Information Sharing for e-Government

Countries' experiences

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Countries' experiences

1. Frameworks and architectures

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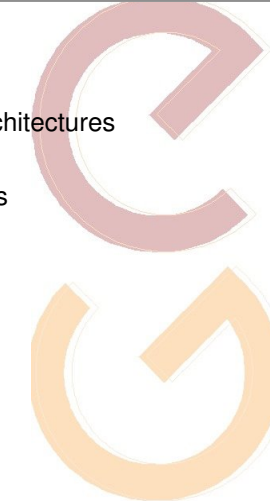
Interoperability approaches

- there are two solution approaches to interoperability
  1. frameworks
  2. architectures

United Kingdom – e-GIF

Germany – SAGA

Hong Kong – HKSAR Interoperability Framework

United States – FEA

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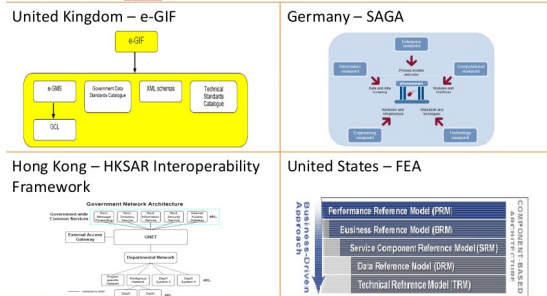
Interoperability Framework

- is a set of standards and guidelines that describes the way in which organizations have agreed, or should agree, to interact with each other
- it must define global interfaces using open standard protocols, common data specifications, common process models and service interaction policies

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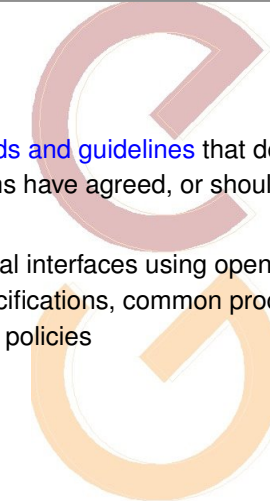
Interoperability Framework

- examples
  - e-GIF – e-Government Interoperability Framework adopted by the Government of United Kingdom `http://www.govtalk.gov.uk/schemasstandards/egif.asp`
  - HKSARG Interoperability Framework adopted by the Government of Hong Kong SAR `http://www.ogcio.gov.hk/eng/infra/eif.htm`
  - European Interoperability Framework defined by the European Union to support the delivery of pan-European e-Government services `http://ec.europa.eu/idabc/en/document/3473/5585`

Enterprise Architecture

- is a rigorous description of the structure of an enterprise, its decomposition into subsystems, the relationships between the subsystems, the relationships with the external environment, the terminology to use, and the guiding principles for the design and evolution of an enterprise
- this description is comprehensive, including enterprise goals, business functions, business process, roles, organisational structures, business information, software applications and computer systems
- an enterprise architect is a person responsible for developing the enterprise architecture and is often called upon to draw conclusions from it. Thus, architects are providing a tool for identifying opportunities to improve the enterprise, in a manner that more effectively and efficiently pursues its purpose

Enterprise Architecture

- examples
  - Federal Enterprise Architecture (FEA) adopted by the Government of United States of America `http://www.whitehouse.gov/omb/egov/a-1-fea.html`
  - Standards and Architecture for e-Government Application (SAGA) adopted by the Government of Germany `http://www.kbst.bund.de/saga`
- corporate adoption of an enterprise architecture involve major changes in legacy information systems of its units. Its very difficult in the context of information sharing for e-government

AGIF introduction

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- The Australian Government Interoperability Framework (AGIF) was defined for ensuring that government agencies maximize the opportunities for IS, system integration and reuse
- AGIF identifies principles, standards and methodologies to support government agencies in the delivery of integrated and seamless services
- we consider AGIF as the most advanced framework because it covers not only technical aspects but also includes guides, principles, and business process of government services
- in AGIF, Information Sharing is defined as the 'cooperation of people, processes and systems to deliver seamless and customer-centric services'

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AGIF challenges

- the following challenges are recognized:
  - improve cross-agency coordination and collaboration while maintaining vertical accountability
  - deliver programs and services in a seamless manner
  - improve government's engagement with individuals
  - respond quickly and effectively to emerging issues and future crises
  - reform and redesign of government business processes
  - reform knowledge and information management practices
  - increase cross-agency integration of information technology systems

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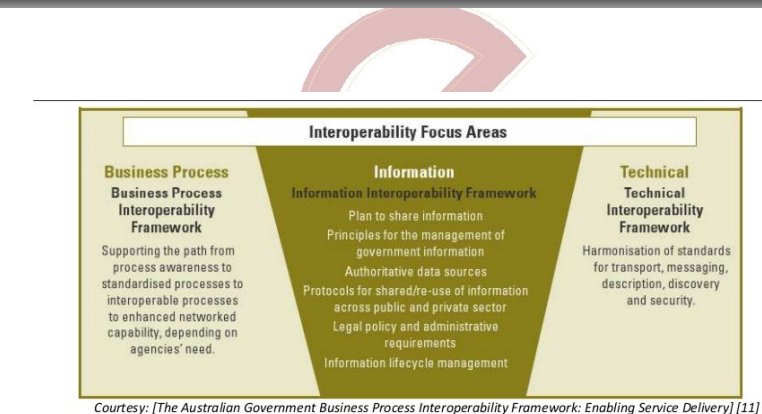United Kingdom
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AGIF benefits

- the expected benefits of IS identified by the framework include:
  - reduced costs of information collection and management through streamlined collection, processing and storage
  - improved decision making for policy and business processes resulting in more integrated planning and enhanced government service delivery
  - improved timeliness, consistency and quality of government responses - information will be easily accessible, relevant, accurate and complete
  - improved accountability and transparency for citizens
  - reduced costs and added value for government vanced framework because it covers not only technical through reusing existing information, sharing infrastructure and designing integrated, collaborative methods of delivering services
  - improved national competiveness
  - improved national security

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AGIF structure

- AGIF is divided in the following three levels:
  1. Business – comprises legal, commercial, business and political concerns
  2. Information – describes information and process elements that convey business meaning
  3. Technical – proposes some technology standards.

