# A framework for selecting information systems planning (ISP) approach

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# ISP 방법론 비교 선정을 위한 프레임워크

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## Abstract

There exist a number of information systems planning (ISP) methodologies. Historically these methodologies have been evolving to reflect new technologies and business requirements. In fact, it is an uneasy task to select a methodology that fits a business need. Though there have been a number of studies proposing new ISP approaches, we are unable to find much research doing a comparative analysis on existing ISP methodologies. Our study, therefore, is to present a classification scheme for ISP approaches and to provide a guideline framework for selecting an approach most suitable to a particular firm's need. Our classification utilizes types of components covered in ISP deliverables and the peculiarity of these components. Such classification scheme and selection framework would help derive an IT-driven new enterprise model more effectively.

Keywords : Information Systems Planning, ISP Methodology

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## 1. Introduction

An ever-increasing market competition is demanding firms to change the way they do business. Such a change will often call for a new IT architecture. Coming up with a blueprint for IT architecture appropriate for a firm's business need and strategic direction is called information systems planning (ISP), which remains one of key issues to information systems managers (Brancheau & Wetherbe, 1987, 1991).

The ISP is a complex, time-consuming process since many different aspects of the enterprise including strategic, organizational, and technical elements must be thoroughly studied. Generally, it requires participation by not only information systems staffs but also executives and users at various levels of management hierarchy. So, it normally takes lots of organizational resource and a significant amount of time to come up with an IT architecture plan. Therefore, to facilitate and support this planning effort, many firms rely upon a guiding framework that we call as information systems planning methodology. This ISP methodology usually constitutes a series of procedural tasks to be undertaken, a number of techniques employed, and a description of deliverables.

In fact, there exist a number of information systems planning methodologies. Since these methodologies have been evolving to reflect new technologies and business requirements, each methodology has its own characteristics. Above all, one type of methodology is different from the other type in terms of components included in the final deliverables and procedural steps to be taken. We believe that identifying these characteristics would help select a type of ISP methodology appropriate for a firm's business need and given situation.

Though there have been a number of studies proposing new ISP approaches, we are unable to find much research doing a comparative analysis on ISP methodologies. Dantzig illustrated the evolution of various ISP methodologies in chronological order (90a, 90b). Tozer (1996) and Kim (1998) attempted to classify existing ISP methodologies, but their criteria are rather ambiguous or incomplete. So our study aims to present an ISP methodology classification scheme that would support the selection of a suitable ISP methodology.

## 2. Previous Research on ISP methodologies

### 2.1 Existing ISP methodologies

The concept of ISP methodologies is continually changing as the ISP objectives themselves vary over time. In the early days firms performed ISP in order to identify information requirements of the enterprise and further to derive an enterprise data model that would ensure data availability, data accuracy, and integrity when building enterprise-wide integrated systems. IBM's Business Systems Planning (BSP) was much used for this purpose (IBM, 1975).

An ever-increasing market competition in 1980s requested firms to direct their IT investment toward their strategic direction and critical business area. Such a request was met by James

Martin's Information Engineering (IE) methodology (Martin, 1989).

Since the beginning of 1990s, more firms recognized that they had to transform the way they do business in order to survive in highly competitive environment. A number of ideas for organizational transformation have been proposed including BPR(Hammer & Champy, 1993) and TQM (Quinn, 1980). The underlying theme behind these efforts was that IT can and should become a great enabler for transforming their business and operations. Accordingly, new methodologies have emerged to derive a blueprint for new IT infrastructure that would support process reengineering as well as the enterprise business and strategic direction. Enterprise Engineering (Martin, 1996), SHL's Transform, and Kim's TISP (Kim et al., 1996) are a few examples belonging to this category.

As recent firms had to utilize many diverse information technologies that were mostly heterogeneous and proprietary, IT architecture has become an important issue. New ISP methodologies reflecting this additional requirement were introduced. DOD's Technical Architecture Framework for Information Management (TAFIM) is one good example (DISA, 1996).

As shown above, there are a number of existing ISP methodologies. Since we have not come up with an appropriate scheme to classify these methodologies, we are still having a problem selecting the one most suitable to a particular business need.

## 2.2 Comparative analysis of ISP methodologies

In spite of the large number of ISP methodologies, we can find only a few studies attempting to classify them. Dantzig (90a, 90b) described the evolution of ISP in chronological order. His description reflected only the ISP concept, not the methodology itself. In 1996 Tozer attempted to categorize ISP methodologies. According to his classification scheme ISP methodologies can be categorized into the following four shown in <Table 1>. His classification, however, is ambiguous and rather incomplete since his criteria are not clear-cut and many newer approaches were not under consideration.

