CHAPTER 2 – SYSTEMS INTEGRATION

CHAPTER OBJECTIVES

- Understand the impact of organizational structure on information systems
- Find out about the types of functional silos in organizations
- Learn about the evolution of information systems technology generations and architectures and their influence on a silo environment
- Know what systems integration is and why it is important for organizations
- Understand the role of Enterprise Resource Planning (ERP) systems in systems integration

CHAPTER OUTLINE

   I.   Opening Case: AIR CARGO's e-ENTERPRISE SYSTEM
  II.   Functional Silos
      a) Horizontal Silos
      b) Vertical Silos
      c) Business Process and Silos
 III.   Evolution of IS in organizations
      a) IS Architectures
      b) IS Fictionalizations
  IV.   Systems Integration
      a) Logical Versus Physical SI
      b) Steps in Integrating Systems
      c) Benefits of System Integration
      d) Limitations of System Integration
   V.   ERP and Systems Integration
      a) ERP's Role in Logical Integration
      b) ERP's Role in Physical Integration
  VI.   Implications for Management
 VII.   Case 2-2 Real-World Case: Systems Integration at UPS Corp

CHAPTER OVERVIEW

     This chapter discusses the evolution and importance of Systems Integration and the role of ERP systems in systems integration. The chapter begins with a discussion on information silos. If you think of an agricultural silo it is an immense vessel used for storing grain, as a representation of departments in a company. Just like a agricultural silo is self contained and has all the resources it needs with little interaction with the outside world, a silo'd information system is separated and does not work together with other systems.   The chapter discusses two types of "silo" systems we can see in a company: Horizontal—that is each department is on the same level within the company, granted the higher ups will be somewhere above that; essentially

the hierarchy is very wide and not very tall. Vertical—that is the system is fairly narrow and tall; envision a pyramid, strategic management on top, tactical management in the middle, and the functional operations of the company at the bottom, supporting it all.   The chapter also discusses the idea of a matrix structure, which combines both ideas of horizontal and vertical silos, to create a strategy driven company that works both equally and unequally to achieve the company objectives.

The next topic covered is the evolution of IS in organizations. The initial use of functional silos was successful when companies were small and information sharing requirements were limited. The information silos, by preventing the sharing of information, create bottlenecks and lead to inefficiency and mismanagement, inaccuracies and errors. Also, it can become a breeding ground for incompatible data and lead to poor management decisions. Without an integrated system it's harder for departments to work together; for example, the inventory and customer sales departments communicate on a regular basis and they do not have a structured way of exchanging information. Silo systems process data differently and store data in different formats, and before you know it, there are forwarded emails going to the wrong people, orders misplaced, and inventory inaccurately tracked.

In addition, the chapter covers how IS architecture, has, over a period, evolved, driven by innovation and organizational requirements which were 1) Centralized, 2) Decentralized, and 3) Distributed. Having an integrated system allows for functional departments to get the information they need while having a broad, company wide system.   Modern ERP systems allow for companies to have a centralized data and information source that can be updated and represented at all levels of the company. These organizational structures allow for better use of data simply by design.

Physical and logical systems integration is another key point. Physical integration is the integration of data systems across a company designed to provide a seamless network of information and decision making tools.   Logical or human integration allows for "logical" understanding of information both between company people as well as company and customers/stakeholders.

There are many pros and cons of systems integration. Some of the benefits of Systems Integration is increasing revenue and growth, information visibility, standardization, and balancing the competitive environment against competitors.   Some of the drawbacks of Systems Integration is the initial cost of designing and implementing the system, and not having a full understanding of the long term and intangible benefits that may be present. Also, power and interdepartmental conflicts may require some business reorganization to conform to the new system, in the hopes that things will work and flow better.

ADDITIONAL INFORMATION

Good information on the TJX hack attack, includes how it was hacked and what was wrong with the TJX system

1. http://www.informationweek.com/news/showArticle.jhtml?articleID=196902075

ANSWERS TO END-OF-CHAPTER REVIEW QUESTIONS

1. What are functional silos and how did they evolve in organizations?

Functional silos evolved when organizations became larger and complex structures. This happens when companies have separations of responsibilities and duties into departments. When departments form in a company they tend to need different things, and then develop their own methods of obtaining their goals, or use methods laid out by higher-ups.   Each department operates separately with little or no interaction with each other; they are autonomous and function without the rest of the company.

2. What is the relationship between organizational functional silos and IS functional silos?

The relationship between these two types of functional silos is that they both serve the needs of a department, but this is done in two different ways. Traditional functional silos operate as independent units with their required information; changes made within these silos are not propagated to other departments. With an IS functional silo there is no online sharing of data and it creates a situation where data has integrity or currency issues.

3. Compare and contrast centralized, decentralized, and distributed IT architectures. Which do you think is most appropriate for ERP and why?

Centralized systems are usually based on servers, mainframes, and supercomputers, where all the data, software, and resources are stored on the server and are accessed via dumb terminal computers, that is, nothing is really stored on the satellite computers. On other hand, decentralized is just the opposite; we have multiple small computers with the information and software they need, this gives them full control over what takes place, but may lead to less real time cooperation.   Finally, distributed architecture is a combination of both centralized and decentralized architectures with their own applications and tools, accessing data and resources from a shared and very centralized network location. I think the most appropriate system for ERP is the distributed architecture as it blends both centralized and decentralized, and boasts better data consistency and integrity.