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AGIF structure

Courtesy: [The Australian Government Business Process Interoperability Framework: Enabling Service Delivery] [11]

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AGIF results

- the three levels support each other to facilitate the delivery of whole-of-government objectives.
- all provide the harmonization of common business processes for service delivery, provide a framework to improve the ability to access, share and re-use information, and technical standards to ensure that information and data can be shared
- AGIF has been taken as foundational stone for the Australian Government to issue the National Government Information Sharing Strategy in August 2009

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National Information Sharing Strategy

- the National IS Strategy is described at

  http://www.finance.gov.au/publications/
  national-government-information-sharing-strategy/

- the primary focus is providing a foundation for information sharing between all levels of Australian government
- makes available to all Australian government agencies best practices, policies, tools, and advice

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AGIF business level

- the Business Level is described in the Business Process Interoperability Framework (BPIF) to meet the requirement of reform and redesign of government business processes in order to ensure information interoperability
- it introduces a series of tools to assist agencies to adopt interoperability:
  1. a roadmap
  2. a capability maturity model
  3. some case studies

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Roadmap

- the roadmap provides a set of high level steps to facilitate progression towards interoperability.
- it is not pretended to be a linear process. Progress towards business process interoperability should be iterative and a constant feedback loop needs to be employed throughout each stage

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Roadmap steps

1. **plan** it enables involved agencies to properly establish the context and drivers for change, the ex- pectations of the initiative and to understand the likely challenges. Establishing these parameters early and clearly communicating them to all parties in- volved throughout the life of the exercise is a critical factor for success. Continuing to review the plans throughout the life of the exercise to ensure that the objectives, intent, goals and challenges are current is also important.

2. **agree** it gains commitment for collaboration and agrees on the arrangements. Most important points to agree are collaborative mechan- isms, standards to be used, and a communication strategy.

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Roadmap steps

3. **discover** it underlines the processes which form the basis for the collaboration. The advice is to start small in an area where there is a high level of readiness and receptiveness to sharing services and processes across internal boundaries and where results can be generated quickly. The maturity model and architecture help to guide towards these areas. Simple, low-detail mapping of processes, with only the high-level activities captured, assist with the identification of issues, participants and users at this stage.

4. **map and model** the next step is to move to a detailed mapping and modeling exercise. Critical to success at this stage is establishing a base line to analyze the impact of the proposed change. It is also critical to understand the impact of an interoperability initiative on users, both internal and external to government
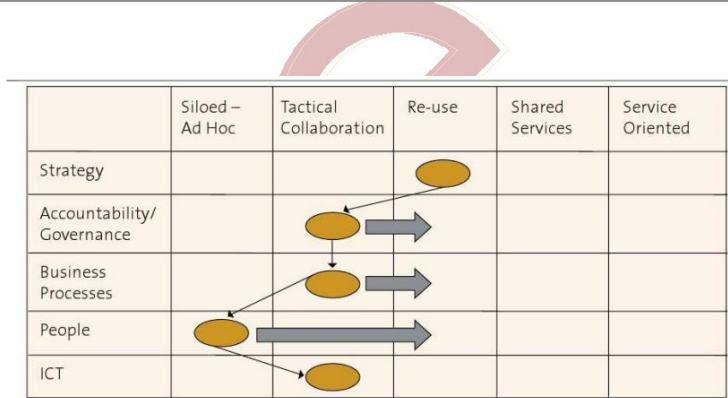
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Roadmap steps

5. **implement** – while analysis will often be performed top-down, with strategic outcomes in mind, implementation will need to be bottom-up. That is why it is critical to engage process owners, participants and users in the earlier stages. A 'no surprises' approach to planning, discovery, mapping and modeling will help to ensure the necessary support for implementing change. Events in the implementation may mean that earlier stages need to be revisited, particularly the Discover, and Map and Model stages.

6. **monitor and review** – monitoring and reviewing arrangements is a key element to ensuring the ongoing success. While it is critical to monitor the overall performance of processes, it is important to establish mechanisms which capture issues that might be harder to identify and quantify, such as user or participant satisfaction.

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Maturity Model

- the **BPIF capability maturity** model can be used by agencies to identify their current level of business process interoperability maturity and to define a strategy for achieving a desired maturity
- this proposal to understanding maturity in the BPIF has been adapted from an approach proposed by David M. Fisher (2004)
- it specifies five stages:
  1. **Siloed** ad hoc, vertical structure, agency-specific arrangements
  2. **tactical collaboration** hierarchical structure and controls, efficiency measures
  3. **re-Use** mixed structure –vertical and horizontal, some multi-agency process controls in place
  4. **shared services** mixed structure – strongly horizontal, efficiency and effectiveness are key performance indicators
  5. **service-oriented** – network structure, cross-agency controls, embedded in government business

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Maturity Model

	Siloed – Ad Hoc	Tactical Collaboration	Re-use	Shared Services	Service Oriented
Strategy			●		
Accountability/ Governance		● →			
Business Processes		● →			
People	● →				
ICT		●			

Courtesy: The Australian Government Business Process Interoperability Framework: Enabling Service Delivery [11]

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Maturity Model

- the evolution from a Siloed organization operating in a rather ad-hoc, non-strategic way towards a Service-Oriented working like whole of government enterprise is not a smooth, linear pathway
- transition from one stage to the next requires substantial investment of time and money in process management, technology and cultural change (people) over a number of years
- also important are changes in strategy, governance and accountability

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Maturity Model

- together these form five triggers for change – strategy, governance and accountability, business processes, people and technology
- these triggers provide a series of measures to determine the state of an organization at each stage along the pathway to maturity.
- measures provide agencies with a guide to understanding the relative maturity of different layers for change and will point towards areas which need to be addressed, first to achieve alignment and a consistent basis for advancing to a new state
- it will also provide a guide to identifying which areas of your agency are most likely to provide the greatest challenges in moving towards business process interoperability or undertaking a business transformation initiative

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Case Studies

- the case studies outlined in BPIF describe initiatives taken by agencies to improve business processes management and interoperability
- they demonstrate two different approaches to achieving business process interoperability
- an internal business process approach from the Department of Education, Science and Training (DEST), and a multi-agency interoperability project called Centrelink

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Case Study: DEST

- within DEST, BPM was introduced by the Information Services Group (ISG) to strengthen program staff skills in the areas of business process mapping and documentation
- DEST have introduced a three-stage approach to BPM, supported by a detailed guide for practitioners and a separate document for senior management which provides an overview and its principles

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Case Study: DEST

- a series of pilot projects were used to validate that the tools and templates developed by ISG were effective in supporting the mapping and documentation of business processes and also to demonstrate the potential broader benefits of this approach

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Case Study: CentreLink

- Centrelink established a Business Process Mapping and Modelling (BPMM) Team to assist with service delivery design and support in May 2006
- strong demand has seen the team grow since then, with a mixture of business and IT skills
- the two case studies have some com- mon characteristics, including adoption of a whole of government approach to service delivery, a focus on external accountability and a desire for greater consistency through standardization and process re-use

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Case Study: CentreLink

- the Centrelink case study demonstrates the benefits of avoiding duplication and conflicts, and the need to clarify the roles and responsibilities of agencies in modeling a multi-agency initiative
- with knowledge and understanding of its own business processes, an organization is well prepared to effectively consult with potential collaborators on streamlining processes across organizational boundaries through sharing, re-use or integration

