2 Strategic Planning and Patterns for Computer Aided Planning – An Overview

Openining Vignette: Planning of a Digital Pizza Shop

Paulo is an enthusiastic young man who just graduated from college and consumed a ton of Pizzas in the process. His friends say that Paulo has a "BP" (BacheIor's in Pizzas) degree. He wants to use his "deep knowledge" about Deep Dish Pizzas to launch a successful business in a small town in New Jersey. His dream is to become an international organization like Domino's by using digital technologies. But Paolo does not know where to start.

One of his professors, a good guy who writes good books, has offered to help and offered the following 10 steps to get started:

1. **Learn about the Business and Set Goals (long range as well as short range):** For example, how will it go from a neighborhood pizza shop to an international chain someday. Also, will it be a take-out, a restaurant or both. In addition, will Paulo stay just with pizzas or offer other Italian dishes and sandwiches.
2. **Examine External Competition and Internal Situation**: Determine who are the other Pizza shops in this town. Also, what is Paulo's core competencies (besides making pizza, can he manage the shop). In addition, who will be the suppliers of different materials needed by the shop.
3. **Determine the Role of Digital Technologies**: Develop an approach for the use of digital technology. Will the technology be introduced gradually or all of a sudden on day one.
4. **Establish a Strategy**: Based on all the information gathered so far, decide on a path forward.
5. **Develop a Detailed Plan to Materialize the Stratgey**: Decide what will be his first step and what he will do in the first year, including financial analysis.
6. **Execute the Plan**: Just pick a day and get started by renting a location, hiring staff, getting licenses and opening the Pizza Shop for business. There are many details associated with this step, of course.
7. **Check the Progress Constantly**: Diligiantly monitor everything to see how everything is going.
8. **Learn from the Experience**: Pay attention to what has gone right and what has not.
9. **Reiterate:** Go back and reiterate through all the steps and adjust accordingly.
10. **Repeat it:** Again and again**!**

Even a small Pizza shop has to go through the entire Learn-Plan-Do-Check cycle. An international chain like Domino's Pizza goes through it more rigorously. Can you quickly identify which of the 10 steps above fall into a specific Learn-Plan-Do-Check cycle step? Specifically:

- Learning Activities: _____
- Planning Activities: _____
- Doing Activities: _____
- Checking Activities: _____

Contents

2.1 What is Strategic Planning ?

2.1.1 Getting Started

Simply stated, *strategic planning* defines an enterprise direction (the strategy) and develops an approach (a methodology) to enable this strategy. As we will see in a later chapter (Chapter 4), there are many definitions, but basically *strategy is a game plan to win* -- it generally involves establishing goals and determining actions to achieve the goals. The two keywords ofstrategic planning differentiate between *strategic thinking* and *planning*:

- *Strategic thinking* is the intellectual process of determining "what should be done"
- *Planning* is the mechanical process of "how it will be done"

For example, a company may determine the strategy to fully adopt digital marketing, but the planning determines how and when exactly the adoption will actually happen.

Many books have been written so far on strategic planning. Some emphasize business issues e.g., [Abraham (2012), Bradford (2001), Olson (2012)] while others concentrate on technologies e.g., [Boar (2001), Dhillon (2014), King (2015), Ward (2001)]. This book attempts to span both. Strategic

planning has also been criticized for attempting to formulate strategic thinking that is inherently a creative activity [Mintzberg 1994]. Since the 1990s, there has been a debate about what exactly drives transformation of a company; is it business strategy or technology? In particular, MIT Sloan Management Review (SMR) has published a series of highly instructive articles on strategic planning in the digital age. See Section 2.12 for a quick overview, with excerpts, that highlights the key ideas presented in SMR.

For example, an article by [Kane 2015] in MIT SMR proposes that strategy, not technology, drives digital transformation. There are also discussions about how much details are needed in a good strategic plan. [Martin 2014], in his article "The Big Lie of Strategic Planning" (published in Harvard Business Review) argues that detailed strategic plans do not guarantee success; however, careful implementation of the plan does. In addition, the range and diversity of strategic plans is quite broad. For example, [Mitroff 1977] reports a case study of Federal employees when they were asked in 1977 to plan for activities in 2000, or as another case in point, Cisco conducted a strategic planning study of Internet Scenarios for 2025 [Olsen 2013]. Basically, strategic planning has been an active area of research and debate for a while.

The objective of this chapter is to present a quick overview of the broad area of strategic planning, engineering and management of digital enterprises, and to introduce the main topics that will be discussed in the rest of this book. The basic premise of this book, as stated previously, is that although strategic thinking and strategic planning are extremely important in organizations, they are not sufficient to assure success. While many companies possess expertise in strategy development and strategic planning, they do not translate these plans into detailed project plans and implementation activities needed for success. On the other hand, some companies jump too quickly into implementation details without enough attention to strategic issues such as what exactly the business drivers are. Simply stated, all the activities in the Learn-Plan-Do-Check cycle, displayed in Figure 2-1 need equal attention. Specifically:

- **"Learn" Activities:** These activities are crucial before initiating a planning process. For example, it is important to learn about the business, ask key questions and set long range as well as short range goals (e.g., increasing sales by 30%) before proceeding. In the digital age, it is also important to learn about the digital enterprises and the enabling digital technologies that competitors may be using. In addition, knowledge of best practices, standards, and methodologies is vital to the strategic analysis. Different chapters of this book will cover these topics. For example, Chapter 1 introduced the basic idea of digital enterprises and digital technologies that could get the ball rolling. Later chapters give more details that are necessary in the later stages.

- **"Plan" Activities:** These activities are at the heart of the entire LPDC circle shown in Figure 2-1. *The strategic plan is developed here*. These activities include evaluation of external competition as well as internal core competencies to formulate a game plan (these topics are discussed extensively in Chapter 4). It is also important to understand the role of digital technologies in the planning activity because some of these technologies such as Artificial Intelligence (AI) may drive strategy formulation. For example, Google is shifting focus from mobile devices to AI. Finally, a strategic plan (path forward) is identified by evaluating alternative scenarios based on cost/benefit and other techniques. This chapter gives an overview of strategic planning and then introduces a powerful computer aided planning, engineering and management environment, called SPACE, that quickly generates strategic plans for large number of scenarios.

- **"Do" Activities:** These activities translate the strategic plan into a solution architecture, and assure that the business strategy and technology solutions are properly aligned with each other. A detailed project management plan is developed to assure that everything is being tracked and

managed properly. Acquisition is a major activity in this phase where different BRODE (Buy, Rent, Outsource, Extend) decisions are made to actually build the needed solution. The solution is then implemented and tested before deployment. These topics deal directly with the digital technologies (Chapters 7, 8, and 9 are devoted to these topics).

- **"Check" Activities:** These activities include project monitoring, quality assurance, governance and information security aspects of the system. The SPACE Environment, discussed in detail in Chapter 11, has an extensive project management module and security is discussed in Chapter 12. The main objective is to check what is working and what is not, and reiterate the LPDC. Chapter 13 discusses additional management topics and concludes this book.

The SPACE Environment, introduced later in this chapter and further explained in Chapter 11, fully supports the entire LPDC cycle through a repository of patterns and best practices, business gamifications and simulations, as well as extensive planning tools.

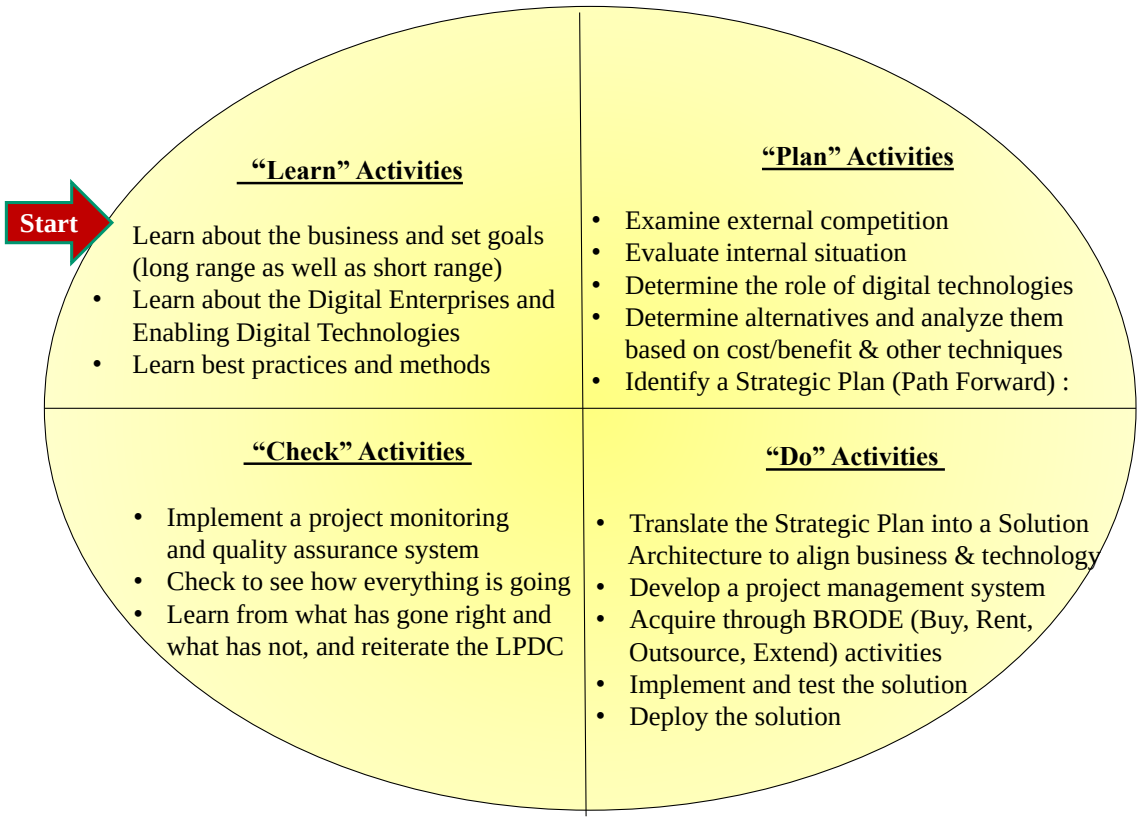


Figure 2-1: Typical Activities in the Learn, Plan, Do and Check Cycle

Most of the literature on strategic planning implicitly assumes that this is carried out at enterprise level. However, in reality, strategic planning and the entire LPDC cycle can be mobilized for very small and individual services too. For example, strategic planning can be invoked for:

- A very specific service (e.g., planning of digital marketing, planning for a telemedicine service, offering online education, starting an online purchasing service, initiating an IoT-based service to a new set of users, offering a doctorate program at a small institution, offering a course for physically handicapped students, etc).

- An enterprise wide initiative, usually called enterprise planning, for situations such as transformation of an entire company for a changing business landscape, a new business opportunity, increased competition, new regulations, new entrants into the marketplace, new substitute technologies that threaten the existence of a company, etc.
- A very large scale initiative that involves many enterprises (e.g., B2B) and even countries. An example is the United Nations Sustainable Initiative that involves 193 countries.
- Something in between (e.g., planning a center or a division with multiple services for multiple countries).

The sidebar "Case Studies in Strategic Planning (Short Snippets)" displays a few examples of strategic planning for general insights. Chapter 3 has many more examples and sample projects that further illustrate the concepts. In all cases, the same LPDC activities occur (learning about the situation, setting the goals, external analysis, internal analysis, cost-benefit analysis, evaluation and choosing options, acquisition through buying and renting, and monitoring the results). The sections of this chapter cover the following topics:

- Section 2.2 takes a closer look at strategic planning of digital enterprises and services
- Section 2.3 introduces a conceptual framework for strategic planning, engineering and management
- Sections 2.4 to 2.8 use a simple example to cover the major stages of the conceptual framework
- Section 2.9 introduces the main capabilities of the SPACE environment
- Section 2.10 provides a quick overview of business and technology patterns and shows how these patterns can be used to develop strategic plans quickly.

2.1.2 Some Thoughts on Strategic Planning – Views from Sloan Management Review

Since 1990, MIT Sloan Management Review (SMR) has published a series of highly instructive articles on strategic planning in the digital age. The following is a quick overview, with excerpts, to highlight the key ideas. These thoughts, and authors' own experiences with strategic planning, have influenced the computer aided planning environment (called SPACE), introduced in this chapter and explicated in more detail in Chapter11.

2.1.2.1 Strategic Planning as a Learning Tool.

Source: Kaplan, S. and Beinhocker, E.D. (2003), "The Real Value of Strategic Planning", SMR, Jan 14, 2003.

