

GOVERNANCE ANALYSIS USING ENTERPRISE ARCHITECTURE

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A Practical Approach for Rapid Enterprise Compliance with Sarbanes-Oxley Driven IT and Business Governance Requirements

A White Paper for Senior Management on Internal Control Reporting
for Sarbanes-Oxley that utilizes:

- A Comprehensive Organizing Framework (Zachman Framework)
- Proven Methods and Tools (Enterprise Architecture)
- A Manageable Step-by-Step Governance Analysis Approach

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Governance Analysis using Enterprise Architecture

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Abstract:

This White Paper describes a practical approach for rapid enterprise compliance with Sarbanes-Oxley driven IT and business governance requirements. It shows how internal controls can be established by senior management using a Governance Analysis Framework (GAF). This is used to document the relationships within an enterprise that support financial and other reporting requirements. It is based on a comprehensive organizing framework using the Zachman Framework for Enterprise Architecture, as well as proven Enterprise Architecture methods and tools for the documentation and management of the GAF. It ensures that senior management is able to comply with the internal control reporting requirements of Section 404 of the Sarbanes-Oxley Act of 2002.

Responsibilities Imposed By Sarbanes-Oxley

The Sarbanes-Oxley Act of 2002 (also called “Sar-Ox” or “SOX”) ³ assigns personal responsibility to senior management of public and non-public organizations in the USA, and is being applied in various forms also by other countries throughout the world. Of particular concern is Section 404 of the Act, which relates to “*Management Assessment of Internal Controls*”. This requires an Internal Control Report and states “*the responsibility of management for establishing and maintaining an adequate internal control structure and procedures for financial reporting.*”⁴

Typical examples of the difficulties that face senior management to ensure they support SOX are the following issues related to internal control over financial reporting of public companies, and also in relation to judgments and estimates: ⁵

“Management is required to document the system of internal control over financial reporting. As required by the Sarbanes-Oxley Act of 2002 (SOX), section 404 (Management Assessment of Internal Controls), management will be required to assess the effectiveness of these controls. The ASB [Auditing Standards Board] believes that the evidence management uses to support its assertion about the effectiveness of its internal control also should be documented. The ASB believes that a failure to document the system of controls or the evidence used in making the assessment should be considered a weakness in internal control.”

... ..

“Management must recognize that judgments and estimates are subject to second-guessing, and an assessment can change in a subsequent period if new information becomes available. As a result, the system of internal control over estimates is particularly sensitive because the auditor or a regulator might conclude that the internal control system was either not appropriate or not functioning because it allowed an inappropriate estimate to be booked in the first place. This will be true for any account or control where there is a greater degree of subjectivity.”

The Internal Controls that are required will vary from enterprise to enterprise. They will need to be tailored to the relevant industry (or industries) that the organization operates within; they are also typically unique for each enterprise. They are determined by its business activities and processes as well as its financial controls. They are closely related to the IT systems and databases that the enterprise uses for financial and other reporting.

For example, a simple test that can be applied in an organization is to ask staff why they carry out a specific business process, financial or otherwise. This is a question that may be asked by an auditor to determine whether internal controls referenced by management do actually work. When asked “*why do you do that process?*” often elicits the response: “*because we have always done it that way*”. This answer indicates that the reasons – even if they were once known – have become lost to history. It is a warning signal to the auditor and to management that the internal controls are not working in that particular case.

Another example of some of the questions that auditors must ensure are adequately addressed is shown in Figure 1, in relation to Multi-Location Testing Considerations.⁶

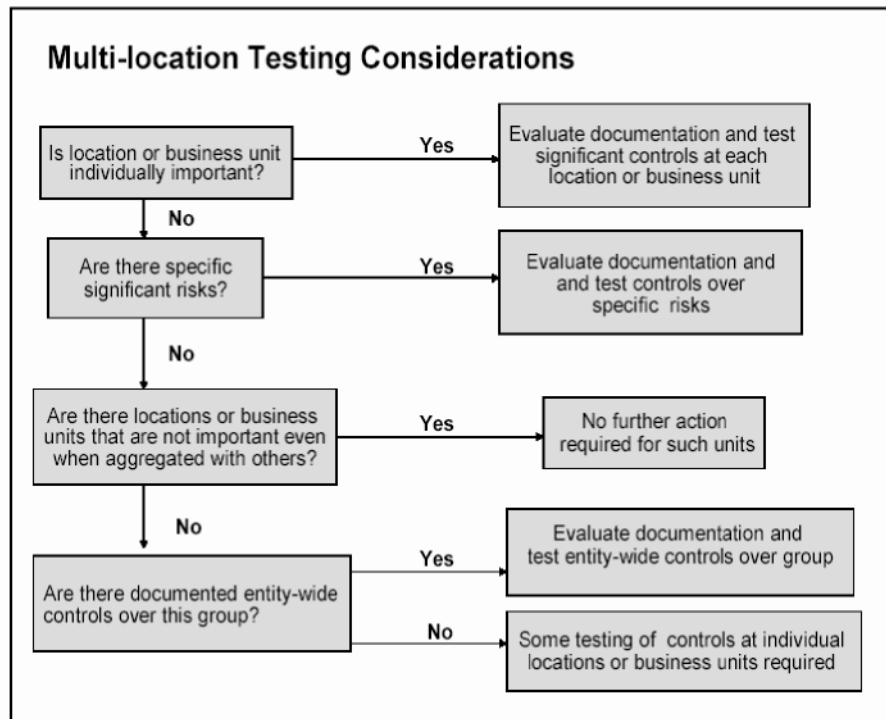


Figure 1: Multi-Location Testing Considerations for Auditors in relation to Internal Control Reporting for Sarbanes-Oxley

The questions in Figure 1 relate to business units and locations and are generally tested first by auditors. They should be easy for most enterprises to answer. Difficulty in answering these simple questions may indicate more serious deficiencies in internal controls. This can lead the auditor to pose more difficult questions: where the detail of the answers is less important to the auditor than the demonstrated fact that senior management do have relevant answers available.

Typical Internal Control Questions

For complete satisfaction that internal controls have not only been implemented, but also work in practice throughout the enterprise, senior management need to show that answers are available for each of the following management and audit questions. Questions should be capable of being answered in relation to key resources such as: data; business activities and processes; locations; people and business units; and events. Answers should be available that show how resources relate to strategic and tactical business plans that have been defined by management, such as:

- *For Data: What does the data represent? How is the data processed? Where is it used? Who is responsible for the data? When is the data used? Why is the data needed? Does this data support the strategic and tactical business plans?*
- *For Processes: How do we execute them? What data do they use? Where are they processed? Who is responsible for the processes? When are these processes used? Why are the processes needed? Do they support strategic and tactical business plans?*
- *For Locations: What data does the location need? How are processes executed in the location? Who is responsible for the location? When is the location involved in key events? Why does the location exist for the enterprise? Do the business plans for each location support the strategic and tactical business plans?*
- *For Business Units and People: What data do the business units need? How are key*

processes executed in each business unit? Where is each business unit located? Who is responsible for the business unit? When is the business unit involved in key events? Why does each business unit exist? Do the business plans for each business unit support the strategic and tactical business plans?