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Principles

- aditionally to the three tools, BPIF identifies nine principles to provide a foundation for agencies to use in planning and undertaking collaboration on business processes across structural and agency boundaries
  1. business process interoperability efforts should focus on outcomes
  2. business process interoperability outcomes should be linked with whole of government initiatives (whole of agency for single agency projects)
  3. business processes must be user-driven
  4. the benefits of collaboration and business process interoperability must be identified
  5. a standardized approach to documenting business processes must be agreed and followed

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Principles

- aditionally to the three tools, BPIF identifies nine principles
  6. the approach to business process interoperability must be practical, rigorous and flexible
  7. sharing business processes across boundaries should promote trust, confidence and security of data
  8. governance arrangements must be agreed between collaborating agencies
  9. people and cultural differences between collaborat- ing agencies must be acknowledged and managed

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Tools

- in order to model business processes, BPIF suggests to use emerging standards like
  - Business Process Execution Language - BPEL (OASIS, 2007)
  - Unified Modeling Language – UML (OMG, 2006)
  - Business Process Modeling Notation – BPMN (OMG, 2009)
- it also provides criteria for selecting the appropriate modeling tool or application to each context
- the Business Level is also supported by the National Collaboration Framework a series of reusable "agreements" between Federal, State and Local gov- ernment agencies to facilitate collaboration between jurisdictions for service delivery
- its website provides a knowledge base that will assist Local, State and Federal government departments and agencies in the effective implementation of cross-jurisdictional projects.

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Information Interoperability Framework

- the Information Level is defined by the Information Interoperability Framework (IIF), identifying those components that support an environment where information that is generated and held by government is valued and managed as a national strategic asset
- the framework defines a plan for IS which include actions (called enablers) for adopting the framework, and defining responsabilities for each role in the processed

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Enablers (I)

- IIF enablers are
  1. forming partnerships that work in a spirit of collaboration work in partnership with agencies that have business needs to share information
  2. using a "create once, use many" approach, with authoritative sources of information identify quality data sources and develop a register, clearly define accountability arrangements, and agree on lead/natural owners
  3. adopting a common business language and standards metadata, thesauri, information object standards and link to business process

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Enablers (II)

- IIF enablers are
  4. establishing appropriate governance arrangements responsibilities, roles, a compliance regime, measures of success and best practice models
  5. understanding the policy and legal framework governing the exchange of information legal issues and security checklists, privacy guidelines
  6. developing and using tools that facilitate the transfer of reliable information across agency boundaries best practice guides, IS protocols and MOUs
- these critical enablers underpin the successful achievement of Information Interoperability

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Roles

- many different functions regarding information are recognized at government agencies:
  - information provider create and provide information, such as policy documents
  - information user access and use information held by the agency or other public or private sector organizations
  - information custodian collect and hold information. In this context, agencies may be viewed as custodians of information – the custodian of the information (on behalf of the third parties) and the custodian of Government information (on behalf of the Australian public)
- these functions are integrated into an information management lifecycle

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Information Management Lifecycle

Courtesy: Australian Government Information Interoperability Framework: Sharing Information across Boundaries [10]

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Lifecycle phases (I)

1. **planning** includes the identification of the information requirements relevant to any work activity. Agencies should identify the potential uses of new information collections, adopt standard concepts and definitions for recording data and items, and consider any potential barriers to making the information available to others. Ongoing third party consent issues should be addressed

2. **create and collect** information is created, collected, captured or accessed in a variety of ways from a variety of sources as part of a business need. Information can be created or collected by, or on behalf of someone or some agency. Prior to creating new information holdings agencies should undertake a review to determine if the information required can be sourced from an existing collection

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Lifecycle phases (II)

3. **organize and store** once created or collected, information needs to be organized and stored to enable consistent treatment (for example, logical organization/collation to best reveal patterns and trends) and to enable easy location/access/retrieval to support business processes. To better support users, agencies should define appropriate metadata, so that information can be described to and discovered by users easily and efficiently

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Lifecycle phases (II)

4. **access and use** involve using information in its original state, or manipulating it in some way, including integrating information from a number of sources, or reusing information. Conditions related to access and use should ensure that information use is appropriate, carried out responsibly and is consistent with the source. Also, access should only be granted to those who have an appropriate business requirement for the information, taking into account legal, policy and administrative obligations

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Lifecycle phases (III)

5. **maintenance** the information lifecycle includes the effective maintenance of information, and in some circumstances, its disposal. With this is mind, agencies should liaise with users when considering terminating, disposing of, or making content changes to collections; and conduct audits and reviews of security, quality, accessibility and compliance with access and use conditions

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Tools

- it is important to observe that the concept of re-use is introduced into the information lifecycle, meaning that agencies must consider not just their immediate information requirements, but the value of information to other users, as well as users' rights and responsibilities to access and use the information
- AGIF provides the GovDex initiative as a supporting tool, which provides a collaborative tool for managing cross-agency projects and for storing shared information, models and resources
- it consists of a collaborative workspace, a repository of projects and standards, and a collection of tools and methods
- it provides a secure, private, web-based space for government agencies to manage projects and their stakeholders, share documents and information, and manage secretariat responsibilities. GovDex currently hosts over 450 private

government.

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Categories of standards

- the standards in this level are grouped in the following categories:
  - security
  - interconnection
  - data exchange
  - discovery
  - presentation
  - metadata for process and data description
  - naming

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Technical Interoperability Framework

- the Technical Level contains the Technical Interoperability Framework (TIF) that suggests a common language, conceptual model and standards that government agencies can use as a basis for interoperating to deliver the Australian Government's policy and program priorities
- TIF divides the technical domain into a series of topics. The intent is not to prescribe an architecture, but to provide a way to categorize a wide number of standards and to recognize linkages to the network and service layers
- it catalogues both open and proprietary standards, but preference is given to the deployment of open standards when feasible

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Standards

- Security covers standards and technologies whose primary role is for supporting secure interoperation. Included in this category are standards and technologies for the encryption of data, public key infra- structure standards supporting the use of public and private encryption and decryption keys, digital signatures, and secure transmission protocols. Some examples are: SSL version 3, S/MIME ESS, and X.509.
- Interconnection covers standards and technologies for connecting systems. Included within this category are basic connection protocols such as HTTP version 1.1, HTTPS and FTP; the Web Services message exchange protocol SOAP version 1.1 and 1.2, and the service description language WSDL

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Standards

- **Data Exchange** contains standards and technologies for the description of the structure and encoding of data for exchange. These include protocols such as the email protocols SMTP and X.400, resource syndication protocols like RSS, as well as data markup languages such as XML version 1.0, XSL version 1.0 and XSLT version 1.0 and basic character-set encodings like UNICODE. Australian local thesaurus is also included here

- **Discovery** covers standards and technologies for supporting the discovery and location of resources. These include metadata standards and thesaurus standards for supporting consistent description of resources, like RDF, the Dublin Core Standard, UDDI and DNS. Also included are directory standards such as LDAP version 3 and X.500

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Standards

- **Presentation** covers standards related to the presentation of information. These standards allow data to be interpreted and presented in consistent ways when shared between systems. Such presentation standards include HTML version 4.01 (and XHTML) as well as selections from the wide range of image and streaming media formats, like GIF, PDF, JPEG, MPEG-1, MPEG-2 and MPEG-4. Also included would be the document encoding format RTF and a range of specialized markup languages, including markup for mobile devices.

