e-Government Procurement Handbook

Asian Development Bank

e-Government Procurement Handbook

ADB

Asian Development Bank

Note:
In this publication, "$" refers to US dollars.

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Preface

Public procurement plays a central role in development and comprises a substantial share of the national economy in nearly every country. Electronic government procurement, commonly known as e-GP, breaks down the physical barriers of space and time, allowing for more transparent public procurement work accompanied by wider access to information and markets. e-GP provides opportunities to introduce innovative measures using information and communication technology (ICT) to streamline public procurement for greater efficiency and economy. It also helps to improve governance and reduce corruption, particularly when it is integrated with other functional areas of government such as budget, tax, and audit.

The Asian Development Bank (ADB) is a founding member of the Multilateral Development Bank (MDB) Working Group on e-GP. The group is represented by ADB, the African Development Bank, the European Bank for Reconstruction and Development, the Inter-American Development Bank, the World Bank, and the United Nations Commission on International Trade Law (UNCITRAL). As e-GP becomes a priority on the agenda for public procurement reform in developing member countries (DMCs) of ADB and of other MDBs, there is an increasing demand for an up-to-date handbook that summarizes internationally recognized best practices in formulating and implementing e-GP solutions. ADB agreed to lead the development of such a document.

This handbook was prepared under the supervision of staff of the ADB Operations Services and Financial Management Department, by ADB consultants. The handbook intends to serve as a handy reference for DMC officials, MDB staff members, consultants, and information technology (IT) firms who are involved or interested in developing and implementing e-GP.

The focus of this handbook is to serve as a guide on concepts related to e-GP, and to examine how e-GP implementations have taken shape in different jurisdictions across the world. In the preparation of this book, the authors acknowledge that there is no one-size-fits-all solution. The circumstances and motivations underlying implementation of e-GP will differ from one jurisdiction to another. However, these underlying circumstances can provide important inputs required to determine the appropriate e-GP strategy for a jurisdiction interested in pursuing the implementation of an e-GP system or enhancing a system already in place.

This knowledge product benefited from valuable comments from, and peer review by DMC officials involved in e-GP implementation and members of the MDB e-GP Working Group.

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Acknowledgments

Abbreviations

APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
BCP	business continuity planning
BIOS	basic input/output system
BPR	business process reengineering
Can$	Canadian dollar
CPB	central purchasing body
CPV	common procurement vocabulary
DMC	developing member country
DPS	dynamic purchasing system
DRP	disaster recovery plan
DSC	digital signature certificate
EBS	electronic bidding (tendering) system
e-GP	electronic government procurement
EPP	electronic public procurement
EFT	electronic funds transfer
EOI	expression of interest
ERP	enterprise resource planning
EU	European Union
FAQs	frequently asked questions
FMIS	financial management information system
G2B	government-to-business
G2G	government-to-government
GDP	gross domestic product
GoK	State Government of Karnataka, India
GUI	graphical user interface
ICT	information and communication technology
IMF	International Monetary Fund
IPR	intellectual property rights
ISACA	Information Systems Audit and Control Association
ISO	International Organization for Standardization
IT	information technology
J2EE	Java 2 Platform, Enterprise Edition
JCA	J2EE Connector Architecture
LKPP	Lembaga Kebijakan Pengadaan Barang/Jasa Pemerintah (National Public Procurement Agency)
MDB	multilateral development bank
MEAT	most economically advantageous tender
MTBF	mean time between failures
OECD	Organisation for Economic Co-operation and Development
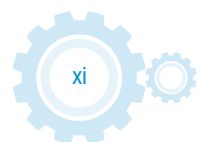
OGC	Office of Government Commerce (UK)
P	Philippine peso
P2P	purchase-to-pay
PEPPOL	Pan-European Public Procurement Online
PKI	public-key infrastructure
PMIS	procurement management information system
PMU	project management unit
POFOD	probability of failure on demand
ROCOF	rate of occurrence of failures
SLA	service-level agreement
SMEs	small and medium-sized enterprises
SOA	service-oriented architecture
SSL	Secure Sockets Layer
SSO	single sign-on
TSA	time-stamping authority
UK	United Kingdom
US	United States
UNDP	United Nations Development Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNSPSC	United Nations Standard Products and Services Code
UNCITRAL	United Nations Commission on International Trade Law
UOM	unit of measure
VFM	value for money
XML-RPC	Extensible Markup Language – Remote Procedure Call

Introduction

Government agencies around the world have been using information technology (IT) and the internet to deliver government services and to access information electronically for several years, practices which are commonly referred as e-government initiatives. For many governments, one of the more successful and applicable initiatives is the delivery of electronic procurement to enhance transparency, establish an open marketplace for procurement needs, and support the introduction of procurement reforms to better manage and monitor public procurement activities. The development of electronic procurement systems has created a number of new options and methods for supporting the procurement processes of governments and for embracing the efficiencies and savings that can be realized. These electronic systems are commonly referred to as electronic government procurement (e-GP).

The Multilateral Development Banks (MDBs) e-GP Working Group defines e-GP as "... *the use of information technology (especially the internet) by governments in conducting their procurement relationships with suppliers for the procurement of works, goods, and consultancy services required by the public sector.*"

The size of public procurement in dollar value is significant and was estimated to be $2,083 billion in 1998 (Audet 2002).[1] For most countries, public procurement expenditure as a percentage of gross domestic product (GDP) is estimated in the range of 10% to 25%. Savings achieved from better utilization of funds allocated for public procurement can therefore have a significant impact on the economy as a whole. A study by the European Union (EU) shows that a 10% saving in public procurement would turn the budget deficits of three EU member countries into surplus values and that no eurozone countries would run budget deficits in excess of 3% (European Commission 2004b). Enhancing efficiency in government procurement is regarded as a viable mechanism to address deficit concerns in the United States as well (Obama 2008). The Republic of Korea, meanwhile, estimates that the implementation of an e-GP system has provided a $6 billion economic benefit for both the government and its suppliers through efficiencies and both tangible and intangible cost savings.

Governments and public sector agencies that have implemented e-GP systems have reported a number of key benefits, including

    (i)   enhanced transparency achieved from online publication of tender notices, contract award notices, and online bid submission;

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[1] Audet conservatively estimates the procurement expenditure (including defense expenditure) of the EU at 9.24% of GDP, whereas a study conducted by the European Commission estimates public procurement at a higher percentage. Hence, actual expenditure on public procurement is likely to be higher than the estimates prepared by Audet.
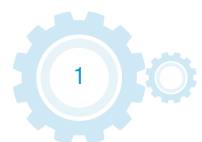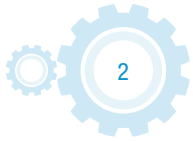
(ii)   increased bidder participation due to better awareness and access to opportunities;
(iii) savings on procurement spend from lower bid prices due to better and open competition (savings of 10% are typically reported);
(iv)   enhanced reporting and procurement analytics to better monitor procurement activities;
(v)   faster processing of procurement activities resulting from online workflow;
(vi)   enhanced tools to address fraud and corruption; and
(vii) reduction in printing, distribution, and storage of paper documents.

Existing e-GP systems are at various levels of maturity. Some countries, such as the Republic of Korea, have implemented advanced, fully integrated end-to-end e-GP systems. Others, such as Canada, Chile, Indonesia, Malaysia, Mexico, the Philippines, and Portugal, have applied e-GP systems for nearly a decade, and they are now used extensively by a large number of procurement entities, with scope for further growth. Bangladesh and Georgia initiated e-GP implementation around 2010, with plans to implement full-fledged e-GP systems. A handful of countries have already made plans but have yet to embark on e-GP implementation, and a few countries have yet to take even the initial steps.

Implementation of a full-fledged e-GP system is a transformational initiative that cuts across the entire government establishment and supplier community. Making the shift from manual handling of public procurement to e-GP requires a well-planned and sustained effort. Government officials and suppliers will have varying levels of maturity when it comes to using IT systems; training is therefore necessary so they can become adept in using e-GP systems. Existing legislation for governing public procurement has to be suitably amended to facilitate and enable e-GP. Concerns raised by stakeholders about e-GP have to be alleviated through training, workshops, and capacity building initiatives. Any gaps in IT and network connectivity in government offices have to be addressed and facilitation centers may have to be developed to enable the supplier community to submit responses online. In short, solutions have to be designed to address technological challenges associated with e-GP implementation.

The countries in advanced stages of implementation have acquired a wealth of experiential knowledge in transitioning from manual systems to e-GP. Though one size may not fit all, the best practices in addressing these e-GP challenges can be shared and suitably adopted across countries, minimizing the learning curve.

The MDBs (the African Development Bank, ADB, the Inter-American Development Bank, and the World Bank) have promoted research on e-GP for several years, taking the initiative to showcase the benefits of e-GP and also to facilitate knowledge-sharing between e-GP implementations. In 2002, the MDBs constituted an e-GP Working Group to coordinate e-GP initiatives and to develop related policies and guidelines; the United Nations Commission on International Trade Law (UNCITRAL) subsequently joined this group. The MDB e-GP Community of Practice portal now serves as a knowledge hub for e-GP implementation.[2] This website serves as a knowledge hub for e-GP and, in addition to a toolkit, also includes research and case studies of existing e-GP implementations. This research, conducted in 2007, was designed to provide insights into how different countries have approached e-GP implementation. Specifically, information about the evaluated systems is documented and analyzed under the following headings:

(i)   system profile and system uptake,
(ii) system functionality,

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[2] http://www.mdbegp.org/
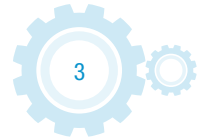
   (iii)   technology,
   (iv)   business issues,
   (v)   implementation costs,
   (vi)   system benefits and problems,
   (vii)   system support for governance,
 (viii)   implementation strategy,
   (ix)   infrastructure and web services, and
   (x)   procurement outcomes and lessons learned.

In 2002, the MDB e-GP Working Group coordinated e-GP procurement activities between the donor organizations, and developed policies and guidelines for implementation of e-GP systems. The result was a set of complementary documents providing guidance on key aspects of e-GP, including

- *Strategic Overview.* This document explains the need for leadership in e-GP implementation and provides an overview of e-GP project objectives and implementation challenges.
- **E-Government Procurement Road Map.** This document advocates phased deployment of e-GP and provides detailed guidance on the activities to be undertaken in each of the phases identified.
- **Strategic Planning Guide.** This was designed to provide awareness and understanding of key design considerations in e-GP implementation strategy development, such as government and institutional leadership; functionality and standards; infrastructure and web services; private sector activation; and management legislation, regulation, and policy.
- **Standards Framework.** This document explains the importance of adopting common standards; identifies areas in which standardization is required for e-GP; and provides a listing of available standards for catalogs, systems interoperability, legislation, security, and authentication.
- **Authentication and Digital Signatures in E-Law and Security.** This document explains the purpose of signatures in commerce; fundamental concepts in information security pertaining to security, confidentiality, integrity, availability, record keeping, non-repudiation, authentication, and authorship; public-key infrastructure (PKI) and its limitations; the evolution of electronic legislation frameworks; and model laws related to authentication and digital signatures.
- **E-Government Procurement Readiness Assessment.** This document provides a framework designed to help jurisdictions to gauge their level of preparedness.
- **E-Tendering Requirements for Multilateral Development Bank-Financed Procurement.** This document provides minimum standards and qualities to be met by electronic systems used to handle bidding activities under MDB-financed projects.
- **E-Reverse Auction Guidelines for Multilateral Development Bank-Financed Procurement.** This document provides a list of conditions which an e-Reverse Auction system should satisfy to qualify for procurement of goods, works, or services under MDB-financed projects. The use of e-reverse auctions is prescribed only for contracts where specifications are well defined, price is the only determinant for selection, and the market has an adequate number of qualified bidders.
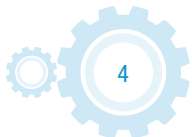
Most of the documents listed above were published between 2004 and 2005, and are collectively referred to as the e-GP toolkit. These documents can be freely downloaded from the MDB e-GP Community of Practice portal.

The EU has also been playing an active role in setting the agenda for uptake of e-GP among member countries, and in preparing a road map for e-GP research and development to enable interoperability between many e-GP systems. The agenda for implementation of e-GP was initially outlined in 2004 in the Action Plan for the Implementation of the Legal Framework for Electronic Public Procurement (European Commission 2004a). In 2005, EU ministers established a goal for at least 50% of public procurement above the public procurement threshold to be carried out electronically by the year 2010. The status of uptake of e-GP was reviewed in 2010 in the report *Evaluation of the 2004 Action Plan for Electronic Public Procurement* (European Commission 2010b), and a green paper was prepared to expand the use of e-GP in the EU.

Since 2004, the EU has made good progress in setting up a common infrastructure for publication of tender notices. In 2009, slightly more than 90% of forms were sent electronically and in a structured form to Tenders Electronic Daily (TED), the online version of the *Supplement to the Official Journal of the European Union,* which is dedicated to European public procurement. Otherwise, less than 5% of EU procurement, on average, is handled electronically compared with the 50% that was targeted. Portugal, however, is one exception. In Portugal, close to 100% of procurement is handled electronically and implementation of e-GP is mandated.

Research initiatives to enable standardization and interoperability between e-GP systems are taking shape, as evidenced by

   (i) Pan European Public Procurement Online (PEPPOL), which is an infrastructure set up to enable suppliers to participate in procurement across e-GP systems in multiple different countries in Europe;
  (ii) e-Certis, a system designed to simplify exchange of experience certificates and attested documents typically sought in procurement procedures across Europe; and
 (iii) Open e-Prior, which enables exchange of e-catalogs, e-ordering, and e-invoicing in a standardized manner between a commission and its suppliers.

Implementation of e-GP continues to advance across the world. Following the release of the e-GP toolkit, e-GP became much more prevalent with more and more countries joining the e-GP bandwagon. A recent survey by ADB of 27 developing member countries (DMCs) in the Asia and Pacific region highlights the awareness and growth of e-GP in the region in recent years (ADB 2011).[3] Some of the key findings from the survey include the following:

   (i) Sixteen of the 27 countries (59%) either have a comprehensive plan and road map for implementation of e-GP or are in the initial stage of preparing an e-GP development plan and road map.
  (ii) Eleven of the 27 countries (40.74%) have implemented e-GP.

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[3]   Available at http://www2.adb.org/Documents/Reports/Consultant/REG/43149/default.asp
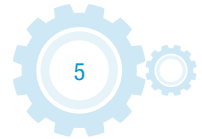
(iii) Seven of 11 e-GP systems have been implemented and operational since 2009, and only two of the 11 systems went live before 2004–2005.

The aim of this document is to enlighten readers about e-GP, to serve as a guide on concepts related to e-GP, and to examine how e-GP implementations have taken shape in different jurisdictions across the world. In the preparation of this handbook, the authors acknowledged that there is no one-size-fits-all solution. The circumstances and motivation underlying implementation of e-GP will differ from one jurisdiction to another. However, those underlying circumstances can provide important inputs required to determine the appropriate e-GP strategy for a jurisdiction interested in pursuing the implementation of an e-GP system or enhancing a system already in place. This knowledge product provides guidance to countries on the various aspects of e-GP implementation such as

   (i)   value proposition;
  (ii)   policy, legal, and regulatory framework;
 (iii)   business model;
 (iv)   project implementation management;
  (v)   functional requirements;
 (vi)   technical requirements and security requirements; and
(vii)   change management.

This handbook was designed to encompass the concepts, policies, and guidelines of the MDB e-GP toolkit in a single volume, to reflect on recent developments in e-GP, and to learn from the experiences of existing e-GP implementations by providing

   (i)   firsthand experiential knowledge acquired by authors in the e-GP domain;
  (ii)   e-GP implementation approaches, key lessons learned, and project outcomes reported by various jurisdictions in conferences, reports, and other information sources;
 (iii)   rich insights obtained from qualitative research of e-GP systems implemented in 14 countries and three regions; and
 (iv)   efforts undertaken by the EU to expedite the rollout of e-GP across member countries.

This handbook does not advocate the adoption of one particular path for implementation of e-GP. Instead, it identifies key decision areas for e-GP implementation and attempts to provide the inputs required for decision making. Government officers and policy makers engaged in implementation of e-GP, as well as members of the academic research community, will find the contents of this guide relevant and beneficial. Though much of the content presented focuses on the "electronic" component of e-GP, the guide also tries to reinforce that e-GP is not only about the electronic implementation of procurement practices. It is more about instituting effective and efficient procurement practices and policies through institutional procurement reforms guided by policy and business reengineering to support a more efficient and effective procurement process that uses electronic tools. Governments are encouraged to take a broad look at their overall objectives and develop long-term strategies for the implementation of e-GP as part of an overall procurement reform and business reengineering initiative. The original MDB e-GP toolkit includes a readiness assessment to help governments identify where they are in relation to the
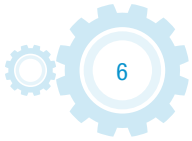
various phases presented in this guide from both a technology standpoint and a policy standpoint. This handbook provides an alternative readiness assessment tool which may also assist in the development of an overall strategy.

Readers are also encouraged to access the MDB e-GP Community of Practice portal to obtain original e-GP toolkit documents and to keep abreast of new research, case studies, and other information of interest on e-GP as they are published.[4]

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[4] http://www.mdbegp.org/

1 The Case for e-Government Procurement

1.1 Definition of e-Government Procurement

What is e-government procurement (e-GP)? In its broadest sense, the term e-GP refers to the use of electronic systems to handle any or all steps of public procurement process, but several formal definitions also exist.

According to the World Bank (2003b), e-GP is defined as: "the use of information technology (especially the internet) by governments in conducting their procurement relationships with suppliers for the procurement of works, goods, and consultancy services required by the public sector." The World Bank further defines e-GP under the headings e-tendering and e-purchasing. An e-tendering solution is used for procurement of specialized works, goods and services, characterized by **high-value** and **low-volume** transactions. Procurement of standard goods and services is addressed using an e-purchasing solution, characterized by **low-value** and **high-volume** transactions.

The European Union (EU) offers a similar definition, specifically distinguishing procurement by "government institutions and other public sector organizations" (European Commission 2004a). Other e-GP definitions have a greater focus on process and refer to the introduction of information and communications technology (ICT) and transaction processing throughout the procurement chain, including the following phases of procurement: "publication of tender notices, provision of tender documents, submission of tenders, evaluation, award, ordering, invoicing and payment" (European Commission 2010a). The handling of all procurement processes—fully electronic and integrated—is referred to as end–to-end e-procurement or straight-through e-procurement. Implementation of straight-through e-procurement is difficult to achieve (Vaidya et al. 2006) and is often referred to as the "ultimate prize" (European Commission 2010a) that various jurisdictions strive to achieve.

Box 1   Definition of e-Government Procurement

The term e-government procurement (e-GP) broadly refers to the use of electronic systems to handle any or all steps of the public procurement process. Many governments across all regions of the world have embarked on implementation of e-GP and worldwide adoption is increasing. Government procurement accounts for a significant percentage of the economy, meaning dollar value savings from implementation of e-GP can be considerably high. Common misconceptions about e-GP are also dispelled, such as e-GP does not necessarily lead to job losses, nor does it take away discretionary powers assigned to officials. Key challenges related to e-GP implementation are identified and explained. It should be noted, however, that the full potential of e-GP will only be realized when implementation is accompanied by procurement reforms.
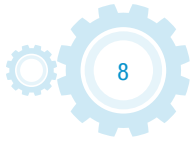
The Republic of Korea, Singapore, and a handful of other countries have had success in implementing straight-through e-procurement. Elsewhere, only one or more stages of public procurement are handled using electronic systems, such as

    (i)   publication of tender documents through a web portal (e-publication),
    (ii) electronic submission of bid documents by suppliers (e-tendering), and
    (iii) vendor selection and transaction processing based on electronic catalogs (e-catalogs).

Government agencies tend to use ICT to handle one or more procurement steps initially, and then roll out the application of ICT to include additional steps in a phased manner over time. With time, the functional coverage of e-GP tends to expand toward end-to-end coverage.

An end-to-end e-GP system typically has an enterprise web portal that primarily addresses the requirements of the supplier community. This portal is tightly integrated with an enterprise application system, designed to handle procurement-related workflows within the government (Vaidya et al. 2006). A fully implemented e-GP system has both government-to-business (G2B) and government-to-government (G2G) system components knitted together.

1.2   e-Government Procurement Systems Plotted on Timescale

Plotting e-GP systems on a timescale provides a high-level view as to where, when, and in what sequence e-GP is being implemented across the world (Figure 1). The information required for the plotting was obtained from secondary sources, including KONEPS (2011), the World Bank (2009), Chia (2009), the Auditor General of Victoria (2003), Sebelebele (2002), Brian (2011), the OECD (2009), UNDP (2005), a survey of international e-GP systems funded by the MDBs (MDBs 2007), and an e-GP survey recently conducted by ADB (2011). The systems plotted on the timescale are by no means exhaustive; instead, they provide a glimpse into the uptake of e-GP systems across multiple world regions.

This plotting of e-GP systems does not make reference to their uptake and usage, such as functionality covered and number of procurement entities using the system. Instead, it makes a basic reference to e-GP adoption and attempts to highlight the initiatives taken by countries that have embarked on e-GP implementation. When there is more than one e-GP system in a country, the earliest and the most prominent is plotted on the timescale.

As the internet became more prevalent, the application of ICT in public procurement increased. Canada's MERX system—considered a pioneering initiative—went live in 1991 (World Bank 2009).[5] Mexico embarked on implementation of its Compranet e-GP system in 1996 and a few years later, the Republic of Korea and Singapore joined the e-GP bandwagon with their KONEPS and GEBIZ systems respectively. Chile embarked on implementation of e-GP in 1999 (Orrego et al. 2000). In Australia, the State of Victoria launched the e-Commerce for Procurement (EC4P) initiative in 1998 and has since added the following systems:

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[5]   www.merx.com

Figure 1   e-Government Procurement Systems Plotted on a Timescale
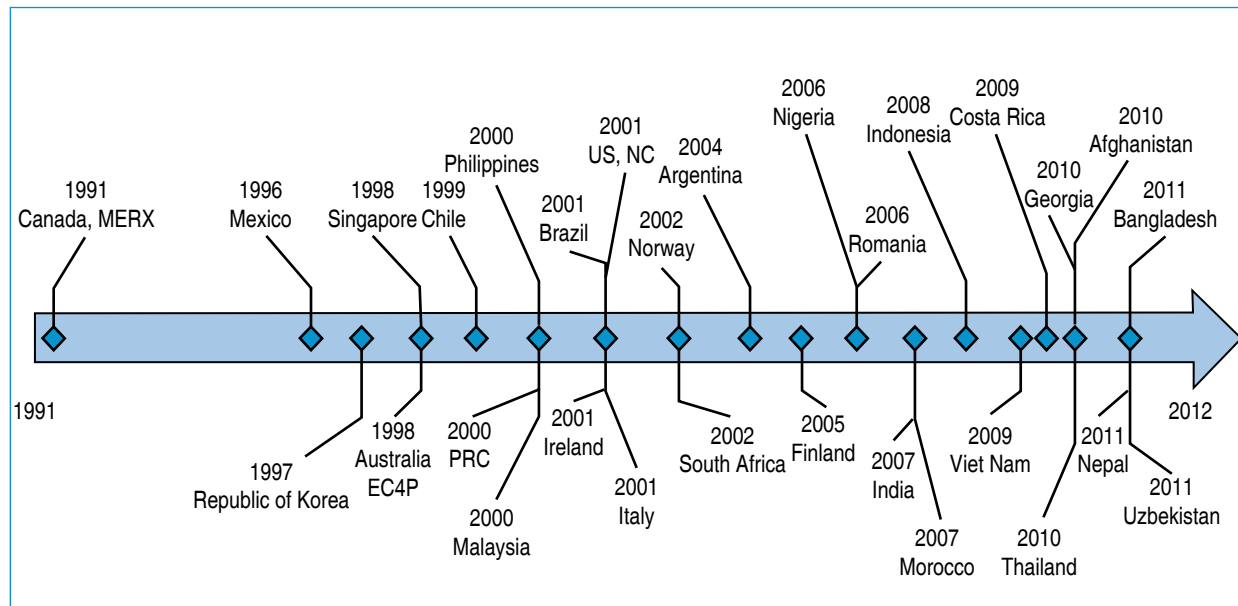
EC4P = E-Commerce for Procurement, NC = North Carolina, PRC = People's Republic of China, US = United States.

(i)   Government Electronic Marketplace, established by the Western Australian Government;
(ii) Austender, a web-based e-tendering system of the Government of Australia; and
(iii) Smartbuy, implemented by New South Wales.

Between 2000 and 2005, a number of additional countries across five continents launched e-GP systems:

(i)   **Africa:** South Africa in 2002;
(ii) **Asia:** the People's Republic of China (PRC), Indonesia, and the Philippines, all in 2000;
(iii) **Europe:** Ireland and Italy in 2001, Norway in 2002, and Finland in 2005;
(iv) **North America:** United States (US) (the state of North Carolina) in 2001; and
(v)   **South America:** Brazil in 2001 and Argentina in 2004.

A similar trend continued from 2005 onward, with many more countries initiating e-GP implementation, including India.

The adoption of e-GP is now widespread; meanwhile, existing systems are getting increasingly sophisticated. According to a recent survey conducted by ADB (2011), 16 out of 27 countries surveyed (approximately 60%) either had a comprehensive plan and road map for implementation of e-GP already in place or were in the initial stages of preparing an e-GP development plan and road map.
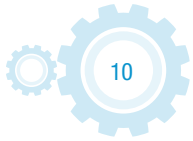
1.3   Importance of Public Procurement and Government Procurement

Public procurement expenditure as a percentage of gross domestic product (GDP) is estimated to be in the range of 10% to 25%. In the EU, for instance, the size of the public procurement market varies significantly, from 11.9% of GDP in Italy to 21.5% of GDP in the Netherlands (European Commission 2004b). Public procurement as a percentage of GDP is estimated at 16% and 20% for Morocco and India respectively (OECD 2009; World Bank 2003c). The dollar value of public procurement is significantly high and estimated as $2,083 billion in 1998 (Audet 2002).[6]

Savings achieved from better utilization of funds allocated for public procurement can have a significant impact on the economy as a whole. A study by the EU shows that a 10% savings in public procurement would turn the budget deficits of three member countries into surplus values and that no eurozone member would run a budget deficit in excess of 3% (European Commission 2004b). Enhancing efficiency in government procurement is also regarded as a viable mechanism to address deficit concerns in the US (Obama 2008).

The money spent on public procurement belongs to taxpayers and it is therefore the responsibility of government to minimize economic losses while obtaining the best value for money (VFM). To do so, government needs to encourage competition among supplier communities. Public procurement transactions are typically governed by well-defined procedures and adherence to these preset procedures by procurement entities is transaction intensive. Optimization of government procurement procedures can reduce transaction costs significantly, particularly when one considers that the cost of transaction amounts to a substantial share of GDP in a modern economy (MDBs 2004d).

That said, public procurement is much more than a mere transaction-focused activity. The policies, procedures, and practices of government also have tremendous impact on the economy and the business community. Government uses public procurement as a policy tool for economic development; for example, to catalyze the economy, promote the development of small and medium-sized enterprises (SMEs), and develop expertise among economic operators in an area of specialization. The public's perception of a government's performance is influenced by the extent to which procurement transactions are conducted in a transparent and efficient manner (World Bank 2003c).

The Organisation for Economic Co-operation and Development (OECD 2007) terms public procurement as "the government activity most vulnerable to waste, fraud and corruption due to its complexity, the size of the financial flows it generates and the close interaction between the public and the private sectors."

It is widely recognized that the introduction of ICT has the potential to significantly improve transparency, efficiency, and effectiveness in public procurement.

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[6] Audet estimates procurement expenditure of EU conservatively at 9.24% (including defense expenditure) of GDP, whereas a study conducted by the European Commission estimates public procurement at a higher percentage. Hence, actual expenditure on public procurement is likely to be higher than the estimates prepared by Audet.
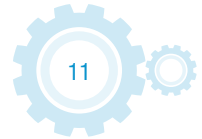
1.4   e-Government Procurement Objectives

Defining the objectives and their corresponding performance measures would appear to be an obvious and essential part of strategic planning for e-GP, yet it is regularly overlooked by implementing governments, and consequently programs commonly underachieve. It is generally agreed that e-GP has the potential to improve upon all eight characteristics of good governance: accountable, transparent, responsive, equitable and inclusive, effective and efficient, follows the rule of law, participatory, and consensus-oriented (UNESCAP website). A full-fledged, end-to-end e-GP system would address all of these objectives; however, procurement entities initiating the implementation of e-GP must prioritize project objectives in light of the context in which the system is implemented, including what is feasible and what is necessary.

For major acquisitions, such as large infrastructure, e-GP can be used as an effective tool to advertise opportunities and to manage contract and planning information and document flows. The major gains from e-GP are in the areas of contract and budget planning, contract management, transparency and efficiency, and integrity in document management (for example, e-GP abolishes the vulnerable physical bid box). The objectives of e-GP depend on the procurement type. For common, lower-value procurements, the role of e-GP is to manage competitive bidding among a significant range of suppliers, via framework agreements, quotations, or reverse auctions. The objective of e-GP in this case is the promotion of competition, price reduction, and strengthening of transparency through the use of online processes. An e-GP platform can also be applied to this level of procurement in a way that excludes the operator from the selection process, strengthening governance and reducing malpractice. Procurement of this type (lower value standard goods and services) typically accounts for approximately 70% to 80% of all transactions in public procurement.

In all cases transparency can be strengthened using e-GP, but there are other benefits as well. First, at all levels, e-GP yields more accessible management information that should be used for planning and budgeting as well as audit purposes. Second, in some countries, e-GP can be instrumental in encouraging a more rapid take-up of online technologies by businesses and thereby promotes economic development.

Nevertheless, few of these benefits are achieved without an underlying reform strategy that introduces new procurement methodologies, procedures, workflows, and improved monitoring and analytical capacity of management. In some countries, this reform necessitates the introduction of effective management systems and controls where few currently exist.

Some e-GP programs make the mistake of focusing on a single objective such as efficiency or transparency. This is generally a mistake, as it narrows the scope of the program in ways that are often difficult to correct at a later stage. If all objectives are explicitly targeted, it opens up the full scope of the potential developments and brings all of the issues to the forefront.

Key e-GP project objectives include the following:

(i)   **Economy.** Significant savings in the cost of items procured and/or enhancements in their quality have been reported. These are considered to be due to a reported increase in competition for government procurement opportunities tendered using an e-GP platform. The publication of award details in an e-GP platform "has reportedly avoided the conclusion of overprized public contracts and contributed to adjusting prices for goods, works, or services in line with true market price levels" (World Bank 2006).
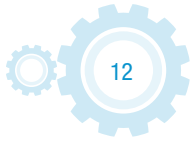
Centralizing purchasing through the use of a unified e-GP system by multiple government agencies enables aggregation of demand for "common spend," enabling collaborative procurement as an innovative way to consolidate purchasing power, achieve economies of scale, and get the most value for money spent. The use of e-reverse auctions for procurement of goods, works, or services—where specifications are well defined, price is the only determinant, and there is significant number of qualified bidders (MDBs 2005b)—has also resulted in significant cost savings.

The same positive effect on value for money can also arise where transactional cost savings due to implementation of e-GP can be passed on by suppliers; governments' transactional costs can also be reduced (see "Efficiency," below). For example, e-bidding enables suppliers to prepare and submit their bids online from their offices, leading to a reduction in transaction costs typically associated with bid preparation. Additionally, suppliers may reduce prices due to a possible reduction in transaction charges resulting from electronic receipt of orders, payments, and invoice submissions, if e-invoicing is also in place.

(ii) **Efficiency.** Reductions in transaction costs, primarily from electronic workflows and automated transaction processing, are a key source of cost savings for government. An audit of the introduction of electronic process in Australia's Department of Natural Resources and Environment shows that eight of the 15 steps were simplified following implementation of e-GP system (Auditor General, Victoria 2003). The Aberdeen Group (2008) reported that public sector enterprises have significantly improved their performance as a result of e-procurement initiatives with lower transaction costs, lower maverick spending, and lower transaction cycle times. Automating the order-payment cycle has led to a reduction in manual processing of procedural error-prone tasks, allowing staff to focus on more productive activities.

The use of electronic workflows and improved access can significantly reduce the time it takes to complete procurement processes, leading to transactional efficiency for both suppliers and governments. Many government agencies have reported significant reductions in the time taken to complete tender processing and purchase-to-pay (P2P) cycles (Bikshapathi et al. 2000). This is because government files, orders, and invoices move from one stakeholder to another faster electronically than manually. Information is keyed in once and does not need to be keyed in again, since entries made in electronic forms can be reused elsewhere in the process.

Restricting the procurement of common items to one or more suppliers listed in an e-GP system minimizes "maverick buying" by end users (Auditor General, Victoria 2003). Maverick buying is not only process intensive but it also causes governments to spend more, and such transactions are not accounted for within framework agreements.

Governments can choose to reduce inventory levels to the extent that the P2P cycle is shortened by e-GP. E-publication of tender documents and e-bidding by suppliers significantly reduces printing and office supplies requirements and also minimizes the storage space required for record keeping (Urjumelashvili 2011).
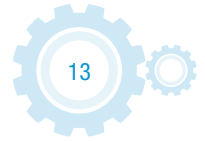
(iii) **Effectiveness.** With e-GP, transaction data from electronic transactions is recorded automatically and used to generate various real-time analytical reports. Such reporting on public procurement expenditure has traditionally been found lacking: "If public sector organisations cannot articulate their spending effectively, they cannot manage their spending effectively. Improving the quality of the current management information will present significant opportunities in driving supplier performance and managing uptake levels and benefits flows" (HM Treasury 2009).

One advantage of this reporting capability is that central purchasing bodies (CPBs) can negotiate more competitive pricing (and can enhance the value-for-money opportunities described under "Economy" on page 11). Traditionally, CPBs have negotiated framework agreements on behalf of procurement entities they seek to represent. End users place orders with suppliers as per terms and conditions specified in these agreements, but because ordering is done in a decentralized manner, CPBs lack the real-time information they need to determine aggregate demand. With e-GP, CPBs gain access to data about ordered quantities, allowing them to negotiate more effectively.

The more that e-catalogs and online ordering are used, the more real-time data about purchasing behaviors can be collected and applied. Analytical reports generated using e-GP enable government agencies to evolve their public procurement policies to operate more effectively through

  (i)   buy-local industry development,
 (ii)   open-market and cross-border trade policies,
(iii)   annual budgeting, and
 (iv)   development of SMEs.

The use of a unified e-GP platform by multiple procurement entities brings to focus arbitrage potential (when two different procurement entities buy a particular item from the same supplier for different prices). Further, blacklisting policies can be effectively implemented in a centralized e-GP platform by revoking authorization credentials or by modification of access controls of the blacklisted supplier.

(iv) **Increased accessibility.** Online publication of tender notices in a centralized web portal allows suppliers to search and locate tender opportunities with minimal effort. It is becoming increasingly common to make tender documents available as free downloads. e-GP systems have the facility to alert suppliers to particular opportunities advertised. Government agencies are taking the initiative to make information about procurement opportunities available in a centralized web portal; for example, Tenders Electronic Daily (TED),[7] Austender,[8] and a Moroccan system.[9]

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[7] http://ted.europa.eu/

[8] https://www.tenders.gov.au/

[9] www.marchespublics.gov.ma

Suppliers can lodge their bids electronically from anywhere through the internet using e-bidding functionality. The implementation of this functionality has, in some countries (the state of Andhra Pradesh, India, for example), eliminated one form of coercion—specifically the practice of physically preventing competitors from approaching and depositing a document in the bid box (Biskhapathi et al. 2006).

(v) **Enhanced transparency and accountability.** Suppliers, governments, and the general public each have the ability to track and monitor all procurement activities at any stage of the process in real time. Key transparency features here include enhanced public access to up-to-date policies, information on bidding programs, standardized documentation and lodgment of bids, progress of bid evaluation, and announcements of outcomes. An e-GP system acts as a catalyst for "standardisation of documentation, tendering templates, tendering rules, policies and procedures and enhances supplier and civil access to the oversight of procurement processes" (MDBs 2007).

Monitoring tools, reports, and search features provide access to past and current information and price bids, demonstrating an open and competitive procurement environment to the supplier community and helping to establish a level of trust in the process that encourages more participation and competition.

Built-in controls restrict the users to strict compliance with procurement policy and legislation serving to govern the procurement activity. For example, only bids submitted by a specified due date and time specified in the tender are accepted, and government officers can only accord approval for a procurement activity if they are assigned the necessary rights. Each and every activity performed in the system can be traced to a particular system user, making the users accountable for their actions. Auditing capability for procurement transactions is therefore ensured.

For high-value exercises, transparency is strengthened primarily through direct public disclosure at all stages of procurement, such as the composition of bid evaluation committees. For low-value procurement, transparency is strengthened primarily through greatly improved audit capabilities. Overall, the strengthening of transparency and accountability resulting from implementation of e-GP greatly reduces the opportunity for fraud and corruption in public procurement.