As noted previously, many management thinkers such as Henry Mintzberg have noted that real strategy is made informally in hallway conversations and quiet reflections and rarely in the formal planning meetings. This research on strategic planning supports these observations but also found that with the right goal in mind, formal planning can be a real source of competitive advantage. The authors write:

> "Most companies invest a significant amount of time and effort in a formal, annual strategic planning process — but many executives see little benefit from the investment. One manager told us, "Our planning process is like a primitive tribal ritual — there is a lot of dancing, waving of feathers and beating of drums. No one is exactly sure why we do it, but there is an almost mystical hope that something good will come out of it." Another said, "It's like the old Communist system: We pretend to make strategy and they pretend to follow it." "

The main idea presented by this article is that planning meetings should not try to generate strategic plans but instead to create "prepared minds" within their management teams. For

learning, companies should not have planning meetings as "reviews by the CEO" but as two-way conversations in which participants learn from and challenge one another. The authors write:

> "The goal is for everyone to leave the room much better informed than when they went in. Achieving that outcome requires a lot of preparation by all the participants. The devil, it turns out, is in a host of seemingly mundane, but actually critical, details"

2.1.2.2 Scenario Planning as a Tool for Strategic Thinking.

*Source***:** Schoemaker, P.J.H. (1995), "Scenario Planning: A Tool for Strategic Thinking", SMR, Jan 14, 1995

Scenario planning is a very important tool for strategic planning because it helps to identify important trends and uncertainties. Basically, a manager can construct a series of scenarios to avoid surprises and tunnel vision. Through two case studies, the author describes how to build scenarios in a step-by-step process and how to use the resulting stories to plan a company's future. The basic difficulty in predicting the future is very well illustrated by the author:

> "Early in the 20th century (circa 1910), it was unclear how airplanes would affect naval warfare. When Brigadier General Billy Mitchell proposed that airplanes might sink battleships by dropping bombs on them, U.S. Secretary of War Newton Baker remarked, "That idea is so damned nonsensical and impossible that I'm willing to stand on the bridge of a battleship while that nitwit tries to hit it from the air." Josephus Daniels, Secretary of the Navy, was also incredulous: "Good God! This man should be writing dime novels." Even the prestigious Scientific American proclaimed in 1910 that "to affirm that the aeroplane is going to 'revolutionize' naval warfare of the future is to be guilty of the wildest exaggeration." "

The main idea is that no one can predict the future. However, scenario planning can help managers imagine a wider range of possible futures, good and bad, and better prepare them for unexpected situations. Scenario planning is a disciplined method for imagining possible futures that companies should be prepared to handle. This paper presents a systematic methodology for scenario planning that is helpful to organizations facing the following conditions:

- Uncertainty is high relative to managers' ability to predict or adjust.
- Too many costly surprises have occurred in the past.
- The company does not perceive or generate new opportunities.
- The quality of strategic thinking is low (i.e., too routinized or bureaucratic).
- The industry has experienced significant change or is about to.
- The company wants a common language and framework, without stifling diversity.
- There are strong differences of opinion, with multiple opinions having merit.
- Your competitors are using scenario planning.

Once strategic scenarios have been developed, then the executive team might assign scenarios to different groups to stimulate managerial thinking or solicit "what to do" proposals that could be beneficial for developing a comprehensive strategic planning.

2.1.2.3 Some Scenario-Based Planning Examples

Organizations are usually caught off guard by unexpected events such as economic fluctuations, natural disasters, and disruptive innovations. Scenario planning is an essential approach for organizations to cope with uncertainty. Here are some additional thoughts and ideas about scenario planning:

- Instead of trying to predict the future, scenario planning should be used to help companies to develop several long-term strategies by using plausible scenarios. Scenario planning became popular following World War II and gained recognition in the corporate world in the late 1960s and 1970s. While several different approaches to scenario planning have emerged since then, most approaches are collaborative discussions between senior managers to identify plausible scenarios and think through the implications. *Source:* Ramírez, R. et al, "Using Scenario Planning to Reshape Strategy", SMR, Jun 13, 2017.
- It is very important to include scenarios in strategic planning to develop a better understanding of various contingencies. Best, worst, and most likely scenarios must be considered in developing a strategic plan. For example, Enron Credit Union survived a bankruptcy of its parent organization because its management had taken previous actions to reduce its dependence on the parent organization. Another example of scenario planning is the UPS' acquisition of Mail Boxes Etc. in 2001. This acquisition gave UPS more than 3,500 retail store locations in the U.S. as mail-sorting facilities. This was based on a scenario called "Brave New World" by the UPS senior managers that was considered in formulating the company's strategy. *Source*: Phadnis, S., Caplice, C., and Sheffi, Y., "How Scenario Planning Influences Strategic Decisions", SMR, May 27, 2016.
- Another example of scenario-based planning is the use of long range scenarios that require management to think beyond 3 years (most strategic planning scenarios are between 1-3 years). The idea is to consider 5+year scenarios of inevitable long range trends such as the impact on auto industry of driverless cars. Other technologies — such as 3-D printing, virtual or augmented reality, Internet of Things, and artificial intelligence— all are inevitable and may have a great impact on many businesses in the long run. So, a 5+year scenario planning may be very beneficial. *Source:* Kane, G.C., "Predicting the Future: How to Engage in Really Long-Term Strategic Digital Planning", Sloan Management Review, May 03, 2016.

2.1.2.4 The Role of Business Strategy in Strategic Planning

Business strategy, of course, plays a key role in strategic planning. The following papers provide insights into what makes a top strategic thinker, how to identify a strategic leader, how to recognize the priorities assigned to different strategies by different companies, how to develop IT strategies, and how to connect the business strategies to operational activities such as supply chain planning.

- [Goldman 2007] argues "that expertise in strategic thinking is not the product of innate ability and pure serendipity. It arises from specific experiences (personal, interpersonal, organizational and external) which occur over 10 or more years". The question is what makes a top strategic thinker. To answer this question, Goldman conducted a study of top strategic thinkers in their industry and investigated the different ways in which the executives acquired their expertise in strategic thinking. The main finding is that it typically takes more than a decade to educate a top strategic thinker. *Source*: Goldman, E.F., "Strategic Thinking at the Top", SMR, Jun 30, 2007
- A strategic leader knows how to translate an action plan into a "sensible way of thinking about the world" that a group can align with. In this short video, Stanford Graduate School of Business Professor Jesper Sørenson, emphasizes that strategy is an ongoing, iterative process that leaders are engaging in all the time. A strategic leader knows not only how to translate a strategy into an action plan but also to make sure that the action plan is a sensible way that a group can align with. A strategic leader helps build a community that is willing and able to work from a shared sense of purpose. *Source:* Kruschwitz, N., "How to Be a Strategic Leader", SMR, Dec 12, 2016.
- It is not very easy to find what exactly are companies strategies. This paper found that a company's financial reports can provide critical insights into its strategy. Key idea is that companies must prioritize their strategies. These researchers analyzed how large, publicly traded companies described their strategy in public documents. They reviewed 494 companies included

in the 2014 Standard & Poor's 500 Index (S&P 500) that were publicly traded at the end of 2015. This gave them interesting ideas about how companies state and prioritize their strategies. This paper provides excellent insights about how to identify strategies and priorities in financial filings (e.g., Form10-K). *Source*: Sull, D., and Turconi, S., (2017) "How to Recognize a Strategic Priority When You See One", Sloan Management Review, Sep 28, 2017

- Many strategic planning methodologies for information technology (IT) were proposed in the early 1990s. This paper is a goof review of the key papers on this topic (up to 1993) and proposes another methodology based on a survey of eighty organizations. The methodology proposed by the authors is very comprehensive and incorporates many of the suggestions offered in the literature and the results of author's own field experiences. However, the proposed methodology is somewhat cumbersome and too much oriented to large scale organizations. We will review this methodology in a later chapter. *Source*: Kovacevic, A. and Majluf, N. , "Six Stages of IT Strategic Management", SMR , July 14, 1993.
- Many companies with global supply chains use different flavors of strategic supply-chain planning approaches. [Sodhi 2003] suggests an approach that combines business-strategy formulation with tactical supply-chain planning. The main idea is to ensure that the strategic direction of the company and the supply chain implementation are in alignment. The need for early communication between senior business managers and supply-chain planners is stressed so that senior managers can formulate strategy to maximize shareholder value and supply-chain planners can run optimization models to minimize total supply-chain costs. This is of great value to large retail stores such as Walmart that succeed primarily based on their supply-chain model. *Source:* Sodhi, M., "How To Do Strategic Supply-Chain Planning", SMR, Oct 14, 2003.

Case Studies In Strategic Planning (Short Snippets)

Note: These are short snippets about different examples of strategic planning to give a general idea about the strategic planning practices.

Relationship Between Strategic Planning and Project Management. This case study shows how Project Management helped a company in transition from strategy development to strategy execution by using Project Management techniques. Many companies develop good strategic plans but do not know how to translate them to implementation plans. URL: http://pm-alliance.com/project-management-services/project-management-consulting/strategic-planning-case-study/

Tobin, S.R. (1995): The strategic planning process: a case study of a non profit organization. This is a very interesting MS Thesis at the University of Rhode Island. It can be used as an example by graduate students interested in strategic planning. URL: http://digitalcommons.uri.edu/cgi/viewcontent.cgi?article=1423&context=theses

Strategic Planning Case Study: Cisco's Internet Scenarios for 2025. This is a good example of strategic planning. Cisco and Monitor Global Business Network asked a question "What will the Internet Look Like in year 2025". To further answer this question, they developed different scenarios that answered important questions about the future of the Internet. Some plans for the different scenarios were developed. Although nobody really knows what the Internet will look like in 2025, the approach followed is interesting. URL: *http://blogs.cisco.com/emerging/the-evolving-internet*

Case Study: Strategic Plan Development & Implementation. This Case Study describes how a consulting firm helped in the development and implementation of this client's first comprehensive strategic plan. Although this case study is basically an advertisement for the consulting firm, the used

approach is interesting. URL: http://thinkgagnonassociates.com/case-studies/orvis-company.

Ward, GL (2001): Strategic Planning at the General Accounting Office (GAO). This well written case study captures key lessons and provides some insights into the planning processes at GAO. The U.S. General Accounting Office developed a strategic plan to guide its efforts and address the major changes in the office. The two-year strategic planning process resulted in a complete reorganization of GAO. URL: www.gao.gov/special.pubs/ward.pdf

Gallagher, C. (2001), "Strategic Planning for Oregon Crime Victim Services Needs Assessment" Project. This case study basically is a competitive "request for proposal" for the "Oregon Crime Victim Services" project that was published by the Oregon Department of Justice in 2001. It is an interesting description of what a government agency expects of a strategic plan to produce. URL: www.navaa.org/sp/**case**%20study-oregonjuly082.doc.

A Case Study of Strategic Planning Failure (around 2010): A large healthcare provider in a large metropolitan area specialized in providing free care to emotionally distressed and Holocaust survivors. It was a very well funded organization but the patients were transients (some were passing on and others felt better after a few visits). The company organized an internal strategic planning effort to determine what to do with the rapidly declining patient population. However, the planning process was not well managed. The planning meetings became gripe sessions and created distrust among the employees. Due to this, the company ran into serious problems and finally cancelled the strategic planning process. Outside consultants were invited later to develop a formal planning process with much better results (Note: This is based on personal experience).

Strategic Planning Case Study Sources:

- Butuner, H. (2016), "Case Studies in Strategic Planning", Aurbauch, https://www.amazon.com/Studies-Strategic-Planning-Hakan-Butuner/.../1498751229
- Dhillon, G.S., (2014) "Strategic Information Systems Planning: Readings and Cases" , Semantic Books

The Agenda

- Strategy Planning Concepts
- Strategy Planning Methodology
- Computer Aided Environment
- Patterns for Planning

2.2 Strategic Planning of Digital Enterprises – A Closer Look

2.2.1 Overview of Planning and Planning Scenarios

Simply stated, planning clarifies the objective, outlines the steps and the sequence of steps to accomplish the objective, and then estimates the time and effort needed to meet the objective. The

result of a planning process is a document, a ***plan***, which is a repository of information about the approach, the steps, the resources needed and the time frame for an effort. Several types of planning exist in real life situations. We all remember planning a vacation, planning a family relocation from one town to another, or planning a wedding.

In enterprises, there can be several types of planning efforts (business, financial, IT infrastructure) at several levels (strategic, tactical, operational). These planning efforts cover different horizons (strategic plans are longer range than tactical or operational ones) and have different areas of focus (business plans concentrate on business issues while IS and IT infrastructure plans focus on information systems and technologies). These plans also support and feed into each other (IS plans support business plans and strategic plans feed tactical and operational plans).

Table 2-1 shows three levels (strategic, tactical, operational) and types (business, information system, IT infrastructure) of plans with their internal relationships. The reality is quite different than this idealized view. In many real life cases, one big plan exists (if at all) that includes all levels and types. In most cases, corporate attention is paid to strategic planning and the tactical/operational plans are left to the individual business unit management. However, this table can be highly effective to explore and understand the following planning scenarios to gain some insights into the practice of planning, engineering and management in digital enterprises:

Table 2-1: Planning Types and Levels

	Business	Information System	IT Infrastructure
Strategic Plan(3-5 years)	Strategic business planning Goal: What new markets to get into in the long run	Strategic IS planning Goal: What ISs will be needed to support the strategic business plan	Strategic IT infrastructure planning Goal: What type of IT infrastructure will be needed to support strategic IS plan
Tactical Planning (1-2 years)	Tactical business planning Goal: What to do with the existing products and services	Tactical IS planning Goal: How to support the tactical business plan through IS. and also the strategic IS plan	Tactical IT infrastructure planning Goal: How to support the tactical IS plan through IT . and also the strategic IT plan
Operational Planning(6months-1 year)	Operational business planning Goal: How to deliver the products and services to existing customers	Operational IS planning Goal: How to support the operational business plan through ISs. and also the tactical IS plan	Tactical IT infrastructure planning Goal: How to support the operational IS plan through IT . and also the tactical IT plan

- *Scenario1: Strategic Planning only.* This is the second row of table 2-1. A company first develops a strategic business plan, followed by a strategic IS plan, followed by a strategic IT infrastructure plan. This horizontal planning can happen when a new company is being formed. In fact, a new company may just spinoff three parallel planning initiatives, one for each row of table 2-1.
- *Scenario2: Information Systems (Applications) Planning only.* This is the third column of table 2-1. A company first develops a strategic IS plan, followed by a tactical IS plan, followed by an operational IS plan. This vertical planning can happen when a company is planning to launch a new initiative such as migrating from legacy applications to newer ERP systems. In such cases, the company may want to know in details exactly how and when the new ERPs will be deployed and used in the company because ERPs require a great deal of staff training.

