CBi webinar
New Technologies

26 NOVEMBER 2020

CONNECTING BUSINESS INITIATIVE

SDG AI LAB

OCHA

UNDP

OBJECTIVES FOR PARTICIPANTS

Become familiar with the SDG AI Lab and CBi collaboration on new technologies for disaster management

Understand the key objectives of the planned work, the desired outcomes, the structure, next steps

Learn basics of the key technologies that can be applied and their potential use within the CBi contexts

Share needs, use cases and experiences with CBi and SDG AI Lab to establish common ground for the research

Indicate your interest in engaging with CBi in this work

AGENDA

10 min	Opening Karen Smith and Tiina Turunen, CBi Gokhan Dikmener, SDG AI Lab
20 min	Presentation of the planned New Technologies workstream Jonas Nothnagel and Martin Szigeti, SDG AI Lab +Mentimeter
10 min	Featured CBi Member Network Examples
15 min	Experiences from other networks and colleagues Questions and Answers Moderator: Tiina Turunen, CBi
5 min	Closing Karen Smith, CBi

Introduction

- CBi work on collecting good practices related to innovation started in 2018

- Boston Consulting Group Strategy Refresh in 2019 found that:
  - Networks innovate organically and out of necessity to improve their operations and effectiveness in disaster management, working on a range of solutions from simple & practical to disruptive
  - CBi can support and elevate network level innovations through a coordinated approach that uses a broad range of local and global sources, fosters inter-network sharing and encourages test & learn culture

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Background

A joint initiative of UNDP Nature, Climate, and Energy Team, UNDP Finance Sector Hub, and UNDP Istanbul International Center for Private Sector in Development (IICPSD)

Objectives

- Harnessing the potential of AI/ML for sustainable development.
- Strengthening UNDP's internal capacity for the increasing demand for AI/ML based solutions.

www.sdgailab.org

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Areas of work:

Development

- Artificial Intelligence and Machine Learning driven solutions for SDGs

Research

- Promising digital technologies such as Artificial Intelligence, Machine Learning and GIS applications for development challenges and clients

Advisory

- Support UNDP units on research, development and implementation of digital development solutions with in-house team
- Facilitate partnerships with the private sector for UNDP units

SDG AI LAB – Current Projects

Partner(s)	Project and Area of Work	SDGs
UNDP Nature, Climate Energy Cluster	**Vertical Funds Portfolio Analysis:** Information retrieval and aggregation from unstructured data	
Connecting Business initiative	**Artificial Intelligence R&D for Private Sector Disaster Preparedness, Response and Recovery:** Identifying promising technologies to enhance the role of the private sector in humanitarian response	
Business Call to Action	**Data Visualization for Annual Report:** Creating visual and analytics materials for the upcoming BCtA annual report	
PPMI	**SDGs Classification and Analysis:** Developing a tool for SDGs classification and analysis	
UNDP Finance Sector Hub	**Assessing Project Risk:** Risk understanding and assessment	
UNDP IICPSD	**SDG Classifier:** SDG interlinkages, clustering and classifying	
UNDP Reef2Resilience	**REEF Data:** Applying AI and machine learning to assess coral reef health	