(vi) **Economic development.** In encouraging a more rapid take-up of online technologies by businesses, and thereby promoting economic development, e-GP can be instrumental. The adoption of e-commerce will reduce the cost of transactions significantly for government and supplier communities alike. The adoption of ICT by government—a significant economic power—in G2B transactions will push the supplier community toward adoption of e-commerce. The standards set forth for such transactions have the potential to gain widespread adoption and become *de facto*. For example, procurement of common items using e-catalogs will require suppliers to prepare catalogs of their items as per the catalog standards. Suppliers will then attempt to leverage their investments in catalog development by using the same e-catalogs in their B2B transactions as well. Government procurement can therefore be used to catalyze the standardization of e-catalogs as well as the adoption of e-commerce.
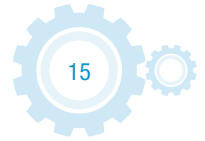
Similarly, governments can enable widespread usage of digital signatures, e-invoices, e-payment, e-mail, and electronic bank guarantees: "A strategic approach to technology by government which harmonizes with its industry policies could enhance interoperability and connectivity throughout the economy as well as the community with potential gains in productivity and competitiveness. This would be promoting the so-called 'leap-frog' scenario through the 'network effect' of government business activities" (MDBs 2004d).

One example that illustrates how governments can bring about economic benefit by implementing e-GP is the implementation of e-invoicing in Denmark. The Government of Denmark mandated government procurement entities to accept invoices from suppliers only electronically as per the OIOXML electronic invoice standard, beginning 1 February 2005. The use of e-invoicing is minimal in the private sector and limited to large retail players. As per a recent report, suppliers are increasingly integrating their internal IT systems to the national e-invoicing service "NemHandel" for B2B transactions as well. As stated by Catherine Lippert, acting deputy head, Division for IT Infrastructure and Implementation, National IT and Telecom Agency: "We are very pleased to see this trend. NemHandel is allowing true interoperability among businesses in the country" (Ng 2010).

Another example is the Open e-Prior initiative of the European Commission, which enables exchange of structured post-award documents via e-catalog, e-ordering, and e-invoicing between the commission and its suppliers (European Commission 2010a and Moran).

(vii) **Cross-border commerce.** An e-GP system provides a business development tool for both governments and supplier communities by providing access to information and opportunities locally, regionally, and internationally. Jurisdictions like Canada had an interest in the third objective—economic and business development to support interprovincial trade and trade commitments under the North American Free Trade Agreement. Suppliers may have been limited or discouraged from participating in tenders that were geographically far away due to lack of knowledge about procurement opportunities and due to the increased effort required to participate in distant tenders. Online publication of tenders and online bid submission have "the potential to reduce these distance barriers and information gaps and encourage greater participation, widening the pool of possible suppliers and potentially enlarging markets." Certain items such as procurement of software, design competitions, and help desks are suitable for cross-border procurement (European Commission 2010a).

(viii) **Equitable and inclusive.** Online publication of tender notices, e-bidding, and e-payment level the playing field for micro, small, and medium-sized enterprises when competing with large enterprises for public procurement opportunities. Research studies conclude that the use of e-GP has reduced the "bureaucratic costs of doing public sector business" (Dutra et al. 2006), making it easier for SMEs to participate in public procurement. A report by the United Kingdom (UK) recommends "prime contractors to make their sub-contracting opportunities accessible through … a single, online portal" where contract opportunities across the whole public sector are advertised (UK 2008). SMEs can then search the sub-contracting opportunities and attempt to win contracts from those prime contractors. Micro and small enterprises in Chile have had success in winning business from transactions performed using an e-GP platform, while competing as per market forces (IADB 2006). Micro and small enterprises account for only 18% of the Chilean economy, but they have transacted 30% of the value of public procurement expenditure handled in the Chilean e-GP system (Goya 2006).

1.5   Key Measurable Benefits of e-Government Procurement

The key measurable benefits resulting from implementation of e-GP are listed in Table 1. The metrics required to benchmark and measure e-GP benefits are identified, where possible. Procurement entities embarking on implementation of e-GP or a feature of e-GP are advised to collect data to benchmark manual processes. This benchmark data is used as the baseline to compare and derive benefits realized from implementation of e-GP. It should be noted that the benefits reported by procurement entities are quoted **as is** along with the relevant citation, and no effort has been made to verify the claims. The list of benefits specified is by no means exhaustive. For example, implementation of e-GP reduces the opportunity for fraud and corruption, which is not listed as a key measurable benefit since it is difficult to benchmark, measure, and quantify.

Table 1   Key Measurable Benefits of e-Government Procurement

	Description	Metric	Benefits reported
1	Transactional efficiency in tendering	Reduction in tender cycle time	• From 90–135 days to 35 days, GOAP, India
		Less incidental expenses	• 25% less in column space used resulting in savings of $0.56 million from advertising costs, GOAP, India
2	Increase in competition	Increase in average number of bidders	• From 1–2 to 10–20, e-Ten pilot project, France • From 3 to 4.5 bidders, GOAP, India
		Cost reduction in value of awarded contracts	• 18% reduction reported in Portuguese hospitals • 12%–20% reduction reported in GOAP, India
		Reduction in costs from e-auctions	• Savings ranging from 10%–45% reported from the use of e-auctions, saving taxpayers £270 million in the UK
3	Transaction efficiency gains in procure to pay cycle	Reduction in process cycle time	• 20%–40% reduction in the time taken to handle procure-to-pay processes, e-Handel, Norway
		Reduction in transaction costs	• £41 per transaction, UK • €6.66 per e-invoice reported from Denmark's e-invoicing initiative; affects 15 million invoices per year • Savings of €67.5 million and time savings of 45 person-years from transactions worth €419 million by Emilia Romagna, Italy. Savings of €178 million reported from procurement volume of €830 million reported by the Austrian Federal Procurement Agency
4	Enhanced user Satisfaction	Survey	• About 95% of procurement entities gave satisfaction of 5 or above for using the ChileCompra system • About 85% of suppliers gave satisfaction of 5 or above for using the ChileCompra system

GOAP = Government of Andhra Pradesh; UK = United Kingdom.

Sources: K. Bikshapathi et al. 2006. *e-Procurement in Government of Andhra Pradesh, India.* World Bank Case Study; ChileCompra. 2007. *ChileCompra Management Report – 2007 Assessment;* European Commission. 2010a. *Green Paper on Expanding the Use of E-Procurement in the EU.* SEC 1214 Brussels; European Commission. 2010b. *Evaluation of the 2004 Action Plan for Electronic Public Procurement;* Office of Government Commerce, UK. 2005. *E-Procurement in Action: A Guide to E-Procurement for the Public Sector.* Government of the United Kingdom; Sigma. 2011. Brief 17: e-Procurement. August.
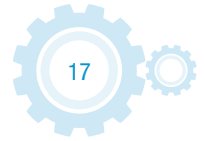
1.6   Common e-Government Procurement Misconceptions

The potential and limitations of e-GP are widely misunderstood, often because procurement itself is a term that is loosely used. The significance of e-GP differs greatly depending on the sort of procurement to which it is applied. Where procurement is considered as a monolithic concept, it is very likely that the potential of technology will be at least partly misstated. For example, for "simple" procurement, technology can streamline processes such as search, requests for quotations, authorizations, financial reconciliations, payments, and reporting. Simple procurement accounts for the majority of procurement transactions, but only a minority of procurement value. On the other hand, for "complex" procurement, the efficiency equation is more related to the quality and relevance of management information, rather than manual processing. Performance in terms of value-for-money outcomes can be affected by improvements in management information facilitated by technology, but these benefits can only be fully realized where the application of technology is accompanied by procurement managers with adequate skill sets. Complex procurement refers to a minority of contracting but the majority of procurement value. The differential impacts of technology on different sorts of procurement are discussed in more detail in Chapter 7 under Spend Analysis.

One lesson learned is that e-GP can refer to many different models, developments, and functions, not all of which will be consistent with government policies or practices. Although e-GP appears to reflect a unitary concept, in reality it refers to a collection of tools and functions.

Other misconceptions about the scope of e-GP are widespread:

(i)   Sometimes it is considered necessary for a government to reform and strengthen its established procurement processes *before* it ventures down the technology path. This is a misconception that assumes that procurement reform is a phased exercise that begins with manual processes then moves on to technological systems. Rather, it is more likely that effective reform will not be achieved at all without technology.

(ii)   Some technologists consider that e-GP represents a form of semi-automated buying, which is common in large private sector warehouses and assembly lines, but which is almost unheard of in the modern public sector. Some also consider that the challenge of e-GP largely relates to the specification, acquisition, development, or leasing of the software.

(iii)   Often, procurement officials in governments fall prey to the misconception that e-GP represents a replacement of their jobs by computers.

(iv)   Sometimes administrators and regulators perceive e-GP as a file management system. At a slightly more technical level there is a common misunderstanding that e-GP refers to the interface between government buyers and suppliers only, such as e-auctions or e-bidding, ignoring the greater benefits that arise from the workflow and analytical functions of e-GP.

(v)   Similarly, financial management information systems (FMISs) often include components marketed as e-procurement. However, these often have their origins in private industry supply lines and can be a poor fit for government requirements without expensive customization and even more expensive upgrades when new versions of the FMIS appear.

(vi)   There is a common misconception that e-procurement automatically eliminates corruption and abuse of discretion.

(vii)   There are also common misunderstandings about specific functions such as catalogs (for example, whether a catalog has to be hosted in a supplier's marketplace or in the e-GP system implemented by the government) and digital signatures (for example, use of public-key infrastructure [PKI] as the only valid method for digital signing).
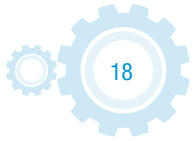
1.7   e-Government Procurement and Procurement Reform

One of the most prevalent misunderstandings by governments is to consider e-GP as a technology project, and fail to appreciate that the true value of e-GP is its capacity to facilitate procurement process reform. Without accompanying procurement process reform, e-GP will yield few gains; imposing technology onto a traditional management framework will, on its own, achieve little.

The traditional management of public procurement originated during an era when government procurement focused primarily on basic goods and military equipment—for most of its history, public procurement has been only a little more complicated than personal expenditure, and procurement personnel have been warehouse officials and accounts payable staff who are often unqualified. In those earlier times, public procurement was a relatively minor part of the national economy.

Today's public procurement environment is quite different from that of even just a few decades ago. Modern governments are now complex service organizations and major economic players. Procurement is more focused on complex infrastructure and services, often involving complete service solutions, high risk and high value, with just-in-time supply lines, and requiring high-level skills for the specifications, market research, financing, and contract management functions.

The management information required to ensure that public procurement is efficient and productive is central to the planning, monitoring, and management of the modern government and its budget. These information requirements cannot realistically be delivered within a paper environment. Government officials have to invest significant efforts to generate rich management information system reports on public procurement, many of which can be automatically generated in an e-GP system.

In addition to a lack of management information, other problems inherent in traditional paper-based procurement processes include inefficient procedures, high compliance costs for suppliers and departments, simplistic and ineffective procurement methodologies, and potential for enhanced transparency. Persistence with paper-based procurement processes also slows the take-up of productive information technologies in the economy generally, and is characterized by

    (i)   uncoordinated buying across government with different departments having different contracts and different prices for the same goods,
   (ii)   high process costs associated with testing the market,
  (iii)   poor and outdated market intelligence,
  (iv)   obsolete supplier profiles,
   (v)   maverick spending (off contract),
  (vi)   inefficient payment processes,
 (vii)   obsolete audit information, and
(viii)   error-prone contract management tracking.

Most reported e-GP benefits have resulted from stronger management and coordination facilitated by technology, rather than from technology per se. For this reason, as for much of e-government initiatives generally, e-GP should be undertaken as part of a procurement reform strategy, not merely as a technology plan.
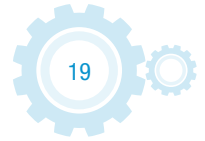
A procurement reform strategy should be driven by reform objectives, a business case, leadership, and resources, and have clearly defined accountability for performance outcomes as defined by the objectives. The introduction of technology needs to be leveraged by changes in work practices and procurement methodologies (reengineering) to allow full use of the capabilities of the technology. An e-GP strategy is usually more of a management than a technological challenge as it is required to holistically address all aspects related to procurement and recognize e-GP as a major procurement management initiative. For example, some of the benefits are tied directly toward shifting to strategic sourcing, upgrading the skills of procurement officers, aggregation of demand, or better vendor management. There has also been use of e-GP as a basis for aggregation and productivity to drive shared services in government procurement, leading to better economies of scale and better category or sector strategies.

1.8   Challenges of e-Government Procurement

The benefits of a well-conceived, competently implemented e-GP strategy can be described in qualitative and quantitative terms. The qualitative benefits are not readily measurable, whereas the quantitative benefits generally result in reported savings ranging between 5% and 20%. With public procurement accounting for about 10% to 25% of the national economy, this level of savings potential is substantial and the cost-to-benefit ratio should be overwhelming even without considering the qualitative benefits. It is likely that the qualitative benefits are even more important.

However, these advantages of e-GP only become available where there is a capacity to reform the practice of procurement. These reform drivers involve political backing, effective bureaucratic leadership, expertise, and procurement skills that may not be readily understood or available within a government. Where the introduction of technology is not accompanied by the reengineering of work practices, the full benefits of e-GP may not be realized.

The cost of an e-GP implementation can be expected to range from around $1 million up to $15 million or more. A competent strategy can expect good results from about $1.5 million.[10] Some government departments have built good systems from internal resources without a budget allocation for this.[11] Malpractice or poor management in the development and implementation of e-GP can multiply this cost several times.

There have been cases where good technical systems have been developed, but without accompanying strategic objectives. This results in multiple systems between various departments and geographic areas, and leads to a fragmentation of services, dissipating the potential for leveraged buying and planning and analysis. The case against e-GP arises in situations where there are likely to be poor strategic and implementation skills, making e-GP a high-risk exercise.

There have been cases where users on both sides of the market have raised objections to e-GP. The reasons for these objections include resistance to greater transparency and competition. Concerns about lack of remote connectivity, low levels of e-literacy among contractors and government users, and data security and fraud (the risks of security and fraud are, however, probably greater in a paper-based environment) are also reported as deterrents to e-GP.

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[10] Brazil: $1.6 million (Crescia 2006) in Nagy (2010).

[11] KIMPRASWIL (Indonesia).

2 Policy, Legal, and Regulatory Framework

Box 2 Key Policy and Regulatory Decisions

An e-government procurement (e-GP) implementation requires more than technical specifications. Political and institutional leadership are also considered essential elements of an e-GP strategy.

To ensure successful implementation of e-GP, certain key policy and regulatory decisions have to be made. These decisions pertain to many different aspects of implementation, such as functionality, legislation, and technical considerations. However, government decision makers often make key technical decisions without realizing the broader policy consequences.

A central lead procurement agency with the capacity and authority to drive procurement reform is required; without it, an e-GP implementation will have limited value. Ideally, e-GP will include an independent procurement policy and oversight body, accompanied by a separate central procurement office responsible for leading and maintaining the e-GP system and arranging instruments such as whole-of-government framework agreements. Interdepartmental working groups or committees may also be required to develop various aspects of e-GP, such as business process reengineering.

Procurement policies and rules should be redefined to update management practices and transactions in the electronic environment and eliminate operating problems that were not present under the manual process; for example, inconsistencies between electronic and hard copy documentation from government agencies, and the malfunction of government facilities before the closing time set for electronic bid lodgment.

The governing law for e-GP should not deal with the working details of the e-GP system. The working details of the e-GP system should be governed through policies and regulations issued by the lead agency, which can be implemented as required to address issues of the day.

As far as possible (limited only by the political landscape), an e-GP strategy should be envisioned as a single system across all government entities and between different levels of government. This will make better use of technology and will minimize duplication of security management, catalog management, supplier registries, and interoperability issues, allowing for greater efficiencies.

2.1   Policy

To ensure successful implementation of e-GP, certain key policy and regulatory decisions have to be made. These decisions pertain to many different aspects of implementation, such as functionality, legislation, and technical considerations. Government decision makers often make key technical decisions without realizing that such decisions have broader policy consequences.

Government policy toward the development and implementation of e-GP should support the objectives discussed in Chapter 1. In other words, policies that guide the various aspects of e-GP should be fully consistent with promoting good governance, value for money (VFM), and economic development.

The Multilateral Development Bank (MDB) procurement guidelines are primarily focused on the key procurement principles of transparency and accountability (governance), economy and efficiency (VFM), equality of access, open competition, nondiscrimination, and promotion of domestic contracting and consulting industries (economic development).

These are the core principles that have broad international standing and are paramount to good procurement practice.[12] Some of these principles are mandated in international agreements such as the European Union (EU) and the Customs Union of Belarus, Kazakhstan, and Russia, where e-GP must include common interoperable standards and policies to ensure that competition and access is free from discrimination among member states. In some countries, such as Australia, the same mandatory policy applies in domestic markets.

Translating these policies into operational effect has implications for the application of e-GP in the following areas:

(i)   bid advertising,
(ii) technological neutrality,
(iii) technical standards for interoperability and security,
(iv) processes such as ensuring good audit trails, and
(v)   cost and ease of participation.

MDB policies are mandatory if a country's e-GP system is to be used for procurement funded by MDB loans, grants, or credits. These policies have been specified for e-bidding and e-reverse auctions, and are listed in Annexes 1 and 2. While MDB policies have, for the most part, been complied with in existing e-GP implementations, some issues have arisen, as demonstrated by the following examples:

(i)   In some e-GP systems, suppliers are required to pay fees for online registration, downloading of bidding documents, and purchase of digital certificates. Such collection of fees, common with e-GP systems in South Asia, may adversely impact accessibility of tender documents and transparency in bidding, causing the e-GP implementation to be inconsistent with the MDB guidelines. In the case of Andhra Pradesh, suppliers can download documents free of charge, which does not weaken transparency (anyone can access the bid documents), nor does it inhibit competition. In the case of Kazakhstan, where there is a policy for accelerating e-procurement rollout, the registration for suppliers is free, as are all of the e-GP processes. This is the preferred approach, especially where e-procurement is new to a jurisdiction. Where an e-GP system is well established with widespread adoption and has become the status quo, such as in Andhra Pradesh and the Republic of Korea, existing practices for fees and charges could be accepted. On the other hand, where a system is not widely established

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[12] Recognized by the OECD, Asia-Pacific Economic Cooperation (APEC), and the EU.

and has relatively few registered suppliers there should be a different interpretation that aligns more literally with the MDB rules.

(ii) In an effort to provide equal opportunities for all supplier categories to participate in government procurement, the MDBs require government agencies to accept manual submission of bid documents until the government agency can demonstrate that bidders have access to the e-GP system. This may slow the rate of take-up of the system and can defeat the purpose of promoting e-procurement. A reasonable solution would be to allow paper bids for a period of 1 to 2 years, following which online applications would be mandated. This approach would need to be sensitive to the degree to which the transition phase has succeeded in promoting uptake by suppliers.

(iii) In the jurisdiction of Thailand, there is a dominant concern about collusion in the bidding process, such that the government has required bidders to physically assemble in a common facility to participate in bidding so that they can be individually supervised. This does not comply with the MDB requirement that the system prevent bidders from being aware of each other's participation.

(iv) The process adopted for verifying individual identity and issuance of digital certificates presents another challenge. Governments usually require the adoption of strong standards for the provision of digital certificates to suppliers, and this verification is almost always performed at a domestic level. Hence, a potential offshore supplier to government may need to travel to the country to be validated and obtain a certificate. If this is required each year, it clearly represents a potential barrier to competition and would be unacceptable under the MDB guidelines. In the case of the Customs Union of Belarus, Kazakhstan, and Russia, there is an agreement that the e-GP system operates seamlessly between all three members. This approach attempts to prevent digital certificates from becoming a barrier to open competition by allowing member states to adopt a policy of mutual recognition, such that a government provider who has a digital certificate from one jurisdiction automatically has recognition in all member states, without needing to reregister. This is not satisfactory under the MDB guidelines because the concept behind an international competitive bidding procedure is that it must be open to bidders from almost everywhere, not just within a closed trading bloc. An alternative solution is for reputable international commercial certification authorities to also be recognized. New developments are also under way, targeted at cross-border trade and not focused at all on digital certificates and the use of public-key infrastructure (PKI).

(v) e-GP developments do not have good quality disaster recovery and backup, which means that there may be noncompliance with traceability conditions for both e-bidding and e-reverse auctions under the MDB rules. This can be a major concern and reasonable grounds to deem an e-GP system not acceptable for MDB work.

(vi) In a few instances, e-GP has not proceeded in a coordinated fashion across a government but is fragmented between ministries or departments. A centralized, coordinated approach is greatly superior in terms of cost, efficiency, and interoperability. For example, fragmentation multiplies security costs and weaknesses, and also requires suppliers to deal with multiple sites. A single system for all government entities is strongly preferred. Some claim that this conflicts with decentralization policies; however, e-GP is a technical and management infrastructure and does not imply centralized procurement. Where fragmentation occurs, each part must be compliant with the MDB guidelines if it is to be used for bank-related activities.
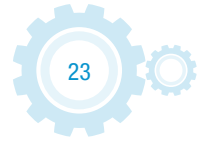
(vii)   The MDB requirement of monitoring the e-reverse auction system for market abuse such as collusion may be difficult to assess. The capacity to review and assess the system may exist, but the data collected is likely to be ambiguous. It should also be noted that several of the rules can only be assessed ex post, meaning approval of the use of the system for bank work will precede verification of compliance.

(viii)   Finally, where third-party service providers host an e-GP system, provider audits may be required. Scope for the government to undertake this, or to receive independent audit reports, must be part of the service agreement. For example, from 1999 to 2002 a comprehensive e-bidding system operated by the government of Western Australia provided an online bidding service to Leeds City Council in the UK.[13] This was the first "cloud" e-GP service provided internationally, and the Leeds City Council auditor gained access to all audits of the system undertaken by the government of Western Australia.

2.2   Centralization versus Decentralization

As far as possible (within the limits of the political landscape), an e-GP strategy should envisage a single system across all government entities and between different levels of government. This makes better use of the technology and particularly minimizes duplication of processes such as security management, catalog management, and supplier registries, as well as interoperability issues. It also ensures a single log-on for suppliers and therefore greater supplier efficiencies, and enhances the prospects of alternative procurement methodologies such as framework agreements.

Sometimes this approach is presumed to represent the centralization of procurement but that is not the case. It represents a unified information infrastructure for procurement rather than centralization of procurement itself. Individual entities and levels of government remain fully responsible and in control of what they buy, how much they buy, and when they buy it. Procurement remains decentralized but is using a common infrastructure, just as it uses other common national infrastructures for commerce such as national currency, national laws, and national banking systems. Often, provision is made for individual ministries and levels of government to be able to customize the unified system for their own management purposes without sacrificing the common elements. In circumstances where multiple systems are unavoidable, single sign-on (SSO) and a common portal are still recommended as a minimum.

2.3   Leadership

Political and institutional leadership are the most important elements of an e-GP strategy. A central lead procurement agency is required (which may also be the entity responsible for the e-GP system) that has the capacity and authority to drive the procurement reforms; without this central agency, e-GP will be of limited value. Reforms include standard bidding documents, whole of government framework agreements, policies around the use of e-bidding and e-reverse auctions, and whole-of-government policies for online catalogs and security.

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[13] See Justin Hunt. 2003. From a Land Down Under. *The Guardian*. 8 October. http://www.guardian.co.uk/society/2003/oct/08/epublic.technology4 and Ben King. 2004. Not Just a Question of Timing. *The Guardian*. 27 October. http://www.guardian.co.uk/society/2004/oct/27/epublic.technology5
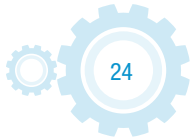
In the absence of adequate leadership, there is a high risk that e-GP implementations will be fragmented and that systems will not be interoperable or possess the core data capture required to enable proper performance assessments and financial integration. Fragmentation also has the potential to exacerbate security risks and add to the costs of development and maintenance. The lead institutional role will require the authority to

(i)   mandate a government-wide framework for e-GP including a single integrated system;

(ii)   develop, implement, and monitor e-GP operating and systems policies (refer to Section 1.6);

(iii) minimize separate developments of various e-GP systems that may lack interoperability or result in potentially expensive duplicate investments or developments;

(iv)   minimize imposition of multiple system requirements, costs, and confusion for suppliers; and

(v)   ensure transparency and efficiency for all stakeholders.

Ideally, an independent procurement policy and oversight body will be established, along with a separate central procurement office responsible for the strategic operational roles of leading and maintaining the e-GP system and arranging instruments such as whole-of-government framework agreements. Interdepartmental working groups or committees can then be arranged on an ad hoc basis as required to develop various aspects of an e-GP system, such as business process reengineering.

These institutional capacities may need to be supported by legislative changes before e-GP can be made fully effective, and may affect the rollout schedule for e-GP.

2.4   Institutional Roles

Developing and implementing an efficient, effective, and interoperable e-GP system requires a lead agency that has full responsibility for the service. Legislation may be required to ensure that this agency has the authority it will need to design, develop (or commission), and implement such a system across other government entities. This lead agency should also have the authority to prevent various entities from fragmenting the system by developing their own systems. In other words, the territorial behavior common between government departments should not be carried into cyberspace (refer to Section 6.2).

2.5   Procurement Processes and Practices

Government procurement regulations, in general, follow fairly common practices for the acquisition of goods, services, and works projects. These include the identification of a need, request for tenders or quotes, and the signing of a contract or purchase order followed by contract management activities (monitoring of deliverables, requesting and releasing securities, and payments).

The application of more productive procurement methodologies, made possible in an electronic environment, may require legislative change. In particular, the introduction of framework agreements is not possible under the existing procurement legislation of some governments. This shortcoming should be addressed as a priority.

Figure 2   Government Procurement Processes
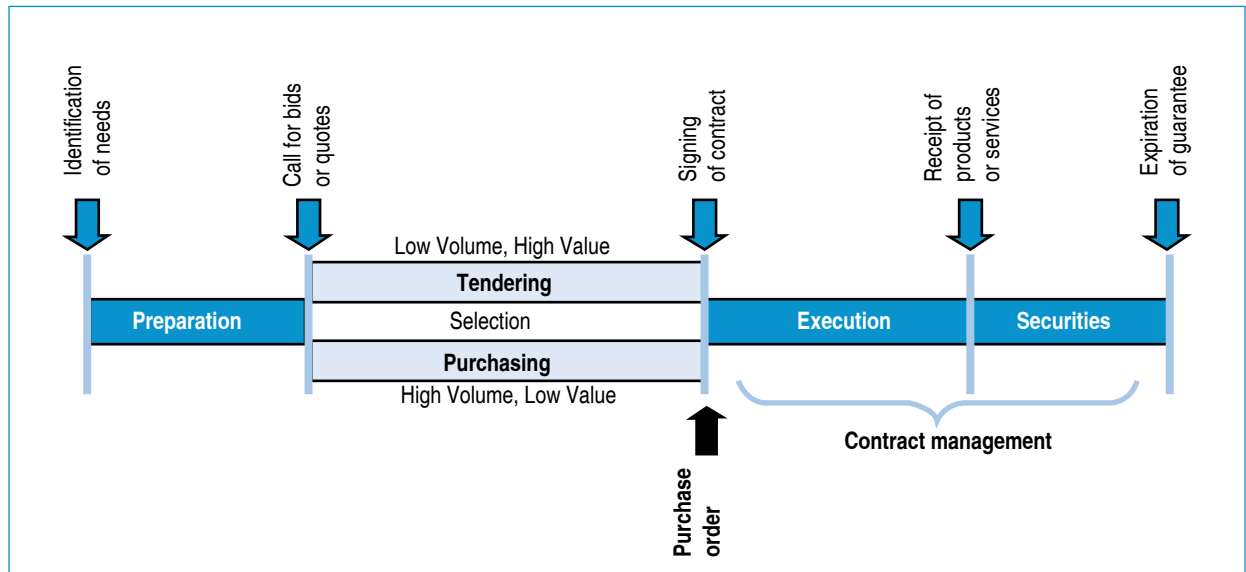
Source: Multilateral development banks. 2004. *Strategic Electronic Government Procurement, Roadmap.*

In addition, an automated e-GP environment offers more effective monitoring and control systems that in turn may facilitate changes to the way in which procurement is regulated. Traditionally, public procurement has been governed by procedure-based regulations that define the permitted processes in detail. Governments have been increasingly challenging this approach,[14] and standards and performance-based procurement regulation are appearing. The regulatory framework should allow for effective performance-based indicators and governance systems that are technologically enabled. e-GP thereby enables government procurement to become performance-based rather than procedure-based, requiring broad reform of procurement legislation.

The procurement process and associated practices are guided by various regulations and policies pertaining to the approaches and procedures to be applied to the tendering process and purchasing requests (Figure 2). Some countries will apply a single-envelope process for tendering while others prefer to follow a two-envelope system whereby the technical bid and financial bid are submitted separately. For financial evaluation, some institutions follow a percentage evaluation whereby a bidder submits a bid as a percentage of the estimated price established by the buying entity, either up or down a certain percentage. Other countries require bidders to submit a price based on their individual price calculations for items in the request. For some tenders, the evaluation may be related to quality only and the price is negotiated with the highest evaluated bidder.

[14] See Veiga Malta et al. (2011).
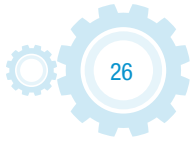
Tenders may call for a national competition or an international competition. Suppliers may have to pre-register with an agency to participate in a tender, or tenders may be open to any supplier that submits an expression of interest or letter of intent for purchasing a bid package from the buying entity. Each tender option or process has its own merits and associated issues. In some cases, the country procurement system may differ from the rules and guidelines of the donor agency funding a specific project.

2.6   e-Government Procurement Operational Policies

In addition to procurement law, procurement policies need to be set forth, taking into account all circumstances that might affect the e-GP environment. These policies should attune the existing paper procurement process to the electronic environment rather than duplicating it directly. The transition to e-GP will reflect changes to a number of common procurement practices and will introduce new issues associated with the support and operation of an electronic business service. How the system operates should be governed by policy, regulations, and procurement law established specifically for the e-GP system.

The specific workflow details as to how those practices are incorporated into the e-GP system should be framed into procurement policies that take into account management practices and transactions in the electronic environment. Procurement policies need be clearly defined and presented in the terms of use for the system and the instructions to bidders. They should address the manner in which documents are received and queries are electronically submitted, and provide support for submission of bids and bid securities.

Procurement policies and rules should be redefined to include management practices and transactions in the electronic environment, addressing any operating circumstances that may not have been present under the manual process, including

    (i)   application usage policy (including a clause on limited liability),
    (ii)   user roles and responsibilities for accessing different components and data in the system,
  (iii)   inconsistencies between electronic and hard copy documentation from government agencies and from the private sector,
   (iv)   the malfunction of government facilities before closing time set for electronic tender submission,
    (v)   electronic contract development for template and document consistency and economy,
   (vi)   online catalogs,
  (vii)   online pre-tendered contracts,
 (viii)   electronic tender bid opening protocols,
   (ix)   electronic tender management security and encryption standards for data,
    (x)   e-quoting search protocols,
   (xi)   support for nonelectronic components of a bid—bid security instruments not supported by e-payments,
  (xii)   handling of submitted documents found to contain a virus,
 (xiii)   mobile technology options,
 (xiv)   engagement and facilitation of SMEs,
  (xv)   IT security policy,
 (xvi)   management of security processes—handling lost or forgotten passwords and replacing a digital signature if lost or expired,

(xvii)   digital signature certificate (DSC) and other forms of authentication,[15]
(xviii)   business continuity planning (BCP),
(xix)   disaster recovery planning (DRP),
(xx)   backup policy,
(xxi)   archival policy, and
(xxii)   e-payments and e-receipts policy.

Developing these policies is a reasonably simple process that should be completed in the short term and should take precedence over the creation of the law(s) in the e-GP implementation road map. Policies or practices on bid submission closure times should also be revisited. Usually, bid closure time is during business hours and at times when internet traffic is at its heaviest. In countries where connectivity is poor, this increases the risk of nondelivery. The policy can equally be set for midnight or any other hour when traffic is low. This would mean that paper delivery of a bid would effectively close at a different time from e-delivery, but this may not be a critical issue, depending on bid box security.

Other policies should also be revisited. For example, all communications should be directed to the clarifications (questions and answers) facility. All documents should be reviewed to remove other avenues of contact such as phone numbers and personnel identifiers. Further, under the quotation method, all supplier identifiers should be removed so that selection is unprejudiced. This means that special methods need to be designed for prequalification.

It should be noted that these policies are required regardless of the platform. Whether the e-GP system itself is built in-house, outsourced, or contracted on a fee-for-service basis, the core issues are, for the most part, about management in the information environment as opposed to the technology platform itself.

2.7   Legal and Regulatory Framework

The legal and regulatory framework for public procurement must allow for e-GP so that governments can safely conduct the procurement process and award contracts electronically. The 2011 Model Law on Public Procurement of the United Nations Commission on International Trade Law (UNCITRAL), the 2012 Agreement on Government Procurement of the World Trade Organization (WTO), and the current EU directives all provide examples of how to allow for e-GP.

The core legislative requirements for e-GP and e-commerce deal with electronic documents and electronic signatures. Other procedural requirements for e-GP include regulations or policies

(i)   to ensure recognition of electronic procurement as being on par with manual procurement;
(ii)   mandating the use of the e-GP system in agencies as per the phasing plan—parallel bidding (the use of both manual and electronic forms) should not be permitted beyond a transition period;[16]

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[15] Access through internet cafés conflicts with PKI authentication.

[16] Current MDB policies that do not mention a transitionary period, but these provisions are under revision.
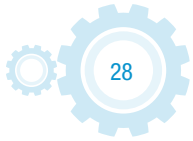
(iii) amendments to bid document conditions wherever required to suit e-GP; and

(iv) mandating online vendor registration as a prerequisite for participating in government procurement through the e-GP system, and for submission of bid responses through the e-GP system.

To address basic requirements relating to e-documents and e-signatures, a number of other legislative reforms could be added in the following areas:

(i) electronic records management,

(ii) consumer protection and privacy,

(iii) laws pertaining to legal evidence,

(iv) data protection and confidentiality,

(v) intellectual property and copyright, and

(vi) codes of practice.

However, these areas are generally not considered prerequisites for the initial application of e-GP.

The general legislative framework should combine any existing legislation and regulations into a common law supporting the implementation and use of e-GP in accordance with the defined guidelines and regulations. The new law should provide overall policy-level guidance for conducting public procurement in the jurisdiction with the following key objectives:

(i) make the procedures, processes, and decisions relating to public procurement much more open, transparent, objective, and reliable;

(ii) obtain the maximum returns on public expenditures in an economical and rational manner by promoting competition, fairness, honesty, accountability, and reliability in public procurement processes; and

(iii) ensure good governance by

(a) enhancing the managerial capacity of public entities for procurement, construction work, goods, consultancy services, and other services by such entities;

(b) ensuring equal opportunity for producers, sellers, suppliers, construction entrepreneurs, or service providers to participate in public procurement processes without any discrimination; and

(c) establishing a clear process for filing complaints or grievances against a given procurement.

The law should provide high-level guidance to public entities about managing the entire life cycle of public procurement, ranging from preparation of the annual procurement plan to maintenance of records related to the procurement proceedings. The law should make it mandatory for all public entities to adopt the provisions and guidelines set forth, and any procurement conducted outside the provisions of the act may be declared invalid and void.

The implementation of new laws may represent a significant project, and significant effort and time may be required for them to pass through the legislature or parliament. For this reason, the governing law for

e-GP should not deal with the working details of the e-GP system. The working details of the e-GP system should be governed through policies and regulations issued by the lead agency, which can be implemented as required to address issues of the day.

Although e-GP requires a range of business and public sector legislation, it is possible to initiate some useful elements of e-GP without legislative amendment. An e-GP strategy should recognize this in its schedule of phased implementation. Legislation that allows for policy to be developed and changed without requiring major change to the legislation has some advantages in dealing with evolving issues in procurement. Some specific legislation may have already been enacted in relation to e-commerce, including issues such as authentication, privacy, and security of data.

The legislative program for e-GP often shapes the implementation schedule and may affect the overall development of the system itself if it attempts to specify too many functional details or proposed workflows for the system. The passing of the legislation could end up being a larger project than the development of the e-GP system. The preferred alternative is to shift as much as possible to the policy framework, which can be supported through directives and regulations issued by the head of the organization. The supporting legislative framework would support and institute e-GP as a government program to be used in accordance with the policies and directives set out for its use.

2.7.1   Signatures and Authentication

As a general principle, signature legislation should conform to international standards to ensure interoperability with similar legislation in other countries. Since the development of the UNCITRAL Model Law on Electronic Commerce (1996), countries have been adopting laws on this issue. However, there are no universal international standards in this area, and such laws therefore have a limited scope as they are only applied to domestic transactions in each country, without any regulation of the wide range of cross-border transactions.

This is evident within members of the Association of Southeast Asian Nations (ASEAN) and the EU. Many of these governments have adopted the 1996 UNCITRAL law and e-signatures are used, but the law has been interpreted differently by different jurisdictions, thereby limiting its application for cross-border procurement. Apart from government procurement there is little evidence that cross-border trade has been inhibited, because private trading partners generally do not rely on these procedures.

There is a need to promote agreements among the countries that, taking into consideration their own national regulations, establish a basis for the mutual recognition of e-signatures. To address this situation, UNCITRAL developed the Convention on International Electronic Communications (2006), which has been signed by 18 countries (as of 2011), including the PRC, Colombia, Honduras, the Republic of Korea, Panama, Paraguay, and Russia.

