第2部分——管理信息系统
Part II: Management Information Systems

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Topic 3: 管理信息系统的本质
The Nature of Management Information Systems

提纲 Outline

1. 为什么信息化项目会失败？Why do informatization projects fail?
2. 信息系统的本质是业务流程再造 The essence of information systems is business process reengineering
3. 如何开展基于信息化的业务流程再造？How to carry out business process reengineering based on informatization?
4. 信息系统的内核是管理逻辑 The core of information systems is management logic
5. 信息系统最终要和人打交道 Information systems ultimately deal with people
6. 为什么信息系统是一把手工程？ Why is information systems a top project?

1. 为什么信息系统会失败？

Why do informatization projects fail?

1. The importance of information systems

- ## Information Systems
  - An information system refers to a human-computer integrated system consisting of computer hardware, networking and communication devices, computer software, information resources, information users, and regulations, with the purpose of processing information flow. In simple terms, an information system is a system that takes input data/information and, through processing, generates information.

- ## Information Systems
  - Focus on the technical part

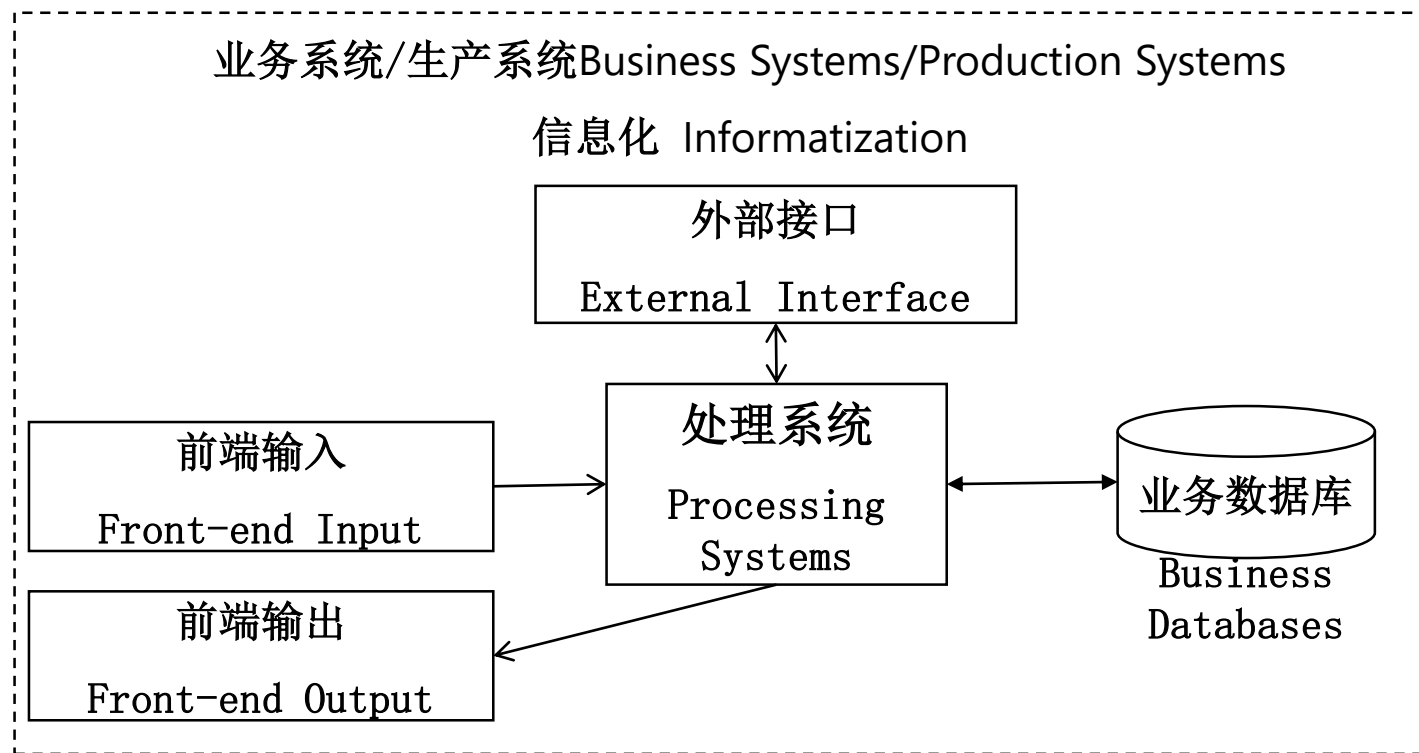- ## Management Information Systems
  - Focus on what is managed.

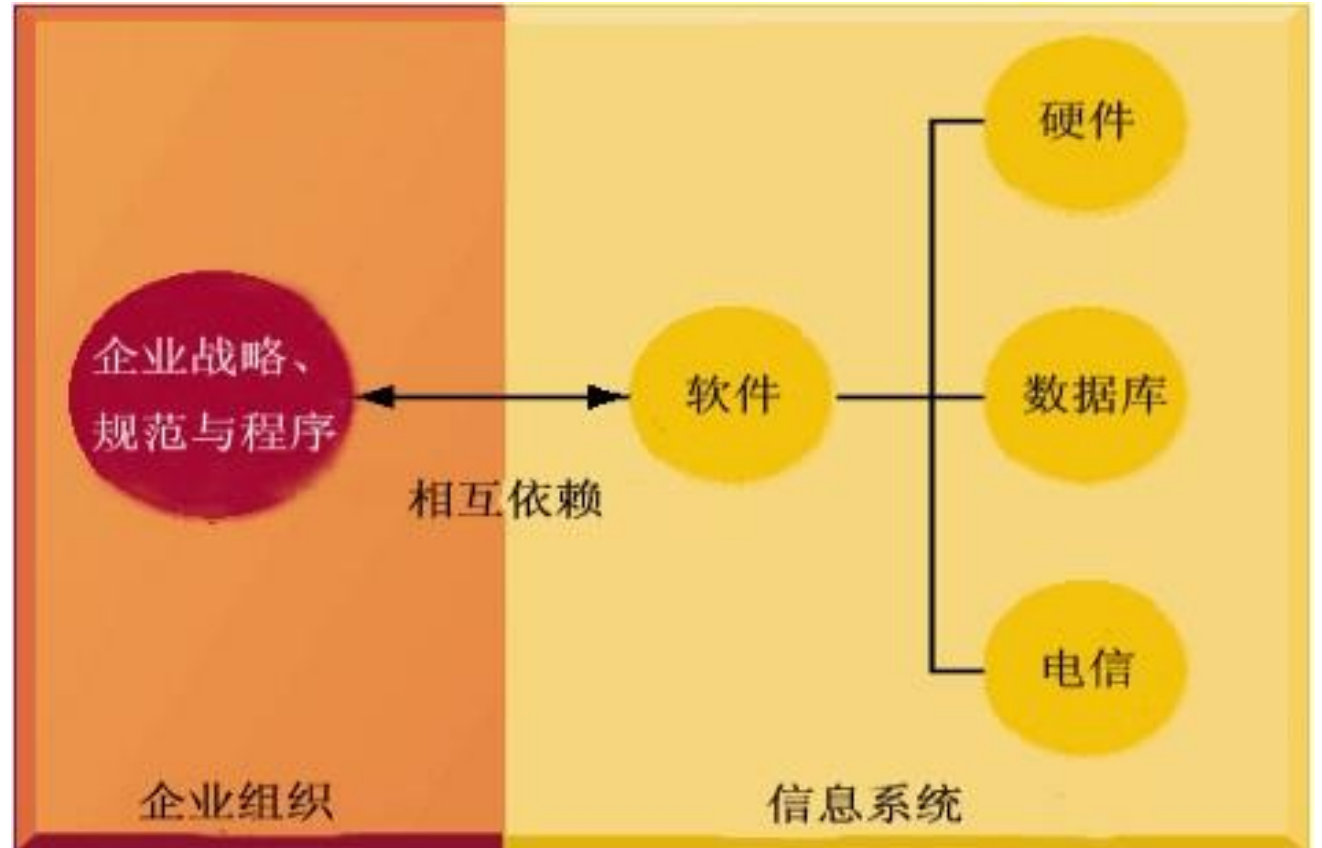- ## Informatization
  - Focus on the process of implementation.