- *For Business Events: What data does each business event need? Which processes are initiated by each business event? Where do business events occur? Who is responsible for these business events? When do they occur? Why do they occur? Do the business events support the strategic and tactical business plans?*
- *For Business Plans: What data do the business plans need? How do processes support the business plans? Which locations do the business plans apply to? Who is responsible for these business plans? When does each event occur that supports the business plans? Why do the business plans exist? Do tactical and operational business plans support the strategic plans?*

An auditor expects that answers to most of these questions are available to senior management, at least when applied at the strategic level – and for key financial aspects at the tactical level also. But the reality in most organizations is much different. Apart from questions relating to “where” and “who”, the answers for many of the questions above are extremely difficult to obtain.

Managing Internal Controls using Enterprise Architecture

These are simple internal control questions: “What”; “How”; “Where”; “Who”; “When”; and “Why”. If controls are in place, these questions should be capable of being answered from the different perspectives of management and staff levels in an enterprise. The answers available to senior management – as the “Planners” and “Owners” of the enterprise – are likely to be different from the detail needed by middle managers, business experts and IT staff – as the “Designers” and the “Builders” – of the business processes and support systems that are used for financial and other reporting.

These six questions can be represented by columns in a matrix, where the different perspectives of “Planner”, “Owner”, “Designer”, “Builder” and “Subcontractor” discussed above are represented as rows. This matrix is provided by the *Zachman Framework for Enterprise Architecture*,⁷ as shown in Figure 2. While Enterprise Architecture has previously been considered to be an IT responsibility, when it is also used by senior management it enables precise *Governance Analysis*. It also provides a *Business Transformation Enablement* capability.

	What	How	Where	Who	When	Why
PLANNER Objectives/Scope						
OWNER Conceptual						
DESIGNER Logical						
BUILDER Physical						
SUBCONTRACTOR Out-of-Context						
FUNCTIONING ENTERPRISE	Data	Function	Network	Organization	Schedule	Strategy

Figure 2: The Zachman Framework for Enterprise Architecture. This is used to create a Governance Analysis Framework (“GAF”) that is tailored to each enterprise. The GAF is an Internal Control Reporting approach that may be used by management to show an ability to comply with Section 404 of the Sarbanes-Oxley Act of 2002.

The Designers, Builders and Subcontractors (often outsourced) work with business experts who understand the business processes of the enterprise. Based on their business knowledge, IT staff have designed and built systems and databases that support those processes. They provide the data, information and processing needed for day-to-day operational functioning of the enterprise. They are represented by the bottom three rows of the Zachman Framework in Figure 2.

In most enterprises, senior managers have not become involved in Enterprise Architecture (EA), which has been considered by many to be a computer discipline. While this is true in part, EA is also a business discipline. It enables business experts and IT staff, working together, to establish and define internal controls – as systems to support key business processes and databases that are needed for internal control reporting. However when used by senior management, Enterprise Architecture also provides methods for “*Business Transformation using Enterprise Architecture*”, as discussed later.

It is the responsibility of senior management – as Planners and Owners of business plans, data, processes, locations, business units and events that are used to manage the enterprise – to define the Objectives and Scope of the internal controls. It is their responsibility also to provide the high-level (conceptual) perspective or view that is needed to manage these controls. These control perspectives are defined in the first two rows of the Zachman Framework in Figure 2.

However, this key definition from the senior management perspective of the controls that are relevant to them for Internal Control Reporting is missing in most enterprises today.

The absence of these controls has merely been embarrassing previously. With legal implications of Sarbanes-Oxley non-compliance, an inability by senior managers – due to the complexity of most enterprises – to answer internal control reporting audit questions takes on a new personal meaning. What is needed is a Governance Analysis Framework – that is both easy to create, and easy to use – to obtain answers for relevant internal control reporting questions.

A Governance Analysis Framework (GA F) for Sarbanes-Oxley

The Zachman Framework provides a way to cut through the complexity of today’s enterprise and document the relationships that exist between each column for each row. These relationships are typically shown as matrices, as illustrated in Figures 3 – 6 and discussed for each figure below. They address Governance of the Project Management Business Unit of a typical enterprise.

The right window of Figure 3 shows a typical Organization Structure for Project Management in some organizations. Under the Project Management business unit are shown three business units: for Financial Management; Resource Management; and Schedule Management. These business units represent “Model Views” of the enterprise.

The left window of Figure 3 is a typical Governance Analysis Framework matrix. This relates business planning statements (goals, objectives, policies, KPIs, strategies, tactics etc) that are shown as rows and address the question “Why”. Relevant business units (based on the Model Views in the right window) are shown as columns of the matrix; they address the question “Who”.

Reading across a row in Figure 3 shows ticked business units that are responsible for, or involved in, implementing the relevant planning statement for that row. For example, the row “P3 Project Authorization (Policy)” that is highlighted shows that the following business units are involved: “F0 Strategic Model”; “F1 Project Management”; “F2 Financial Management”; and “F3 Resource Management”. This clearly answers the question: “Who” is responsible for managing, or involved in implementing, this statement.

Reading down a column in Figure 3 indicates the subset of planning statements that the relevant business unit column is responsible for, or involved in implementing. For example reading down the column “F2 Financial Management”, the ticked planning statement rows together represent the Tactical Business Plan for Financial Management in the business unit. By referring to the detailed text in those planning statements, these rows clearly answer the Financial Management question of “Why”, for financial reporting.