- *Scenario3: IT (Digital) Infrastructure Planning only.* This is the fourth column of table 2-1. A company first develops a strategic digital infrastructure plan, followed by a tactical and an operational digital infrastructure plan. This vertical planning can happen when a company is planning to, for example, outsource its digital infrastructure by using cloud computing. In such cases, the company needs to know exactly how and when the move to the cloud will take place.

Besides these three basic scenarios, several other scenarios can be envisioned that are a mixture of horizontal as well as vertical planning activities. For example, a company can start with scenario 1 for business and IS strategic planning but then move to scenario 2 to focus on IS planning at strategic, tactical and operational levels. In fact, this is a highly desirable scenario for adopting major digital technologies such as Big Data, IoTs, and AI (Artificial Intelligence) – these technologies can practically transform companies. Digital enterprises have to frequently develop plans for new IT services and integrate existing systems with new systems due to frequent mergers, acquisitions, business process reengineering initiatives, outsourcing of services, and fluctuations in market conditions. This table cannot handle all possible scenarios, but it provides a good starting point for systematically developing and exploring new scenarios. This table also serves as the initial stepto use the SPACE computer aided planning environment introduced later in this chapter.

2.2.2 Relating Business Strategy to Strategic IS Planning

Figure 2-2 shows a broader view of the three major levels of IS planning in enterprises. This view is based on a mixture of scenarios from table 2-1. Specifically, it puts the IS planning in context along with other systems of the organization. Figure 2-2 also shows a fourth "development" level for completeness. At the highest level, as stated previously, is the business strategic planning which determines the enterprise services to be provided. At the next level, the strategic systems (financial, engineering, manufacturing and information systems) are planned. The infrastructure (facilities, equipment, human and IT infrastructure systems) needed for the services are planned at the third level. The actual development and support is conducted at the fourth level. The major planning processes and the interrelationships between the planning processes are also displayed.

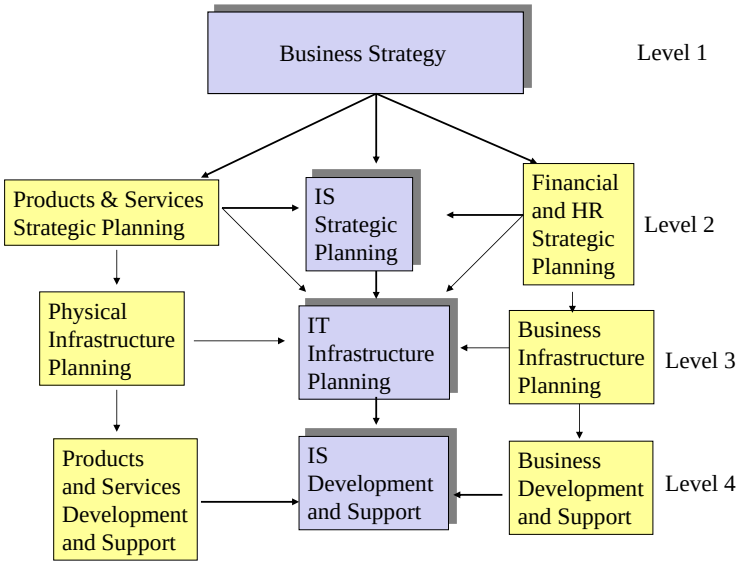


Figure 2-2: IS (Information Systems) Planning Levels -- A Simplified View

IMPORTANT NOTE: Our main interest is in the information systems related processes (highlighted borders in the middle of Figure 2-2) because these activities dominate digital enterprises.

2.2.3 Strategic Planning for a Smart Town – An Example

Strategic Planning for a Smart Town

Ms Fran Kuye is a very popular mayor of "Paradise"; a town with 10,000 residents located in a developing country. She wants to use the knowledge gained from her MPA (Master of Public Administration) program to transform her small town to a "Smart Paradise" that heavily relies on digital services to support its residents. Her overall goal is to develop a 2 year plan that includes the following:

- First year starts with informational services on the web and mobile devices that deliver the information to the citizens over the Internet instead of mailing printed forms and brochures.
- Second year starts with "transactional services", where some services are delivered online (e.g., online registration for licenses, some telemedicine services for the aging populations).
- Then exploit Big Data, AI and online collaborations with other towns and government agencies to improve the entire region.

She does not know where to start. She has visited some of the key information sources on digital and smart government shown below (a friend told her about these sources). However, she still does not know how to develop a solid plan that covers the management as well as technology issues; a plan which can also be successfully executed, monitored and controlled. She knows about some successes and failures and likes the egovernment success and failure model published by www.egov4dev.org. She wants to make sure that she follows the successes and not the failures. Basically, her goal is to significantly grow the town by using digital services in an innovative manner. She needs help in developing an overall strategic plan that includes business processes, applications and the enabling IT infrastructure.

Useful Sources of Information for Digital Governments and Cities

- Pelton, J.N. and Singh, I.B., (2019), "Smart Cities of Today and Tomorrow", Springer, 2019.
- UN Public Area Network: www.unpan.org
- World Bank Infodev: http://www.infodev.org/en/index.html
- World Economic Forum, Global Information Technology Report 2009–2010 (http://www.networkedreadiness.com/gitr/)
- Center for Digital Governments: http://www.centerdigitalgov.com/
- eGovernment for Development Information Exchange (http://www.egov4dev.org/index.shtml)
- Digital Britain Report (2010): http://interactive.bis.gov.uk/digitalbritain/report/

As stated in the sidebar "Strategic Planning for a Smart Town", Fran does not know how to develop a strategic plan for her town. She needs to initiate a planning process that identifies the main alternatives, the key issues involved in each alternative, and helps in evaluation and selection of the most viable alternatives *before* initiating any work. Planning can be at strategic (i.e., long range and big picture) or detailed (short range and highly specific) levels. The objective of strategic planning is not to investigate one or two issues in detail but instead to identify the most promising options and

minimize surprises. For Fran, the process displayed in Figure 2-2 is a good starting point (she should explore other scenarios in table 2-1 also). Specifically:

- In the first year, the planning for informational services (the middle in Figure 2-2) will be lightweight because it will only need documents on the town web sites that will deliver the information to the residentsc over the Internet instead of mailing printed forms and brochures.
- In the second year, the "transactional services" will require more extensive work in IS Planning because payments have to be handled for online registration for licenses, etc. The interfaces with financial systems will have to be resolved.
- In the later years, the partnerships with other towns and government agencies will require extensive collaboration with the town's products and services that could be important to the partners. As the town becomes more digital, the IS planning will dominate other aspects of town planning.

Current and next generation of public as well as private enterprises (like Smart Paradise) need to continuously plan a very wide range of digital services that are delivered to the consumers. Examples of common eservices span ehealth, elearning, eprocurement, etransportation, emarketing, and the likes. These eservices provide tremendous benefits to the consumers by allowing them to easily access large number of information sources around the globe, purchase needed items online, join discussion groups, receive healthcare in remote areas, and learn about the latest developments in different areas of work. However, these eservices rely on a complex digital IT infrastructure that includes technologies such as social networks, mobile computing platforms, wireless networks, application servers for ecommerce and B2B trade, broadband networks, cloud computing, and systems management platforms. To survive and thrive, the town would need to plan its eservices and the needed IT infrastructure quickly and correctly. Here are some examples:

- a town portal that can be used internationally
- a web-based emergency response unit to be used by the town government
- applying for social security benefits online
- applying for passports, tax information and other government documents online
- paying for driver's licenses, parking fines, and towing services online
- a mobile health clinic for delivering healthcare to remote areas
- a social networking system that can be used in the public sector
- an entrepreneurship portal to help startups compete and succeed
- health information network between healthcare providers, pharmaceutical firms and insurance companies in the town
- connecting cottage industries in the town to an international trading network

To develop solid plans for these and other eservices, enterprises need to be guided through the maze of intricate choices that involve multiple policies, procedures, technologies and suppliers. Typical challenges faced by the people involved in the planning process are:

- How to understand the business strategies and to align IT with the business strategies
- What business processes (BPs) should be automated and re-engineered to compete and succeed
- What type of IT infrastructure (application packages, computing platforms, and network services) are needed to support the BPs
- How to integrate new applications with the existing (including legacy) systems

In the next section, we will introduce a very simple and basic planning methodology that will be used to address the challenges faced by the "Smart Paradise".

Time to Take a Break

- Strategy Planning Concepts
- Strategy Planning Methodology
- Computer Aided Environment
- Patterns for Planning

Suggested Review Questions Before Proceeding

- What exactly is strategic planning and why is it important?
- Table 2-1 shows the various levels and types of plans with their internal relationships. Based on your own experience, which scenario is most common in your company?
- What is the relationship between business strategy and strategic planning?
- What are the key challenges faced by the "Smart Paradise" initiative?

2.3 The Basic Framework and a Planning Methodology

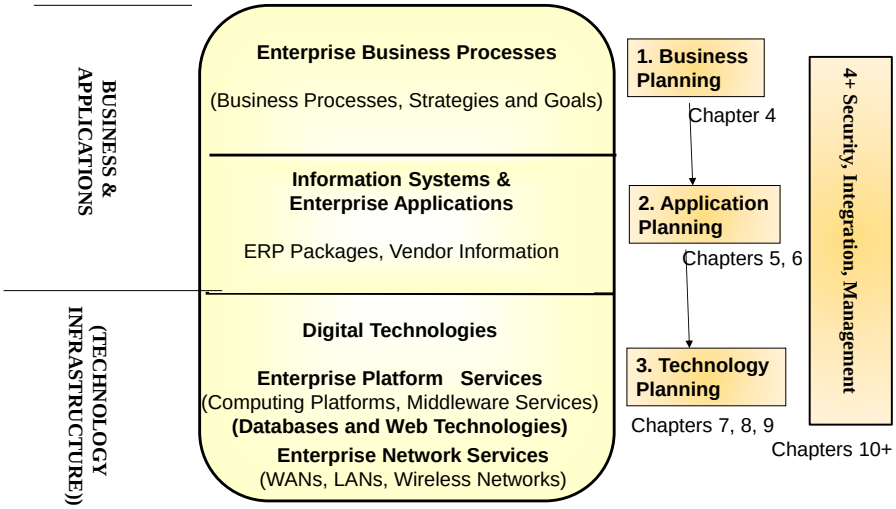
Figure 2-3 shows a planning framework, based on well known enterprise architecture frameworks such as TOGAF (the Open Group Architectural Framework)[1] that will guide Fran in her town planning. This framework shows the following horizontal layers that also help us to develop a very simple planning methodology (we introduced this framework in the previous chapter):

- **Enterprise business processes (BPs)** are a collection of *activities* that are required to achieve business strategies and goals. At a basic level, a BP can be represented as a flowchart that specifies the orchestration of activities needed to complete the goal. For example, for a payroll *service*, several BPs have to be carried out (e.g., pay has to be computed, deductions have to be considered, overtime may need to be calculated, etc).
- **Enterprise information systems and applications** are computer-based information systems that provide automated support to business services/processes. These applications are also referred to as enterprise applications, business applications or just as applications in the literature. Whatever the name, these applications are *business aware (i.e., they know about the business).* For example, a patient care application is business aware because it contains business logic and data that is concerned with hospitals, doctors and health insurance. However, a web browser is business unaware because it can be used in any business setting.
- **Information technology (Digital) infrastructure** is used to build, deploy and operate the business applications. IT infrastructure, also known as digital infrastructure, consists of computing platforms (e.g., computers, operating systems, utilities), the databases and the networks that interconnect the computing platforms. *This infrastructure enables the applications and is business unaware.* For example, the same type of networks and computers are used in

[1] TOGAFF, described in detail at the website (www.togaf.org), is very detailed and complicated. It is easy to get lost in TOGAF documents. We have presented a simplified and conceptual view for the purpose of this tutorial.

airline reservation systems as well as hotel reservation systems. The best known infrastructure is the network that interconnects remote applications, databases, and users. Internet, wireless, and broadband networks are examples of vital network technologies.

These horizontal layers represent the key building blocks of a plan. These horizontal layers need to be properly secured, integrated, and managed/governed (represented as vertical bars that cut across different horizontal layers of the framework). We will use this framework to establish the interrelationships between different technical and business aspects of a modern enterprise and to define some basic terms. We start from the top layer (business strategy and processes) and proceed to the lower ones. The discussion then moves to the vertical bars of security, management and architecture that cut across all layers.