The basic functions of an information system

- Input Function: The input function of an information system depends on the system's purpose, its capabilities, and the permissions within the information environment.

- Storage Function: The storage function refers to the system's capacity to store various types of information, data, and materials.

- Processing Function: It involves Online Analytical Processing (OLAP) and Data Mining (DM) technologies based on data warehousing.

- Output Function: All the functions of an information system are aimed at ensuring the achievement of the best output function in the end.

- Control Function: It involves the control and management of various information processing devices that make up the system, as well as the control of the entire information processing, handling, transmission, and output stages through various procedures.

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业务系统/生产系统Business Systems/Production Systems

信息化 Informatization

外部接口

External Interface

前端输入

Front-end Input

处理系统

Processing
Systems

业务数据库

Business
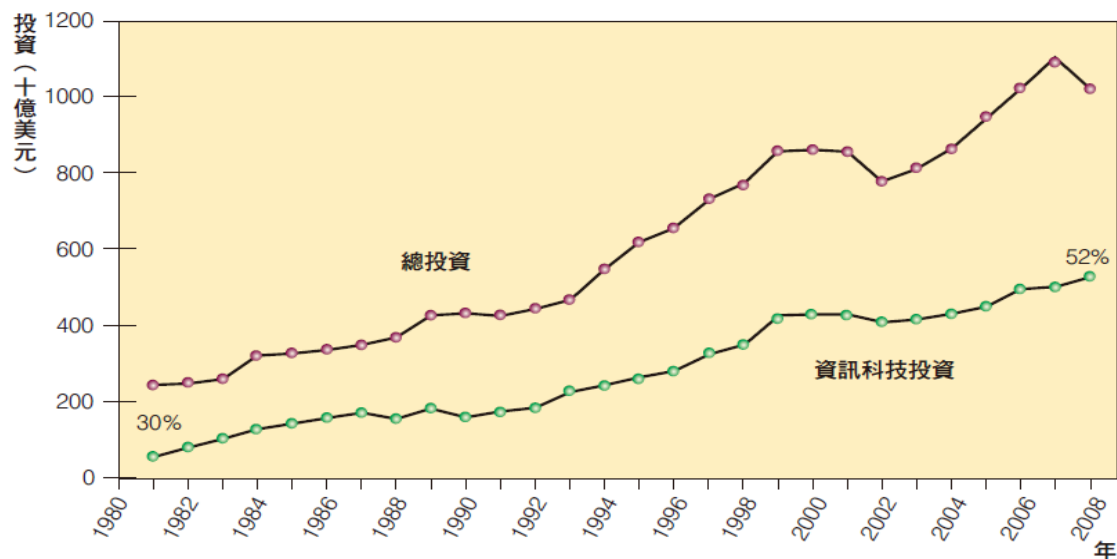Databases

前端输出

Front-end Output

- Information systems are the foundation of business in the 21st century
  - =office, File cabinets, Building

- What an information system can do often determines what a business can do in the next five years.
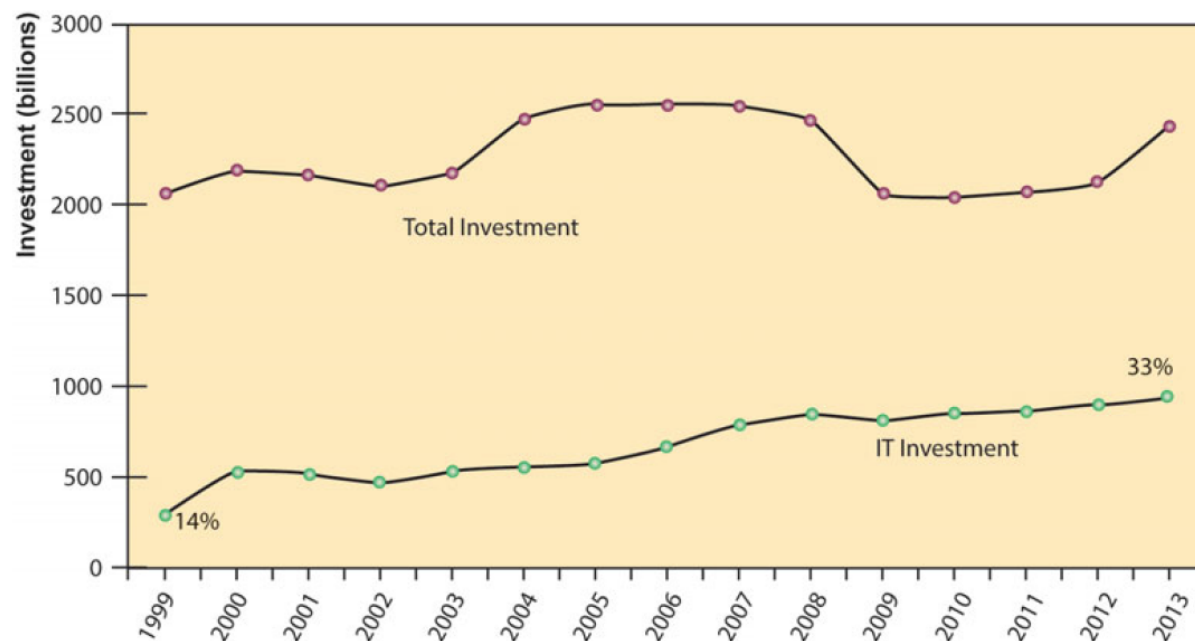
商业中信息系统的投资
Investment in information systems in business

