e-Government Interoperability: A Review of Government Interoperability Frameworks in Selected Countries





# e-Government Interoperability: A Review of Government Interoperability Frameworks in Selected Countries

United Nations Development Programme

with the support of IBM Oracle The analysis and recommendations of this publication do not necessarily reflect the views of the United Nations Development Programme nor do they necessarily reflect the views of the institutions with which the authors are affiliated.

Copyright © 2007 UNDP

United Nations Development Programme Regional Centre in Bangkok 3rd Floor, UN Service Building Rajdamnern Nok Avenue Bangkok 10200, Thailand http://regionalcentrebangkok.undp.or.th

Design and layout: Keen Media (Thailand) Co., Ltd.

ISBN: 978-974-13-1624-3

# Foreword

Information and communication technologies (ICTs) provide developing nations with an unprecedented opportunity to meet vital development goals such as poverty alleviation, basic health care improvement and universal education more effectively than before, via the appropriate utilization of technological tools. There is increasing evidence that e-government, if implemented strategically, can improve efficiency, accountability and transparency of government processes. However, the full potential of e-government applications and other ICTs remains to be fully harnessed by developing countries.

Through UNDP's experiences in e-government initiatives, one of the key challenges we have identified is the existence of a patchwork of ICT solutions in different government offices that are unable to 'talk' or exchange data. In the process of digitization, government processes and systems are, in many instances, reinforced rather than transformed. As a result, citizens continue to visit different departments to access public services, even after the introduction of ICTs, as systems are not interconnected.

Recognizing that e-government should be transformative and become more citizen- rather than governmentfocused in delivering public services, investing in the development of an e-government interoperability framework is fundamental. Otherwise, the millions of dollars spent on e-government would rarely lead to good governance and the achievement of the Millennium Development Goals.

UNDP created a Study Group of government officials from 14 nations, supported by a team of experts from IBM, Oracle and the International Open Source Network, to help countries, especially those in the Asia-Pacific region, reverse this trend of fractured ICT projects by developing and promoting Government Interoperability Frameworks (GIFs). Working collaboratively, this group shared and reviewed existing GIFs, promising practices around interoperability and strategies and policies for promoting open standards, resulting in the development of guidelines that are now reflected in a GIF series of three publications.

The three publications on e-Government Interoperability (the Overview, the Guide and the Review of GIFs in selected countries) aim to assist countries who are striving to set up or improve interoperable ICT frameworks for better e-government delivery. It is our hope that the series will provide a helping hand – a guiding tool – to understanding what e-government interoperability is, why it is important and how governments can improve or start to develop GIFs.

The idea for the project came to life during a policy dialogue at a regional conference on open standards that the UNDP Asia-Pacific Development Information Programme (APDIP) organized with the National Electronics and Computer Technology Center in Bangkok in 2006. Participants agreed that government policies of interoperability are advantageous and that, if governments have not already done so, they should consider formulating their respective GIFs.

In order to ensure that the final publications are responsive to the requirements for interoperability in the respective countries, the GIF Study Group collaborated online and had face-to-face conversations. Hosted by the Chinese Government's State Council Informatization Office, the GIF Study Group met in Beijing on 18-20 April 2007. At the workshop, participants shared experiences, asked questions and set goals for their work.

The GIF Study Group includes representatives from the Governments of Brazil, Canada, China, Egypt, India, Indonesia, Malaysia, Netherlands, New Zealand, Philippines, South Africa, Sri Lanka, Thailand and Viet Nam. Also represented are the European Commission and a standards expert from the United States. The study was convened by UNDP and project advisor Dr. Emmanuel C. Lallana, who is also the author of all three publications in the series.

This series is a practical guide and attempts to answer questions that policy makers and practitioners may have on GIF and open standards. For ICT and e-government to work for development and poverty alleviation, information and knowledge need to flow seamlessly across agency borders and various levels of government, and ultimately between different countries, across regions and continents without being locked into specific software packages. Eventually, this will lead to better and more informed decisions, better public service and better governance.

Please visit our e-Government Interoperability website for additional information: http://www.apdip.net/projects/gif

Mijawete Ang

Elizabeth Fong Regional Manager UNDP Regional Centre in Bangkok

# Contents

Foreword		iii		
undp-af	VDP-APDIP GIF Study Group Members vii			
List of Ac	ronyms	viii		
1	Introduction	1		
2	Content of GIFs	3		
3	<b>Context</b> Defining the GIF Standard selection principles Scope Validity	5		
Ą	<b>Technical Content</b> Defining the layers The standards life cycle Open standards in the GIFs Use of proprietary standards	9		
5	<b>The GIF Authoring Process</b> GIF development GIF revision	17		
6	Implementation and Compliance	21		
7	Conclusion	23		
	Acknowledgments	25		

#### List of Tables

Table 1: Selected GIF versions reviewed	1
Table 2: Comparative content of selected GIFs	3
Table 3: Definitions of selected GIFs	5
Table 4: Standard selection principles for selected GIFs	6
Table 5: Scope of selected GIFs	7
Table 6: Selected GIF validity	7
Table 7: Layers for selected GIFs	9
Table 8: Services or life events for selected GIFs	10
Table 9: Interconnection layers for selected GIFs	10
Table 10: Data integration layers for selected GIFs	11
Table 11: Information access and presentation layers for selected GIFs	11
Table 12: Metadata layers for selected GIFs	12
Table 13: Security layers for selected GIFs	12
Table 14: Other standards categories for selected GIFs	13
Table 15: Standards maturity and obsolescence for selected GIFs	14
Table 16: Open standards in selected GIFs	15
Table 17: Proprietary standards in selected GIFs	16
Table 18: Actors and roles in GIF development	17
Table 19: Development of a GIF	19
Table 20: Revision of a GIF	19
Table 21: Agencies in charge	21
Table 22: Securing compliance	22
Table 23: Treatment of non-compliance	23

# **UNDP GIF Study Group Members**

Appreciative of the inclusive publication development process and the careful reviews by the Study Group members listed below, the views expressed in this paper are the views of the authors alone.