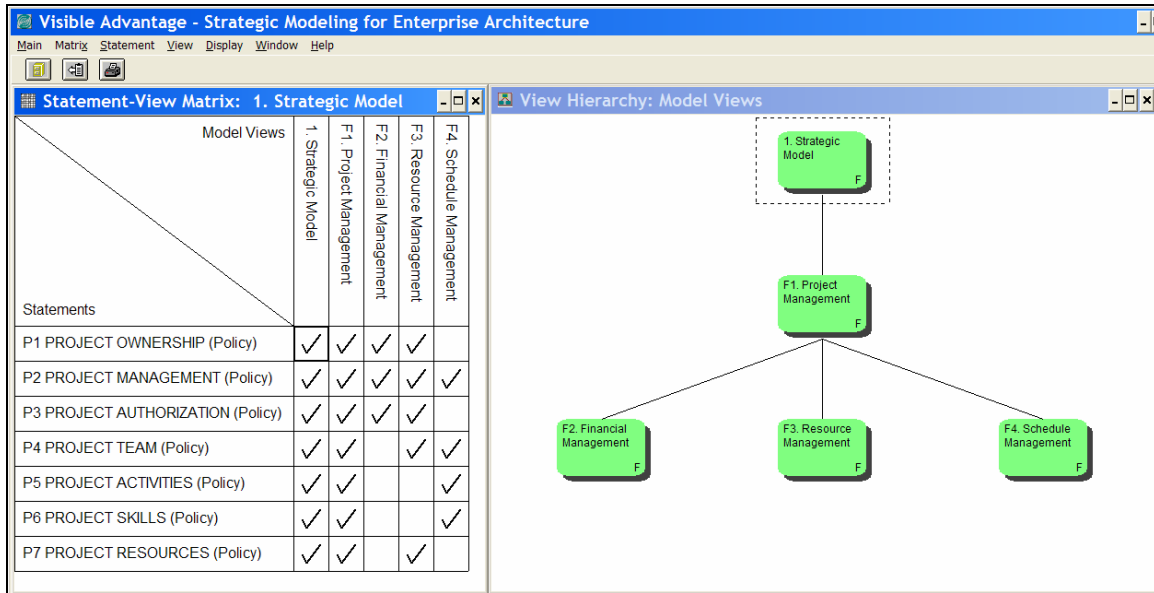


Figure 3: Typical Governance Analysis Framework Matrix that relates “Why” (shown as rows for Planning Statements) and “Who” (shown as columns for Business Units)

Figure 4 shows a matrix that lists business activities for Financial Management as rows, with the relevant business planning statements shown as columns.

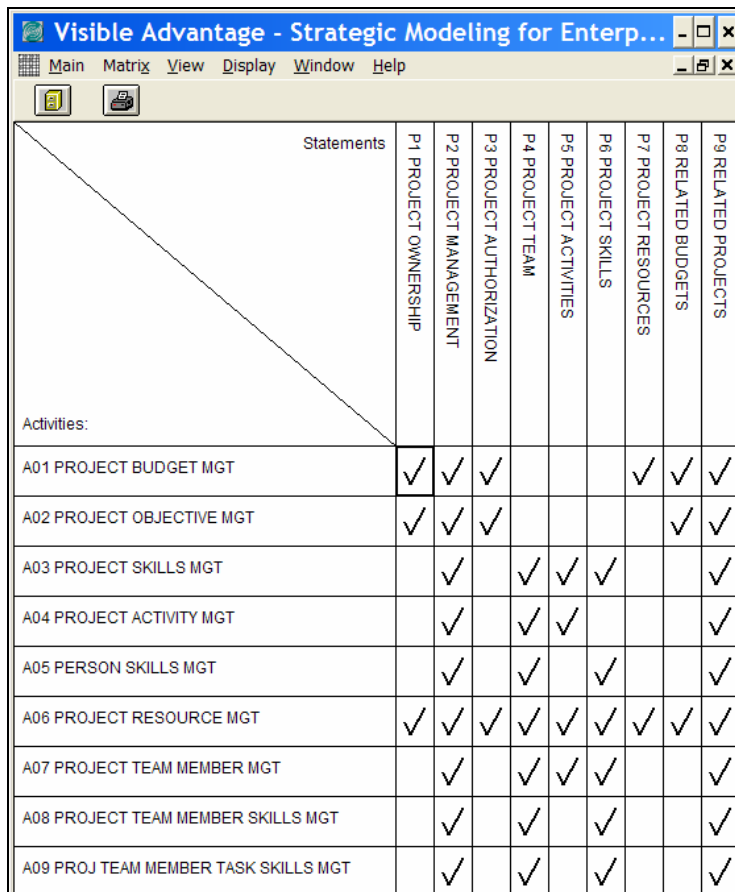


Figure 4: Typical Governance Analysis Framework Matrix that relates “How” (shown as rows for Business Activities) and “Why” (shown as columns for Planning Statements)

This matrix has been created for the particular organization. It provides a Governance Analysis Framework (“GAF”) that is to be completed by knowledgeable business experts. When completed, it can be easily used to answer the questions “How” and “Why”.

Reading across a row in Figure 4 with an understanding of the relevant business activity for that row, the Financial Management business experts refer to the relevant planning statement text for each column. They tick those planning statement columns that require the relevant activity.

On completion of the matrix in this way, some internal controls for Financial Management have now been documented for later reference. For example, reading down a planning statement column in the matrix answers the question “How” the planning statement is implemented or managed based on the activity rows that are ticked. Reading across an activity row answers the question “Why” the activity is carried out, for all of the planning statement columns that are ticked

Figure 5 provides a further Internal Control matrix. It relates Business Plans (shown as planning statement rows) with Data (shown as data object columns). When this Governance Analysis Framework matrix has been completed, it can be used to answer “What” and “Why”.

Statements	ACTIVITY	BUDGET	FUNDS RESOURCE	OBJECTIVE	PERIOD	PERSON	PERSON RESOURCE	PERSON SKILL	PROJECT	PROJECT ACTIVITY	PROJECT BUDGET	PROJECT MANAGER	PROJECT OBJECTIVE	PROJECT OWNER	PROJECT RESOURCE	PROJECT SKILL	PROJECT TASK	PROJECT TEAM	PROJECT TEAM MEMBER	PROJECT TEAM MEMBER SKILL	RELATED BUDGET	RELATED PROJECT	RESOURCE	SKILL	TASK	TASK ACTIVITY	TASK SKILL
P1 PROJECT OWNERSHIP		✓			✓				✓	✓	✓	✓	✓	✓	✓						✓	✓	✓				
P2 PROJECT MANAGEMENT		✓		✓	✓				✓	✓	✓	✓	✓								✓	✓					
P3 PROJECT AUTHORIZATION		✓		✓	✓				✓	✓	✓	✓	✓	✓	✓						✓	✓	✓				
P4 PROJECT TEAM					✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
P5 PROJECT ACTIVITIES	✓				✓				✓	✓		✓					✓					✓				✓	
P6 PROJECT SKILLS					✓				✓			✓				✓	✓						✓	✓		✓	
P7 PROJECT RESOURCES		✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓							✓					
P8 RELATED BUDGETS		✓			✓				✓			✓	✓	✓							✓	✓					
P9 RELATED PROJECTS	✓				✓				✓	✓		✓	✓	✓	✓		✓				✓	✓					

Figure 5: Typical Governance Analysis Framework Matrix that relates “Why” (shown as rows for Planning Statements) and “What” (shown as columns for Data Objects)

For example, reading across a planning statement row in Figure 5 – such as for the “P3 Project Authorization” row – each data object column is ticked that provides data in support of the full text of that planning statement.

On completion of the matrix, by reading down a data column each ticked row shows the planning statements that the data supports: so answering the question “Why” the data is needed. Reading across a planning statement row indicates the data that is available to support that statement and associated management decision making. This answers the question “What”; it shows the data that supports the relevant statement.

A fourth Governance Analysis Framework matrix is also very important. This is shown in Figure 6. It lists Business Activities as rows, with data objects as columns (shown as “Entities” here).