This convention has the goal of promoting legal certainty and trading predictability when electronic communications are used in international contracts. It assists in determining such questions as

    (i)   the location of the parties involved in an electronic environment;
   (ii)   the time and place when electronic communications are sent and received;
  (iii)   the use of automated message systems to generate agreements; and,
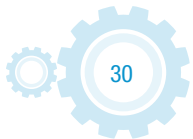
(iv) the criteria applied to determine functional equivalence between electronic communications and paper documents, including "original" paper-based documents, as well as the methods for electronic authentication and handwritten signatures.

The 2006 UNCITRAL convention is now consistent with the technological neutrality principle, moving away from PKI, and accepting any authentication method that allows both determination of a person's identity and establishment of personal involvement. It also admits agreements between parties, antecedents, and the proportionality between means and purposes, including further proof, thus permitting the scope for activities to be risk-rated in determining the approach to authentication. Such methods are considered the functional equivalent of electronic signatures.

2.7.2   Public-Key Infrastructure

The 2006 UNCITRAL convention now recognizes that PKI is not a standard but rather a technology, and that there are competing authentication technologies that are less costly and more easily understood by business users. These new technologies, including biometrics and tokens, seek to overcome the disadvantages of PKI. The UNCITRAL model law and other e-commerce regulations aspire to be technologically neutral so as not to obstruct the development of these new technologies.

Many countries are proceeding with e-GP without mandating the use of certified digital signatures, including Australia, Singapore, the UK and the US. UNCITRAL has changed its model law to remove any implied requirement for PKI. Some countries that had previously adopted PKI have since abandoned it. Significant work is also proceeding in relation to the application of biometrics online, for example in the Southern Common Market (MERCOSUR) framework in Latin America.[17]

Regulation for e-signatures in relation to e-GP is an issue that should be carefully considered. Often such regulation is developed along the traditional lines of certified digital signatures, based on the presumption that PKI is a standard. Adopting this path may slow adoption of e-GP among SMEs (as well as eliminate the use of cyber cafés for business users) and add to the cost of business, without adding significant value. The overwhelming proportion of e-business today operates without client digital signatures, even in the banking industry.

In a narrow, mathematical sense it is practically impossible for someone to forge a digital signature. Technologists have latched onto this and sought to build laws and processes around this (described as PKI) and propagate the certificate authority business. However, while in this narrow mathematical sense digital signatures are difficult to forge, they can still be stolen through technological means, physical theft, and identity fraud. PKI has already been circumvented in e-GP. For example, in the Republic of Korea there have been cases of suppliers borrowing certificates so that a single supplier could bid as several different suppliers. The solution in that case was to apply biometric security measures.

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[17] XIII Ibero-American Conference of Ministers of the Federal Administration and Reform of the State. 2011. Ibero-American Social Electronic Identification Framework. Asunción, Paraguay, 30 June–1 July 2011.

Common PKI weaknesses include

   (i)   identity theft;
  (ii)   insecurity of the verifying server;
 (iii)   lack of warranties by certificate authorities;
 (iv)   insecure key management;
  (v)   no way to measure risk;
 (vi)   no way to assign accountability, and therefore no way to handle liability;
(vii)   unlimited liability means that the process is uninsurable; and
(viii)   non-repudiation is unachievable (as it requires proof of a null hypothesis).

In addition, digital signatures and digital certificates are not viable for use in internet cafés and public procurement terminals. Browser-based certificates could be loaded onto the web browser in an internet café, provided the networking in the café allows for it. But the user has to remember to delete the certificate from the key-store, otherwise the certificate can be used by any public user of the system. A certificate stored in a token requires installation of specific drivers, which an internet café administrator may not allow. Hence, the use of digital signatures and digital certificates is not recommended.

For major contracts, digital signatures are not a substitute for traditional due diligence. It should also be noted that the way governments are applying PKI for e-GP is mostly for bid submission, which in the paper environment required ex post authentication of the winner and now requires partial ex ante authentication of all bidders. Therefore, the rationale is not clearly established. There is no requirement for PKI from suppliers—a private key (for example, a password) is just as effective, and may have stronger authentication characteristics in an e-GP environment.

3 Strategic Considerations for Government Implementers

For governments that have yet to implement e-GP, the decision should not be whether to implement, but how to approach the implementation of e-GP. There are many e-GP system options available in the marketplace today that have been developed by governments, for governments, or for businesses that may be adapted to a government e-GP environment.

The key to a successful implementation is not simply related to the chosen e-GP system application with all of its features and functions, but has more to do with the government and how it organizes itself to manage the business delivery of the system. The success of the system relies on the leadership of the government implementing the system, the rules it sets forth for using the system, and the support it provides to ensure the successful operation of the system, including any necessary procurement reforms.

This chapter provides an overview of the business requirements for an e-GP system from a government perspective, along with case studies of existing e-GP implementations and a suggested framework for performing an e-GP readiness assessment.

3.1   Transition from Manual Procurement Process

The introduction of an e-GP system will affect the procurement practice, rules, and guidelines governing the procurement process, and could represent a significant change in operational procedures for the procuring agencies and supplier communities.

Traditionally, the common practice for procurement requires an agency to place an advertisement in a newspaper, place a notice on a bulletin board, or send an invitation to a select list of suppliers. The suppliers contact the agency to receive a bid package, attend a bid conference and then submit their response directly to the agency. The government procurement is conducted in accordance with a set of rules or regulations defined by laws and financial administrative controls. The procuring agency is responsible for supporting the procurement process, which includes the creation of bid packages for multiple interested bidders, and for notifying bidders of any update or amendment to the bid package including any responses to queries. The newspaper advertisements and the creation and management of bid packages and resources to manage the process are costly and not always efficient. In some jurisdictions, procurement is centralized in selected agency administrative offices to provide better oversight and management of the process. Often the standard practices are not considered "open" due to limited access to the opportunity information, use of a closed supplier list, or outside influences that interfere with the procurement process, creating the perception of unfair competition and creating opportunities for corruption or collusion.

Box 3   Change Management Considerations

The transition to an e-government procurement (e-GP) system does not happen overnight, nor is its implementation a short information technology development project. The transition to e-GP is a business reengineering process that involves the creation of a new business service operation and should be part of an overall procurement reform process. The program should be supported by a dedicated organization that can oversee the administration, management, ongoing development, and operation of the system. Meanwhile, the government needs to provide the dedicated organization with the necessary leadership, responsibility, and authority to fully support e-GP operation.

The most common business model options used by governments for the implementation of e-procurement include public–private partnership, shared service, and government-managed service. Regardless of the business model selected, the government is still responsible for the management of business services being delivered and will need an operations management unit responsible for managing the service operation even when the service is fully outsourced to a third party.

Technology and services exist that allow any organization or jurisdiction to establish its own e-GP system to service the procurement and information management needs of its organization, whether that organization is a single department, city, state agency, national agency, or government. A single unified system approach would provide the most effective option for a country, state, or departmental organization whose primary objective is to establish the most open, transparent system to support its procurement program.

When implementing e-GP, a government needs to realize that operational management and support is an activity that will be required throughout the system life of the e-GP initiative, which may span 10, 15, or 25 years into the future. From the outset, the government needs to plan how ongoing service delivery will be managed.

The e-GP system provides a critical support role to the procurement process on behalf of government. To ensure the success of the process, the operator of the system—be it the government itself or a service provider—has the responsibility to ensure an uninterrupted service is delivered to support the needs of all users.

With an e-GP system, the procuring agency places its advertisement information, bid documents, and any updates on the system once and suppliers interact with the system to retrieve bid opportunities, submit queries, and submit a response. There is no longer a need for any direct communication or interaction between the agency and the supplier during the procurement process unless there is a public bid conference and a public bid opening, which may also be conducted online through the system. Suppliers have the opportunity to review all tender notices and decide which notices they may be interested in participating in.

The implementation of an e-GP system effectively introduces a third party to the procurement process— the e-GP system itself—whether the system is operated by government or an external party. The e-GP system has little to do with the actual procurement being conducted by the procuring entities and their suppliers, as the system does not create the procurement requirements nor does it create a response to the requirements. The e-GP system simply collects and distributes information to and from users, and initiates transactions to and from other systems in accordance with the business rules and practices defined by the government. The e-GP system at its rudimentary level represents a government business service offering.
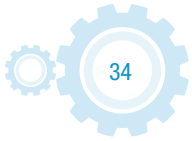
As a business service operation supporting the procurement process and guided by government rules and regulations, the e-GP system becomes the gatekeeper for the procurement process. It provides the government and participating suppliers with the necessary tools to effectively manage and support the procurement process conducted by the participating agencies.

The use of an e-GP system, however, represents a significant change in process for the procuring agencies and supplier communities. The government will need to ensure that procuring agencies and suppliers are properly informed of the transition to e-GP and have the capacity to properly access and use the new system. One of the main challenges when introducing a new system is changing the mind-set of existing practitioners to accept new approaches and practices. A full communication, training, and support program is critical to the initial system implementation and ongoing operation. It is also important to ensure that participating agencies have the necessary resources required to use the e-GP system, such as computer and network infrastructure. In many developing countries, a shortage of proper workstations and network connections are an issue either due to budget constraints or availability.

Most governments start their e-GP programs with a basic e-tendering system implementation that supports the publication of tenders and bid documents, and registers buyers and suppliers. This is because use of basic e-tendering can easily be associated and run in parallel with existing manual processes while providing significant benefits for both the government and suppliers by making use of the internet. The initial use of a basic e-tendering module allows both procuring agencies and suppliers to familiarize themselves with a new approach to the procurement process and establishes a foundation for changes and reforms. The basic system helps the government to build its online supplier marketplace before moving to a full e-tendering system that includes additional features and functions such as bid submission and catalog shopping.

The e-tendering module is characterized by high-value and low-volume transactions, and its users tend to be few and located in a handful of government offices. Hence, the effort required to shift from a manual to an electronic system of tendering is less difficult when compared with implementing the e-purchasing module. The e-purchasing module is characterized by high-volume and low-value transactions, and users of this module are spread across multiple government offices. Further, the e-purchasing module tends to be workflow heavy.

To properly support the implementation of e-GP, a government needs to review and update existing rules and regulations guiding the manual procurement process to reflect the new practices to be followed when accessing tender information, registering for a bid, submitting queries, responding to bids, and opening bids online. The new practices and guidelines will also need to define the roles and responsibilities of each party in the procurement process: the procuring agency, the supplier, and the e-GP system. New rules should stipulate that the procuring agency is required to publish all tender notices, all associated bid documents, and all updates in the system to ensure the supplier community receives a complete source of information related to a bid. In addition, the instructions should stipulate that even though the system will attempt to notify suppliers of any change or update to a tender, it is the responsibility of suppliers to check the tender notice to ensure they have all the latest information before submitting their bid. The e-GP system and the procuring entity will not assume any liability for any information published on the system.

The success of an e-GP system is also dependent upon the participation of the supplier community. The e-GP system will offer great value through open access to all procurement opportunities, and even more when interactive purchasing through e-catalogs is supported. However, the supplier community will not necessarily register simply because a system is put in place. Participation occurs when there is a desire from
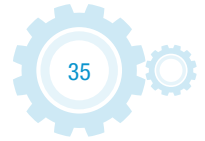
the business community to participate in government procurement, and the more they become aware of the new system and change in government procurement practice to a more open and transparent environment, the more they will participate.

The government and participating agencies need to ensure their supplier communities are fully aware of the new e-GP system and what is required to access it. The procuring agency also needs to be properly trained in the use of the system and how to prepare bid documents for electronic publishing. Common questions include how pages can be scanned which may not be readily available in an electronic form, and how to ensure bid packages are in a standard format and fall within specified file size limits. If the creation of documents is not properly managed, the file size can easily become quite large, which will in turn affect system resources and the time it takes to upload and download files. The use of PDF as a standard file format has become a popular option for the creation and distribution of bid documents across multiple system platforms. However, if these files are not created properly there can be file size issues and suppliers may not be able to properly complete the required forms without having to re-create them or print and scan them first.

The transition to an e-GP system does not happen overnight, nor is its implementation a short IT development project. The transition to e-GP is a business reengineering process that involves the creation of a new business service operation and should be part of an overall procurement reform process. The program should be supported by a dedicated organization that can oversee the administration, management, ongoing development, and operation of the system. Meanwhile, the government needs to provide the dedicated organization with the necessary leadership, responsibility, and authority to fully support e-GP operation.

3.2   Choice of e-Government Procurement Business Model

The implementation and ongoing support of an e-GP program can require a significant investment by government. Unlike the manual process, which is normally managed by individual departmental organizations and where the associated costs typically relate to newspaper advertisements and copies of bid documents, the e-GP system represents an enhanced service operation supporting many government organizations and their suppliers who become reliant on the system for timely access to information required to conduct business. Though the government can realize significant savings in advertising and bid document expenses, as well as the administrative costs associated with the handling, filing, and archiving of paper documents, new costs are incurred with the development and support of the system and its users.

Most of the e-GP systems in place today were developed over time and have evolved as their requirements changed. Custom development of an initial implementation may take 1 to 2 years to get up and running, including the scoping of requirements, development, and implementation. The use of an existing off-the-shelf system or a shared service environment with minimal customization could technically be available for use in a much shorter period. Regardless of the approach, a government needs to plan for the transition to a new system usually through the introduction of a pilot stage.

A pilot stage allows a government to slowly introduce the new system to its user community, both government buyers and suppliers, giving them an opportunity to adapt. It also gives the government time to better understand the new system and the implications it may have on existing policies and regulations
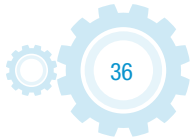
that may need to be properly addressed prior to full system implementation. During the pilot stage, the government can give consideration to security processes, operational processes, registration processes, and to ensuring the system can adequately support forecast user loads and storage requirements. The system implementation must also take into account operational procedures to protect against system failures or disasters that may occur. As the system becomes more integrated with the various processes associated with procurement, such as delivery, bid submission, and payment, and more integrated with other government systems, the more critical it becomes to the government and its vendor community, requiring a higher level of service and reliability.

A number of governments find that they do not have access to the initial investment required to implement a system, nor do they have the necessary expertise or resources to support the development and operation of a service. For these governments, the use of off-the-shelf or shared service environments through a contracting or partnership relationship with a private sector provider can help to alleviate some of the operational risks and funding needs. Governments have been able to establish partnership arrangements with third-party providers to deliver and support an e-procurement system funded primarily through transaction fees, as evidenced by the e-GP system implemented by the State of Karnataka in India. When using existing off-the-shelf systems or shared services environments, a government needs to understand the extent of the system or service it is acquiring and what the limitations may be with regards to customizations, costs, and the ability to integrate with other government systems. The government must also fully understand the contractual relationship and terms of the agreement with regard to their rights and ownership of the system and/or data, and provide for a transition plan at the end of the contractual relationship.

Most governments that have undertaken the implementation of an e-GP system have come to realize that implementation of the system is more than just a short-term information and communication technology (ICT) project. Rather, the development of an e-GP system reflects a reengineered business process to meet new policy objectives for a more open, efficient, effective, and transparent procurement environment for government. The implementation of the e-GP system is normally associated with the institution of procurement reforms across the government, and supported by a comprehensive information management system that enables future data mining and auditing of the procurement process. The e-GP system can become one of the most valuable resources for managing and monitoring government procurement by enabling direct real-time access to each stage of activity, analyzing past transactions, ensuring full compliance with rules and regulations, conducting spend analysis, and planning new programs.

The scale and scope of the envisioned system can become a significant development project, creating different levels of risk and cost for the government to ensure its successful implementation, operation, and support. Many systems require an investment of millions of dollars and the allocation of 30 to 40 technical staff to support ongoing operation. System implementation may also require a significant change management process and business reengineering exercise to fully capture all of the potential benefits. In some environments, the implementation of a change in process may present a bigger challenge than the system development if the target users are not provided with the proper skills and resources to support the change.

The most common approaches used by governments for the implementation of e-procurement include the following:

    (i) **Government owned and operated.** The e-GP system may be a government-developed and operated e-procurement solution that may or may not have been delivered by third-party partners. The governments of the Republic of Korea and Singapore both own and operate
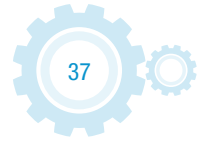
their services. Singapore developed its system in-house whereas the Republic of Korea contracted out the development of the system.

(ii) **Government-managed service.** The e-GP system may be a government-managed e-procurement solution that is operated and owned by a third-party partner. The Philippines manages the delivery of its e-procurement system, which is supported by a third-party service provider. All business relationships, support services, data, and the government e-procurement portal are owned and controlled by the government.

(iii) **Public–private partnership.** The e-GP system may be a government e-procurement solution that is managed, owned, and operated by a third-party service provider, often with the intent to transfer the platform back to the government in the future. The State of Karnataka in India has followed a public–private partnership (PPP) arrangement whereby the system may be transferred to the state at the end of the initial agreement or extended.

(iv) **Shared service.** The e-GP system may be a third-party e-procurement service that is fully managed, owned, and operated by the third party and used by one or more governments and suppliers. This approach has been undertaken by a number of agencies in India whose e-procurement platform is hosted and delivered by a third-party operator. Canada has followed this approach as well, with one service provider hosting e-procurement delivery for the federal government and multiple provinces, cities, and other public agencies.

The choice of model is associated with the amount of risk and cost a government organization is willing to undertake when implementing its e-GP program. Governments must recognize that e-procurement involves more than just the technical development and implementation of applications and infrastructure; it also involves the business services required to support ongoing development activities and to build customer relationships.

Whoever takes ownership for developing and maintaining the e-GP system needs to have the capacity and resources to manage risks; for example, if the system is delivered late, projected revenue models are slow to materialize, or significant system failure occurs during the operation, the carrying costs for the system can be significant. Other operational issues related to server downtime or potential security breaches that may affect a procurement process will also need to be quickly resolved. The party assuming the risk associated with the system operation must be prepared for and capable of carrying these costs and accepting a delay in return on investment.

When choosing an e-GP model, the highest risk issue facing a government relates to its capacity to manage and implement the software application and its underlying infrastructure. The software required to run an e-GP system can become especially complex, leading to the possibility of growing costs over time, delays in the delivery of the system, and downtime due to unplanned system failures. The use of a third party with the necessary skills and expertise can help to alleviate the risk associated with the management and retention of resources, as well as with continually evolving technology.

A significant problem for governments using a third-party service provider is the management involved in extracting itself from a provider if, at a subsequent date, the relationship becomes too expensive or service levels are unsatisfactory. Though a third-party service can offer a viable alternative for the delivery and operation of the e-GP system, there are risks related to intellectual property rights, data security, and the ability to transfer to a new service offering at the end of a contract period. These risks can be mitigated by ensuring the rights of the government and its information are properly protected and a transition plan is part of the agreement. The State of Andhra Pradesh found itself in a dispute at the end of its initial
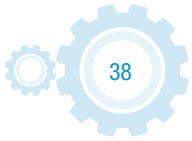
service agreement regarding its rights when looking at changing providers. Similarly, the Government of the United States also encountered issues with the proprietary rights to components of the system and data at the end of a service agreement. Governments need to plan for the eventual transition of a system and ensure that they have sufficient knowledge of the system to support any new provider during the transition period. It would be impractical to assume that a new service provider could conceivably take over from its predecessor while ensuring business continuity without any support, even when moving to a new platform. It would take time to gain familiarity with the software coding and systems, and there would be little incentive for the outgoing provider to assist unless it is required to as part of the original agreement. The prospect of government procurement being offline for days or weeks on end, and the political and financial fallout that would ensue, would be particularly unattractive. Governments must apply proper contractual controls and standard processes as they would with the delivery and support of any e-service agreement to ensure their proprietary rights for the system and data are clearly defined and that the agreement includes a transition plan upon termination of the agreement.

The e-GP program often becomes a critical part of government service operations, supporting the procurement and delivery of goods, services, and works projects required to sustain the government. The systems also contain the information necessary for monitoring and auditing government purchases, as well as private and confidential information on participating vendors, procurement initiatives, responses to bids, and in many cases payment information. Both government users and suppliers become dependent upon the system to conduct their procurement activities in a timely and efficient manner. System delays, interruptions, or downtime can have a serious impact on the procurement process. The government needs to ensure the necessary resources are in place to support any projected user activity over the life of the system. The system must also include a sufficient level of security within its infrastructure and application procedures in order to ensure the integrity, transparency, and privacy of e-procurement, but the actual procurement process is protected by the procuring authority.

It is important to remember that e-GP systems fundamentally provide a service to support the procurement process and that the system operation should remain independent of the procurement process itself.

Regardless of the business model selected, the government is still responsible for the management of business services being delivered and will need an operations management unit responsible for managing the service operation even when the service is fully outsourced to a third party.

3.3   Single System or Multiple Systems

Technology and services exist that allow any organization or jurisdiction to establish its own e-GP system to service the procurement and information management needs of its organization, whether that organization is a single department, city, state agency, national agency, or government. Economies of scale for e-GP systems derive from having more buyers and suppliers using the same system environment.

A single system approach provides the most effective option for a government, state, or departmental organization whose primary objective is to establish an open, transparent system to support its procurement program. With a single system, the jurisdiction is better positioned to implement standard practices and monitor all activities while the supplier community only has to register in one system to access and participate in multiple opportunities. A single system would simplify integration with other e-government systems as the systems would be interacting with a common system interface for the e-GP system, and

would reduce any duplication between processes or data management functions, providing a more seamless environment for suppliers conducting business with government.

The ability to implement a single system in a jurisdiction depends on the legislative powers provided to mandate use of the system. Some departments within selected jurisdictions may have significant procurement volume to support their own e-GP system implementation to better serve their supplier community and their own internal information and financial management systems. The local communication infrastructure and regional structure of a country may also be better served through local system implementations.

The implementation of multiple systems in a jurisdiction, even though each system on its own may support a solid e-GP implementation program, can increase the overall cost of e-GP across the government and may potentially create closed or regional systems, leading to confusion in the supplier community. Suppliers may be subject to different registration processes, and if the government wants to establish a single supplier registry for all systems, it will need to establish accepted process and data requirements to service each system. Multiple systems may limit the ability to establish a national monitoring program to properly analyze data collected from different systems and thus limit the ability to ensure a fully transparent process is applied across all government organizations.

Not all models or approaches will work in all environments. When selecting the implementation approach that will best suit their needs, governments need to take into consideration the various technical and business challenges that exist within their individual environments. The approach for implementation of a particular system should be driven by business needs rather than technical needs, as the implementation of e-GP is primarily a business issue.

National or state governments may have to take preexisting systems into account within their jurisdictions, particularly where selected agencies already have established e-GP systems in place prior to undertaking efforts to establish a national program. In such cases, the existing e-GP systems in these jurisdictions may need to coexist with other systems due to existing contractual relationships with service providers or investments that have been made. Governments will need to establish guidelines and policies to be followed by the e-GP systems and ensure that all systems are in compliance with overall procurement reforms and rules. They must also ensure that the existing e-GP systems can support the reporting requirements of the national or regional program, as procurement is not only about the e-GP application, but also includes the overall guidelines and laws governing procurement.

3.4   Software Selection and Implementation Considerations

Because e-procurement software is usually modular and somewhat customizable, it is important to understand that an e-GP platform is seldom made up of a single product. There are common components to any framework, including supplier registration, search capabilities, e-tendering functionality, catalog management, and order and payment systems. But many of these modules will cross boundaries and interact not only with other modules, but also with other external systems—for example, a supplier's catalog management program, enterprise resource planning (ERP) systems, supply chain management systems, or payment platforms. They will almost certainly be linked—either feeding or receiving data—directly to third-party providers, including independent tendering search engines, bank and payment systems, and credit and business certification agencies. In many places now, and certainly in the future, e-GP systems will talk to other e-GP systems; not only the systems of other agencies within the same national government, but
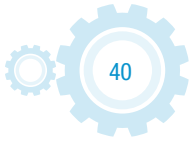
to other systems in other agencies in other national governments. Elements of the e-GP software platform may be owned and managed by government, by an individual agency, or by a third party, or may even simply be part of the growing set of applications that can be accessed through the "cloud."

Whatever the system's configuration and wherever it physically and managerially resides, there is a core functionality that most agencies will want in order to ensure that their system provides a seamless, end-to-end procurement process that extends from the publication of requirements, through the selection of vendors or products, to delivery and payment.

The strategic approaches most commonly used by central and local governments and their agencies when implementing their e-GP platforms involve some variation of ownership and management control—government-owned and operated, a public–private partnership, or even independent third-party ownership with arms-length government supervision.

Deciding which of these options is right for the particular needs of the government will depend on many things: the capability of the technology group, usage and availability expectations, cost considerations, functionality, and ease of use for buyers and suppliers (particularly SMEs). The system management and fiduciary arrangements that a government chooses will be crucial to the success of the program, and will depend on decisions made during the planning phase of implementation.

Although it is fair to say that e-GP should never be considered as just a technology issue, the success of an e-GP program—or from the supplier's point of view, the benefits and effectiveness of their participation in that program—can very much depend on the type, functionality, and availability of the e-procurement software that is chosen. Fortunately, e-procurement has been around for nearly 2 decades, and many software groups have created modules and features that cater specifically to the needs of governments. By 2013, the functionality and availability of e-procurement software, and the support services that have grown around it, could provide both governments and suppliers with a wide variety of options for participation.

3.4.1   Factors to Consider When Selecting a System

The reason most often cited for the failure of e-GP initiatives is not one of management responsibility or ownership; whether self-managed or outsourced, e-GP frameworks have had spectacular successes worldwide in both the private and public sectors. But they have also had their failures. The reason most often cited when e-GP initiatives falter is that the program has failed to attract enough suppliers to create a critical mass of users that will justify the initial investment and sustain future investment. Low supplier participation may simply be because the government agency implementing the e-GP platform has not done the necessary outreach with suppliers to make them aware of the benefits. More often, though, the reason for poor supplier participation is structural, and can be attributed to one or more software-based concerns:

    (i) the software chosen was too difficult to implement and so had poor availability and value,

    (ii) use of the software (including government fees) was so expensive that all but the larger suppliers were priced out, or

    (iii) the software was simply too difficult to access or use from a supplier's point of view.

When implementing e-GP, a government needs to realize that operational management and support is an activity that will be required throughout the system life of the e-GP initiative, which may span 10, 15, or

25 years into the future. From the outset, the government needs to plan how ongoing service delivery will be managed. It will also need to recognize that the technology applied in the original system implementation must evolve as new technology and communication standards become available. The system will require ongoing product planning to address new functional needs and technology changes, which may occur as some system components may no longer be supported over time.

Depending on the business model selected, the involvement of third parties in the delivery and support of an e-GP program creates a variety of new business relationships between the service providers, governments, and suppliers that did not exist previously with manual procurement systems. A government needs to ensure that any ensuing relationships and associated business practices are properly protected, and that they support the interests of the participating parties.

Most public sector agencies already have some experience with purchasing software, but with a framework as comprehensive as an e-GP system it can be worthwhile considering the issues of implementation and continuous operation, from contracting with third-party vendors and supporting e-bid submission to collecting information in the system and capacity building. There are several primary considerations that will form part of the system design and procedures.

3.4.2   Contracting Considerations

Long-term planning is critically important when dealing with third-party service providers as a government will typically look at a 3- or 5-year contract with a service provider when planning the delivery of a business service over 20 years. It is vital to consider what will happen at the end of the initial contract term:

(i)   Will the government retain rights to the system infrastructure so that it may continue operation on its own?
(ii)   Does the government have the capacity to undertake the operation of the system?
(iii)   Who owns the system?
(iv)   Who owns the data?
(v)   If the government is only participating in a third-party system, does it retain access to the suppliers that are registered in the system if it decides to switch systems in the future?

The government needs to take into account the risks associated with using a third-party service, particularly as they relate to data security and business continuity. These risks can be mitigated through the contractual arrangement with the service provider, ensuring the government's rights and ongoing business requirements are properly addressed.

Regardless of the model followed for system administration, data ownership should always remain with the government. This is necessary in order to ensure the sanctity of the procurement data and the ongoing operation of the system in the event of significant failure by the provider. The ownership of the data is the most critical issue due to the fact that the technology will always change and evolve, yet the data will basically stay the same. In cases where the system administration is outsourced to a service provider, sufficient security systems need to be in place to ensure that the database administrator does not have "read/write/modify" access to sensitive data.
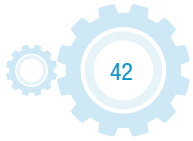
The original contract should contain a well-documented transition plan to ensure that the government will have the option to acquire the system and software at the end of the contract, as well as to extend the service portion of the contract or facilitate a contract renewal to minimize the expense of a full procurement process for a new service. If the government plans to re-tender the e-GP system, the tendering process needs to ensure that there will be adequate time to plan and conduct the bidding process, as well as to give the incumbent time to put a new system in place before the contract expires. The contract must also contain clauses to support transition, including the transfer of all data to the new system and the removal of any and all data such as backups or archives from the old system once the new one is operational. Canada learned this firsthand when transitioning from OBS to MERX. When tendering a third time, the Government of Canada took those transition costs and challenges into account and incorporated the transition plan and associated costs as part of the requirement and evaluation criteria in the bidding document.

Governments should establish parameters for terminating or renewing any service contract during initial contract negotiations. The main issue is to ensure all ownership and rights to any data created by the government or collected on behalf of the government—including the registration of suppliers—remains the property of the government so that information can be transferred to any other system in the future without dispute. Governments should ensure they retain the rights to any system design, database structure, and workflows developed or implemented on their behalf so that any such information may be used in the development of any new system in the future.

The most critical—and yet often overlooked—investment that governments should make is to establish and own the URL used to direct traffic to the system. In this way, if they switch systems in the future they can simply redirect traffic to the new system from the e-GP portal. The URL is the least costly but most valuable asset of the e-GP system. Users do not really know or care about the nature of the back-end e-GP system; they will simply use the system presented to them, provided the security and integrity of their data is maintained and there is no interruption to any of their procurement activities.

With regards to the intellectual property rights (IPR) of the whole e-GP system implementation supported by customized off-the-shelf packages and other supporting components of a shared implementation, it may not be possible for a government to actually claim rights to the IPR for its entire solution. In such cases, some of the IPR for a software product or solution may be held by the service provider and therefore may continue to rest with the service provider after a contract terminates. Governments need to ensure that rights of use for any component of their system implementation can be transferred to them if they opt to take over operation. In the case of custom development, governments should maintain complete ownership of the source code for the e-GP system software.

In PPP models, there should be a provision to keep the source code in an escrow account to mitigate the risk of a service provider being liquidated. This ensures business continuity for the government when adopting a new PPP model. The onus rests with the vendor for maintaining the same version of source code in the escrow account as that of the code running in the application. It will be up to the government to put third-party mechanisms in place to oversee this process.

3.4.3   Scalability

Careful thought has to be given as to how an e-GP system may grow over the years. If the e-GP platform is developed as a centralized system for multiple government agencies, it should be designed to

support multiple agencies. This means catering to departments with enormous purchasing budgets like transportation that may want to tender to many thousands of suppliers from chain stores to manufacturing facilities, as well as to smaller, more service-oriented agencies that may be more concerned with complex, service-related tenders. Supplier participation may grow rapidly, and although to begin with the tendency will be toward a system meeting immediate needs and within the available budget, it may be important to choose a procurement software platform that is able to handle an expanded volume of both users and transactions in the future.

3.4.4   Flexibility and Customization

An e-GP platform should have the flexibility to bolt on additional functional components with minimal effort and for a reasonable price. The system should allow addition of new government departments by way of simple configurations and yet address the process or workflow requirements of the added departments satisfactorily. The key to flexibility lies in proper software design. Software for e-GP should be designed to accommodate process variations in key decision points; for example, the system should allow calls for tender from a centralized office or be decentralized to multiple different offices. In the latter case, tender evaluation would be decentralized but evaluation results would be sent to the central office for approvals. While standardization of processes is possible and often required, some variations in procurement processes tend to exist for valid reasons. Hence, the software should be adequately flexible to accommodate variations in procurement processes.

3.4.5   Data Considerations

The e-GP system can have many components, all of which support a fully integrated procurement and procurement monitoring process in order to improve the old manual system. However, the key component of the system will be its content, provided by the procuring agencies conducting the tenders. All other system components can be considered add-ons that make the system more efficient.

A government will need to consider the type of reporting and data analysis it wants from its e-GP system. In some implementations, the reporting facilities are limited due to the data parameters associated with the tender notice or other procurement information and registered users. If the intent is to support price analysis, the system will need to have appropriate data elements to compare prices of similar goods or services. If the system only identifies a tender as a *good, service, consulting service, or civil works*, the comparison is limited to *goods tender to goods tender,* which will not mean much. To ensure a better analysis, a government should include a detailed commodity classification table such as the United Nations Standard Products and Service Codes (UNSPSC) as part of a tender record. The UNSPSC provides more than 185,000 detailed product and service specifications from goods, services, civil works, and consulting services under 57 high-level groupings. A detailed commodity code enables better reporting and comparative analysis options, resulting in a better understanding of the activity occurring in the system and what goods or services are available from registered suppliers. The commodity could be enhanced with unit of measure (UOM) and quantity parameters to support more effective price comparison. UOM and quantity codes could also be applied to works projects such as road construction with UOM (in meters or kilometers) and a quantity to quickly compare the price of similar road projects.
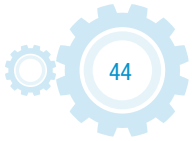
The more data parameters associated with a tender record, award, or supplier, the more informative the system. A government should therefore try to identify the types of management reports it may require and adjust its parameters accordingly.

The data collected by the system is its most valuable asset and the government needs to ensure access to that data is properly managed and protected. Data is just as relevant whether the operation is managed by government or a third party. A government needs to ensure that access to any data by personnel involved in the operation and management of the system is necessary for the functions of supporting and operating the system and not for individual benefit. Some of the key risks to be considered include the following:

(i) **Data aggregation.** The aggregation of data from individual transactions can provide more data and affect national security.
(ii) **Data privacy.** The system may collect private information on individuals or corporations, which needs to be protected.
(iii) **Confidentiality.** Commercially sensitive information will be collected during a bid process, which could be sold. Access must be limited to only those users authorized to access it following the bid opening time.
(iv) **Commercial gain.** Pricing, product, volumes, and customer data may be sold elsewhere for commercial gain.
(v) **Data integrity.** The government must ensure that data cannot be changed or altered in the system and therefore become subject to commercial fraud.
(vi) **Data access and separation of duties.** Access and data rights in the system must be strictly controlled and no user (including technical support staff) should be able to perform all of the steps to set up a supplier and authorize a payment.
(vii) **Fraudulent suppliers.** Bogus and fake suppliers in a system can be an issue when supporting a bid process and managing payments. The registration process needs to have proper verification and validation processes to ensure the accuracy and validity of the suppliers registered in the system.

3.4.6   Special Requirements

When implementing e-GP, it is important to consider special requirements—multiple languages, many small suppliers, direct links to a manufacturing facility's ERP system—that may be costly if they are not part of the functionality of the core software modules and may need to be built into the system at a later time.

3.4.7   The Implementation History of the Provider

Governments need to consider the capabilities of the provider of the e-GP software platform they select. Does their size and market presence assure good support and service? Are they well established and financially stable? Have they had a history of success with similar government—or comparable private sector—implementations? These are the types of questions that experienced purchasing officers ask as second nature as part of any large tender, and are just as applicable to the purchase of a strategic electronic public procurement framework.

4

Change Management and Capacity Development

In many jurisdictions, the introduction of e-GP will represent a significant change from current manual practices used by procuring entities and suppliers. Target users will require an understanding of the new processes and how to access the system and the electronic tools they will be using.

For procuring entities and their suppliers, capacity building is not just related to use of the system. The focus should be directed more toward the procurement process in general and how the e-GP system is applied as part of this process. Procuring agencies need to be fully versed on the guidelines and laws relating to procurement so that they can prepare the tender documents and notices that will be published and distributed in the system. Suppliers will also require training on the procurement process and rules so they can ensure a bid follows the proper procedures during a procurement process.

The approach for capacity building will require a communication, training, and support program that includes training guides and a help function. Training should be coordinated with registration to ensure that all participants are prepared to participate in the system. Training and support will be a long-term operation and governments will need to determine the most effective way to support their capacity building programs.

Governments also need to ensure the procuring entities know how to use the new system and that they will follow the rules of the system, publishing all necessary information. The supplier community will use the system if all the information is available and the government ensures full compliance.

Capacity building and implementation issues need to be considered as part of the overall investment cost regardless of who owns or operates the resulting e-GP system—especially in environments where there may be a large disparity between the technical skill sets of the target users and the infrastructure used to connect users to the system.

4.1   Operational Requirements

The e-GP system provides a critical support role to the procurement process on behalf of government. To ensure the success of the process, the operator of the system—be it the government itself or a service provider—has the responsibility to ensure an uninterrupted service is delivered to support the needs of all users. The operator needs to ensure the system has sufficient capacity to support projected user loads and storage requirements. Users of the system do not want to be subject to system interruptions, downtime, slow response, or complicated procedures when using the e-GP system. Though the success of an e-GP system will primarily depend upon a sound business plan and practices, and the content published by the government, poor service delivery will lead to failures and diminish uptake of the system.
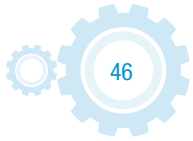
For a national system with multiple participating agencies and a large supplier base, an e-GP system will require significant resources and bandwidth to support the user load. Many large implementations are handling over 100,000 transactions on a daily basis and supporting thousands of concurrent users. The implementation of full e-GP will usually be more than just a simple web service. The system will require ongoing monitoring and planning to ensure it continues to service the needs of the users. The technical requirements and skills associated with the operational management and support of a large system implementation are often beyond the capabilities of the agency responsible for the business management of the procurement process.