#### Convener of Study Group: Emmanuel C. Lallana, UNDP-APDIP GIF Advisor

#### Brazil

Rogerio Santanna, Secretary, Ministry of Planning, Budget and Management

#### Canada

Gary Doucet, Executive Director, Architecture, Standards and Engineering, Treasury Board of Canada

#### China

Madame Chen Xiaozhu, Director General, State Council Informatization Office

#### Egypt

Hatem El Kadi, Program Director, Government Services Development, Ministry of State for Administrative Development

#### **European Union**

Serge Novaretti, Head of Unit, Interoperable Delivery of European eGovernment Services to Public Administrations

#### India

B K Gairola, Director General, National Informatics Centre

#### Indonesia

Pancat Setyantana, Head of Interoperability Division, Directorate General ICT Application, Ministry of ICT and Communication

#### Malaysia

Norhamimah Ibrahim, Deputy Director, ICT Policy & Planning Division, Malaysian Administrative Modernisation & Management Planning Unit

#### Netherlands

Jan Willem Broekema, Manager, National Coordinator Open Standards and Open Source Program

#### **New Zealand**

Laurence Millar, Deputy Commissioner, Information and Communication Technologies, State Services Commission

#### Philippines

Maria Teresa Garcia, Chief of Staff, Commission on Information and Communications Technology

#### South Africa

Aslam Raffee, Chairperson, Government IT Officers Council, OSS Working Group, Department of Science & Technology

#### Sri Lanka

Shahani Markus Weerawarana, Chief Technology Officer, Information and Communication Technology Agency of Sri Lanka

#### Thailand

Puttipong Puasiri, Project Leader, e-Government, Ministry of Information and Communication Technology

#### USA

Andrew Updegrove, Gesmer Updegrove LLP

#### Viet Nam

Nguyen Ai Viet, Deputy Director General, National Steering Committee on ICT and Director of e-Government Architecture and Infrastructure Development Center, Ministry of Posts and Telematics

# List of Acronyms

AGTIF	Australian Government Technical Interoperability Framework
DIF	Danish e-Government Interoperability Framework
EIF	European Interoperability Framework
e-PING	Standards of Interoperability for Electronic Government (Brazil)
G2B	government-to-business
G2C	government-to-citizen
G2G	government-to-government
G2OG	government-to-other government
G2Org	government-to-organization
GIF	Government Interoperability Framework
ІСТ	information and communications technology
LAN	local area network
MyGIF	Malaysian Government Interoperability Framework
NZ e-GIF	New Zealand e-Government Interoperability Framework
PDA	personal digital assistant
SAGA	Standards and Architecture for e-Government Applications (Germany)
SOAP	Service-Oriented Architecture Protocol
UK e-GIF	United Kingdom e-Government Interoperability Framework
WAN	wide area network

# Introduction

Experiences of e-government initiatives show that new information and communications technology (ICT)based systems are often developed with specifications and solutions that match goals and tasks relevant to a particular agency, but without adequate attention to the surrounding government institutions and ICT systems. The result is a patchwork of ICT solutions that are not always compatible with each other, despite the need for interoperable systems. In addition to the loss of efficiency, there is a huge loss of resources on developing multiple systems to solve the same problems, as well as on generating the same data from many different places.

Some countries have addressed this problem by drafting a **Government Interoperability Framework (GIF)**. These GIFs set out the policy and technical structure by which e-government services are developed in order to ensure coherent flow of information across systems.

This Review compares and analyses the GIFs of seven countries (Australia, Brazil, Denmark, Germany, Malaysia, New Zealand and the United Kingdom), as well as the European Interoperability Framework (EIF) promulgated by the European Union. These comparisons are intended to provide supplementary information for countries interested in developing their own GIFs or updating existing frameworks.

This Review focuses on how GIFs in different countries were developed, the principles that animate them, the technical standards they mandated and/or recommend, the way they are managed, and the implementation and compliance mechanisms they have established. Table 1 shows the selected GIFs and their corresponding versions that have been compared in this Review.

	GIF	Version
Australia	Australian Government Technical Interoperability Framework (AGTIF) http://www.agimo.gov.au/publications/2005/04/agtifv2 #Australian20Technical20Framework	July 2005, v2
Brazil	Standards of Interoperability for Electronic Government (e-PING) http://www.apdip.net/projects/gif/country/BR-GIF.pdf	December 2006, v2.01
Denmark	Danish e-Government Interoperability Framework (DIF) http://standarder.oio.dk/English/	June 2005, v1.2.14
EU	European Interoperability Framework for Pan-European e-Government Services (EIF) http://ec.europa.eu/idabc/servlets/Doc?id=19529	2004, v1
Germany	Standards and Architecture for e-Government Applications (SAGA) http://www.apdip.net/projects/gif/country/GE-GIF.pdf	October 2006, v3
Malaysia	Malaysian Government Interoperability Framework (MyGIF) http://www.mampu.gov.my/mampu/bm/ program/ICT/ ISPIan/ ispdoc/ Interoperability%20Framework.pdf	August 2003, v1
New Zealand	New Zealand e-Government Interoperability Framework (NZ e-GIF) http://www.e.govt.nz/standards/e-gif/e-gif-v-3/e-gif-v-3-total.pdf	March 2006, v3
ИК	United Kingdom e-Government Interoperability Framework (UK e-GIF) http://www.govtalk.gov.uk/documents/eGIF%20v6_1%281%29.pdf	March 2005, v6.1

#### Table 1: Selected GIF versions reviewed

L



# Content of GIFs

The content of the GIFs reviewed can be divided into five sections.

The GIFs typically lead off with an introductory section that enlists the Context that underpins the whole framework. This section includes the definition of the GIF, aims of the document, principles that support the selection of standards, scope and limitations, agencies bound by the specifications of the GIF, and the relationship of the GIF with other government documents.

Another section of the GIF is the Technical Content. This section contains the standards and recommendations of the GIF regarding the development of ICT systems. The Technical Content is a listing of standards categorized according to interoperability layers as determined by the respective governments.

