NGE Solutions
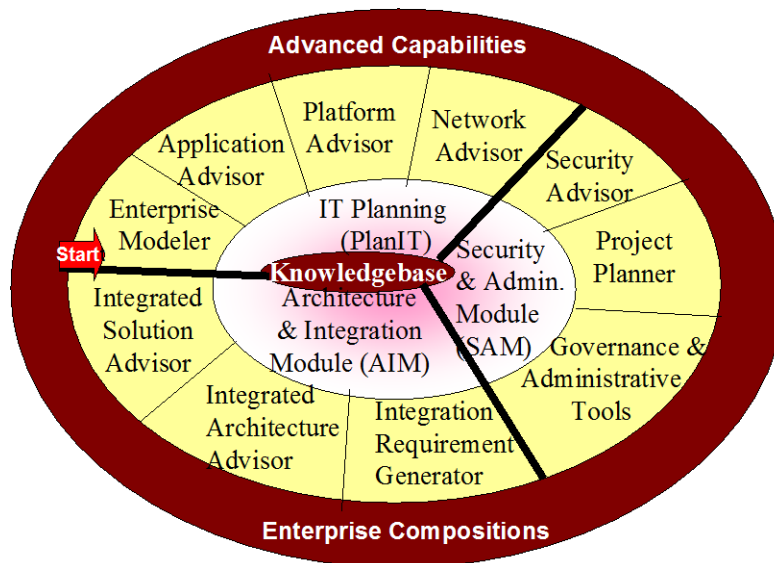Building the Next Generation Enterprise

PISA
(Planning, Integration, Security and Administration)

An Intelligent Decision Support Environment for IT Managers and Planners

Quick Overview

NGE Solutions, Inc. (www.ngesolutions.com)

1. WHAT IS PISA?

PISA (Planning, Integration, Security, Administration) is an intelligent decision support environment that helps businesses plan, integrate and secure their IT (information technology) systems. At present, PISA is intended for small to medium businesses (SMBs) but can also be used for offices and divisions of larger businesses.

The PISA environment, conceptually shown in Figure 1, provides a family of automated consultants ("advisors") that support all stages of IT planning, integration and security projects (e.g., enterprise modeling, application planning, network planning, security planning, project planning, architecture analysis, solution evaluation). At the heart of PISA, as shown in Figure 1, is the knowledgebase (KB) that contains an extensive patterns repository. The KB is used by the PISA advisors which are segmented into three modules (see Figure 1):

- **PlanIT (Planner for IT)** concentrates on IT planning projects and develops a plan at the enterprise level (see Section 4)
- **SAM (Security and Administration Module)** provides guidance for security, project management and governance issues (see Section 5)
- **Architecture and Integration Module (AIM)** focuses on how SOA (Service Oriented Architecture) can be used to architect and integrate the various components to form a functioning system (see Section 0).