To complete this matrix, business experts who are knowledgeable in a listed business activity row will tick each data column that the activity requires. The resulting completed matrix enables the questions “What” and “How” to be answered. Reading down a data column, each activity row that

has been ticked indicates “How” the data is used. Reading across an activity row, each column that has been ticked indicates “What” data is required.

Other matrices are also needed to be able to answer each of the Internal Control questions posed earlier. Relevant matrices are identified next, with reference (in brackets) to earlier figures where appropriate:

- *Data Matrices:* Data to Processes (see Figure 6); Data to Locations; Data to People and Business Units; Data to Events; Data to Business Plans (see Figure 5).
- *Process Matrices:* Processes to Data (see Figure 6); Processes to Locations; Processes to Business Units; Processes to Events; Processes to Business Plans (see Figure 4).
- *Location Matrices:* Locations to Data; Locations to Processes; Locations to People and Business Units; Locations to Events; Locations to Business Plans.
- *People and Business Unit Matrices:* People and Business Units to Data; People and Business Units to Processes; People and Business Units to Locations; People and Business Units to Events; People and Business Units to Business Plans (see Figure 3).
- *Business Event Matrices:* Business Events to Data; Events to Processes; Events to Locations; Events to People and Business Units; Business Events to Business Plans.
- *Business Plan Matrices:* Business Plans to Data (see Figure 5); Business Plans to Processes (see Figure 4); Business Plans to Locations; Business Plans to People and Business Units (see Figure 3); Business Plans to Business Events.

Activities:	ACTIVITY	BUDGET	EQUIPMENT RESOURCE	FUNDS RESOURCE	OBJECTIVE	PERIOD	PERSON	PERSON RESOURCE	PERSON SKILL	PROJECT	PROJECT ACTIVITY	PROJECT BUDGET	PROJECT MANAGER	PROJECT OBJECTIVE	PROJECT RESOURCE	PROJECT SKILL	PROJECT TASK	PROJECT TEAM	PROJECT TEAM MEMBER	PROJECT TEAM MEMBER SKILL	PROJECT TEAM MEMBER TASK SKILL	RELATED BUDGET	RELATED PROJECT	RESOURCE	SKILL	TASK	TASK ACTIVITY	TASK SKILL	
A01 PROJECT BUDGET MGT	✓				✓	✓			✓	✓	✓	✓	✓	✓	✓									✓					
A02 PROJECT OBJECTIVE MGT	✓				✓	✓	✓			✓	✓	✓	✓	✓	✓									✓					
A03 PROJECT SKILLS MGT	✓					✓	✓			✓	✓	✓	✓	✓	✓	✓								✓	✓				
A04 PROJECT ACTIVITY MGT	✓	✓				✓	✓			✓	✓	✓	✓	✓	✓									✓					
A05 PERSON SKILLS MGT							✓		✓																✓				
A06 PROJECT RESOURCE MGT		✓				✓	✓		✓	✓	✓	✓	✓	✓	✓									✓					
A07 PROJECT TEAM MEMBER MGT							✓						✓					✓	✓										
A08 PROJECT TEAM MEMBER SKILLS MGT							✓						✓					✓	✓	✓					✓				
A09 PROJ TEAM MEMBER TASK SKILLS MGT							✓	✓					✓					✓	✓	✓	✓				✓	✓	✓		
A10 TASK ACTIVITY MGT	✓					✓	✓					✓						✓								✓	✓		
A11 PROJECT TASK MGT		✓				✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓						✓	✓				
A12 TASK SKILLS MGT						✓	✓					✓					✓							✓	✓	✓			
A13 RELATED BUDGET MGT		✓				✓																✓							
A14 RELATED PROJECT MGT		✓				✓	✓		✓	✓	✓	✓	✓	✓	✓									✓	✓				

Figure 6: Typical Governance Analysis Framework Matrix that relates “How” (shown as rows for Business Activities) and “What” (shown as columns for Data)

When senior managers use Governance Analysis Framework Matrices as described above, they are able to demonstrate they have a powerful management tool for Internal Control Reporting as required by the Sarbanes-Oxley Act of 2002.

Developing Governance Analysis Frameworks for an Enterprise

It is important to note that none of the matrices discussed above for Figures 3 – 6 were manually defined. To manually determine the relevant row and column titles for each of these tailored matrices is extremely difficult; to keep them manually updated continually as the enterprise changes over time is even more difficult. Only if all matrices are maintained up-to-date over time can they be relied on for effective internal control. When the other matrices also listed above are considered, *manual* definition and maintenance of these matrices for internal control reporting purposes is no longer a practical or realistic option.

Instead, the relevant row and column titles for each matrix in these figures were automatically generated by a modelling tool (discussed later), based on a rigorous Governance Analysis methodology. Each generated and tailored matrix for an organization provides a Governance Analysis Framework to be completed by relevant business and IT experts. When completed these matrices provide a powerful Internal Control Reporting capability. Furthermore, this automated support enables the matrices to be easily maintained up-to-date over time. Any relevant changes are automatically applied to all other matrices that are also affected. The methodology, the steps and the modelling tools used to achieve this automatic matrix creation and maintenance are discussed later in this paper, in *“Methods and Tools for Governance Analysis Frameworks”* and *“Step-by-Step Approach for Governance Analysis Frameworks”*.

These matrices are generated from the Strategic Business Plans that are defined and agreed by senior management for the enterprise. Such plans define the strategic directions that the senior management team establishes to manage the enterprise today, and provide direction as it moves into the future. These strategic plans provide a catalyst to develop a Strategic Map as part of a tailored Strategic Model for the enterprise.

A Strategic Map is a “picture of the business”, similar in concept to the layout of a city. A city map clearly shows the layout of streets (“where”) and the access routes that define “how” to get there. It also indicates “what” is located in parts of the city. Given a reason (“why”) to take a given route at a certain time (“when”), people (“who”) can use the map to navigate through any city.

What is missing in most enterprises is a similar “map (or picture) of the business”. A city map can be bought from newsagents in that city, but no newsagent sells Strategic Maps for enterprises. In the absence of a Strategic Map for your enterprise, it is hard to answer the same questions ... as we have discussed earlier. As a result, Internal Control Reporting is difficult.

A Strategic Map that is developed and tailored to an enterprise enables senior managers, as well as middle managers, expert business staff and IT staff to see the data, activities and processes, locations, business units and people, the business events and the business plans that all need to be managed effectively for internal control reporting.

From the Strategic Map and underlying Strategic Model, the Governance Analysis Framework matrices discussed above become dynamic. They are automatically generated. For example:

- The strategic data of vital importance for financial and other reporting, and for internal control reporting, is defined as the Strategic Map is developed. This data is automatically used to create the Data columns shown in Figure 5 and Figure 6.
- The Strategic Map also enables key business activities and processes to be identified and named. These identified activities and processes are automatically used to create the Activity rows shown in Figure 4 and Figure 6.
- The planning statements from strategic plans that are used as the catalyst to develop the Strategic Map are automatically used to create the statement rows shown in Figure 3 and Figure 5 and the statement columns shown in Figure 4.