FIGURE 1.1 INFORMATION TECHNOLOGY CAPITAL INVESTMENT

信息科技资本投资，由硬件、软件与通讯设备组成，
从 1980 年到 2009年由占所有企业投资的 32% 成长至 52%
Information technology capital investment, defined as hardware,
and communications equipment, grew from 32 percent to 52
percent of all invested capital between 1980 and 2009.

Information technology capital investment, defined as hardware, software, and communications equipment, grew from 14 percent to 33 percent of all invested capital between 1999 and 2013.
Source: Based on data in U.S. Department of Commerce, Bureau of Economic Analysis, *National Income and Product Accounts,* 2014.

14版

11版？

新兴的数字化企业/数字化转型
Emerging Digital Enterprise/Digital Transformation

- 数字化企业（Digital Firm）
  - 和客户、供应商和员工的重要商业关系几乎完全借助数字化实现

    Important business relationships between customers, suppliers and employees are almost entirely digital
  - 通过覆盖整个企业或连接多个企业的数字网络完成核心业务流程

    Complete core business processes with a digital network that spans the entire enterprise or connects multiple enterprises
- 关键企业资产（知识产权、核心能力、财务和人力资源）可以通过数字化方法管理。

    Key corporate assets (IP, core competencies, finance, and human resources) can be managed digitally.
- 数字化企业对其环境的感知和响应远比传统企业更加迅速。

    Digital businesses are aware of and respond to their environment much faster than traditional businesses.

数字化转型，赋能企业数字化重塑

IBM 是企业数字化转型的绝佳合作伙伴，凭借全球技术和人才网络，丰富的行业经验和敏锐的行业洞察，帮助企业利用认知、AI、云计算等进行数字化重塑，构建具有前瞻性业务模式，帮助企业始终站在业界前沿。

十四五"开局之年 再谈企业架构驱动的数字化转型 →	数字转型六大关键技术指南 →

免费咨询售前顾问或拨打热线 400-669-0581（工作日 9:00 - 17:00） →

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数字化转型重磅报告	数字化转型成功案例	数字化转型核心优势	数字化转型相关服务	联系 IBM	IBM Garage

数据之巅，制胜未来：金融行业数
据中台五大关键成功要素

领先的银行业者纷纷将构建
安全的平台和生态系统作为
首要任务，而这些能力的实
现依赖于高精尖的数字技
术。

立即阅读 →

中国企业碳中和战略选择及实施路
径

企业在实现双碳使命时，需
要"战略先行"。中国企业可
以按照合规、优化、重塑、
引领四个阶段，选择适合自
身的战略，并借助数字科技
的力量，全面系统地实施战
略，实现双碳使命。

立即阅读 →

构建认知型企业- 九大行动领域实现
AI 赋能的企业转型

我们的研究就后疫情时代的
商业格局提出了五个主要观
点，为数字化转型、未来的
工作、透明度以及可持续发
展提供了全新视角。

立即阅读 →

2. 实施信息系统很大可能会失败！

There is a high probability that the implementation of the information system will fail!

不上ERP等死　上了ERP找死

If you don't adopt ERP, you're waiting for death; if you adopt ERP, you're inviting trouble.

Increase the Operational Burden

- Nike adopted i2 Corporation's ERP product, i2-powered, but the user experience was not satisfactory. For example, in the order fulfillment process, Nike's operators had to resolve orders twice, once through the newly implemented management system and once through the old order management system.

- When Nike communicated their concerns to i2 Corporation, i2's consultants didn't see any issues with the i2-powered product or implementation services. They believed the key was for Nike to minimize customization of the system to fit their specific needs and instead adopt best practices in the footwear and apparel industry. They argued that this approach would help reduce the risks and implementation challenges associated with customization activities.

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Project costs have skyrocketed

- To achieve digital transformation, businesses often need to bear high costs, and this investment is not a one-time occurrence because business needs continuously change with external market dynamics. According to statistics from Gartner, the cost required to make a system functional after its initial deployment can be 5-6 times the initial implementation cost.

- For instance, in 2019, there was a collective lawsuit involving Revlon due to the indirect consequence of the high cost of ERP customization. Revlon, a well-known cosmetics company, chose one of the world's top ERP vendors. However, as the ERP project progressed and Revlon's requirements kept changing, the vendor's pricing became increasingly expensive. Unable to bear the escalating costs, Revlon decided to postpone the project, leading to project delays and, ultimately, the non-timely delivery of $64 million worth of products, resulting in a collective lawsuit.

- The U.S. Air Force's Expeditionary Combat Support System (ECSS), based on Oracle, cost $1 billion. It was first deployed in 2005, but by 2012, it had yet to deliver any significant results. The U.S. Air Force estimated that the project would require an additional $1.1 billion to achieve only a quarter of its initial envisioned effectiveness, prompting them to decide to cut their losses.

- In 2014, a permanent subcommittee of the U.S. Senate found that the project had violated many key principles and best practices in information technology acquisition. The committee stated, "The U.S. Air Force lacked a clear objective and organizational commitment to changing internal business processes, which was crucial for integrating ECSS into the organization."

Cause more damage

- In January 2006, seven UK research councils agreed to establish a shared logistics department spanning functions such as human resources, procurement, finance, ICT, and funding. The project also faced troubles over the following decade. Oracle and Fujitsu were responsible for this project. The committee ultimately terminated the contract with Fujitsu, resulting in a cost loss of £13 million. The implementation work was originally scheduled to be completed by December 2009 at a cost of £79 million. By 2011, implementation costs had overshot by 65%, reaching a staggering £130 million.