4. List the horizontal and vertical levels of systems that exist in organizations.

Vertical Levels of systems → going down
- Strategic Management
- Tactical Management
- Functional Operations

Horizontal Levels of systems → going across
- Human Resources
- Accounting
- Finance
- Marketing
- Manufacturing
- MIS

5. What is logical integration and how is it different from physical integration?

Logical or Human systems focus on integration of business process and people changes for successful use of systems by getting people to share information across functional areas with relative ease. On the other hand, physical systems integration involves building a system architecture that supports many different applications, and gets them to work together seamlessly.

6. Describe at least five steps involved in systems integration.

Step 1 – Resource categorizing – take inventory of hardware and software and seek vendors that comply with this technology
Step 2 – Compliance and standards – check to see what kinds of standards are used for database support JDBC/ODBC
Step 3 – Legacy systems support – develop support for older systems
Step 4 – Middleware tools – tools that are used to support legacy systems, and are a short-term solution to fixing the problem
Step 5 – Authentication and authorization policies – Create standards that users can login and log off to create information protection, to hide sensitive information.

7. What are the key benefits and limitations of systems integration?

Some of the key benefits to Systems Integration:
* The increase of Revenue and Growth
* Enhanced information visibility
* Standardization of data
* Better business practices and
* Levels the competitive environment with competitors.

Some of the Limitations of Systems Integration:
* High initial setup costs
* ROI with benefits showing up after long time
* Power and Inter-departmental Conflicts.

8. What is the role of ERP systems in systems integration?

ERP can play a crucial role in systems integration, with Logical systems integration it forces companies to focus on business processes and practices instead of focusing on function alone. Also ERPs allow for co-influence of departments, which forcibly removes the Silo concepts from a business. With physical integration, ERP systems force companies to focus on upgrading and removing legacy systems, and also forces companies to improve flexibility and fluidity throughout the system.

9. Summarize the role of management in systems integration.

Management has several integration issues it has to face. First, it has to accept that Silos do not work and to begin accepting an integrated information system to store and use data.   They also have to understand that Systems Integration has many hidden benefits and many challenges; they will need to look to make improvements while not underestimating the challenges. Likewise, they will have to overcome the challenges without missing the very possible and very intangible benefits of an Integrated System. Finally, integrated systems also raise many ethical issues, with more electronic transactions taking place, customer information becomes more often a source of information, but that information is private to the customer, and could pose many problems if it were to be released to the public. Such an example would be the TJX incident.

DISCUSSION QUESTIONS

1. **Refer to the AirCargo Case in the chapter. Discuss the silo problem at ACI and how it was solved via the eEnterprise system.**

   The systems passed data applications using import/export of text files creating a delay reporting and the data being dated. ACI used the Data Transformation Services product from Microsoft to pass data real-time between its enterprise systems.

2. **Refer to the AirCargo Case in the chapter. Discuss both short-term and long-term benefits of the eEnterprise system.**

   The short-term advantage of eEnterprise system is that it links the systems together such that a single update is propagated across the enterprise, reducing data entry errors and timing problems.

   The long-term benefit is that the systems provide the building blocks that enable two-way information flow between ebusiness and financial systems.

3. **Why do you think functional silos are not appropriate for today's organization? Discuss your answer from organizational and technical perspectives.**

   In the internet world of today information needs to be timely and available. Systems that do not talk to each other will create bottlenecks in processing information within a company. Eventually decisions will be made without the latest information and possibly a loss of revenues.

4. **What is the relationship between the logical and physical system integration? Why is it important for organizations to have both together?**

   Logical integration allows organizations to share data with all of its stakeholders. Physical integration provides seamless connectivity between heterogeneous systems. If the application systems are not seamless, sharing of data in a timely fashion with all of the organizations stakeholders is not achievable.

5. **Why is business process re-engineering needed for implementing an ERP?**

As with most ERP implementations the system is designed for "leading practices". An organization would benefit from understanding how the business processes will lead to better efficiency and quality. Current organization business practices would need to be reviewed and analyzed with the implementation of the ERP in order to take advantage of these "leading practices"

6. **Discuss the role of management in systems integration in terms of the ethical and other challenges they face during the systems integration process.**

Management must understand the tangible and intangible benefits of integrated systems. Decision making across the organization is cascaded to all employees in the organization at all levels creating a more productive environment and satisfied employees.

UPS CASE QUESTIONS:

1. **What are some of the system integration challenges faced by UPS?**

UPS had acquired more than 30 other companies since going public in 1999. They had over 3,600 IT professionals, 14 mainframes, 2,755 mid-range computers, 6,200 servers and over 260,000 PCs. Its systems were not well integrated and therefore, not easy to pass data between them.

2. **Discuss the systems integration solutions at UPS. How does it help UPS integrate new technologies?**

They consolidated data centers and chose to implement products across all the lines of business. This was achieved through a focus on the business objectives and not the technology.

3. **Discuss the advantages of systems integration for UPS customers.**

Customers can track the status of packages around the globe through a single web-based system. It puts the power directly in the customers' hands to know the status of a package.