The third section of the GIF pertains to the Development Process Documentation of the GIF creation and revision. This section includes the actors

and organizations involved in the development and revision of the GIF. It also includes the processes that these actors should follow in updating the GIF. Some GIFs include an addendum on the corrections and revisions done per version.

The fourth section of the GIF is the Implementation. This section describes the support tools that are provided and/or being developed to aid the widespread adoption of the GIF. One GIF added a fifth section, the Compliance Regime, where indicators for interoperability, strategies for ensuring compliance, and additional guidance for stakeholders are provided.

The comparison presented in Table 2 shows that all the GIFs reviewed have the Context and the Technical Content sections. The Danish, German, and UK GIFs remain the most comprehensive because they address implementation and compliance issues. The succeeding parts of this review will compare the contents of the GIFs according to these five sections.

	Context	Technical Content	Development Process	Implementation and Compliance
Australia	•	•		
Brazil	•	•	•	
Denmark	•	•	•	•
EU	•	•	•	•
Germany	•	•		
Malaysia	•	•	•	
New Zealand	•	•	•	•

## Table 2: Comparative content of selected GIFs



## Defining the GIF

The GIFs reviewed define the GIF as a set of standards and guidelines that sets out a common language to govern exchange of information between ICT systems. These standards form the basis of designing e-government services so that administrations, enterprises and citizens can interact efficiently. Thus, the GIF is one of the means to achieving the goals of e-government.

## **Standard selection principles**

The principles stated in the GIFs indicate the priorities of government in terms of ICT development. These principles guide the development of the Framework and become the criteria for choosing standards. Many of the GIFs recognized seven similar key principles as described below and highlighted in the next chart.

- Interoperability guaranteeing a media-consistent flow of information between citizens, business, the Federal Government and its partners (Germany) and selecting only those specifications that are relevant to systems' interconnectivity, data integration, e-services access and content (UK).
- Scalability ensuring the usability, adaptability and responsiveness of applications as requirements change and demands fluctuate (Australia, Brazil, Germany, UK).

	Definition
Australia	A common language, conceptual model and set of standards that government agencies can employ as a basis for interoperating to deliver policy and programme priorities.
Brazil	A paradigm for the establishment of policies and technical specifications that will allow for the provision of high-quality electronic services.
Denmark	A national interoperability framework containing descriptions and recommendations of selected standards, technologies and protocols, which might be used and supported in relation with the implementation of e-government in Denmark.
EU	A set of standards and guidelines that describes the way in which organizations have agreed, or should agree, to interact with each other. The EIF defines a set of recommendations and guidelines for e-government services so that public administrations, enterprises and citizens can interact across borders, in a pan-European context
Malaysia	The minimum set of ICT standards and technical specifications governing the communication of systems, flow of information, as well as the exchange of data and business processes that relates to government ministries, agencies and departments.
New Zealand	A set of policies, technical standards and guidelines that covers ways to achieve interoperability of public sector data and information resources, ICT and electronic business processes.
ИК	The minimum set of technical policies and specifications governing information flows across government and the public sector.

#### Table 3: Definitions of selected GIFs

5

- Reusability establishing processes and standards for similar procedures when providing services and defining data structures (Germany) and that consider the solutions of exchange partners that one has to communicate with, leading to bilateral solutions and agreements (EU).
- Openness focusing on open standards; that is, all standards and guidelines must conform to open standards principles (Australia). Wherever possible, open standards will be adopted while establishing technical specifications (Brazil), and standards that are vendor and product neutral should be considered in favour of their proprietary alternatives (Malaysia).
- Market Support drawing on established standards and recognizing opportunities provided by ICT industry trends (Australia).
- Security ensuring reliable exchange of information that can take place in conformity with an established security policy (EU).
- Privacy guaranteeing the privacy of information in regard to citizens, business and government organizations, and to respect and enforce the legally-defined restrictions on access to and dissemination of information (Brazil) and ensuring that services need to endure uniform levels of personal data protection (EU).

Three other unique but noteworthy principles are: Accessibility and Multilingualism in the EU's EIF, and Transparency in Brazil's e-PING.

- Accessibility is defined in the EIF as ensuring that e-government creates equal opportunities for all through open, inclusive e-services that are publicly accessible without discrimination.
- Multilingualism, as defined by the EIF, means that at the presentation level, language is a major factor in the effective delivery of European e-government services. At the back-office level, architecture should be linguistically neutral (in cases where this is not possible, provisions should be made for translation).
- Transparency, according to Brazil's e-PING, is having the GIF documentation available to society and the Internet, with mechanisms for dissemination, feedback and evaluation.

## Scope

All of the GIFs concern itself with government-togovernment interaction (G2G). The GIFs of the Brazil, Malaysia and the UK provide for the widest scope of interaction since they also consider governmentto-citizen (G2C), government-to-businesses (G2B), government-to-organization (G2Org) and governmentto-other government (G2OG) interactions.

## Validity

GIFs are mandatory for Brazil, Malaysia, New Zealand and the UK, while in Australia, Denmark and Germany, GIFs act as guidelines only.

	Interoperability	Scalability	Reusability	Openness	Market Support	Security
Australia	•	•	•	•	•	٠
Brazil	•	•		•	•	
Denmark	•	•	•	•		•
EU	•		•	•		٠
Germany	•	•	•	•		
Malaysia	•			•	•	
UK	•	•		•	•	

#### Table 4: Standard selection principles for selected GIFs

# Table 5: Scope of selected GIFs

	G2G	G2C	G2B	G2Orgs	G2OG	Other
Australia	•				•	
Brazil	•	•	•	•	•	foreign organizations
Denmark	•					
Germany	•	•	•			
Malaysia	•	•	•			
New Zealand	•					
ИК	•	•	•	•	•	intermediaries