The infrastructure for the system should provide built-in redundancy with defined and tested backup recovery plans and disaster recovery plans to minimize service interruptions. The infrastructure and application should also have sound security and security management processes to ensure overall system integrity.

Protection from outside penetration or denial of service attacks is critical to the overall integrity of the system and its supporting infrastructure and operations. An e-GP is a critical system and governments should not rely solely on internal test procedures conducted by system operators.

Governments need to regularly monitor the e-GP system and its supporting infrastructure through regular operational, security, and load tests managed by separate third-party service providers to ensure the system configuration continues to meet system expectations. These tests should be part of the standard operational procedures and performed at least once each year, including testing the system backup and recovery procedures as well as the disaster recovery plan.

4.2   Outsourcing e-Procurement Functionality—Independent Software Providers

It only takes a brief description of an e-GP framework's functionality to begin to appreciate the power and efficiency of an e-GP system, and the importance of matching software selection with the agency's buying needs. But it is also worth noting that interoperability among modules means that a government agency is not limited to buying generic "one-size-fits-all" e-procurement software. Different public sector agencies and departments have different procurement patterns and requirements, and over the past decade a wide variety of specialty e-procurement software has become available that is designed with the needs of specific public service groups in mind, such as local government, health authorities and hospitals, universities, school districts, correctional facilities, police and fire departments, and public utilities.

There are many examples of these specialized public service software offerings. In the UK, for example, Govpartner.com provides a core set of modules specifically for community development and parks and recreation.[18] SunGard's GovNow software provides an e-government portal specifically for municipalities.[19] Periscope has provided its customizable web-based e-procurement system to public sector clients in the US that range from local sanitation districts to some of the country's largest states and agencies.[20]

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[18]   www.GovPartner.com

[19]   www.sungard.com

[20]   www.periscopeholdings.com

So far, attention is focused on the implementation of an e-GP platform that is owned, managed, or outsourced by central government or a government agency or public sector group. There is also a growing private sector element to e-GP. After all, the private sector knows that around the world, and particularly in fast-growing developing economies, government will continue to be the largest buyer. With business-to-business e-procurement now almost universally applied in the private sector, many web-based facilitators have turned that private functionality toward public sector purchasing. This has meant that over the past few years many private websites and portals have emerged as independent facilitators between suppliers and government agencies—augmenting important e-GP functions once exclusively controlled by government itself. These private sector facilitators are helping to encourage supplier participation and to make electronic public procurement much more successful.

Electronic public procurement-related services provided by private enterprise include the following:

- In Hong Kong, China and the Asia and Pacific region, Go-Business has developed e-tendering.com,[21] which collects tender information from over 40 Hong Kong, China government departments and more than 200 government bureaus worldwide.
- In the UK, IDeA:marketplace is an independent e-commerce platform that allows more than 100 local authorities to pool their purchasing power for consolidated bids. Other sites like PublicTenders.net provide full-service assistance with government tendering, including search and sourcing capabilities on behalf of both suppliers and government buyers. Supply2.gov.uk is a government-backed portal that gives building services suppliers easy access to lower-value public sector contract opportunities, and PfH Marketplace is both an e-procurement portal and marketplace specifically designed to cater to the purchasing needs of the public sector social housing market.
- In the US, third-party providers such as BidRadar and sell2gov will search various government websites on behalf of suppliers in order to find competitive bidding opportunities,[22] matching their client's unique product or service profile against a government buyer's pricing history so that the supplier can provide a competitive approach and bid price. FindRFP is a government bid and government contract finder and notification service that provides unlimited online search services to suppliers for government contracts, bids and auctions.[23] BidLink in the UK and BidManagement Services in Ireland boast of maintaining government vendor requirements databases that are updated several times each hour.[24] Other groups will guide a supplier through all phases of e-government tendering, helping the client assemble the necessary documents, assisting with contract negotiations, and providing an e-catalog to which client suppliers can upload their product or service listings for submission on government contracts. There are even third-party service providers like Uscontract Registration that,[25] for a fee, will help suppliers to fill out the paperwork and ensure proper electronic public procurement registration.

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[21] www.e-tendering.com

[22] www.governmentbids.com; www.sell2gov.com

[23] www.findrfp.com

[24] www.bidlink.net; www.bidmanagement.ie

[25] www.uscontractorregistration.com
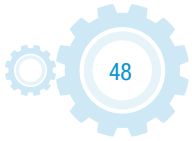
- @UK PLC has a vision of directly linking the financial systems of bodies such as local authorities, hospitals, schools, and large corporations to their suppliers in the UK.[26] The network involves thousands of suppliers of every size, from huge multinationals to sole proprietors—boasting that even the smallest suppliers can both accept electronic orders and raise electronic invoices for all of their customers.
- Application Link provides a fully integrated e-procurement solution, linking qualified suppliers with government agencies in a virtual marketplace.[27] By integrating inventory and purchasing systems governments can accurately track and anticipate needs, and potential vendors can access information about purchasing policies, regulations, and requirements online. There is even a growing private market for supplying e-reverse auctions for government tenders. FedBid is an online reverse auction site,[28] and EASi will work with public sector buyers on city procurement bids to help develop their tender documents and source suppliers for reverse auctions.[29] They will provide e-reverse auction training for all participants and even host the auction on their own internet site.

There are many more examples around the world. From a government or agency point of view, the emergence of these private sector sites means that the government doesn't always need to build or buy all e-GP functionality. In many cases, suppliers can simply use these private sites to search and bid on advertised government tenders or bid on government-sponsored e-reverse auctions. And these independent facilitators are not limited to simply bringing private sector suppliers to the government. Increasingly, government buyers are taking advantage of these independent third-party sites just the same as any other private sector buyer—using third-party software services to access a supplier's e-catalogs through the internet, or taking advantage of vendor registration or certification services.

4.3   International Cloud-Based e-Procurement of the Future

The ultimate prize, of course, for both government buyers and private sector suppliers, is "straight-through e-GP" with all phases of the procedure from notification to payment being conducted on an automated, electronic basis. Until now, the complexity and cost of this level of integration has evaded all but rich government agencies and large suppliers. But all of that may change with the onset of cloud computing and the move toward international and virtually unbounded e-procurement.

The Government of Canada has created a new department called Shared Services, intended to save Can$100 million to Can$200 million per year through consolidation-driven efficiencies in the future, using cloud computing to consolidate the e-procurement needs of disparate Canadian agencies and provincial governments. The best example so far of the move toward cloud computing can be seen in the ground-breaking platforms now emerging in Europe under a pan-European e-procurement project known as Pan-

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[26]   www.uk-plc.net

[27]   www.applicationlink.com

[28]   www.fedbid.com

[29]   www.eauctionservices.com

European Public Procurement Online (PEPPOL).[30] Sponsored by public sector organizations from several EU countries and co-funded by the European Commission, the project is powered by software from the Swedish cloud process company eBuilder and the French e-government software company ATEXO.[31] Its goal is to provide a standards-based IT framework that will allow suppliers and public sector vendors to connect their own IT systems seamlessly together in secure and comprehensive interchange for all types of public electronic purchasing. Providing all of the key components of an e-GP platform (from notification through tendering, e-catalogs, receipt, and payment), PEPPOL will transform public procurement by providing SMEs throughout Europe (and in Norway) with a complete cross-border solution for selling to public sector buyers.

However, there is substantial risk involved in promoting cloud computing for all situations and jurisdictions. Any technical solution must be evaluated in the context of country background, stakeholder analysis, and change management.

4.4   Country Experiences

Throughout the past 2 decades, a significant number of countries and government organizations have implemented various e-GP solutions using different models and approaches. Their experiences will help other countries and organizations in planning their own approach for system implementation. Most countries have been clear in the definition of their e-GP service offering, which is to implement a service to support and govern the procurement process, but the actual procurement remains the responsibility of the procuring entity, and any awards granted through the system represent a contractual relationship between the vendor and the procuring entity—not the system. The primary function of the e-GP system is to serve as a gateway between government buyers and their vendor communities.

Different countries have taken different approaches to implementation and some have a far more integrated system than others when it comes to supporting the end-to-end procurement process. The approaches vary in accordance with the objectives, needs, and funding, as well as to the reforms the government wishes to address with the implementation of its system. Some governments have developed their systems in-house, some have relied on the services of a third party, and still others use the procurement platform offered by a service provider.

The countries and agencies with successful implementations have established proper business organizations to support their respective e-GP system operations. Most business organizations require an average of 30 to 40 staff to support the service operations including management, customer care, operations, and ongoing development. Most systems are set up to run as independent service offerings supporting a broad user group, either as a countrywide system as in Singapore or as a statewide system like that in the State of Karnataka. The broader the system implementation—either at a national or state level—the more effective it will be in establishing transparency, implementing procurement reform, leveraging costs, creating monitoring and reporting functions, and generating efficiencies.

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[30] www.peppol.eu

[31] www.e-builder.net; www.atexo.com
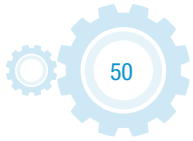
The true value a government receives from e-GP is in the size of its online marketplace and the level of competition generated by its user base. Building the user base doesn't happen overnight. It requires a lot of effort in the promotion, marketing, and delivery of an e-GP system and procurement reforms that encourage vendors to participate.

4.4.1   India

In India, there is no single e-GP system. Various national agencies and state governments have been undertaking their own e-GP initiatives using different approaches to meet their individual needs. National Railways and the Directorate General of Supplies & Disposals initiated their own e-GP programs, as did several states, before any national program or system was available. The independent implementations led to the development of a number of private sector e-GP application service providers who support the needs of the individual agencies. Because there are no national laws governing a standard system implementation, most of the implementations are governed by regulations at the local level related to financial controls.

Public–private partnership (PPP) has been a common approach for the implementation of e-GP systems in India. Some states and departments have established e-GP on their own using a system provided by a third party, while others have opted for a portal as part of an e-GP service operated by a third party. The PPP operations are typically funded through a transaction fee paid for participating in a bid. Where the government organization has established a governing law and directives supporting the implementation of e-GP and an organization to oversee and manage the e-GP system, such as in Andhra Pradesh and in Karnataka, the systems have established a strong user base over time and can generate sufficient transactions to support their operational costs. Where the agency or state has not established the same management commitment, the service provider has not realized the same level of results.

The Government of India established an e-procurement law to recognize digital certificates as official signed documents. The issuance of digital certificates is controlled through six approved certification authorities responsible for authenticating users. Organizations wishing to participate in a government e-GP system must acquire a digital certificate from one of the certification authorities, which is valid for 1 to 2 years based on the fee applied. The certification authority operation is separate from the e-GP system. The e-GP uses the certificate as part of its authentication process during sign-on and to sign documents during the submission as a means of authenticating the source of the document. For most system implementations in India, the documents are normally encrypted using the digital certificate of the receiving party when the bid is submitted. The application controls access to bids in accordance with the defined bid closing and opening times.

4.4.2   Indonesia

Indonesia followed a different approach for the implementation of its national procurement reform program. Instead of a single, national e-GP implementation, Indonesia developed an e-tendering procurement application SPSE (Sistem Pengadaan Secara Elektronik) that is distributed freely to the different national and local agencies, leading to the creation of individual e-GP systems at the national, provincial, and local levels across the 13,000 islands in the country. Each local site is owned and operated by the local government supporting the system known as the local LPSE (Layanan Pengadaan Secara Elektronik). The local LPSE is responsible for the local operation, including the training and registration of the buying entities and

suppliers participating in the bids. The goal is to have up to 600 local installations serving all of the islands and jurisdictions, giving local access and support to buying groups and suppliers.

The national program is being implemented and managed by LKPP (the National Public Procurement Agency), which is responsible for the development and implementation of the national e-GP application and the laws and regulations governing the use of e-GP. LKPP is also responsible for the capacity building of all government agencies and conducts training, certifying all local LPSE operators before they can implement and support the local e-GP application. Indonesia opted for the local e-GP system implementation in order to get full buy-in from the local government organizations as they have ownership of and responsibility for the local operations. The local systems also serve as local access points and training centers for the supplier community, providing public workstations and direct access to the system. This approach allows Indonesia to avoid local telecommunication service quality issues and inconsistent internet service within various local environments.

Though each system operates as a standalone system, all of the individual LPSE systems are connected to a national e-GP portal so that advertisements of all tenders can be hosted in a central site and individual system activity can be monitored. The use of multiple sites creates particular operational management problems for LKPP as it needs to support and maintain its application in multiple environments. It also needs to establish a monitoring system to ensure all systems continue to operate in accordance with the national operational and security standards. However, the system was designed this way to suit the country's specific business objectives and to address concerns over the state of the current telecommunication infrastructure in the country.

4.4.3   The Republic of Korea

The Republic of Korea has established a full end-to-end procurement system, KONEPS, a single e-GP system that is connected to more than 100 government systems and supports all aspects of the procurement process. As part of its overall program, the Government of the Republic of Korea initiated 11 e-GP projects to enhance national competitiveness utilizing IT. The e-GP systems aim to achieve efficiency and transparency, to save costs in administration and transactions, and to provide an optimal business environment for the private sector.

KONEPS processes the entire procurement procedure through four major subsystems: e-bidding, e-contracting, e-payment, and an online shopping mall. The focus was to shift the paradigm from conventional manual processes and the inefficiency inherent those processes to a fully integrated, open, and transparent electronic system environment. The government set out a complete implementation plan that focused not only on the e-GP system but also on the laws, guidelines, and business practices supporting the process, including establishing the lead agency responsible for the management and ongoing operation of the system. The system was implemented over multiple years and was a full business process reengineering program (BPR), with the government ensuring that proper support and planning was provided to all stakeholders.

The economic benefits reported by the Republic of Korea indicate savings in the range of billions of dollars due to time saved, costs saved, and more competitive procurement from a supplier marketplace of over 190,000 suppliers and 41,000 government agencies.
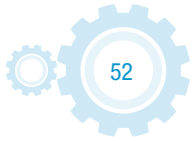
4.4.4   The Philippines

The Philippines followed a government-owned business operation. PhilGEPS is supported by a third-party service provider responsible for the initial delivery, implementation, and ongoing operation of the system including hardware, software, infrastructure, network, bandwidth, security for the production system, and a mirror site as part of the disaster recovery plan. The service provider is also responsible for any ongoing development to support the implementation of new features such as bid submission that need to be customized to the government rules and regulations. Meanwhile, the government retains ownership and control of the business operation and management of the service. The third-party service remains in the background as a contractor to the government while all business relationships associated with procurement are between the government and the supplier community, including registration on the PhilGEPS system.

The Government of the Philippines pays the service provider a flat monthly fee for the services provided, using a 99.9% uptime service-level agreement (SLA) to ensure a system response time of 5 seconds per page displayed regardless of the user load. Failure to meet the service delivery requirements results in penalties against the monthly fee. Monthly fees were paid only after the service went into production. All costs associated with the delays in the initial system implementation were borne by the service provider. The Philippines opted for a monthly fee-for-service arrangement versus a transaction fee arrangement because it had no way to effectively predict what the transactions may be and how the system would be used prior to implementation. The Philippines wanted to launch the system at no cost to users to help build a marketplace for the procurement information. PhilGEPS now supports over 11,000 agencies and more than 50,000 suppliers and has sufficient data to map out an alternate business case to support the funding of the system in the long term.

5 Readiness Assessment

How can a government entity determine whether or not it is ready to embark on e-GP?[32] A detailed readiness assessment is a good starting point as it will identify gaps in existing processes that need to be addressed and will also provide a good indication as to which e-GP implementation model is best suited to a particular country's circumstances.

Readiness is defined as the ability of an entity to deliver and operate a specific feature in order to deliver an expected value. A readiness assessment should focus on evaluating the current readiness of an entity, not its future readiness.

Using the values entered during a readiness assessment (Table 2), the model will calculate a capability gap, which must be closed in order to achieve the expected benefits of an e-GP system. In most cases this will mean additional steps within the project execution plan.

Readiness is assessed in the following categories:

(i) **Technical.** This encompasses the current technical ability to develop, deliver, and operate the feature. Factors such as available skills, resources, technical infrastructure, and legacy applications should be considered.
(ii) **Regulatory and legal.** This covers the entire legal framework, from laws and regulations to contracts and licenses.
(iii) **Organizational.** This takes in the current readiness of the extended organization to support the operation of the particular feature. Standard operating procedures, change management, training, culture, and prior experience should be considered.
(iv) **Market.** This covers the readiness of any impacted third parties to integrate with or use the indicated feature. Technical, legal, and organizational readiness to fully utilize the feature as well as demand and preferences should be considered.

Under each category, the assessment will focus on

(i) **Current readiness.** This expresses, on a scale of 1 to 10, the state of readiness at the current time, not the expected future state.
(ii) **Required readiness.** Not every feature requires an assessed department to be the absolute world leaders in a particular area. In most cases, moderate levels of skills and capabilities are all that is necessary to be successful. This value indicates on a scale from 1 to 10 the level

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[32] This chapter is drawn from Mutkoski (2011).

Table 2　Readiness Assessment Values

Readiness Value	Meaning
0	Not relevant—to be ignored.
1	Experimental or evaluation level experience. No real competency.
3	Some pilot implementations.
5	Successful operations. Mix of internal and external resources used as required.
7	Core capability. External resources used for additional peak capacity or specialist requirements.
9	Identified failure cause with no risk management activities in place. Will fail if no action is taken.
10	Self sufficient, world leader or authority. At this level you write books, deliver lectures, and set global standards.

necessary for the feature to provide the expected benefits. The difference between these two values (current and required) is known as the gap. Large gaps increase risks to the success of the project. In order to be successfully managed, additional costs should be added to the project to ensure that the gap is closed. It is recommended that the following items be added to any project implementation:

(i) **High gap.** A line item should be added to address the root cause of the gap before the project is executed. During the execution phases there will be fewer opportunities to correct the causes of the gap.

(ii) **Moderate gap.** A line item to monitor the performance of the indicated component and take corrective action is required.

(iii) **Small gap.** Periodic reevaluation is required to ensure that no change to readiness has occurred.

5.1　Risk Assessment

The risk assessment model helps to create a high-level weighted risk and impact analysis,[33] calculated from the assessment of two components:

(i) **Risk.** This takes in the probability of an event occurring that will prevent the complete implementation of a feature. This is given as a value from 1 to 10, where 10 represents 100% certainty that the feature's implementation will be impacted.

(ii) **Impact.** This covers the impact of such an event on the ability to deliver or operate the feature to the level required to provide the expected value. This is also measured on a scale of 1 to 10, where 10 means "complete failure to deliver—no benefits achieved."

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[33] See Mutkoski (2011).

Table 3   Risk Values

Risk Value	Meaning
0	No possible way for this component to fail.
1	Failure would be a rare event through an unlikely series of circumstances.
3	Failure is rare; management of the risk is an option, though insurance would probably be more cost-effective.
5	Even chance of failure given the current state of risk management. Can be managed.
7	Failure highly likely, or risk is unable to be managed at a reasonable cost.
9	Identified failure cause with no risk management activities in place. Will fail if no action is taken.
10	100% probability of failure.

Risk is assessed in the same categories as readiness, namely technical, regulatory and legal, organizational, and market (Table 3).

5.1.1   Risk Assessment Methodology

The method used for the risk assessment focuses on identifying components that have a high potential for catastrophic failure. It does this by rating each feature with a single number calculated as follows:

$Risk_w = Risk \times Impact^2$

Using this formula, the maximum assessed weighted risk is therefore 1000. The squaring of the impact variable means that high-impact events are separated out from more common operational events (Table 4).

Table 4   Impact Values

Risk Value	Meaning
0	No impact at all. This means that the component is irrelevant to the risk analysis.
1	Cosmetic failure or a failure with automated recovery. Business-as-usual scenario.
3	An operational failure with multiple impacts but with identified recovery scenarios and minimal economic impact.
5	There will be moderate or sustained loss of service. Backups are probably in place though they incur additional costs.
7	A highly expensive failure. Multiple components impacted, extremely visible and very expensive to recover from.
9	The most expensive failure to be recovered from. Recovery is often politically motivated rather than based on economics.
10	Total loss of delivered function and wide impact to the entire system with no documented recovery scenario. If it happens, then game over.

5.2   Strategic and Architectural Alignments

These two indicators attempt to capture the conformance of the feature with the desired future state of the organization.[34] Future state is defined within this model in terms of architecture and strategic goals.

Architectural alignment refers to the level of conformance of the indicated feature with both the business architecture and the technical architecture (Table 5). It is possible for a valuable tactical project to have little alignment with the desired state and still be an important intermediate step; this indicator would then serve to identify those elements which at some stage need to be standardized to conform to the defined architecture.

Table 5   Architectural Alignment Values

Architectural Alignment Value	Meaning
0	Legacy approach or a very temporary solution with no reuse and no alignment to either business or technical architectures.
1	Makes use of few architected components, largely legacy in both business and technical terms. The very beginning of the journey.
3	An initial transition state in which the business process is being transformed to meet the requirements of the business architecture. Technical requirements are being developed but not yet implemented.
5	A combination of architected components and un-architected components. Alternatively, conformance with business architecture but utilizing legacy infrastructure.
7	A progressive transition state between "as-is" architecture and desired state. This is expected to be a transitional state.
9	A cost-effective level of alignment. There may be a few legacy components, though they are trivial and mainly for backwards compatibility. This is often a final state as it is economically appropriate to spend funds on other areas rather than trying to make this one perfect.
10	Fully documented component that provides maximum reuse by providing complete conformance with standards and business and technical architectures.

Strategic alignment refers to the level that the indicated feature enhances or contributes to the meeting of defined strategic goals.

Table 6 shows the standard meanings for each of the strategic alignment values.

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[34] See Mutkoski (2011).
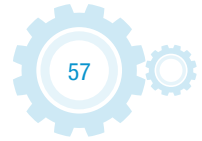
Table 6   Strategic Alignment Values

Strategic Alignment Value	Meaning
0	Not applicable.
1	No strategic alignment. 100% tactical to cover an immediate requirement.
3	Provides alignment to a single strategic requirement.
5	Aligns to multiple strategic requirements though is not core to their implementation.
7	Aligns to multiple strategic requirements and is a core element in implementing at least one strategy.
9	Aligns to multiple strategic requirements and is a core element in delivering multiple strategies.
10	Core strategic feature. Aligns to all core strategic requirements

5.3   Costs and Values

The aim of this exercise is not to perform a detailed cost–benefit breakdown as the model does not include detailed internal rate of return or net present value modeling.[35] The intention is to arrive at an approximation of the cost–benefit ratio used to indicate whether the project meets the requirements for more formal evaluation. There are two techniques that may be used to populate values within the cost and value sections of the worksheet. What is important is that the same technique is used for all of the initiatives within the assessment:

- The first technique is the relative value method, also known as the "monopoly money" approach. In this case, each value is simply chosen within the range of $0 to $100. The aim is to identify the relative value expected from each feature.
- The second technique is the more traditional approach and is used when the actual monetary values are known. After the initial phases of a project, these values are more likely to be known and can be entered directly.

5.4   Interpretation

5.4.1   Using the Comparison Chart

Most decisions in the real world are based upon a number of different factors, not simply upon a straight ratio such as the cost–benefit ratio. This model normalizes and allows comparison between initiatives using the following dimensions:

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[35] See Mutkoski (2011).

Figure 3   Assessment Comparative Chart

Project Comparisons

Note: Bigger values are better.

Council of State   Central Procurement   Vendor Registration   Automated Scoring   Audit
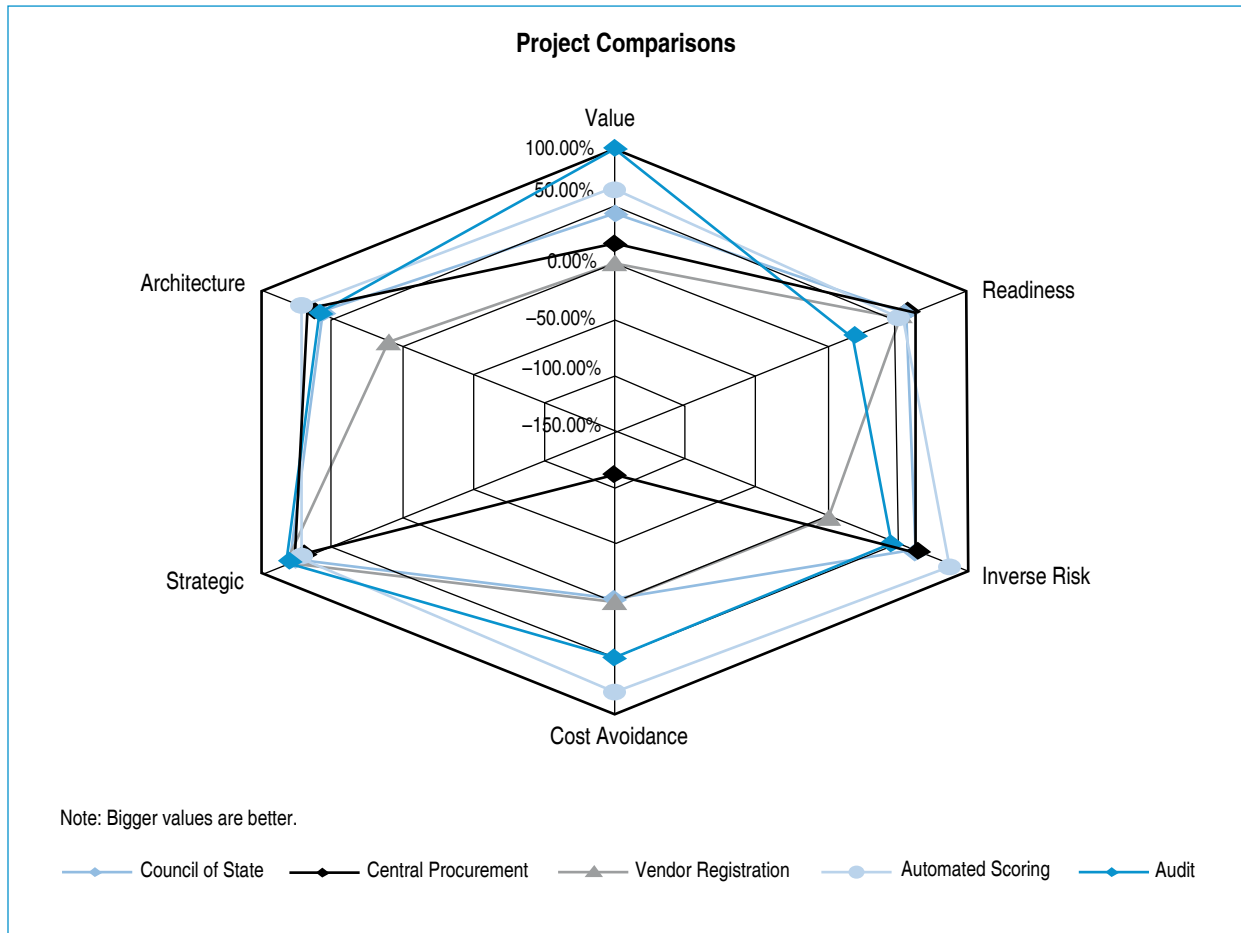
- cost,
- value,
- readiness,
- risk,
- strategic alignment, and
- architectural alignment.

These are then converted into normalized measurements to allow for rapid comparison. The result is a radar chart that allows comparison of all projects across all dimensions in a simple visual manner (Figure 3). To use this comparison chart effectively, users should be aware that higher values are better. To achieve this consistency the model shows costs as "cost avoidance" and shows risk as "inverse risk."

5.4.2   Responses to Exceptions

Where the comparison chart shows that unacceptable conditions exist, for example a negative return on investment or a failure to meet strategic objectives, there are two possible responses:

- **Attempt to analyze and correct the root cause.** The detailed analysis pages will indicate areas that need corrective action. Once these actions have been taken, the initiative should be reevaluated to determine whether it meets the required parameters. This step can be performed iteratively to improve the planned initiative.
- **Drop the initiative.** If a reasonable attempt to correct root causes is undertaken and the initiative still cannot pass the acceptable threshold, then the initiative is either incorrectly defined, being planned in the wrong sequence or is simply a bad idea. It should then be either dropped or postponed.

5.4.3   Using the Standardized Indicator

Some organizations require a single metric against which each project or agency can be ranked in order, from most attractive to least attractive. This is where a metric known as the standardized indicator can be applied, which is a weighted value obtained by multiplying each of the six dimensions against an organizationally defined weighting (Table 7).

Table 7   Examples of the Standardized Indicator

Initiative	Maximum Score	Weighted Score	Summary
EOI electronic publishing	85	30.00	35.29%
Vendor registration	85	79.00	92.94%
Procurement oversight	85	30.00	35.29%
Public sector reform	85	131.75	155.00%

EOI = expression of interest.

If the weighting values are well thought out and agreed upon, this can be quite effective, particularly when there are several potential candidates to be evaluated. However, reliance on this figure should not be in isolation; the preferred evaluation methodology still revolves around the comparison chart.

5.4.4   Detailed Analysis

Each of the analysis areas is represented as a color-coded traffic light display (Table 8). Key values are represented in green, meaning a nominal value; amber is used for a potential issue; and red indicates items that might lead to problems during execution, and need detailed planning or analysis.

Table 8   Traffic Light Display

Delivers	Value	Readiness						
		Technical			Regulatory & Legal	Organizational	Market	
	Summary	Current	Required	Gap	Gap	Gap	Gap	Consolidated
Procurement Code of Ethics	$0	0	0	0%	67%	67%	67%	67%
Cross Agency Working Group Establishment	$0	2	5	60%	29%	29%	29%	35%
Changes to Public Service Act	$0	5	7	29%	50%	50%	50%	42%
Donor Agency Liaison	$0	3	7	57%	60%	60%	60%	59%
Establishment of Government Audit Office	$0	2	7	71%	20%	20%	20%	36%
Statement of Strategic Intent	$6	4	10	60%	0%	0%	0%	60%
Totals	$6	16	36	44%	56%	56%	56%	53%

Source: S. Mutkoski. 2011. *eProcurement: Current State Analysis.* http://www.scribd.com/fullscreen/77224106?access_key=key-1hqr2mqjgfwt8642w8rm

In order to improve the chances of success for a specific imitative, the focus should be on identifying areas that are colored red and trying to identify corrective actions that can change those values. This is done in the planning and review stages to ensure that attention is given to the most critical areas.

The thresholds for the traffic light displays may be customized in the parameters worksheet, or by using the Options menu item in the Readiness Menu.

Depending on the results of its readiness and risk assessments, strategic and architectural alignments, and costs analysis, a government can decide on the optimal choice of business model, software, and staging for its e-GP implementation.

6 Implementation in Government

The road to a successful e-GP implementation is not only through the implementation of an IT system, but also through a procurement reform program that addresses the overall government objectives of transparency, governance, efficiency, and business development. e-GP is one part of an overall procurement operation and should take into consideration the legislative framework, rules and regulation, policies, and oversight that will govern its operation as a business service.

The e-GP system can be the central component for a procurement reform strategy and should support the interactions between governments and suppliers. A well-implemented system helps to bring together various supporting government operations, from financial management and payment processing to contract management and monitoring functions, all through one central portal. A cohesive e-GP strategy can provide a level of openness and transparency that cannot be realized through existing dispersed system operations. As illustrated in Figure 4, the reform strategy for an e-GP implementation should focus not only on the system but also on the supporting components, including

(i) institutional leadership and capacity,
(ii) governance,

Figure 4   e-Government Procurement Reform Strategy
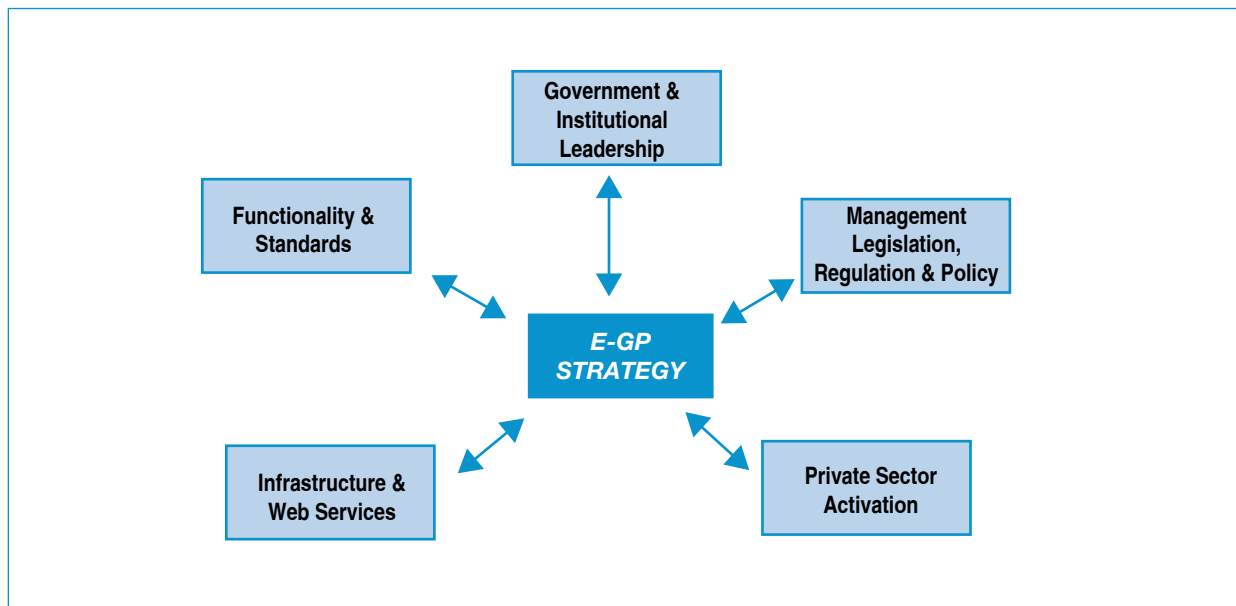
E-GP = e-government procurement.
Source: Multilateral development banks (MDBs). 2004. *Strategic Electronic Government Procurement—Strategic Overview: An Introduction for Executives.*
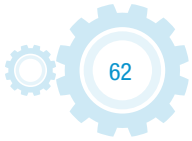
(iii) technical infrastructure and web services,

(iv) business and system functionality and standards, and

(v) private sector integration.

The Multilateral Development Bank (MDB) institutions have supported government organizations by developing and implementing e-GP strategies as well as the procurement reforms that underlie those strategies and programs. They recognize the significant benefits that e-GP can have for transparency and good governance. As part of their support, MDB organizations have developed e-GP planning guides—including a road map and a readiness assessment guide—to help develop a plan for e-GP implementations and to conduct assessments that enable government institutions to understand the capabilities and target areas that need to be addressed in an overall procurement reform plan.

Institutions or organizations have individual objectives and are likely to be at different levels of readiness. They may also be governed under different forms of legislation that may, in turn, affect the approach they take.

Box 4   Leadership

An e-government procurement (e-GP) system implementation introduces a significant change management issue as it moves procuring organizations from current manual processes and direct interaction with suppliers to new electronic processes that minimize the need for direct interaction.

As stated previously, political leadership and sponsorship is a decisive factor (often *the* decisive factor) when launching and sustaining e-GP within an organization or across a government. In fact, successful e-GP system implementation has more to do with the leadership and organizational structure supporting the system than with the system itself. Establishing a sound organizational structure and leadership with the ability and authority to develop and implement the necessary governing rules, laws, and policies to support an e-GP system is critical to its success.

A government needs to assign a lead agency with the mandate and responsibility to institute a procurement reform strategy. The e-GP system is only one part of the reform strategy; the strategy should also address capacity building with organizations, monitoring, and overall management of the program.

The implementation of e-GP requires strong institutional leadership from a senior government official who will drive the change management process, facilitate the development of supporting e-GP legislation and regulations to mandate the use of the system, and provide management oversight for a designated project management unit (PMU) responsible for the implementation and operation of the system.

The system should be supported by legislation to enforce use of the system, but the functional details of the system should be directed by policies and directives instituted and managed by the lead agency and PMU.

The e-GP system is independent of the individual procurement processes, which are conducted and managed by the individual buying authorities. It is only there to support the procurement process; responsibility for procurement resides with the procuring organization. e-GP is a critical business service supporting procurement for multiple stakeholders, and requires a highly reliable service operation. The PMU needs to ensure that system and security risk management are an integral part of system operation to ensure its integrity and security.

The true benefits of e-GP will only be realized through its full use and adoption by both buying entities and suppliers. If the system is fully operational and boasts a complete set of features and functions, but only has one supplier participating in a bid, it cannot be considered very successful.

The MDB road map and readiness assessment guide help an institution to identify the approach and business model that will best support its e-GP system, not just during the initial implementation but through its long-term operation over the next 15 to 20 years. An e-GP system can help to establish a foundation for change that will evolve over time as the objectives and policies of the institution and the needs of the users continue to evolve.

Regardless of the approach chosen for the actual e-GP solution, the key to success rests with the business principles associated with its management and governance, including the guiding regulations and legal framework that support the system and the institutional leadership that guides its system implementation and supports its long-term operation.

6.1   Developing an e-Government Procurement Reform Strategy

It should be clear that the mere introduction of technology within the traditional procurement environment alone cannot bring about the potential benefits that electronic procurement solutions provide.