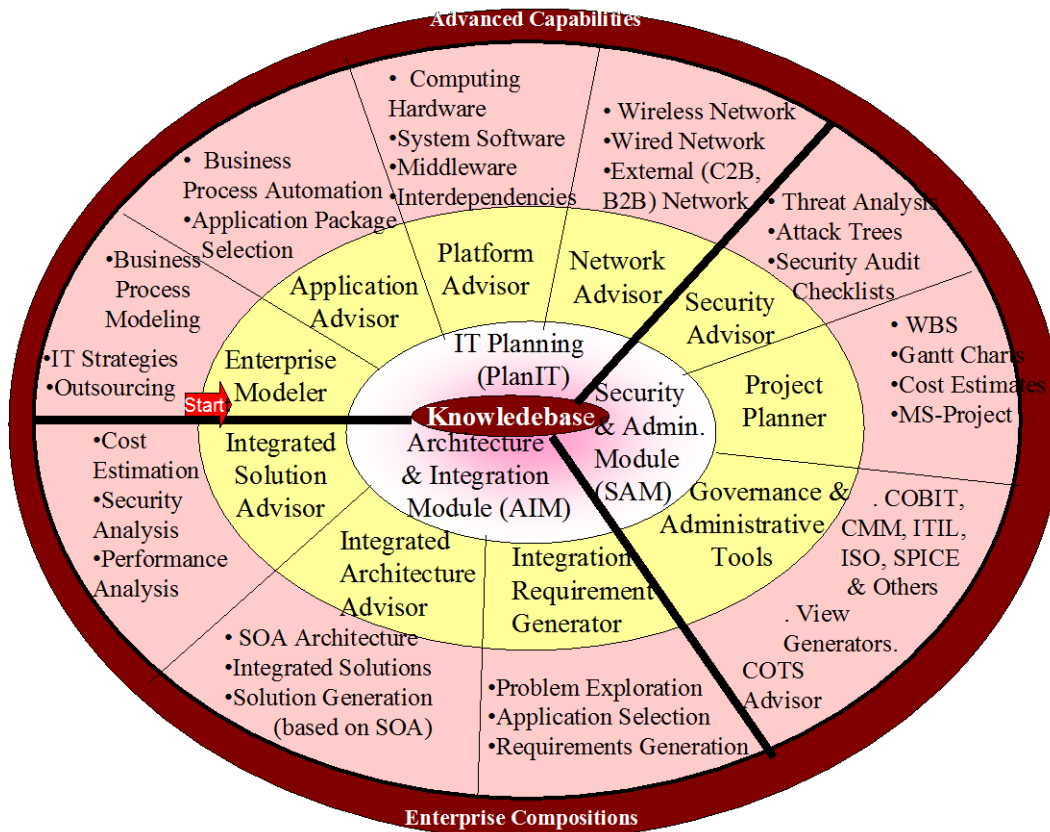Figure 1 shows an expanded version of the PISA pie shown on the title page.

Figure 1: Conceptual Model of PISA

Each PISA advisor, as shown in the outer circle of Figure 1, supports a specific stage and collaborates with other advisors to produce plans. For example, the Network Advisor supports the network planning stage and collaborates with the Security Advisor to develop a security plan that secures a network. The outermost circle ("the PISA crust") represents the **Advanced Capabilities Module (ACM)** that accepts the outputs produced by the PISA advisors and then helps the users to invoke detailed simulation and analysis tools (see Section 7 for more information on ACM).

To understand the sequence in which these advisors are invoked, start from the Enterprise Modeler ("Start" arrow in Figure 1) and follow the circle clockwise. Specifically, the PlanIT advisors do the following: the Enterprise Modeler develops a model of an enterprise, the Application Advisor develops an Application plan, the Platform Advisor develops a computing platform plan, and the Network Advisor builds a network plan. The SAM advisors develop a security plan, a project plan, and provide other administrative services. The AIM advisors develop an integrated architecture plan based on SOA. The advisors are not strictly sequential – different advisors can be invoked in different sequences to fit the type of project you are working on. However, some things have to be done in sequence. For example, you cannot secure a network before developing a network plan (naturally!). The PISA Control Panel, discussed later, guides the user through what can be invoked when.

Modeling Large Organizations and Business Networks: PISA was originally designed for small to medium (between 20 to 500 employees) organizations. However, PISA can be and has been used to represent large organizations, mergers and acquisitions, supply chain networks, B2B marketplaces and business networks. We have developed an **Enterprise Composer** that takes different business scenarios/business models and composes them into larger and more complex organizational structures. Enterprise composition capabilities are also shown in the outermost circle of PISA ("PISA crust"). See details in Section 8.

2. WHO SHOULD USE PISA AND WHY?

IT managers in modern enterprises face a bewildering array of decisions in planning of new systems, integration of new systems with existing ones, securing the IT assets, and administrating the resulting complex systems. In particular, modern IT managers frequently must answer the following questions that span the processes shown in Figure 1:

- What business processes should be automated and re-engineered to compete in the market place

- What application packages (ERP systems) should be used and how (buy, rent, outsource, extend)

- What type of computing platforms and software services should be bought or rented

- Should wireless networks be used, when and where

- How to integrate new applications and services with the existing, including legacy, systems

