แก้ไขครั้งล่าสุดเมื่อวันที่ 16 กุมภาพันธ์ 2568

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SYSTEMS ANALYSIS AND DESIGN

6

Moving into Design

The purpose of the **analysis phase** is to figure out what the **business needs**.
The purpose of the **design phase** is to decide **how to build it**.

Activities in the Design Phase	Deliverables	Chapter
✓ Determine preferred system acquisition strategy (make, buy, or outsource).	– Alternative matrix	6
✓ Design the architecture for the system.	– Architecture design	7
✓ Make hardware and software selections.	– Hardware and software specification	
✓ Design system navigation, inputs, and outputs.	– Interface design	8
✓ Convert logical process model to physical process model.	– Physical process model	9
✓ Update CASE repository with additional system details.	– Updated CASE repository	
✓ Design the programs that will perform the system processes.	– Program design specifications	
✓ Convert logical data model to physical data model.	– Physical data model	10
✓ Update CASE repository with additional system details.	– Updated CASE repository	
✓ Revise CRUD matrix.	– CRUD matrix	
✓ Design the way in which data will be stored.	– Data storage design	
✓ Compile final system specification.	– System specification: all of the above deliverables combined and presented to approval committee	6

FIGURE 6-1 Activities of the design phase.

- Recommended System Acquisition Strategy
- System Acquisition Weighted Alternative Matrix
- Architecture Design
- Hardware and Software Specification
- Interface Design
- Physical Process Model
- Program Design Specifications
- Physical Data Model
- Data Storage Design
- Updated CRUD Matrix
- Updated CASE Repository Entries

FIGURE 6-2 System specification outline.

หลังจบ design phase จะต้องได้ system specification

PRACTICAL TIP 6-1 Avoiding Classic Design Mistakes

In Chapters 2 and 3, we discussed several classic mistakes and how to avoid them. Here, we summarize four classic mistakes in the design phase and discuss how to avoid them:

1. **Reducing design time:**
   If time is short, there is a temptation to reduce the time spent in such "unproductive" activities as design so that the team can jump into "productive" programming. This results in missing important details that have to be investigated later at a much higher time cost (usually, at least 10 times longer).
   Solution: If time pressure is intense, use rapid application development (RAD) techniques and timeboxing to eliminate functionality or move it into future versions.
2. **Feature creep:**
   Even if you are successful at avoiding scope creep, about 25% of system requirements will still change. Changes—big and small—can significantly increase time and cost.
   Solution: Ensure that all changes are vital and that the users are aware of the impact on cost and time. Try to move proposed changes into future versions.
3. **Silver bullet syndrome:**
   Analysts sometimes believe the marketing claims that some design tools solve all problems and magically reduce time and costs. No one tool or technique can eliminate overall time or costs by more than 25% (although some can reduce individual steps by this much).
   Solution: If a design tool has claims that appear too good to be true, just say no.
4. **Switching tools in midproject:**
   Sometimes, analysts switch to what appears to be a better tool during design in the hopes of saving time or costs. Usually, any benefits are outweighed by the need to learn the new tool. This also applies to even "minor" upgrades to current tools.
   Solution: Do not switch or upgrade unless there is a compelling need for specific features in the new tool, and then explicitly increase the schedule to include learning time.

Source: Adapted from *Professional Software Development*, Redmond, WA: Microsoft Press, 2003, by Steve McConnell.

Pros	Cons
Custom Development	
Get **exactly** what we want New system built consistently with existing technology and standards Build and retain technical skills and functional knowledge in-house Allows team flexibility and creativity Unique solutions created for strategic advantage	Requires significant time and effort May add to existing backlogs May require skills we do not have Often costs more Often takes more calendar time Risk of project failure
Packages (purchased or obtained from ASP or SaaS)	
No need to "reinvent the wheel" for common business needs Tested, proven product Cost savings Time savings Utilize vendors' expertise Some customization may be possible	Rarely a perfect fit Organizational processes must adapt to software Reliance on vendor for maintenance and future enhancements Will not develop in-house functional and technical skills Unique needs may go unmet May require system integration
Outsourced Development	
Hire expertise we do not have May save time and money Lower risk	No opportunity to build in-house expertise Reliance on vendor Future options limited Security—potential loss of confidential info Performance based on contract terms