The objectives of an e-GP implementation form the basis for procurement reform that is balanced and fair, and promotes development. Most objectives are mutually compatible and can be pursued simultaneously for much the same cost as aiming for one level alone. The issues are primarily about design, standards, management, and governing policies as opposed to resources. The procurement reform strategy should also take into consideration the need for capacity building and professionalization of the procurement professionals within the institutions. This ensures that the human resources involved will have the appropriate skills and knowledge required to properly conduct and manage the new electronic processes.

The implementation of e-GP represents a significant change management exercise for an institution. When a system is applied across organizations or throughout a jurisdiction, the implementation becomes more complex and challenging, particularly when trying to transform from a process featuring multiple influences and accountabilities to a more uniform process. To ensure a successful implementation, the e-GP project requires strong political and management leadership and support throughout its full business life cycle, not just during initial implementation. This ongoing support ensures compliance as well as the overall success of the system.

To encourage full support for the implementation of e-GP, governments should be fully transparent with regards to their approach. All of the objectives for the system and reform strategy should be clearly defined and made publicly available to all interested parties as part of an online e-GP portal. The portal should clearly outline the program and implementation schedule, including the compliance goals and the mandated adoption of the system by organizations.

The basic framework of the e-GP system targets the main components of government procurement: e-tendering, e-purchasing, and contract management. The approach and timing for each component is dependent on the abilities and resources of the implementing agency and on the support available in the form of governance, legislation, and finances allocated to the reform program.

Figure 5   e-Government Procurement Road Map: Phases and Stages

Road map: Phases and Stages

Stage	No.	Phase
Customized services and supply incentives	6	e-GP Purchasing
Online purchasing and e-transactions	5	
Structure of demand on the internet	4	
Structure of supply on the internet	3	
Supplier enablement	2	
Procurement policies	1	
Contract capacity consolidation	2	e-GP Contract Management
Contract execution management	1	
Electronic bid submission	4	e-GP Tendering
Bidding documents on the internet	3	
Customized search facility	2	
Tendering opps. and awarded contracts on internet	1	
Connectivity plan and internet assessment	3	Preparation
General assessment and strategic plan	2	
Establish institutional framework	1	

e-GP = e-government procurement.

Though the nature of public procurement is intended for more complex purchasing needs, using different processes such as single or two-envelope submission or different options for evaluation, the electronic implementation of public tendering can be a fairly straightforward process. Most countries using an e-GP system today started with a basic implementation of e-tendering that focused on the publication of bid notices and distribution of bid documents and supplier registration. In many instances, the initial system started within an agency website as a method of announcing tenders and distributing documents. Such e-tendering implementations helped establish the value of the e-GP system and the development of a central e-GP portal for government procurement. Over time, those portals were recognized as the go-to source of procurement information and established the foundation for an overall e-GP system that would eventually serve as the central component for reform.

Once a base system is implemented and a marketplace of buyers and suppliers is developing, the implementation team can continue to implement new features and functions to support the various tasks associated with tendering, purchasing, and contract management.

The system implementation road map (Figure 5) identifies the need for an e-GP implementation plan that evolves over time.[36] The plan should incorporate the basic functionalities to be achieved by the different system components and then illustrate how those components will be integrated into the new procurement process. It should also include steps to promote adoption across the participating institutions and supplier communities.

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[36] See MDBs (2004). The original document is available on the MDB e-GP website at http://www.mdbegp.org/

6.2   Leadership and Institutional Structures

Political leadership and sponsorship are decisive factors (often *the* decisive factors) when launching and sustaining e-GP within an organization or across a government. In fact, successful e-GP system implementation has more to do with the leadership and organizational structure supporting the system than with the system itself. Establishing a sound organizational structure and leadership with the ability and authority to develop and implement the necessary governing rules, laws, and policies to support an e-GP system is critical to its success.

A lead agency or sponsor should have the necessary oversight and management to ensure that it can define and properly address the overall objectives of the government in an efficient and realistic manner. Within many jurisdictions, the lead agency operates in conjunction with a steering committee that includes representation from key stakeholders and reports either directly to the head of government or to the head of a key ministry such as finance or budgets. The head of the lead agency should be a senior official who can promote and push the project forward and has the ability to secure the necessary legislative and financial support for the project implementation and its ongoing operation.

The primary function of the lead agency is to set the policy and rules guiding the implementation of the procurement reform strategy and which will be supported by the e-GP system. It is also responsible for capacity building within the government to support the implementation of the strategy, including training and certification of all personnel on the new procedures and practices of the new strategy.

The lead agency has oversight responsibility for the development and implementation of the e-GP solution while the solution itself is delivered through a dedicated project management unit (PMU) that may be internal or external to the lead agency. The type of solution or system to be implemented is dependent upon the business approach the government or lead agency opts to pursue, based on its own capabilities and resources. The system may be developed and managed entirely by the government, or all or parts of the system may be serviced by third-party providers.

The main role of the lead agency is to oversee the system implementation and operations to ensure the service and system being provided is reflective of the government objectives. It ensures that the PMU has the necessary support and resources required for successful service delivery of the e-GP system, particularly when the system is being delivered and/or managed by another government entity.

The lead agency and PMU should have no direct involvement in the actual procurement being conducted by the buying groups, other than to service their own operational needs. Their role should be related to the policy development and oversight of the system implementation and the monitoring of the system to ensure compliance by the buying groups. The implementing agency, meanwhile, should be involved in the long-term planning of the system. This ensures that both the guiding policies and regulations continue to evolve along with the actual e-GP system in accordance with changes in overall government objectives and new technology options.
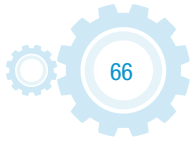
6.3   The Project Management Unit

The lead agency will need to identify or establish the PMU responsible for the actual development, delivery, and operation of the e-GP system. The responsibilities of the PMU include defining the project scope and deliverables, and creating an implementation plan with realistic milestones. The PMU will identify, assess, and manage key project risks, which may either be internal to the project or external to it—such as the approval or specification of governing policies.

Together, the PMU and lead agency will establish the appropriate support organization for e-GP, which typically includes a dedicated project manager, implementation team, and support teams, as required. The PMU needs to ensure that the allocated resources have the necessary skills to support the project and, as necessary, will develop a plan to ensure the personnel receive the required skills training and knowledge development.

An initial project implementation plan established by a PMU should cover the following activities:

  (i)   project initiation and startup;
 (ii)   functional and technical specifications;
 (iii)   planned integration with existing systems (such as ERP and finance);
 (iv)   implementation schedule;
  (v)   operation and management procedures;
 (vi)   change management procedures;
 (vii)   testing (development, user acceptance, and security);
 (viii)   training program;
 (ix)   pilot agencies and setup;
  (x)   pilot suppliers and setup;
 (xi)   communication plan;
 (xii)   adoption for all agencies and suppliers; and
 (xiii)   user support operations.

For many government organizations, the development of electronic initiatives is new and the experience and skills required for this type of program are not readily available, simply because the agency has not undertaken such activities before. The learning curve will be challenging and external support is required to give the institution the support it needs. The lack of internal capacity within the government may lead to delays or may result in systems that do not meet the objectives.

The implementation plan should outline all of the activities associated with the delivery and ongoing operation of the system, including

  (i)   infrastructure supporting the system (hardware, software, and network);
 (ii)   backup and recovery procedures;
 (iii)   service delivery levels (average response times and system uptime);
 (iv)   disaster recovery plan (backup site and time to switch over);
  (v)   error reporting;

   (vi)   management procedures for system failures;
  (vii)   system monitoring and activity reporting; and
 (viii)   testing.

If a third-party service provider is being used to deliver the system or parts of the system, the PMU needs to work closely with that organization to develop the implementation plan and deliverables.

6.3.1 A Reengineering Opportunity

Adoption of an e-GP system also provides an opportunity for business process reengineering (BPR) in order to maximize the initiative's benefits. The PMU should continuously review existing procedures and collected information in order to identify areas for improvement within system workflow, to integrate and coordinate the program with other systems, and to improve the structure of documents or forms that will enhance the bidding process. (For a more complete description of implementing strategies to consider, refer to Section 5.6)

6.3.2 Change Management

Change management will be a major function of the PMU, not just pertaining to initial implementation of e-GP, but also for its ongoing operation. Specific change management activity will be required to embed business change in the procurement processes. The PMU needs suppliers and buyers to adopt the system and to be engaged with its future development and enhancement. The PMU needs to develop a change management plan to

    (i)   identify the impact of the proposed business change activities and outcomes,
   (ii)   identify willingness to accept change and potential barriers,
  (iii)   identify change agents within the affected units,
  (iv)   develop a plan that outlines the transition from project delivery to business-as-usual operations, and
   (v)   develop a benefits realization and measurement plan.

6.3.3 Engaging Stakeholders

Key stakeholders need to be engaged in the change management process. The PMU should form different user groups among the buying and supplier organizations to gain their input in the planning and acceptance of the new features and functions of the e-GP system. Buy-in from key stakeholders facilitates the transition to the new system and processes. Their input and feedback also assist with the development of a communications and training strategy for deployment of the system and new features in the future.

Adoption of the system within the supplier community will be one of the key objectives of the PMU. The full benefit and value of the system implementation will be significantly diminished if the supplier community is not participating and competing on government tenders. The PMU needs to ensure the adoption of the system within the supplier community in order to ensure there are registered suppliers to compete in the
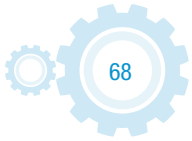
various tenders published on the system. The PMU needs to develop a communications strategy and work with the participating agencies to ensure their existing supplier communities are registered and trained on the new system. Ongoing efforts should be focused on continually expanding the system marketplace.

6.3.4   Retain Control of the Project

If third-party service providers are engaged for the delivery of the e-GP system, a government needs to recognize that procurement is not a function or responsibility of the third party. The actual procurement process is the responsibility of the government and the government must therefore take responsibility for the service being delivered. This means supporting the procurement process by ensuring the project is being managed and delivered to expectations through its own PMU and not simply leaving the overall delivery to the third-party service partner. The PMU defines the roles and responsibilities of both the government and the third party, ensuring each one has the capabilities it needs to support its role. Without the full support of a dedicated PMU ensuring the overall delivery of the system, the government will have difficulty realizing the full benefits of an e-GP system or achieving full participation by the target agencies.

6.3.5   Backup and Security Planning

Under system operation, the PMU should ensure all backup and recovery processes and disaster plans form part of a regular operation test plan, conducted once or twice each year to guarantee defined procedures will work when called upon. The PMU should also consider using external third-party security and load-testing services to validate established security policies and system configurations, confirming that they meet expectations and generally accepted best practices.

6.4   A Phased Approach and Piloting

As previously discussed, e-GP represents a significant change management exercise not only because it involves the introduction of new technology but also because it requires changes to supporting regulations, policies, laws, and infrastructure. All stakeholders, including the lead agency, the project management unit responsible for system implementation, and the buyers and suppliers who will be using the system, will be faced with a learning curve.

The main components that form a fully integrated e-GP system—e-tendering, e-purchasing, and e-contract management—are in turn supported by other functions such as e-payment; security solutions (such as PKI); and integration to other government systems including those for company registration, financial management, auditing, and monitoring. Attempting to implement all of the various components of an e-GP system is a major undertaking and can often be delayed by the time it takes to define all detailed requirements. Even when using an existing e-GP system that may already have the technical requirements defined, the challenges of adapting existing work processes to a new environment and integration with other government systems remain.

It is therefore recommended that an e-GP implementation should be managed using a phased approach, beginning with the development of a web portal to support the basic components of an e-tendering system.

Such components may include the publication of tender notices and bid documents; vendor registration; posting of awards; and eventually bid submission, bid opening, and evaluation, if not part of the initial implementation. Additional procurement information related to the reform strategy being implemented across government may also be included.

The initial implementation should set the foundation for an open, transparent, and competitive procurement environment that creates awareness among, and educates users within, both the buying and supplier communities. Governments adopting e-GP should not, however, expect all target users to be capable of switching to the new system on day one. The transition process will take time and requires active support.

6.4.1   A Pilot Project

Starting with a small pilot group of buying agencies helps the e-GP system implementer to better understand the user environment, training needs, support services, and IT infrastructure required for users. It also gives buying agencies time to coordinate the change in process with the supplier community so that they can register on the system and learn the new process. Keeping the initial system simple helps to facilitate the transition and minimizes the potential for errors or problems that could occur if the system becomes too complicated, especially when integration of different components or linkages to external systems are required.

A pilot approach helps to validate the proof of concept for the system and makes it easier to expand the system to other user groups because the implementer is better at understanding and addressing the needs of the target users. Once users are familiar with an e-GP system, the addition of new features and components is much easier. This is because the main learning curve in the use of e-GP has already been achieved and users are now looking forward to new functions that will continue to streamline their processes.

6.5   Functional Specifications

The various components of an e-GP system support different levels of features and functions that determine the complexities of system development and implementation. The development of the system should be progressive and the first release of the system does not need to address all features and functions at once. System features and functions should be incorporated over time in conjunction with the capacity and technology infrastructure available. Delivery of the e-GP system should take into consideration the nature and complexity of the processes to be supported, especially when the division of simple and complex procurement processes or integration with external systems is required to support a function such as e-payment or PKI security applications. The functional development should also take into account the capacity and capabilities of the users and the web services currently available. If bandwidth capacity is an issue, the system development process should ensure the service can be properly delivered in a low-bandwidth environment.

Some of the main functional specifications that should be incorporated in the implementation of an e-GP system include the following:
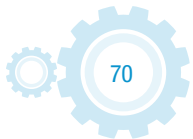
(i) **e-Tendering.** Implementation of this functionality is relatively simple, has low implementation and maintenance costs, and provides significant value to businesses. Functionality can be increased incrementally and includes

　(a)　all tendering opportunity information on a single internet site,
　(b)　online registration for businesses,
　(c)　online search tools,
　(d)　open access through the internet to all original bidding documents,
　(e)　electronic bid submission by suppliers, and
　(f)　customization options for agencies.

The most technically demanding element of this service is sometimes regarded as the security demands of online tender submission, although potentially all elements have strong security requirements. The role and status of parallel systems for a phase-in period is a policy issue that also needs to be addressed. Implementation of e-tendering in large procurement entities may involve complex workflows for approval of tender documentation, evaluation results, and award of contract procedures. Implementation of these workflows in centralized software such that department-specific workflows are built within one single instance of the software can make design of e-tendering a complex task.

(ii) **e-Purchasing.** This functionality is relatively complex because there is a need to integrate workflows and transactions, as well as to manage a wide variety of purchases and information flows for many buyers and many sellers. The basic functionality of this module includes

　(a)　online registration of businesses,
　(b)　purchasing policies available online,
　(c)　buyer authorization management,
　(d)　online quotations and information flows,
　(e)　e-purchasing transactions,
　(f)　financial management integration,
　(g)　data warehousing,
　(h)　reverse auctions, and
　(i)　online catalogs.

SMEs will be hesitant to invest in this level of functionality without government leadership and proof of concept via e-tendering. Businesses will need to invest in online cataloging and other elements while government agencies will need to engineer significant changes to work practices for e-purchasing to realize its potential.

(iii) **Online contract management.** This module is primarily aimed at improving internal efficiency and transparency for both government agencies and businesses (especially construction businesses). Commonly implemented functionalities in this module are

　(a)　management and monitoring of contract performance,
　(b)　management and monitoring of contract payments,
　(c)　management of contract variations,
　(d)　management of contract completion and final evaluations,
　(e)　management of guarantees, and
　(f)　contract templates and best practice guides.

For all of these elements—e-tendering, e-purchasing, and online contract management—it is essential to address the business needs of suppliers and agencies, change management, and procurement management, as well as technical design. Technical design includes

(a) project design;
(b) procurement process review;
(c) system specifications and performance;
(d) system scope (business and technical); and
(e) system development, acquisition, hosting, support, and maintenance.

The initial system implementation should also take into consideration the administrative support functions for system operation, including user management (new organizations and contacts); approvals and rejections; data management (default selection list); commodity classification management; reporting tools; and the publication of other information (regulations, announcements, frequently asked questions, and help text). Supporting the operation of the system and the users is just as critical as the tender management process. Some system implementations include "act as" functions that allow an administrator to impersonate a user in order to remotely assist with the setup and configuration of an organization and its matching profile. In such cases, system security policies need to be developed to ensure their activity is monitored and controlled by the application.

Another key component of the functional design is the recording of system log records, which should track any activity by a user that affects the content of the data collected in the e-GP system as well as when a user connects and disconnects from the system. System log files provide a critical tool for the system audit process. They also allow administrators to monitor how the system is being used for future product planning. Transaction log files enable the generation of activity reports to analyze the impact of the system with regards to economic development and other objectives.

6.6   Technical Specifications and Infrastructure

The successful implementation of an e-GP system and its adoption in various processes and environments will depend upon on its ability to operate with and connect to users and other systems.

As its name implies, e-GP focuses on the development and implementation of web-based services. The available telecommunication infrastructure in a country or region is therefore an important consideration for the implementation of e-GP. Reasonable connectivity and the availability of web services are needed to provide users with reliable access and support at comparatively affordable prices.

The unavailability of internet services may affect some of the features and functions of a planned e-GP system, which may need to support more than just internet access and e-mail, taking into consideration the use of fax or post to support the delivery of information. In most developed and developing jurisdictions, affordable, quality web services are generally available and improving with the ongoing advancement of wireless options. However, governments need to be mindful of the infrastructure available in different regions and how it may affect the delivery of an e-GP system. They may also want to consider various options to support access to the system through kiosks, the promotion of internet cafés, or industry support to advance the infrastructure implementation.
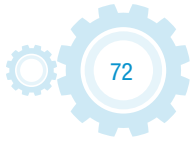
The applied technical standards should clearly define the user requirements for accessing the system, such as computer configurations, browsers supported, and the type of connection required. From the MDB perspective, any e-GP should be available through standard computer configurations using Microsoft Windows, open-source options with no additional software other than a standard browser required, or freely available through the e-GP system portal.

6.6.1   Interoperability Considerations

The interoperability of the e-GP system with other government systems and with an individual user environment will be determined by the standards applied in the e-GP system implementation. The benefits of the system might diminish if access is restricted due to cost, licenses, or interoperability with other systems and specific applications. From a management perspective, a government should have a strategic plan to link e-GP with other e-initiatives and provide for the development and implementation of the e-GP initiative. Government policy and management direction should help to define some of the different systems being considered as part of the e-GP initiative, such as national certification authority for a PKI infrastructure, e-payment functions, finance systems, and vendor registration.

From the e-GP system perspective, the system should follow open standards as much as possible and not require any additional software or applications outside of a standard web browser and a reasonable internet connection running on a standard computer using Microsoft Windows or another operating system such as Linux. Any additional client software that may be required should be freely available from the e-GP portal.

The standards applied in the e-GP system are the key vehicle through which access and interoperability are ensured. Some of the standards to be considered in system implementation include

  (i)   catalog management,
  (ii)   commodity classification,
 (iii)   security,
 (iv)   authentication,
  (v)   supplier identification,
 (vi)   data and record management,
 (vii) legislation, and
(viii) reliability.

Because procurement data will need to link with other government applications and information, the interoperability of data and records is an important consideration. Systems will only be able to exchange data if both systems have a copy of each data item. For example, if the e-GP system is to check the availability of an approved budget for an item to be procured in the budget system, the procurement record would require the budget code for the budget system.

The reporting and analysis available from an e-GP system is dependent upon the data collected and generated within it. Attempts to compare the value of one tender with another would be impossible if the application of the necessary data elements is not part of the tender record (such as standard commodity classifications or units of measure that reflect the services or types of works projects, e.g., the type and length of a road). The underlying value of the system will be driven by the data; system objectives should therefore identify the functions and information to be supported.

6.6.2 Security

Security standards, including methods for authentication and digital signatures, are another key decision area related to the methods and standards applied. Some e-GP systems elect to use PKI infrastructures, using the distribution of the digital key on a physical USB flash drive; others have applied authentication using embedded certificates in the Microsoft Internet Explorer browser. Still others have applied a secondary password for the key. The different options affect the basic requirements for connecting to and using the system, and the option selected should be compatible with the electronic initiatives set out by the government. For instance, if a government is promoting the use of open-source Linux-based systems using open-source office suite software, difficulties may be encountered if the security method of the selected platform applies a proprietary solution not supported on an open-source platform. (Refer to Section 3.1 for a complete overview of e-GP security.)

6.7 Policy

6.7.1 System Availability Issues

Does a short system failure 3 hours before bid closing actually affect the bidding process, as bidders still have time to complete their bid submission? Is the e-GP system responsible for communication issues outside of its control? Should the system automatically extend a closing time in case of system failure within its control? Governments need to establish how to accommodate system failures and other operational issues that may affect procurement, even if e-GP systems are supported with full redundancy and operational procedures and infrastructure to prevent system failures. In reality, no system can guarantee 100% availability.

For any failure within control of the e-GP operation that may affect the procurement process before the specified bid closing time, a government should make it a general policy to extend this time by a reasonable amount. This would accommodate potential bidders, similar to extensions that are currently provided in the event of typhoons or other outside influences that may affect the bidding process. The decision to extend any bid closing or opening should remain with the procuring entity responsible for the procurement and the system should only provide the tools necessary to support the notification of any bid extension.

6.7.2 Terms of Use

As a service operation, the e-GP system has very little control over the content of the tenders published in the system or over the decisions or actions of the procuring entities. The terms of use should clearly define the role and responsibilities of the e-GP system and the procuring entities and suppliers using the system.

6.7.3 Liabilities

To protect the government and the e-GP service operation, the government should assume no liability associated with use of its e-GP system. Users need to be responsible for their individual use of the system and should not be able to hold the system operator responsible or liable for any information published
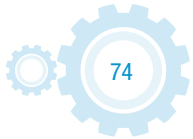
or distributed through the system. If the system is to support notification services for bid matching or amendments to a tender, the system policy should make the supplier responsible for checking the system for any up-to-date information for a tender or bid notification, since it is difficult for the system to guarantee the successful delivery of all messages through internet, e-mail, or SMS.

The directives defined in the policies and procurement law may also affect the features and functions within the system, imposing certain limitations on the delivery of the electronic service. For example, the need to support manual submissions of bids or components of a bid may counter some of the advantages that may be applied through the collection of structured information for a bid response. An e-GP system can present comparison reports or rankings to assist in the evaluation of bids, provided the information is available in system tables. If manual document submission is supported, such a feature would not be available unless the buyer enters the bid information during opening so that it may be compared with electronic submissions.

6.7.4   Bid Securities

Similarly, supporting different forms of bid securities such as cash, check, or credit line will not be easily accommodated unless business relationships with the appropriate banks are established to facilitate the electronic process. To date, a range of options exist:

  (i)   Some e-GP operations will accept an electronic copy of the original bid security document for bid opening, and then require ranked bidders to submit originals for evaluation.
 (ii)   Some system operations require the electronic copy of a bid security instrument as well as the original document prior to bid opening, requiring the bidder to submit a portion of the response manually.
(iii)   Other e-GP implementations have made arrangements with selected banks to support different forms of electronic security, avoiding the need for scanned copies or original documents to be submitted.

Each option for bid security will require a different level of support in the system application.

Policies may also need to be developed for different rules and processes that may be applied depending on the source of funding; rules for MDB-sponsored procurement may differ from country rules, for example. The main objective is to ensure policies and regulations are in place beforehand to stipulate how system failures that affect the bidding process will be accommodated in the system and how other functions in the system will be managed.

Policies will evolve over time to support new features or functions or to accommodate new buying methods or procedures, such as e-purchasing, catalog shopping, or reverse auction.

The overall security of the system is related more to the management of the process than just the technology itself. A government needs to ensure there are proper management and authentication processes in place and that procedures are properly adhered to. The users—both suppliers and buyers—need to take responsibility for their use of the system and the protection of their user identification and password or digital certification. The e-GP system only knows that someone signed on with the correct credentials; the user is responsible for the credentials.

6.8   Risk Management

As with any system implementation, there is always a risk for system failure due to potential security breaches or operational errors. The issue is not whether a system failure may occur; the issue is how the failure in operation or delivery of the service will be managed. Risk management is critical to the successful operation of an e-GP system.

One of the main areas of risk is the data collected and managed by the application. The security and integrity of the data in an e-GP application is paramount for establishing a high level of trust with the system. Risk to data security arises not only from external threats but also from internal threats. Procedures and controls need to be in place to manage the associated risk to data including clear separation of duties and access controls to ensure no user may have any unauthorized access to any data. Whether the system is managed internally or through a third party there is still a risk associated with data security, and controls need to be in place to prevent any unauthorized access.

As the e-GP system becomes a critical part of the procurement process, users will tend to develop a dependency on the system that did not exist under the former manual procurement regime. Management and operational procedures need to be in place to ensure a high service reliability to minimize potential operational issues including

    (i)   backup and recovery procedures,
   (ii)   built-in redundancy on the system and data,
  (iii)   a disaster recovery plan that includes a hot site to switch the service to in case of a serious failure at the production site, and
  (iv)   system security and monitoring to identify and address any potential attacks.

6.8.1   Availability and System Recovery

The operation of the system is not only related to its technical management and development. It also requires user support and training services on a system that will be operational 24 hours a day, 7 days a week. Such "24/7" support requires a certain level of resources to provide coverage and any operational issue will need to be addressed when it occurs, not the next business day when workers return to work.

All of the risk management functions need to be tested on a regular basis to ensure the operational team is prepared and recovery procedures are in place to address issues as they occur. Governments should also give consideration to using external testing of system capacity and security procedures to ensure the system has the capacity to meet any projected user load, and that there are no known holes in the security infrastructure of the system.

6.8.2   Contractual Risk

The system approach and business model to be followed should be suited to the capacity of the governing organization to support the development, implementation, and ongoing operation and management of the system. If the organization does not have the technical capacity to support the development of an e-GP
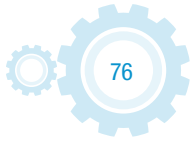
system, consideration should be given to using a third-party partner that may have an existing system that can be applied as-is or customized to support specific requirements.

The choice between internal development and operation of an e-GP system, and the use of private sector solutions or solutions from other governments depends on the capacity of the government as well as the overall marketplace being supported. For small institutions or governments, using an external service offering for some components of an overall e-GP program may be the most effective option, regardless of whether or not the government has the capabilities to develop or manage its own solution, simply due to the economies of scale that can be offered through a third-party operator.

When using third parties for part of the service delivery, governments need to consider long-term business operations as part of their initial contracts; this mitigates any operational risk that may occur at the end of a contract or service delivery. Some business risk will be associated with intellectual property rights (IPR) to the system or rights to continue using the system and the supporting infrastructure. Any contract should include a transition plan, options for renewal, and options to acquire the system and infrastructure. The contract should clearly define the government's rights and ownership of all data collected in the e-GP system on its behalf, including all registered users and their associated information so that the information can be transferred to a new system and removed from the old system after termination of the original contract. The government may also have a knowledge risk if it is not actively involved with the system service delivery. During the contract period, a government should ensure it has adequate resources available to develop a strong working knowledge of the system and its operational requirements. This better prepares the government in case it has to support the system directly or assist in transferring the system to a new platform.

Governments should also recognize that supporting the operation or management of an e-GP system over a long period of time will require resources and funding for each and every year of its operation, whether the system is managed internally or with a third party. For most governments, e-GP represents a new cost. This means budget requirements and continuous funding will be required to ensure the continuity of service. A third-party service provider would require the same level of support to ensure a continuous level of operation.

There will always be a cost associated with the management and operation of an e-GP system whether the system is eventually moved into government operation or continues to be supported by a third party.

6.9   Monitoring and Evaluation

The implementation of e-GP can be complex and lead to many changes to government business practices and procurement operation. The successes of the system and the new processes applied need to be evaluated and reviewed on a regular basis to ensure the system meets the original objectives and goals.

The true benefits of the system will only be realized through its full use and adoption by both buying entities and suppliers. If the system is fully operational and boasts a complete set of features and functions, yet only has one supplier participating in a bid, it cannot be considered very successful.

The ongoing evaluation of the overall system should be an integral part of system operations. Governments should continually examine system activity to assess whether

  (i)   the initial objectives and targets are being met;

  (ii)   the justification of the business case is being met;

  (iii)   there is compliance by all agencies;

  (iv)   there is improvement in performance indicators (e.g., number of bidders and prices); and

  (v)   there is improvement in economic activity (activity from different regions).

An e-GP strategy enables access to a wealth of information, allowing an organization or government to analyze its individual activity and results. A government will be able to gather statistical information related to tenders and purchasing activities to better understand what is being procured or bought. This information allows organizations to determine average purchase values and volumes for better estimation and planning on future purchases or to identify exceptions that may require further review. The information gathered and analyzed also helps the government formulate new policies and practices to realize further efficiencies in the system.

Meanwhile, the PMU can assess service delivery and monitor adoption by government and industry to help identify strategies for improving service delivery and communication, thereby facilitating adoption in different market segments where there is low participation. If third-party partners are providing the e-GP service, this assessment will allow the PMU to consider different options for the renewal of existing contracts or re-tendering of a new service delivery based on activity levels.

The evaluation of the system should be outcome-based in terms of the key objectives of governance, value for money, and economic development.

6.10　Examples of e-Government Procurement Implementations

6.10.1　State Government of Karnataka (India)

The State Government of Karnataka (GoK) followed a phased approach to the development and implementation of its e-GP system. The implementer worked closely with a small set of key pilot agencies to fully understand their internal workflows and the amount of information that needed to be integrated into the system. The implementation of the initial system represented a significant change to existing practices. GoK moved to change a paper process to an electronic process, converting all paper documents into electronic formats and moving from manual approvals to electronic approvals. The change required all users associated with the procurement process to be trained and registered in the system, with proper roles and responsibilities defined in the workflows and a significant effort applied to the creation of the electronic documents and form templates to support the information flow. GoK set out an implementation plan to migrate all agencies to the new system over 2 years, starting with six key agencies during the first 9 months, then adding six more agencies in 4 months. As they reformed and improved their processes, the time to incorporate new users improved with each transition. Though the system implementation started slowly with little activity, the e-procurement system in GoK is now the primary business process supporting procurement across each state and it now provides a foundation to which additional components for contract management and e-purchasing can be added in a timely and effective manner.
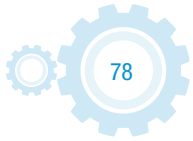
6.10.2   Zanzibar by the United Kingdom

Zanzibar is the strategic collaborative electronic marketplace and e-invoicing system of the Government of the United Kingdom.[37] Provided by ProcServe, Zanzibar offers a "procurement hub" whereby buyers and suppliers can use the collaborative nature of the system to share procurement information with similar organizations, and to join in trading communities that aggregate purchasing power and lower the costs of buying day-to-day goods and services. The system provides

 (i) easy-to-use requisition creation, which allows buyers to quickly and accurately submit purchase requests;

 (ii) a self-service catalog system that allows buyers and suppliers to upload and import catalog data in an easy-to-use format, and provides a flexible "shopping cart" selection system that can automatically route non-catalog requests to sourcing professionals;

(iii) a feature for suppliers to export their existing catalogs to the system, or publish into the pre-integrated ProcServe Catalogue Search Engine, which includes external PunchOut support to their own websites;

(iv) fully integrated electronic approval, contract compliance, reconciliation, and payment functionality (including full support for corporate p-card programs);

 (v) a trading management functionality that allows suppliers to send and receive electronic documents directly from their own back office ERP, warehouse management, and sales order processing or finance systems; and

(vi) an easy-to-use interface that provides purchasing teams with real-time management information on what was bought from whom and at what price, using a UNSPSC coding standard.

For suppliers, Zanzibar provides self-service access to manage catalogs and content, and a secure, single-entry, and multiple-use portal. A supplier only registers once to be set up on the system and there is no registration charge, providing suppliers with an ability to trade electronically with government agencies—a "no barrier to entry," easy-to-use solution, at no cost.

6.10.3   xchangewales by Wales

The Government of Wales is helping to change the way procurement is carried out in Wales through the xchangewales e-trading program, which was introduced to create efficiencies in procurement and stimulate greater collaboration between Welsh public sector customers and their suppliers. Available to all public sector bodies, including local and central government agencies as well as the National Health Service and schools across Wales, xchangewales provides an online service that allows buyers to manage catalog content and order approved goods and services through a wide range of privately held electronic catalogs. It also has full contract and workflow management capabilities, providing organizations with four key components:

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[37] See www.procserve.com/solutions/zanzibar/ and www.ogc.gov.uk/markets_and_collaborative_procurement_zanzibar.asp

(i) **xchangewales Hub (e-Trading).** This central hub allows end users to view, manage, and search online catalogs and transact electronically with suppliers. It also gives suppliers the ability to manage catalog content, view orders, and create electronic invoices and credit notes.

(ii) **xchangewales Hub (e-Trading for Schools).** This is a solution similar to the e-Trading hub, tailored for schools.

(iii) **Management information system.** Through this tool an organization can review and analyze its xchangewales Hub transactions.

(iv) **Purchase-to-Pay tool (optional).** This optional tool enables users to raise purchase orders, receipt goods and/or services, and process invoices and credit notes electronically.

Savings have been in the range of £70 million to £200 million for the program, and participating organizations retain all financial and efficiency savings made in order to improve their core activities.[38]

6.10.4   ProcServe in the United Kingdom

ProcServe offers a cloud-based solution for electronic procurement that ties together a wide range of separate back-office systems—from both buyers and sellers—that receive and process data in different formats, enabling "buying clubs" or "trading communities" to aggregate purchasing power and lower the costs of buying day-to-day goods and services. With clients in the UK that include central civil government, police, housing associations, health, education, and local and regional government agencies, it hosts the ProcServe Trading Network and the e-Marketplace solution of the Government of the United Kingdom. The following government marketplaces are also included in the hosted solutions: Zanzibar, OPEN, the National Police Procurement Hub, xchangewales e-Trading, and xchangewales e-Trading for Schools.[39]

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[38] www.xchangewales.co.uk

[39] www.procserve.com

7

e-Government Procurement Functionalities

There is no "one-size-fits-all" solution for e-government procurement (e-GP) functionality. Development of e-GP needs to be based on an underlying understanding of current government procurement rather than on practices from the private sector or from government of a previous era. A good starting point for understanding the potential for technology to transform procurement and for developing an e-GP strategy is to perform spend (or portfolio) analysis. Spend analysis categorizes procurement in terms of expenditure, complexity, and market competitiveness.

Equally important, however, is the capacity to access, organize, and analyze procurement information, areas that provide the most potential for adding value to an e-GP strategy. This is where a procurement management information system (PMIS) comes into play, providing functionality such as contract management, tracking, planning, performance assessments, auditing, and reporting. The development of a PMIS requires extensive knowledge of procurement and is not dependent upon the existence of portal services. In fact, there is significant value to be gained through use of a PMIS for procurement reform even without the operation of a web portal.

Information requirements and spend analyses together should form the basis for development of e-GP. An e-GP technology architecture should provide public sector buyers, suppliers, and the general public with secure access to an integrated range of procurement systems and services. The interoperability of the e-GP system with other management systems is also an important part of gaining full benefits from automation. The efficient exchange of information should not be obstructed by differences in platforms or standards between the leading government entities.

While an efficient interface between the PMIS and the financial management information system (FMIS) is essential, it is widely considered that for public sector implementations these are separate systems. The PMIS needs to be accessible, with two-way data exchange between many buyers and many sellers, and include the numerous operational considerations and authorizations for procurement that are likely to change on a daily basis. Adapting an FMIS to undertake these and other management functions is sometimes costly and difficult. Programming an interface between the PMIS and the FMIS is likely to be a more efficient option.

There are e-GP systems that have been built using good software design and development techniques, but where the underlying understanding of government procurement has been more closely related to practices from the private sector or from government of a previous era. These systems generally do not deliver the full benefits available from e-GP. Over time, e-GP tools and functionalities have evolved. In 2005, the UK Office of Government Commerce (OGC 2005) classified e-GP tools into the categories e-sourcing and e-purchasing:

(i) **e-Sourcing tools.** These "help buyers establish optimum contracts with suppliers, and manage them effectively. The tools include supplier databases and electronic tendering tools,
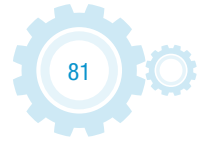
evaluation, collaboration and negotiation tools. Also included are e-auction tools and those tools which support contract management activity."

(ii) **e-Purchasing tools.** These "help procurement professionals and end users achieve more efficient processes and more accurate order details. The two aims of (i) maximising control and (ii) process efficiency are the function of e-purchasing tools such as purchase-to-pay systems, purchasing cards and electronic invoicing solutions."

Defining which tools to implement first depends on a spend analysis (portfolio analysis). Spend analysis is helpful in developing an understanding of the potential roles for technology—in particular it helps to explain why e-GP is made up of various functions that, as concepts, are largely stand-alone and need to be a good fit with government procurement management.

7.1   Spend Analysis

Spend analysis categorizes procurement in terms of expenditure, complexity, and market competitiveness. Spend analysis

(i)   promotes understanding of how e-GP may be developed,
(ii) demonstrates how different procurement techniques may be applied, and
(iii) promotes understanding about the limits in scope of e-GP and the vital significance of knowing the market.

The Government of the United Kingdom has classified spend (based on expenditure and complexity and risk) under four quadrants:

(i)   technical (high complexity and risk and low expenditure),
(ii) strategic (high complexity and risk and high expenditure),
(iii) acquisition (low complexity and risk and low expenditure), and
(iv) leverage (low complexity and risk and high expenditure).