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Standards

- **Metadata for Process and Data Description** these standards are concerned with the sequencing of operations and their execution dependencies. Common amongst these standards are a range of workflow definition and description languages and the emerging Web Services coordination and choreography languages such as BPEL4WS. The standards under this heading also support the description of the meaning of data elements, data structures and the interrelationships between data elements. Included within this fairly broad range of modeling standards are the UML, ER Diagrams, and flowcharts. Also covered would be XML Schema supporting the definition of XML instances

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Standards

- **Naming** the naming category covers the basic primi- tives for defining consistent names for resources, like URI, URL, XML Namespaces, ISO 3166 (country codes), and ISO 8601 (date and time representation). Standards in this category could perhaps be included within the data exchange category; however, given the importance of consistent naming schemes, it is distinguished as a separate category
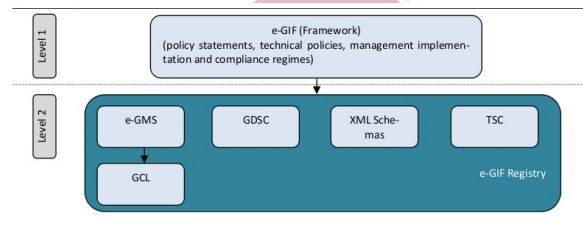
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Standard status

- a status is assigned to each of these standards, classifying its current usage
- the status can be
  - fading refers to standards and technologies that, while still used, are receiving less support or are being superseded
  - emerging refers to standards that do not currently have widespread use, but which are expected to receive more usage in future
  - current refers to standards that have strong and ongoing support.

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e-GIF

- the Government of UK defined the e-Government Interoperability Framework (e-GIF) to set out the government's technical policies and specifications for achieving interoperability and Information and Communication Technology systems coherence across the public sector
- the framework was shaped with the some basic design principles
  - alignment with the Internet;
  - adoption of XML as the primary standard for data integration and data management; and
  - adoption of the browser as the key interface
- e-GIF is complemented with a series of policy frameworks which covers specific issues like security, confidentiality and delivery channels

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e-GIF components

- e-GIF is divided into two layers:
  - the Framework itself covers high-level policy statements, technical policies and management, implementation and compliance
  - the e-GIF registry covers the e-Government Metadata Standard (e-GMS) that includes the Government Category List (GCL), the Government Data Standards Catalogue (GDSC), XML schemas, and the Technical Standards Catalogue (TSC). Each one of these component is specified in a separate document

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e-GIF components

- the first layer of e-GIF is similar to the Technical level and part of the Information Level of Australian AGIF. There is no equivalent in e-GIF for the Business Process level
- the second layer of e-GIF is just a collection of concrete standards

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Sections

- the framework is presented in five sections:
  1. Policy and Scope
  2. Technical Policies
  3. Implementation Support
  4. Management Process
  5. Change Management and Compliance Regime
- the first section presents the objectives and drivers of the framework, describes the architecture, and defines its scope

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Technical Policies

- the Technical Polices section is equivalent to the Australian IIF, but contains only the more general standards
- more specific standards are left to the TSC document which is also supposed to be regularly updated

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Technical Policies

- the standards and thesaurus in this section are classified into the following categories:
  - Interconnection: recommends standards like S/MIME, TSL/SSL, FTP, DNS, SOAP, UDDI and WSDL
  - Data Integration: includes XML, XML Schema, XSL for transformation, RDF and UML
  - Content Management Metadata: specifies e-GMS for metadata, which includes GCL, and the ANSI/NISO Z39.84 standard for identifiers
  - E-Services Access and Channels: describes relevant specifications for e-services access using different channels
  - Standards for Business Areas: includes standards for e-learning, e-health, finance, commerce, workflow and web services

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Implementation Support

- the Implementation Support section covers the processes by which the e-GIF and the tools needed to implement it will be developed, applied and maintained
- priorities are defined for the productions of XML Schemas
- also, it presents the GovTalk website

    http: //www.cabinetoffice.gov.uk/govtalk.aspx

  that supports the whole initiative and incorporates the management processes so that government can consult and take decisions

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Management Process and Change Management

- finally, the Management Process section outlines roles and responsibilities of central government and other public sector and industry organizations.
- the Change Management section shows how to manage the update process of e-GIF, so that it meets the requirements of all stakeholders, and it is aligned to the potential of new technology and market developments
- the Compliance Regime provides general guidance on what compliance means and how it will be enforced
- it is intended to inform all those involved in the development and provision of public sector systems and services of their responsibilities and timetable for conforming to the e-GIF

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e-GIF registry

- the e-GMS describes the core vocabulary needed for effective retrieval and management of official information
- each element in this vocabulary contains details related to a particular aspect of an information resource, e.g. 'title' or 'creator'
- it is based on the Dublin Core (DC) vocabulary, now ISO 15836, and it is meant as a superset of all elements and refinements needed throughout the UK public sector
- e-GMS contains GCL (Government Category List) an older taxonomy for indexing government web pages
- the GDSC comprises two volumes
- the first sets out the rationale, approach and rules for setting and agreeing the metadata to be used in schemas and other interchange processes
- the second presents data types and data items standards

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e-GIF registry

- the XML Schemas component includes a library with concrete definitions of XML schemas, together with a developers' guide
- the TSC defines the minimum set of specifications that conform to the technical policies in e-GIF
- it covers the domains of interconnectivity, data integration, content management metadata, e-services access, and specification for miscellaneous business areas, like e-health and e-learning
- these categories are the same as those included in the Technical Policies section of the framework

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NIEM

- the National Information Exchange Model (NIEM) was designed in USA to develop, disseminate, and support enterprise-wide information sharing standards and processes across the whole of the justice, public safety, emergency and disaster management, intelligence, and homeland security enterprise at all levels and across all branches of government
- the vision for NIEM is to be the standard of choice for intergovernmental information exchange, having common exchange standards, tools, processes, and methodologies to improve public safety and homeland security
- NIEM represents a partnership, initially between the US Department of Justice and the US Department of Homeland Security, and soon engaged other critical agencies

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NIEM

- the current domains in NIEM include justice, intelligence, immigration, emergency management, international trade, and infrastructure protection
- it is a framework to bring stakeholders together to identify information sharing requirements; develop standards to support information sharing; and to provide technical tools and assistance in the development, discovery, dissemination, and reuse of information

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NIEM concepts: data component