## Table 6: Selected GIF validity

	GIF validity
Australia	Guideline. AGTIF widely defines its clientele as 'Australian Government Agencies'.
Brazil	<b>Mandatory</b> for the Executive Branch of the Brazilian Federal Government, including the units of Direct Administration: Ministries, Secretariats and others of the same legal nature, directly or indirectly linked to the Presidency of the Republic and the Autarchies and Foundations. Within the jurisdiction of the above-mentioned entities, the e-PING specifications are mandatory for all new information systems that are implemented within the government and society interaction scope and the information systems that are the object of implementation involving the provision of e-government services or the interaction among systems.
Denmark	<b>Guideline</b> for the design of government projects. It is intended for authorities in IT project development, as well as suppliers and advisors involved in such endeavours.
Germany	<b>Guideline</b> that serves as an orientation aid when it comes to developing concepts for technical architectures and general technical concepts for individual IT applications. SAGA's scope of validity covers the federal administration and software systems with interfaces between federal authorities and federal-state and/or municipal authorities.
Malaysia	<b>Mandatory</b> for all new systems established by the Malaysian Government. The Malaysian Government includes: the government ministries and their agencies and departments, local authorities, statutory bodies and the public sector at large, such as the public higher learning institutes and national health services.
New Zealand	<b>Mandatory</b> for: all public service departments, New Zealand Police, New Zealand Defence Force, Parliamentary Counsel Office, Parliamentary Service, Office of the Clerk, and New Zealand Security Intelligence Service. Cabinet has encouraged adoption by organizations in the wider State sector local authorities.
UK	<b>Mandatory</b> for all new systems that fall within the UK e-GIF scope. Public sector organizations, including government departments, their agencies, the Non-Departmental Public Bodies, the National Health Service, devolved administrations (Scotland, Northern Island and Wales) and local authorities are bound by the recommendations and mandates of the UK e-GIF.



# Technical Content<sup>1</sup>

The Technical Content in all the GIFs contain standards and requirements. While there are some differences in the categorization and clustering, most use one of two means. Six out of the eight GIFs (Australia, Brazil, Denmark, Malaysia, New Zealand and the UK) clustered the standards according to layers, the remaining use Services or Life Cycles. The layer model means that the focus of the GIFs has been on the technical dimension of interoperability only, including: Interconnection, Data Integration, Metadata, Information Access and Presentation, Standards for Business Areas, Standards for Web Services, and Security.

#### Table 7: Layers for selected GIFs

	Interconnection	Data Integration	Metadata	Information Access and Presentation	Standards for Business Areas	Web Services	Security
Australia	•	•	•	•			•
Brazil	•	•	•	•			•
Denmark	•	•	•	•	•	•	•
Malaysia	•	•	•	•			•
New Zealand	•	•		•	•	•	•
UK	•	•	•	•	•		

Limitations of this Review: A majority of the countries reviewed in this paper (Australia, Brazil, Denmark, Malaysia, New Zealand and the UK) grouped standards according to technical layers. The German SAGA and the EU's EIF represent another approach to interoperability – that is, clustering standards according to services/life events. The first approach emphasizes standardizing technical requirements to achieve interoperability. The second approach highlights business process design to attain interoperability. It is for this reason that the German and EU cases are not consistently discussed throughout this Review. The Review focuses more on the technical aspect of interoperability; hence, the content of SAGA and the EIF, which were often not comparable to the other GIFs included in the Review, have therefore been excluded in some tables. In comparison, the German SAGA and the EU's EIF grouped standards according to services or life events. Clustering standards this way means that the framework considered the **organizational dimension** and **data/semantic dimension** of interoperability along with the technical dimension.

## Defining the layers

The **Interconnection layer** contains standards and technologies for connecting systems and enabling communication between them. The common standards found in this layer include: HTTP, FTP, WSDL, and SOAP.

#### Table 8: Services or life events for selected GIFs

	Services included under the GIF
EU	Income taxes, job search, social security contribution, personal documents, car registration, permits, certificates, enrolment, announcement of relocation, health-related services.
Germany	Around 400 services were identified for the different federal administrations. An analysis of the services along the value chain made it possible to identify 8 service types. 73% of the services used today belong to the three following types:
Containy	<ul> <li>Capturing, processing and providing information;</li> <li>Processing applications and requests sent to an administration office; and</li> <li>Processing subsidy and assistance applications.</li> </ul>

#### Table 9: Interconnection layers for selected GIFs

	Interconnection layer
Australia	Standards and technologies for connecting systems. Included within this category are basic connection protocols such as HTTP and FTP; the Web Services message exchange protocol SOAP, and the service description language WSDL. Alternative distributed computing middleware such as J2EE (including Java RMI) or CORBA would also be located here. Asynchronous messaging standards such as JMS would be considered interconnection standards.
Brazil	Conditions under which the government units will interconnect and the interoperability conditions between the government and society.
Denmark	Standards related to networks and system development.
Malaysia	Interoperability components and technical specifications required to enable communication between different systems and the exchange of information over the networking environment – both local area network (LAN) and wide area network (WAN) within the public sector, as well as the Internet at large.
New Zealand	Details of data transport, such as network protocols. This is a crucial area for interoperability. Without agreement on networking standards, it is difficult or impossible to make systems communicate.

The **Data Integration layer** contains standards related to exchanging and processing data. The standards in this layer allow for recognition of data. XML is the key technical policy in this layer. The **Information Access and Presentation layer** contains standards related to the means of access of citizens to services and the way information is presented to them. This layer is further divided according to the mode of service delivery (i.e. personal computers, personal digital assistants (PDAs), mobile phones, etc.) and the corresponding standards on how the documents are presented (ODF, PDF, JPEG, etc.).

### Table 10: Data Integration layers for selected GIFs

	Data Integration layer
Australia	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 such as RSS, as well as data markup languages such as XML and SGML. Basic character set encodings would also be positioned here.
Brazil	XML schemas of applications related to the Areas of Government Performance that are displayed as a catalogue in the e-PING site, whose current contents are presented in a latter topic. Also components related to issues that cut across the Areas of Government Performance, whose standardization is relevant for the interoperability of e-government services such as geographical processes and information.
Denmark	Standards related to processing of data.
Malaysia	Components and technical specifications required to enable the recognition of data, including codes, recognition methods and interpretation (including formats used).
New Zealand	Facilitates interoperable data exchange and processing. Its standards allow data exchange between disparate systems and data analysis on receiving systems.