Many governments (and e-GP system vendors) do not consider spend analysis and many governments lack the data required to meaningfully allocate spend. Some governments, in the absence of any analysis, tend to assume that a single approach (e-reverse auction, for example) is the key to improving procurement performance, virtually to the exclusion of any other approach. These assumptions have even been applied to markets in the technical quadrant where little competition is available and where the technique is not appropriate.

Other e-GP programs have focused only on the e-bidding function, primarily relevant to the strategic quadrant, although such programs can also apply with some inefficiency to the leverage quadrant. Others have developed e-bidding functions, as well as e-shopping.

Figure 6   Explanation of the Four Quadrants

For items in the **technical quadrant**, the lack of choice (due to technical complexity or weak competition in the market) and relatively low buying power of the government means that this is a suppliers' market in which monopoly pricing is likely to apply. Buyers are locked into these purchases and have to pay these prices because exit costs and switching costs are high. The main focus of e-GP here is contract management and demand management (insourcing may sometimes be a preferred option).

In the **strategic quadrant**, there are high-value complex procurement processes, where specifications and options may require some levels of negotiation. Contracting methods including contract management are likely to require customized approaches for each project. Processes here involve requests for proposals, expressions of interest, promotion of innovation, open bidding and long-term relationships, and alliance contracting.

In the **acquisition quadrant**, there are numerous day-to-day transactions but the values of these are small; price is often less significant than the cost of processing these purchases. The government has little if any more market power than any other buyer. The main role of technology here is to improve transactional efficiency (using e-catalogs, e-payments, and workflow management). For government procurement, examples of what falls into each of these quadrants are also shown in Figure 7.

In the **leverage quadrant**, the specifications of the goods and services are relatively simple and there is a high degree of competition in the market. The government as a major buyer should be able to leverage its position and access advantageous pricing—this is a buyers' market. In addition to better governance, the main focus of e-GP here is to leverage buying power to gain better pricing.

Figure 7   e-Government Procurement Applications
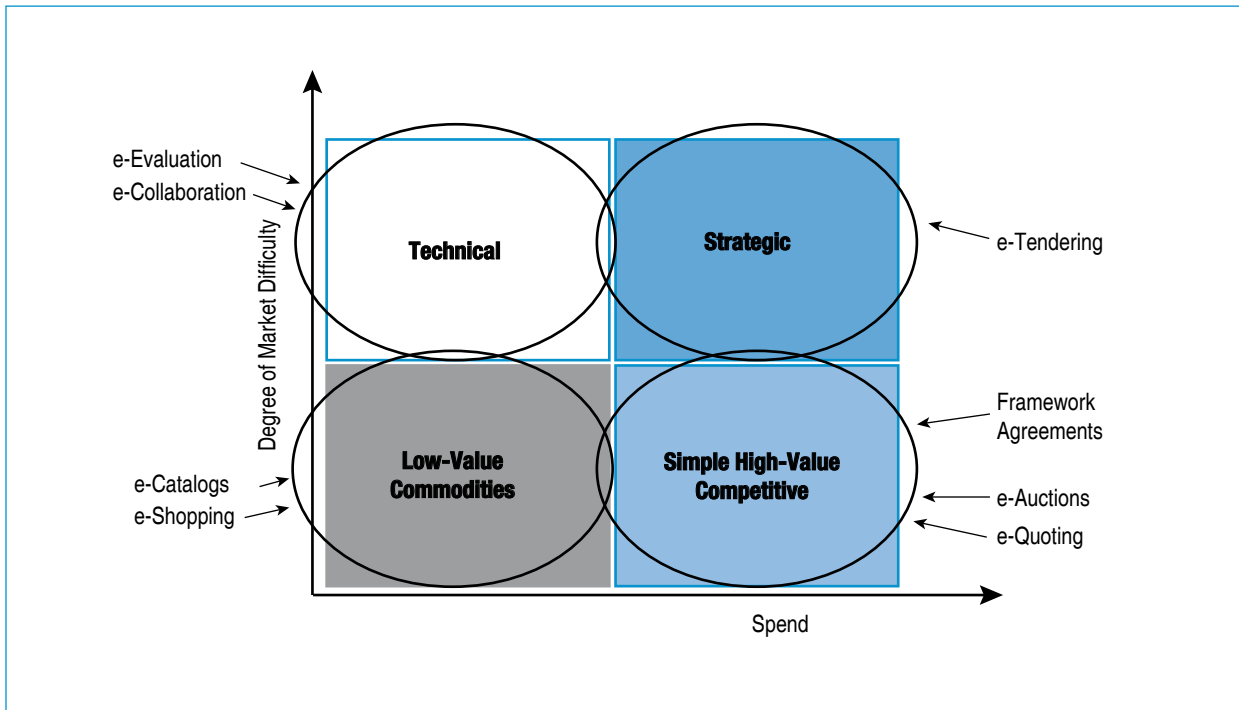
Source: P. Schapper. 2011. A Risk Managed Approach to e-Government Procurement – A Management Perspective. Workshop presentation in Botswana, adapted from Open Geospatial Consortium.

Broadly, the applications most commonly developed in e-GP can be described in terms of the above analysis. Figure 7 identifies the functional components of e-GP suitable for different spend categories; the categories identified correlate with the spend analysis quadrants identified in Figure 6.
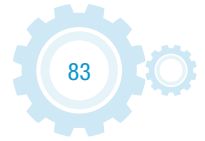
7.1.1   Acquisition Quadrant

As noted above, procurement of low-value commodities in the acquisition quadrant may be supported by e-catalog buying and can include the use of framework agreements. In this case, small-value simple procurement (such as for photocopy paper) is specified in an e-catalog, and supplier prices and availability are reviewed online. A buyer can choose to order online from the e-catalogs listed. Government purchasing cards (p-cards) may be used to procure low-value commodities.

7.1.2   Leverage Quadrant

The leverage quadrant (simple high-value items) may be supported by e-reverse auctions and alternatively by framework agreements, depending on the nature of the markets, the level of competition, and the turnaround times required by buyers.

7.1.3   Strategic Quadrant

The strategic quadrant will be supported by open competitive bidding, in which the e-GP system enables advertising of the call for expressions of interest (EOIs), online download of tender documents, and electronic receipt of bid responses from suppliers in a safe and secure environment. For this quadrant, which is responsible for the largest share of government procurement, an e-GP system is largely a document management system in relation to selection, but is more complex in relation to contract management.

7.1.4   Technical Quadrant

For the technical quadrant, the e-GP functionality may have relatively little role in the traditional selection process but can make significant contributions to precontract collaboration and to contract management. This quadrant involves noncompetitive markets for which competitive bidding may be of little relevance. e-GP functions may be useful for advertising and managing calls for EOIs in order to determine the depth of the market; however, the procurement methodology for these acquisitions should be direct negotiation and collaboration or insourcing if the specifications cannot be changed to move the items into the strategic quadrant. The government is at a disadvantage in this quadrant and technology may be useful in enhancing demand management to reduce its exposure and in organizing workflow.

7.1.5   Discussion

From the quadrant analysis, it is clear that there is no "one-size-fits-all" solution for government procurement. A detailed study has to be performed in order to understand the structure of government procurement and any decision on implementation of e-GP functionality has to match the government's spend pattern. Accordingly, the e-GP implementation approach tends to vary from one government to another depending on its spend pattern.
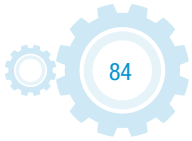
Case studies by the Organisation for Economic Co-operation and Development (OECD) have illustrated that public tendering for goods, services, and civil works with a value greater than $25,000 usually represent 70% to 80% of the procurement value, but only 10% to 20% of the overall procurement transactional activities. General purchasing of items less than $3,000 to $5,000, meanwhile, represents about 20% to 30% of the procurement value but 80% to 90% of the procurement transactional activities. Public tendering is normally associated with complex procurement that requires various processes to support the submission and evaluation procedures on a national or international level. Purchasing is normally associated with an immediate local need through a very simple process. Contract management provides a level of support and monitoring of the contracts being implemented or purchases being made.

7.2   e-Government Procurement Functionalities

The e-GP technology architecture should provide public sector buyers, suppliers, and the general public with secured access to an integrated range of procurement systems and services, consisting of two high-level components: the procurement portal and the PMIS.

A procurement portal provides the following informational and transactional services:

(i)   **Supplier register.** This records basic details of suppliers interested in doing business with any part of the public sector.

(ii)   **Buyer register.** This hosts the details of procurement entities participating in e-GP and their designated procurement officers.

(iii)   **Information services.** This provides access to public sector procurement-related information such as news, publications, and policies, as well as discussion forums.

(iv)   **e-Bidding system.** This facilitates the secure transmission of electronic bid documents between buyers and bidders for public sector contracts.

(v)   **e-Auctions and e-reverse auctions.**

(vi)   **e-Purchasing or e-sourcing, procure-to-pay tools.**

(vii)   **Catalog-based ordering system.** This provides public sector buyers with facilities to order from online catalogs of goods available under contracts agreed with suppliers.

(viii)   **P-cards.** These are government purchasing cards.

(ix)   **e-Payments and e-receipts system.**

A PMIS includes the following two subsystems:

(i)   a procurement planning and inventory management system; and

(ii)   regular and ad hoc reporting systems on procurement, providing data on performance and trends.

Because the primary access mechanism for e-GP services and systems will be the internet, both government users and contractors require access to a secured intranet to participate in e-GP, and the broadband network capability available in most countries is typically adequate to support e-GP.
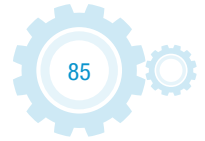
7.2.1   Procurement Portal (Web Portal)

An electronic public procurement web portal is the government or agency website that acts as a gateway to an e-GP's functionality—the electronic face of government to the outside world. The portal is more than just a gateway. The portal software itself also provides much of the early identification and authentication functionality within the system. It prompts suppliers to provide registration data, and provides passwords and electronic signatures for both government buyers and external suppliers. It is also the interface to all of the functionality within the system itself, supporting a single, universal supplier or buyer login that provides access to the user across all modules.

The web portal is essentially the shop front and postbox for government procurement. The content of the procurement web portal may be limited to general information about government procurement laws and regulations, procurement policies, standard bidding documents, and a basic bulletin board listing bidding opportunities and contract awards. Depending on the status of e-GP development, the procurement portal may include

    (i)   supplier and buyer registries,
   (ii)   annual procurement planning by departments (procurement plans),
  (iii)   early warning notices for forthcoming bid invitations (general procurement notices) and a list of current bidding opportunities (specific procurement notices),
  (iv)   notification of contract awards and tender document uploads,
   (v)   bid uploads,
  (vi)   bid tracking capabilities, and
 (vii)   intelligent search and bid matching capabilities.

All advertisements and publications for public procurement across the country would be accessible from the portal. Suppliers would not need to search various departmental or ministry sites to find out what opportunities are available each day. The portal would have transaction capabilities developed in line with national standards.

The majority of procurement management activities—particularly the critical monitoring and reporting of management and compliance information—are not addressed from the e-GP portal but rather from the PMIS, which needs to be seamlessly linked with the e-GP portal.

7.2.1.1   Supplier and Buyer Registries

A database of suppliers and government buyers is gradually developed over time as the e-GP system is used to handle procurement transactions. Suppliers register in the system to get value-added services such as automated transactions and to submit their bids and invoices online. Registration of buyers is a prerequisite for publication of tender notices, download and evaluation of tenders, and e-ordering. The system should have built-in validations to ensure that both suppliers and buyers have only one identity in the e-GP system, as duplicate identities will adversely impact the validity of the registries. A supplier can be effectively blacklisted from participating in public procurement opportunities in government by modifying access controls to the identity assigned in the registry.
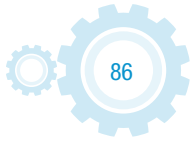
7.2.1.2   e-Notification and e-Information Services

Suppliers will be able to participate only if they can get access to the information they need, at the right time and in the right format. The notification functionality of an e-GP platform is used to assemble and publish requirement documents, such that government users can create and upload tender notifications and prospective bidders can find and download documents using a simple, user-friendly interface. Because the platform has the potential for a large number of users, the notification module needs to be easy to navigate and intuitive to use. Most agencies will require the system to allow suppliers to search by categories such as bid size, industry, or product or service. Suppliers can specify their area of expertise and seek to be notified by e-mail about tender opportunities published in an e-GP system. The effectiveness of automated notification can be improved significantly with proper implementation of unified item code classification (for example, suppliers can be notified when a tender under one or more categories of items, such as furniture, is published).

7.2.1.3   e-Bidding/e-Tendering

The e-bidding/e-tendering component interacts with the notification module, allowing sellers to prepare and submit their responses to posted tenders, and providing the contracting authorities with the compliance data and selection criteria (such as supplier validation, contract terms, and weighting) required to evaluate and award contracts. One of the most technically demanding elements of e-bidding functionality is the security of online bid submission, specifically as it relates to storing commercial quotes submitted by bidders in a safe and secure manner.

e-Bidding systems have to be implemented in line with existing procurement laws and regulations. Certain modifications to existing regulations are therefore required to address specific challenges associated with e-bidding, such as online opening of tender documents and bid submission time, as per the e-GP system clock. Tenders published using e-bidding typically generate formatted advertisement notices in the e-GP portal.

The Multilateral Development Banks (MDBs) have prescribed certain minimum standards and qualities that must be met by e-GP systems used to handle procurement and tenders funded by MDBs. e-Bidding systems used to handle tenders funded by MDBs shall adhere and strictly comply with these prescribed guidelines.

7.2.1.4   e-Bidding Considerations

As governments implement e-GP systems, they should take time to review the information required from suppliers as part of the suppliers' bid response. Some common information—such as company registration, tax information, financials, or work experience—can become part of the supplier's system profile during registration and automatically be included as part of its bid response, reducing the time and effort required to prepare a bid response. Consideration should be given to how the government collects different components of a bid response specific to each tender, such as the technical compliance on specifications and bid prices as well as company registration information and tax filing status, which may be tied to other government systems. Will suppliers simply upload electronic files (scanned images of documents) in the same manner they would have submitted a manual bid response in an envelope? Or will the system present electronic web forms to be completed by suppliers, which can then be organized to present rankings or
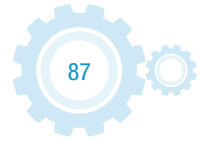
comparisons between bidders upon bid opening? The preparation of original electronic bid documents will affect the nature of the bid responses prepared by suppliers and the information collected in the system that may be used to facilitate bid evaluation and comparison.

Different e-GP applications take different approaches to the preparation of the tender package and the receipt of bid documents. Some applications simply allow a supplier to upload a file or a collection of files in single or multiple electronic envelopes, emulating the manual process of submitting a bid. In this case, the system is simply supporting an electronic bid box. Buyers download the bids received, open the associated file, and conduct their bid opening and bid evaluation. These activities are normally conducted offline and the procuring entity posts the results at the completion of the process. Suppliers prepare their responses as before by assembling the required information and creating the electronic file (or files) that form their bid. If a supplier needs to scan a number of pages due to old manual processes that require signing each page of a submission, the resulting response can become quite large—which may have an effect on the system resources required to support the e-GP system.

Systems in India, Indonesia, and Nepal have applied this approach for collecting bid responses and it was not uncommon to have tender packages or bid responses in excess of 50 megabytes (MB). These systems can only present the procuring agency with a list of bidders and their attached files during bid opening as the information that would have been used to rank the bids is contained in separate files. It is up to the procuring entity to update information on the system in order to present rankings and make bid results available to all parties—provided that the system supports the collection of information to present the results.

In other system implementations, such as that of the Republic of Korea, governments have taken the opportunity to examine all of the forms and information associated with suppliers and bid responses to create various electronic forms, tables for bid estimates, price bids, specifications, and contract clauses. Through e-GP, the governments have reengineered a number of the processes associated with creation and approval of a bid, its estimate, and the information to be collected by a supplier in response to a bid. The results of this reengineering led to a number of efficiencies in the procurement process by reducing the time and effort required to create a tender or a bid response and by allowing the system to collect information and present various reports such as bid comparisons and rankings, opening and evaluation results, price comparisons across multiple tenders, and other data analysis. By managing the bid response process through electronic forms, the system ensures that suppliers cannot submit incomplete bids; the system will recognize when a component of the response is incomplete.

In the Republic of Korea, the government analyzed all content and forms related to all aspects of the procurement process, including the company registration process, tax filings, and all other components tied to the e-procurement system. It was able to consolidate over 750 different paper forms into about 160 electronic data forms. This activity facilitated the integration of its e-procurement system with 100 other government and private sector systems—for company registration, tax payments, financial management, and payment systems—to create a fully integrated end-to-end e-GP system. By fully defining all of the information components in the e-GP system, it facilitated the interaction and information exchange with other systems. The government also enabled the system to use various reporting tools to facilitate the bid opening and evaluation processes for a specific tender, and to analyze all tender activity across the government from one central information management system.
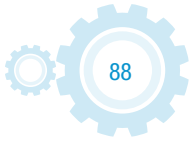
Other system implementations have undertaken similar activities, applying electronic forms and data to better support the procurement process by facilitating the creation of the tender package and corresponding bid responses. Each of these systems helps to ensure proper standards are applied for all procurement and provides better management reporting tools to analyze bid responses and overall procurement activity.

7.2.1.5   e-Auctions and e-Reverse Auctions

With e-auctions, framework agreements, and e-reverse auctions, price competition is carried out online, in a dynamic manner, and public sector undertakings that procure large quantities of standardized goods and services are amenable to any of the three approaches. e-Reverse auctions are no different from any other negotiating process except for the fact that the technology can ensure strict neutrality and fairness. On the other hand, there is the same susceptibility to collusion that exists for other methods.

An e-reverse auction is a mechanism by which a buyer can take advantage of dynamic competition among suppliers without compromising on the objectives of public procurement. The underlying requirement is to create genuine competition in the market. The buyer specifies the item to be procured, along with a base price. Registered suppliers then compete to offer the best price for the item, within a prescribed time frame. The vendor who quotes the lowest price before expiry of the time frame will be awarded the contract. The e-reverse auction mechanism can be used mainly for procurement of commodity items with simple, well-defined specifications, for which considerations other than price are not significant.

Some government e-GP systems apply only reverse auctioning while others follow the common sealed bid practice. Procuring agencies may find this works well when procuring goods with the same specifications, as a way to achieve the best price. Before conducting an e-reverse auction, the procuring entity should still conduct a technical bid evaluation to ensure the bidders participating in the e-reverse auction are providing the same goods or services. Further, the procurement agency could compare the final bid price in auction to the estimated contract price and then take a decision on whether or not to accept the bid. It should be noted that the e-reverse auction mechanism is only supporting another option for the financial evaluation. Bidders will normally start with a slightly higher bid price and determine the level of competition based on the current low response, which is displayed during the reverse option process. If there is little activity, the procuring agency may not be receiving the best price.

e-Reverse auctions are normally limited to goods or selected services where price is based on a unit of measure (UOM) for a specific item or defined service (such as specific cleaning services) and the evaluation consideration is primarily related to price. They typically do not support complex bidding in which technical evaluation parameters are applied that may affect the overall price proposals. Most governments will apply sealed bids for complex service or works tenders.

Many e-GP systems that use the e-reverse auction mechanism claim significant savings on the cost of goods and services; however, the same can be said for systems following a sealed bid approach. The main issue for governments is to ensure they are receiving the best value for the goods or services being purchased. Price validation can be achieved by comparing current price submissions with past awards to monitor any variance in the cost. With more e-GP systems coming online, procuring agencies now have the opportunity to check price points in other procurement systems to determine how their results compare.

Real savings for any procurement system will only be driven by competition. If there are only one or two bidders for a given commodity or service, there may not be significant savings regardless of whether the
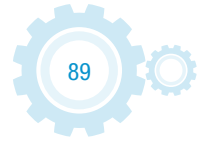
bidding was conducted through e-reverse auction or sealed bids. Governments need to make the effort to expand their supplier marketplace as much as possible to ensure that there is reasonable competition for the different types of procurement conducted on the system.

Legal sanctity for e-reverse auctions will need to be provided through provisions under the public procurement law. The policies should clearly define the cases in which an e-reverse auction mechanism can be adopted. The e-reverse auction implementation should ensure the confidentiality and integrity of the bids placed by the vendors. The details of the lowest bidder should be kept hidden from both the buyer and the other vendors.

Governments often do not appreciate that e-reverse auction methodology is usually unsuitable for large strategic or technical procurement. It is also unsuitable for small day-to-day procurement, and in markets where the risk of collusion is significant due to insufficient competition. Operators can easily manipulate e-reverse auctions in some systems.

7.2.1.6 e-Quoting—Purchase-to-Pay Tools

The acquisition of low-value, high-volume, and commonly used goods, works, and consulting services by direct quotation in the open market (or from prequalified suppliers), and payment for the purchase, constitutes e-purchasing activity. e-Purchasing functionality is relatively complex because there is a need to integrate workflows and transactions, as well as manage a wide variety of purchases and information flows, including banking for many buyers and many sellers. It requires greater involvement of the supplier community in working with online catalogs. e-Purchasing facilitates implementation of framework agreements, where the framework agreements would have been finalized by adoption of a call-off procedure (e-bidding or e-reverse auction). The software and systems used to handle online transactions between buyer and supplier are referred to as purchase-to-pay (P2P) tools. There are three categories of P2P tools:

(i)   buy-side systems focused on automation of workflows within government,
(ii) marketplaces that facilitate matchmaking between buyers and suppliers, and
(iii) sell-side solutions (web shops of suppliers).

This method is suitable for low-value goods and services, for which auctions and bidding processes are not appropriate; instead, a list of supply sources is used. This level of purchasing is expected to account for the bulk of the volume of transactions. The functional capabilities that make up an e-purchasing system suitable for public procurement include

(i)   many-to-many functionality (many buyers to many sellers);
(ii)   decentralized buyers and sellers;
(iii) search for suppliers by name, category, locality code, and contract;
(iv)   browse supplier catalogs;
(v)   comprehensive (100%) quote selection with minimum price benchmarking;
(vi)   generate and award all procurement requests for information and quotes;
(vii) create purchase requisitions;
(viii) generate purchase orders while including optional approver workflow;
(ix)   generate receiving (fulfillment) reports;
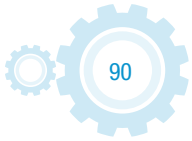
  (x)   allow for the customization of buy policies;
 (xi)   buyer data management;
 (xii)   supplier data management;
(xiii)   single sign-on (SSO) capability;
(xiv)   FMIS integration and interface;
 (xv)   reporting on all e-marketplace activity;
(xvi)   payment gateway integration; and
(xvii)   supply chain workflow management, recording, and reporting.

When quotations are requested in a traditional manual system, a minimum of three to five quotes are expected before the procuring authority can proceed with the procurement and select the supplier. Upon adoption of e-quoting, the best quote can be selected from the entire set of vendors offering the required product (100% sampling). The electronic mode allows for evaluating quotations from any number of suppliers without adding any cost or affecting the timelines of procurement.

When a specific good or service is to be purchased, the system automatically seeks quotations and selects the lowest bid within the buying rules (which may be specific to a given area or locality). The selected good or service is then ordered directly online from the supplier and the necessary funds to pay for it are automatically set aside within the FMIS. Once the order is delivered, the authorized person who accepts delivery inputs his or her acceptance into the system. A design with good business rules can minimize subjective intervention by the operator.

The system then automatically processes the payment order for the supplier, seeks payment, requires payment authorization, updates the accounts, addresses any tax issues, records an inventory update, and records the information in the database for use in governmental and public oversight. Often there is no inventory and purchasing proceeds on a just-in-time basis with delivery made to end users. The information transactions must be automatically tracked for subsequent use in auditing and review of individual transactions by any combination of purchasing individuals, organizations, suppliers, region, price, and product category.

The government can choose to mandate purchase of selected low-value items using designated P2P tools. Effective implementation of such mandates will reduce maverick buying by end users spread across the government.

7.2.1.7   e-Catalogs

e-Catalogs are key to more advanced e-purchasing programs. The e-catalog module will need to integrate with suppliers' electronic catalogs (if they have their own electronic catalog systems), and also provide other suppliers with the tools and system templates necessary to build and populate product catalogs on the government agency's system. Because prices and products are constantly changing, and because sellers may want to customize their catalogs for individual tenders or for framework agreements, the e-catalog module must allow many thousands of suppliers to classify, code, price, and upload their products and continuously manage their portfolios online.

From the contracting authority's point of view, this module must allow government buyers to search quickly and easily for products in supplier-managed catalogs, create requirement documents, short-list suppliers, and verify in-stock and out-of-stock items. For framework agreements, governments may also

Figure 8   Classification versus Identification of Items

Classification Codes

- Classifies products in relation to each other
- Ordinal/Hierarchical
- Management analysis
- Market research
- Supports e-market catalogs
- Supports common language market search

Identification Codes

- Uniquely Identifies products
- Nominal/Unique
- Tracking information
- Audit
- Supports in-house bookkeeping
- Supports common language inventory control

want to make sure that the module includes a blanket purchase order function that will allow for automatic re-ordering, and will alert the purchasing agent if the agency is exceeding predefined thresholds, requiring a manual sign-off, or if the framework agreement or contract is expired.

Catalogs for e-GP require the inclusion of classification codes as well as identifier codes. Classification codes are required to allow analyses to roll up data into summary form for reporting and analysis. For example, a financial report may present procurement expenditure in terms of broad categories of items, such as IT equipment or vehicles. Thousands of line items are summarized and examined in as much detail as necessary. In the paper environment, classification codes are less important simply because there is little opportunity to access, aggregate, and analyze the data since it resides in paper format and spans numerous filing cabinets. Figure 8 shows the differences between identifiers and classifiers.

It is also necessary to have a further entry for each item that allows for a common word description as well as a picture. The classifier should be an international code such as the EU Common Procurement Vocabulary (CPV)[40] or the UNSPSC.[41] This helps promote international consistency to facilitate trade, and

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[40] The CPV consists of a main vocabulary for defining the subject of a contract, and a supplementary vocabulary for adding further qualitative information. The main vocabulary is based on a tree structure comprising codes of up to nine digits (an eight-digit code plus a check digit) associated with a wording that describes the type of supplies, works, or services forming the subject of the contract. More information is available at http://simap.europa.eu/codes-and-nomenclatures/codes-cpv/codes-cpv_en.htm

[41] http://www.unspsc.org. A free webinar is available at http://www.unspsc.org/education
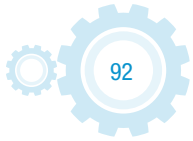
is also consistent with international customs codes. The cost for a government to create and maintain its own catalog codes would be significant and provide no additional value.

7.2.1.8   P-Cards—Government Purchasing Cards

Purchasing cards (p-cards) are similar to charge cards, and are used to procure low-value and high-volume transactions. They are considered an effective tool for generating reports on utilization of framework agreements. Purchasers in government are provided with p-cards and usage can be restricted to certain categories of items, to a certain transaction value, and by the total value of purchases in a certain time period. Suppliers typically handle p-card transactions using the same electronic systems already in place for credit card transactions. Information about the category of item purchased is captured at the time of the transaction and passed on to the p-card service provider. On a periodic basis, p-card service providers consolidate purchase information and send out monthly statements with details. P-card service provider charges range from 1% to 4% of purchase value.

The key benefits of implementing p-cards are that

> (i)   transaction charges are reduced when compared with manual invoice processing (a study by the Government of the United Kingdom estimates savings from use of p-cards at £28 per transaction [OGC 2005]),
> (ii) suppliers tend to offer better prices since payment due to them is credited promptly, and
> (iii) SMEs find p-card transactions particularly beneficial since they improve cash flow.

7.2.1.9   e-Payments and e-Receipts

All payments in the procurement process should ideally be handled electronically. There are two types of payments that e-GP is concerned with:

> (i)   payments to suppliers (e-payment) for goods, works, and services supplied; and
> (ii) payments received by suppliers (e-receipt) for
>
>> (a) tender documents or tender processing fees,
>> (b) bid security deposits or electronic performance bank guarantees (unless bid securing declarations are used instead), and
>> (c) other fees for value-added services delivered.

Payment to suppliers for works, goods, or services delivered can be paid by electronic funds transfer (EFT) or by p-card functionality.

Two key prerequisites for e-payment using EFT are that

> (i)   the country's banking system should enable electronic transfer of funds across banks; and
> (ii) the e-GP system should be interlinked with the treasury system, where the payment to suppliers is routed through the treasury.
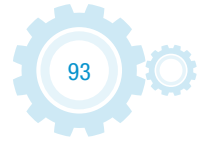
From the outset of e-GP implementation, the receipt of registration and transaction fees, and the receipt and refund of bid and performance securities, should be handled electronically. Payments made through direct debit or by credit or debit cards might facilitate this. A central pooling account can be set up in a principal bank to electronically handle the registration and transaction fee receipts (nonrefundable) and securities and their refunds. The selected bank should be required to tightly integrate its e-payment solutions with the e-GP system.

Contractors should transact funds through a set of approved banking instruments such as

   (i)   credit card, purchase card, or debit card;
   (ii)   internet banking;
  (iii)   EFT;
  (iv)   real-time gross settlement; and
   (v)   remittance at the designated principal bank counter (traditional), over the counter.

The e-payment system design should ensure that suppliers are not required to open an account with a particular bank and that they may receive and make payment wherever they manage their existing accounts. Other modes may also be considered, provided that the following requirements can be met without manual intervention:

    (i)   **Payment acknowledgment.** A unique, irrefutable reference number is generated as acknowledgment for the payments made by suppliers. The reference number should conclusively inform the government that either the funds have already reached the government pool account or will reach it very soon.
   (ii)   **Payment reconciliation.** The reconciliation process reconciles the payment received in the central pooling account with the specific service request for which the payment was made (using the reference number for the service request).
  (iii)   **Payment timelines.** The e-GP system should be able to ascertain that the payments have been received, within a reasonable period of time (a maximum of 2 working days).

Payment functions will eventually become a requirement for any e-GP system. A number of governments require payments during the procurement process for accessing bid documents, to participate in bids, or to register with agencies. Payments or forms of bid securities also need to be supported in the procurement process.

The e-GP operator has several options when it comes to payment gateways to support e-payment, such as PayPal, online credit card payment, and direct debit, as well as options for mobile payment through cell phone operators. However, the implementation of some of these online payment services may be difficult or onerous in certain countries due to inherent problems with credit card fraud or processes that may still require authentication and signatures. Some government organizations may also require special approval or have a reluctance to establish a merchant account in order to accept credit card payment, or the online payment support within their local bank may not be as advanced as it is in developed countries. The government may also be restricted in its ability to integrate with its own internal financial management systems to manage the payment process and accounting procedures that should be applied when collecting and distributing funds through the system.
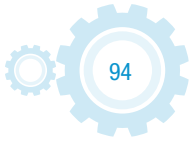
The e-GP system designers will need to look at more than just the interface required to support online payment. They will also need to consider the back-end banking support available as well as the account management functions needed to reconcile payment transaction with corresponding system activity. In the case of a national system, the system may need to redistribute fees back to individual procuring agencies when an agency requires bid form fees for its tender process.

Consideration also needs to be given to how bid securities will be handled by the system. In most cases, a bid security may take different forms, such as cash, check, or credit line. Unless the banks are fully integrated in the procurement process, it is difficult to manage a credit line in the system. The MDBs suggest the use of a bid security declaration in the bidding documents in lieu of a monetary bid security to avoid the need for e-payment functions for the bidding process.

In lieu of online payment functions, some e-GP implementations and procuring agencies will require scanned copies as proof of payment for any fees or the bid security instruments to be submitted before closing when conducting electronic bidding. They do this to avoid having suppliers deliver a physical document before the bid closing when the goal is to move to electronic procurement. However, suppliers are still required to have the original documents at the public bid opening or before the evaluation if they are the ranked bidder, depending on the individual policy of the procuring agency. Other procuring agencies require both a scanned copy of the instrument to be submitted with the electronic submission and the originals to be submitted before the bid closing time to ensure they have all required documents and payment documentation before the bid opening. The belief here is that the original bid security is required for the opening; otherwise it may never be delivered if called upon as a method for withdrawing a bid.

When e-payment functions are not supported in the system due to various administrative issues, the procuring agency may also require the supplier to submit required payment for bid form fees directly to the agency before the bid closing time as part of the bid submission process. The MDBs prefer not to charge fees for bid forms, as the fee may present a barrier to participation.

Like the procurement process, the e-GP system is only supporting a payment process by facilitating a payment transaction between the supplier and the purchasing organization, or the system in the case of a system transaction fee. The system is not actually receiving or delivering payments. The system is merely passing payment requests through the appropriate payment gateway or financial management system within the government that is responsible for making a payment to a supplier. When a payment function cannot be directly supported electronically, a manual workaround is normally required to support the process. Government organizations may consider other payment options such as the use of purchasing cards to facilitate the payment process for selected transactions.

Once a system starts collecting and managing payment functions, the e-GP system operator will require a certain level of account administration and financial management functions to audit and monitor system accounts.

7.2.1.10   e-File Management and Workflow Management

All e-GP modules will tie into a central file management system that will convert all related electronic documents into common formats and store them centrally, so that they can be accessed by multiple modules and other applications. The file management facility is critical to the security and reliability of the system. The workflow functionality of the system should support the contract management aspects of e-tendering and e-purchasing, by routing documents electronically to all the parties involved in the approval process, such as finance, legal, or receiving.

7.2.2 Procurement Management Information System

While the preceding discussion refers to various methodologies for procurement (such as bidding, auctions, and payment), equally or even more important is the capacity to access, organize, and analyze procurement information. It is this capacity, commonly referred to as the procurement management information system (PMIS), that provides the most potential for adding value to e-GP. This system provides for contract management, tracking, planning, performance assessments, auditing, and reporting.

The initial portal strategy is often regarded as the centerpiece of e-GP; however, it adds relatively little value unless it is accompanied by the information and management systems associated with procurement workflow, control, and budgeting. There is a need, at an early stage, to initiate the development of PMISs to establish national standards and guidelines while interoperability can still be ensured. The development of the PMIS is not dependent on web portal services, but requires extensive knowledge of procurement, and therefore should not be delayed while waiting for take-up of those services. There is major value to be gained through use of a PMIS for procurement reform even without the operation of a web portal.

Figure 9 Information Registry and Procurement Management Information System
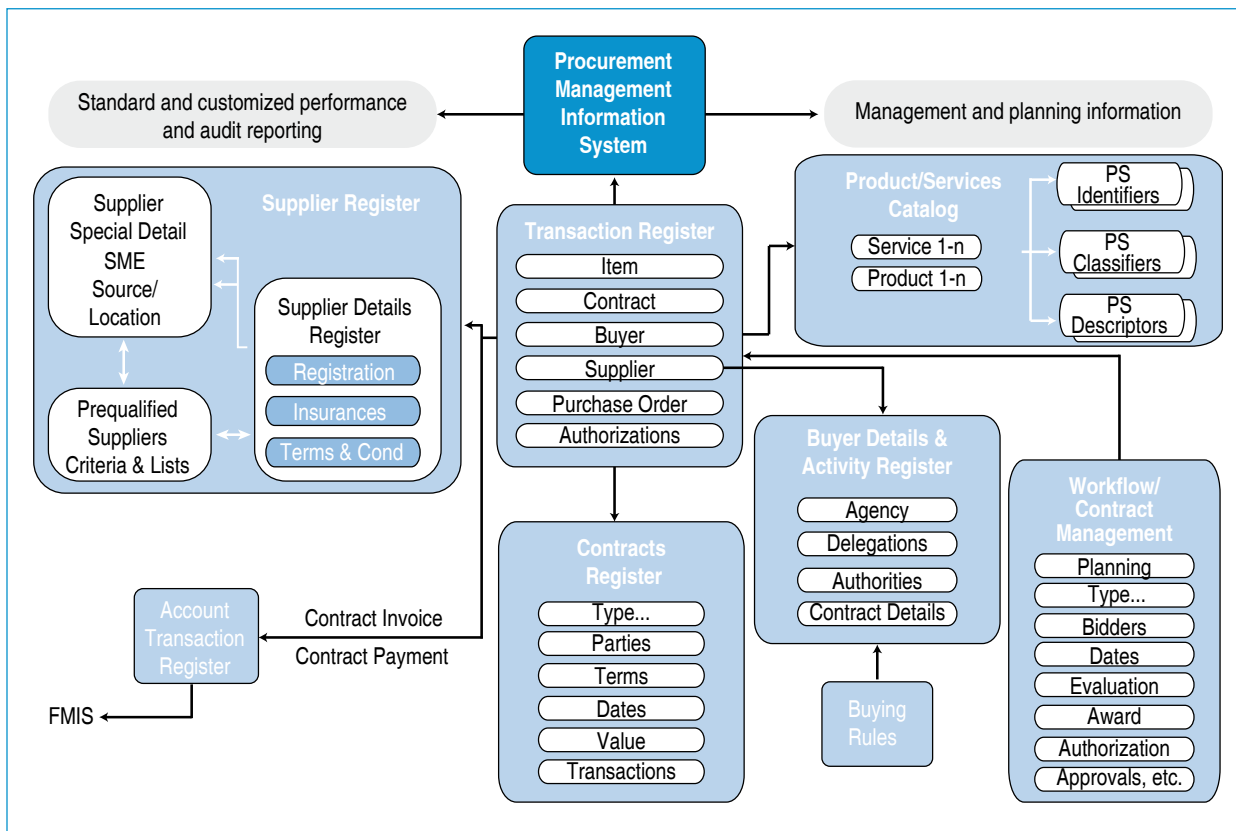
FMIS = financial management information system; PS = product and service; SMEs = small and medium-sized enterprises.
Source: P. Schapper. 2008. Presented during the World Bank workshop to the Government of Indonesia in May.
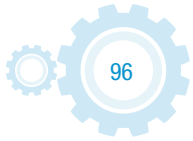
The work that is undertaken to consolidate the PMIS is closely related to the management systems for procurement in each agency. A standardized, quality-assured workflow process should be developed within the e-GP system and promoted among jurisdictions. The opportunity should be taken to review current rules and management processes of the pilot agencies as well, in order to identify those that can be streamlined, modified, or abolished in the electronic environment.