Kim (1998) suggested another classification scheme. Among many components or ingredients to be analyzed over the course of ISP, he mentioned as the three key components work, strategy, and information technology architecture (this IT architecture may be further classified into data, application, and IT platform). His classification scheme utilized which of these ISP components are aimed to include in ISP de-

〈Table 1〉 Tozer's ISP methodology classification scheme

| Types | Examples |
|---|---|
| Pre-1980s | IBM's BSP, Arthur Andersen's Information Planning |
| IE-based approaches | Martin's IE, IEF, IEW, Navigator, SP4IS, ISP |
| Cranfield-influenced approaches | Cranfield, UK Government CCTA, PA Consulting's Tetrach |
| Other current approaches | DCE, CSC's SPIRIT, Nolan & Norton's Stage by Stage,<br>Coopers Deloittes's Summit, LBMS's LEAP, Soft Systems Methodology (SSM) |

<Table 2> Kim's ISP methodology classification scheme

| Component / Class of methodologies | | Data-model oriented | SIS planning | IE-oriented | Transformation -driven | Reference-based |
|---|---|---|---|---|---|---|
| Strategy | | | U | U | U | U |
| Work | | U | | U | U/C | U/C |
| IT Archi-tecture | Data | C | | C | C | C |
| | Application | C | C | C | C | C |
| | IT platform | | | C | C | C |

Legend : U for use, C for Create

liverables and which of these ISP components are analyzed in order to come up with such ISP deliverables. As a result, he has come up with 5 different ISP methodology categories as shown in <Table 2> data model oriented, strategic information systems planning, information engineering oriented, transformation-driven, and reference-based. Though this classification scheme is the first one that has utilized the concept of ISP components, it did not fully reflect the degree of components specificity. This specificity of components is closely related to the depth or concreteness of ISP methodology.

## 3. A Classification scheme for analyzing ISP approaches

Section 2 described a few previous studies on ISP methodology classification. As newer information technologies and various system planning approaches have emerged to meet current business needs, we think we need a more robust and complete classification scheme.

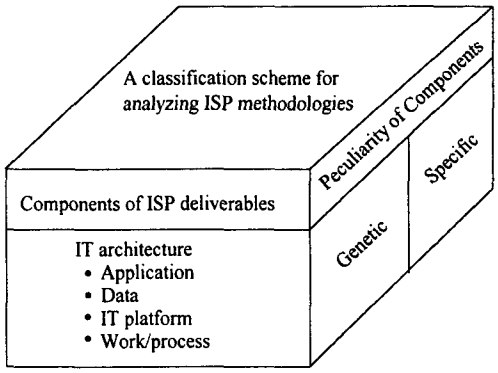
### 3.1 A classification scheme of ISP methodologies

The main objective of ISP is to come up with a blueprint for IT architecture appropriate for business needs and strategic direction. There exist a number of different views about IT architecture. Some viewed IT architecture composed of application, data, and IT platform and not including process or work [Kim, 1998]. A more broad definition of IT architecture can be made to include the organizational work or process as one IT architecture component. That is, IT architecture is composed of the following 4 components : (1) data, (2) application, (3) IT platform (or infrastructure including hardware, non- application software, networks), and (4) work (or process/organization) (Spewak, 1992). This definition is more common and therefore is used in our paper.

Our classification scheme is based upon two dimensions. One is type of components covered in ISP deliverables and the peculiarity of such components is the other. The reason we included the concept of components peculiarity is that a number of newer ISP approaches has emerged recently and most of them are IT vendors' proprietary approach. They fully utilize their own reference models or specific IT components. For instance, ERP vendors tend to apply their own planning approach in order to select a set of pre-built application modules and to set a direction to customize and deploy these

modules. These domain specific reference models keep growing up because distributed and complex IT environment and new emerging technologies demand more domain specific architectures than general and uniform architectures.

Utilizing these two dimensions, we present our classification scheme as shown in (Figure 1). As mentioned above, this scheme is based upon the 4 different types of IT architecture : data, application, IT platform, and work. This view is similar to the previous work by Kim (1998), but this time we removed the strategy component because it was felt the strategy itself can not be an element of ISP deliverables though it should be a major component in strategy formulation methodologies. Also the peculiarity of components is classified into generic or specific. For example, a particular ERP vendor's ISP methodology is described as specific because it mainly helps to come up with an information systems plan that was composed of its peculiar IT solutions or reference models.




(Figure 1) Classification scheme for analyzing ISP methodologies

## 3.2 Dimension of ISP Deliverable Components

After a close analysis on the ISP deliverable components, we have identified a feasible combination of deliverable components. A set of feasible combination is shown in <Table 3>.