#### Table 11: Information access and presentation layers for selected GIFs

	Information Access and Presentation layers
Australia	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 (and XHTML) as well as selections from the wide range of image and streaming media formats. Also included would be the document encoding format RTF and a range of specialized markup languages, including markup for mobile devices.
Brazil	Standards that apply to the means of access to e-government services. The present version exclusively approaches the policies and specifications for workstations, smart cards, tokens and other cards. In future versions, other access means will be treated, such as cellular telephones, handheld devices and digital televisions.
Denmark	Standards related to the presentation of data to the user and to formatting of documents.
Malaysia	Components and technical specifications required to enable users to access public sector information and services electronically via a range of delivery channels (e.g. World Wide Web) and devices (e.g. personal computers, mobile phones, PDAs).
New Zealand	How users access and present business systems. Most of the standards in this layer are in the Government Web Guidelines.

The **Metadata layer** contains standards and elements related to the storage and retrieval of government files.

The **Security layer** contains standards regarding the safety of information processed through the government e-services.

#### Table 12: Metadata layers for selected GIFs

	Metadata layers		
Australia	Standards and technologies for supporting the discovery and location of resources. These include metadata standards and thesaurus standards for supporting consistent description of resources. Also included are directory standards such as LDAP and X.500.		
Brazil	Aspects related to the treatment and transfer of information in e-government services. It includes the standards for government subject matters and metadata.		
Denmark	Standards and requirements for metadata and content management.		
Malaysia	Components and technical specifications needed to enable the secure exchange of information as well as the secure access to public sector information and services.		
Malaysia	A core set of elements that contain data needed for the effective retrieval and management of official information in order to meet the government's information management and retrieval needs.		

#### Table 13: Security layers for selected GIFs

	Metadata layers	
Australia	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 infrastructure standards supporting the use of public and private encryption and decryption keys, digital signatures, and secure transmission protocols such as the Internet Protocol Security.	
Brazil	ICT safety aspects to be considered by the federal government.	
Denmark	Standards related to storing, using, and safekeeping identity information for users, citizens, employees, and resources.	
Malaysia	Components and technical specifications needed to enable the secure exchange of information as well as the secure access to public sector information and services.	
New Zealand	All layers to reflect the fact that security needs to be designed into a system, not added as a layer on top. The NZ e-GIF contains standards at the various levels designed to offer different levels of security as appropriate. It also refers to a series of standards and policy statements that provide advice and direction on the levels required.	

The five layers mentioned above are the foundations of the layer model. More recent versions of the Denmark, New Zealand and UK GIFs pertain to new layers of interoperability. The **standards for specific business**  **areas** is a new category that lists requirements for areas of services like e-learning. The **standards for webbased services** provide guidelines for the development of government e-services.

#### Table 14: Other standards categories for selected GIFs

	Other standards categories		
Denmark	Standards related to specific business areas, e.g. e-learning, and standards related to the World Wide Web and web services.		
	<b>Business Services</b> – supports data exchange in particular business applications and information contexts. Some of the standards in this layer are generic, covering multiple business-information contexts. 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.		
New Zealand	<b>Best Practice</b> – 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.		
	e-Government Services – the actual implementations of IT infrastructure, which the ICT branch of the State Services Commission makes available for public sector agencies to use.		
	<b>Web services</b> – an emerging set of standardized applications to connect and integrate web-based applications over the Internet. Using Best Practice implementations, agencies can agree on a common approach to interoperable service delivery to customers.		
UK	There are various standards bodies, business communities and other groups working on XML-based and other specifications for the exchange of specific content-related information.		

## The standards life cycle

It is important to realize that standards change. They evolve and move through a maturing process driven by pragmatism, speed to market and efficiency. There is also the need to adopt new standards due to changes in the environment – development of new technologies, etc. Six out of the seven national GIFs in this review took the standards life cycle in recommending a standard. This entails standards in three basic categories, which most countries – except Australia – further sub-divided:

- Emerging under development (or for future consideration) and under review (observation or evaluation). These either have yet to be appraised, are being evaluated by committees or via pilot projects, and/or have potential in line with intended development trends but not yet categorized.
- Current recommended/approved and adopted/ mandatory (interestingly, some countries such as Denmark and New Zealand use 'recommended' as the higher status, while Brazil and the UK use 'recommended' as the status below 'adopted'). These are formally reviewed and accredited, tried and tested, have ongoing support, and are considered mature and/or crucial for interoperability.
- Fading de-facto/sustained and transitioning/ migrating from/depreciated or not to be used as in the German 'black list' classifications. These standards do not comply with one or more of the technical requirements as set up in the general policies of the architecture, standards and technologies that, while still used, are receiving less support, and/or have been abandoned for a better solution.

	EMERGING		CURRENT		FADING	
	Under Dev	Under Review	Recommend	Mandatory	Sustained	Depreciated
Australia						•
Brazil	•	•	•	•		•
Denmark	•		•	•	•	•
Germany	•	•	•	•	•	•
New Zealand	•	•	•	•		•
ИК	•	•	•	•		

#### Table 15: Standards maturity and obsolescence for selected GIFs

#### Open standards in the GIFs

Open standards are an important element of any interoperability framework. Except for the UK e-GIF, which referred to international standards (only some of which are open standards), open standards are directly referred to in all of the GIFs. Furthermore, Australia, Germany, Malaysia and New Zealand explicitly state preference for the use of open standards over proprietary technologies.

Australia's AGTIF defines open standards as "recognized national or international platform-independent standards that are developed collaboratively through due process, are vendor neutral, and do not rely on commercial intellectual property". Malaysia's MyGIF refers to open standards as "standards that are vendor and product neutral." Germany's SAGA provides a minimum requirements definition of open standards, referring to them as "published standards available for unrestricted use with minimal or no royalty charges and [that] will continue to be freely available in the future". New Zealand encouraged adoption of open standards to "facilitate a greater level of uptake for bundled services in the future" Australia preferred to use open over proprietary standards where feasible because open standards "require no royalty payments, do not discriminate on the basis of implementation, allow extension, promote reusability, and reduce the risk of technical lock-in and high switching costs".