- The business units responsible for, or involved in, implementing the business plans are automatically used to create the business unit columns in Figure 3.
- Similarly, the Strategic Map and other associated maps are automatically used to create the relevant rows and columns of many other required matrices as also listed above.

The role of the Strategic Map and underlying Strategic Model is vital for the automatic creation of the Governance Analysis Framework matrices discussed earlier, for Internal Control Reporting. Methods and tools for developing and maintaining these internal controls are discussed next.

Methods and Tools for Governance Analysis Frameworks

The development of a tailored Strategic Map and underlying Strategic Model for an enterprise is the vital first step to establish Internal Control Reporting based on dynamic Governance Analysis Framework matrices that can be automatically generated as discussed earlier. The method used to achieve this is called Strategic Modelling.

A typical Strategic Modelling project to define a tailored Strategic Map and underlying Strategic Model for an enterprise takes 25 days – typically spread over a duration of three months. This 25-day period does not complete the content of the GAF matrices. But it does automatically create each relevant dynamic matrix row and column name, tailored to the terminology enterprise.

Near the start of the 25-day period, the senior management team and their direct reports are involved for two days in a facilitated session, to develop the tailored Strategic Map. This time commitment is vital, to ensure that the Strategic Map incorporates the key needs of management for internal control reporting.

Two days is a significant demand on their limited time-availability, but it is essential. While this facilitated session with senior management has been reduced in some cases to one day, the accuracy, usefulness and maintainability of the resulting GAF matrices suffer if the senior management team is not involved. If only the direct reports participate on the second day, it is critical that senior management do at least spend a further half-day to review the additional detail provided when they were absent from the facilitated session.

Given this input from the senior management team and their direct reports, detailed analysis is carried out by the facilitator in the remainder of the 25 day period. This strategic model analysis identifies key data, business activities, locations, business units, and business events for the business plans that were used as catalysts.

The result of this strategic model analysis is documented in a Governance Analysis Framework (GAF) Report, which is the main deliverable – along with the Enterprise Architecture Portfolio Plan (EAPP) Report – from the Strategic Modelling project. These reports include an Executive Summary and key recommendations, with a description of methods for maintaining the delivered tailored GAF matrices. Also included are Appendices that document all components of the defined Strategic Model for Internal Control Reporting as follows:

- *Business Plan*: Documents the Strategic Business Planning statements that were used as the catalyst for the facilitated strategic modelling session.
- *Strategic Map*: Documents the enterprise Strategic Map and subset tactical maps for key business units.
- *Strategic Data*: Documents the underlying data represented in the enterprise Strategic Map and subset tactical maps for key business units.
- *Business Activities*: Identifies key business activities that are reflected in the Strategic Map, as determined during and after the facilitated session.
- *Business Activity Clusters*: Documents automatically derived project plans that identify the data required by each activity. This Appendix identifies activities that can be reused throughout the enterprise – with large potential cost savings from this reuse.
- *Business Locations*: Lists key locations (where relevant) that were identified during and after the facilitated session.

- **Business Units:** Lists key business units identified during and after the facilitated session based on the subset tactical maps from the Strategic Map.
- **Business Events:** Lists key business events (where relevant) identified during and after the facilitated session.
- **GAF Matrices:** Documents initial (blank) Governance Analysis Framework matrices from the data, activities, locations, business units, events, and business plans from the earlier Appendices. This includes the four tailored matrices discussed in Figures 3 – 6 and other matrices as required.

The GAF Report and its contents (as described above) provide a high-level documented view of tailored Internal Control Reporting from the strategic perspective for senior management. These matrices must be completed by relevant business experts as discussed earlier.

The strategic GAF matrices are typically populated by more detailed matrices from key business units. Tactical Modelling projects – each similar to the Strategic Modelling project – can in turn be undertaken for these business units. Depending on the business focus they take in relation to the enterprise, these Tactical Modelling projects typically are completed in 20 days within a two month elapsed period.

Strategic Modelling projects and Tactical Modelling projects as described above have been completed for large and medium Commercial enterprises throughout the world.⁸ Governance Analysis Frameworks for Internal Control Reporting are also vitally important to large Government Departments and Defense Departments. Strategic Modelling and Tactical Modelling projects for Government and Defense have also been completed in the USA, Canada, Australia and NZ.⁹

The ability to develop the tailored definition of a Strategic Map and underlying Strategic Model, together with the Appendices and Matrices above, depends on the methodologies that are used for Strategic and Tactical Modelling projects as described earlier.

However, even more important is the ability to develop a Governance Analysis Framework that is tailored uniquely to an enterprise – and to complete this GAF in 25 days within an elapsed three months. Most modelling tools require much of the definition to be carried out manually over many months (sometimes even over years); but not in days. Their lack of automated tools for dynamic maintenance may further mean that this maintenance must also be done manually.

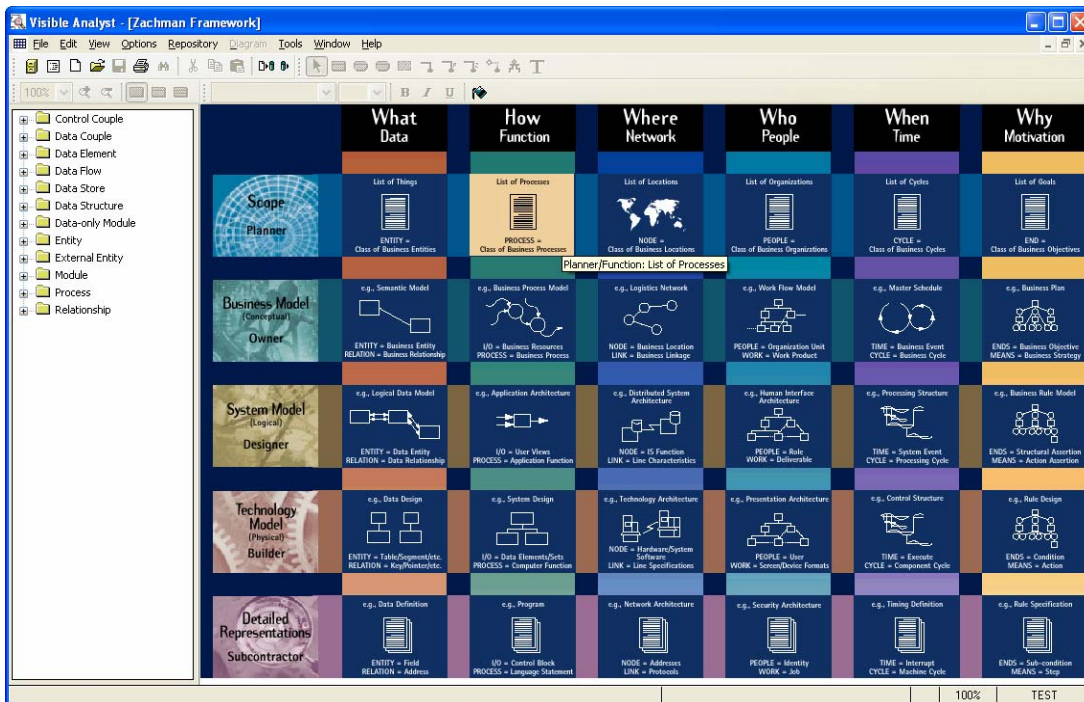


Figure 7: Visible Analyst uses the Zachman Framework as an interface for dynamic access

to Enterprise Architecture models. It supports all cells of the Zachman Framework