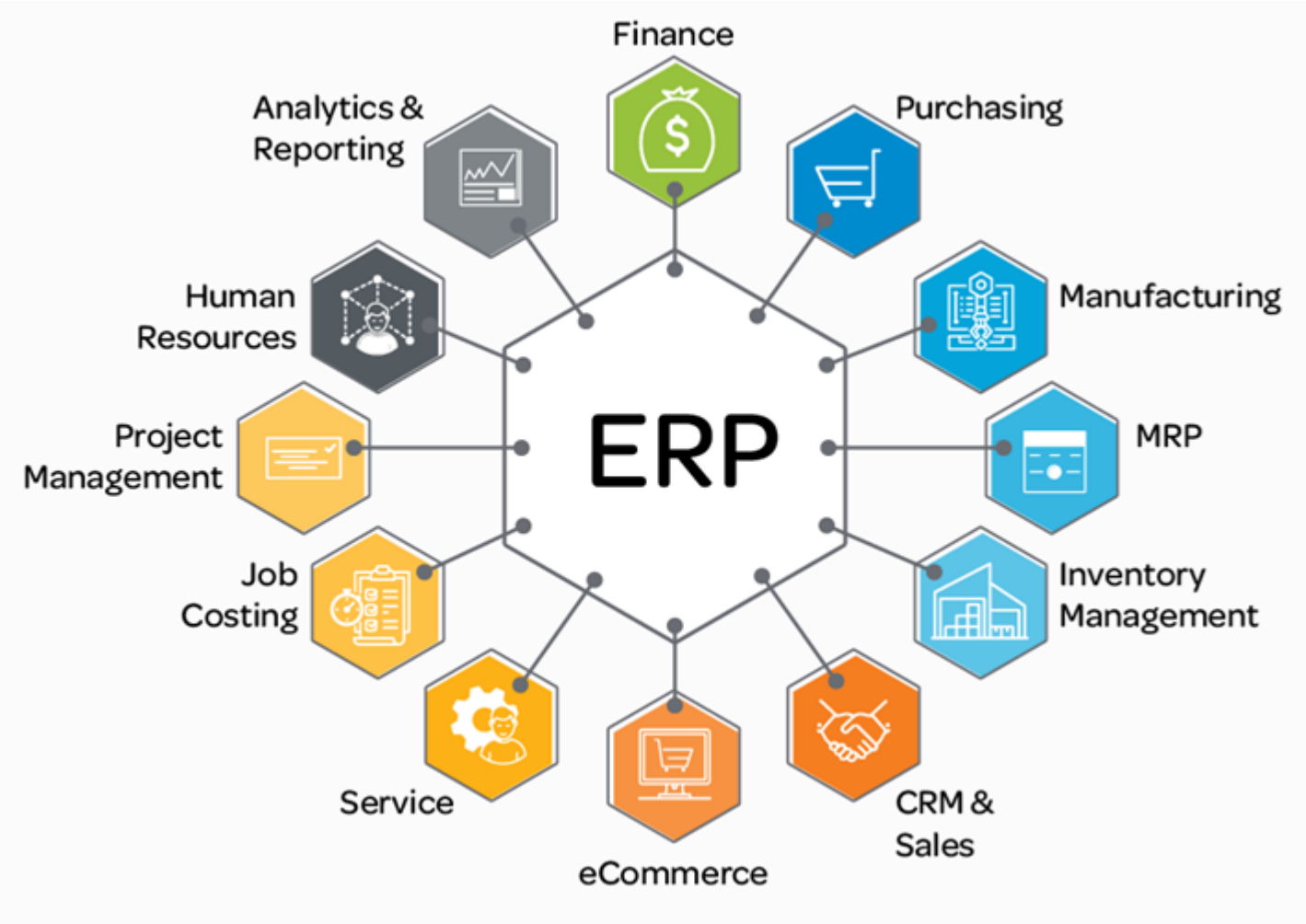
FIGURE 6-3 Summary of software acquisition options pros and cons.

Custom Development

myCourseVille vs. Blackboard, Canvas, Google Classroom, Moodle ฯลฯ
ลองยกตัวอย่าง custom dev ที่มี packages ให้แต่ก็ไม่ใช้

Packages

Enterprise Resource Planning (ERP) เช่น SAP, Oracle, Infor



Workaround is a custom-built add-on program that interfaces with the packaged application to handle special needs.

Systems integration refers to the process of building new systems by combining packaged software, existing legacy systems, and new software written to integrate these.

Outsourced Development

Application Service Providers (ASPs)
Software as a Service (SaaS)

There are three primary types of contracts that can be drawn to control the outsourcing deal.

- Time and arrangements deal
- Fixed-price contract
- Value-added contract

Concepts in Action 6-A Out of the Box . . . ?