- When and how to introduce SOA (Service Oriented Architecture), if at all

- How to estimate the cost of transitioning to SOA

- How to determine the impact of transitioning to SOA in terms of security and performance issues

- How to secure the company assets to minimize risks

- How to develop security audits for normal as well as disaster situations

- How to develop detailed project plans for implementation and governance

These are difficult questions that must be answered frequently and quickly to cope with the highly fluctuating business and technology landscape. Many SMBs have a particular problem because they do not possess in-house expertise to make these decisions and develop good plans. Instead of different tools from different vendors that address different aspects of Figure 1, a comprehensive computer aided consulting environment is needed to systematically guide the IT managers and

planners through the processes displayed in Figure 1. A research project focusing on computer aided consulting for IT has produced the PISA environment to meet this challenge.

PISA has no competition at present. Companies such as IBM, SAP, Cisco and Dell have provided individual tools to sell their products as shown in Table 1. However, the user has to go to Dell for computers, Cisco for networks, SAP for applications, Verisign for security, and then integrate everything into a working system – a daunting task. As compared to different tools from different suppliers that address different stages of Figure 1, the PISA environment provides one stop shopping through a set of integrated advisors as shown in Table 1.

Table 1: High Level Comparison of PISA with Key Competitive Products

Planning, Integration, Security & Administration Activities	Key Commercial Products	PISA Advisors
Enterprise Modeling	IBM Rational Rose	Enterprise Modeler
Application Planning	SAP Business Maps	Application Advisor
Platform Planning	Dell Configurator	Platform Advisor
Network Planning	Cisco Net Designer	Network Advisor
Security Planning	Amenaza Planner	Security Advisor
SOA Planning	IBM eBusiness Framework (limited capabilities)	Architecture and Integration Module (AIM)
Project Planning	Microsoft Project	Project Planner

3. HOW TO USE PISA?

The PISA website (www.ngepisa.com) provides a great deal of information about this system. A logon ID/password is needed to use the system.

Figure 2: Sample PISA Control Panel

The user session, after signing in, is guided through a control panel shown in Figure 2. The system automatically determines which advisor you can invoke and this is indicated by a red arrow. In a normal session, advisors are automatically invoked in the pre-defined sequence suggested by Figure 1 (i.e., Enterprise Modeler -> Application Advisor -> Platform Advisor, etc.). However, a user may invoke other advisors as they become available (indicated by a yellow arrow). ACM can be invoked anytime for more detailed analysis. Each advisor, when invoked, produces a model and then returns control to the control panel. As shown in Figure 2, the links to the results produced by advisors used previously ("generated models"), if any, are also shown. The top toolbar provides buttons for help and the bottom toolbar provides access to a glossary, online guides and tutorials, PISA documentation, business scenario templates, and the PISA pie (Figure 1).

4. PLANIT MODULE TO DEVELOP A PLAN FOR IT INFRASTRUCTURE

Businesses face numerous challenges in using IT. The main challenge is that these businesses increasingly rely on sophisticated information technologies such as the Internet, wireless networks, Web technologies, numerous application software packages, different types of security solutions, and a multitude of system software packages such as database managers, utilities, .Net framework, and the like. Many businesses, especially SMBs, lack in-house expertise to properly plan the IT infrastructure needed to support the business. The PlanIT module of PISA helps with IT planning decision through the following advisors:

▪ Enterprise Modeler helps the user to create an enterprise model that captures the important aspects of a company such as company type, company size, company sites, outsourcing decisions, etc.

▪ Application Advisor helps the user develop automation strategies and suggests the business applications that will support different automation strategies.

▪ Platform Advisor suggests computing platforms ("hosts") on which the applications will reside.

- Network Advisor suggests a network configuration that includes wireless as well as wired networks.

5. SAM (SECURITY AND ADMINISTRATION MODULE) TO SUPPORT PLANIT

SAM provides the following security and governance/administrative advisors that help you to secure and administer the enterprise resources.

- Security Advisor secures the applications and the hosts on the network. It also produces a list that can be used in security audits.

