GLOBAL LOGISTICS CLUSTER PREPAREDNESS

The Global Logistics Cluster Platform and Data Team Strategy

Introduction
Imagine you are rolling out a new supply chain in your global supply network in a new country. Your programme colleagues request your supply chain expertise to design the most efficient and effective project. Imagine this under the time and cost constraints of a sudden-onset emergency. Now, imagine something that sits on your laptop, iPad, mobile phone – that is ready to research relevant information on command. It would help you make decisions based on past sourcing, shipping and distribution patterns. It would tell you how historic disaster risks in the region could impact your envisioned supply chain, it would tell you where best to locate your facilities and capacities to operate quick and cheaper. It would give you insight to plan, schedule and route your distribution assets. It would help you design and analyse KPI’s of your logistics channels within your supply network. What if such a tool would be shared between preparedness and response actors, from your organisation to governments and local private and development sectors. Evidence based-decision making sounds great, and it is great.

To generate such actionable information (ability to make informed transportation and logistics decisions), effective management of big data is needed. We would need a repository of integrated data, and a team with multiple skillsets such as deep analytical skills, data science, computer science expertise, subject matter expertise that can take domain knowledge of an industry/function and be able to translate through heuristics for wider consumption. Defining what data is needed, where and how to find and get it and how to govern the process, are the foundational enablers of such a system.

Most organisations already have most of this data within their own walls. Effective strategies, technologies and infrastructure for gathering, managing, leveraging and disseminating high-velocity, high-variety and high-volume of data is necessary to produce actionable insight, risk analytics, enhance planning, decision support, optimisation and overall data processing automation. Spatial analytics, dynamic mapping, visualisation, real-time GIS and imagery integration is a prerequisite to leverage data for supply chain networks.

The Logistics Cluster Preparedness Platform (ArcGIS/ESRI)
The Logistics Cluster Preparedness Platform is a niche innovation to address this challenge. Multiple structured, semi-structured and unstructured datasets exist separately. Integrating datasets into a master network dataset, has already allowed information to be accessible 24/7 and shown ways to leverage data to improve global logistics planning. The Platform already contains over 20 datasets ranging from global logistics baseline datasets to historic cyclone and earthquake risk overlays. This increase in visibility is breaking down data silos whilst building cross-sectoral bridges and changes the border between preparedness and response coordination. Allowing for direct field to platform update for rapid assessment and analysis, sharing resulting insights with all stakeholders including self-service analytics will lead to improvements to the preparedness and response system.

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The LC Data Team Concept
The LC has a fair amount of historic data mainly captured on the Relief Item Tracking Application (RITA). Recently data was extracted from RITA for the multimodal network model being built on the LCPP. Data was modelled and visualised in different ways, using the LCPP (eg. Haiti response timeline – dynamic map populating with logistics access constraints as data occurred and supply chain rollout (hubs, logistics modalities and delivery locations/demand fulfilment) and Tableau (showing storage and dispatch/delivery data in multiple graphical forms with analysis interfaces). This exercise together with the network model of Haiti (sans- logistics cost data and actual delivery timing data, as they were not yet available), have given new perspectives to supply chain analysis of the response and planning for preparedness and response scenarios.

Data Team Composition
A potential LC Data Team would need to consist of cross-sectoral experts that could perform data sourcing, preparation and exploration, visualisation (interpret and translate), and build model libraries for global scenario planning. Expertise would consist of data engineers/scientists to access, clean and input large sets of data for model building, supply chain experts for their experience and understanding of supply chain requirements, policies, contracts and priorities – the heuristics required to rationalise and humanise the data. Application Programming Interfaces (API) between selected supply chain systems (eg. RITA) would allow the LCPP to integrate supply chain rollout in a response country as it happens. Collaboration through annotations and discussions by the data team would then be able to analyse the logistics response in real-time and provide operational insights for supply chain reconfiguration based on optimisation outputs eg. optimised routing, hub locations etc. underpinned by cost saving and time saving calculations.

Data Team Output
The data team would then produce flexible reports and dashboards for an ongoing operation and post-operational analytics. Analytics reporting of this nature are a natural progression to accompany the current lessons learned reporting. Such insights, techniques and data models would then be used towards future preparedness supply chain scenario planning. This would result in more lives being saved at a more effective and in a more efficient fashion. Supply chain transparency and funding accountability would then be improved. The above is possible through a combined approach of advanced and predictive analytics eg. geo-analytics and modelling (core-functions of the LCPP), and graphical analytics (eg. Tableau)

Four factors determine the depth of insight that can be drawn from supply chain analysis:
1) The collective skill of the data team (technical and supply chain operational knowledge, cross specialisation collaboration and ideation);
2) How much data is available;
3) The quality of the data;
4) The tools used for the analytics exercise;

Types of Models
Listed below are two basic types of models and their benefits to a logistics system:
1) Simulation models: a model created based on the real world that you can perform experiments against to see how changes made to the model could affect dynamics of a logistics system eg. Costs, effects on KPI’s, response times etc.
2) **Optimisation models**: a model used to offer the best/optimum solution based on mathematical formulas/linear programming (assumptions and data only – no subjective input) eg. With a goal of cost minimisation, it could determine optimum warehousing patterns, linking supply and demand limitations etc.