A consultant I know led a very large project revising the financial systems of a major global financial services company. The company had a successful, well-defined program of software standards in place. Therefore, initially, the project team attempted to employ software from one of the major ERP software vendors in the project. After experiencing dismal (and unacceptable) processing speed during tests of the ERP software, the CIO and team concluded, "Out of the Box is out of the question." *Roberta Roth*

CONCEPTS IN ACTION 6-B

Bucking Conventional Wisdom with Custom Development

Bonhams 1793 Ltd. is a London-based auctioneering house, ranked number three globally behind Christie's International PLC and Sotheby's. After embarking on a series of acquisitions in 2000, the firm recognized the need to standardize its IT system. The requirements that Bonhams 1793 faced included ERP functions, CRM, and auction catalog production, among others. Rather than follow the lead of its larger competitors and acquire a software package from SAP AG or Siebel Systems Inc., Bonhams 1793 instead developed a system from scratch. By carefully planning the system architecture, selecting powerful and integrated development tools, employing open source software when possible, and empowering its in-house developers, Bonhams 1793 developed a custom system rapidly and at lower cost than it could have by using a packaged solution. Bonhams 1793 avoided purchasing an expensive package and then spending a significant amount to tailor and implement it. The result is a successful custom system that provides exactly the functions that Bonhams 1793 sought.

Source: Anthes, Gary, "Best in Class 2007, Bonhams 1793," *Computerworld*, August 14, 2007.

CONCEPTS IN ACTION 6-C

Finding Just the Right Blend

Welch Foods, Inc., recognized that the new ERP system being implemented did not have the same reporting capabilities as the systems that were being replaced. Key transportation operations and cost data was going to be lost. Welch's turned to a SaaS business intelligence solution to ensure continued access to old and new data. The SaaS solution was ideal because the company could not realistically manage another project or add an additional burden on its employees at the time, especially in light of the ERP implementation. The SaaS solution provided a variety of business intelligence reporting capabilities to Welch's, enabling cost savings and overall transportation operational efficiencies.

Source: Christina Torode, "SaaS BI helps boost Welch's efficiency, data retention," *SearchCIO.com*, January 13, 2010.

CONCEPTS IN ACTION 6-D | Building a Custom System—With Some Help

I worked with a large financial institution in the southeast that suffered serious financial losses several years ago. A new chief executive officer was brought in to change the strategy of the organization to being more customer focused. The new direction was quite innovative, and it was determined that custom systems, including a data warehouse, would have to be built to support the new strategic efforts. The problem was that the company did not have the in-house skills for these kinds of custom projects.

The company now has one of the most successful data warehouse implementations because of its willingness to use outside skills and its focus on project management. To supplement skills within the company, eight sets of external consultants, including hardware vendors, system integrators, and business strategists, were hired to take part and transfer critical skills to internal employees. An in-house project manager coordinated the data warehouse implementation full time, and her primary goals were to clearly set expectations, define responsibilities, and communicate the interdependencies that existed among the team members.

This company showed that successful custom development can be achieved even when the company may not start off with the right skills in-house. However, this kind of project is not easy to pull off—it takes a talented project manager to keep the project moving along and to transition the skills to the right people over time. *Barbara Wixom*

Questions

1. What are the risks in building a custom system without having the right technical skills available within the organization?
2. Why did the company select a project manager from within the organization?
3. Would it have been better to hire an external professional project manager to coordinate the project? Why or why not?

- Keep the lines of communication open between you and your outsourcer.
- Define and stabilize requirements before signing a contract.
- View the outsourcing relationship as a partnership.
- Select the vendor, developer, or service provider carefully.
- Assign a person to manage the relationship.
- Do not outsource what you do not understand.
- Emphasize flexible requirements, long-term relationships, and short-term contracts.

FIGURE 6-4
Outsourcing guidelines.

ควรพิจารณาจากผลงานในอดีต หรือขอผลงานในอดีตมาดู เช่น เอกสารการวิเคราะห์และออกแบบระบบ ระบบนั้นใช้งานได้จริง เป็นต้น

สามารถกำกับดูแลการทำงานของผู้รับจ้าง ตรวจรับงานและควบคุมคุณภาพงานได้

	When to Use Custom Development	When to Use a Packaged System	When to Use Outsourcing
Business need	The business need is unique.	The business need is common.	The business need is not core to the business.
In-house experience	In-house functional and technical experience exists.	In-house functional experience exists.	In-house functional or technical experience does not exist.
Project skills technical/functional	There is a desire to build in-house skills.	The skills are not strategic.	The decision to outsource is a strategic decision.
Project management	The project has a highly skilled project manager and a proven methodology.	The project has a project manager who can coordinate vendor's efforts.	The project has a highly skilled project manager at the level of the organization that matches the scope of the outsourcing deal.
Time frame	The time frame is flexible.	The time frame is short.	The time frame is short or flexible.