- In 2011, the UK National Audit Office concluded, "To date, this shared services project has not achieved its main goal, particularly in coordinating back-office functions. Existing evidence suggests that cost savings realized so far have fallen short of the figures estimated in the business case by at least £73 million, and the project's implementation has not represented value for money."

The system is only partially available

- Guangzhou's joint venture company with Peugeot, the Guangzhou Automobile Corporation (GAC), initiated an MRPII project shortly after its establishment. They decided to replicate the mature model of Peugeot in France, which involved an extensive period for system development. Initially, the project progressed rapidly, with the basic infrastructure of the corporate information network established in the first year. By the third year, the MACH7 financial system was completed, and in the fourth year, the Spare Parts Sales Management System (SMS) construction commenced. In just four years, over 40 million French Francs were spent. However, the project later found itself in a state of stagnation, with only the Inventory Management Module (MHF) fully operational among the numerous functional modules, accounting for less than one-tenth of the software's intended capabilities. The project as a whole made little progress.

- The MACH7 financial system only handled functions like voucher entry, posting, reconciliation, and closing, and reports had to be generated manually using microcomputers. The PMS personnel system, strictly speaking, was just a database with only input, modification, and deletion capabilities, lacking even a query function, and reports had to be generated manually.

- Overall, the system that Guangzhou Automobile Corporation spent years developing was far from its initial grand vision. The lengthy development cycle and high associated risks of traditional development methods resulted in a high failure rate.

问题： Questions

- 你知道哪些信息系统失败的案例？What cases of information system failure do you know?

- 你如何理解"不上ERP等死，上了ERP找死"？How to understand "If you don't adopt ERP, you're waiting for death; if you adopt ERP, you're inviting trouble"?

- 在企业内上信息系统可能会存在哪些风险？What are the possible risks of an information system in an enterprise?

2. 信息系统的本质是业务流程再造

The essence of information systems is business process reengineering

1. 从4个案例看信息化建设的本质

The essence of informatization construction is seen from four cases

- 案例1：某高校财务处报销系统信息化建设 Case1: Informatization construction of reimbursement system of financial department of a university

- 案例2：港澳通行证办理信息化系统建设 Case2: Construction of information system for Hong Kong and Macao permits

- 案例3：耐克公司ERP系统 Case3: Nike ERP system

- 案例4：华为IPD削足适履 Case4: Huawei's IPD is sufficiently sized

案例1：信息系统不是"电子化"

Case 1: Information systems are not "electronic"

- 身边的案例：交大财务处 Case study: Finance Office of Jiaotong University
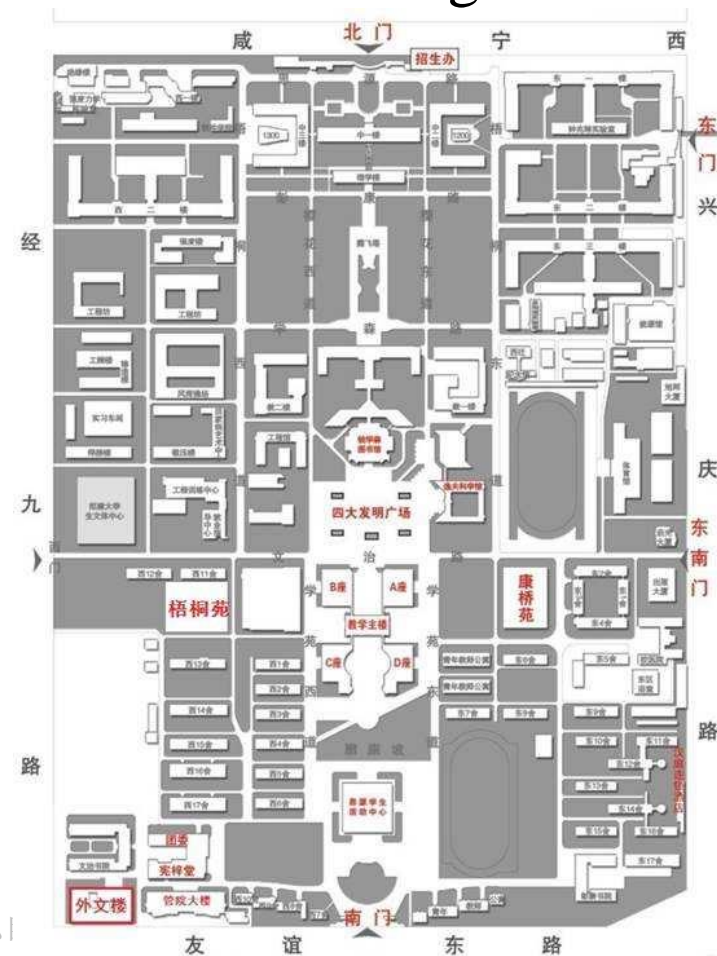
案例2：港澳通行证的办理

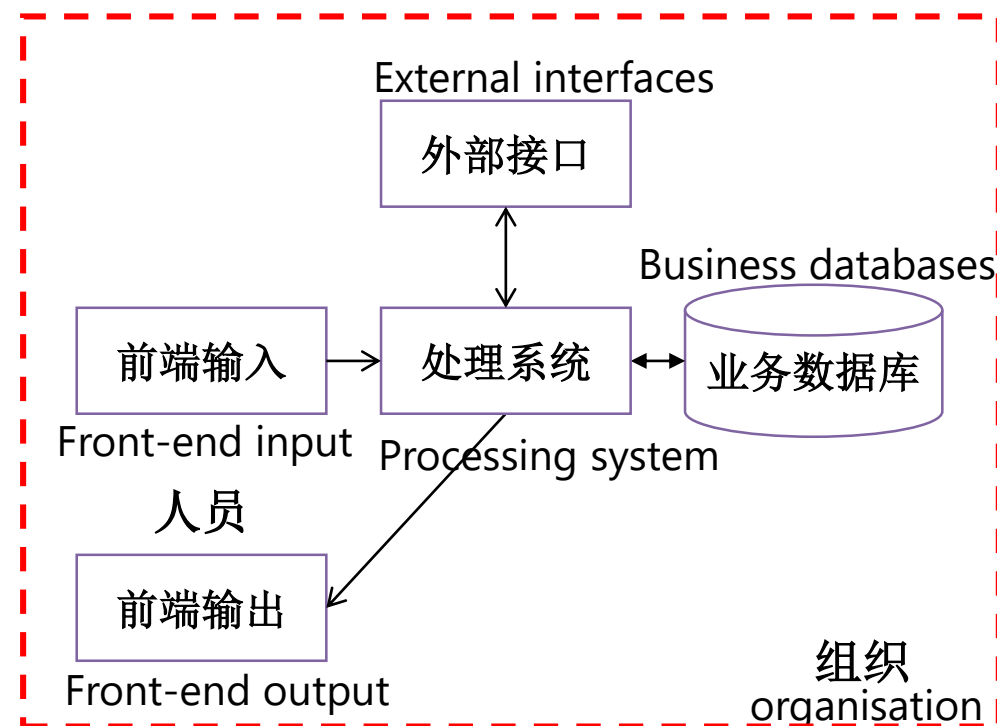Case2: Construction of information system for Hong Kong and Macao permits

- 为什么之前办港澳通行证的证件/签注，需要审批20天以上，而换通行证卡片后，立即就能办好？ Why does it take more than 20 days to apply for a Hong Kong and Macao Permit before and it can be done immediately after replacing the Permit card?