- from the technical point of view, this framework introduces the following concepts
  - Data Component represents a real-world object or concept. Information exchanged between agencies can be broken down into individual components— for example, information about people, places, material things, and events
  - components that are frequently and uniformly used in practice are specified in NIEM and can then be reused by practitioners for information exchanges, regardless of the nature of their business
  - some sources of data components include data models, databases, data dictionaries, schemas, and exchanges

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NIEM concepts: data component

- this framework introduces the following concepts
  - in NIEM, these objects and constructs are represented using XML Schema for the purpose of consistent definition. The model, however, is independent of any particular technology and in the future could be depicted in any number of representations, such as Resource Definition Framework (RDF) or Web Ontology Language (OWL), which would produce semantically consistent interoperable information sharing
  - it is anticipated that future versions may migrate to new and evolving forms. To effectively exchange information, there must be a common semantic understanding of data among participating agencies, and the data must be formatted in a semantically consistent manner

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NIEM concepts: NIEM core

- this framework introduces the following concepts
  - NIEM Core data components within an information exchange that are universally shared and understood among all (or almost all) domains are identified as universal components (e.g., person, address, and organization)
  - to become a universal component, consensus by all domains is needed on the semantics and structure of the component
  - once established, the set of NIEM universal components is stable and relatively small

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NIEM concepts: domain

- this framework introduces the following concepts
  - Domain refers to a business enterprise broadly reflecting the agencies, units of government, operational functions, services, and information systems which are organized or affiliated to meet common objectives
  - NIEM domains are organized to facilitate governance, and each has some measure of persistency
  - each domain traditionally includes a cohesive group of data stewards who are subject-matter experts, have some level of authority within the domains they represent, and participate in the processes related to harmonizing conflicts and resolving data-component ambiguities
  - examples of domains include justice, intelligence, immigration and emergency management

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NIEM concepts: COI

- this framework introduces the following concepts
  - Community of Interest (COI) is a collaborative group of users who exchange information in pursuit of shared goals, interests, missions, or business processes and who therefore must have a shared vocabulary for the information they exchange
  - COIs are formally constituted through an organizational charter, a memorandum of understanding (MOU), articles of incorporation, or the Federal Advisory Committee Act (FACA)
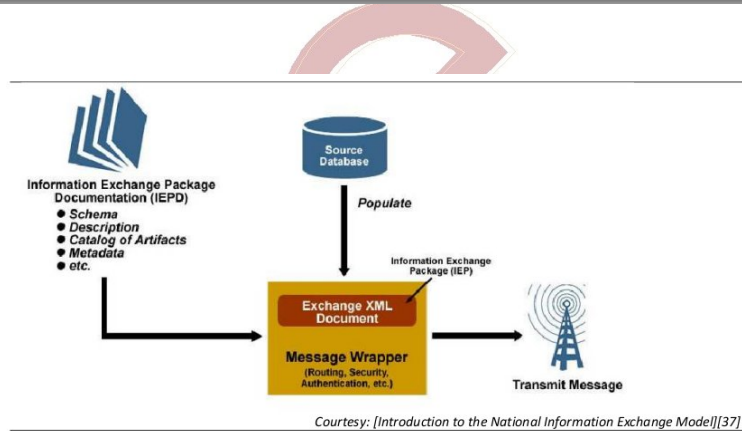 - examples:

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NIEM concepts: IEP

- this framework introduces the following concepts
  - Information Exchange Package Documentation (IEPD) the information that is commonly or universally exchanged between participating domains can be organized into information exchange packages (IEPs) in the form of XML Schemas
  - an example of this collection of information is data associated with an arrest
  - the data to be exchanged includes not only descriptive and personal identification data regarding the individual arrested but also information about the person's alleged offense, the location of the offense, the arresting officer, etc
  - the IEP represents a set of data that is actually transmitted between agencies for a specific business purpose (e.g., initiating a charging document by the local prosecutor)
  - it includes the actual XML instance that delivers the payload of information

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NIEM concepts: IEPD

- this framework introduces the following concepts
  - additional innformation regarding a specific exchange can be further documented in the form of an Information Exchange Package Documentation (IEPD), which also contains data describing the structure, content and other artifacts of the information exchange
  - an IEPD supports a specific set of business requirements in an operational setting

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NIEM concepts: IEPD

Courtesy: [Introduction to the National Information Exchange Model][37]

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Organization

- the formal definitions of these concepts together with the technical principles and rules governing their use are presented in the document NIEM Naming and Design Rules
- it is declared that NIEM conceptual model follows RDF semantics (each piece of data is presented as a sentence with three parts: subject, predicate and object), but this is just an informal statement
- in the end, data components are presented as instances of XML Schema declaration, and RDF is not used
- from the political and organizational point of view, NIEM includes a set of operational and governance procedures, documentation, tools, training material, and technical assistance, introduced in NIEM Concepts of Operations (ConOps)
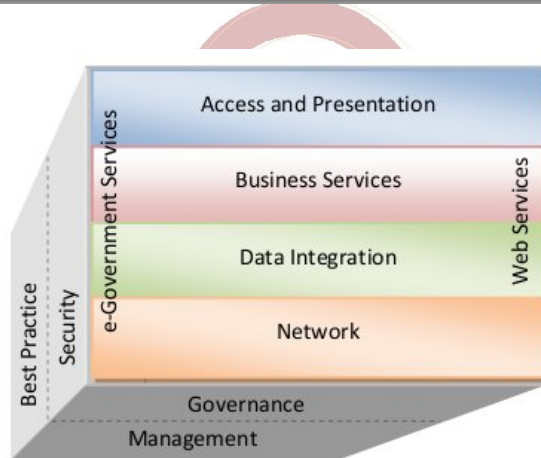
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NZ e-GIF

- inspired on the UK e-GIF, the Government of New Zealand defined the New Zealand e-GIF (NZ e-GIF) framework in 2002. After that, the framework has evolved independently, and has been proved to be a significant tool for enabling agencies to work together
- by promoting collaboration and the efficient use of resources, the NZ e-GIF contributes to important government initiatives. The version 3.3 dates back to February 2008, and consists of three documents: Policy, Resources and Standards

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NZ e-GIF structure

- the policy document outlines the policy behind the NZ e-GIF and its development. It includes sections with the compliance regime, its design principles, and a proce- dure for its extension and evolution
- the resources document includes a section about the history of the framework, reference lists and URLs for all standards
- the Standards document is a collection of standards that makes up the NZ e-GIF. These standards are categorized in a layer model that consists of four basic structural layers – Network, Data Integration, Business Services, and Access and Presentation; and four aspects that are orthogonal to these layers – Security, Best Practice, Governance and Management

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Classification of standards

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NZ e-GIF: layers

- network covers details of data transport, such as network protocols. This is a crucial area for interoperability. Without agreement on networking standards, it is hard or impossible to make systems communicate. The e-GIF uses a subset of the widely proven Internet Protocol suite, like IP v4, IP v6, LDAP version 3, FTP, HTTP version 1.1 and WebDAV

- Data Integration facilitates interoperable data exchange and processing. Its standards allow data exchange between disparate systems and data analysis on receiving systems, for example UTF-8, HTML version 4.01, XML 1.0, GZIP and TAR

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NZ e-GIF: layers

- Business Services supports data exchange in particular business applications and information contexts. Some of the standards in this layer are generic, covering multiple business information contexts, like RDF and NZGLS version 2.0 (New Zealand Government Locator Service). Others work with data integration standards to define the meaning of the data, mapping it to usable business information. For example, an agency will format a stream of name-and-address data in XML (Data Integration) using the business rules of xNAL (Business Services) to create a commonly agreed representation of name-and-address information, or GML (Geographic Markup Language) to describe geographically oriented information

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NZ e-GIF: layers

- Access and Presentation covers how users access and present business systems, compiled in the New Zealand Government Web Standards and Recommendations version 2.0. It includes, for example, regulations of contents for websites, ."about this site"sections, and printing options in web pages.