TECHNOLOGY RESEARCH AND DEVELOPMENT FOR PRIVATE SECTOR DISASTER PREPAREDNESS, RESPONSE AND RECOVERY

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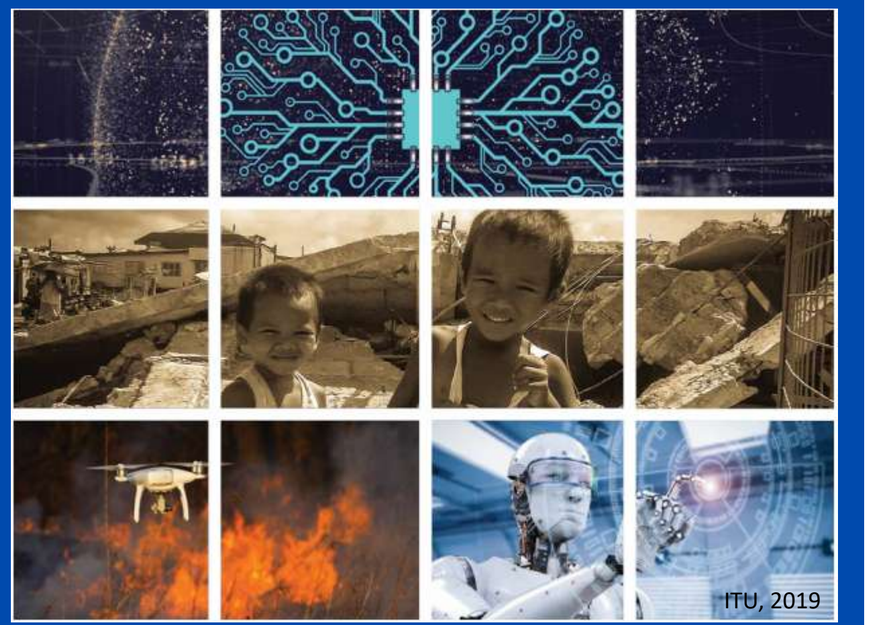


We observe an increasing number of disasters:

- Between 2010 and 2017 alone, we recorded 354 disasters, 68 000 deaths, over 210 million people affected and USD 153 billion in damages.
- Just in 2017, 122 countries were affected by disasters.

Meanwhile, we are at a breakpoint of digital advancement:

- 90% of the worldwide data was created in the last 5 years.
- There are 40x more bytes of data then stars in the observable universe
- Technology becomes more accessible and in light of these enormous increases algorithms advance to have nearly ubiquitous impact on society.

Make use of new and existing technologies to support Disaster Preparedness, Response and Recovery.

RESEARCH STREAM
What technologies do we want to cover?

3D Printing

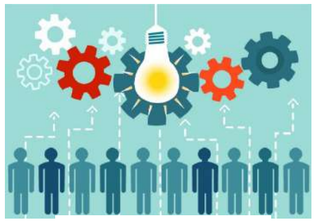
Artificial Intelligence (Machine Learning; Computer Vision, NLP)

Augmented Reality/Virtual Reality

Blockchain

Cloud Computing

Communication networks - 5G



Crowdsourcing

Cyber Physical Systems

Drones

Geographical Information Systems (GIS)

Internet of Things (IoT)