- 这其中发生了什么变革？

    What has changed?

- 问题：有哪些关键点发生了变化？
    What are the key points that have changed?

Streamline the government, delegate power, and improve government services: Let the data run more and let the masses run less errands

- Input: Manual form filling → Personnel input → Card swiping for reading/calling various related information (connectivity with information systems).

- Processing flow (multiple system approvals): Physical document circulation → Electronic document circulation and approvals (multiple systems) → Automated verification and circulation → Input equals approval (change in management mode).

- Output: Certification, printing of paper annotations and pasting → Self-service card printing (card erasure, printing, anti-counterfeiting technology).

External interfaces

外部接口

Business databases

前端输入 → 处理系统 ↔ 业务数据库

Front-end input   Processing system

人员

前端输出

Front-end output

组织
organisation

- 技术变革：防伪卡片擦除及打印、系统连通

 Technological change: anti-counterfeiting card erasure and printing, system connectivity

- 管理变革：审批模式变革

Management Change: Change in the approval model

- 问题：没有技术变革，能否缩短时间？

Question: Can the time be shortened without technological change?
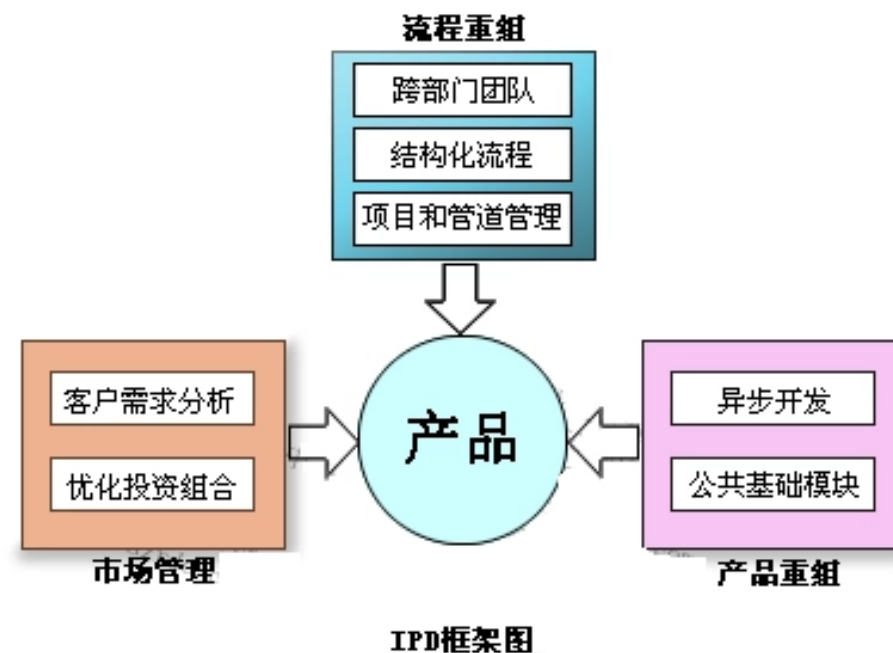
案例3：华为IPD削足适履

- 集成产品开发（Integrated Product Development, 简称IPD）是一套产品开发的模式、理念与方法。

- IPD的思想来源于美国PRTM公司出版的《产品及生命周期优化法》（简称PACE——Product And Cycle-time Excellence）一书。

- 核心思想：产品开发是一种投资

- 三大业务流程：市场管理流程、产品开发流程、技术开发流程

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IPD概念介绍

Case3: Huawei "cut the feet to fit the shoes"

- ntegrated Product Development (IPD) is a set of patterns, concepts, and methods for product development.

- The concept of IPD is derived from the book "Product And Cycle-time Excellence" (PACE) published by the American company PRTM.

- Core idea: Product development is an investment.

- Three major business processes: Market management process, product development process, and technology development process.

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Introduction to the concept IPD
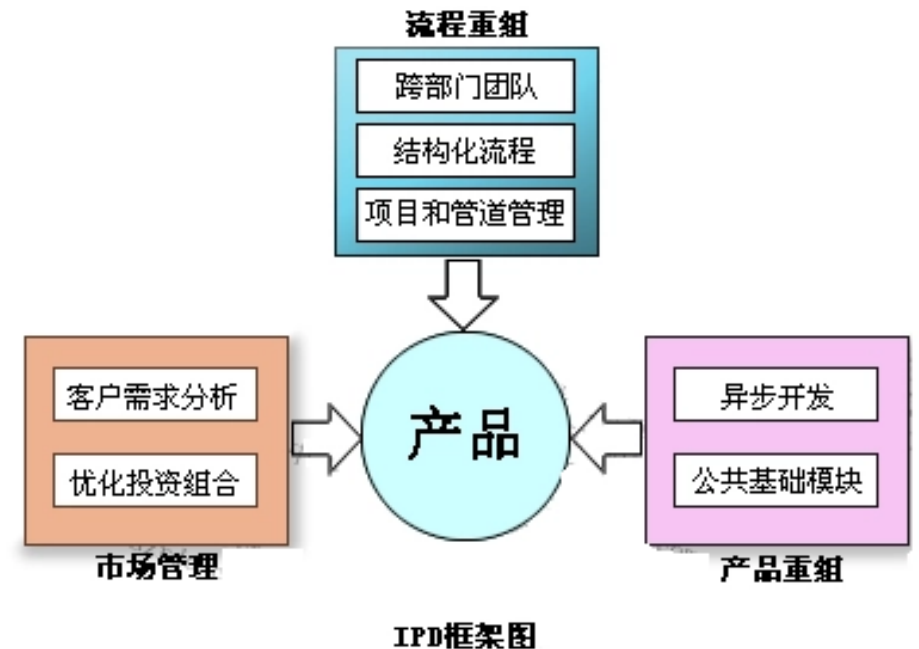
IPD Core Idea

- New product development is an investment decision. IPD emphasizes the need for effective portfolio analysis in product development and setting checkpoints in the development process to determine whether the project should continue, pause, terminate, or change direction through stage reviews.