## 3.3 Dimension of Peculiarity of ISP components

We introduced the peculiarity dimension of ISP components because we believed it is important to determine whether an ISP approach aims to derive an IT architecture from generic

〈Table 3〉 Deliverable components description

| Types | Descriptions |
|---|---|
| Application | An approach where application architecture is the only ISP output. (CSF, Wiseman's SIS) |
| Application<br>+ Data | An approach where the application and data architecture are the main ISP deliverables. (IBM's BSP and James Martin's IE) |
| Application<br>+ Data<br>+ Work | An approach where application, data architecture, and work are the main ISP deliverables. (Enterprise Engineering, Transform, TISP) |
| Application<br>+ Data<br>+ IT platform | An approach where application, data architecture, and IT architecture are the main ISP deliverables. (EAP, Zachman framework, ACES) |
| Application<br>+ Data<br>+ IT platform<br>+ Work | An approach where the whole set of IT architecture and work are the main ISP deliverables. (Large ERP vendors' planning approach) |

ISP components or a limited number of proprietary products (including reference models). Some ISP approaches are designed to choose an appropriate set of IT architecture components among a set of the vendor's proprietary elements and to set a direction to customize these elements when needed. In contrast, some others aim to develop an information technology architecture plan based upon general, vendor-independent elements. We classified this dimension into the following two, generic or specific, as shown in <Table 4>.

### 3.4 Mapping existing ISP approaches onto the classification scheme

We now attempt to map existing ISP approaches onto our classification scheme as shown in <Table 5>. The description for each area is made as below :

〈Table 4〉 Generic vs. specific components

| Division | Descriptions |
|---|---|
| Generic Components | The approach where one may choose an IT infrastructure based upon any kind of feasible elements. ISP approaches taken by most consulting firms follow this model. Most of commercial ISP methodologies belong to this category. Although it is versatile and can be applied to a broad range of clients, it may require excessive dependency on experts and require a lot more organizational resource since wide-ranging elements or options need to be taken into consideration. |
| Specific Components | This ISP approach is designed to select among a given or proprietary ISP elements. The approaches taken by some ERP vendors or IT service providers specializing in specific domains belong to this category. This approach may present great advantages since one is allowed to derive effectively an IT infrastructure based upon existing modules or elements that have been already deployed or tested beforehand. Unfortunately, these approaches tend to be dependent upon a particular vendor or IT architecture. However OMG recently suggests Model Driven Architecture(MDA) in which a platform-independent application model can covert into a specific IT platform using standard mappings. MDA will be helpful to attain interoperability among diverse IT platforms, If it is accepted by IT industry. |

〈Table 5〉 Mapping results of existing ISP approaches onto the classification scheme

| Deliverables / Peculiarity | Application | Application + Data | Application + Data + IT | Application + Data + Work | Application + Data + Work + IT |
|---|---|---|---|---|---|
| Generic components | **AREA 1** : CSF ; SIS | **AREA 2** : BSP ; IE | **AREA 3** : EAP ; IBM's Infra Design Method ; Zachman framework ; TAFIM, RMODP | **AREA 4** : Martin's EE ; Transform TISP | **AREA 5** : CIMOSA PERA |
| Specific components | **AREA 6** : CBD planning | **AREA 7** : Medium-sized ERP vendor planning | **AREA 8** : IBM's Insurance /Retail Architecture | **AREA 9** : Wizdom's Manufacturing Enterprise Reference Model | **AREA 10** : Large ERP vendor planning |

Area 1 : This type of ISP methodology is designed to identify applications that would be used as a competitive weapon. For this goal, a careful analysis is made on a firm' external environment, strategic direction, and inherent capabilities. Wiseman's SIS (strategic information systems) planning methodology and Rockart' CSF (critical success factors) approach are two good examples.

Area 2 : This type of ISP methodology is designed to derive an IT infrastructure mainly covering am enterprise-wide data and application architecture. For this goal, some methodologies reflect not only a firm's organizational process but also its strategic direction including IT utilization. IBM's BSP and James Martin's popular IE methodologies belong to this category.

Area 3 : Emphasizing the importance of IT architecture, this type of ISP methodology is allowed to come up with IT platform as well as application/ data. To acquire a flexible IT platform has become an essential issue for firms that need to react to the challenging environments more effectively. Such examples are EAP (Spewak 1992), IBM Infra Design Method (IBM, 1994), and Zachman framework (1987).

Area 4 : This type of ISP methodology is designed to derive a blueprint for new IT infrastructure that would support work reengineering as well as strategic directions. Those categorized into this type include James Martin's Enterprise Engineering (1996), SHL's Transformation, and TISP (Kim et al., 1996).

Area 5 : This type of ISP methodology aims for a broader goal. All IT architecture components are covered in the deliverables. However, this approach does not still enforce any specific IT or reference models. Enterprise integration efforts such as CIMOSA (Bermus et al., 1996) and PERRA (Williams, 1998) belong to this category. Their main goal is to support a complete modeling of manufacturing enterprises and to provide execution support in operations of these enterprise systems.