It is recommended that the development of the PMIS become a central part of the e-GP agenda. All standardized documents as well as guides, policies, and legislation should be made available online. The PMIS must also include workflow and authorization trails, and all information transactions in any part of the procurement process including contract management, contract planning, and interactions between stakeholders.

7.2.2.1   Procurement Planning

Procurement planning includes budgeting, supplier analysis, and spend analysis. The e-GP system should allow the government to analyze procurement activity, providing monthly, quarterly, or annual budget data, broken down by suppliers, purchasing officers, department or agency, and product category, and highlighting overspends or violations of set budget limits.

The PMIS is essential for comprehensive spend analyses, which should be undertaken quarterly or at least annually on a departmental or ministerial basis, and on a whole-of-government basis. Spend analysis reviews what is bought, who are the buyers, the transaction values, volumes, and trends. This analysis provides the basis for the implementation business case and a list of baseline measures from which key performance indicators can be developed.

Areas of such analyses include

    (i)   transaction analysis: the number and value of transactions;
   (ii)   requisitioning activity: identification of the main buyers within an agency;
  (iii)   supplier analysis: the number of transactions per supplier;
  (iv)   off-contract spending: the number of suppliers used for the provision of similar goods or services, and whether a local and/or central contract is in place for specific supply;
   (v)   category management: all relevant spend is included to maximize procurement leverage—without category management there is a danger that the purchase of common use items is spread across government agencies in quantities that are too small to get volume discounts and attract manufacturers, rather than intermediaries to supply the government;
  (vi)   priority adoption lists: for users and suppliers, and timescales for their adoption;
 (vii)   payments: the current payment methods;
(viii)   payment errors: a measure of potential cost savings; and
  (ix)   late interest payments: a measure of potential cost savings.

These and other requirements are addressed in Figure 9, which provides a guide to the scope and modules of the PMIS. The functionalities under the PMIS do not represent a single monolithic structure, but a combination of modules. Although a consistent architecture can apply, these PMIS functionalities need to be readily customized department by department because they reach into mainstream management delegations and processes.

7.2.2.2   Integration with Inventory Management

Further reduction in public procurement expenditure can be achieved by integrating inventory management systems with the PMIS. Capturing the key inventory data and obsolete items data in the PMIS, and laying down guidelines in procurement policy regarding minimum inventory levels for emergency situations, inventory management, and disposal of obsolete items by way of sale through e-auction, would lead to substantial efficiency gains. Inventory may be decentralized, but its management can still be centrally coordinated—there should be scope to identify stock surpluses in one part of government before reordering takes place in another part of the same government, for example.

7.2.2.3   Contract Administration

In terms of managing procurement contracts, the PMIS should include the following capacities:

(i) **Contract variations.** The system should record and publish price variations to the awarded price per line item or quantity purchased. A full audit trail of the contract and price variations is recorded.

(ii) **Contract extension.** The system should manage the contract extension process. Many contracts are let for an initial period with the option to exercise extensions for further periods. The system should provide an early warning report of contracts that are due to complete their current term. There can also be an automated report to show multiple extensions of the contract (this may arise for legitimate reasons, or may reflect poor practice).

(iii) **Contract cancellation.** The system should manage the contract cancellation process and maintain an evidence trail for future review and legal proceedings.

7.2.2.4   Interface with the Financial Management Information System

The interoperability of the e-GP system with other management systems is an important part of gaining full benefits from the technology. Figure 9 shows an interface between the account transaction register of the PMIS and the financial management information system (FMIS). There are clearly close relationships between procurement activities and budget management and planning, including progress payments, forward scheduling and contract commitments, inventory, and performance assessment and reporting. The efficient exchange of information should not be obstructed by differences in platforms or standards between the leading government entities. This issue underlines the importance of establishing whole-of-government enterprise architecture.

While an efficient interface between the PMIS and the FMIS is essential, it is widely considered that for the public sector these are separate systems. The PMIS needs to be accessible with two-way data exchange between many buyers and many sellers, and to include the numerous operational considerations and authorizations for procurement that are likely to change on a daily basis. Adapting an FMIS to undertake these and other management functions is sometimes costly and difficult. Programming an interface between the PMIS and the FMIS is likely to be a more effective and efficient route.
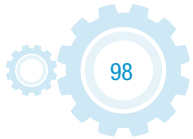
7.2.3   Standardization of Tender Documents and Interactive Bid Forms

7.2.3.1   Standard Forms and Templates

Standardization of key procurement processes is an important enabler for bringing efficiency and transparency into public procurement. Though the implementation of e-GP will bring some amount of standardization to the processes of public procurement, there is a need to reinforce standardization through business process reengineering (BPR), which will accompany document standardization. Departments can be expected to resist some of these efforts to impose standard documents, claiming that their needs are unique.

During various stages of the procurement process, buyer departments prepare various documents for the vendor and buyer community and other stakeholders. These include annual procurement plans, early information notices (general procurement notices), prequalification notices and notices inviting bids (specific procurement notices), bid documents, procurement summary reports, and others.

The following documents, used throughout the procurement process, should be standardized. This standardization process is an important step to ensure the efficiency and transparency that accompanies e-GP implementation:

  (i)   annual procurement plans,
 (ii)   early information notices (general procurement notices),
(iii)   EOIs and invitations for prequalification,
 (iv)   bid summary notices,
  (v)   requests for proposals and bid documents,
 (vi)   bank guarantee formats for security deposits and performance guarantees,
(vii)   letter of award,
(viii) contract standard terms and conditions,
 (ix)   contract formats, and
  (x)   procurement summary reports.

The e-GP system should provide these templates so that standard bidding documents can be automatically generated by combining the static (non-modifiable) parts of the document and user inputs (for the customized parts). The e-GP system needs to facilitate auto-generation of other procurement documentation in standard format, using the inputs provided by the procuring authority. At each stage of the procurement process, auto-generation and auto-publishing of the documents should be enabled.

Finally, it should be emphasized that just because these forms have been standardized, this does not mean that they have been reformed suitably for technological analyses. The BPR process should review the work practices behind each document and make revisions so that comprehensive data is automatically downloaded from each template in a form that allows auto-generation of standard analyses.

7.2.3.2   Interactive Bid Documents

Reading and downloading tendering documents is only the supplier-facing portion of the application. e-GP modules also allow government contracting authorities to assemble and prepare proposals and invitations to tender. The government contracting authorities may involve public sector personnel from purchasing

departments as diverse as central government agencies, local authorities, universities, hospitals, and the myriad of public departments that may be using the system for public e-procurement. Putting together tender documents can be a complex task, often involving many employees from disparate parts of one or more agencies, so it is important the system is easy to use, reliable, and flexible enough to allow government employees to collaborate online to create the procurement documents.

The response times for testing the performance of an e-GP must be measured in a database that has preloaded a considerable amount of data, simulating the performance of the system in real conditions. In addition, actual use of the system will have to be simulated including concurrent data uploads and downloads.

8

e-Government Procurement Technical Requirements and Specifications

To realize its full benefit, an e-government procurement (e-GP) system has to be interoperable with multiple external systems (such as those of banks, certification authorities, and suppliers) and internal back-office systems (such as those of the treasury and for income taxes). The exchange of information between the e-GP system and the external systems during different phases of procurement should be seamless.

Technical considerations related to e-GP implementation include information security, interoperability, reliability, scalability, and availability. Apart from ensuring reliability, it is also recommended that governments establish mechanisms to handle potential system disruptions by applying business continuity planning (BCP) and disaster recovery plans (DRPs). Key system components of e-GP that should be included in any risk management strategy include content management, access control management, workflow management, and system integration. The information issues of authentication, authorization, confidentiality, integrity, and non-repudiation also need to be addressed within the risk management framework, along with virus protection and other security threats.

Additional technical requirements to be considered include use of single sign-on (SSO) capability so that users log on once and are able to access all appropriate services in e-GP based on authorizations created for them in the system, use of server certificates supporting secure communication over an encrypted Secure Sockets Layer (SSL) session, and extensive audit trail facilities implemented for every electronic procurement and administration activity performed through the system.

By applying a service-oriented architecture (SOA) paradigm to the design of core components, e-GP system implementers can ensure a significant improvement in system flexibility, while leveraging the benefits of reuse at the same time. Online help can be offered, providing assistance at any time to users performing activities in the system through means such as in-context sensitive help, user manuals, wizards, walkthroughs, and online demonstrations.

The e-GP system should also include performance measures to assist with administration, establish maintenance criteria, and generate performance standards.

Technical issues related to e-GP implementation include information security, interoperability, reliability, scalability, and availability. Apart from ensuring reliability, governments are recommended to establish mechanisms such as business continuity planning (BCP) and disaster recovery plans (DRPs) to handle potential system disruptions. All of these issues need to be taken into consideration, regardless of the platform or service provider. Additional technical considerations relate to the requirements and specifications for key system components of e-GP such as content management, access control management, workflow management, and system integration. Technical considerations for e-GP should be addressed in a comprehensive risk management framework that also examines the information issues of authentication, authorization, confidentiality, integrity, and non-repudiation, along with virus protection and other security threats.
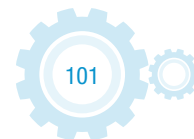
To realize its full benefit, an e-GP system has to be interoperable with multiple external systems (such as those of banks, certification authorities, and suppliers) and internal back-office systems (such as those of the treasury and for income taxes). The exchange of information between an e-GP system and the external systems during different phases of procurement should be seamless. e-GP should seamlessly, securely, and efficiently address the specific requirements of many different user types, including

    (i)   procuring entities in government and their employees,
   (ii)   suppliers and potential suppliers,
  (iii)   the general public,
  (iv)   civil society organizations and nongovernment organizations,
   (v)   banks,
  (vi)   certifying agencies (if used),
 (vii)   auditors, and
(viii)   multilateral development agencies.

To enable seamless, cross-platform interactions, e-GP should use open standards-based system development and communication protocols. Interfacing or integration with external systems should support both synchronous and asynchronous communication (message exchange) between the e-GP system and external systems.

8.1   Security

Security requirements and standards are crucial, especially since e-GP systems are used to handle high-value transactions in an internet environment. Security should be implemented and audited holistically, not only from a software implementation point of view, but also from the view of the processes associated with e-GP implementation.

Secured communication mechanisms, protocols to exchange information with external systems, and secured storage of sensitive bid data should be set as per international standards. The system should include protection from denial-of-service attack, virus attack, and hacker intrusion. Bid data should be in an encrypted form during transfer (transit) and storage, and should not be decrypted until the scheduled bid opening date and time. Strong security standards need to be implemented throughout the life cycle of procurement processes handled by e-GP.

Because tendering or framework agreements form the basis for a legal contract, an e-GP system must ensure that all data is kept secured, complete, and auditable. This means the system must satisfy the following requirements for electronic notices: proof of issuance, acknowledgment of bid receipt, and irrefutable identification of the bidder and the bid recipient. The system will need to support encryption and decryption functionality, as well as the components of security and integrity necessary to maintain electronic records and a verifiable audit trail. Most systems will provide security features such as an "electronic vault," which prohibits any e-GP user, except for the concerned bidder, from accessing and knowing about electronic submissions before the bid submission timeline.
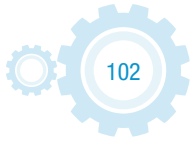
From an infrastructure perspective, the system should have the proper firewalls, intrusion prevention systems, and security processes in place to prevent or limit any unauthorized external access to the system. From the system application viewpoint, the government needs to define implementation of access controls within the software application. Will the system be managed simply by user identification and passwords internal to the system, or will users be required to sign in using a valid digital key issued by an external certification authority and acknowledged by the system for user identification, digital signing, and encryption of bids and any associated documents?

8.1.1   Encryption of Bids

A bid submitted by a supplier typically contains technical details (the bidder's capabilities and experience) and sensitive commercial bid information. The commercial bid information submitted has to be kept secured (encrypted) until the commercial bids are opened on or after the due date for commercial bid opening specified upfront during tender preparation. The use of asymmetric key pairs for encryption of commercial bids is recommended, where the public key of a designated official from the procurement entity is used to encrypt the data and the corresponding private key held by that designated official is used to decrypt the encrypted data.

The e-GP system has built-in controls to ensure that the designated official will have the option to decrypt commercial bids only after the expiry of the commercial bid opening date specified, including any change in opening dates issued by way of corrigendum on or before bid submission date and time.

A bid is effectively secured in an e-GP system when suppliers lock their commercial bids using their own keys. This would imply that suppliers have to apply the corresponding key to unlock their bids by a certain date so the tender evaluation process can proceed. This method of securing a bid, however, carries a risk that one or more of the suppliers may not unlock their bids on time. The procurement entity may then find it difficult to make a decision as to whether or not to reject the bidder or wait for the bidder to unlock the bid.

Governments need to evaluate the various options available for implementation of security and understand in detail the implementation of security in the e-GP system:

 (i)   How is the encrypted information managed in the system and protected from unauthorized access?
 (ii) What if the government user reports loss of the private key required for opening a document? Should there be a duplicate of the key? If yes, who is responsible for securing the duplicate key?
 (iii) What is the process for associating a digital key with a user in the e-GP system? How is key expiry managed?

8.1.2   Security Governance

Implementation of security in an e-GP system must be administered under a strong governance framework. For example, data backup policies, supplier and government user identification creation, and changes in security settings on the server side have to be performed as per approvals accorded by the government.
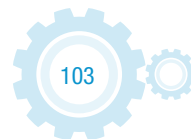
This requires not only that the appropriate security tools (firewalls, encryption, and time locks) are in place, but also that the management around the system is secure. There are international risk audit standards and methodologies that apply, such as those published by the Information Systems Audit and Control Association (ISACA 2011a), that link with organization-wide risk management concepts and approaches, such as Enterprise Risk Management Integrated Framework of the Committee of Sponsoring Organizations of the Treadway Commission and ISO 31000.

A competent e-GP system has to be compliant and regularly audited against these international standards. Ideally, security standards should be verified and confirmed by a reputable third-party audit agency. The MDBs require e-GP systems to be audited and audit findings made available to MDB staff prior to use of a system for handling procurement in MDB projects.

Where the systems are hosted in an external source (for example a public or private cloud service)[42] certain concerns are raised about data security, audit trails, and transparency of controls. Governments need to establish service-level agreements (SLAs) to manage the risks of an e-GP system hosted in an external environment, outside their control. Such SLAs need to remedy concerns identified in international standards of risk management. For cloud operations specifically, certain security questions have to be addressed,[43] such as

   (i)   What level of visibility into the specific cloud environment is available?
  (ii)   What are the availability guarantees and resiliency capabilities and how are these supported?
 (iii)   What guarantees of risk management and security are provided?
  (iv)   How are the solutions and services protected from denial-of-service attacks?
   (v)   How comprehensive and mature is the information risk management and security program and the capabilities it provides?

The same requirements apply in relation to the system functionality and access standards. These should be subject to periodic audit to ensure continuing compliance.

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[42] ISACA (2011b) has stated that "At the time of writing, there is no comprehensive and commonly accepted standard to address the technical risks in cloud environments. There does exist, however, a hierarchy of approaches such as checklists and scenario generation techniques that require the user to have only a minimum knowledge of information systems security. To have a well-defined scope for the checklist, cloud managers can follow the formats that are provided by British Standards or the US National Security Agency (NSA). The NSA suggests using 18 areas for information security assessment, which is more comprehensive than the British Standards. It is suggested to follow the NIST's guidelines for ranking threats, use NSA's 18 areas of information security assessment, and use checklists for vulnerability assessments that can lead an organization to estimate probabilities of the occurrence of incidents and quantify information security risks."

[43] These have been raised by John P. Pironti, CISA, CISM, CGEIT, CRISC, CISSP, ISSAP, ISSMP ISACA Vol15
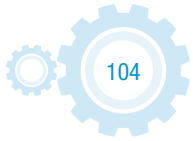
8.1.3   Authentication

User authentication is central to the operation of e-GP. Prospective bidders want confirmation that bid documents made available through the e-GP portal are authentic. Similarly, government users require assurance that a bidder participating in a tender is authentic and does not have a duplicate identity in the system.

In a manual system, bidders would normally purchase or receive a copy of bidding documents directly from the procuring entity and, if required, register themselves as prospective bidders. In this instance, bidders know the source of the bidding documents. Bidders are typically required to apply physical signatures on certain prescribed forms from company management and stamp bid documents to confirm authenticity of their bid. Governments also validate successful bidders during a postqualification process to ensure authenticity and accuracy of the submitted bid before signing contracts and issuing notice to proceed.

To properly manage and support electronic transactions conducted within e-GP systems, support for the system business practices for authenticating users is required. The level of security and validation is dependent upon the system functionality supported. For e-publication systems used only to publish tenders and distribute bid documents, simple user identification and passwords may be sufficient to identify a user. As the main purpose of the system is to distribute information, this level of validation would be appropriate to ensure the validity of the main contact information—the e-mail address to be used to send information and messages. Validation can be performed by sending a link to the e-mail address, which the user would then use to complete the registration process in order to receive a user identification and password. Such basic registration would not confirm validity of the organization or its ability to participate in a bid.

However, if a government intends to extend its e-publication module to add e-bidding and other transactional functional components, it is advisable to validate suppliers as a prerequisite for registration and user identification generation. Two key validation criteria are (i) whether a supplier is already registered in the system and (ii) whether a supplier is a valid entity.

Unless an e-GP system is well evolved to allow electronic submission of experience certificates and integrated with external systems to allow electronic submission of tax and company registration details, individual procuring entities would have to authenticate and validate bids or information received from suppliers, just as they do in the manual tendering system. To enhance ease of access for bid submission, governments can accept electronic copies of bids from suppliers with the implementation of e-bidding. If electronic documents are not considered legal, a government would require submission of original manual copies from the ranked bidders, complete with the original signatures to recognize and authenticate from a legal perspective.

The more business transactions supported by the e-GP, the more security and authentication processes need be incorporated and supported by legislation to recognize the validity of electronic transactions and digital signatures associated with the transactions.

Digital signatures and authentication in e-GP systems, like manual paper-based systems, have two important requirements. First, they need to recognize the legal status of a transaction and second, from a business perspective, they need to establish a level of trust and security for the process and the environment in which they operate. The legal status and security of the e-GP system are two separate issues that are often blended together as system implementations attempt to apply the same technology solution to address both

Figure 10   Authentication for e-Government Procurement
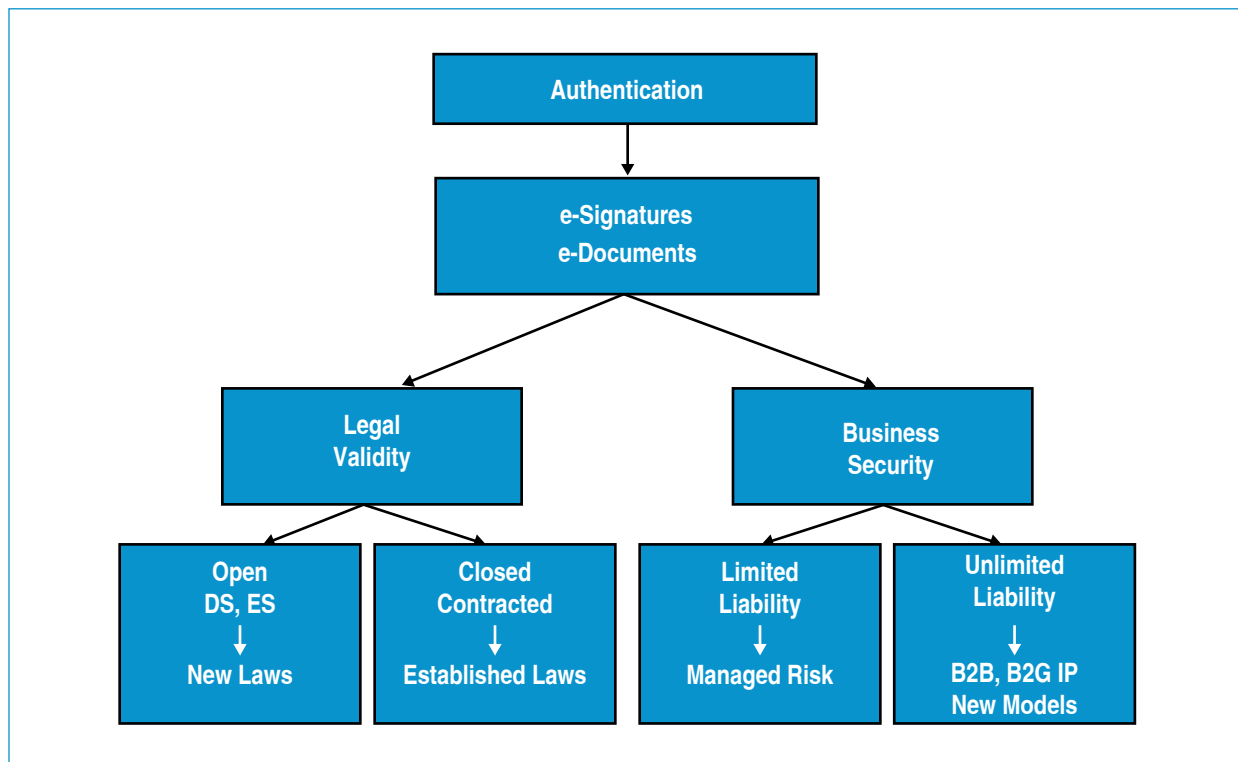
B2B = business-to-business; B2G = business-to-government; DS = digital signature; ES = electronic signature; IP = intellectual property.

Source: Multilateral development banks. 2004. *Authentication & Digital Signatures in E-Law and Security.*

issues. The first version of the MDB e-GP toolkit includes the report *Authentication & Digital Signatures in E-Law and Security,*[44] which specifically addresses the authentication requirements, legislative issues, and technical options that have been applied, including a chart (Figure 10) that illustrates the requirements associated with authentication within an e-GP system.

8.1.4   Public-Key Infrastructure

One of the most common approaches for supporting digital signatures is use of public-key infrastructure (PKI). With PKI, each user receives a unique private and public key which is used to encrypt and authenticate a transaction or document. The proper application of the private and public key pairs by a user allows the e-GP system to validate the origin of a transaction or document and ensure the security of a document. A document encrypted using the public key of a user (Mr. Tom), can be decrypted only by the corresponding private key in possession of that user (Mr. Tom).

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[44] See MDBs (2004a), available at http://www.mdbegp.org/
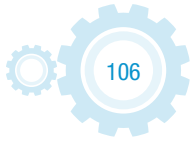
While PKI sets the foundation for a secure environment, the application of PKI as a technology on its own does not truly establish the authentication of a user without a certification process that authenticates the user before assigning a digital certificate. Most of the work associated with the issuance of a digital certificate is related to the validation of the user and the information they provide as part of their registration process.

In some jurisdictions, the issuance and management of digital certificates is handled outside the e-GP implementation through the use of a third-party certification authority—an organization that has been authorized to issue digital certificates to users. Digital certificates are normally issued for 1 to 2 years and will require users to renew before the expiry date to ensure their associated information is up to date. The e-GP system accepts the authenticity of the certificate and uses the information associated with it to validate the information provided by the user during the registration process. The e-GP system should ideally verify the certificate with the certification authority each time it is used to ensure the certificate is still valid and has not been reported lost or stolen by the original owner.

The e-GP system may also incorporate PKI infrastructure or other security process within its own infrastructure and assume the responsibility of authenticating the user before issuing a digital certificate or password. Where jurisdictions have opted to manage the issuance of certificates within the e-GP system, this is normally done to minimize the cost associated with the use of third-party certification authorities, as most private sector certification authorities charge annual fees for a digital certificate and the authentication of user information. If a government is already validating the user information, it may not see any advantage to subjecting users to additional external fees in order to access the system.

To ensure that there is an open policy for the issuance of digital certificates, the policy for authentication should comply with the following:

(i)   The certification process shall certify bidders for a reasonable period of time (at least 1 year) and bidders shall not be required to request a certification for each bidding process.

(ii) The certification process shall be kept open permanently, allowing bidders to submit the request for certification at any time to allow them to register in advance for future bidding processes.

(iii) The certification process shall allow bidders to take all actions required for their certification within their own countries, without the need to travel abroad.

(iv) The certification process shall accept an electronic signature or a digital certification or signature issued by certifying authorities within the country of the bidder, or the process shall accept submission of online or offline documentation for certifying the authenticity of the bidder representative, accepting such documentation that can be obtained under commonly used procedures in the country of the bidder (for example, notarization in a consulate or embassy shall not be required).

(v)   The certification process shall not require bidders to submit mandatory information with origin outside the bidder's own country.

To ensure that commercial aspects of the service are only accessible to users with a verified identity, e-GP may also provide information on procurement requirements, procurement entities, updates, and other areas to all the users of the system without verifying the identity. However, for any transactional services such as submission of bid documents, the system should verify identity prior to initiation and commitment of a transaction in the system. There are different standards of authentication, and the required standard should be proportional to risk.
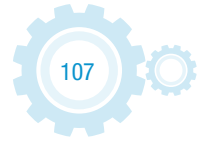
8.1.5   Authorization

Strong systems have to be put in place to ensure that assignment of privileges to a user is properly performed in an e-GP system. Authorization levels are defined at the system level and also at the workflow-based specific process level. Users can access only those services or data corresponding to their role and access rights. All workflow activities will be stored in an audit log. Workflow activities will be based on an authority register, which stores the user permissions to carry out authorized procurement activities.

8.1.6   Confidentiality

An e-GP system should be designed to ensure that the data exchanged between entities is not intercepted or accessed by an unauthorized third party. Strong internal management policies and governance systems have to be put in place to ensure that confidentiality is not breached.

8.1.7   Integrity

An e-GP system should have built-in controls to ensure that data exchanged between entities has not been modified or tampered with by a nonauthorized third party. Integrity of data transfer is validated by generation and verification processes at source and destination of transfer.

8.1.8   Non-Repudiation

A key requirement in e-GP is that once users take certain actions (e.g., bid submission or approval of technical bid evaluation), they should not be denied by the system at a later point in time. Proper systems have to be put in place to irrefutably attach a user to an action in the system. Other considerations include

    (i)   data storage and bid security;
    (ii)   time-stamping;
    (iii)   reporting, logging, and monitoring;
    (iv)   security architecture and management;
    (v)   interoperability;
    (vi)   scalability and availability;
    (vii)   data exchange standards;
    (viii)   catalog format standards; and
    (ix)   multilingual requirements.

8.2   User Security and Administration

User profile management involves the management of user profiles, including secured storage of personal details, while authorization identifies different roles a user can undertake within the e-GP system. The e-GP system should also provide for single sign-on (SSO) capability so that users log on once and are then able to access all appropriate services in the system per the authorizations created for them. The e-GP system
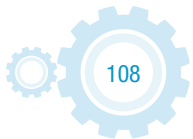
needs to facilitate access to content and services based on type and use of the content made available through the system based on users' roles.

e-GP systems should support industry-standard methods of user registration and authentication. The system may support options including standard user identification and password, PKI-based authentication using digital certificates, or biometric authentication with SSL connections. e-GP systems should clearly distinguish and educate system end users about the services provided by the e-GP system and the type of authentication required for respective services. Two primary options for user registration and authentication are user identification and password, and digital signature certificates.

8.2.1   User Identification and Password

User registration based on user identification and password is the prevalent approach in many countries such as Australia, Canada, Singapore, the UK, and the US, and in most commercial applications including the banking industry. This approach is acceptable under the UNCITRAL Model Law on Digital Signatures (2006). Requiring the use of a valid digital signature certificate (DSC) creates hurdles in user registration, especially for foreign companies seeking to register and participate in an e-GP system, adversely affecting cross-border commerce. However, it is imperative that a well-defined user registration system with proper validations is put in place to ensure that a user is (or represents) a valid entity and the user (or the entity represented) has only one single identity in the system. The process of user identification creation, including submission of user credentials for registration and authentication, should be performed using a secure SSL connection.

8.2.2   Digital Signature Certificates

Some countries permit authentication for e-GP only through digital certificates and PKI. This approach is based on the earlier UNCITRAL Model Law for Digital Signatures (1996) and is commonly used in the EU and much of Asia. DSCs can be a hindrance for some categories of business that either find DSCs costly or face practical challenges in procurement of the DSC system.

India and the Republic of Korea have applied DSCs through PKI infrastructure to support authentication and security within their respective e-GP systems, where the DSC is supplied and managed by a separate organization. The role of the e-GP system is limited to reading the certificate for digital signing, encryption, and decryption. Singapore, on the other hand, does not apply an external PKI. The PKI for encryption and decryption is managed internally within the system. Users are authenticated during the registration process and with their user identification and password when participating in an online bid.

8.3   User Profile and Authorization Management

User profile management involves the management of user profiles including secured storage of user personal details, while authorization identifies different roles a user can undertake within the e-GP system. The user profiles are stored in a relational database, which identifies all the system users and the roles
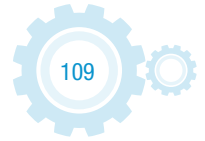
that are associated with the system users. It is important to store the user credentials and profiles in an encrypted and secured manner, which cannot be decrypted by the database administrators.

8.4   Server Certificate

The use of server certificates is advisable for supporting secure communication over an encrypted Secure Sockets Layer (SSL) session, between e-GP users (the web browser used by the procurement entities and the suppliers) and the web server of the e-GP.

8.5   Storage

Since e-GP deals with sensitive information (such as bid responses and commercial information), it is essential to encrypt stored data in its various modules (database, Lightweight Directory Access Protocol, or file system) via a recognized encryption algorithm. Encryption increases system security and protects data even when an unauthorized person has physical access to the hosting server(s).

The security systems implemented for e-GP should ensure secure storage of documents, and bids uploaded in the system should not be accessible by any user until the completion or achievement of specific milestones defined for bid processing. Such content should not be stored or transmitted in clear text at any point within or outside the e-GP system. The encryption should be implemented on an end-to-end basis from the end-user node until the documents are received by the web server and stored in the e-GP system.

The e-GP system should implement an anti-virus gateway for scanning all incoming documents and communication from the users, and should restrict communication of any unauthorized or malicious content. No document or communication (e.g., e-mail) should be received and stored unless it has first been screened for viruses.

A document uploaded into an e-GP system should be scanned for viruses at the beginning of the upload process and stored only after it is found to be virus free.

8.6   Time-Stamping

A secure and reliable time-proofing mechanism should be implemented as part of e-GP system. The system should record the exact date and time for all activities taking place, obtaining the time from the source defined for the system. This will assist in dealing with issues such as whether a bid was submitted before the bid submission deadline.

Time can be obtained using the Time-Stamp Protocol and a time-stamping authority (TSA) to issue time-stamps that associate a unique date and time with any action in the e-GP system. The digital time-stamp can be used to prove that an electronic document was transmitted to the procurement server at the time stated on its time-stamp. The e-GP system can continuously synchronize with a TSA, through the reception
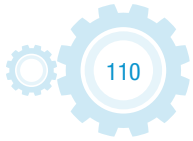
of broadcast time signals, and the audit trail implemented in e-GP can use an accurate time-stamp to record all activities performed.

All documents can be time-stamped on the server side immediately after the completion of their transmission from the client site. Electronically signed documents can be associated with a strong time-stamp, if sent to the TSA, which stamps documents with a legally robust date and time.

8.7   Reporting, Logging, and Monitoring

Extensive audit trail facilities should be implemented for every electronic procurement and administrative activity performed through the e-GP system (to track bid uploading and downloading, versioning, and approvals, for example). Inspection of audit logs provides information to effectively detect attempts at intrusion, such as tampering with the bid documents after the submission deadline. The data archival mechanism implemented for e-GP should also ensure archiving of audit logs for support in case security incidents or disputes need to be investigated (providing for non-repudiation). The access to the audit trail data should be restricted to avoid unauthorized tampering, changes, or deletions.

8.8   Search Engine

Advanced search facilities should be provided to all users of e-GP. These should allow all users (including anonymous, non-logged-in users) to perform searches for all available notices inviting bids, and to identify those of potential interest to them. Searches and notifications should also interface with mobile technology. A predefined set of the most important data in a notice inviting bids (including its name, CPV or similar item code classification codes, keyword, and location) can be made available as search criteria, as well as the option for end users to combine these criteria. Advanced Boolean logic operations (AND, OR, and their precedence) may also be provided, allowing users to execute refined searches. The system can allow users to define the fields used for displaying the results of a search and the sorting parameters used. Furthermore, users can be given the possibility to select a particular bid invitation from the search results and view its details. The system may utilize an external search engine in order to take advantage of the specialized features offered, such as support for UTF-8 character encoding, content-based search, and support for searching content stored within several popular types of documents (Microsoft Word, Microsoft Excel, PDF, and plain text).

8.9   Technical Interoperability

In order to accommodate full end-to-end automated procurement between an agency and a supplier base, the e-GP system will need to be able to initiate a requisition (often to multiple suppliers), confirm product availability and price, award the contract, and produce a purchase order. But the process does not end with the award of a contract. A full-service requisitioning and buying module also allows a buyer to confirm delivery and acceptance of either all or a partial amount of the order, match what is received against what was requested on the purchase order, and then create an invoice request to send to the suppliers. If buyers and suppliers are working within a framework agreement, the system should also be able to manage what is

known as vendor punch-out—allowing a buyer to access the supplier's catalog or website directly through the purchase order program itself, saving time and effort looking up potential vendors. Because not all orders are complete or even in one piece when received, the system should provide a return management function that includes asset and problem tracking and quality assurance reports. Once the invoice is received, the buying module should be able to pass all payment information directly to the financial module.

At a technical level, interoperability refers to the technical issues involved in linking computer systems and services (open interfaces, interconnection services, data integration and middleware, and security services). These should be based on open standards. Multi-platform specifications in terms of operating systems, database, programming languages, server architecture, network configurations, and other aspects add technical interoperability requirements if users are to be provided with mechanisms allowing them to submit requests and to obtain information in more than one environment. This can require the use of translation software that will enable users to understand requests in other environments and respond accordingly.

8.10   Application Interfaces and Technical Standards

The importance of technical interoperability in an e-GP environment means that an e-GP system should have appropriate open application interfaces to support the interaction between various operational systems, as well as systems and applications under development. An e-GP system can be designed in a way that enables interoperability with existing legacy systems, allowing the reuse of existing system components and minimizing costs. To address interoperability requirements, several strategies may be employed:

(i) **Service-oriented architecture.** SOA is concerned with the independent construction of services that can be combined into meaningful, higher-level business processes within the context of an application system like e-GP. SOA describes several aspects of services existing within an application:

   (a)   the detail (or granularity—the size or extent of functionality in a given interaction) and types of services,
   (b)   how services are constructed,
   (c)   how services are combined together,
   (d)   how services communicate on a technical level, and
   (e)   how services interoperate on a semantic level.

By applying the SOA paradigm to the design of the core components, e-GP system implementers can ensure a significant improvement in system flexibility, while reusing business components at the same time. This consideration needs to be part of the e-GP system design phase.

(ii) **XML-based communication protocols.** XML-based communication protocols (Simple Object Access Protocol [SOAP] and Extensible Markup Language – Remote Procedure Call [XML-RPC]) can be utilized when cross-platform interaction is required. Furthermore, SOAP and XML-RPC are standard components of almost all environments, constituting two protocols to enable remote cross-platform communication in a standardized and convenient way.

(iii) **Integration capabilities.** Depending on the development framework used, an e-GP system should be designed in such a way that future interoperability capabilities are enhanced through the adoption of appropriate standards. One popular option is the use of the Java 2 Platform, Enterprise Edition (J2EE). The J2EE Connector Architecture (JCA) for the J2EE framework, for instance, can assist in establishing an environment for secure system interoperability. JCA defines and enables a standard way for connecting J2EE-based applications to heterogeneous enterprise information system environments. Many information system environments consist of enterprise resource planning (ERP) systems, database systems and various legacy applications. JCA offers a set of scalable, secure, and transactional mechanisms to enable connectivity to these systems and there is a substantial market of JCA adapters to simplify integration of enterprise applications.

8.10.1   Application Graphical User Interface

Departmental procurement officers use e-GP systems only when creating a notice inviting bids, or when managing their existing bids. Depending on the size and type of department, and the frequency of its purchases, the utilization of the system can be as rare as a few times every year, while suppliers use such systems only when participating in a particular bid, which may also occur very rarely. The user interface of such a system needs to be intuitive and operational in all popular internet browsers, and technical prerequisites for accessibility should not impose significant limitations to suppliers. The functionality made available to users should be self-explanatory and assistance should be always available, helping them to understand the steps they need to follow in order to take full advantage of e-GP system functionality.