Australia and New Zealand have both proclaimed that their respective GIFs are open-standards based. This means that any guideline or standard included in these frameworks must conform to open standards principles. These statements were found at the beginning of both respective GIFs. Malaysia's MyGIF included the "adoption of open standards and specifications that are widely supported by the market in order to reduce the total cost of ownership of government information systems" as one of its objectives. Similarly, Germany's SAGA indicated the promotion of the integration of open standards in e-government applications as one of its aims.

# Table 16: Open standards in selected GIFs

	Open standards definitions		
Australia	Open standards are recognized national or international platform independent standards. They are developed collaboratively through due process, are vendor neutral, and do not rely on commercial intellectual property.		
Brazil	The e-PING states that, whenever possible, open standards will be adopted in establishing technical specifications		
Denmark	<ul> <li>One of the five recommendations of the DIF is that open standards should be used, and that:</li> <li>Standards should be accessible to everyone free of charge (i.e. there is no discrimination between users, and no payment or other considerations are required as a condition of use of the standards);</li> <li>Standards must remain accessible and free of charge (i.e. owners renounce their options, if indeed such exist, to limit access to the standards at a later date, for example, by committing themselves to openness during the remainder of a possible patent's life); and</li> <li>Standards are well documented (i.e. all aspects of the standards are transparent and documented, and both access to and use of the documentation is free).</li> </ul>		
Germany	<ul> <li>The minimum requirements are defined as follows:</li> <li>The standard has been published, and the standard specification document is available either freely or at a nominal charge.</li> <li>The intellectual property (patents, for instance) of a standard or of parts of a standard must, if possible, be accessible without being contingent upon the payment of a license fee.</li> <li>One aim of SAGA is to promote the use of open standards in e-government applications.</li> </ul>		
Malaysia	Open standards are referred to as standards that are vendor and product neutral. Adopting open standards and specifications that are widely supported by the market in order to reduce the total cost of ownership of government information systems is given as one of the five objectives of MyGIF.		
New Zealand	Open standards feature strongly in the NZ e-GIF. The document also says that agencies and service sectors are encouraged to draw from open standards to facilitate a greater level of uptake for bundled services in the future. The NZ e-GIF intends to enable any agency to share its information, ICT or processes with those of any other agency using a predetermined framework based on 'open' (i.e. non-proprietary) international standards.		
ИК	Does not directly refer to open standards.		

# Use of proprietary standards

Proprietary standards are still used in many of the GIFs included in this Review. The policy stance of these frameworks though, is to use open standards over

proprietary standards when feasible. However, certain proprietary standards, such as Microsoft Word's .doc format, have become so widely-used that they are considered de facto standards.

#### Table 17: Proprietary standards in selected GIFs

	Proprietary standards in the GIF	
Australia	AGTIF mentions two proprietary standards, though the reasons for their selection were not given. Although AGTIF catalogues both open and proprietary standards, where feasible, preference has been given to the deployment of open standards.	
Brazil	Proprietary standards are accepted until migration to open standards is feasible. When available, free software solutions are preferred, in keeping with the policies defined by the Electronic Government Executive Committee.	
Denmark	Company names and proprietary technologies have been mentioned in DIF. They are not treated differently.	
Malaysia	Proprietary trademarks and company names such as Microsoft, IBM, Borland and Sybase are widely used throughout MyGIF. There are also many product names mentioned, including the Microsoft Office programme suite. MyGIF recommends neutral standards (open standards) over proprietary alternatives where possible.	
New Zealand	NZ e-GIF refers to the web links of some of the famous IT firms, but contains very few references to proprietary technologies, standards and trademarks. NZ e-GIF discourages the use of proprietary standards.	



# The GIF Authoring Process

The lead authorities assigned to develop GIFs in five of the seven countries are the offices in charge of public administration. In the case of Denmark and Australia, offices that are focused on the more technical issues took the lead. Brazil assigned the lead authority of developing a GIF to both administrative and technical offices. The bulk of the policy work goes to the designated Secretariat and the Working Groups. The lead authorities are mainly responsible for approving and implementing the GIF document.

Most of the GIF development process is consultative. Citizens, industry, and independent consultants are given opportunities to participate in the process through requests for comments, websites and memberships in the Working Groups.

	Actor(s)	Role(s) in GIF development
Australia	Chief Information Officers Committee (public sector)	Acts as Lead Authority and responsible for implementation in their offices
	Australian Government Information Management Office	Functions as GIF Secretariat
	Interoperability Framework Working Group	Drafts and reviews the technical policies and specifications in the GIF
	Distributed Systems Technology Centre (consultants)	Provides independent <b>expert</b> advice
Brazil	The Ministry of Planning, Budget, and Administration's Secretariat of Logistics and Information Technology	
	The National Institute for Information Technology of the Presidency of the Republic	Act as Lead Authorities
	The Federal Data Processing Service (public company attached to the Treasury Department)	
	e-PING Coordination	Functions as GIF Secretariat and GIF author
	Working Groups	Draft and review the technical policies and specifications in the GIF
	Public	Contributes during consultations
Denmark	National IT and Telecom Agency, and KIU (a committee that facilitates coordination of initiatives related to IT in the Danish public sector)	Acts as Lead Authority
	IT Architecture Committee	Functions as <b>GIF Secretariat</b> and GIF <b>author</b>