- Governance Information Extractor examines the information from a diverse array of governance standards (e.g., CMM, CobIT, ITIL, SPICE, ISO200x, and SOX) and presents it to different advisors of the PISA platform as customized checklists.

- Business Continuity Planner generates a comprehensive plan that heavily utilizes different patterns for business continuity.

- Project Planner develops a project plan based on the decisions made in the previous advisors.

These advisors make inferences based on the information gathered by the previous advisors and further enrich and enhance the PISA knowledgebase. You can, of course, further refine and customize the plans generated by SAM.

SAM also supports the following administrative tools to support PlanIT:

- COTS (Commercial-off-the-Shelf) Advisor populates a Techbase that serves as a repository of commercially available solutions.

- Diagram Generator creates visual representations of the various solutions.

- Intelligent Document Generator produces reports at the end of the interview.

6. AIM (ARCHITECTURE AND INTEGRATION MODULE) FOR SOA

PlanIT produces an enterprise-wide IT plan that shows the main elements of the IT infrastructure. However, it does not answer the important question: how will all these elements fit together to form a working solution? This is where AIM fits in. A user would typically develop an enterprise-wide plan by using PlanIT and then use AIM to investigate in more detail how different aspects of this plan can be integrated into an overall architecture. AIM helps its users to develop an integration plan based on Service Oriented Architecture (SOA) principles.

Development of an integration plan is a complicated task with many challenges. Instead of a 'big bang' approach where all enterprise systems are converted to SOA in an afternoon, AIM supports a gradual approach where the enterprise achieves an integrated architecture one business (application) area at a time. The AIM methodology, shown in Figure 3, guides the user through the iterative process of choosing a business problem and then developing and evaluating integrated architectures for the chosen problem

The AIM advisors (Business Problem Explorer, Integration Requirements Generator, Integrated Architecture Advisors, and Integrated Solution Advisor) support different stages of this methodology and generate extensive documentation (an integration requirements document, an integrated architecture document, and an evaluation report) that can be used to understand, explain and communicate the major decisions. The starting point for AIM is the overall IT plan generated by PlanIT.
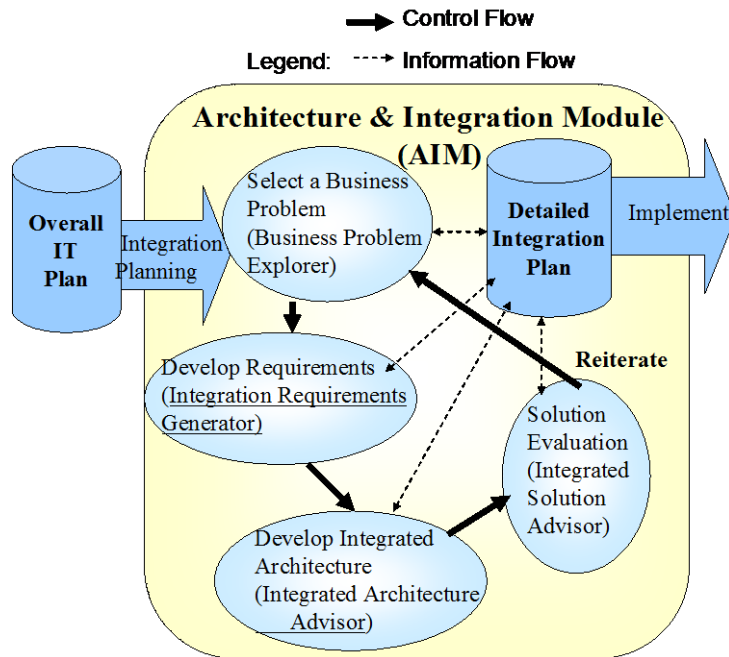
Figure 3: Conceptual View of AIM

7. ADVANCED CAPABILITIES MODULE (ACM): GETTING INTO MORE DETAILS

The focus of the basic PISA advisors (PlanIT, SAM and AIM) is to minimize user effort by extensively using defaults and patterns. Naturally this approach is not suitable for all situations. In many cases, more detailed analysis is needed, requiring more effort but providing more complete and accurate information. This is where ACM enters the picture – it accepts outputs generated by the Basic PISA system and shows how it can be used for detailed modeling and analysis. ACM expands the basic capabilities of PISA by:

- Allowing users to modify the output produced so far by using XML tools.

