

BIG DATA ANALYTICS FRAMEWORK FOR NATURAL DISASTER MANAGEMENT IN MALAYSIA

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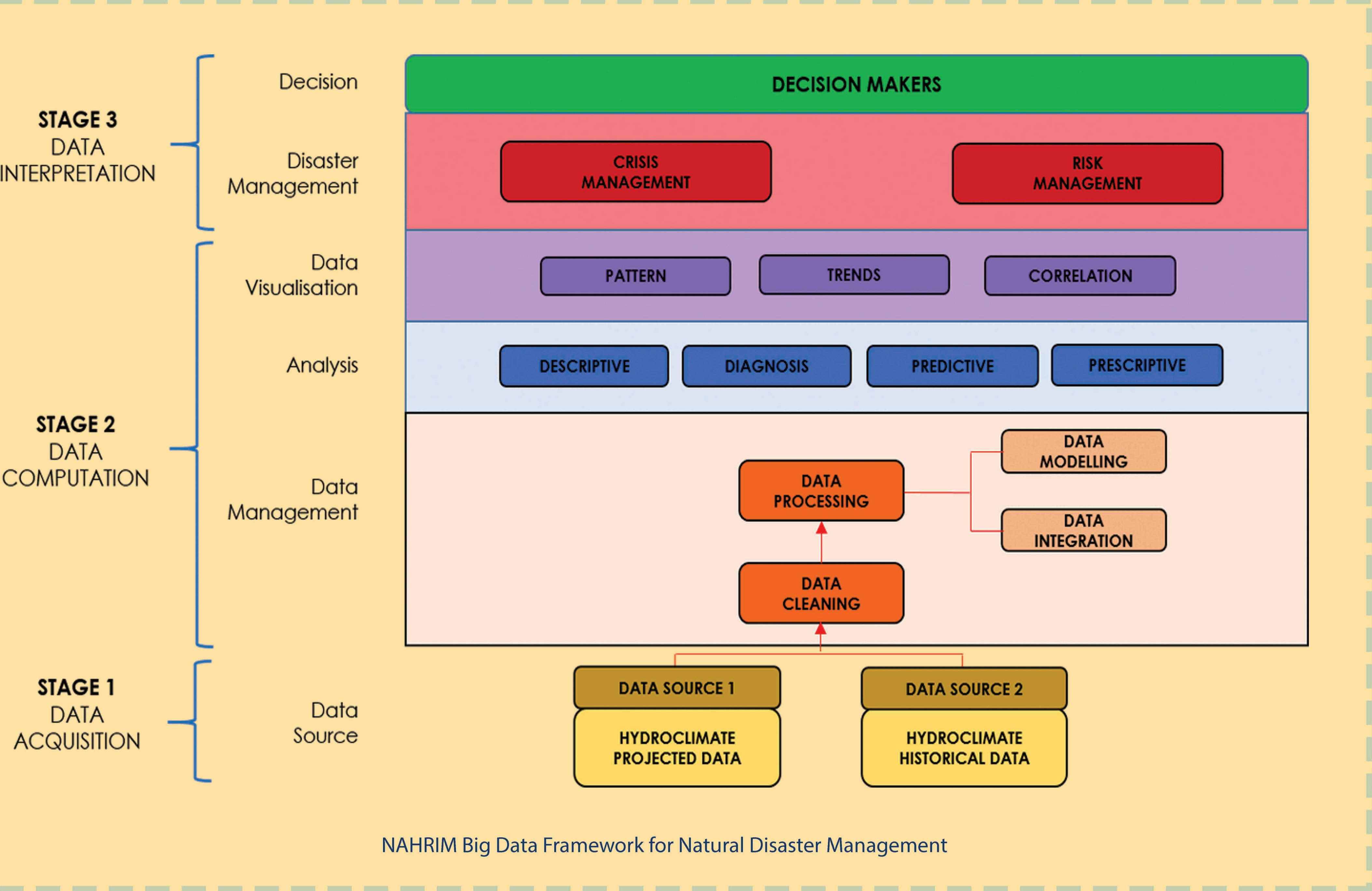
INTRODUCTION

Issues of heterogeneity of reliable data sources during the period of crises and disasters requires advanced and systematic analysis approach to execute disaster management plan.