Remote Sensing

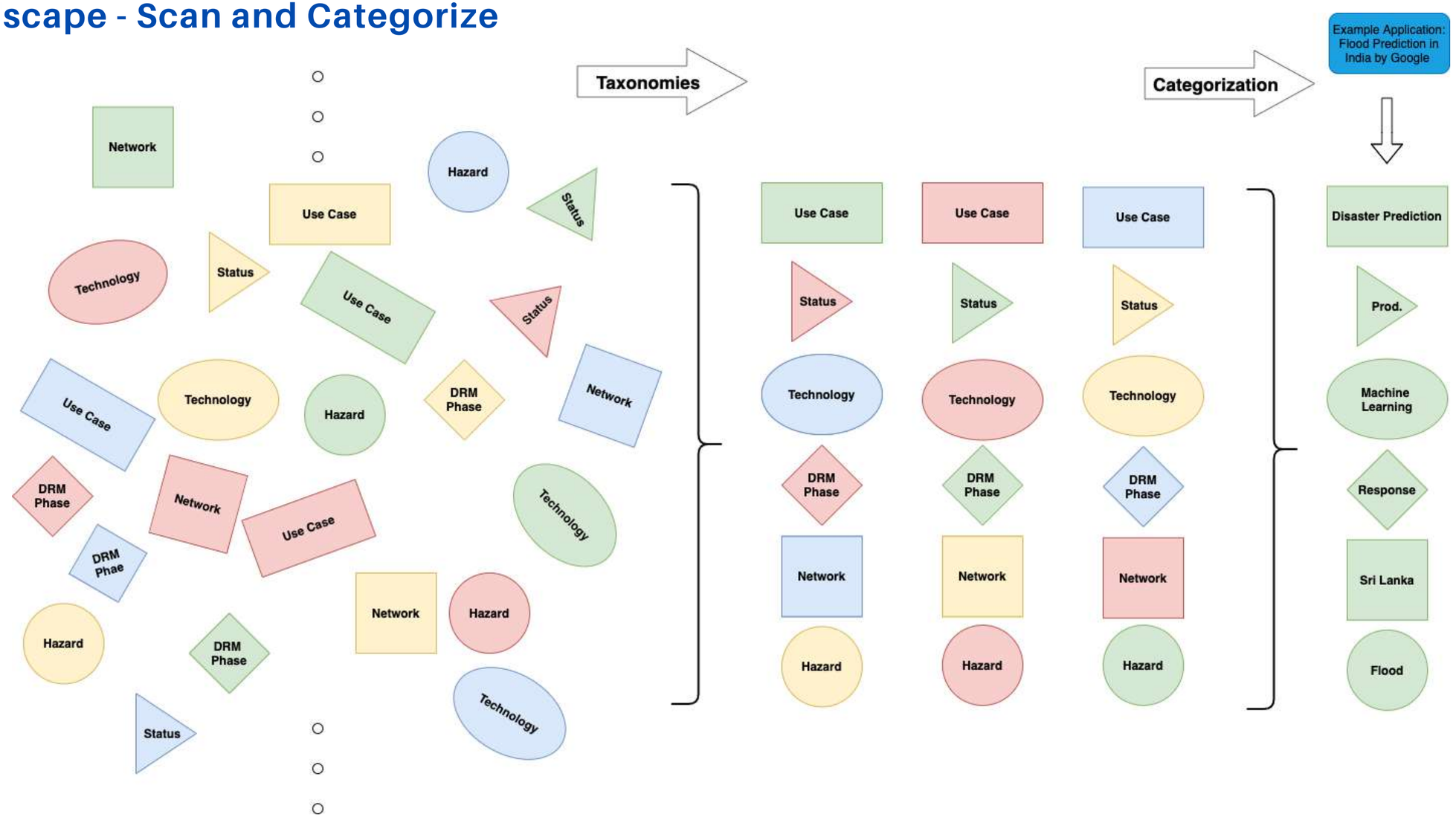
Social Media

RESEARCH STREAM
How are these technologies applied?

Disaster Category	Key Technology	Use Case
Hurricanes/Cyclones/Typhoons	GIS, Artificial Intelligence, Drones, Social Media	- Disaster Relief Logistics: **Hurricane Maria 2017 Puerto Rico.** Using Drones to transport relief goods. - Damage and Loss Assessment: Classify Images from social media to assess damages after **Hurricane Dorian.**
Floods	GIS, Remote Sensing Artificial Intelligence, IoT	- Disaster Prediction: **Flood Mapping – positive examples from India, Iran and Myanmar** - Disaster Preparedness and Situational Awareness: Dashboard that utilizes IoT to combine information in real-time.
Conflict & Fragility	Blockchain, Social Media	- Situational Awareness: Social media analysis to understand population's sentiment towards a specific topic. - Using blockchain as a payment system and alternative tool for distributing cash-based transfers.
Health Epidemics / Pandemics	Social Media, AI	- Disease Forecasting: Dengue Fever, Flu, Covid-19 examples. Using Search engine queries, social media, weather data and geographical data. - Covid-19: Tracing & Tracking Apps, Vaccine Development (choose optimal patients for trials) and Disease Evolution Monitoring.

RESEARCH STREAM

Landscape - Scan and Categorize



TECHNOLOGY RESEARCH AND DEVELOPMENT FOR PRIVATE SECTOR DISASTER PREPAREDNESS, RESPONSE AND RECOVERY

1-year Research and Development being conducted by SDG AI LAB and CBi.

Research study aims to strengthen the internal knowledge, understanding and awareness on how technologies are applied in disaster risk management with emphasis on the private sector angle.

Practical implementations will provide hands-on capabilities to incorporate technological solutions in current workflows.

Activities and Outputs: Webinars and Interviews on the way; Qualitative Research, Technology Scoping and Prototyping; Final Webinar Series.

RESEARCH STREAM

Main Objectives and Key Questions

Improved understanding of the existing applications of technologies in DRM

- What are the most relevant and promising technologies and existing use cases? What can we learn from them?
- What are the underlying key themes/clusters?
- What are the main challenges to overcome in applying technologies in DRM?

Identify what technological solutions can respond best to the specific needs of the networks

- What are the main challenges the networks encounter in applying technologies?
- what enabling environments can the networks already provide or potentially create?

Increased understanding of how to use technologies in an inclusive and responsible manner.