Note: All layers need to be planned, integrated, secured and administered

Figure 2-3: The Basic Framework for Planning

This framework helps us to develop a very simple planning methodology (blocks on the right) that consists of the following major stages (related chapters are also shown in figure 2-3):

Stage 1: Business planning that concentrates on business and strategic issues

Stage 2: Application planning that establishes the business applications (automated business processes) needed to support the business strategies

Stage 3: Technology Planning that includes computing platforms and database planning plus network planning that establishes how all the pieces will communicate remotely with each other

Stage 4+: Security, integration and administration planning that concentrate on how all the layers will be secured and administered properly

These simple stages can be used to develop a comprehensive plan for the "Smart Paradise". The following discussion uses this planning methodology to get the process started.

2.4 Stage 1: Business Planning and Strategic Analysis

The objective is to create a model of the enterprise (in our case a town) to capture key business services (in our case government services) and strategies. Figure 2-4 shows a "business pattern" of a government agency such as the "Digital Town". This pattern captures a high level view of enterprise

functional areas represented as business functions (e.g., corporate management, sales and marketing) and the key interactions between these services. This high level view is very useful for enterprises because it shows the key *business services (BSs)* and can be easily modified to reflect Smart Paradise by simply deleting or adding new building blocks. It can also help a business develop a BPO (Business Process Outsourcing) strategy, an enterprise application strategy (i.e., what BSs to automate), and an integration strategy. Business patterns provide a powerful tool for representing a wide range of enterprises in different industry segments.

Given a business pattern that has been modified for a specific enterprise, the main task of the enterprise management is to find the best service providers (SPs) that can support the critical BSs shown in Figure 2-4. In addition, a company can expand and transform its business by adding new BSs from new SPs. For example, a wired telephone company can add a wireless service provider or a manufacturing company can add a retail outlet provider, etc. In addition "service bundles" can be created by different SPs to meet user needs and to compete for user business. For example, Fran may add, delete, change and merge SPs that provide the best services for her town. After identifying the needed business services, she needs to make the following decisions:

- Decide which business services/processes take place in different buildings of the town (we can assume that the town government is in one building).
- Include business outsourcing, i.e., determine which BSs/BPs take place at the outsourced sites.
- Assign employees to sites. The number of employees at each site is based on the type and "intensity" of work performed at each site. Outsourcing reduces the number of town employees (a political issue for the town mayor).

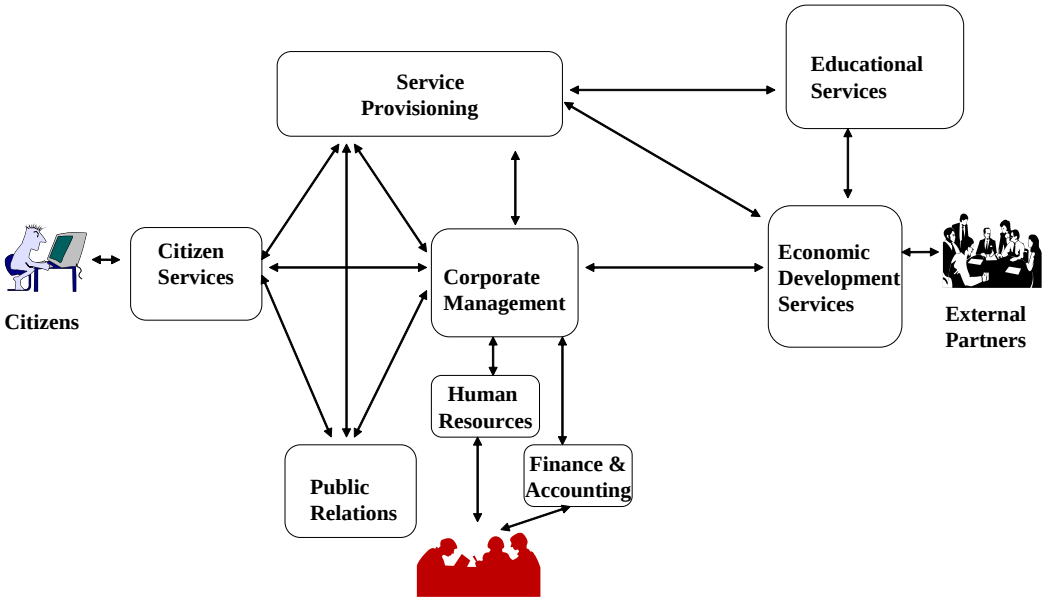


Figure 2-4: Sample Business Pattern

Fran can use this sample business pattern for strategic analysis and to decide which BSs to automate and which ones not to automate. Simply stated, strategy is a game plan to win. There are many different ways of evaluating strategies. These techniques, such as SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis will be discussed in a later chapter. Let us briefly review a well known cost/benefit model (known as the Portfolio Model) that can be used to quickly evaluate a particular strategy based on broad estimates. This model, shown in Figure 2-5:

- Categorizes each service in terms of costs (low, high) and benefits (low, high)
- Focuses on low cost/high benefit first ("must-do" region)
- Explores high cost, high benefits services ("investigate")
- Avoids high cost and low benefit services ("avoid")
- Ignores low cost and low benefit services ("don't care")

This simple model can be used to analyze a large number of projects quickly and identify the ones that need to be pursued and the ones that need to be avoided. For a project with high potential benefits but high cost, an attempt should be made to reduce the cost (say by outsourcing) to move it to the "must-do" zone. On the other hand, a project with low cost but low benefit should be examined for adding some benefits. In other words, important projects that fall in the "Don't Care" and "Investigate" zones should be further examined and studied to move them to the "must-do" zone.

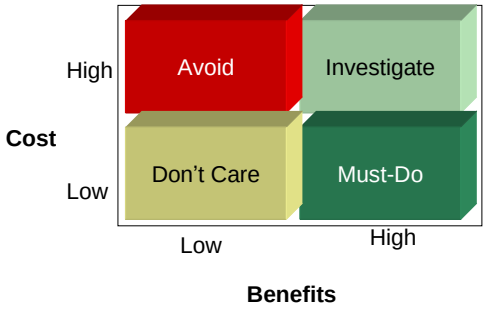


Figure 2-5: Simple Cost-Benefit Analysis Model

Let us assume that Fran performs cost/benefit analysis of all of the BSs shown in Figure 2-4 and determines that economic development and education are in the "must-do" (low cost, high benefit) zone. She;thus,decides to focus on the educational and economic development areas.

2.5 Stage 2: Information Systems (IS) and Application Planning

2.5.1 IS and Application Planning Overview

Simply stated, an information system (IS) collects, organizes, stores, and communicates information. Although information systems can be manual but most ISs in the digital age are automated and are the nerve centers of digital enterprises. The objective of this stage is to identify the applications, A_1, A_2… A_n, that are needed to automate the business services BS_1… BS_n established in the enterprise modeling step. Several methodologies have been developed for this stage since the 1970s. Best known examples are the traditional information systems planning methodologies such as IBM's Business Systems Planning (BSP), Rockart's Critical Success Factors (CSF), and Nolan's Stage Model. Most of the modern IS planning methodologies are synthesis and extensions of these classics. These planning methodologies are briefly reviewed for general background in the sidebar "Classical Information System Planning Methodologies at a Glance". A more detailed review can be found in [McNurlin 2001]).

In Fran's case, a set of application packages (software modules) will be needed to support education and economic development services. Once key applications have been identified, the next main activity is to develop an automation strategy with different options of Buy, Rent, Outsource, Develop in-house, or Extend-re-use **(BRODE).** It is also desirable to determine how the BRODE strategies

could be implemented. For example, it is important to select the commercial-off-the-shelf (COTS) application packages that can be bought and identify application service providers for rental and outsourcing. These decisions can be made by using the following steps:

1. For each BS, identify which ones will be done manually and which ones will be automated. In addition, for the automated BSs, determine an automation strategy (BRODE). For example, if inventory management is to be automated then you can either buy an inventory management application package, or rent an inventory management service from an application service provider (ASP), etc.
2. For each option, explore the commercially available solutions (e.g. for buying, investigate and select the inventory management application packages available in the marketplace).
3. Develop a sketch of an application architecture that identifies which of these services will be informational (e.g., just an informational website) and which ones will be transactional (e.g., registering for a course for fee).

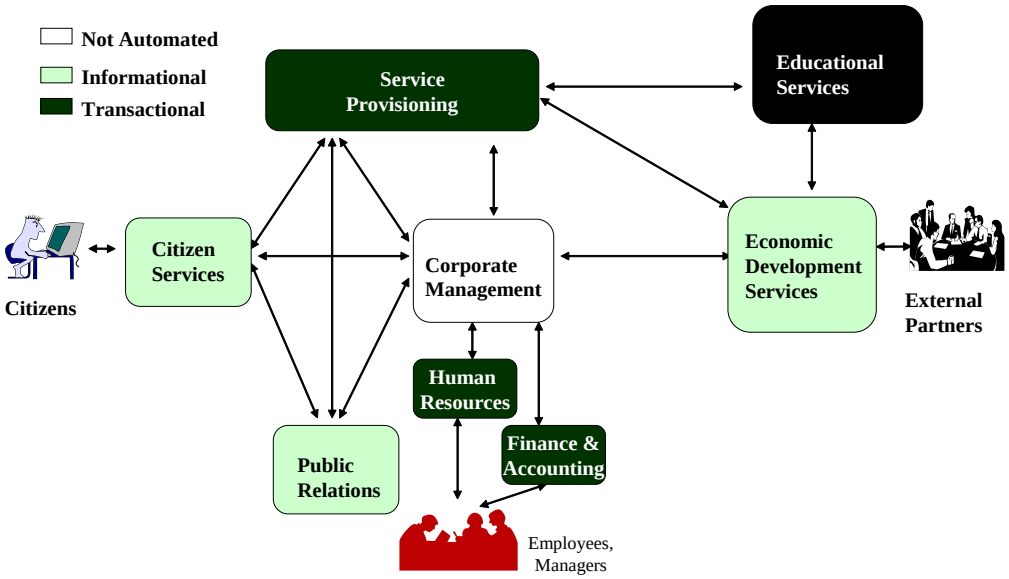


Figure 2-6: Sample Enterprise Application Plan

Figure 2-6 shows a sample result of this stage for Fran's town. This example shows that Fran will not automate corporate management, but she will provide citizen services, public relations and economical development as informational services only. Fran is already using automated application packages for human resources and finance & accounting – these are traditional transactional services. She has chosen to support transactional services for education (i.e., the citizens can register and pay for educational services). It should be quickly noted here that IoTs (Internet of Things) is changing everything in this stage because small sensors and RFIDs on everyday appliances can perform simple operations and communicate with each other over wireless networks. We will look at IoTs later.

2.5.2 Application Planning – A Closer Look

The objective of this stage is to identify the applications A_1, A_2… A_n that are needed to automate business processes BP_1… BP_n identified in enterprise modeling. To identify the complete set of business processes (BPs), the following approach may be used:

- List all BPs that support the B2C, B2B, B2E, and other business interactions
- Keep the focus at enterprise level activities that are vital to the business, i.e., those processes that are *critical to the success of the business*.

- Reduce duplication by clustering similar BPs into one. For example, if the same BP is used for customers as well as business partners, then it is better to cluster the two BPs into one.
- It is highly desirable to question, eliminate, and restructure business processes/services to improve organizational efficiency.

In reality, one or many applications may be needed to support a given business process, and a given business process may need multiple applications. For example, a customer information system may support many business processes such as purchasing, marketing, and payment. Similarly, purchasing business process needs support of many applications such as order processing, inventory management, shipping/receiving, and payment packages. The result of this step is an *IT Strategy Matrix* that may resemble table 1-3. Tables of this nature can be extremely revealing and are used in some IS planning methodologies such as IBM's Business System Planning. For example, the following table indicates the following:

- Application Package2 does not support any business processes. This may mean that an application was developed without any business reason or it supports an outdated business processes
- Business process 2 is not supported by any application. This may indicate that this business process can be directly supported by the IT infrastructure or that this BP is being ignored.
- Application Package 3 and 4 supports many BPs, each. Thus replacement/enhancement of this application should be done very carefully.

Table 2-2: IT Strategy Matrix -- Applications to Support Business Processes

	Application Package1	**Application Package2**	**Application Package3**	**Application Package4**
Business Process1	X			X
Business Process2				
Business Process 3				X
Business Process4			X	X
Business Process 5			X	X

Once the key applications have been identified, the next main activity is to develop an automation strategy with different options of buy, rent, outsource develop in-house, or extend-re-use (BRODE). It is also desirable to determine how the BRODE strategies could be implemented. For example, it is important to select the COTS (commercial-off-the-shelf) application packages that can be bought and identify application service providers (e.g., Microsoft and SAP) for rental and outsourcing. We will look at these considerations in more detail in Chapters 5 and 6.

Classical Information System Planning Methodologies at a Glance

IBM's Business Systems Planning (BSP) has been the most widely known and used information system methodology for years. [Galliers 1987] quotes a survey which reports that BSP has been used 23% in organizations. BSP was used by IBM internally and was introduced to customers in the mid 1970s. The main steps in BSP are as follows:

- Define the organization's business needs and processes.
- Identify the data classes and applications needed to support the business processes.