Area 6 : This type of ISP methodology is designed to derive application architecture based upon a given list of software components. Such component-based development planning is becoming an essential trend in software engineering industry. A good example is IMRglobal's Edifice components based development methodology that covers from information system strategy and planning to design and implementation.

Area 7 : In an effort to achieve more innovated information systems rapidly, some firms may rely on pre-built products such as ERP. ERP products designed for smaller firms mainly include a set of software modules, each being a collection of application programs and data that operate as an individual entity and provide a well defined set of capabilities. So the planning approach taken by such ERP vendors are to define application and data-oriented IT architectures. It, however, does not cover the work/ process component completely. And a complete picture of IT platform is usually not referenced or embedded in their technologies. LGCNS's URP (University Resource planning)

can be included in this category.

Area 8 : This type of ISP methodology is designed to derive IT architecture peculiar to a particular industry. Most of industry-specific IT architectures are IT vendors' strategic products that mainly include application, data, and technology. In the planning approach taken by such vendors a work/ process component is usually not referenced or embedded in their technologies. IBM's Insurance Architecture and Retail Architecture belong to this category.

Area 9 : This type of ISP methodology is designed to come up with a newly improved enterprise model. To use a set of best practice models may be necessary in planning an improved business model. So some planning approach provides these best practice models of a particular industry within the planning guide. One good example is Wisdom's Manufacturing Enterprise Reference Model, a step- by-step guide to successfully change and improve a manufacturing organization.

Area 10 : Some firms have been looking for a way to come up with a complete IT architecture at a relatively shorter period of time. Large ERP products such as SAP or Oracle possess a given set of proprietary solutions or reference models in a particular industry. The planning approach taken by these ERP implementers covers application, data, work, and IT infrastructures. Since they are taking a rather holistic approach, it still takes a long time and much of organization resource to plan and implement using pre-built products.

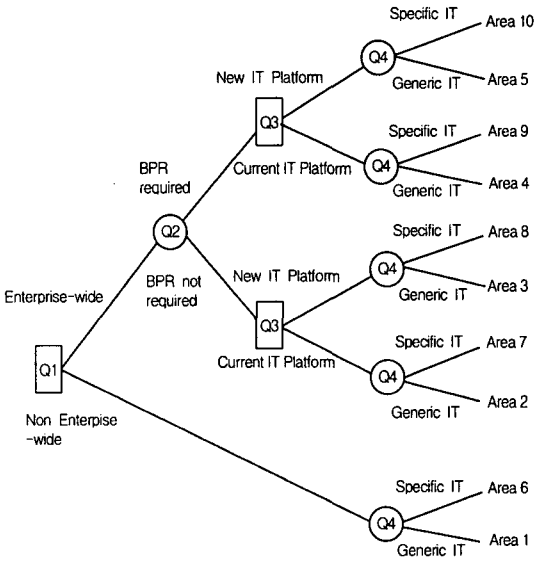
## 4. Guidelines for ISP methodology selection

To select an ISP approach most suitable to a particular firm is not an easy task. Because each firm is in a different situation and may have a different goal for pursuing a new IT architecture, one can rarely find a most appropriate ISP approach easily among a number of diverse ISP methodologies. Some would pursue a complete restructuring like BPR or some would change a portion of IT architecture.

In order to give assistance in selecting an appropriate ISP approach, this paper here presents a decision tree model. Our ISP approach selection model is based on the following criteria.

- Q1 : Does the firm consider an enterprise-wide system?
- Q2 : Does the firm need an organizational transformation such as BPR?
- Q3 : Can the firm afford to replace with a new IT platform?
- Q4 : Can the firm afford to be dependent upon a specific architecture?

The decision tree model is shown in (Figure 2). Following the decision points, you may find a particular category of ISP approach that may fit a firm's business need and situation. For instance, for a firm that has a purpose to transform entire organization and system with up-to-date IT platform if needed but prefers not to be dependent upon a particular IT vendor, ISP methodologies belonging to Area 5 would be good candidates.




(Figure 2) Decision tree model for ISP methodology selection

## 5. Summary and future direction

We have presented a classification scheme for ISP approaches and an ISP approach selection model. The classification scheme is based upon two factors : type of components covered in ISP deliverables and the peculiarity of these components. We have mapped most of existing ISP methodologies onto this classification scheme. We have further suggested an ISP selection decision model so that a firm can select effectively an ISP approach most suitable to its own need and situation. The decision model involves with four questions worth considering before initiating ISP project.

This research can be credited for having made a comparative analysis on ISP methodologies and having suggested an ISP approach selection decision tree model. In the future we need to come up with a way to validate this classification scheme and elaborate the selection model.

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