Day 7
Architecture and Infrastructure

(Pearlson Ch 6)

Today’s Learning Objectives

• Articulate the difference between infrastructure and architecture
• Understand the role that each plays in realizing a business strategy
• Articulate the mechanisms by which business strategy is transformed into tangible information systems
FROM VISION TO IMPLEMENTATION

IS Architecture

• like the architectural plans for a building
  – unchangeable in some areas, but subject to interpretation in others.
• Architectural plans are used by builders to select materials and use construction techniques based on past experience and industry standards.
The Manager’s Role

- The manager needs to communicate with the IT architects and implementers to ensure that the resulting architecture meets the firm’s business strategy.
- Lack of managerial involvement can result in a poorly directionless, inefficient infrastructure that may even present obstacles to achieving with business goals.
THE LEAP FROM STRATEGY TO ARCHITECTURE TO INFRASTRUCTURE

From strategy to business requirements

The manager’s role is to first set business requirements for the desired IS
The next step is then to translate the business requirements into the IT architecture that the system will use.

The next step is to translate architecture into infrastructure. This entails adding the actual hardware and software that will be used.
Information System Components

• **Hardware**: physical components that handle the computation, storage and transmission of data.
• **Software**: programs that run on hardware and enable work to be performed
• **Network**: hardware and software components connected according to a common protocol to create a shared computing environment.
• **Data**: numbers and text that the IT infrastructure performs work on.

A Framework for the translation of architecture to infrastructure

• Begins with a simple overview of the current IS components, asking “what, who and where” for each.
• hardware example
  – What hardware does the firm have?
  – Who manages, uses and owns it?
  – Where is it located? Where is it used?
• Similar questions apply to the software, network and data components of the system.
A Framework for translation (cont.)

• The next step is to ask questions about the future IT architecture and infrastructure for the components of the system under development:

• Hardware example
  – Arch.: Does our strategy require thick or thin clients?
  – Infra.: What hard drives do we use on the thick clients?
  – Arch.: Who knows most about servers in the firm?
  – Infra.: Who will operate the sever?
  – Arch.: Does our architecture require centralized or decentralized servers?
  – Infra.: Must we hire a server administrator for the Tokyo office?

Examples of Architectures: Client-server vs mainframe

• Client/server architecture is an example of a type of architecture that is growing in use.
  – Because it is modular, it is easy to add additional servers to a client/server architecture.

• Mainframe architecture has a central computer and is easier to manage in some ways because of this.
OTHER MANAGERIAL CONSIDERATIONS

Understand the existing architecture

• Understanding the existing architecture
  – evaluate the IT requirements of an evolving business strategy vs. current IT.
• Compare the current architecture with plans for the architecture of the future
  – to help identify which components of the current system can for the system being developed.
Relevant questions for managers:

- What IT architecture is already in place?
- Is the company developing the IT architecture from scratch?
- Is the company replacing an existing architecture?
- Does the company need to work within the confines of an existing architecture?
- Is the company expanding an existing architecture?

Legacy systems

- Managers usually must deal with adapting existing architectures as part of planning their new systems.
- In so doing they encounter both:
  - Opportunity: to leverage the existing architecture and infrastructure and
  - Challenge: to overcome or within the old system’s shortcomings.
Conversion of legacy systems:

1. Objectively analyze the existing architecture and infrastructure
2. Objectively analyze the strategy served by the existing architecture.
3. Objectively analyze the ability of the existing architecture and infrastructure to further the current strategic goals.

Current vs. Future Requirements

- defining an architecture that addresses an organization’s current needs may find that by installation time those needs have changed.
  - Common sources of change:
    - changes in the business environment, organization, IT requirements and technology.
- Issues to consider in IT planning include:
  - Strategic Time Frame and
  - Technological Advances,
  - Growth Rates
Issues to consider: Strategic time frame

- The point: to gauge the life-span of IT architecture and infrastructure. Relevant questions on this topic include:
  - How far into the future does the strategy extend?
  - How long can the architecture and its associated infrastructure fulfill strategic goals?
  - What issues could arise and chance these assumptions?

Strategic time frame (cont.)