8.10.2   Graphical User Interface Interoperability

The technology used for graphical user interface (GUI) implementation of an e-GP is primarily chosen based on a single criterion: the level of accessibility. Several state-of-the-art GUI implementation techniques have emerged, allowing system developers to implement GUIs in a simpler and/or more efficient way. Nevertheless, not all new technologies have set standards, or are supported in exactly the same way by web browsers or operating systems, substantially reducing the level of accessibility. It is therefore recommended that the GUI for e-GP is based on widely accepted technologies. For instance, all commonly used web browsers support the HTML 4.01 standard. A GUI constructed in HTML 4.01 reduces accessibility considerations to other, nonfunctional issues.

8.11   Multilingual Requirements

Users may be provided with the functionality to select their preferred language for the GUI from a menu of supported languages, as well as the ability to switch from one language to another. All descriptions should therefore be placed in an easily customizable and parameterized format (property file or database table) so that they can be translated if there is a future need to export the GUI to another language. Additionally, the fonts used in the application should use all of the glyphs for all official languages of a jurisdiction.
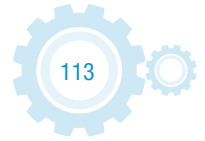
In principle, two parts of e-GP localization should be considered:

(i) **Language.** The GUI needs to be capable of displaying data in any of the languages supported by the system (if more than one language is provided), allowing users to set their preferred language from a user profile screen.

(ii) **System character encoding.** System character encoding is the method for encoding text entered in any input fields. UTF-8 (Unicode) character encoding can be supported for non-Latin characters. The database might also need configuration for UTF-8 to work. For instance, older versions of MySQL did not support Unicode. It was, however, possible to configure Java Database Connectivity drivers to use Unicode when handling texts. Most databases and user input interface components today support Unicode.

8.12   Usability

When designing and implementing an e-GP platform, it is important to consider who the users of the system will be (including government, private sector, and civil society users) and to ensure that they will be able to use the system with little hindrance or need for reference manuals. Ideally, the system should be designed in such a way that it guides users through a number of choices using online wizards, avoiding situations where extensive user support is required to navigate or complete forms. A basic level of IT literacy should be a benchmark for usability. It is also useful to consider an e-GP solution against other commercial shopping or auction platforms (such as amazon.com, eBay, or trade-me) because users will often form their expectations about usability based on their familiarity with such systems. Usability is a necessary condition for survival of an e-GP system; if the online system is difficult or cumbersome to use, people will leave (Nielsen 2012).

A government buyer might not need to be an expert in all of the details about government procurement regulations and thresholds; if an e-GP system is designed in a way that provides answers to intelligent questions, it will be able to guide buyers to the most appropriate procurement methods and will secure necessary workflow approvals. For civil society organizations, the e-GP system should be able to produce data on government procurement per agency, product category, or region that is easy to analyze and does not require specialized programming skills.

Nonfunctional user requirements for an e-GP implementation originate from system properties, such as environmental or implementation constraints (for example, remote access should be provided, and software must run on various operating systems) and qualities of the system.
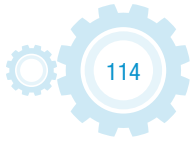
8.13   Online Help

Online help can be offered, providing assistance at any time to users performing activities in the system. Examples include

    (i)   in-context sensitive help, user manuals, wizards, walkthroughs, and online demonstrations, which can significantly assist users in understanding the functionalities of the services offered by the system;

   (ii)   online help documentation and glossary, which can provide fast and easy access to clear definitions for all the fields used (what they represent and what they measure);

  (iii)   user guides, which can explain in detail the GUI of the e-GP system, for example, using screenshots and detailed descriptions; and

  (iv)   frequently asked questions, which can provide answers to the most commonly asked questions from users.

A successful e-GP process depends heavily on the correctness of the data submitted by users of the system. The validity of all data submitted by users through completed web forms should therefore be checked. This can be done at both the server and the client sides:

    (i)   **Server side.** When the validity of data provided by a user is verified on the server side and the values are invalid in any way, users can be prompted to access the same entry form again, with descriptive warning messages next to the field(s) improperly completed.

   (ii)   **Client side.** When the validity of data provided by the user is verified on the client side, the browser uses business logic in order to locate and explain the errors to the user. With this check, error messages need to be shown to the users. In web-based technologies, this implementation may create interoperability issues, however, as JavaScript or other client-based scripting languages will need to be enabled.

e-GP systems may also inform users performing "significant" activities (such as creating a call or submitting a bid) using informative and confirmation pages and automated notification mechanisms. All online help facilities should be made available in all languages supported by the system.

8.14   Risk Management

Risk management involves more than security considerations, and includes issues of reliability and suitability of the software and hardware (refer to Section 7.8).

8.14.1   Reliability

The degree of reliability of a system can be assessed in relation to the reliability of its components, allowing reliability requirements to be expressed at the component or unit level, rather than the entire system level.
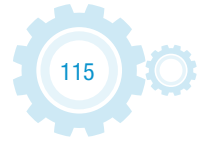
Reliability requirements are related to the quality of a system, and are usually defined quantitatively. Typical requirements include the following values:

(i) **Mean time between failures.** The MTBF measures the average time between failures. As an example, there are 8,760 hours in 1 year (365 days x 24 hours per day) so the MTBF of the system can be divided by 8,760 to identify how long the system will run in years. A system with a rating of 30,000 MTBF would on average run 3.42 years without a failure.

(ii) **Mean time to repair.** The MTTF measures the average time required to perform corrective maintenance on a system in the event of a system failure. As the value for mean time to repair approaches zero, the availability of the system increases to 100%.

(iii) **Probability of failure on demand.** The POFOD measures the likelihood that the system will fail when a service request is made. As an example, if POFOD equals 0.01, this means that one out of every 100 service requests results in a failure. This is relevant for the e-GP system operating nonstop.

(iv) **Rate of occurrence of failures.** The ROCOF refers to the frequency of occurrence of unexpected behavior. As an example, a ROCOF value of 0.02 means that two failures are possible every 100 operational time units.

Because some functionalities of an e-GP system are more critical than others, reliability requirements may be restricted to the most important ones. For example, the reliability of bid submission and bid locking modules should typically be higher than the module used for creating a contract award notice. When defining the metrics for the reliability requirements, the government needs to specify the system conditions. For instance, the reliability of any IT system usually depends on the user request load, and may decrease when the number of simultaneous transactions or requests increases. Therefore, reliability and scalability are closely related.

An e-GP needs to be easily accessible, guaranteeing minimum disruptions to competitions while not compromising confidentiality of data and security at any time; it also needs to ensure transparency and nondiscrimination at all times. These requirements can only be fulfilled by a highly reliable e-GP system. The government should specify the reliability requirements according to national, regional, and/or local laws and the estimated usage of the system. During the development phases, a wide range of testing techniques (including unit testing, integration testing, factory testing, and stress testing) may be employed to ensure the quality of the programming code. Moreover, as well as realizing systems that are as highly reliable as possible, governments are advised to establish mechanisms for handling potential system disruptions, in the form of business continuity planning (BCP) and disaster recovery plans (DRPs).

8.14.2   Scalability and Availability

The e-GP system should be designed to meet a significantly larger transactional load than what is estimated prior to its development. Good scalability for a system can be achieved through effective software architecture and adequate hardware components. It is essential for departments to establish systems that remain constantly available, in order to guarantee support for critical and all other types of events. In all probability, the most critical event is during the closing stages of bid submission for bidders (the e-bidding phase). In the case of e-reverse auctions, most bids are received during the final few minutes. Before the end of e-bidding, suppliers are required to access the system to submit their bids. However, it is common practice for suppliers to submit their bids toward the end of the bid submission deadline. Additionally,
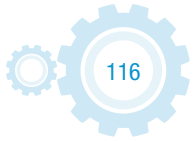
depending on a specific notice, a bid may consist of several files. This in turn can result in megabytes of data needing to be transferred from the IT environment of the supplier to the e-GP system, and stored on the appropriate secure servers. The combination of these parameters signifies that the e-bidding closing period for each notice can potentially be affected by failures due to volume capacity problems. Furthermore, an e-GP system may be harmed by disruptive events, including internet connection failures, malicious attacks, power failures, system software, or hardware failures. System implementers must ensure that their systems can handle these issues, while plans must be in place for handling critical failures in the form of BCP and DRPs.

A service-level agreement (SLA) can be negotiated between the technology provider of the service and government authorities to establish availability requirements for e-GP. The availability of an e-GP system can be improved through identification of the system components. If one component is prone to failure, the entire system will be prone to failure too. An e-GP system usually consists of three elements:

(i)   one or more servers, where most of the data is processed and stored;
(ii) a client, making requests to the server; and
(iii) the network, which allows for the communication between the client and the server.

These three elements can be broken down into components, such as hardware, software, processes, and procedures. All of these components need to be checked for their reliability in order to guarantee the availability of the system. More specifically, the hardware making up the system includes, among others, the following components that need to be checked:

(i)   central processing unit;
(ii) storage devices;
(iii) input devices (keyboards, serial ports, and mice);
(iv) output devices (monitors and printers); and
(v)   cables.

The software running in the system generally includes the following components, all of which need to be reliable:

(i)   firmware embedded in the hardware (basic input/output system [BIOS]) to allow it to communicate with the operating system;
(ii) operating systems, such as Microsoft Windows, Linux, and others;
(iii) programs used by administrators or maintenance stuff for performing control functions and data housekeeping;
(iv) applications performing specific tasks or operations depending on the user; and
(v)   middleware programs supporting communication or data exchange.

The processes needed to run the system will typically include

(i)   power-up and system initialization;
(ii) network management and operation;

(iii)   system monitoring;
(iv)   backup and restore and archiving;
 (v)   user management, including security; and
(vi)   system shutdown.

When all relevant system components are identified, the following approaches can reduce the risks associated with critical components, namely those that are a single point of failure for the system:

(i)   reduce the frequency of the system being nonoperational by looking for ways to prevent outages from happening to critical components,
(ii)   minimize the duration of time the system is nonoperational by trying to prevent outages from happening to critical components and reducing the number of critical components that may be affected by an outage, and
(iii)   reduce the parts of the system that are potentially affected by an outage.

System developers can quantitatively measure availability by following certain approaches and at regular intervals calculating values for the degree of availability achieved, in order to set targets for improving the availability values. An indicative calculation for quantitatively measuring availability is provided as follows:

(i)   **Hours the system should be available in a month.** 24 hours per day x 7 days x 4.33 weeks per month (on average) = 720 hours per month.
(ii)   **Hours the system was down in a month.** Consider 5 hours due to corrective maintenance (e.g., correction of a software defect), 3 hours due to perfective maintenance (e.g., a hardware upgrade), and 1 hour due to hard disk failure, totaling 9 hours of unavailability.
(iii)   **Net availability.** ((720 – 9) / 720) * 100% = 98.75%
(iv)   **High availability.** 3 out of the 9 hours were due to maintenance activities and only 6 hours (5 + 1) were due to failures. Therefore, high availability is ((720-6)/720)*100% = 99.16%. Commercial grade availability is often five nines: 99.999%.

8.14.3   Performance Assessment

A system that can handle and respond promptly to any user request not only has the potential to accelerate e-GP activities, but will also assist users to better understand the different functionalities offered by the system. Naturally, there may be activities that inevitably require significant time (e.g., uploading of documents). In such cases, system implementers need to ensure that users are informed of the progress of their requests, avoiding events such as users canceling their activities or being unsure of the status of their actions. Obviously the performance requirements of an e-GP system are dependent upon the envisioned number of users and bids. System implementers need to plan for software and hardware scalability and establish systems that can achieve the predefined performance goals.

The following definitions are commonly used for measuring performance:

(i)   simple query: a query accessing a single database table or a join of two tables;
(ii)   complex query: a join of three or more database tables;
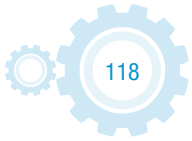
(iii) report: a report ready to be printed, produced by PDF generation on the server, reporting tool plug-in, or any other technology applicable;

(iv) document management: uploading, downloading, and opening of a document to or from the document library of the system to the client workstation;

(v) active user: a user of the application performing constantly typical operations; and

(vi) response time: the period of time from the moment the user initiates an action (by clicking on a button or a link) until the moment a web page with the requested information or update confirmation message is completely downloaded and displayed on the screen of the user—response times can be affected by internet latency, therefore response time is commonly tested in a local area network environment.

Sample performance goals can include

(i) at least 50 concurrent active users with maximum response time,

(ii) up to 200 concurrent active users with 10% increase in maximum response time, and

(iii) maximum response times that return up to 200 result rows is X—for every additional 100 results, the maximum response time may increase for up to X seconds.

Maximum response times (in a local area network environment) can be

(i) 90% of simple queries to have a maximum response time of 2 seconds,

(ii) 99% of simple queries to have a maximum response time of 5 seconds,

(iii) 95% of complex queries to have a maximum response time of 5 seconds,

(iv) 99% of complex queries to have a maximum response time of 10 seconds

(v) 95% of reports to be generated in less than 6 seconds,

(vi) 99% of reports to be generated in less than 15 seconds,

(vii) 95% of document management activities to have a maximum response time of 5 seconds, and

(viii) 99% of document management activities to have a maximum response time of 8 seconds.

The response times for testing the performance of an e-GP must be measured in a database that has pre-loaded a considerable amount of data, simulating the performance of the system in real conditions. In addition, actual use of the system has to be simulated including concurrent data uploads and downloads.

8.15   Hardware

The hardware requirements for e-GP typically include various servers, disaster recovery facilities, and a data center capable of delivering reliability, service, and risk management as set out above. These requirements depend partly on the existing infrastructure already in place, the estimated demand, and the operating environment, and should be subject to expert appraisal. The data center should have dedicated web, application, and database servers, as well as other supporting servers (such as a log storage server, domain controllers, and a time-stamp server). To meet the high availability requirements of the system, servers are used in pairs and configured for failover support. Redundancy in the internet connectivity source is highly desired for uninterrupted availability of the e-GP system to its users.

9

e-Government Procurement from a Supplier Point of View

Box 7 Bringing Suppliers on Board

In order to prepare for e-government procurement (e-GP), it is important for a business to think through where it wants to be in 1 to 3 years, taking into consideration key issues concerning processes, people, and technology. This chapter provides project-level advice for suppliers in an e-GP environment, including a road map that identifies key success factors such as strategy development, systems design decisions, training, and change management issues.

It is important to remember that, despite new technologies, selling to government can still be very different from selling to other businesses; government procurement tends to be much more formal and regimented than purchasing and sourcing in the private sector. Before contacting the agencies it has targeted, a supplier may want to develop a government sales strategy that includes thinking about what will make its company attractive or unique to government agency buyers.

Governments need reassurance that the suppliers they select will be safe, easy to work with, and competitively priced. A basic information technology (IT) infrastructure—an internet connection and a computer with standard office software and e-mail—should be all that a supplier needs to begin to participate in basic tendering opportunities.

If a supplier is able to compete for portions of larger contracts, it might be worth considering a joint venture or a consortium, working as a partner or a subcontractor with other suppliers. If a supplier is hoping to become a qualified supplier to government for day-to-day, low-value, high-volume products, it will need to move beyond the simple e-tendering approach and apply for access to the e-GP system in order to create an electronic catalog of its products.

For the most part, e-GP systems are user-friendly and intuitive enough that most sellers with basic internet experience can easily navigate through them. If problems or questions arise—either technical or bid-process-related—most agencies will provide a central help desk.

e-GP is becoming the de facto way of conducting business with governments around the world. So what steps does a supplier need to take to participate in e-GP? This will vary depending on the size of the business and what it sells. Access to the internet and a computer are minimum prerequisites, and for any supplier that has both, bidding on government tenders can be as easy as registering and entering data online.

It is important to remember that, despite new technologies, selling to the government can still be very different from selling to other businesses. Although government procurement officers have the same motivation as their counterparts in the private sector—to buy quality goods at the lowest prices that will ensure quality and dependability of delivery—they work in a much more restricted setting. In order to avoid favoritism or corruption, government procurement tends to be much more formal and regimented than purchasing and sourcing in the private sector. It would be unusual, too, for a private company to publicly reveal its purchasing needs, or to refuse to negotiate the price or the terms of a contract made by a supplier. Strict rules, larger quantity contracts, extensive vendor registration—all of these things make
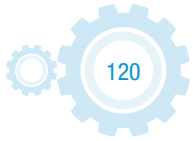
the public procurement process very different from what suppliers will be used to in the private sector. Yet, selling to government agencies can be done successfully, even by smaller companies. Understanding the differences between private and public sector procurement is the first step toward developing a successful strategy for winning government contracts.

9.1   Electronic Public Procurement Strategy and Tactics for New Suppliers

What does a supplier need to do in order to successfully sell to government through an e-GP system? There are several key steps worth considering on a road map toward e-GP.

9.1.1   Develop a Sales Strategy

One of the first things a supplier has to do is decide on its level of entry. Selling office equipment or stationery supplies on an ongoing basis to an agency will require a very different approach than tendering for occasional high-value service contracts. A service provider may want to limit its efforts to e-tendering. Or, if it supplies a specific brand of parts that may be uniquely in demand within a specific government department, it may want to create an electronic catalog of products and then target that agency alone. These approaches are very different in terms of the level of preparation and investment required.

9.1.2   Research and Agency Contact

A good starting point for a supplier is to use the internet to find out which agency is most likely to buy its product or service. Even if a government provides a central procurement site, it is usually worthwhile visiting the web pages of individual agencies, where they will usually describe their proposed future projects and spending plans, and list agency contacts. Not only is it possible to view past and current notices, but often agencies will post prior information notices as well, indicating what they are likely to tender throughout the year.

Many agencies will have a site where past tenders and awards are available for viewing even before a supplier registers. On other sites, suppliers may have to register in order to get access to published government tenders. In Scotland, for example, the e-sourcing system only allows suppliers to access the system if they are fully registered and have already been invited to respond. In the Republic of Korea, on the other hand, the GePS platform openly allows access to agency buyer profiles and past purchases.

At this early stage, most government agencies are very interested in learning about any suppliers that can satisfy their general prerequisites in terms of quality and reliability. As a supplier, it is important to try to understand government requirements:

  (i)   Do they need the sort of product or service you supply?
 (ii)   Do they trade more with small or large suppliers?
(iii)   Do they require references on past performance?
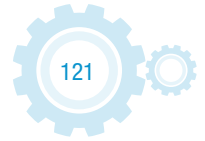
   (iv) What seems to be their most important buying criteria: price, availability, dependability of delivery, quality of goods, or brand?

   (v) If you are selling a service, do they prefer individual contracts, or do they encourage collaborative bids with other suppliers?

This type of research can generally be performed online, but in most countries suppliers can also contact a government agency's procurement office directly. Once the name(s) of the agency's purchasing officers are obtained, suppliers can e-mail them directly with a letter of introduction that describes their company, products or services, and area of interest. It is also a good idea for suppliers to include a link to their website, if they have one, or to their product lists or online catalogs. Another approach is to request a face-to-face meeting or phone call with one of the agency's buyers, providing an opportunity to describe products and services and to better understand the agency's purchasing plans and strategies. Suppliers should ask clarifying questions that reveal both the process and the criteria that the agency will use for selecting suppliers. For example, is the agency intending to

   (i) issue tenders and orders electronically,

  (ii) use purchase cards for low-value transactions, or

 (iii) pay for goods and services through purchase cards?

9.1.3   Pre-Contact Preparation

Before contacting the agencies they have targeted, suppliers need to think about what makes them unique. Is it price, brand, technical implementation, or post-sales service?

At a minimum, government purchasing managers and buying teams are looking for suppliers that are safe, easy to work with, and competitively priced. Their formal requirements usually reflect those characteristics, and as part of the tender registration process suppliers will be advised about how proposals will be judged, often based on terms such as lowest price tender, lowest evaluated substantially responsive tender, or, when agency buyers want to have more flexibility, the most economically advantageous tender (MEAT). Whichever method the contracting authorities choose, they will make it clear at the beginning of the procurement process, and if they choose to use the MEAT approach, the tender documents should explain the evaluation criteria and weightings.

Almost universally, government buyers will be looking for suppliers that can demonstrate

   (i) **A formal legal structure.** This must distinguish the company as a legal business entity (a registered and bonded company such as a limited liability company or a partly limited company).

  (ii) **Evidence of good governance.** Keep in mind that formal business entities are also expected to keep formal accounts, so a supplier needs to think about what types of financial records and client testimonials will help to provide the agency with an assurance of its ability to deliver on the contract (audited financial statements for the past 2 to 5 years are a usual requirement for public procurement).

 (iii) **Track record.** Qualification criteria generally require evidence of contracts of similar size in the past 2 to 5 years.
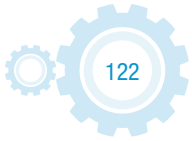
    (iv) **Flexibility.** This includes an ability to work or deliver in other locations outside of a supplier's traditional sales territory, or demonstration of its ability to work as part of a project team or collaborative bid.

If suppliers want to compete for portions of a larger contract, it might be worth considering working collaboratively in a joint venture or a consortium—as a partner or a subcontractor—with other suppliers. There are obvious advantages and disadvantages to a collaborative approach. Working with other suppliers can open up larger, more complex tenders that would normally be beyond the scope of a small or specialized supplier. And for public procurement beginners, it provides an opportunity to ride the coattails (the previous government contracting record and reputation) of a more experienced supplier.

On the other hand, if a supplier joins a consortium or a collaborative bid, it will want to think carefully about the legal implications; depending on the contractual arrangements, a failure by one of the partners to deliver on its portion of the contract could leave other suppliers exposed to liabilities—even if they have fulfilled their portions of the contract to the letter. One of the things that good agency purchasing officers consider when selecting a collaborative bid is whether or not the various partners within the consortium can demonstrate a clear purpose for each group and a coordinating and responsible management structure that can ensure delivery. They will often ask, as part of the requirement for a collaborative bid, that each company is able to document adequate insurance coverage against default. Insurance can be a worthwhile and necessary investment, but suppliers need to take the cost into account.

9.1.4   Basic Information Technology Capabilities

It is worthwhile for suppliers to consider what level of IT is necessary to satisfy the basic buyer's criteria of being safe, easy to work with, and competitively priced. At a minimum, these criteria mean that suppliers should be able to

    (i)   log on to, register, and search the government agency's website;
    (ii) receive and send documents electronically, including

        (a) informational e-mails,
        (b) data-intensive tender documents, and
        (c) purchase orders and invoices that may require authentication;

    (iii) accept and use basic word processing and spreadsheet applications; and
    (iv) complete payment online (when possible).

A basic level of IT infrastructure—an internet connection and a computer with basic office software and e-mail—should be all that a supplier needs to begin to participate in basic tendering opportunities. If, however, a supplier wants to move toward e-purchasing, it will want to expand its systems in order to take advantage of the full purchase-to-pay (P2P) cycle. This will require more sophisticated financial and transaction software that can link more seamlessly with agency buyers.

9.1.5   Internet Access

As IT costs have dropped and the use of personal computers has become almost ubiquitous, most companies can easily afford the necessary level of investment in basic hardware. Much more problematic, in many areas of the world, is the speed and dependability of the internet connection itself. In many rural areas, slow-speed, dial-up access remains the norm, and high-speed connections can be expensive and unreliable. Poor internet connection affects both buyers and suppliers. There is not too much that a supplier can do about its local telecommunications infrastructure, but with these problems in mind, most e-GP portals have taken into account the need to cater to a broad community of internet users, and most government purchasing websites will incorporate a minimum of data-hungry graphics. This often makes the site appear rudimentary or unsophisticated, but the trade-off in terms of accessibility is worth it.

9.1.6   Software and Websites

Most government agencies have, as part of their e-GP charter, a pledge to provide a service that does not require potential suppliers to buy special software, telecommunications, or IT equipment in order to use their system. This means that downloadable documents are usually in a common office software format. Increasingly, these documents are published in PDF, and nearly all agencies provide suppliers with easy access to download links for this freely available document reading and editing software.

If a digital subscriber line or broadband connection to the internet is available in a supplier's area, it provides a faster, always-on connection, which can be helpful when downloading large documents or requiring uninterrupted e-mail delivery.

For small suppliers or companies just moving into e-procurement, it may be worth registering an internet domain. This allows them to set up a variety of e-mail addresses which can help to present a more professional face to government buyers. Domains usually provide as many separate e-mail addresses as needed for employees, and suppliers can also set up a specific address for tenders, for example, tenders@yourcompany. com. This ensures that e-mails for tenders will be automatically forwarded to those employees responsible for the tender response process.

While company websites are not a direct part of the e-GP process, a website that provides important information about a supplier, its products or services, and its past successes can be an important validation for procurement officers. Suppliers should be sure to include a hyperlink to their website on any electronic tendering documents and e-mails they submit.

9.1.7   Contracting and Payment Tools

If a product supplier is keen to move into e-purchasing and expects government buyers to continuously order goods from its company, it will be asked during the supplier registration process whether or not it has any type of electronic payment capability. There are a variety of tools, third-party providers, and computer-based software that are available in this area. P-cards, for example, are charge cards that are widely used within many electronic public procurement frameworks that allow government employees to buy supplies directly from an approved or short-listed company, based on quantity, availability, and pricing arrangements that are agreed upon in advance. These types of electronic payment tools are important for
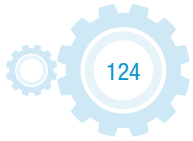
government buyers, because the traditional payment process involving low-value items for a large number of suppliers can greatly increase the agency's costs. Although there will be added costs to the supplier, being able to process electronic payment cards will bring benefits in terms of simplifying the order and payment process, and speeding up the payment process.

9.2   Getting Registered

If a supplier seeks to register with a government that has a single, government-wide procurement site, the registration process only needs to be completed once. In its simplest form, e-GP registration requires that suppliers complete a pro forma application providing basic information about their company. Some countries will require suppliers to validate their registration by submitting copies of incorporation documents (as in the Philippines). Others (e.g., the Republic of Korea) will be able to interface other e-governance applications for this purpose. In some cases, additional authentication or validation might create barriers to entry for out-of-country suppliers (cross-border trade regulatory barriers).

Once registered, suppliers will be assigned a user identification and a password, and possibly a unique security key. Once the process is completed, they will be able to access the system and update their company profile at any time. At the outset, all the e-GP system cares about is that a supplier is a viable entity, and that it is not duplicated in the system. Moving beyond basic registration requires a little more effort and thought.

9.3   e-Tendering

There are two ways of engaging in e-tendering. The first, open tendering, is very simple. A supplier browses through and responds to tenders that interest it. The second, restricted tendering, requires the supplier to prequalify and makes a short list of acceptable suppliers from which the procuring entity invites a response.

9.3.1   Open e-Tendering

With basic, open bids, once a supplier is registered in the government's e-GP system, it will be given access to search the tendering database for potential offerings. With some systems, the search is unrestricted and suppliers can see and respond to any open tenders they believe to be suitable. In many countries, only selected tenders will be made available for browsing, while "restricted tenders" may only be accessed by suppliers who are specifically invited by the agency to respond. Once a supplier finds a tender opportunity it wishes to bid for, it will be able to submit an expression of interest, which will, in turn, prompt the system to e-mail a prequalification questionnaire to fill out electronically.

9.3.2   Restricted e-Tendering

Most complex and high-value tenders will require potential suppliers to be prequalified as an initial step, so that the buying agency can create a short list of suppliers it will select to move forward with the rest of the

tendering process. This prequalification process usually requires suppliers to submit a statement and some proof of financial and technical capabilities along with any plans they have with regard to collaborative bidding with others. It is important to give some thought to this documentation, and prepare submissions well before the prequalification process begins. Typical information that might be required includes

    (i)   a company incorporation certificate or registration document,
    (ii)   a tax identification number,
    (iii)   a value-added tax certificate, or
    (iv)   an authorization letter from an owner or director of the company.

If a supplier meets the prequalification requirements, the agency's system will respond by allowing full download capabilities of the related tender documents and inviting the supplier to formally apply for the tender opportunity with a request for proposal or invitation to bid. Occasionally, the agency will ask a supplier to make a presentation on its proposal, or conduct an interview by telephone as part of the selection process.

9.3.3   e-Purchasing

If a supplier intends to become a qualified supplier to government for day-to-day, low-value but high-volume products, it will need to move beyond the simple e-tendering approach and apply for access to the e-GP system in order to create an electronic catalog of its products. These e-catalog platforms are usually hosted by the government—or a third-party supplier to the government—and will provide a broad variety of online functionality, including

    (i)   **Catalog management.** This allows suppliers to prepare, upload, and manage their own product catalogs, and to create product or service "packages" that they wish to sell for a fixed price.
    (ii)   **Order management.** This includes all of the necessary features (authorization, approval, translation, and electronic signing) for completing the contract online.

Once a supplier has registered and been allocated online access to the e-catalog management site, some government agencies will have the functionality available to allow their buyers to simply browse supplier e-catalogs and make direct purchases through a repetitive procurement agreement—an arrangement that allows authorized buyers within government agencies to select goods and services directly from e-catalogs on an as-needed basis. Before it is allowed to do that, a supplier will need to negotiate and agree to terms and conditions on pricing and delivery structure with the agency in what is known as a framework agreement. Once agreed upon, these terms will be reflected in the product catalog.

Usually negotiated by government agencies for a set period of time, framework agreements allow purchasing officers in the agency to make specific purchases (call-offs) as needed. Although sellers will still be given the option to approve or disapprove any specific purchase, they are usually expected to adhere to the terms of the framework agreement until it comes to an end and can be renegotiated. That means it is important to think carefully about the likelihood of any changes to pricing and product availability before entering into what may be a 1- or 2-year commitment.
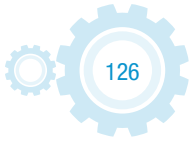
Framework agreements are a valuable tool that can greatly speed up the normal e-tendering approval process. Because this type of approach means that an e-catalog itself becomes a legal contract, some care has to be taken to make certain that a catalog's format and content—product classifications, descriptions, coding, and terms and conditions of delivery and payment—adhere to the agency's contractual requirements. Negotiating framework agreements involves a comprehensive approval life cycle, but if a supplier is hoping to make its products easily available (as if the agency were simply buying off the shelf), they can prove invaluable.

Negotiating a framework agreement does not necessarily mean that an agency will always buy from a specific supplier's catalog. Most framework agreements involve multiple suppliers, and for very large or expensive purchases or specific e-tendering opportunities, agency buyers may choose to apply a ranking system based on their MEAT criteria and cascade the offer downward beginning with the highest-ranked supplier. If that supplier decides not to accept the order (because they cannot supply a particular quantity or specific brand within the time frame required, for example), the offer will continue to be passed from one supplier to the next until it is accepted. If none of the approved suppliers within the framework agreement can accommodate the order, the agency usually reopens the competition through an open or restricted e-tendering process based on more specific terms.

Variations of this ongoing, repetitive procurement process include what is known as a dynamic purchasing system (DPS). These are becoming popular in well-established e-GP frameworks (particularly in the EU) and allow for unlimited participation by suppliers in a framework agreement, as long as they meet the requirements set by the buying agency. The advantage for government (and for many, the disadvantage) of dynamic purchasing systems that they keep competition—and prices—in a constant state of uncertainty.

9.4   Participating in e-Auctions

An e-GP system with DPS capabilities is likely to have implemented an e-reverse auction module. e-Reverse auction is, in many ways, like a DPS, in that it opens up bids to any qualified supplier and is usually only valid for a short period of time. However, e-reverse auction is often more restrictive, allowing only a select group of prescreened bidders.

There is some debate about the value of these auctions, particularly to the supplier, in that most e-reverse auctions involve the buying agency inviting several of its prequalified buyers to "improve their offer"—essentially bid against each other in order to lower their framework agreement or proposed e-tendering price. Still, the approach remains transparent and equitable; the participating suppliers are all prequalified and the auction is held online and in real time, and the e-reverse auction system itself decides the winner based simply on the lowest-priced bidder when the clock stops at the end of the time allotted for the auction.

9.5   Post-Submission Activities

When submitting a bid in an e-GP system, suppliers will be asked to validate their responses based on the system's security features (an automatically generated digital signature or fingerprint are common), and will be asked to pay any necessary fees. Most authorities are moving away from charging submission or document download fees, because they are an obvious disincentive for suppliers to participate. Government
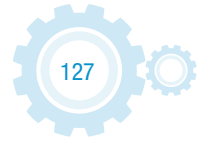
agencies that still require a fee will often provide an online e-payment system that will accept supplier credit cards as part of the process. Others will expect other methods of payments. The e-GP system of the Philippines, for example, does not accept payment using credit or debit cards.

The e-GP system will provide printable, time-stamped receipts for fees and tender submissions so that suppliers can keep a permanent record of the procurement process. Usually, tenders—and all supporting documentation and prices—will remain confidential until the actual result of the process is announced and a contract with a supplier is finalized. In many cases, the bids are not accessible to the buying agents until the tenders are officially opened.

9.6 Getting Information, Training, and Technical Help with e-Government Procurement

Every effort is made to design e-GP systems to be user-friendly and intuitive so suppliers with basic internet experience can navigate through them easily. If suppliers do experience problems or have questions—either technical or bid process-related—most agencies will have a central help desk, or suppliers can contact the buying authorities themselves.

Often, though, it is not the system that causes a problem for the seller. Many small and medium-sized enterprises (SMEs), simply do not have the history of electronic sales or a high level of familiarity or comfort with public procurement. And because many government agencies still persist with their own particular vocabulary or unique set of procedures, the e-GP process may still be confusing to the uninitiated seller. In fact, initial resistance to participation in e-GP programs is not normally due to technical or contractual concerns, but stems from a lack of basic familiarity with how to pursue business opportunities with government.

For that reason, many government e-GP programs offer a wide variety of conferences, seminars, and training sessions for the supplier community that are usually available free or for a minimal fee, both online and in person.

9.6.1 Online Training

e-GP systems usually provide a detailed user guide for using e-GP software and participating in procurement opportunities published in the e-GP platform. In Austria, for example, the central purchasing body prepared a checklist that can be used and published as an annex to contract notices relevant for SMEs which is aimed at preventing the most common mistakes made by SMEs when submitting a bid. Other online training systems will allow suppliers to actually work through a "dummy" training module so that they can familiarize themselves with the process, understand the format of the tender response, and, if they are going to be using the product catalogs, allow them to load some of their product data.

9.6.2   Courses and Road Shows

Many governments recognize that online training is effective for SMEs and corporate sellers already in favor of participating in an e-GP program. It is often more important to raise awareness among the contractor and seller community about e-procurement and public sector opportunities. This is best done through road shows or government-sponsored courses. In the UK, for example, the government developed a training program for SMEs that was presented to more than 3,000 SMEs and 800 contracting authorities regionally during 2005–2006. The courses have the added advantage of allowing contracting agents and potential sellers to sit side by side as they work their way through the bidding process.

9.6.3   Supplier Input

Finally, it is important that, as part of the supplier community, suppliers make their government purchasing authorities aware of their suggestions and concerns. Too often, e-GP implementation tends to be a government-driven process, focused on what is easy and profitable for government, without the proper level of concern for input from the supplier perspective. Suppliers should make their views and suggestions known to the government or particular buying agency wherever possible, including more formally through supplier representation on committees and project groups. Most governments would welcome this level of input from the supplier community.

9.7   Case Studies

9.7.1   Supplier Training in the Philippines

One of the major functions of the PhilGEPS e-GP system in the Philippines is to provide regular training for users.[45] It provides two modules—one for buyer agencies and one for suppliers—each consisting of a short video feature about the e-procurement process, a Microsoft PowerPoint presentation that includes the legal basis for the PhilGEPS, and hands-on exercises for students. Both modules are conducted at the PhilGEPS office in Pasig City with occasional sessions in key regional centers around the country, coordinated by regional government offices. The supplier training module is a half-day program that costs P500.00 (about $12).

9.7.2   Supplier e-Procurement Training in the State of Karnataka

The State Government of Karnataka, India, has established three training centers, each with a training capacity of 25–30 seats. The dedicated training server, hosted in a centralized data center, can be accessed anywhere through the internet. Training of government officers and contractors is a continuous activity: as of April 2010 a total of 4,000 government officials and 2,500 contractors had received hands-on training about how to use the e-GP system.

In addition, a dedicated help desk has been set up to provide telephone guidance and clarification to government users and contractors. It is open from 9 a.m. to 9 p.m.

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[45] www.philgepstraining.net

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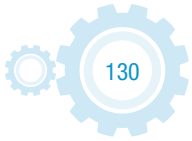
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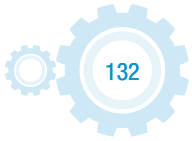
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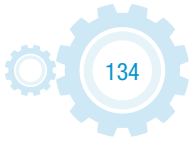
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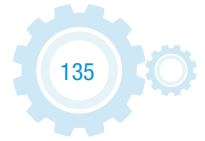
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e-Government Procurement Handbook

Electronic procurement has become one of the main e-government initiatives for many countries as they look to improve procurement through a more open, competitive, and transparent environment. E-procurement continues to prove itself as a viable alternative to manual processes, bringing cost savings and efficiencies. The Asian Development Bank has been a promoter of electronic government procurement (e-GP) as a key component for procurement reforms through active involvement in the Multilateral Development Bank Working Group on e-GP. This handbook aims to inform readers about e-GP, provide a reference for related concepts, and examine how e-GP implementations have taken shape in different jurisdictions worldwide.

About the Asian Development Bank

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to two-thirds of the world's poor: 1.7 billion people who live on less than $2 a day, with 828 million struggling on less than $1.25 a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

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