- Suggesting how users can do more detailed analysis by using existing modeling, simulation and analysis tools.

- Suggesting how users can develop their own tools by using outputs generated by the basic PISA system.

ACM is a relatively new module and we are in the process of developing the following capabilities:

- Advanced Business Process Analysis: business process modeling and workflow analysis

- Advanced Network Analysis: simulation analysis through tools such as Opnet

- Advanced Security Analysis: detailed attack tree and risk analysis

- Advanced SOA Analysis: detailed evaluation of SOA-based architectures

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IMPORTANT: ACM is intended for more technically savvy people, especially knowledge of XML is required because all outputs produced by basic PISA are in XML.

8. ENTERPRISES COMPOSER: BUILDING LARGER AND COMPLEX ORGANIZATIONS

In addition to small and medium (between 20 to 500 employee) organizations, PISA can be used to represent large and more complex organizations. Enterprise Composer takes different business scenarios and business models and composes them into larger and more complex organizational structures such as the following (see Figure 4):

- A large company consisting of many smaller plants, sites, and divisions..

- A large corporation based on mergers and acquisitions (M&A) of many companies

- A B2B marketplace with numerous buyers and sellers

- A supply chain system consisting of several consumers and suppliers

- A business network such as a health information network (HIN)

The Enterprise Composer treats each "scenario" generated by a PISA session as an organization unit (a reusable component) and composes large and complex organizations from these components by using SOA. It then suggests approximate configurations with details about the infrastructure components needed. The type of configurations and infrastructure components needed depend on the organizational composition and other parameters such as the number of participants (organization units), volume of transaction handled by the composition, value of transactions handled, security and trust level between the partners, etc. For example, the collaboration between partners in a supply chain require higher security than units of a large organization.
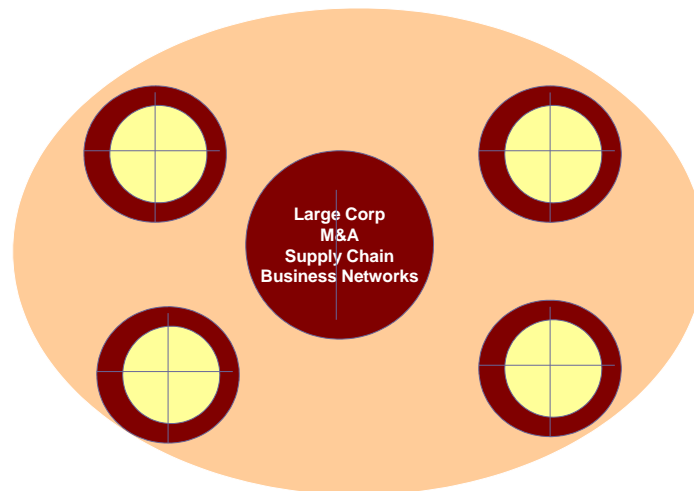

Figure 4: Building a Large PISA from Smaller Ones

9. TECHNICAL ARCHITECTURE OF PISA

PISA uses Software as a Service (SaaS) model where the user logs on to a remote system instead of downloading and installing it. The system resides on a web server and is accessible from commonly available Web browsers. Figure 5 shows the technical architecture of PISA with its two major modules: PlanIT and AIM. All advisors are invoked from a controller that signs a user in, assigns a unique ID to the user, and manages user sessions. This allows each user to develop and store her own object model that is enriched as the user invokes different advisors. As stated previously, the object model (OM) is a set of XML documents that represents the results of the

