

# Share and share alike

Following the exploration of basic principles behind data sharing covered in the last edition of *Police Product Review*, **Becky Ward** delves deeper into architecture and initiatives currently being used in the US to ensure standardisation of data exchange

**A**t the most fundamental level the goal for any data sharing project should be to increase operational awareness that enhances decision making. This is accomplished by procuring the right applications from the right service providers; utilising the right analytical applications for data mining or query; and using the right workflow tools for collaboration, dissemination and work management.

One caveat to keep in mind when contemplating a data-sharing project is that the technology will be the easiest part of the equation. The policies and governance will be the most challenging and the hardest on which to gain consensus. It is vital not to overlook all of the nuances of governance when contemplating a data-sharing project.

While integrated data is useful for local analysis and intelligence, it has no value if it cannot be accessed in a timely manner. In much of the world today, access to routine law enforcement data stops at the border with the neighbouring jurisdiction. Detailed below are different models currently in use to provide data sharing – along with some of the economic, technical and operation considerations (pros and cons) that must be taken into account.

jurisdiction, such as all cities within the geographic boundaries of a county (or province, as in Canada).

Counties purchase computer-aided dispatch and record keeping software, and invite or coerce all cities within their jurisdiction to use the database. This 'centralised' system can take the approach of 'single system, single domain' or 'single system, multiple domains'. Of course, there are still data entry and data accuracy challenges, but data is more easily shared.

#### *a) Single system, single domain*

One example of this architecture is the Royal Canadian Mounted Police's national Niche Records Management System (RMS) that allows some data entities to be common (for example, persons), while ownership of other data (for example, reports) remains with the originating police service. This approach provides sufficient inter-service isolation to facilitate normal police operating procedures while presenting a province-wide master-filed view of persons, vehicles and other similar data.

## Current models of data sharing

### **Multiple similar silos**

Several solution providers have sold a concept that is, at best, weak data sharing. They propose to have all agencies within a jurisdiction using the same software, provided by the same service provider yet operating completely independently. While this does not automatically provide the ability to share data, it can more easily be made to do so (if web access or some other means is made available) as all users are familiar with the software's layout and search mechanisms.

One consistent problem with this approach is that different entities may be on a different version of the application software or operating system, or may be using different hardware. They may also have different interface needs. Any of these issues could be the 'fly in the ointment' that impairs reliable and consistent data exchange. Any asynchronous upgrades could also potentially disrupt service.

■ **Pros of this method – local control is maintained and it is better than no data sharing at all**

■ **Cons of this method – probably no economic advantage for smaller agencies and may carry implementation and maintenance charges; may be challenges to overcome regarding the issue of 'data ownership' and the willingness to actually share information**

### **Single system and single or multiple domains**

One of the more common methods for information sharing is for centralised systems to be used by all agencies within a certain

■ **Pros – in a multi-jurisdiction environment the parent agency has the ability to negotiate a more favourable contract with the service provider as they now represent a much bigger customer. This is usually very economically advantageous for the smaller agencies, as well as the group as a whole; depending on governance agreements, there may be benefits in consolidation of IT staffing dedicated to network and application support issues; searches are performed in real time.**

■ **Cons – the smaller entities may**

**'Technology will be the easiest part of the equation. Policies and governance will be the most challenging'**

have to acquiesce to the functional and procedural desires of the governing entity; loss of historical data if no data conversion is planned; smaller entities may have to use applications that are not well suited to them (but rather better suited to the larger agency)

*b) Single system, multiple domains*

An example of this architecture is the Niche RMS in the province of Ontario, Canada. The Ontario Police Technology Information Cooperative (OPTIC) system includes roughly 8,300 officers from 43 different agencies. The largest participant is the Ontario Provincial Police with about 5,400 officers. All share a single Niche RMS installation.

■ **Pros – configuration options and business processes are controlled at the local level; local control over data shared at the granular level; data can be queried by all users**

■ **Cons – does not by itself facilitate data sharing outside the system; technically feasible to scale system to virtually any infinite size, yet politically would be very difficult**

### Data warehouse model

The data warehouse model is one in which all agencies contribute to a centralised server usually housed at one of the participating agencies. Data is thus queried from a single location (compared to the so-called federated model where data is queried from multiple locations in parallel).

This data repository must have a manager to ensure the data is kept clean – that master indices are indeed master and the inevitable duplication of records is kept to an absolute minimum.

The software must have a way to deal with errant records by merging, unmerging, purging and expunging.

■ **Pros – queries are usually fast; many contributors provide richer data; data providers can exercise control over**

DATA FEDERATION	DATA WAREHOUSE
No centralised database; data resides at the agency	Data is copied to the warehouse
Data is always up to date	Data may be stale depending on upload schedule
Manager required at local level	Additional manager at warehouse
Agency owners have significant control	Agency data owners have some control
Queries are fast	Queries can be slow
May have to aggregate data for analysis	Great for data mining over larger geographic area
Example: Department of Justice's OneDOJ	Example: FBI National Data Exchange (N-DEx)

**contribution; massive amounts of data can be aggregated so it is great for data mining**

■ **Cons – traditionally has been significantly more susceptible to corrupted data; data is stale (not real time); economic impact of maintaining the warehouse and managing the data**

### Head to head

The differences between data queried from multiple locations in parallel (data federation) and data copied to a central warehouse (data warehouse) has been characterised by Ohio-based software development company Sypherlink, the chief architect of the Florida Department of Law Enforcement's Regional Law Enforcement Exchange (RLEX), in the table above.