- What are the vulnerable groups to consider when applying technologies for DRM?
- How to make sure we can trust our results and confidently use them for decision making?

Technology Scoping

–

Practical Implementations

Objectives

Provide hands-on applicable knowledge for networks to build their own capacities.

Produce two prototypes to showcase the potential of frontier technologies for networks and DRM and to illustrate the data science process from scratch.

Consider networks needs to design prototypes in a way they can be used to build further to production.

Two streams: Natural Language Processing and Geographical Information Systems.

GIS IN DEVELOPMENT CONTEXT

Framework to store, manage, analyze and display spatial information of any kind.

Borrows from computer science, engineering, geodesics, geophysics, environmental sciences, sociology and more

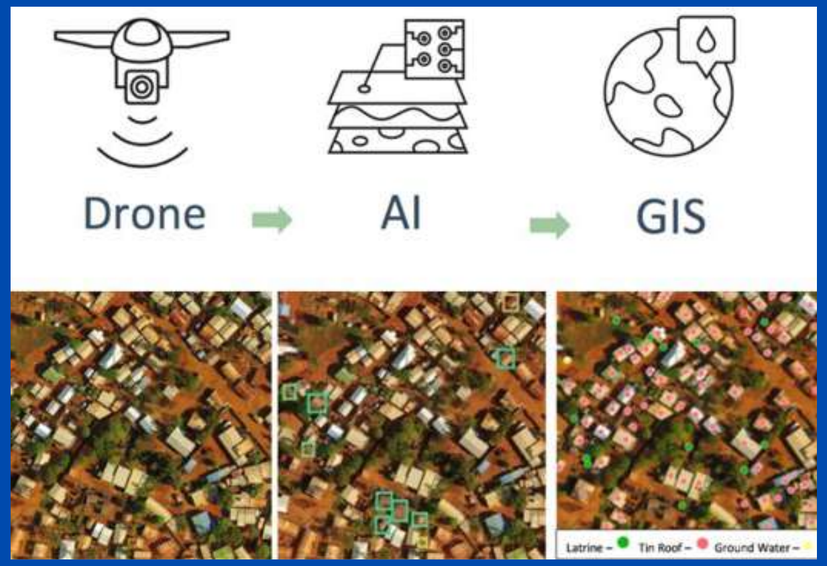
GIS Framework

Collection

Processing

Displaying

Frontier technologies



https://indianacademyofdrones.com/how-drones-are-revolutionizing-gis/

Data collection side:

Improvements in all data collection dimensions:

(Real)Time + Resolution + Flexibility + Crowdsourcing

Processing side:

Implementation of Deep Learning has been facilitated:

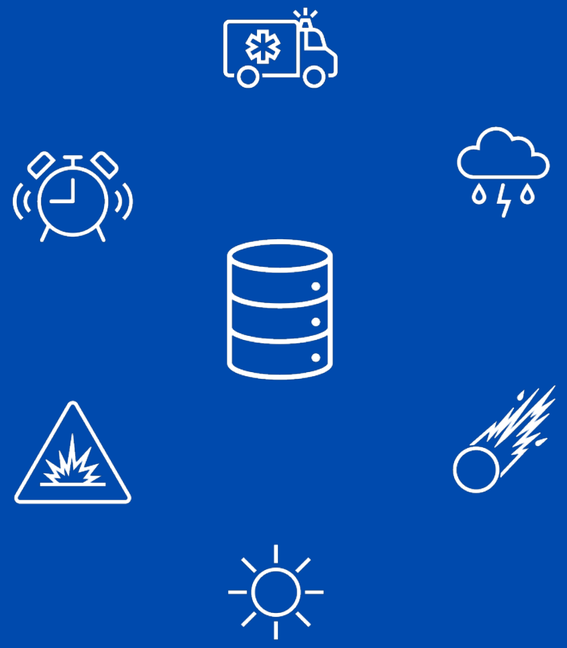
Artificial Neural Networks

Cloud Computing

End User side:

Ease of access through digitalization

GIS in Disaster Risk Management



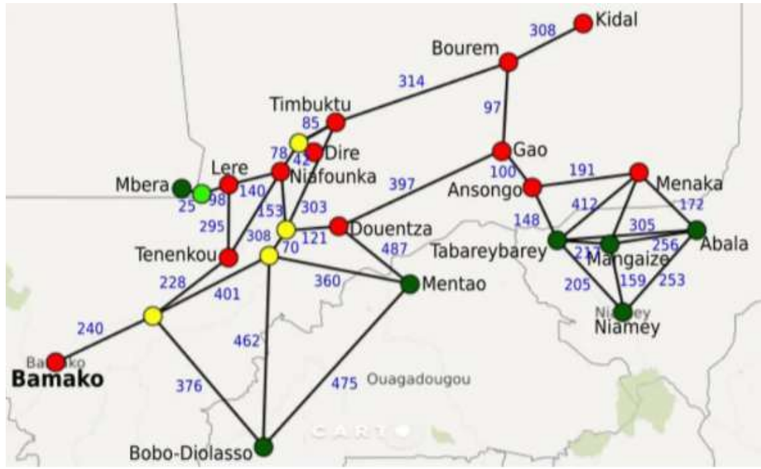
GIS applications

- Urban Sprawl / urbanization
- Poverty / wealth mapping

Monitoring people at risk:

- Landslides
- Earthquakes, Tsunamis
- Disease spreading
- Storm surges / River floods
- Tropical cyclones
- Droughts
- Refugee movements

https://www.pix4d.com/blog/drone-map-refugee-camp



https://www.nature.com/articles/s41598-017-13828-9/figures/2

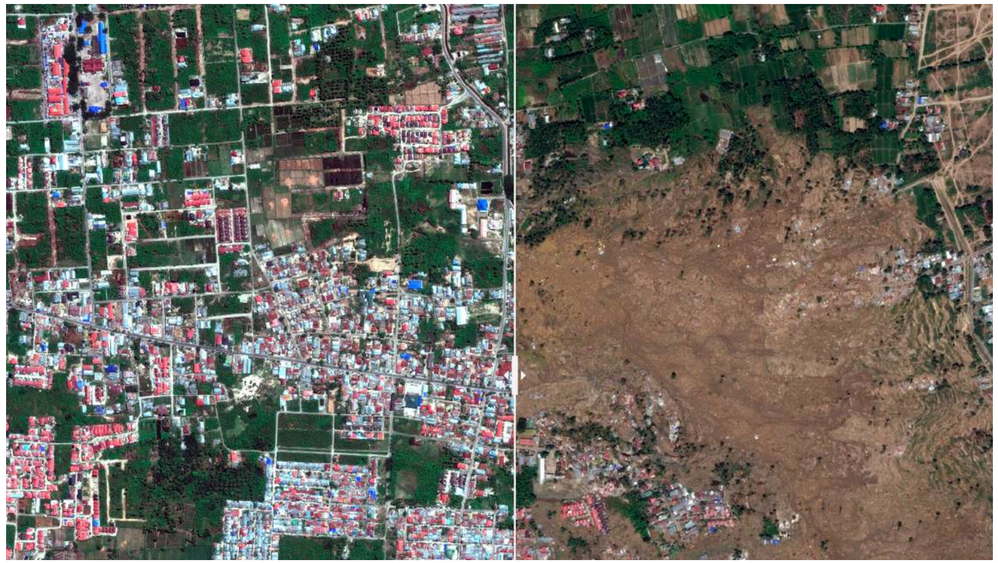
GIS in Disaster Risk Management

GIS applications Example

Building detection with Artificial Intelligence.

https://laptrinhx.com/the-open-cities-ai-challenge-2367507709/

Losses can be estimated quickly after a Catastrophic event.



https://www.thenationalnews.com/world/asia/devastation-of-indonesia-s-earthquake-and-tsunami-shown-in-satellite-photos-1.776196