I have found two modelling tools vital to my use in completing Strategic Modelling and Tactical Modelling projects rapidly. These are Visible Advantage and Visible Analyst, both available from Visible Systems Corporation.¹⁰ Other tools are also available for automatic code generation and for problem tracking.¹¹

Screenshots of Visible Advantage were shown earlier in Figures 3 – 6. Visible Analyst, with its full support of the Zachman Framework for Enterprise Architecture as a clickable interface, is shown in Figure 7. It is one of the few modelling tools that support all cells of the Zachman Framework.

Business Transformation using Enterprise Architecture

A key comment was included in the discussion above of the contents in the Governance Analysis Framework (GAF) Report: the main deliverable from Strategic Modelling and Tactical Modelling projects. This was the reference to *Strategic Model Analysis*, which was briefly mentioned in the GAF Report contents in relation to *Business Activity Clusters*.

These clusters are automatically generated by the above modelling tools as project plans, which are used for rapid delivery of priority business activities and processes into production in only 3 – 6 months. This capability for rapid delivery is vital in today's rapidly-changing world. Priority business activities and processes can be implemented in this rapid timeframe that also use the latest technologies based on: XML; Web Services; Service-Oriented Architecture; and Business Process Management (BPM) languages. BPM languages can be automatically generated as executable code from Process Models, Workflow Models or similar diagrams. This means that business processes can be rapidly delivered into production, and also can be easily and rapidly changed as the business changes. Microsoft and IBM have released BPM products that provide this capability.¹²

An important fact also is the ability of the modelling tools used in Figures 3 – 7 to automatically identify reusable activities as part of their analysis of the Strategic Model. Business Activity Clusters are derived automatically by Strategic Model Analysis and clearly identify reusable activities. These reusable activities are a catalyst for Business Transformation.

This Business Transformation capability is significant. Even today, most organizations still use business activities and processes that were defined before the advent of the Internet. These older activities and processes do not enable the full benefits and cost savings of the Internet to be realized effectively. The reusable activities and processes identified in the GAF Report, when used as catalysts for Business Transformation and when they are subsequently implemented, can represent potential cost savings of hundreds of millions of dollars for large enterprises.¹³

The GAF Reports produced from Strategic Modelling and Tactical Modelling projects provide the documentation and modelling tool capabilities that are needed. This is an added by-product of the Governance Analysis Framework methods described in the paper for Internal Control Reporting. The methods and tools that I have discussed are similarly used to implement the transformed business activities and processes for Business Transformation Enablement.¹⁴

Step-by-Step Approach for Governance Analysis Frameworks

Finally, the methods discussed above can be applied rapidly in a manageable step-by-step approach as illustrated in Figure 8, which is keyed to the steps described below:

1. Establish Plan for Strategic Modelling Project

A project plan is established to manage the tasks to be carried out over the elapsed period of the 3-month Strategic Modelling project. This involves identifying the senior managers and their direct reports who will participate in the 2-day facilitated session and the subsequent review session after analysis of the Strategic Map defined in that session. The facilitated session is scheduled to take place over two days at a convenient date for all managers, following step 2 next.

2. Capture Initial Business Planning Input as Catalyst

Strategic Modelling uses the Strategic Business Plans of the enterprise as a catalyst. These are expanded with input from all participating managers (who were identified in step 1) using a Business Planning Questionnaire tailored from the Strategic Plans. This questionnaire requests anonymous responses for each question from each manager 3 weeks prior to the 2-day session. The questionnaire takes 1 hour for completion, over a weekend. This ensures the managers personally complete the questionnaire, not their assistants. All responses are returned to a central point a few days prior to the scheduled facilitated session, where all manager responses to each question are consolidated under that question – maintaining full anonymity to encourage uninhibited discussion during the facilitated session. The Strategic Plans and all consolidated questionnaire responses are entered into the modelling tool that is to be used in step 4 for later Strategic Model Analysis.

3. Conduct Strategic Modelling Facilitated Session

The scheduled 2-day Strategic Modelling facilitated session is undertaken with all of the invited managers present, using the consolidated responses to the Business Planning Questionnaire as a catalyst. From these, with further expansion of business strategies by the group of managers based on questions asked, the facilitator progressively develops a “picture of the business” on a whiteboard to represent the Strategic Map. This map is used by the facilitator and managers to identify, to name and to prioritize key business activities and processes that exist within the map. As required by the enterprise, key locations, organizational units and business events may also be listed if they are not already documented elsewhere.

25-day Project for Enterprise Architecture Delivery in 3-month Increments

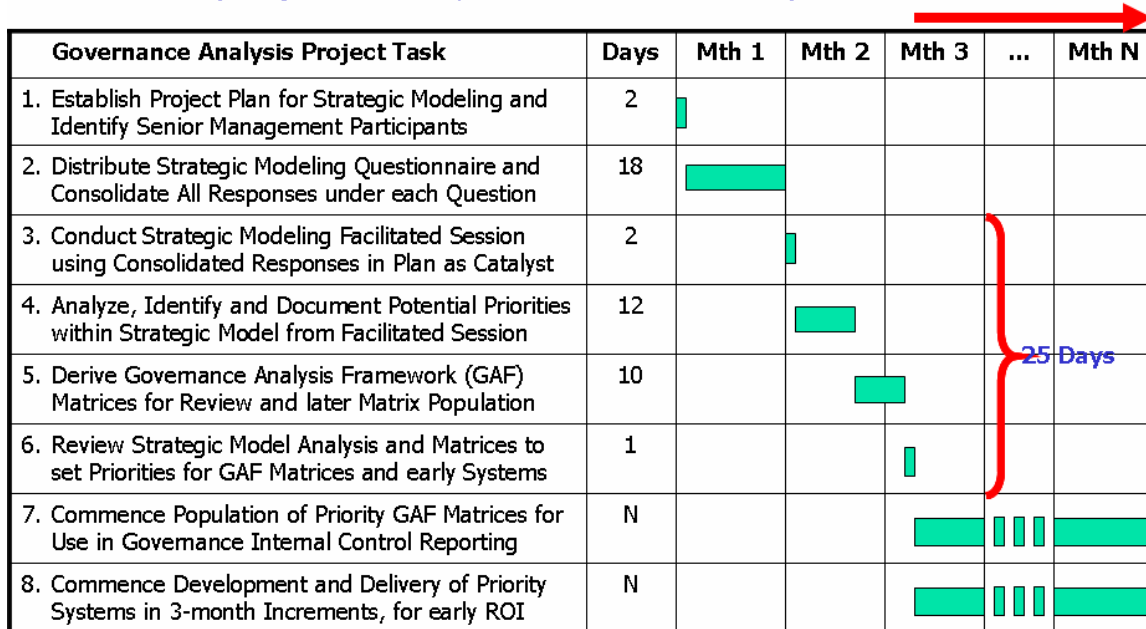


Figure 8: Project Plan for Governance Analysis Framework Strategic Modelling Project