A few rules for information sharing might be to: address governance first, work out the architecture and technical issues next, plan to keep the data clean and uniform, concentrate on query capability, develop an equitable financial plan, and do not forget

## A new way to interface systems: NIEM

There are a plethora of other initiatives underway in the US to make data sharing more effective and efficient on regional, state and national levels. Momentum is gaining for nationally accepted data exchange standards such as the National Information Exchange Model (NIEM), which has greatly excited the solution providers as well the agency practitioners. NIEM promises standardisation of data exchanges which should:

- make them less expensive to develop, implement and maintain;
- increase interoperability between agencies and other entities;
- enhance the common operating picture during times of normality and emergency;
- provide better, richer and faster information.

### What is NIEM?

NIEM began as a partnership between the US Department of Justice and the US Department of Homeland Security with the first release in early 2005 and the second release – called 'Harmony' – in mid-2007. NIEM is an interagency initiative encompassing local, state, tribal and federal entities providing a foundation for seamless information exchange. It has merged or incorporated many previously used reference models. There was universal agreement that in detecting, preventing and investigating crimes, disasters and terrorist acts the exchange of information among multiple agencies must be timely, accurate and highly automated.

NIEM provides a framework to bring stakeholders and communities of interest together to identify information sharing requirements for both day-to-day operational and emergency situations. Its stated mission is to develop standards, a common lexicon, and an online repository of information exchange package (IEP) documents to support information sharing. It also provides technical tools to support development, discovery, dissemination, and re-use of exchange documents.

NIEM, quite simply, is designed to develop, disseminate, and support enterprise-wide information exchange standards and processes that can enable

**'There was universal agreement that in detecting, preventing and investigating crimes, disasters and terrorist acts the exchange of information must be timely, accurate and highly automated'**



**SEVEN DOMAINS OF NIEM:** This graphic shows the seven domains of the National Information Exchange Model (NIEM) that share a common and universal core. NIEM aims to provide a framework for existing data exchanges to be re-used and adapted to allow integration between local, state and federal organisations

jurisdictions to effectively share critical information in emergency situations, as well as to support the day-to-day operations of agencies.

In the past, information exchanges have been developed specifically for each unique situation and have often been bound by technology currently in use to that specific scenario.

NIEM will ultimately provide a framework to ensure that information exchanges are easily re-used, adapted, and made available to allow additional partners to engage with minimal redundancy.

The graphic above shows how the domains share a common and universal core. This core contains data elements that have been determined to have the same meaning across all domains, and reflects information about people (persons and organisations), things (property and metadata, for example), places (locations) and events (activities).

**What NIEM is not**

Misunderstanding of NIEM has resulted in the misperception that conforming to NIEM would force a solution provider to change or re-engineer the underlying records database. This is not true. NIEM is a data dictionary of

**‘Past information exchanges have been developed for each unique situation’**

agreed-to terms and definitions; an object-oriented data model providing components for creating IEPs; a set of rules for building NIEM components and IEPs; a clearinghouse of re-usable IEP documentation; a library of supporting documentation; tools, training, knowledge centre and help desk; a program providing leadership and governance; a partnership of local, state, tribal and federal organisations; and, finally, it is practitioner driven.

NIEM is not a database schema or just a data dictionary; only applicable to the federal government; a programming language; and, finally, it is not a replacement for interagency agreements, business rules and policies.

Examples of projects embracing NIEM are:  
 ■ the Florida Law Enforcement Exchange (FLEX), which includes development of a NIEM compliant data model and IEP

documentation (more at [www.sypherlink.com](http://www.sypherlink.com))

■ the Federal Bureau of Investigation (FBI), which has released the preliminary IEP documentation and schema for its National Data Exchange (N-DEX) consistent with NIEM (more at [www.fbi.gov/hq/cjisd/ndex/ndex\\_home.htm](http://www.fbi.gov/hq/cjisd/ndex/ndex_home.htm))

■ the New York Division of Criminal Justice Services, which utilises NIEM to implement all Criminal Justice Information System (CJIS) information exchanges (more at [www.nga.org/files/pdf/0801NIEMNY.PDF](http://www.nga.org/files/pdf/0801NIEMNY.PDF) and ([www.criminaljustice.state.ny.us](http://www.criminaljustice.state.ny.us)))

The US federal government supports NIEM at both the Department of Justice and the Department of Homeland Security. In fact, the government is providing billions of dollars in grant funding with the stipulation that agencies require their service providers to be NIEM conformant when designing data exchanges.

■ For more information about NIEM visit [www.niem.gov](http://www.niem.gov)

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