The data received need to be analysed thoroughly as an input to decision makers to made precise decisions in limited and ad-hoc time manner.

National Hydraulic Research Institute of Malaysia (NAHRIM) is called to formulate a framework for natural disaster management using Big Data Analytics (BDA) technology to analyse hydroclimate data to gain meaningful insights.

PROPOSED BDA FRAMEWORK



BACKGROUND STUDY

1965-2016 : 76 disasters has been recorded in Malaysia including wildfire, storm, landslide, mudflows, epidemic, tsunami, drought and more than half of the disasters were flood related hazard.^a

Disaster management is the management of the risks and consequences of a disaster in order to reduce or to avoid potential losses from hazards.^b

Decision making in government usually takes much longer and is conducted through consultation and mutual consent of a large number of diverse actors including officials, interest groups and ordinary citizens.^c

Natural disaster requires a different analytic approach either because their probability of concurrence is very low or it is difficult to foresee by normal strategy processes.^d

BDA exploitation can help local government to allocate resources where they will have biggest impact and restructure services in such a way that early prevention is prioritised to avoid the need for more expensive interventions.^e

Challenges to overcome : Wide technology gap between industrial applications and decision makers.^f

Data sharing among different public agencies and departments.^g



Example of NAHRIM BDA POC interfaces

NAHRIM BDA PROOF OF CONCEPT

BDA - Digital Government Open Innovation Network (BDA-DGOIN): strategic collaboration between Malaysian Administrative Modernisation and Management Planning Unit (MAMPU), Malaysia Digital Economy Corporation (MDEC) and MIMOS Berhad in 2015.

Four public agencies with five pilot projects were selected to develop Malaysia Proof of Concept and NAHRIM was one of them titled **Projected Hydro-climate Data Analysis and Visualisation for Potential Drought and Flood Events in Peninsular Malaysia**.

This system was able to : Visualise 3,888 grids of Peninsular Malaysia. Detect extreme rainfall and runoff projection data for 90 years.

Identify flood flow for 11 rivers basins, and 12 states in Peninsular Malaysia.

