemon Go). **"Disaster"** is a hidden mode which is automatically activated once a disaster occurs and provides integrated information regarding disaster risk-levels (like inundation water-levels, land-slopes in case of storm-surge, radar data for torrential rain). In the absence of GPS, the approximate shelter location can be provided by triangulation between three or more radio towers. Being just an 'app', it has large scale potential with significantly lower investment requirements. We made a LESAT model implementation in the Philippines involving incentives for each of the diverse stakeholders involved.
Shelter 2.0 is a website that uses location data obtained from social networks (demonstration prototype is limited to Twitter, but others can be similarly included) to provide disaster relief services. When a natural disaster occurs, **"Providers"** can offer their houses as a safe shelter by just posting it on social networks, and the location will be retrieved by Shelter 2.0 system. Not requiring a separate registration simplifies the process, and being on popular platforms raises awareness about the service. **"Users"**(people severely affected by the disaster) can access the website to find a shelter near their location. The matching system also allows avoiding overcrowded shelters, as they are removed from the list once full. To ensure the sustainability of the system, with no need to rely on government support, a business model has been developed by investigating how the data produced could be made commercially valuable. This would involve selling enhanced safety and damage data to private companies, especially insurance and infrastructure, in order to sustain the cost of running Shelter 2.0.

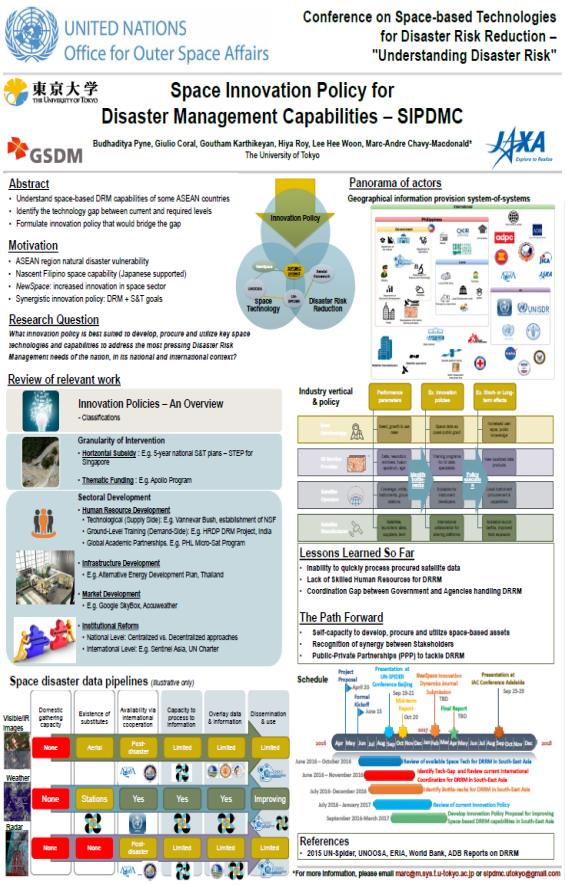
Budget: List the budget this project implemented. *About the details, add the appendix.

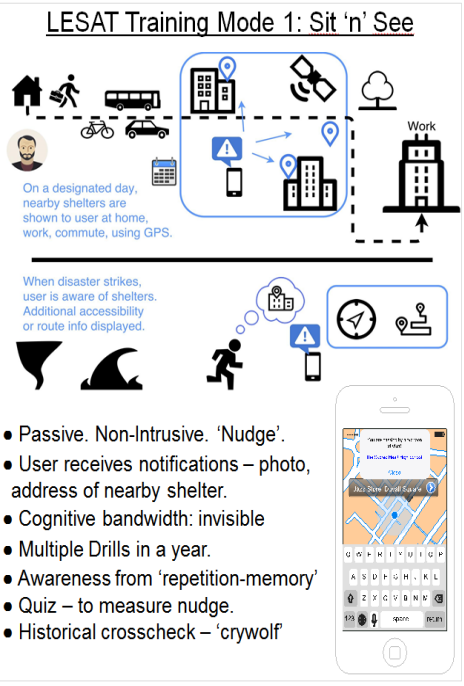
Purposes	**Expense**
Books	0
Travel fee (UNSPIDER Beijing 2016 Conference Attendance for 2 students)	¥155000
Honorarium	0
Others	0
Total	¥155000