- Chart and analyze how the current applications can meet these needs.
- Identify and evaluate the new applications that need to be developed.

BSP involves a lengthy procedure in which data is tracked as it flows through various activities (e.g., order processing, inventory control, etc.). The output of one activity is treated as input to the next so that the complete data flow between all organizational units is examined. BSP generates a large amount of information which can be stored in databases. More information about BSP can be found in IBM manuals and other sources (see, for example, the Zachman web site www.zachman.com).

Critical Success Factors (CSF) was introduced by John Rockart at MIT [Rockart 1982]. CSF has been used by many consulting firms and was used by 17% of the companies surveyed in mid 1980s [Gallier 1987]. The main steps of CSF are as follows:

- Identify the most critical ingredients of an enterprise which will make the enterprise successful.
- Define the application systems which will support the critical business functions.
- Analyze, evaluate and justify the proposed application systems.

The main difference between CSF and BSP is that CSF pushes the enterprise toward long-range *critical factors* without having to analyze all the data and processes, while BSP leads the enterprise to a comprehensive analysis of all business processes.

The Nolan Stage Model was introduced by Richard Nolan in 1973 at Harvard and later expanded by the consulting firm of Nolan, Norton and Company [Nolan 1973]. This approach was initially developed to map the growth of the IS (information system) budget over time in relation to the services provided by the information systems. At present, the stage model analyzes the ways in which IS growth affects the information services. This approach compares the stage of each firm with the stages of growth in other similar companies.

References:

- Gallier, R. (1987), "Information Systems Planning: A Manifesto for Australian-Based Research", The Australian Computer Journal, May 1987, pp. 55-69.
- IBM Corportation (1978), "Business Systems Planning", GE20-0527.
- McNurlin, B. and Sprague, R. (2001), "Information Systems Management in Practice", Prentice Hall, 5th edition.
- Nolan, R. (1973), "Managing the Computer Resource: A Stage Hypothesis", Communications of the ACM, Vol. 16, No. 7, pp. 399-405.
- Rockart, J. (1982), "The Changing Role of the Information Systems Executive: A Critical Success Factors Perspective", Sloan Management Review, Vol. 24, No. 1, pp. 3-13.

2.6 Stage 3: IT Infrastructure Planning

IT infrastructure (platform) planning is concerned with determining the most appropriate technologies needed to *enable* the enterprise application plan developed previously. Examples of such enabling technologies are the Web technologies (including Web 2.0 and Web Services) used in corporate intranets, computing platforms on which the applications will reside, wireless and wired networks which connect all the computing platforms in an Intranet, and "Extranets" which connect many businesses for B2B trade. IT infrastructure planning can be subdivided into a) *computing platform*

planning that supports the applications and b) *network planning* that interconnects these platforms with each other and the end-users. Computing platform planning consists of the following steps:

- Determine the middleware and Web and wireless services needed to interconnect the widely dispersed applications, users and databases.
- Identify the computer platforms, including servers, that will support the automation strategy and the application plan determined in the application planning stage.
- Decide which applications and databases will reside at which computing platforms (e.g., servers) at each site.
- Handle the software/hardware interdependencies (e.g., can a Windows application run on Linux platform, can an IIS server be installed on an XP machine, etc.).
- Decide if cloud services will be of value to Smart Paradise

Figure 2-7 shows a sample computing platform for the Smart Paradise. The applications have been allocated to different computing platforms -- each computing platform consists of computer hardware (e.g., processor, disk drives), an operating system (e.g., Linux), some system software (e.g., MS Access), and middleware (e.g., Internet Explorer or Microsoft .NET Framework). The figure shows that the Town Portal will reside on a town owned Unix server and the various services will reside on other internal machines. Some of these applications may reside on the Portal Server (this decision can be made later). In addition, the town portal is connected to some other portals that reside on the public network (external portal) and on the partner network (partner portal). These computing platforms are interconnected through a network that is defined later.

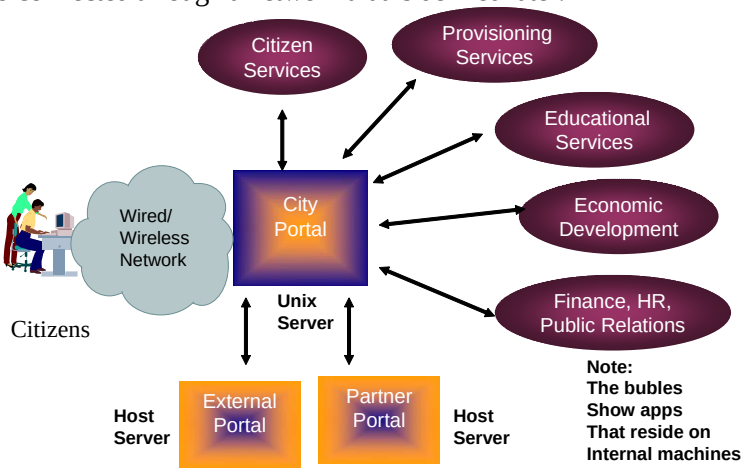


Figure 2-7: A Sample Computing Platform Plan

Network planning develops a network configuration that interconnects the computing platforms by using wireless as well as wired network elements. Figure 2-8 shows a sample network plan for this town. Network planning involves three major tasks. First, determine the workload based on the work activities at each site. Second, develop a network configuration and estimate the bandwidth needed by using queuing network models. This involves, for example, network capatown planning for the internal plus external networks depending on the type of connection (wired/wireless) and the network traffic patterns. Finally, the type of connections and the commercially available network solutions need to be developed.

The network "pattern" shown in Figure 2-8, is a very good starting point for a detailed network planning. This pattern represents a typical enterprise network with an Intranet for internal use, an Extranet for business partners (e.g., other towns), multiple wired/wireless LANs connected to the Intranet backbone and a Public Internet connection for the customers. This pattern has been

customized and expanded for Fran's Town and can be further expanded to include more technologies such as Big Data and IoT services if needed.

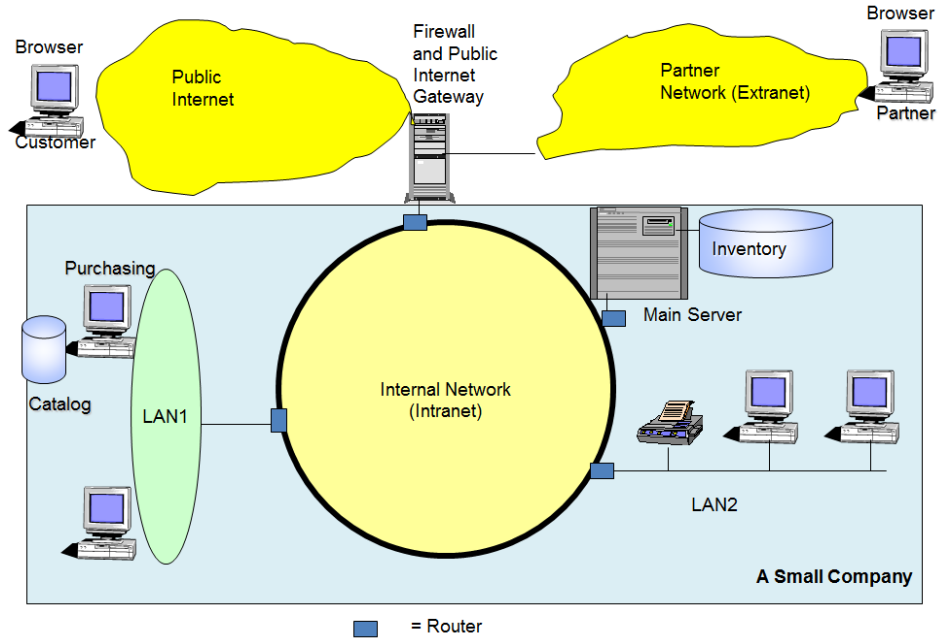


Figure 2-8: Sample Network Configuration (an "IT Architecture")

2.7 Stage 4: Administrative Issues (Security, Governance and Project Management)

Modern enterprises heavily rely on IT to deliver automated services in an agile manner for its customers, suppliers, and employees. In particular, there is an increased use of wireless networks such as 802.11, Bluetooth, cellular networks, satellite networks, wireless local loops (WiMax) and wireless sensor networks. The main management task is to properly secure and administer the corporate assets and technology components.

For security, new technologies such as wireless need special attention. Wireless components have known weaknesses that have been covered widely in the literature. While progress is being made in individual components, more attention needs to be paid to the development of comprehensive security planning approaches -- to maintain overall system security despite weaknesses in individual components of the system. A large number of security tools are commercially available that analyze the security of a system *after* it has been implemented. However, these tools do not help with the security during planning phase because planning requires analyzing and determining security *before* implementing a system. Security planning consists of the following steps:

- Modeling of a system. The models may represent different scenarios and situations for contingency planning and what-if analysis.
- Determination of system weaknesses. Although many techniques exist, attack trees is one of the most effective techniques for detecting weaknesses.
- Determination of countermeasures. The recent work in security patterns can be of significant help in this area.

In addition to security planning, several administrative decisions need to be made. These decisions are concerned with project planning, policies, procedures and governance issues. A large number of governance standards (e.g., CMM, CobIT, ITIL, SPICE, ISO2000, and SOX) are currently being used by modern enterprises. However, it is best to start with the PMI (Project Management Institute) guidelines and best practices as a basis for project management and governance. PMI uses the Project Management Book of Knowledge (PMBOK) as best practices that specify the following main PMBOK activities. The activities are shown in Figure 2-9:

- Initiation
- Planning
- Execution
- Monitoring and Control
- Closing

These activities are also known as Project Life Cycle. The ***Project Life Cycle*** refers to a logical sequence of activities to accomplish the project's goals or objectives. All projects go through a series of phases – independent of size and complexity. In the **Initiation** phase, the outputs and critical success factors are defined. This is followed by a **Planning** phase, characterized by decomposing the project into smaller tasks, and an **Execution** phase, in which the project plan is executed. The **Monitoring and Control** phase ensures that the project activities are properly executed and controlled, and is followed by the **Closing** phase that marks the completion of the project. Project activities are typically grouped into these phases so that the project manager and the core team can efficiently plan and organize resources for each activity, and also objectively measure the achievement of goals. "Score cards", also known as Balanced Score Cards (BSCs) are used extensively in project planning and management. The basic idea of score cards is very simple: a) identify a few (5-10) major goals that need to be accomplished, b) for each goal identify the KPIs (Key Performance Indicators) that can be used to measure the progress, and c) monitor and control the progress by using the KPIs. A large number of templates and software packages for BSCs are available over the Internet.

Figure 2-9; The Project Management Book of Knowledge (PMBOK)

2.8 Stage 5: Integrated Architecture Planning

The main objective of integrated architecture planning is to assure that all pieces fit together to form a working solution within the performance, security, and cost constraints. To illustrate the main issues addressed, let us consider the following situation for the Smart Paradise. To improve services, the town needs a very flexible online user registration and purchasing application that is based on service

oriented architecture (SOA)[2]. The pattern shown in Figure 2-10 provides a good starting point. This pattern assumes that the application consists of N large grained components that are arranged in several tiers: front-end integration, business logic, backend integration, back-end apps, and external (B2B) apps. This architecture pattern also includes the following integration components:

- BCs (Business Components) are the software modules that imbed the business logic of the application and provide business services.
- FICs (Front-end Integration Components) are the adapters that allow different types of user devices (e.g., mobile, handheld) to invoke the BCs.
- BICs (Back-end Integration Components) are the adapters that BCs use to interact with different back-end and external applications.

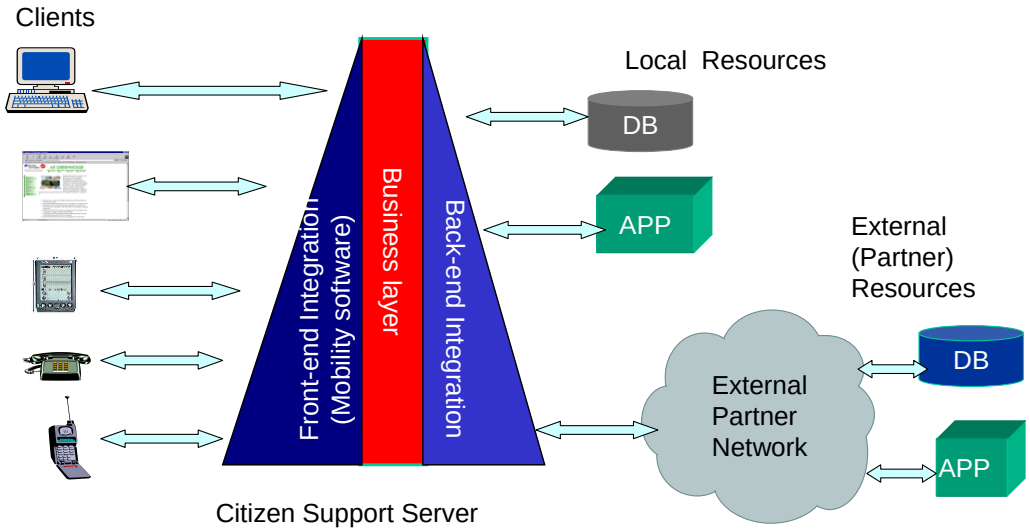


Figure 2-10: SOA-based Architecture Pattern

Determination of these integration components depends on several other factors such as hosting options and integration strategies used for internal and external (B2B) applications. Detailed discussion of these topics is beyond the scope of this book.