- Market-based development. IPD underscores that product innovation must be rooted in market demand and competitive analysis. Therefore, IPD starts the process with correctly defining the product concept and market requirements as the first step to ensure that things are done right from the beginning.

- Cross-functional, cross-system collaboration. Utilizing cross-functional Product Development Teams (PDTs) and effective communication, coordination, and decision-making to expedite the product's market launch.

- Asynchronous development mode, also known as concurrent engineering. This involves planning rigorously and precise interface design to advance many subsequent activities, thus reducing the time to market for the product.

- Reusability. Improving product development efficiency by employing Common Building Blocks (CBBs).

- Structured processes. The relative uncertainty of product development projects necessitates finding a balance between unstructured and overly structured development processes.

IBM & IPD

- In 1992, IBM faced severe financial difficulties amidst intense market competition, with stagnant sales revenue and a sharp decline in profits. Through analysis, IBM identified several areas in which they lagged far behind industry best practices, including research and development expenses, R&D loss costs, and time to market for products.

- To regain a competitive edge in the market, IBM proposed the goal of halving the time to market and reducing R&D expenses by half without compromising the outcomes of product development.

- To achieve this objective, IBM was among the pioneers in implementing the Integrated Product Development (IPD) approach. Guided by a framework that incorporated numerous elements of industry best practices, they aimed to shorten time to market, enhance product profitability, efficiently conduct product development, and provide greater value to customers and shareholders through both process and product restructuring.

企业变大之后不得不投入的管理成本
The management costs that have to be invested when the company grows bigger

- IBM公司实施IPD的效果不管在财务指标还是质量指标上得到验证，最显著的改进在于：The effectiveness of IBM's implementation of IPD has been validated in both financial and qualitative indicators, and the most significant improvements are:

  - 产品研发周期显著缩短；The product development cycle is significantly shortened
  - 产品成本降低；Reduced product costs
  - 研发费用占总收入的比率降低，人均产出率大幅提高；
  The ratio of R&D expenses to total income has decreased, and the per capita output rate has increased significantly;
  - 产品质量普遍提高；The quality of the products has generally improved
  - 花费在中途废止项目上的费用明显减少；Significant reductions in the amount of money spent on projects that were scrapped in the middle of the process

Huawei and IBM collaborated on an IT strategy and planning project

- In August 1998, Ren Zhengfei convened a management conference with over a hundred vice presidents and director-level executives, announcing the official launch of Huawei's IT strategy and planning project in collaboration with IBM. This project encompassed eight management transformation initiatives, including IPD (Integrated Product Development), ISC (Integrated Supply Chain), IT system restructuring, and Four Unifications in Finance, among others, required for Huawei's transformation into a world-class enterprise over the next 3-5 years.

- Following Ren Zhengfei's instructions, Huawei's already crowded headquarters made available numerous seaside rooms, renovated them as per IBM's specifications, and procured new office furniture. Everything was done to ensure that when the consultants arrived at Huawei, they would feel as comfortable as they would at IBM.

- According to IBM's pricing, the hourly fees for the 70 consultants ranged from $300 to $680 per hour, depending on their level. Clearly, to complete this 5-year management transformation, Huawei would have to invest at least 2 billion RMB in consulting fees alone.

"Cutting the feet to fit the shoes"

- The IPD transformation required the establishment of cross-functional teams, with departments like marketing, production, and services all participating in the product design phase, making interdepartmental communication the norm.

- For Huawei employees who had long been accustomed to linear work patterns, this parallel way of working was not easy to adapt to. Some employees believed that IPD decreased their work efficiency and even resisted it.

- However, Ren Zhengfei believed that for Huawei to develop, it needed to undergo transformation. Anyone who obstructed the transformation was working against the company's future. In this process, some members of the management were either dismissed or demoted. With Ren Zhengfei's determined push, the transformation persisted and resulted in a significant improvement in product development efficiency.

华为1987—2019年的销售收入和员工数量，及主要变革举措开始时间

- In the face of resistance and opposition from the R&D and marketing departments, on November 16, 1999, during the summary report meeting of the first phase of IPD, Ren Zhengfei firmly stated:

- "We must avoid having illusions of a Chinese version or a Huawei version. When introducing, it needs to first become rigid, and then be optimized, while also being cautious not to become fixed. Over the next two or three years, the main focus should be on understanding and digesting. After two or three years, some improvements will be allowed."

- "IPD is crucial for the company's survival and development. All levels of organizations and departments need to fully recognize its importance. We are here to buy a pair of American shoes. If they don't fit, we'll cut our feet to make them fit."

- During the subsequent IT transformation team meeting, Ren Zhengfei reiterated with seriousness:

- "A size 37 is just a size 37. If your feet are too big, you need to cut off some of your feet to wear them. Those who are unwilling to cut off their feet can go over there and act like a woman with big feet, go do some farming, stand aside."

- "The attitude towards implementing the process should be resolute: those who don't adapt will be laid off, and those who resist will be demoted. IPD needs to be implemented layer by layer. If it can't be carried out successfully, I will hold you accountable. There is no room for ambiguity!"
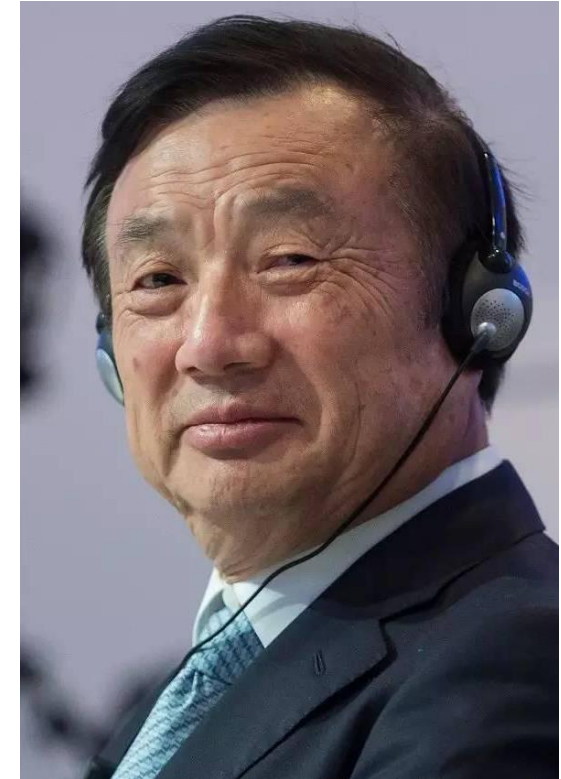
Case 4: Revisiting the case of Nike

- Nike adopted i2 Corporation's ERP product, i2-powered, but the user experience was not pleasant. For example, in the order fulfillment environment, Nike's operators had to resolve orders twice, once through the newly implemented management system and once through the old order management system.