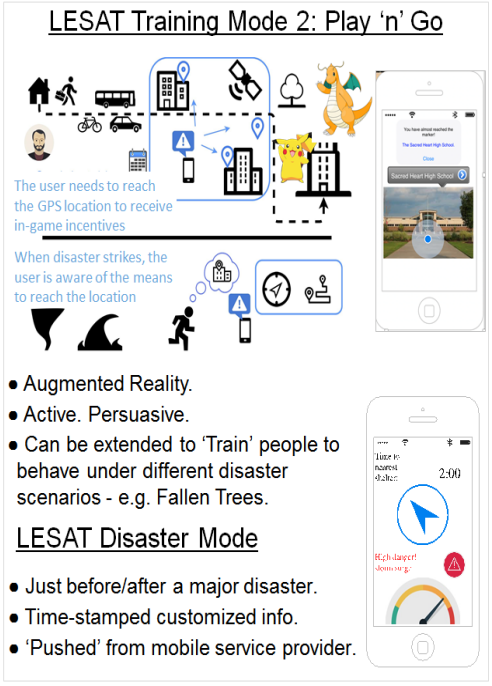
Appendix (optional)

*Project Timeline *UNSPIDER Poster *LESAT Details *Shelter 2.0 Details *Relevant Photos









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SOS Activities X **SNS Hashtags** = **Shelter 2.0**

Team Members

- LEE, Hee-Woon
- KANEKO, Tomohiro
- VESPIEREN, Quentin
- CORAL, Giulio

& FRANCIS, Danny

TARGET:
Resilience to Disasters due to Rapid Urbanization

By 2020, substantially develop and implement holistic disaster risk management at all levels

SUSTAINABLE DEVELOPMENT GOALS

PROBLEM:
LIMITATION of Government
UNDERUTILIZATION of Individual

@Tokyo, Japan 2011
3.11 Earthquake aftermath

3.52Million No Place to Stay

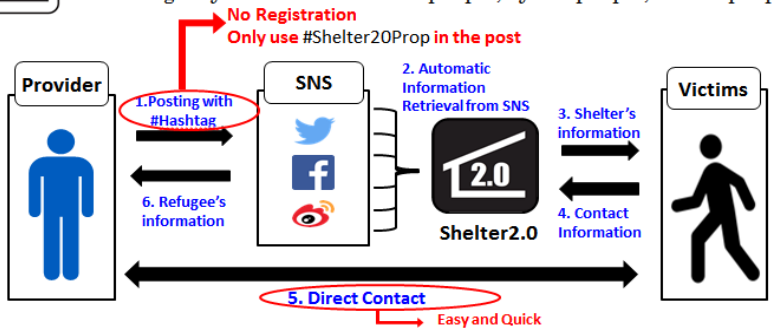
3.43M now here to go = Shortage of Evacuation Shelter

94,000 In Evacuation Shelters

ANSWER:
Min. of INTERVENTION
Max. of ACCESSIBILITY

Inspired by @Paris, Tokyo 2015
#PorteOuverte (#Opendoor)

SOLUTION: Project 'Shelter 2.0'
Web-based matching service platform which encourages and supports the emergency aid activities of the people, by the people, for the people



PROTOTYPE: available at
http://www.shelter20.org

For TEST purpose, tweet with #Shelter20Prop

GraSPP THE UNIVERSITY OF TOKYO GPPN global public policy network

Contact: shelter20.project@gmail.com