4. Carry out Strategic Model Analysis

On completion of the Strategic Modelling facilitated session, the facilitator enters the Strategic Map into a modelling tool.¹⁵ This tool is uniquely able to analyze and automatically identify the data required by each key business activity or process prioritized by the managers during the session. Business and IT experts, working together under the guidance of the facilitator, develop textual definitions for identified data, activities and processes represented in the map. These data and activity definitions are entered into the modelling tool, together with the lists of key locations, organization units and the business events that were obtained from available documentation or separately listed during the session in the absence of that documentation.

5. Derive Governance Analysis Framework Documentation

Following analysis of the Strategic Map in step 4, the agreed names from the facilitated session and associated definitions of data (“what”), activities and processes (“how”), locations (“where”), organization units (“who”), business events (“when”) and business plans (“why”) are used to derive the key matrices identified by the enterprise as needed for subsequent GAF matrix completion in step 7. Further modelling tool analysis also automatically derives the Governance Implementation Portfolio Plan in an Enterprise Architecture Portfolio Plan (EAPP) Report.

6. Review of GAF Matrices and Governance Implementation Plan

The managers who participated in the facilitated modelling session in step 3 return for the 1-day Review Session scheduled at the end of 25 days, on completing steps 4 and 5. The Governance Analysis Framework matrices that were derived are reviewed, together with the documented Governance Implementation Portfolio (GIP) Plan in the EAP Report. Any required changes or reprioritization are discussed and documented for later update to the associated GAF matrices or GIP Plan. These changes are made immediately on completion of the Review Session by the business and IT expert team, under the guidance of the facilitator.

7. Progressive Enterprise Completion of GAF Matrices

The business and IT experts used to develop definitions in step 4 and make changes in step 6 are assigned to progressively complete each required Governance Analysis Framework matrix. The matrices are reviewed and maintained up-to-date by iterating through steps 6 and 7. As the enterprise changes over time, these two steps are repeated periodically to ensure all matrices reflect the current Governance status of the enterprise, for up-to-date Internal Control Reporting.

8. Implementation of the Governance Implementation Portfolio

As systems are identified that are needed to support key GAF matrices for further Internal Control Reporting to senior management, the Governance Implementation Portfolio Plan reviewed in step 6 is used for rapid delivery of these systems. These are managed as Tactical Modelling projects, as described earlier and using the same approach detailed in steps 1 – 7 for Strategic Modelling projects. This tactical Governance Implementation Portfolio (GIP) Plan can be used for later rapid delivery of priority activities and processes into production in 3-month increments, using the technologies discussed earlier based on XML, Web Services and Service-Oriented Architecture with automatically generated directly-executable code derived from Workflow Models or Process Models in relevant Business Process Management languages.

Conclusion

Internal Controls will vary from enterprise to enterprise. They need to be tailored to the relevant industry (or industries) that the organization operates within; they are also typically unique for each enterprise. They are determined by its business activities and processes as well as its financial controls. They are closely related to the IT systems and databases that the enterprise uses for financial and other reporting.

With the legal implications of Sarbanes-Oxley non-compliance, an inability to answer internal control reporting audit questions takes on a new personal meaning for senior managers. A Governance Analysis Framework is needed – that is both easy to create, and easy to use – to obtain answers for relevant internal control reporting questions.

Senior management need to show that answers are available that address typical internal control questions of: “What”; “How”; “Where”; “Who”; “When”; and “Why”. They are shown as columns in a matrix, where the perspectives of “Planner”, “Owner”, “Designer”, “Builder” and “Subcontractor” are shown as rows. This is provided by the *Zachman Framework for Enterprise Architecture*.

While Enterprise Architecture has previously been considered to be an IT responsibility, when it is also used by senior management it enables precise *Governance Analysis*. It also provides a very effective capability for *Business Transformation Enablement*.

An example was discussed in the paper of a Governance Analysis Framework (GAF) that uses matrices based on the Zachman Framework to create and maintain relationships for an enterprise that enable each of these questions to be answered.

Such GAF matrices are tailored to each enterprise. They can be created in a 25 day Strategic Modelling project within an elapsed 3 month duration, based on the Strategic Business Plans of the enterprise. This is based on a facilitated Strategic Modelling session over two days with the active participation of senior management and their direct reports, where a Strategic Map is developed.

A Strategic Map is a “picture of the business”, similar in concept to the layout of a city. A city map clearly shows the layout of streets (“where”) and the access routes that define “how” to get there. It also indicates “what” is located in parts of the city. Given a reason (“why”) to take a given route at a certain time (“when”), people (“who”) can use the map to navigate through any city.

What is missing in most enterprises is a similar “map (or picture) of the business”. A city map can be bought from newsagents in that city, but no newsagent sells Strategic Maps for enterprises. In the absence of a Strategic Map for an enterprise, it is hard to answer these questions. As a result, Internal Control Reporting is difficult.

A Strategic Map that is developed and tailored to an enterprise enables senior managers, as well as middle managers, expert business staff and IT staff to see the data, activities and processes, locations, business units and people, the business events and the business plans that all need to be managed effectively for internal control reporting.

From the Strategic Map and underlying Strategic Model, the Governance Analysis Framework matrices become dynamic. They are automatically generated. Given the Strategic Map input from the senior management team and their staff, more detailed analysis in the 25-day Strategic Modelling project period identifies key data, business activities and processes, locations, business units, and business events for the business plans that were used as catalysts. The result of this analysis is documented in a Governance Analysis Framework (GAF) Report and an EAPP Report: the main deliverables from the Strategic Modelling project.

The GAF Report and its contents provide a documented view of tailored Internal Control Reporting from the strategic perspective for senior management. These dynamically-tailored matrices must then be completed by relevant business experts. The strategic GAF matrices are also populated by more detailed matrices from key business units. These Tactical Modelling projects – each similar to the Strategic Modelling project – can in turn be undertaken for relevant business units.

Strategic Modelling projects and Tactical Modelling projects have been completed for large and medium Commercial enterprises throughout the world. Similar Strategic Modelling and Tactical Modelling projects for Government and Defense Departments have also been completed in the USA, Canada, Australia and NZ.

