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“Adapting C2 to the 21st Century”

Developing a Horizon Scanning System for Early Warning

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Abstract

In Singapore we have embarked on a Horizon Scanning Initiative to provide the concept, theory and technology enabler for making sense of the vast amount of available data for early warning. Our system is premised on three principles: (a) Technologies are to augment Human and team in the sensemaking process and the needs to b) move beyond data sharing to perspective sharing and (c) to move beyond mere search towards data analytic and data structuring services. We have completed the development of a Service Oriented Based Horizon Scanning Architecture (SOSA). SOSA enables collaboration across agencies and allows data and tool in different agencies to be treated as web services that are discoverable, sharable and can be orchestrated for analysts' consumption. The perspective sharing services allow multiple analysts from different agencies to meta-tag and add comments to incoming data set which could then be visualised and can serve to amplify outliers and allow users to avoid getting blind-sided through premature convergence. The data structuring services enable building of system map with associated consistency matrix and to perform automated morphological analysis. This paper will explain the imperatives of the Horizon Scanning Initiatives, SOSA and the perspective sharing and data structuring services.

Preliminary Outline

Imperatives of Horizon Scanning Initiatives

Increased tempo and complexity in our current operating environment requires an improved horizon scanning capability across time and space to provide early warning. In Singapore we have embarked on a Horizon Scanning Initiative to provide the concept, theory and technology enabler for making sense of the vast amount of available data for early warning. This paper focuses on the technology aspect of the Singapore initiative.

Premise of system

Our technology initiative is premised on the following three principles: (a) Human is key to this sensemaking process and technology serves to augment the human. More importantly, it is not just human from a single agency but team of human from multiple agencies that need to be augmented. Multi-agency team is required to make sense of data from multiple perspective and experience. (b) We need to include not only data sharing but also perspective sharing in the system and (c) We need to build upon data management technology and move towards data analytic and data structuring services. Data analytic helps the analyst to do more analysis beyond pure search while data structuring helps analyst to develop model of past and future events. The model can then be used to provide context to interpret incoming data stream.

Service Oriented Based Horizon Scanning Architecture (SOSA).

We have successfully completed the development of a Service Oriented Based Horizon Scanning Architecture (SOSA). The architecture sits on a physical network connecting the various agencies involved in our pilot phase of the project. SOSA enables collaboration among human analysts in the different agencies. It also enables data and tool in different agencies to be consumed as services so that they are discoverable and can be orchestrated.

Figure 1 shows the orchestration interface which display the data, tools and visualization service available to the human analyst for orchestration.

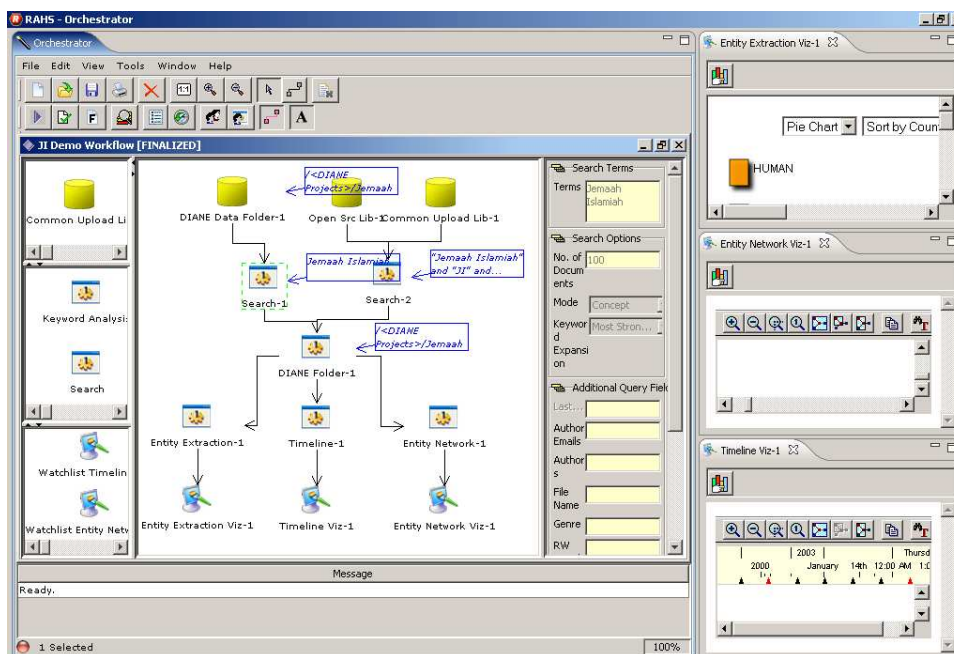


Figure 1: The User Interface for the Orchestration Software

Perspective Sharing and Data Structuring Services

We are currently integrating services to provide perspective sharing and data structuring capabilities into SOSA. In perspective sharing, a service we are implementing is to allow multiple analysts from different agencies to meta-tag and add comments to incoming data set. These multiple perspectives comprising of meta-tag and comments from multiple agencies could then be visualised and this can serve to amplify outliers and allow users to avoid getting blind-sided through premature convergence. In data structuring, we are incorporating services to enable analyst to build model of system map with associated consistency matrix and to perform automated morphological analysis. SOSA enables collaborative modelling effort and this allows users to connect across silos and challenge previous assumptions. Model monitoring service is to be provided to enable matching with incoming data stream and to allow the human team to explore the interpretation and implication of the data.

Conclusion and the Way Ahead

This section describes the lessons learnt from the projects and the way ahead for the system