Time to Take a Break

- ✓ Strategy Planning Concepts
- ✓ Strategy Planning Methodology
- Computer Aided Environment
- Patterns for Planning

[2] Service-oriented architectures (SOAs) rely on services and the components that provide the services as the fundamental elements for developing applications. The main idea of service oriented architectures is that the applications should be thought of in terms of the services they provide and the individual components that actually deliver the services. The services can be combined into aggregate services and similar components can be combined into applications. Thus a bank, for example, provides a set of services (e.g., deposits, withdrawals, fund transfers) and these services are provided through components that can be combined into banking applications.

Suggested Review Questions Before Proceeding

- List the key building blocks of Strategic Planning for Digital Services
- What is the main focus of Stage 1 of Strategic Planning (one sentence)
- List 3 key decisions that are made in Stage1 of Strategic Planning
- What is the main focus of Stage 2 of Strategic Planning (one sentence)
- List 3 key decisions that are made in Stage2 of Strategic Planning
- What is the main focus of Stage 3 of Strategic Planning (one sentence)
- List 3 key decisions that are made in Stage3 of Strategic Planning
- What is the main focus of Stage 4 of Strategic Planning (one sentence)
- List 3 key decisions that are made in Stage4 of Strategic Planning
- What is the main focus of Stage 5 of Strategic Planning (one sentence)
- List 3 key decisions that are made in Stage 5 of Strategic Planning

2.9 Computer Aided Planning, Engineering and Management

2.9.1 Why Computer Aided Planning, Engineering and Management?

Most of the work on strategic planning at present is being done manually. However, there is a shortage of skilled planners especially in small to medium businesses and developing countries. Consequently, project planning takes too long and is highly error prone. In fact, many digital services projects fail, i.e., they are never used by the intended users. The well known Standish Group Chaos reports indicate failures range from 50% to 70%. Failures in developing countries are much higher – in the range of 85% [Dada 2006]. This is a huge problem, keeping in mind that out of the 193 countries recognized by the United Nations, about 150 are considered under-developed (within these countries, 50 are considered least developed with practically no infrastructure). The major and perhaps the most unfortunate challenge is that the underserved segments have no room for failures -- a poor country can neither afford to spend 50 million dollars on a project that fails nor hire expensive consultants to help them out. Most failures occur due to re-invention of the wheel throughout the system life cycle -- the unnecessary trial and error is not limited to one phase.

Figure 2-11 summarizes the key reasons based on literature surveys and firsthand knowledge [Umar2012]. For success, the entire life cycle activities (Learn-Plan-Do-Check) shown in Figure 2-11 must be executed properly. Specifically, the key players need to *Learn* what needs to be done, *Plan* how to do it right, *Do* whatever needs to be done, and *Check* to see if it is done right. These are non trivial challenges that are further complicated in global settings due to the differences in geographic situations, different problem types ranging from simple to large and complex, different lessons learned by using the same approach, wide range of technical and management issues, and different cultures and diverse training and experience levels of the participants. The know-how to address the issues is available, but the major challenge is: *how to transfer the know-how to the needy parties rapidly, economically, and globally.*

This challenge was raised in a United Nations Conference in 2010 that resulted in a computer aided planning, engineering and management environment called SPACE (Strategic Planning, Architecture, Acquisition, Controls & Education). SPACE supports the entire Learn-Plan-Do-Check cycle and quickly produces highly detailed plans based on best practices for a wide range of ICT services that

are customized for the chosen country/region. SPACE is briefly introduced in this chapter and discussed in more detail in Chapter 11.

Figure 2-11: Typical Reasons for Digital Services Failures, in Terms of the Learn-Plan-Do-Check Cycle

2.9.2 SPACE (Strategic Planning, Architectures, Controls and Education)

The SPACE environment has been developed to support the planning methodology described in the previous section. SPACE consists of the following components (shown in Figure 2-12):

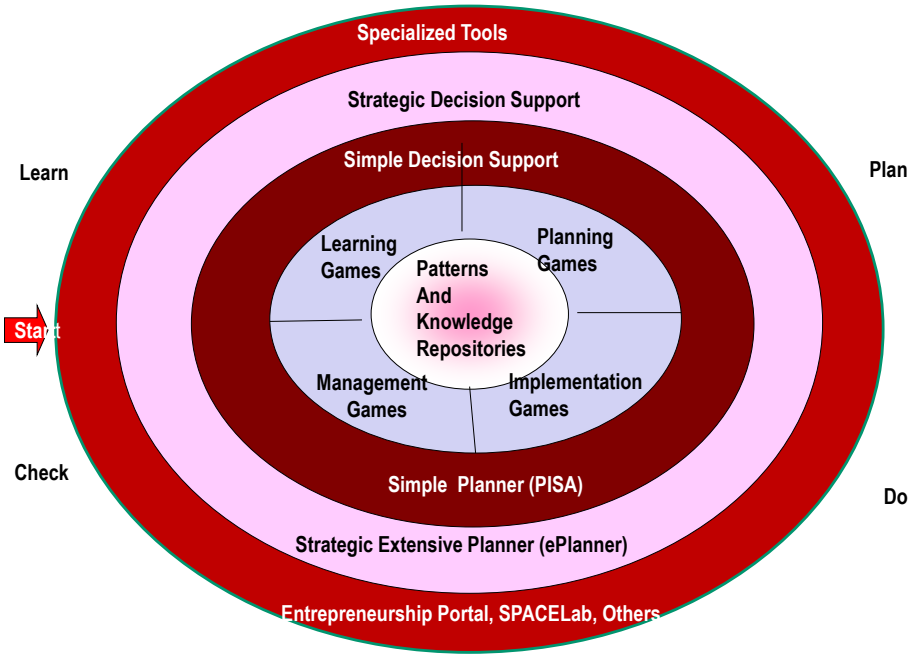


Figure 2-12: Conceptual View of SPACE (Strategic Planning, Architectures, Controls and Education)

- **Patterns Repository for Industry Sectors (PARIS)** that capture the core knowledge needed by SPACE (almost 100 services in more than 10 sectors such as healthcare, education, public safety, public welfare, transportation, and others).
- **Games and Simulations** that support decisions in strategic analysis, mobile services planning, interagency integrations and health exchanges, application migration versus integration tradeoffs, risks and failure management, and quality assurance.
- **Simple Planner (PISA)** that can be used to quickly build real life business scenarios for small businesses and then guide the user through IT planning, integration, security and administration tasks by using best practices.
- **Extensive Planner (ePlanner)** that can be used for small to large scale government and the private sectors who need to strategically plan, architect, integrate, and manage the needed IT initiatives quickly and effectively by using the best practices.
- **Specialized Initiatives and Tools** that are built on top of the SPACE environment (i.e., they invoke many of the SPACE capabilities). Examples of these tools are the SPACE Lab (an online training center), an Entrepreneurship Portal, and several specialized advisors and tools to support the UN initiatives and other partnerships. More tools and initiatives are always being added to this layer.

Please note that the pattern repository is at the core of the entire SPACE environment – the patterns are used in all games, planning advisors and specialized tools. We will briefly review the concept of patterns in the next section. SPACE is currently being used to help developing countries and small to medium businesses to plan and engineer their systems. In addition, SPACE is being used extensively to support graduate courses and professional education in strategic planning and enterprise architectures and integration.

Specifically, we have been working with more than 20 developing countries on projects that range from simple eService to inter-agency and inter-country communications. In addition, we have also been working with almost 30 small to medium businesses in healthcare, telecommunications, and consulting services. Additional information about the SPACE environment can be found at the SPACE Site (www.space4ict.com). We will also take a closer look at SPACE in Chapter 11.

2.9.3 The SPACE Environment – A Quick Tour

A user of the Planner selects a service (e.g., mobile health clinic) for a given country (e.g., Nigeria) and quickly generates the following reports:

- Business plans that can be used to obtain funding
- Detailed Planning Reports (DPRs) that show the architecture, the needed policies, and enabling technologies for the chosen service
- Standardized RFPs (Requests for Proposals) that can be used to attract the needed vendors through an open bidding process
- Project management, disaster recovery and governance guidelines for monitoring and controlling the development activities
- Education, training and public awareness campaigns needed for success

In addition to these reports, SPACE also produces an operational portal that can be quickly customized to operate a mobile health clinic. This portal also automatically includes capabilities for communicating and collaborating with other clinics and agencies.

Let us briefly review how these outputs are produced by using Figure 2-13 which shows a more detailed view of the Planner. *Simply stated, the Planner is a set of intelligent apps ("advisors") that are integrated around common resources.* These advisors collaborate with each other to cover five phases (P_0 to P_4), shown in Figure 2-13. These advisors invoke the games, patterns, and other resources to generate the outputs shown in Figure 2-13.

These outputs can be further customized by local experts and/or end users. Suppose that a user wants to develop the strategic plan for an eLearning service in Nigeria. P_0 helps the user to capture Nigeria specific information and P_1 helps in specification of the eLearning service. P_2 generates a customized plan based on P_0 and P_1. P_3 generates the information for RFP and requirements & integration. P_4 generates outputs to support project management and governance. The outputs produced can be further customized by the users or local experts manually or by invoking specialized games and simulations. Our goal is to produce the outputs that require less than 30% of local modifications.

Using Big Data: The Planner fetches, uses and customizes extensive Big Data resources such as a set of Knowledge Repositories that provide links to a wide range of case studies and educational materials, and External Resources such as the UN Public Administration Network (UNPAN), World Economic Forum (WEF), and World Bank Institute initiative on Open Data. Rules in different phases of the Planner retrieve needed data and use it to produce outputs and/or modify decisions.

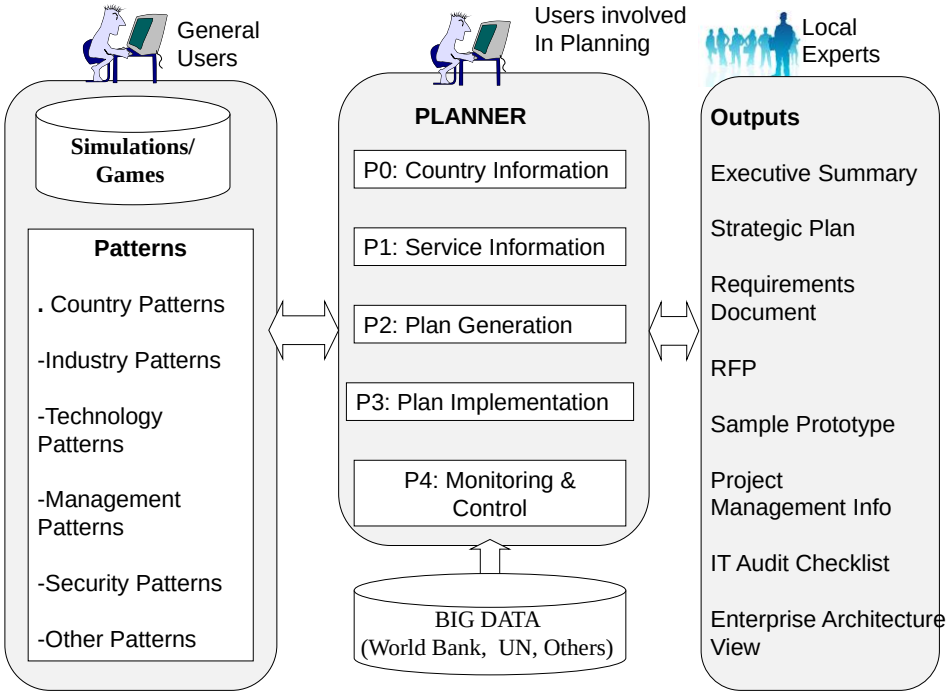


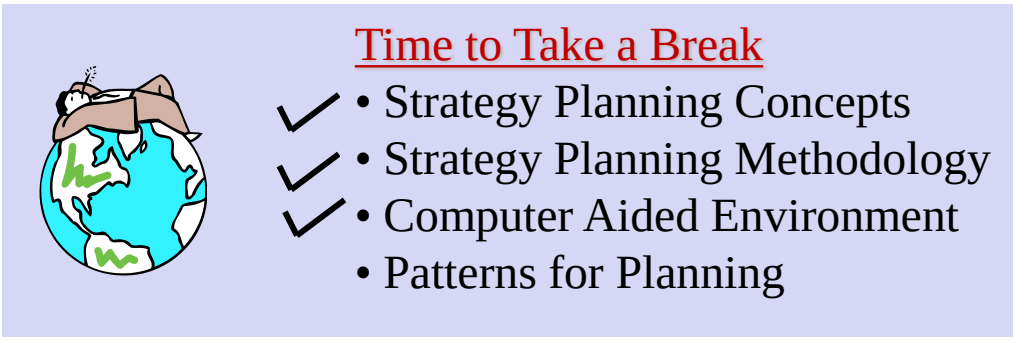
Figure 2-13: A More Detailed View of SPACE

From Small and Simple Services to Large and Complex "Service Bundles". The ability to select large number of services for different countries and regions is a very powerful capability of SPACE. Specifically, the users of SPACE can do the followings:

- Select a single service (e.g., a mobile health clinic) within a sector (e.g., healthcare)
- Combine different services from one or more sectors to construct "service bundles" that may represent large initiatives (e.g., Smart Cities) or interagency and B2B services (e.g., healthcare exchanges and supply chains between multiple suppliers and consumers).