The methods discussed in the paper can be applied rapidly in a step-by-step approach as follows:

1. Establish Plan for Strategic Modelling Project
2. Capture Initial Business Planning Input as Catalyst
3. Conduct Strategic Modelling Facilitated Session
4. Carry out Strategic Model Analysis
5. Derive Governance Analysis Framework Documentation
6. Review of GAF Matrices and Governance Implementation Plan
7. Progressive Enterprise Completion of GAF Matrices
8. Implementation of the Governance Implementation Portfolio

The GAF Reports produced from Strategic Modelling and Tactical Modelling projects provide the documentation and modelling tool capabilities that are needed for Internal Control Reporting for

Sarbanes-Oxley. As an added by-product of the Governance Analysis Framework methods described in the paper, similar methods and tools can be also used to implement transformed business activities and processes for Business Transformation Enablement.

Clive Finkelstein



Clive Finkelstein is acknowledged worldwide as the "Father" of information engineering, and is Managing Director of Information Engineering Services Pty Ltd in Australia. He has more than 45 years of experience in the computer industry. Author of many books and papers, his latest book, *Enterprise Architecture for Integration: Rapid Delivery Methods and Technologies*, brings together the methods and technologies for rapid delivery of enterprise architecture in 3-month increments. This White Paper is based on principles covered in that book. Read the book review at <http://www.ies.aust.com/ten/ten32.htm>. Project references, project steps and descriptions are available from <http://www.ies.aust.com>. Click on the **Projects** link from any page.

Many courses are also available from this web site: click on the **Courses** link from any page. Clive may be contacted at cfink@ies.aust.com.

References

- 1 Clive Finkelstein, the author of this White Paper, is Managing Director of Information Engineering Services Pty Ltd in Australia. He can be contacted at cfink@ies.aust.com. The full text of this paper and the Executive Summary is available for download from <http://www.ies.aust.com/~ieinfo/governance.zip>. Modelling tools that support Enterprise Architecture and the development of Governance Analysis Frameworks in the paper are available for download from <http://www.visible.com/>. Training in the methods for rapid delivery of Enterprise Architecture and Governance Analysis Frameworks is available by Clive Finkelstein at <http://www.ies.aust.com/>. Click on the **Courses** link from any page.
- 2 Governance Analysis using Enterprise Architecture is presented as part of a one-day seminar for senior management presented by Clive Finkelstein, titled: "Enterprise Architecture for Managers and IT". This is Day 1 of the 5-day seminar "Rapid Delivery of Enterprise Architecture". It is also part of Section 1: "Enterprise Architecture for Managers and IT" in the Webcast Online courses series on "Rapid Delivery of Enterprise Architecture". For a description of these courses, visit <http://www.ies.aust.com/>. Click on the **Courses** link from any page.
- 3 A summary of links to the Sarbanes-Oxley Act of 2002 is located at <http://www.aicpa.org/sarbanes/index.asp>. The full text of the Act is available from these resource links as "Sarbanes-Oxley Act 072302.pdf". A Summary of key sections of the Act is available from [http://www.aicpa.org/info/sarbanes oxley summary.htm](http://www.aicpa.org/info/sarbanes%20summary.htm).
- 4 Ibid.
- 5 These quotations are from "Key Issues Document – FINAL.pdf". This PDF document is in "2003_0822_pcaob.zip", which can be downloaded from <http://www.aicpa.org/sarbanes/index.asp>. The zip file contains many recommendations from the Auditing Standards Board ("ASB") of the American Institute of Certified Public Accountants submitted for the consideration of the Public Company Accounting Oversight Board. The subject matter of these recommendations is amendments to various standards included in the Board's Interim Professional Auditing Standards and a new standard to reflect certain provisions of the SarbanesOxley Act of 2002 ("Act") and the final Securities and Exchange Commission ("SEC") rules entitled "Retention of Records Relevant to Audits and Reviews and Strengthening the Commission's Requirements Regarding Auditor Independence".
- 6 This figure is from "2003_0822_Sarbanes-Oxley_Omnibus_Final_rev.pdf", also in "2003_0822_pcaob.zip" as discussed above.
- 7 The Zachman Framework for Enterprise Architecture, developed by John Zachman, is used world-wide for the management of internal controls and alignment of information systems with business and IT resources of Government, Defense and Commercial enterprises. The Zachman Framework is the Enterprise Architecture

- foundation used by US Department of Defense (as DoDAF – the DoD Architecture Framework) and by US Federal Government Departments (as FEAF – the Federal Enterprise Architecture Framework). The DoDAF and FEAF are based on Enterprise Architecture, as mandated by the Clinger-Cohen Act of 1996.
- 8 Clive Finkelstein has completed numerous Strategic and Tactical Modelling projects in 20 – 25 days throughout the world. Many of these have also provided rapid delivery of priority Enterprise Architecture areas into production in 3 – 6 months. Contact him at cfink@ies.aust.com.
 - 9 He has provided training and support for Government and Defense projects with rapid delivery of Enterprise Architecture using the FEAF (Federal Enterprise Architecture Framework, in Government Departments) and DoDAF (DoD Architecture Framework, in Defense). Contact him at cfink@ies.aust.com.
 - 10 Further information on Visible Advantage and Visible Analyst can be obtained from Visible Systems Corporation in Lexington, MA at <http://www.visible.com/>. Both of these modelling tools can be downloaded as evaluation versions, with full documentation.
 - 11 Visible provides an automatic code generation tool, Visible Developer, that automatically generates executable code from models produced by Visible Analyst or Visible Advantage. These are automatically generated in Visual Basic, ASP, Visual Basic.Net, ASP.Net and C#.Net. Visible provides two Problem Tracking tools for use with the above products: Razor and Polaris. Further details can be found at <http://www.visible.com/>.
 - 12 Microsoft Biz Talk Server 2004 and IBM WebSphere Business Integration Server Foundation both support automatic generation of executable code from Orchestration Diagrams as workflow models and process models. Both products generate BPM code in BPEL. Business Process Execution Language for Web Services (BPEL4WS, also called BPEL). Further information can be found for Microsoft from <http://www.microsoft.com/biztalk/> and for IBM from <http://www.ibm.com/websphere/>.
 - 13 A large Government Department was able to identify potential cost savings of this magnitude in the development and later maintenance of new systems for these reusable activities. They were able to eliminate much of the data redundancy in their databases. This has the potential also to save them millions of dollars of operational costs per year, through elimination of redundant data maintenance processes that were needed for manual data reentry to keep the previous redundant data up-to-date. Further details are available from Clive Finkelstein at cfink@ies.aust.com.
 - 14 Commercial, Government and Defense Strategic Modelling projects that have used these same methods and tools for Business Transformation Enablement are available from Clive Finkelstein.
 - 15 Visible Advantage is typically used for this analysis of the Strategic Model. Further details are available from <http://www.visible.com/>.