Facilitating AI Technology and GIS

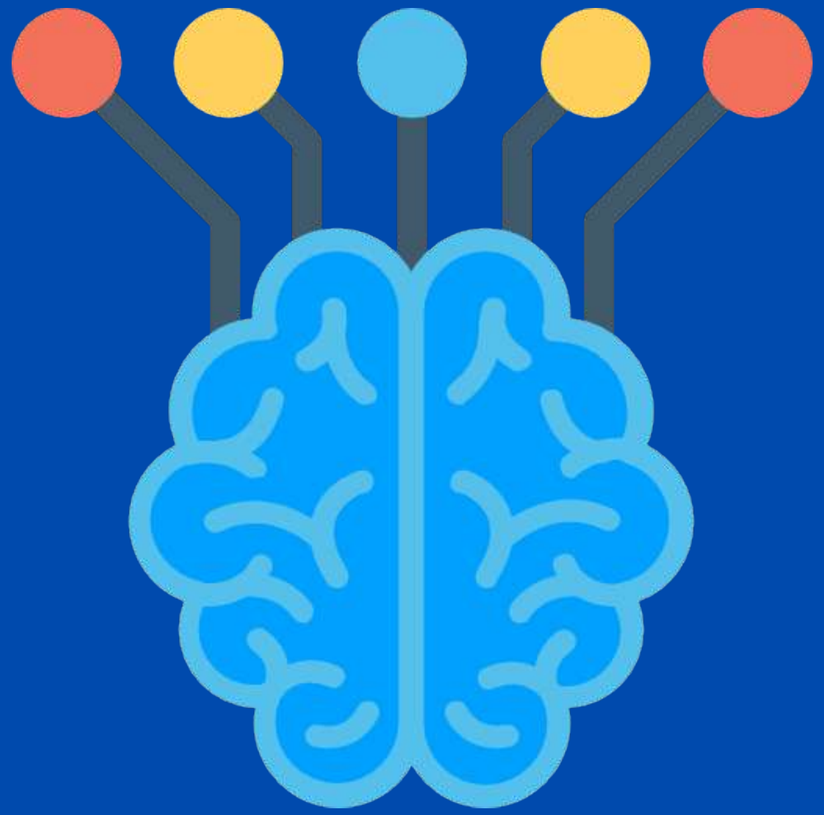
Enabling this technology

- GIS is currently the **core technology** in DRM.
- Utilizes cutting-edge Machine Learning algorithms for deeper analysis and better prediction models.
- Systems for rapid emergency response.

Key Considerations

- Requires support of technical specialists and high-quality data.
- Data availability and computational power of great importance.

NATURAL LANGUAGE PROCESSING



Describes a subfield of linguistics, computer science and artificial intelligence concerned with the interactions between computer and human language.

Google Search queries, text messages, news items, social media posts, forums, documents, etc.

- 70% - 80% of ALL data is text data.
- Text can preserve most complex and critical information.
- Text data can be historical or real-time data.

NLP IN DEVELOPMENT CONTEXT

Information Extraction:

(Project) Documents are long and complex: NLP algorithms can facilitate rapid assessment and information retrieval.

Text Classification:

- Map national development plans to SDGs to broaden understanding and increase accuracy.
- Automatically categorize project documents.

Text Generation/Summarization:

Automatic Summarization of long and tedious text sources and documents.

Question Answering Chatbots and Translation:

- Chatbots for emergency communication and Question Answering.
- Encompassing 193 member states, machine translation is a key factor for UN’s daily activities.

NLP APPLICATIONS IN DISASTER RISK MANAGEMENT

Detect and predict disaster events:

- Using Tweets and social media exchanges to detect sub-events during a disaster.
- HealthMap: Detect outbreak and spread of diseases by analysing discussion in online forums.

Increase situational awareness:

- Analyse Twitter for in-situ information after earthquake in Haiti in 2010.

Gather actionable information.

- Analyzing #PorteOuverte during Paris terror attacks to classify whether the tweet is relevant and contains actionable information.

Assess public sentiment.

- Analyse social media to detect sentiment in population towards a specific issue, e.g. elections.

Underlying theme: Process and extract information from unstructured sources.

NLP APPLICATIONS IN DISASTER RISK MANAGEMENT

Key Considerations:

The main impacts are achieved in the fields:

1. Information Extraction from semi-structured text sources.
2. Supporting different languages (machine translation) to reach more communities and people.

Note:

- As an additional advantage both do not require sensitive data.
- Language of study matters: Findings of English based study may not always be relevant for disaster responder.

Wrap up - Next steps

- Interviews with partners and domain experts (ongoing)
- Written Landscape Study for Review
- Onboard data science online volunteers for technology scoping
- Kick-off technology scoping
- Next round of presentation/webinars early 2021

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Thank you!

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