- depends on industry factors such as:
  - level of commitment to fixed resources, industry maturity, cyclicality and barriers to entry.
- hypercompetition has increased the rate of change
  - any strategic decision must be viewed as temporary.
- IT architecture must include the ideas of flexibility and scalability.
Issues to consider: Technological Advances

• IT architecture needs to be capable of supporting technological change.
• At a minimum, the architecture should be able to handle expected technological advances.
• An exceptional IT architecture will also have the ability to absorb unexpected technological leaps as well.

Technological advances (cont.)

• The following guidelines are suggested for planning adaptable IT architecture and infrastructure:
  – Plan for applications and systems that are independent and loosely coupled rather than monolithic.
  – Boundaries between infrastructure components should be clear.
  – When designing a network architecture, strive to provide access to all users when it makes sense to do so.
Issues to consider: Growth Requirements

- What will be the rate of growth in use of the information system?
- What are the projected increases in the capacity of its components?
- Relevant questions to consider include:
  - What’s the company’s project growth?
  - What does the architecture have to do to support that expansion?
  - How will it respond if the company greatly exceeds its growth goals? (overcapacity)

Assessing the return on IT infrastructure

- STEPS
  - Quantify costs
  - Determine the anticipated life cycles of system components
  - Quantify benefits
  - Quantify risks
  - Consider ongoing dollar costs and benefits
FROM STRATEGY TO INFRASTRUCTURE: AN EXAMPLE

BluntCo. fictitious case

- The process includes four steps:
  - Step 1: Defining the Strategic Goals
  - Step 2: Define Related Architectural Goals
  - Step 3: Apply Strategy-to-Infrastructure Framework
  - Step 4: Evaluate Additional Issues
Step 1: Defining the Strategic Goals

- Blunt Cos. business strategy is to respond to possible changes in demand by outsourcing clipper manufacturing.
- The company’s strategic goals are as follows:
  - To lower costs by outsourcing manufacturing
  - To lower costs by clipper distribution
  - To improve market responsiveness by outsourcing clipper manufacturing
  - To improve market responsiveness by outsourcing clipper distribution

Step 2: Define Related Architectural Goals

- Consider the first goal: outsourcing clipper manufacturing. How can the company’s IT architecture support this goal?
- It must provide the following interfaces to its new manufacturing partners:
  - Sales to mfg. partners: send forecasts, confirm orders received
  - Mfg. partner to sales: send capacity, confirm orders shipped
  - Mfg. partner to accounting: confirm orders shipped, electronic invoices, various inventory levels, returns
  - Accounting to mfg. partners: transfer funds for orders fulfilled
Step 3: Apply Strategy to Infrastructure Framework

- Translating the strategic goals to the architectural and infrastructural framework means asking the what, who and where questions discussed before.
- For example, for the network:
  - Arch.: What is the anticipated volume of transactions between BluntCo and its manufacturing partners?
  - High volume may require leased lines to carry transaction data, dial-up connections may suffice for low volume (i.e., what’s the best leased line to use?).
- See figure 6.7 presents a detailed list of questions.

Step 4: Evaluate Additional Issues

- The last step is to compare managerial considerations such as strategic time frame, technological advances, etc., with the architectural goals listed in step 2.
- For example, regarding HR compatibility:
  - Arch.: The new model will displace some current human resources. BluntCo must analyze costs and the effect on morale.
  - Infra.: Current staff not familiar with EDI; must be trained, some new staff hired. BluntCo must analyze associated costs.
FOOD FOR THOUGHT: TOTAL COST OF OWNERSHIP

Total Cost of Ownership (TCO)

- TCO measures the annual cost to operate a component. It is fast becoming a standard.
- TCO looks beyond capital (acquisition) costs to include technical support, administration and training.
- TCO estimates provide the best investment numbers to use in financial return calculations.
TCO as a Management Tool

- TCO can also help managers understand how infrastructure costs break down by providing a fuller picture of where IT dollars are spent.
- It may be possible to evaluate TCO results against industry standards.
- Even if there is no comparison data, TCO values can be helpful with decisions about budgeting, resource allocation and organizational structure.

Wrap Up

- Strategy, is to architecture is to infrastructure
  - As plans are to blueprints are to buildings
- IT planning requires an assessment of:
  - Strategic Time Frame,
  - Technological Advances,
  - Growth Rates
- The cost of IS/IT ownership is greater than that of the cost of acquisition
A Look ahead…

• Knowledge management

Study questions

• What constitutes organizational knowledge?
• What forms does it take?
• How can it be managed?