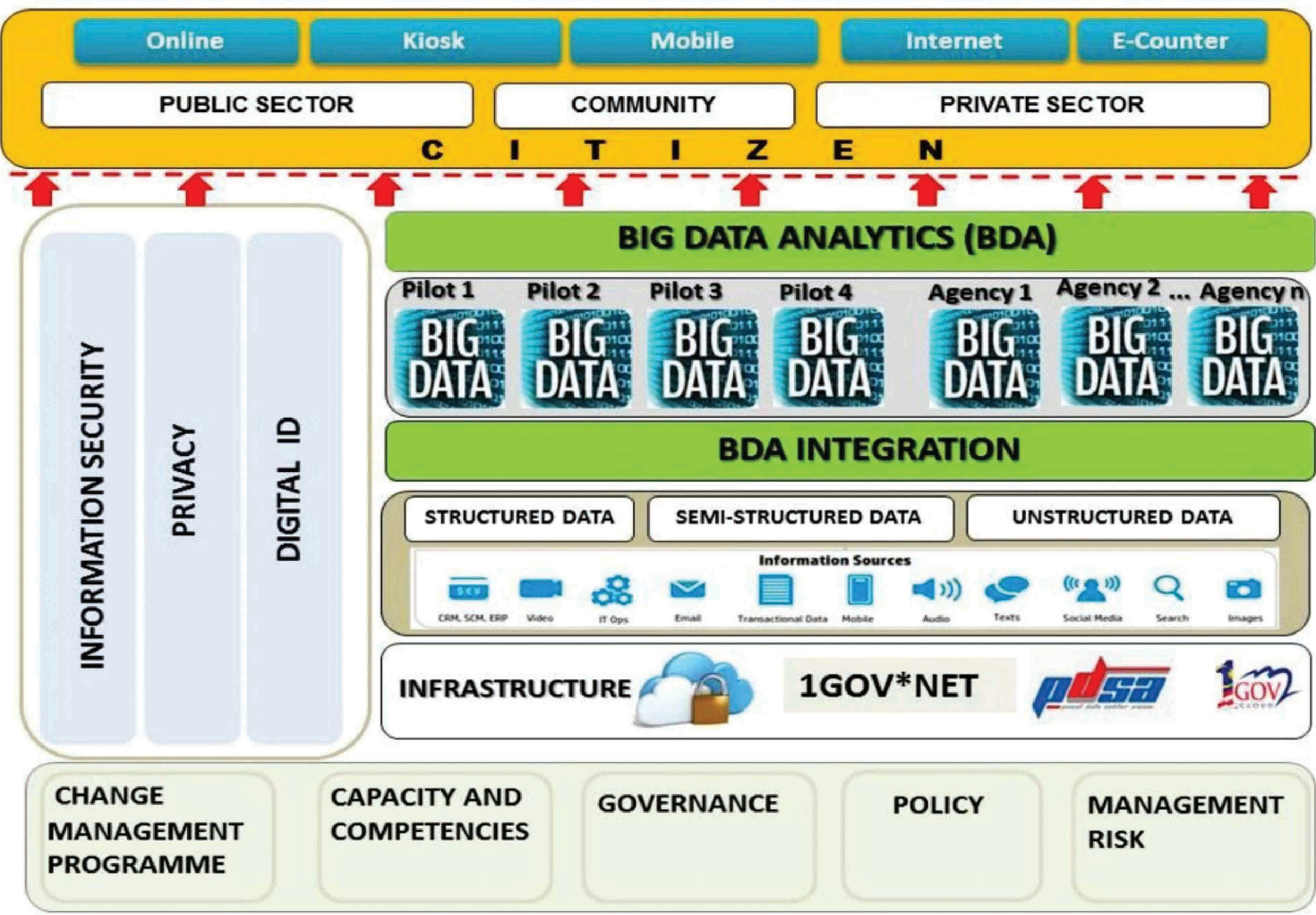
Trace drought episodes from weekly to annual rainfall data for 90 years.

CONCLUSIONS

Exploiting government data to their full potential by leveraging the benefits offered by Big Data Analytics will give impact in prevention, mitigation, preparation, adaptation, response, and recovery of disasters.

Process of analysing hydroclimate data requires tools to speed up the process of accelerating data computation as a fundamental of BDA that support disaster management in Malaysia.

This framework also hoped as guideline to help other government agencies and departments for creating their own data-driven decision making.



^aAmin, M.Z.M. (2016). Applying Big Data Analytics (BDA) to Diagnose Hydrometeorological Related Risk Due To Climate Change. GeoSmart Asia, [online] Available at: <http://geosmartasia.org/presentation/applying-big-data-analytics-BDA-to-diagnose-hydro-meteorological-related-risk-due-to-climate-change.pdf> [Accessed 1 November 2016].
^bOthman, S.H. and Beydoun, G., 2013. Model-driven disaster management. Information & Management, 50(5), pp.218-228.
^cKim, G.H., Trimi, S. and Chung, J.H., 2014. Big-data applications in the government sector. Communications of the ACM, 57(3), pp.78-85.
^dKaplan, Robert S., and Anette Mikes. 2012. Managing Risks: A New Framework. Harvard Business Review 90, no. 6.
^eMalomo, F. and Sena, V., 2016. Data Intelligence for Local Government? Assessing the Benefits and Barriers to Use of Big Data in the Public Sector. Policy & Internet.
^fTekiner, F. and Keane, J.A., 2013, October. Big data framework. In Systems, Man, and Cybernetics (SMC), 2013 IEEE International Conference on (pp. 1494-1499). IEEE.