Basically, a SPACE user may select an individual service or construct a service bundle for large and complex situations. Based on the choices made, the Planner automatically walks the user through the most appropriate steps and then generates very powerful outputs. Thus, the Planner adjusts its behavior based on the type of service selections. The following steps can be used for a quick tour of SPACE:

- Please go to SPACE website (www.space4ict.com).
- After reviewing the website, please visit the SPACELab. It has several stages that expose a visitor gradually to different features of the SPACE environment.
- Stage 0 is just for the casual users to get them familiar with the system. No ID-PW is needed. Please use the Planner as a Guest User and run through it quickly to see the very basic features. It is very intuitive, and you should be able to go through it very quickly. You can use "?" option for help in any page.
- Proceed to Stage 1 and review the documents in Stage 1. Especially, the Conceptual Overview Document is very important. It explains the basic capabilities of the Planner and the users do not get access to the Planner Tool without reading through the Planner Overview document. Please signup for the Planner and get a Permanent ID for a better exposure to the SPACE capabilities.
- A user can go to Stage 2 and higher by reading more documents and taking the quizzes for higher stages. Stage 3 and Stage 4 of SPACE are especially suited for enterprise application integration and B2B (Business to Business) integration for large and extra large scale projects.



2.10 Patterns to Support Computer Aided Planning – An Overview

2.10.1 What are Patterns

Patterns are well-known formats for capturing engineering knowledge. The idea was introduced by Christopher Alexander, a civil engineer, who wrote a series of books [Alexander 1977], [Alexander 1979] observing that well designed buildings have common structures. Based on this, he devised a set of rules for architects to construct such buildings. According to Alexander, "Each pattern describes a problem that occurs over and over again in our environment and then describes the core of the solution to that problem in such a way that you can use this solution a million times over without ever doing it the same way twice" [Alexander 1977]. The "Gang of Four" extended the pattern format to software design [Gamma 1994]. Since then, patterns have been used extensively in software design and have been extended to e-business patterns [Adams 2001], requirements patterns [Bode 2014], architecture patterns [Buschmann 1996], and others. See the website (www.hillside.net/patterns) for extensive discussion, tutorials, and articles on patterns.

At a very basic level, a pattern *T* is a template *T(p, c, s)* where *p* is the problem to be solved, *c* is the context (under what conditions the pattern holds, i.e., why the problem needs to be solved), and *s* is

the solution (what works in practice). Additional information such as examples and limitations can also be added to a pattern to help the designer. In addition, each pattern is assigned a name. Exhibit 1 shows a simplified example of a well known design pattern (*Adapter*) that occurs commonly in software engineering. Some patterns can be quite detailed and complex. We will discuss several patterns in this book. Due to space limitations, we cannot show every pattern completely by using the format shown in Exhibit 1. Instead, an abbreviated version consisting of few sentences will be used to highlight the essence of patterns, i.e., the solution of each pattern. For example, we will use the following sentence to describe the pattern shown in Exhibit 1:"The Adapter pattern shows how an intermediate object can be used to integrate two systems together".

Exhibit 1: Example of a Pattern

The following is a simplified view of a commonly used pattern (adapter). Patterns like this can be stored in a pattern repository and interlinked with each other.

Name: Adapter

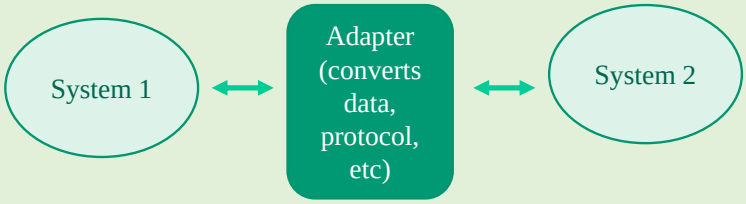
Problem: How to interconnect and integrate two different systems

Solution: Develop or buy a new component (Adapter) that does the translation between the two systems. The main idea is to imbed all the conversions in this new component and make it general so that it can be reused over and over again. The adapter may be very simple (e.g., a currency converter) or very complex (e.g., interconnects a very old system to a modern one).

Examples:

- Adapter for the US Electrical Power System and the British Electrical Power System
- Adapter for an old legacy application that connects it to a new Web-based application.

Diagram:



2.10.2 Common Examples of Patterns

Here are some common examples of patterns:

- Chair is a common pattern in furniture. Almost all chairs have 4 legs and a back. Of course, some chairs have arms and some don't.
- Jacket, pants and a shirt are good patterns for mens' clothes in most countries at present.
- Hamburger, French fries, and soda are good patterns for fast food.
- A small house with two rooms, a bathroom, and a car garage is a good pattern for a starter family in the United States.

2.10.3 An Example of Using Patterns in IS Planning

For the purpose of computer aided IS planning, we have found the following patterns of very high value:

- *Business patterns*, especially business process patterns, because they represent common/best practices in various business sectors.
- *Technology patterns*, especially application and IT infrastructure patterns that represent commonly used network configurations.
- *Management patterns*, such as information security and project management patterns.

We briefly show how some of these patterns are used in developing IS plans. Later chapters will further expand and illustrate these and other patterns. It should be noted that these patterns cover people, processes and technology issues – they are not just software design patterns.

2.10.3.1 Enterprise Process Pattern

There are different ways of representing business processes in an enterprise. A powerful way of representing this information is through a ***Business Process Pattern (BPP),*** shown in Figure 2-14 that captures an overall view of enterprise functional areas (e.g., sales, corporate management, back-office operations), the major business processes in each functional area (e.g., purchasing and payment within procurement) and the key interactions between these processes. A BPP can be used to identify what BPs are automated by different types of enterprise applications. For example, a purchasing application system, also referred to as a purchasing application package, automates the purchasing business process.

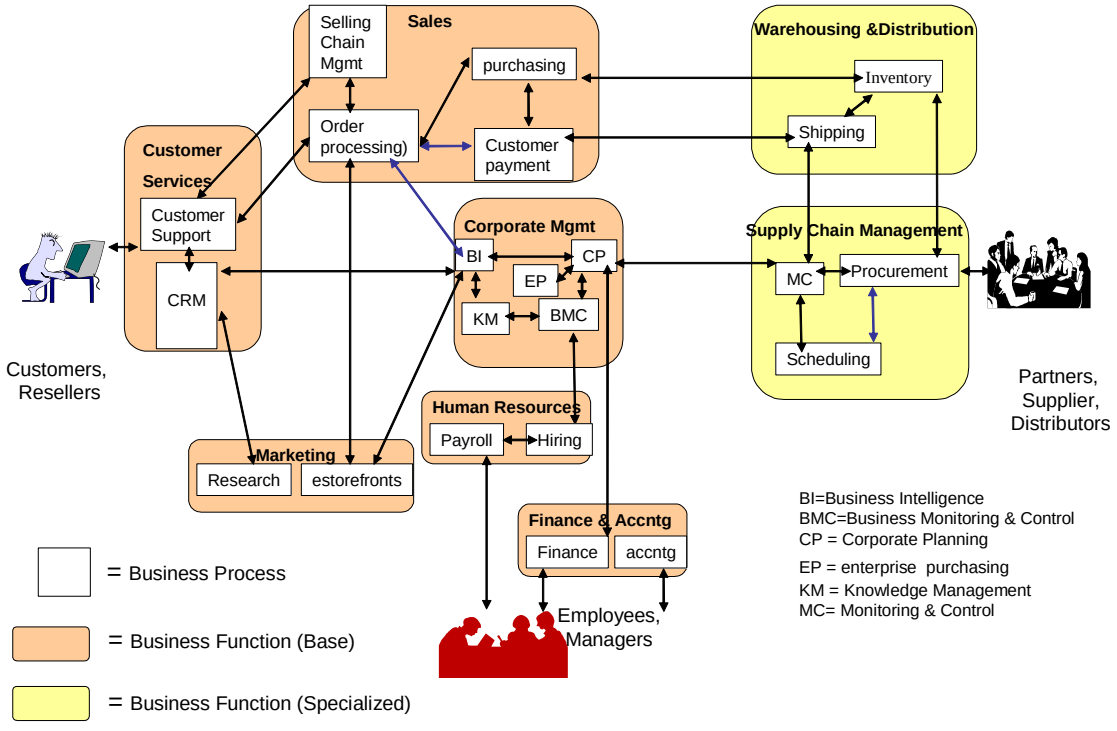


Figure 2-14: Sample Business Process Pattern (BPP) for a Retail Store

A BPP can be used to represent an enterprise business architecture (EBA), because it can be used to represent various business processes and their interrelationships and interactions. In addition, the

critical business processes can be identified to represent a business strategy. BPPs can be used to conduct quick sensitivity analysis such as the following:
a) If one BP is eliminated, then what other BPs will be impacted
b) If an application package that supports a BP is replaced with another application, what other applications/BPs will be impacted
c) Which application, if replaced, will have the most impact in terms of integration
d) Which application, if replaced, will have the least impact in terms of integration
We will use business process patterns and other types of patterns throughout this book.

2.10.3.2 Enterprise Application Pattern

Knowledge of enterprise applications is a cornerstone of modern enterprises. Enterprise applications automate the business processes and involve many application strategies such as commercial-off-the-shelf (COTS) packages, rentals through application service providers (ASPs), outsourcing of software development, and increasing appeal of software re-use through service-oriented offerings based on Web-Services. These strategies translate a BPP to an enterprise application pattern (EAP), illustrated in Figure 2-15, that shows what BPs are automated and how they are automated (i.e., which automation strategy is used: buy, rent, outsource development, build in-house, or re-use/re-engineering of existing applications).

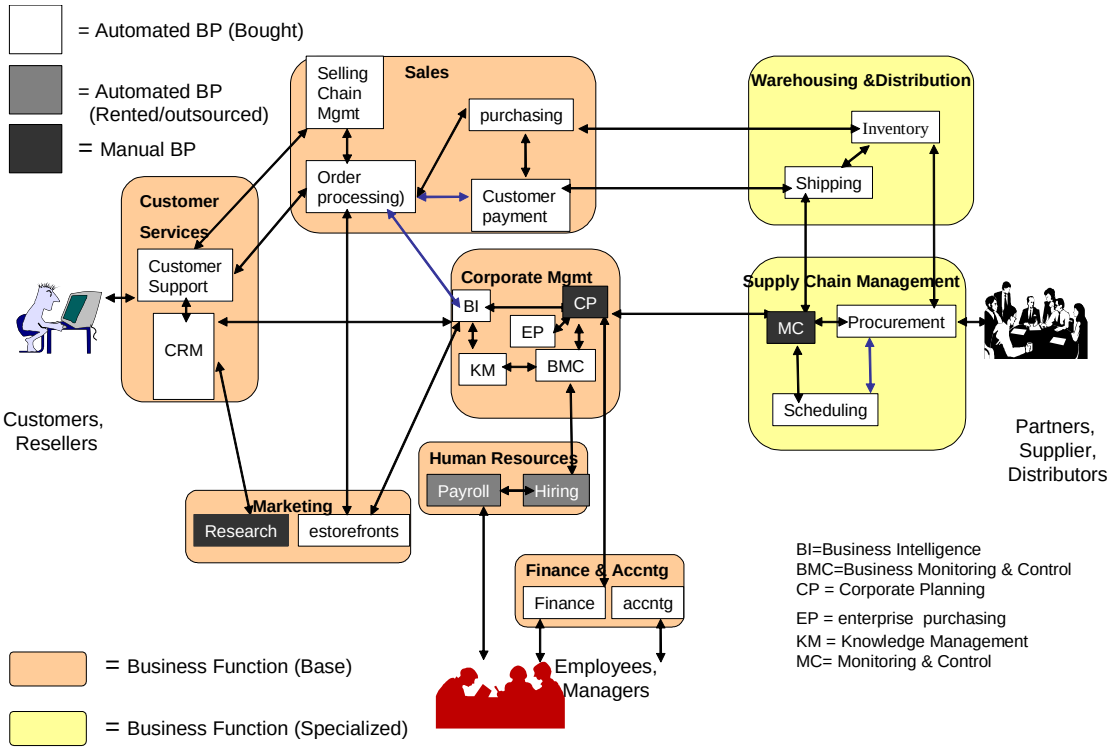


Figure 2-15: Enterprise Application Pattern (EAP) of a Retail Store

The choice of applications and the automation strategies depends on several factors such as company size, web reliance and mobility reliance. For example, small companies in some industry segments (e.g., restaurants and local stores) typically automate only a few essential services such as back-office processes and may rent many of these services from ASPs. ASP companies are relying heavily on Web to build and deliver services that will have high degree of automation and will invest in web-based purchasing and enterprise portals. Figure 2-15 shows the resulting EAP of a small to medium store with low reliance on Web and mobile services. It is a refinement of the BPP shown in Figure

2-14. The EAP suggests a sketch (a pattern) that the user can customize to build an automation vision for the business processes.