- When Nike provided feedback to i2 Corporation, i2's consultants did not see any issues with the i2-powered product or implementation services. They believed the key was for Nike to minimize customization of the system to fit their specific needs, ideally adopting best practices from the footwear and apparel industry. They argued that only in this way could the customization activities' risks and implementation difficulties be reduced for the project.

2. 信息系统不是简单地将流程搬进电脑

Information systems are not simply moving processes into a computer

- 关键性问题：
  - **信息系统能否提升业务效率？**

  Key Questions: Can information systems improve business efficiency?

- 深层次的问题：Deeper Questions:
  - 信息系统是否改进了业务流程？Does the information system improve business processes?
  - 员工是否愿意使用信息系统？Are employees willing to use information systems?
  - 组织是否因为系统而发生变革？Is the organization changing because of the system?

- 纯谈技术是没有用的。认识不到这些本质的问题，系统就一定会失败！
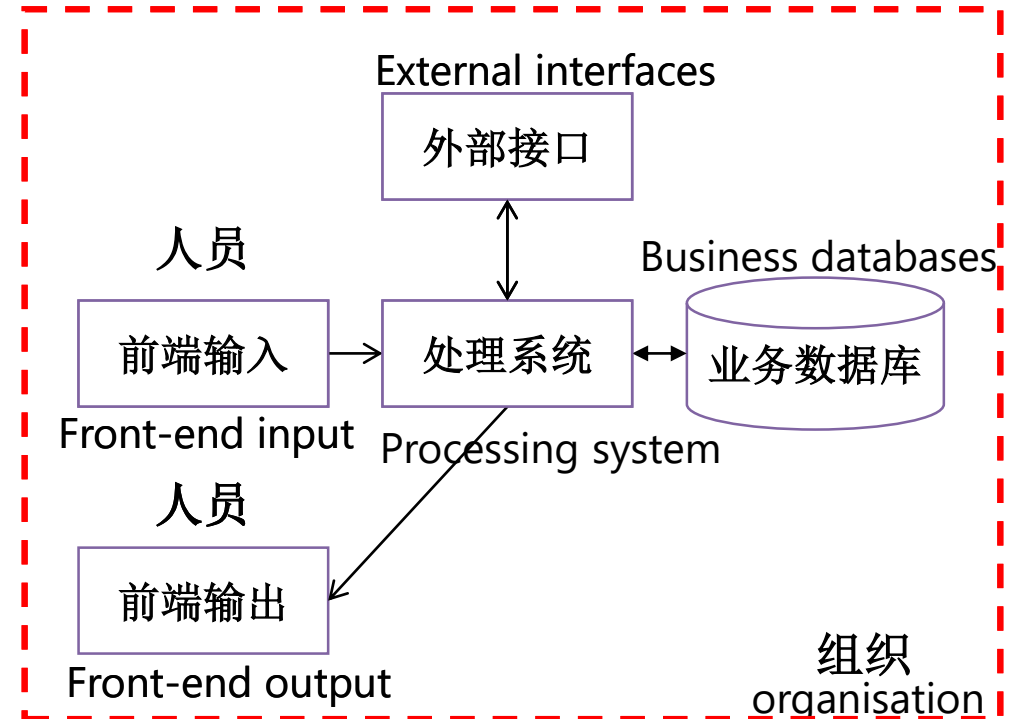
  It's useless to talk purely about technology. If you don't recognize these essential problems, the system will fail!

External interfaces
外部接口

人员

前端输入
Front-end input

处理系统
Processing system

Business databases
业务数据库

人员

前端输出
Front-end output

组织
organisation

定制开发和购买都一样

Custom development and purchase are the same

- **定制开发和购买系统都是业务流程再造！Custom development and purchase systems are all business process reengineering!**

- 你会选择哪一种？核心考虑的因素有哪些？Which one will you choose, and what are the key considerations?

- 信息系统是投资，目的是为了回报。Information systems are investments that are intended to be rewarded.

- 谋定而后动，不是为了信息化而信息化。Planning and then acting, not informatization for the sake of informatization

Customized development of a system

定制开发
一套系统

购买一套
现成系统

Purchase an off-the-shelf system

信息系统的本质

The essence of information systems

- 信息系统表面上看起来是信息技术/计算机系统。 Information systems appear to be information technology/computer systems on the surface.

- 实践过程中看起来像组织成员是否愿意使用信息系统。The practice process looks like whether the members of the organization are willing to use the information system

- **实际上信息系统是组织的管理变革，是管理问题的技术解决方案。In fact, the information system is the management change of the organization and the technical solution to the management problem.**