FIGURE 6-5 Selecting a system acquisition strategy.

CONCEPTS IN ACTION 6-E | Electronic Data System's Value-Added Contract

Value-added contracts can be quite rare—and very dramatic. They exist when a vendor is paid a percentage of revenue generated by the new system, which reduces the up-front fee, sometimes to zero. The landmark deal of this type was signed several years ago by the City of Chicago and EDS (a large consulting and systems integration firm), which agreed to reengineer the process by which the city collects the fines on 3.6 million parking tickets per year. At the time, because of clogged courts and administrative problems, the city collected on only about 25% of all tickets issued. It had a $60 million backlog of uncollected tickets.

Dallas-based EDS invested an estimated $25 million in consulting and new systems in exchange for the right to up to 26% of the uncollected fines, a base processing fee for new tickets, and software rights. To date, EDS has taken in well over $50 million on the deal, analysts say. The deal has come under some fire from various quarters as an example of an organization giving away too much in a risk/reward–sharing deal. City officials, however, counter that the city has pulled in about $45 million in previously uncollected fines and has improved its collection rate to 65% with little up-front investment.

Question

1. Do you think the city of Chicago got a good deal from this arrangement? Why or why not?

Source: "Outsourcing? Go out on a Limb Together," *Datamation*, February 1, 1999, 41(2): 58–61, by JeffMoad.

YOUR TURN 6-1 Select a Design Strategy

Suppose that your university were interested in creating a new course registration system that could support Web-based registration.

Question

1. What should the university consider when determining whether to invest in a custom, packaged, or outsourced system solution?

ตอบได้หลากหลาย ขึ้นกับสมมติฐาน (assumption)

Evaluation Criteria	Relative Importance (Weight)	Alternative 1: Custom Application Using VB.NET	Score (1–5)*	Weighted Score	Alternative 2: Custom Application Using Java	Score (1–5)*	Weighted Score	Alternative 3: Packaged Software Product ABC	Score (1–5)*	Weighted Score
Technical Issues:										
Criterion 1	20		5	100		3	60		3	60
Criterion 2	10		3	30		3	30		5	50
Criterion 3	10		2	20		1	10		3	30
Economic Issues:										
Criterion 4	25	Supporting	3	75	Supporting	3	75	Supporting	5	125
Criterion 5	10	Information	3	30	Information	1	10	Information	5	50
Organizational Issues										
Criterion 6	10		5	50		5	50		3	30
Criterion 7	10		3	30		3	30		1	10
Criterion 8	5		3	15		1	5		1	5
TOTAL	100			350			270			360

* This denotes how well the alternative meets the criteria. 1 = poor fit; 5 = perfect fit.

FIGURE 6-6 Sample alternative matrix using weights.

Evaluation Criteria	Relative Importance (Weight)	Alt 1: WB-1	Score (1–5)*	Wtd Score	Alt 2: WB-2	Score (1–5)*	Wtd Score	Alt 3: WB-3	Score (1–5)*	Wtd Score
Technical Issues:										
Integration with existing infrastructure	15	Very little capability	2	30	Provided, but appears awkward	3	45	Strong, appears seamless	5	75
Database capabilities	15	None	1	15	Limited	2	30	Excellent; compatible with company standards	5	75
Access to underlying code	10	Not possible	1	10	Limited	3	30	Easy	5	50
Video support	15	Yes; adequate	3	45	Yes; adequate	3	45	Yes; excellent	5	75
Economic Issues:										
Cost	20	$15/month	5	100	$25/month	4	80	$90/month	1	20
Organizational Issues:										
Market adoption	5	Strong—widely used	4	20	Moderate—newer product	3	15	Strong—market leader	5	25
Ease of learning	10	High	5	50	Somewhat complex	3	30	High learning curve	1	10
Ease of use	10	Inflexible	2	20	Somewhat flexible	4	40	Very flexible; easy to modify	5	50
TOTAL	**100**			**290**			**315**			**380**

* The score denotes how well the alternative meets the criteria; 1 = poor fit; 5 = perfect fit.

FIGURE 6-7 Alternative matrix for website builder program.