#### Table 18: Actors and roles in GIF development

# Table 18: Actors and roles in GIF development (continued)

	Actor(s)	Role(s) in GIF development
Germany	Federal Ministry of Interior The Co-ordinating and Advisory Agency of the Federal Government for Information Technology in the Federal	Acts as <b>Lead Authority</b> Functions as <b>GIF Secretariat</b> and GIF author
	Koopa-SAGA project group (public sector representatives) SAGA expert group (public and private sector representatives, appointed by the Federal Ministry of the Interior) Public	Support and contribute to GIF development Contributes during public consultations
Malaysia	Malaysian Administrative Modernisation and Management Planning Unit ICT Policy and Planning Division	Acts as Lead Authority Functions as GIF Secretariat and GIF author
New Zealand	State Services Commission ICT Branch e-GIF Management Committee Working Groups Other government agencies	Has accountability and final decision-making authority of the GIF Functions as GIF Secretariat Oversees GIF Secretariat Draft and review the technical policies and specifications in the GIF Support and implement the GIF
UK	UK Cabinet Office, Delivery and Transformation Group Public sector organizations Industry Citizens Senior IT Forum Working Group and Sub-Working Groups (open to public and industry members)	Acts as Lead Authority Support and implement the GIF Participates as Interoperability Working Group members or as independent contributors Contribute during public consultations Provides expertise on procurement and IT projects Drafts and reviews the technical policies and specifications in the GIF, as well as the implementation, and management guidelines

# **GIF** development

Table 19 provides a reconstructed workflow of how a GIF is developed.

Table 20 provides a reconstructed workflow of how a GIF is revised.

**GIF** revision

## Table 19: Development of a GIF

Tasks	Responsibility
Establishment of a GIF Secretariat	Lead Authority
Creation of action plan, timetables, Working Groups, etc.	GIF Secretariat
Undergo review of GIFs in other countries	GIF Secretariat/Working Group
Draft initial GIF format	GIF Secretariat/Working Group
Draft technical policy and specifications	Working Group
Release v 0 for consultation or informal review	GIF Secretariat
Provide input and contributions	Government agencies, expert groups, industry, citizens
Re-draft v 0 to incorporate contributions	Working Group
Release v 0.5 for formal review	GIF Secretariat
Provide input and contributions	Lead Authority/Expert Group
Re-draft v 0.5 to incorporate contributions	Working Group
Release v 0.9 for approval	GIF Secretariat
Approve document	Lead Authority
Release v 1 for policy use	GIF Secretariat

## Table 20: Revision of a GIF

Tasks	Responsibility
Continuous input via consultation mechanisms	Government agencies, expert groups, industry, citizens
Monitoring and compilation of contributions	GIF Secretariat
Undergo review of GIFs in other countries	GIF Secretariat/Working Group
Provide list of topics for review	GIF Secretariat/Working Group
Review existing technical policy and specifications	Working Group
Release v1.3 for consultation and informal review	GIF Secretariat
Provide input and contributions	Government agencies, expert groups, industry, citizens
Re-draft v1.3 to incorporate contributions	Working Group
Release v1.5 for formal review	GIF Secretariat
Provide input and contributions	Lead Authority/Expert Group
Re-draft v1.5 to incorporate contributions	Working Group
Release v1.9 for approval	GIF Secretariat
Approve document	Lead Authority
Release new version for policy use	GIF Secretariat



# Implementation and Compliance

As to be expected, the government units involved in the drafting of the GIF are also responsible for managing its implementation. In the case of Germany, the SAGA is maintained by the Co-ordinating and Advisory Agency of the Federal Government for Information Technology in the Federal Administration, but the implementation rests on the federal ministries. In the case of Australia, the Chief Information Officers of each agency are specifically tasked with implementing their GIF strategy in their respective agencies.

#### Table 21: Agencies in charge

	Role(s) in GIF development
Australia	The Australian Government Information Management Office
Denmark	The National IT and Telecom Agency
Germany	The Co-ordinating and Advisory Agency of the Federal Government for Information Technology
New Zealand	The State Services Commission
UK	The e-Government Unit of the Cabinet Office

Table 22 shows that there are a number of ways that governments use to ensure compliance with the GIF. These measures include:

- Adopting GIF specifications as an agency policy;
- Drafting a GIF compliance road map or a migration policy;
- Self-regulating the system owner and departmental checking;
- Providing a decision-support tool or service for public officials who will design IT projects; and
- Recommending GIF conformity in the bidding process. In Germany, preference in the bidding process is given to those who are GIF-compliant.

Only the UK and Germany include penalties for non-compliance. These penalties include:

- Possible withholding of project approval or funding;
- · Refused connection to government networks; and/or
- Possible discrimination in procurement biddings for suppliers.

# Table 22: Securing compliance

	GIF compliance measures
Australia	Chief Information Officers may implement the framework in their agency by endorsing it as an agency policy.
Denmark	A decision support tool that outlines the crucial considerations of a public authority when choosing multimedia standards is used.
Germany	<ul> <li>The public agency responsible for an e-government application is also responsible for ensuring conformity with SAGA. The public agencies are responsible for examining ways to migrate their applications.</li> <li>One implementing mechanism is that when inviting tenders for e-government applications for the federal administration, the agency in charge recommends that compliance with SAGA be considered.</li> <li>The following measures are designed to support conformity with SAGA:</li> <li>SAGA is included in project planning processes at an early stage;</li> <li>Conformity with SAGA is specified and checked when projects are approved;</li> <li>Conformity with SAGA can be a mandatory criterion for projects subsidized by public administrations; and</li> <li>SAGA conformity is mandatory for government contracts.</li> </ul>
Malaysia	For legacy systems that fall within the scope defined, agencies will need to assess if any integration is required between the legacy systems and other systems. If the agency (assumed to be either Chief Information Officer or IT project developer) determines that integration is required, interfaces will need to be defined to allow such integration to take place.
New Zealand	Current information systems do not need to comply immediately with NZ e-GIF; however, any new information system must be compliant. Any appeal for exemption must be approved by the State Services Commissioner.
UK	Responsibility for compliance rests with the system's senior responsible owner or sponsor. Compliance is by self-regulation, using normal departmental checking arrangements throughout the system's development lifecycle. An e-GIF Compliance Advisory Service is provided by the National Computing Centre. The service provides a structured, web-based commentary about the e-GIF and a self-assessment questionnaire.