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NZ e-GIF: aspects

- Security crosses all layers to reflect the fact that security needs to be designed into a system, not added as a layer on top. The e-GIF contains stan- dards at the various levels designed to offer different levels of security as appropriate, for example HTTPS, SSL version 3.0 and S/MIME version 3.0. It also refers to a series of standards and policy state- ments (the NZSITs), which provide advice and direction on the levels required

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NZ e-GIF: aspects

- Best Practice this is a new category to help readers of the e-GIF distinguish published standards from Best Practice, Codes of Practice, and other general or sector-focused guidance. Published standards alone do not ensure interoperability. They merely offer a common approach to managing and understanding the context of the information exchange. Included in this section are international standards and local conventions that support best practice, rather than the actual data exchange in interoperability. Agencies use these standards, not necessarily with direct dependence on the standards of other agencies with whom they interoperate, but to support interoperability in general. DRM, WSBPEL, XSLT, UML, XMI, SAX and DOM belong to this category

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NZ e-GIF: aspects

- E-government Services these are actual e-GIF compliant implementations of IT infrastructure, which the ICT Branch of the State Services Commission makes available for public sector agencies to reuse. Some examples are Metalogue, a web-based repository for metadata, and the Government Logon Service (GLS), providing Government to Individual and Government to Business online high quality authentication service. The GLS provides people with a common logon, such as a username and password or token, to access all online services provided by participating agencies

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NZ e-GIF: aspects

- Web Services Web Services connect services together. They are an emerging set of standardized applications to connect and integrate web-based applications over the Internet. Using Best Practice implementations, agencies can agree a common approach to interoperable service delivery to customers. Standards like UDDI version 3, WSDL version 2.0 and SOAP version 1.2 are listed here

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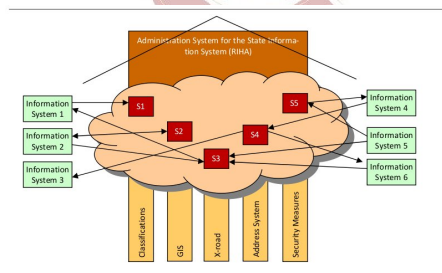New Zealand
Estonia

Policy

- underpinning all these layers are governance and management specifications introduced in the Policy document
- NZ e-GIF introduces several compliance status levels for these standards: future consideration, under development, recommended, adopted, and deprecated
- if a standard is classified as future consideration then it means that is not yet reviewed, customized, or having any successful, documented implementation in the New Zealand government; yet probably necessary for public sector IT systems
- a standard is under development if it is actively under assessment by more than one government agency, e.g. having an active working group, a proof of concept, or a pilot implementation with associated documentation

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Policy

- recommended standards emerge from the development, review, or Working Group process with implementation documentation and evidence of successful interoperability and data exchange experiences. They are generally more recent, founded upon newer technologies or standards
- adopted standards are mandatory and normally upgraded from Recommended status. They are well established in public sector ICT systems and having complete supporting documentation and processes for implementation
- a standard is deprecated if its practice has been abandoned for, or superseded by a better solution at the Adopted or Recommended levels. Agencies should plan to migrate away from solutions with deprecated standards

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RIHA

- aiming at providing guidance for elaborating common oncepts used in country-wide information systems and aiding in the organization of public procurements, the Government of Estonia defined the Estonian IT Interoperability Framework

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Components

- the vision is that the state information system is a service-centered organization, which means that operations performed by civil servants, entrepreneurs, local residents and software are considered services
- end users access the services in a common service space. They are interested in the service, and not in the organization which is providing it. These services can be used with minimal training
- a service is provided with access to several information systems which do not necessarily belong to the same agency

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Components

- in order to achieve interoperability service descriptions (containing syntactic and semantic description, provision policy and quality indicators) are compiled by service providers and published in the administrative system for state information systems (RIHA)
- a taxonomy has been created in the RIHA UDDI to present the characteristics and indicators of a service. The free text of the service description is published as a separate file on the public Web (either in RIHA, by the service provider or elsewhere)

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Layers

- the framework is divided in three aspects:
  1. Organizational Interoperability refers to the ability of organizations to provide services to other organizations or to their clients, by making use of information systems
     - it is associated with activities carried out by organizations and agreements between them, and ensured by legislation and general agreements

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Layers

- the framework is divided in three aspects:
  2. Semantic Interoperability refers to the ability of different organizations to consistently understand the exchanged data
     - this presumes the creation of a mechanism allowing the presentation of service data and data definitions
     - semantic interoperability has been recently updated in order to include a domain glossary using OWL and a semantic description of operations and databases using WSDL

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Layers

- the framework is divided in three aspects:
  3. Technical Interoperability denotes the interoperability of infrastructure and software. Infrastructure interoperability is the ability of hardware acquired by different organizations to work in a connected way
     - it is ensured by the Internet and the infrastructure. Software interoperability refers to the ability of software used in different organizations to exchange data.