We have developed two types of application patterns to help us in choosing between the buy, rent, outsource, build, and extend/re-use (BRODE) strategies. APP-STRATEGY pattern helps in choosing one of the strategies and consists of five sub-patterns, one for each of the strategies. The APP-SOLUTIONS pattern suggests a detailed solution approach based on the selected APP-STRATEGY. For example, to support the buy strategy for CRM, this pattern suggests the COTS CRM packages that are used for different company sizes.

2.10.4 IT Infrastructure Pattern

IT infrastructure (platform) planning, as discussed previously, is concerned with determining the most appropriate technologies needed to *enable* the enterprise application plan developed previously. IT infrastructure planning can be subdivided into two broad categories: *computing platform planning* that supports the applications and *network planning* that interconnects these platforms with each other and the end-users. Figure 2-7 shows a sample computing platform for Fran's town, discussed previously. The figure shows that the Town Portal will reside on a town owned Unix server and the various services will reside on other internal machines (some of these applications may reside on the Portal Server. In addition, the town portal is connected to some other portals that reside on the public network (external portal) and on the partner network (partner portal). These computing platforms are interconnected through a network that is discussed next.

Network planning develops a network configuration that interconnects the computing platforms by using wireless as well as wired network elements. Figure 2-8 shows a sample network plan for Fran's town. The network "pattern" shown in Figure 2-8, is a very good starting point for detailed network planning. This pattern represents a typical enterprise network with an Intranet for internal use, an Extranet for business partners, multiple wired/wireless LANs connected to the Intranet backbone and a Public Internet connection for the customers. This pattern has been customized and expanded for Fran's Town and can be further specialized if needed.

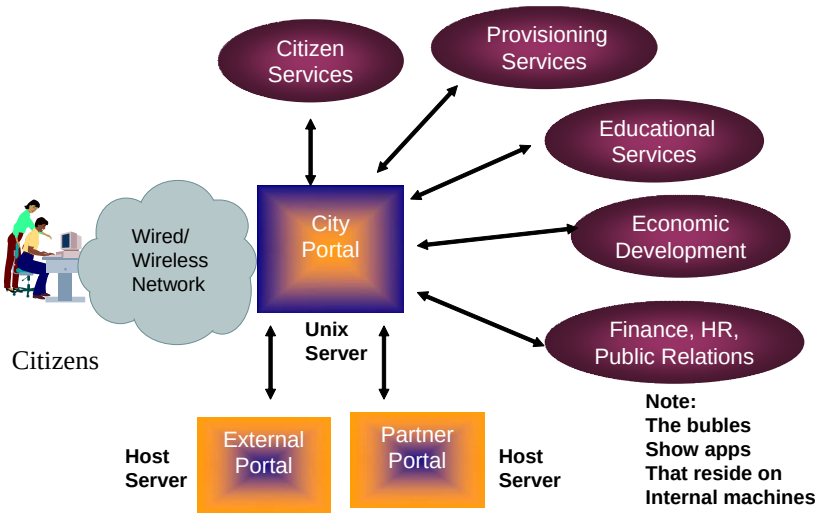


Figure 2-16: A Sample Computing Platform Plan

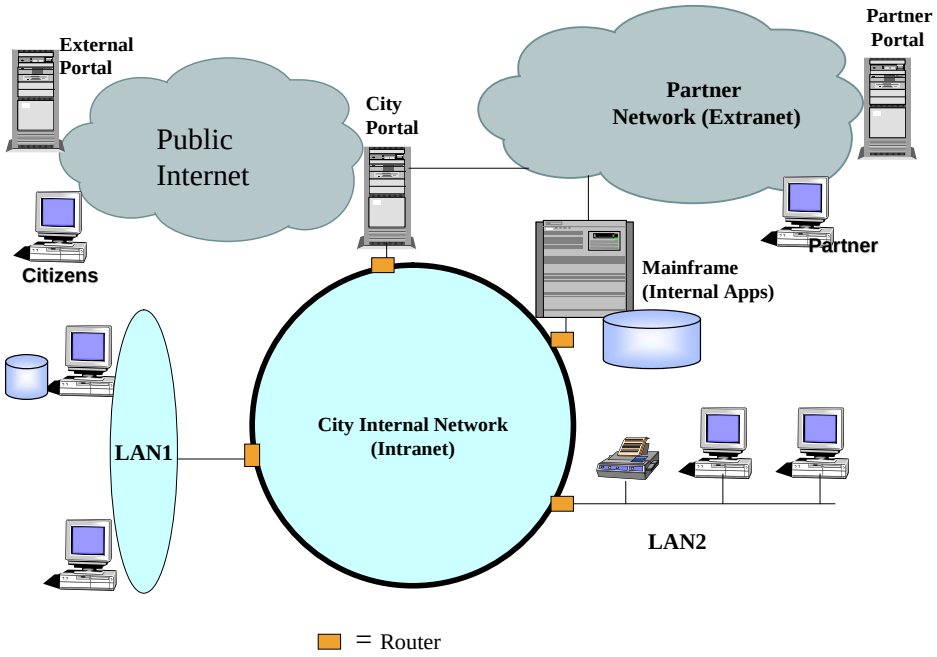


Figure 2-17: Sample IT Infrastructure Pattern for a Small Company

Time to Take a Break

Suggested Review Questions Before Proceeding

- What is computer aided planning and what is its main objective
- List the main components of SPACE (Strategic Planning, Architectures, Controls and Education)
- List the name of one or two tools that are similar to SPACE
- What are Patterns and why are they important for strategic planning
- What is the difference between a business pattern and an application pattern
- Give an example of a pattern in a real life situation
- Give one example of using Patterns in strategic IS Planning

Key Strategic Planning Books for Additional Information

- Abraham, SC (2012), *Strategic Planning: A Practical Guide for Competitive Success*, second edition, Emerald House Publishing

- Bradford, R. (2001), *Simplified Strategic Planning: The No-Nonsense Guide for Busy People Who Want Results Fast*, Chandler House Press, 2001
- Boar, B. (2001), *The Art of Strategic Planning for Information Technology*, Second Edition, John Wiley, 2001
- Dhillon, G. (2014), *Strategic Information Systems Planning: Readings and Cases*, Semantic Books
- King, W.R. Editor (2015), *Planning for Information Systems*, Routledge Publications
- Ward, J and Peppard, J. (2001), *Strategic Planning for Information Systems*, John Wiley & Sons

2.11 Concluding Comments and Next Steps

Strategic planning of digital services is a crucial but challenging task for the public as well as private sector. The objective of strategic planning is to identify the key opportunities and the issues before initiating a project. To succeed, the strategic planning process must explore a large number of people, process and technology issues and eliminate surprises. This chapter has given a quick overview of the vast body of knowledge that entails a typical strategic planning process. The objective is to emphasize the key concepts without technical details. The following steps are suggested for further studies:

- Please select an eservice problem of your choice. It may be an eservice in healthcare, transportation, public safety or any other area that you are interested in.
- Develop a sketch of a plan for this eservice by using the methodology presented in this tutorial.
- Surf the Internet to find a computer aided planning tool that can help you to develop this plan quickly.

References

[1] Abraham, SC (2012), *Strategic Planning: A Practical Guide for Competitive Success*, second edition, Emerald House Publishing

[2] Adams, J., et al (2001), *Patterns for e-Business: A Strategy for Reuse*, IBM Press.

[3] Alexander, C. (1979), *The Timeless Way of Building*, Oxford University Press

[4] Alexander, C. et al (1977), *A Pattern Language*, Oxford University Press

[5] Boar, B. (2001), *Art of Strategic Planning for Information Technology*, Second Edition, Wiley

[6] Bode, S., & Riebisch, M (2014). *Tracing the Implementation of Non-Functional Requirements.* Retrieved Feb 2, 2014, from igi-global.com: http://www.igi-global.com/viewtitle.aspx?titleid=52227&sender=aa801e50-1c1f-45d0-96e9-348334b0606f

[7] Bradford, R. (2001), "Simplified Strategic Planning: The No-Nonsense Guide for Busy People Who Want Results Fast", Chandler House Press, 2001

[8] Butler, D. (2006), Enterprise Planning and Development, Elsevier Publishing

[9] Buschmann, E., et al (1996), "Pattern-Oriented Software Architecture, Vol. 1, John Wiley

[10] Dada, D (2006), *The Failure of e-Government in Developing Countries*, EJIDSC, Vol 26, no. 7, link: http://www.ejisdc.org/ojs2/index.php/ejisdc/article/viewFile/277/176.

[11] Dhillon, G. (2014), *Strategic Information Systems Planning: Readings and Cases*, Semantic Books

[12] Goldman, E.F. (2007), "Strategic Thinking at the Top", *Sloan Management Review*, Jun 30, 2007

[13] Gallier, R. (1987), "Information Systems Planning: A Manifesto for Australian-Based Research", The Australian Computer Journal, May 1987, pp. 55-69.

[14] Gamma, E., et al (1994), *Design Patterns*, Addison Wesley.
[15] IBM Corporation (1978), "Business Systems Planning", GE20-0527.
[16] Kane, G.C. (2015), "Strategy, not Technology, Drives Digital Transformation", *Sloan Management Review*, MIT, July 14
[17] Kane, G.C. (2016), "Predicting the Future: How to Engage in Really Long-Term Strategic Digital Planning", *Sloan Management Review*, May 03, 2016.
[18] Kaplan, S. and Beinhocker, E.D. (2003), "The Real Value of Strategic Planning", *Sloan Management Review*, Jan 14, 2003.
[19] King, W.R. Editor (2015), *Planning for Information Systems*, Routledge Publications
[20] Kovacevic, A. and Majluf, N., (1993) "Six Stages of IT Strategic Management", *Sloan Management Review* , July 14, 1993.
[21] Kruschwitz, N, (2016) "How to Be a Strategic Leader", *Sloan Management Review*, Dec 12, 2016.
[22] Martin, R (2014), The Big Lie of Strategic Planning, *Harvard Business Review*, January–February 2014 Issue.
[23] McNurlin, B. and Sprague, R. (2001), "Information Systems Management in Practice", Prentice Hall, 5th edition.
[24] Mintzberg, H. (1994), "The Rise and Fall of Strategic Planning", *Harvard Business Review*, January-February.
[25] Mitroff, I. et al (1977), The Application of Behavioral and Philosophical Technologies to Strategic Planning: CASE Study of a Large Federal Agency, Management Science, Vol. 4, No.1., available at url: http://www.kilmanndiagnostics.com/system/files/Mitroff-Barabba-Kilmann.pdf
[26] Nolan, R. (1973), "Managing the Computer Resource: A Stage Hypothesis", Communications of the ACM, Vol. 16, No. 7, pp. 399-405.
[27] Olsen, E., (2013), "Strategic Planning Case Study: Cisco's Internet Scenarios for 2025", http://www.dummies.com/business/business-strategy/strategic-planning-case-study-ciscos-internet-scenarios-to-2025/
[28] Olsen, E., (2013), "Strategic Planning Case Study: Cisco's Internet Scenarios for 2025", http://www.dummies.com/business/business-strategy/strategic-planning-case-study-ciscos-internet-scenarios-to-2025/
[29] Pelton, J.N. and Singh, I.B., (2019), "Smart Cities of Today and Tomorrow", Springer, 2019.
[30] Phadnis, S., Caplice, C., and Sheffi, Y. (2016), "How Scenario Planning Influences Strategic Decisions", *Sloan Management Review*, May 27, 2016.
[31] Porter, M. E., and Lee, T. (2013), *The Strategy That Will Fix Health Care*, Harvard Business Review, October.
[32] Ramírez, R. et al, (2017) "Using Scenario Planning to Reshape Strategy", *Sloan Management Review*, Jun 13, 2017.
[33] Rockart, J. (1982), "The Changing Role of the Information Systems Executive: A Critical Success Factors Perspective", *Sloan Management Review*, Vol. 24, No. 1, pp. 3-13.
[34] Rosenfeld, E., *After all this…. Why Do Projects Fail?*, http://www.adaptivepartners.com/projfailb.htm.
[35] Schoemaker, P.J.H. (1995), "Scenario Planning: A Tool for Strategic Thinking", *Sloan Management Review*, Jan 14, 1995
[36] Sodhi, M., (2003) "How To Do Strategic Supply-Chain Planning", *Sloan Management Review*, Oct 14, 2003.
[37] Sull, D., and Turconi, S., (2017) "How to Recognize a Strategic Priority When You See One", *Sloan Management Review*, Sep 28, 2017
[38] Umar, A. (2013), *Computer Aided Consulting for Developing Countries, IEEE International Technology Management Conference,* Hague, June.

[39] Umar, A. (2012), "Computer Aided Planning, Engineering and Management of IT Services", *IEEE International Technology Management Conference,* Dallas, June.

[40] Umar, A., and Zordan, A. (2009), "Enterprise Ontologies for Planning and Integration of eBusiness*", IEEE Transactions on Engineering Management*, May, Vol. 56, No. 2, pp. 352-371.

[41] Umar, A. (2007), Intelligent "Decision Support for Architectures and Integration of Next Generation Enterprises ", *Informatica*, V. 31, No. 14, pp. 141-150.

[42] Ward, J and Peppard, J. (2001), *Strategic Planning for Information Systems*, John Wiley & Sons

[43] Weblink1: Standish Group Chaos Report, published annually by the Standish Group (www.standishgroup.com), last accessed: April 22, 2016.