For a successful Platform, three factors should be determined:
- **Flow**: how the platform allows the joint-creation of value through exchange/collaboration
- **Connection**: how collaborators can plug-in to the platform and share/transact
- **Gravity**: how the platform is perceived and attracts users and collaborators

*Innovation can help deliver humanitarian and development solutions that are cheaper, faster and more effective.*

**GLC Master Data Model and Strategy**
At present, useful data remains siloed within and between sectors. A **centralised lens from which each sector can plan and respond, remains something to be achieved**. Understanding the potential and actual impact of disasters on local populations and supply networks servicing them, is critical to effective preparedness actions, providing humanitarian assistance and development action. To do this we are reliant on availability, accuracy and utility of data as well as tools that can handle such data in velocity and volumes that it may arrive. A **strategic data model that allows for multiple stream data integration, processing and visualisations, allows us the right balance between network analysis and spatial analysis**. It is imperative that such tools have the correct level of data rules, relationships and security for tool system and output integrity.

**Persistent Data Gaps**
Many data gaps exist, which leads to need for **data preparedness** (prior to a disaster), predetermined secondary **data channels** (immediately after a disaster has occurred and beyond) and continuous update and **utility verification** of incoming data volumes. Multiple source input (inclu. from all in the GLC stakeholders ecosystem – Ref. GLC Preparedness Strategy Note 2016/ GLC Preparedness Platform Concept Note) and data partner agreements make the task easier. The more geo-referenced secondary and primary sources available (existing supply chain baselines, historic risk related vulnerabilities, socio-economic information, population movements, impact severity, critical infrastructure, logistics capacity, live feeds, targeted assessments, social media, drone and satellite imagery etc), given that correct sources are chosen and data channel signal tested during the data preparedness phase, the higher the information output can be expected. Once combined with responder/planner experience, knowledge and insights are produced from a solid analytical foundation. **It is imperative that a toolset be able to rapidly consume and digest chosen data streams to allow for cross-sectoral insights.** Such data and information is already being stored and integrated on a **GLC repository** where it is ready-to-map and disseminate. All partners are able to populate the system (verification/clearance and firewalling is possible), including Government data (where available).
**Overall Aim**

The aim is to assist national disaster management GIS divisions within governments to embed such a toolset (IT investment, training and updating are required). With pre-agreed, harmonised and streamlined data flows to the LCPP, the most up-to-date and accurate dynamic picture can be shared amongst the GLC stakeholder ecosystem (humanitarian partners, governments, private sector, development sector) as appropriate and agreed. This results in stakeholders assessing risk commonly and jointly developing analytics based mitigation, preparedness and response strategies. Digitised collaboration with set parameters can automate input and output products through API’s, increasing the flow of life saving information.

**Example**

An actual example being tested for development is with the Fijian Roads Authority (through the WFP Pacific Preparedness Project) which has been mapping road, bridge, port, jetty and infrastructure expansion projects on an ArcGIS server, which is now shared with the LCPP. When the FRA or field mapping partner updates their critical infrastructure, access constraints data is immediately available on the LCPP. Pacific response partners have also mapped out humanitarian aid stockpiles which are geo-located on the LCPP. Possible next steps: Similarly, when logistics capacities and critical assets are mapped out – and Fiji is at risk of an imminent hurricane, the LCPP can automate analysis and produce a product of which supply chain assets (logistics capacities and critical infrastructure) are at risk in the projected storms buffer zones. This could activate equipment and supply prepositioning in non-risk areas or secure structures within risk areas for faster response. Projected demand data can be incorporated to allow supply chain service area visibility, logistics channel optimisation between stockpiles, storage locations, routing, markets, population movements and congregations (data partner agreement and strategic data alliances pending). Post-storm passing through, rapid assessment data from remote sensor networks (eg. Drones, HOT-OSM) can swiftly conduct impact analysis of the situation so that all are informed of the current situation whilst access constraints are calculated into the routing and service area analysis reports.

**Graphics/maps below:**

1 – Network Model Strategy/Capability
2 – Network Model + recent response supply chain (Haiti – RITA data)
3 – Supply chain network model + historical natural hazard risk/exposure
4 – Tableau graphical representation of RITA data
5 – Operational Analysis Portal – with logistics datasets on the right

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