# Table 23: Treatment of non-compliance

	Non-compliance restrictions
Germany	e-Government applications that are, as a whole or in part, non-compliant with SAGA are subject to the following restrictions:
	<ul> <li>The use of one-for-all offers can be restricted;</li> <li>Advisory and consultancy services by competence centres are limited or even impossible;</li> <li>Interfaces with such systems may, under certain circumstances, not be supported; and/or</li> <li>In most cases, no subsidies are available from public administrations.</li> </ul>
UK	Compliance with the UK e-GIF is one of the criteria that will be used when assessing/evaluating departmental e-business strategies and deciding on the release of funding by the e-Government Unit and Treasury.
	New systems failing to comply with the UK e-GIF will not receive approval or funding from the appropriate bodies within their organizations.
	Systems seeking to link to Directgov, the Government Gateway or the Knowledge Network and failing to comply with the UK e-GIF will be refused connection.
	Suppliers that are not prepared to meet the specific requirements set forth in the UK e-GIF or their equivalents (which do not adversely affect functionality) during procurements, etc., will not meet the specifications.

# Conclusion

No two GIFs are the same. They vary from country to country, depending on numerous factors; however, they also have many common features. Likewise, the agencies bound by GIFs are different among countries, but most generally cover the government sector. The legality can sometimes be strict, but all countries covered in this Review use GIFs as guidelines, at the very least. The common principles of GIFs, such as scalability, reusability, flexibility, preference for open standards, preference for nationally-legislated or -adopted standards, are common across borders.

The process of formulating a GIF is as critical as the GIF itself to ensuring appropriate support, governance, and a baseline for measuring success. Bringing together

officials from across government agencies to discussing a framework, with the participation of businesses and citizens, would go a long way.

Governments in the process of preparing GIFs may want to pay special attention to open standards, while those who already have them may need to reinforce their stance. This is the best way to encourage software and hardware manufacturers to produce applications with open standards. At the same time, product vendors have an obligation to meet the commonly preferred standards and increase users' choice. This balance will facilitate the ease of interaction between government agencies, as well as a seamless delivery of e-government services to citizens.

# Acknowledgements

The UNDP Regional Centre in Bangkok, publisher of the GIF series, would like to express its gratitude to Dr. Emmanuel C. Lallana for his dedication and efforts in steering the drafting process and seeking input from its members by moderating all the discussions at the GIF Study Group Meeting in Beijing. Dr. Lallana has created the substance of the reports and consistently consulted with study group members during the development of the GIF series. Thanks to Kathryn V. Pauso for assisting Dr. Lallana in the process. UNDP also wishes to express its gratitude to the study group members for being in Beijing to share their experiences, and for providing input and case studies in the drafting process.

UNDP expresses its gratitude to IBM and Oracle for not only sponsoring the project but also for contributing substantively with valuable inputs in the interactive discussions in Beijing, and for providing ideas and inputs throughout the process. Particularly, we wish to thank Roslyn Docktor and Peter Lord for taking the time to participate in numerous teleconferences and helping us to achieve the desired outputs.

Moreover, we would like to extend our thanks to industry partners who provided their perspective on the subject at the GIF Study Group Dialogue with Industry and Other Stakeholders in Beijing on 20 April 2007.

Shahid Akhtar, former Programme Coordinator of APDIP, initiated the project and without his dedication and network of contacts in the region, the project would not have been possible. Thanks also to Lars Bestle, who managed the project, and Christine Apikul, who coordinated the development of the GIF series.

Finally, we would like to thank the following individuals for providing and sharing ideas, knowledge, insight and observations throughout the preparation process: Chanuka Wattegama, Sunil Abraham, Joan McCalla, Raul Zambrano, Norman Sanders, James George Chacko, Leandro Corte and Jantima Sirisaengtaksin.

This series on *e-Government Interoperability* comprises three publications – An Overview, A Guide and A Review of Government Interoperability Frameworks in Selected Countries. e-Government interoperability leads to better decision-making, better coordination of government agency programmes and services, cost savings and/or cost avoidance, and is the foundation of a citizen-centred, one-stop delivery of services. The series aims to assist countries who are striving to set up or improve interoperable ICT frameworks for better e-government delivery. The Overview provides a quick introduction on the what, who, why and how of e-government interoperability and is aimed at policy makers. The Guide is a practical tool for technical officials and policy makers who plan to draft or revise a Government Interoperability Framework (GIF). The Review provides a comparative analysis of eight existing GIFs and serves as a useful resource for those involved in the development or revision of a GIF.

#### **Overview**

The Overview introduces and guides policy makers to the what, who, why and how of e-government interoperability. Through a question-and-answer format, the publication walks its readers through the vision, rationale and value of GIF and a National Enterprise Architecture (NEA). It answers some fundamental questions such as what are the resources required, who should be involved and what are the key factors for its successful development and operationalization. It also looks at open standards and what they have to do with GIF. This Overview is particularly useful for senior officials in governments who are starting to implement their e-government strategies and for those who are planningto develop a GIF or NEA.

#### Guide

The Guide is a practical tool for technical officials and policy makers in governments who plan to draft or revise a GIF to ensure e-government interoperability among national government agencies. It is a comprehensive guide giving details on the approaches and principles of a GIF, and the standards categories and selection processes. It provides a step-by-step guide to developing and revising a GIF, illustrated with relevant case studies. This Guide also provides guidance on operationalizing the GIF, examining key issues related to implementation, compliance, enforcement and capacity development.

#### Review

The Review provides a comparative analysis of eight existing GIFs of Australia, Brazil, Denmark, the European Union, Germany, Malaysia, New Zealand and the United Kingdom. It serves as a useful resource for government officials, the corporate sector and civil society involved in the development or revision of a GIF. This Review focuses on how GIFs in different countries were developed, the principles that animate them, the technical standards they mandated and/or recommend, the way these GIFs are managed, and the implementation and compliance mechanisms they established.

#### **United Nations Development Programme**

Regional Centre in Bangkok 3rd Floor, UN Service Building Rajdamnern Nok Avenue Bangkok 10200, Thailand Tel: +66 2 288 2129 Fax: +66 2 288 3032 Email: regionalcentrebangkok@undp.org Website: http://regionalcentrebangkok.undp.or.th