interviews as the user interacts with different advisors. After being invoked, each advisor conducts its own interview, consults the object model to review the decisions made so far, makes inferences as much as possible, makes further decisions based on the user interview, extracts needed patterns from the patterns repository, and further enriches the object model. The object model is used as a basis for collaboration between the advisors.
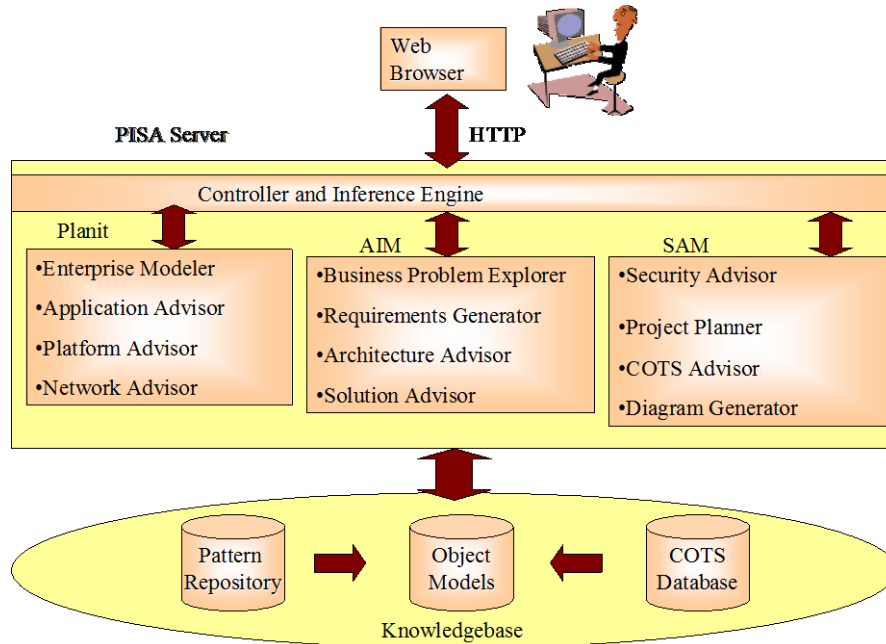
Figure 5: Technical Architecture of PISA

10. CONCLUDING COMMENTS AND ADDITIONAL INFORMATION

PISA is a comprehensive environment that supports the IT planning, integration, security and administration activities through a family of automated consultants ("advisors"). These advisors are integrated around an extensive knowledgebase and collaborate with each other like a team of consultants in real life situations. PISA demonstrates the technical and business feasibility of computer aided consulting. The focus on SMBs is deliberate to allow development of complete solutions. Future research and development directions include a wide range of activities to make the existing platform into a valuable tool for SMBs.

A great deal of additional information and documentation about PISA can be found at the website www.ngepisa.com. Exhibit 1 displays the main documents that are available at the PISA Website. If you are going to actually use the system, then we suggest that you access and read the 'PISA User Guide' before using the system.

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Exhibit 1: PISA Documents on www.ngepisa.com site

(Follow the "Learn More" link)

PISA Quick Start:

- **PISA Executive Summary**, a three slide executive summary.
- **PISA at a Glance**, a one page flier on PISA.
- **PISA Overview** gives a quick overview of the system (this document)

PISA Details:

- **PISA User Guide** gives details about how to use the system, illustrated through an example
- **SOA Planning Through PISA-AIM** shows how PISA can be used to develop an SOA-based architecture.
- **CASE STUDY: IT Infrastructure Planning Through PISA-PlanIT** describes how PISA-PlanIT was used to develop a complete IT plan for a manufacturing-retail company.
- **CASE STUDY: SOA Planning Through PISA-AIM** describes how PISA-AIM was used to develop a complete SOA plan for a retail company.
- **PISA Demo Example** illustrates a demo of using PISA through extensive screenshots.
- **PISA Patterns Repository** gives an overview of the patterns that are contained in the pattern repository.

PISA in Classroom:

- **PISA Instructor's Guide** shows how to use PISA in online or on-site courses
- **Course "Architectures for Globally Integrated Enterprises"** describes a course that is heavily supported through PISA.

Sample Reports Generated by PISA:

- **Complete IT Plan**, generated by PISA-PlanIT
- **Security Audit Report** generated by PISA Security Advisor
- **Application Requirement Document**, generated by PISA-AIM
- **Application Architecture Document**, generated by PISA-AIM

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