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Methodology

- this framework is complemented by a methodology for semantic interoperability
- this methodology addresses some questions like what is semantic interoperability, who are the relevant target groups, and what are the options to enhance semantic interoperability
- it includes a list of problems and ideas to be tackled and considered in the next versions of the methodology, ranked by priority

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Methodology

- for example, multi-linguism, description of business rules within business processes, and semantic description of the compensation mechanism for launching operations are among the most important problems to be considered
- also, the methodology is the basis for a set of instructions to specify all operations performed by databases as web services in an electronic environment, providing added value to the user
- the practical implementation of these instructions calls for a variety of standards, including XML, XSD, WSDL, SA- WSDL, RDF and OWL from the W3C recommendations, and UML2 and XMI from OMG's standards

Comparison criteria

- these frameworks analysed according to five dimensions:
  - Foundation the motivation behind the introduction of the framework;
  - Technical assesses the level at which technical standards are specified from both information and networking points of view;
  - Organizational emphasizes the methodologies and tools offered to organizations in order to reform their business processes and adopt the framework;
  - Inter-Organizational governance structures supporting the implementation, adoption and evolution of the framework; and
  - Environmental the level of support for the framework

Comparison

	Australia	United Kingdom
Foundations	Seamless Services	Information as Economic Asset
Technical	in XML Schema	in XML Schema
Organizational	Capability Maturity Model, Data Life-Cycle, Roadmap	General Polices
Inter-org	Governance Structure	Governance Structure
Environmental	Agreements	Legislation

Comparison

	US	NZ	Estonia
Foundations	Information Ex-change	Seamless Ser-vices	Semantic Inter-operability
Technical	own Language	XML Schema	OWL
Organizational	Not Aimed at Organizational Reform	Best Practices	Towards Service-Oriented Organization
Inter-org	Governance Structure	Governance Structure	Not Clear
Environmental	Agreements	Agreements	Agreements and Legislation

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Comparison

- All frameworks reached the stages 1 and 2 in the Landsbergen and Wolken model - inter-agency IS has been identified and there is an infrastructure proposal to support it
- in the cases of Australia, New Zealand and Estonia, the technical interoperability policy and institutional elements were explicitly included, whilst in others the elements were present but not classified as such
- we consider Australia as the only case that arrived at the stage 3 of the model as it provides a range of legal, administrative and technical tools to promote the delivery of integrated government services i.e. all dimensions are covered and supported in this framework

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Comparison

- thus, Australian AGIF is the most complete case addressing not only the technical but also business process re-engineering issues
- however, XML Schemas in AGIF do not cover the diversity of domains and concrete examples of data and metadata from e-GIF, that provides policies and guidelines that extend the current XML schemas
- at the same time, NZ e-GIF, based on four layers and four orthogonal aspects, provides the richest classification of standards

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Comparison

- although all frameworks declare the promotion of consistent IS between government systems as their objective, some for governmental efficiency, others for security reasons, they mostly use XML Schemas to capture metadata of the information exchanged
- however, no semantic information beyond data types is captured with this language. UK e-GIF and NZ eGIF mention RDF (W3C, 2004b) as a possible standard to be used in data exchange, but both specify metadata in XML Schema. The only exception is the Estonian IT Framework which employs not only RDF but OWL for metadata description.

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Australia: Centrelink

- Centrelink plays a pivotal role in delivering Australian Government health and welfare support services
- Centrelink's online services for customers provide a facility through which customers can view and update a range of their data on the web. The facility enables customers to:
  - access their information online, and encourages them to correct inaccurate or out-of-date information, therefore improving the accuracy of their payments;
  - lodge a new claim online without the help of a customer service adviser
  - manage their Centrelink affairs without having to contact a customer service adviser
- Centrelink's webpage

  www.centrelink.gov.au

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Australia: Centrelink

- the development of online services within Centrelink has been supported by a transformation in business processes, including:
  - the development of ICT architecture and technology to enable online services to be continuously improved
  - extensive user testing and customer consultation through user-centred design teams and customer research, web metrics and value creation workshops
  - changes to the service delivery strategy across all customer channels, including promoting online services during all customer contact
  - a focus on service delivery through a combination of channels
  - strategic and targeted marketing of online claims and services, including online and offline advertising, link building and affiliated marketing tactics

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New Zealand: Establishing a quality early childhood

- Early Childhood Development (ECD) staff throughout New Zealand provide advice, support, and information about early childhood education and parenting to parents, early childhood centres, playgroups, and the wider community. ECD typically works with many agencies and stakeholders, coordinating and developing services for children in the first five years of life
- it's a complex process preparing to run an *early childhood centre* It involves getting to know the regulations and requirements, working to ensure these are met, and then applying for a licence from the Ministry
- the ECD website provides an easy to follow guide to setting up a quality early childhood centre which is segmented into a logical twelve step process. It's an innovative one-stop-shop for people wanting to set up an early childhood centre

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New Zealand: Establishing a quality early childhood

- the website links to frequently asked questions; relevant legislation and regulations; pdf handbooks on managing centres; a spreadsheet to download and create an annual operational budget; a checklist of infants' and toddlers' requirements; and a timeline for establishing centres.
- the result is a client-focussed service that integrates information provided by as many as 26 agencies and other organisations, including non-governmental organisations like the Royal New Zealand Plunket Society. It is not only easy to get information (by a web link) but it is presented in a context and sequence that guides people from beginning-to-end
- the website is

  www.ecd.govt.nz/establish.html

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US: California-Nevada pilot project prescription monitoring information exchange (PMIX)

- prescription monitoring programs (PMPs) are state-sponsored initiatives aimed at addressing the diversion and abuse of prescription drugs
- in 2007 a pilot design of an interstate prescription monitoring information exchange (PMIX) program between California and Nevada was established
- it involved developing a standard for information exchange. within NIEM, with the ultimate goal of implementing the standard and enabling state PMPs to share information to effectively combat the diversion of prescription drugs

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US: California-Nevada pilot project prescription monitoring information exchange (PMIX)

- the program was succesfully field- tested the Information Exchange Package Document (IEPD) and operational software needed for a baseline standard for information exchange
- for the two states involved, the pilot spun off several benefits:
  - lessons learned on increasing the reusability of PMIX artifacts
  - a reusable IEPD and a concept-of-operations document
  - adaptable implementation artifacts, including an architecture, a system design, and a software source code
- this programs shows successful electronic exchange of PMP data between two states; electronic exchange of data between disparate domains (in this particular case, justice and public health); exchange of data using Web services; and exchange design using the BEPL open standard

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New Zealand: Discover Te Kohinga Taonga

- Discover Te Kohinga Taonga is an online resource developed for New Zealand schools
- it is a database containing more than 2500 multimedia items, almost all from the National Library's collections. Included are photographs, paintings, posters, music, video clips, essays, and biographies
- designed to support the Visual Arts and Music disciplines of the Arts/Ngā Toi curriculum, but it can also be used by teachers of other learning areas, for example Social Sciences

  discover.natlib.govt.nz/

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New Zealand: Discover Te Kohinga Taonga

- the site gives teachers specific topics to support learning. Bibliographies, essays and introductions to each subject support multimedia items by supplying background and context
- through Discover, the National Library is widening the range of resources available to schools. There are also plans to take Discover into other curriculum areas. A recent Learning Centre Trust report has found that seven in ten schools make learning material available to students over the web
- the standards-based approach allows interoperability with other online collections, even when content is held outside the National Library
- the site uses Dublin Core standards. The depth of the metadata describes items in detail

Australia: Northern Queensland Wildfire Mitigation Project

- the Northern Queensland Wildfire Mitigation Project (NQWMP) website is a shared mapping and data exchange facility for all agencies involved in managing wildfire in an area of 340,630 sq km across Cape York and other areas of Queensland
- this website is free to approved stakeholders and the general public. For approved stakeholders, this online facility offers tools to create detailed maps on demand using over 60 detailed Geographical Information Systems (GIS) mapping layers. Additionally, there are over 140 fire-district maps prepared for 90 rural fire brigades available for downloaded
- as some of the data presented on the website is sensitive, full access is available only to approved and registered stakeholders
- NQWMP website

    `wildfire.atgis.com.au/`

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Australia: Northern Queensland Wildfire Mitigation Project

- the overall project delivers far more than the website, it also provides:
    - a rapid response mapping service for fire incidents
    - data sharing negotiations on behalf of project stakeholders
    - access to an improved fire hazard modelling methodology to assist in identifying high-risk areas
- while the NQWMP website was developed primarily for wildfire mitigation the site has also proved useful for cyclones, flooding and missing person's searches
- NQWMP collates information from multiple organisations. For example, Queensland Fire and Rescue Service originally identified 12,000 fire hydrants in the project area, but by collating data from additional sources, such as local governments, over 20,000 fire hydrants have been confirmed across the project area and consolidated

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- users can upload their own data, whether created in other mapping software or downloaded from a Global Positioning System (GPS) receiver. Online digitising tools also allow users to create their own data to include on their maps
- the high-quality data and easy-to-use interface of NQWMP provides many benefits to volunteer fire-fighters by making a high-quality map portal freely available. NQWMP encourages volunteer effort and results in a much more rewarding experience
- the project's geographical extent is currently expanding to incorporate areas south of the existing coverage, including the Townsville and Bowen areas. ATGIS anticipates that this expansion and consultation with additional project stakeholders will improve the usefulness of the online tools for stakeholders

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New Zealand: MAF - IRD collaboration

- as a country which is significantly dependent on a land-based economy, the border control of biosecurity issues is critical. Any failure to prevent the entry of unwanted organisms could have a disastrous effect on the nation's land-based exporters. Responsibility for that lies with the Biosecurity unit within the Ministry of Agriculture and Forestry (MAF)
- in 2004, MAF and Customs committed to a single electronic system, so that as much data as possible was entered and submitted only once
- the benefits arising from the single data entry system are to container importers (who worked with a faster and more streamlined container clearance system, which included the elimination of paperwork) and to MAF (which benefited from reduced manual data handling and the generation of better

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New Zealand: MAF - IRD collaboration

- some of the critical issues around the project are:
  - governance is particularly important for cross-agency projects in which multiple business units are involved. In particular, there must be a senior management governance body drawn from both agencies. If the opportunity exists, there should be representation from user groups and/or advisory groups
  - it is essential to identify, discuss and arrive at a common understanding of each organisation's process standards at the very beginning of the project
  - the solution to the differences in these standards lies in a willingness to compromise, rather than either party clinging stubbornly to their preferred option

New Zealand: MAF - IRD collaboration

- some of the critical issues around the project are:
  - agreement on definitions is critical. The Customs definition of a container was the contents inside; the MAF definition was not only the contents but also the physical container itself, which could carry material which was a biosecurity threat. This difference in definitions was discovered some way through the project
  - ideally, each agency should have its own project management office to ensure internal coordination between business units
  - project objectives must be agreed in advance and must be measurable
  - the project would have been easier to achieve had there not been significant differences in technical standards between the agencies. [MAF suggests these difficulties might not have existed, or at least would been easier to resolve, if there was state sector protocols for business process integration

US: DHS Domestic Nuclear Detection Office

- a vehicle carrying nuclear material activates several sensor rings along every trip. It is important to determine if it is a false alarm or a "hot" vehicle speeding toward a highly sensitive location
- the race is on to make sense of the data being received; to determine the true nature of the threat; to share the data widely, moving it quickly from classified to unclassified, putting the information into the hands of those who will take action
- in such a situation, delays can be deadly. But moving too soon also has its risks. False alarms can be onerous for the many legitimate transporters of radioactive materials on America's roadways, at its ports, and in its storage facilities, not to mention bulk transporters hauling scrap metal, granite, and even bananas—all of which emit isotope signals that sensors can pick up as "hot"

US: DHS Domestic Nuclear Detection Office

- today, there are obstacles that can keep data from traveling from the thousands of sensors planted for chemical, biological, or nuclear detection to analysts, decision-makers, and operations personnel. Disparate message standards, syntaxes, and formats abound
- NIEM was used in the Domestic Nuclear Detection Office (DNDO) to get better technology in place to give first responders better tools for guaranteed delivery so they're not interrupted by system filters, human or other, when we're talking about national securit
- a global nuclear detection architecture continuously monitored by the Joint Analysis Center (JAC), a division of the Operations Support Directorate of the DNDO

Frameworks and architectures
Country Frameworks
Comparison
Case Studies

e-Health
e-Learning
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Security and Emergency Management

US: DHS Domestic Nuclear Detection Office

- the NIEM process and its principal artifact—the Information Exchange Package Documentation (IEPD) were selected because of DNDO's network of State and local law enforcement partners had embraced Global Justice XML, a foundational predecessor and building block of NIEM
- the Southeast Transportation Corridor Pilot (SETCP), launched in 2008, was designed to "red team" a sensor web. The idea was to take radioactive material that represented a threat, and see if operators at truck weighing stations could detect it

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Australia: CrimTrac

- the National Police Reference System CrimTrac is a national system that sources information about persons of interest from all police jurisdictions across Australia and then provides a consolidated view. Police can access the information through their existing software systems, or through a generic interface
- it provides a variety of nationwide search requests tailored to the needs of police. In addition to this, operational police can use the NPRS to access nationwide profiles of persons of interest. The NPRS also gives police access to records of people who are wanted, unidentified, missing, escapees, or on child protection registers. Development of the National Police Reference System

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Australia: CrimTrac

- in October 2005, the Australasian Police Ministers' Council agreed to support a national roll-out of NPRS, and funds were approved in June 2006
- the information provided by the NPRS is defined by a common information model, which was developed after extensive consultation among all parties to define common policing concepts related to persons of interest. The project also involved negotiating agreed technical standards to ensure interoperability between the NPRS and jurisdictions
- NPRS webpage

    www.crimtrac.gov.au

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Australia: CrimTrac

- features include:
    - web services that enable the various police jurisdictions to provide and obtain information, create links to distributed information and integrate nationwide information into their local systems
    - web services that provide a variety of nationwide search requests tailored to operational police needs and consolidated views of a person of interest
    - centrally stored searchable information (at CrimTrac) and other information stored centrally or in jurisdictional domains
    - the ability to access information using the CrimTrac generic application or existing systems
    - auditing and security provided through the Australian Police

Frameworks and architectures   e-Health
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Australia: CrimTrac

- the system is based on a common information model that harmonises policing models in the various jurisdictions. The model defines the scope of information to be shared, the agreed common business definitions, and relationships between items of information. It is flexible and extendible, supporting distributed data hosting and allowing arbitrary links to be made among entities

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