组织管理
Organizational Management

人员应用
Personnel Use

信息技术

Information Technology
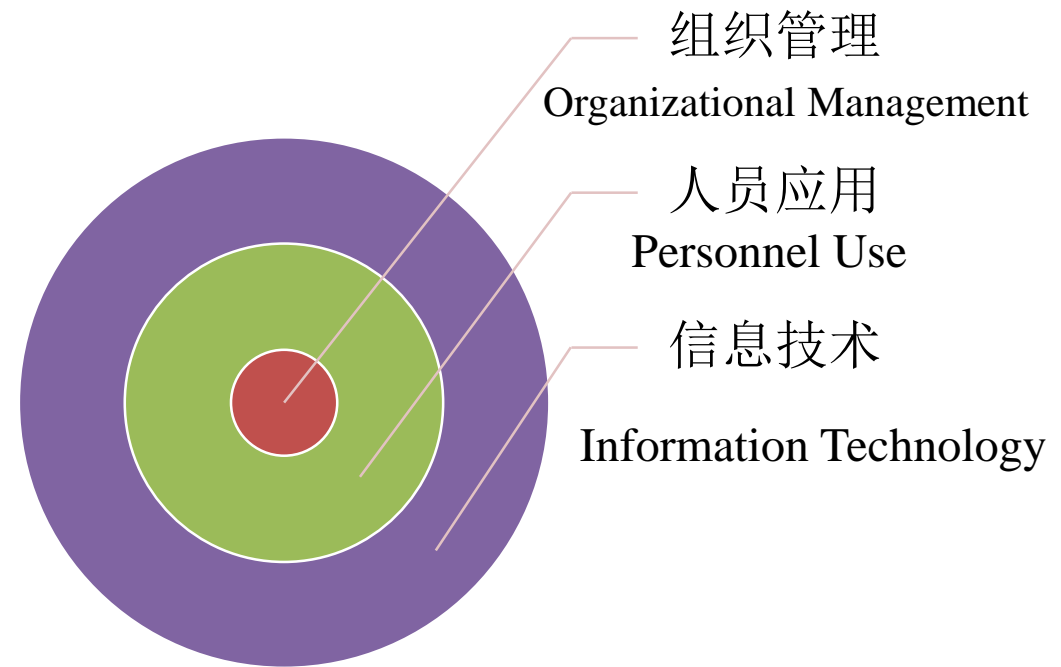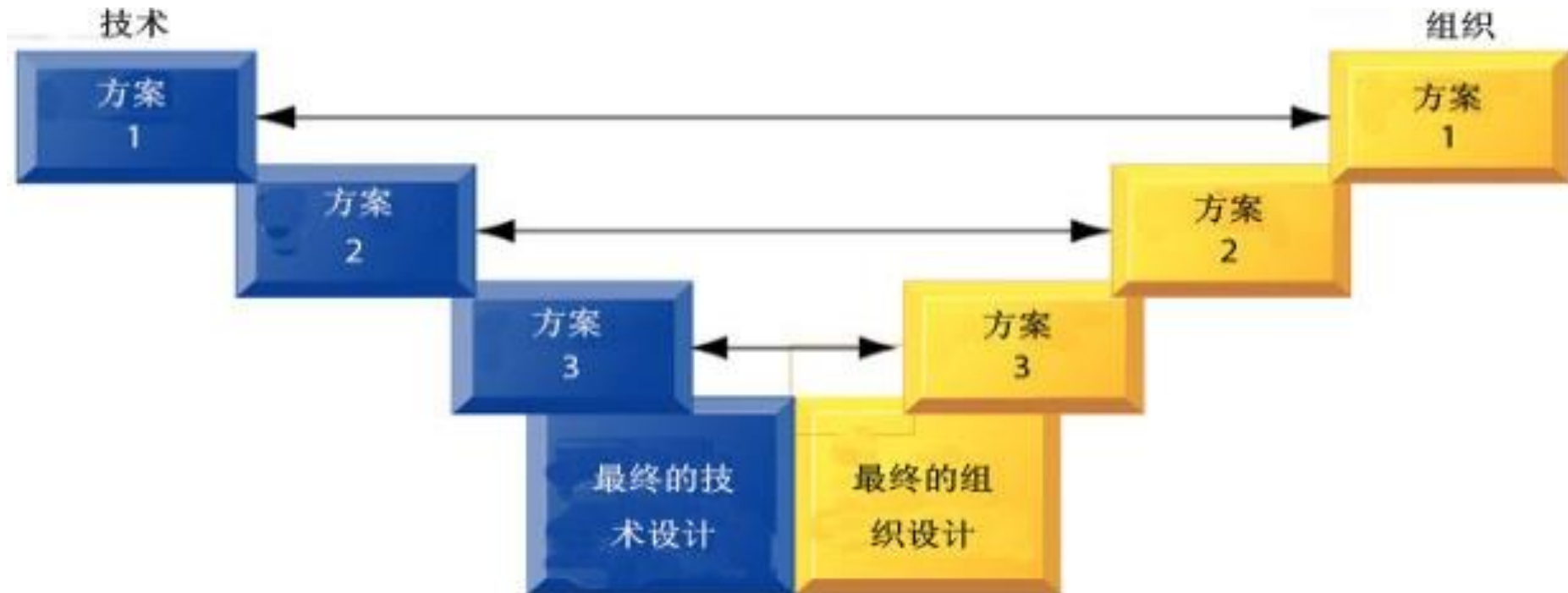
由社会技术面来说，当科技与组织互相调整直到获得令人满意的配合方式时，系统便达到了最完美的成效。
From a socio-technical point of view, the system achieves its most perfect effect when technology and organization adjust each other until a satisfactory way of cooperation is obtained.

3. 如何开展基于信息化的业务流程再造？

How to carry out business process reengineering based on informatization?

1. 社会分工提高劳动效率吗？Does the social division of labor improve labor efficiency?

Does the social division of labor improve labor efficiency?

- Adam Smith: "Division of labor increases labor efficiency."
  - Efficiency is improved at the level of individual tasks.
  - However, not every task begins processing as soon as it is received.
  - Interdependencies result in business processes taking much longer than the actual time needed to complete the tasks (building relationships can speed up the process).
  - Considering the time redundancy at each stage, the overall process takes much longer.
  - Does division of labor lead to reduced efficiency?

- Why is organizational process efficiency low?
  - (1) Interdependencies
  - (2) Statistical fluctuations
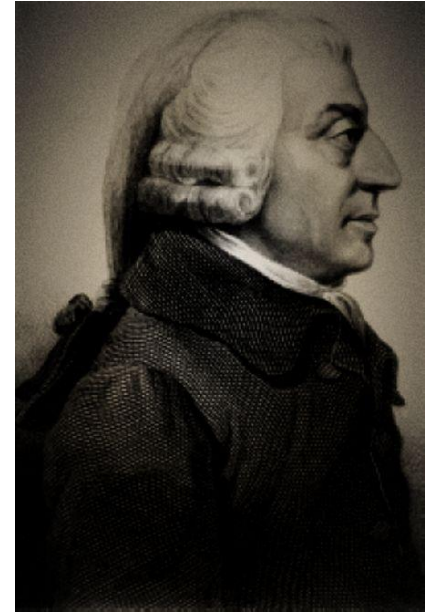
Experiment: Dice - Working hours game

A set of n steps (n windows) for a task, with the waiting time for each window being the result of rolling a random number on a die. The time required for each step can be disregarded. How long do you think your team will take to complete the task? If your team needs to commit to a completion time for the customer, how long will you promise?

输入：今日待
处理工作
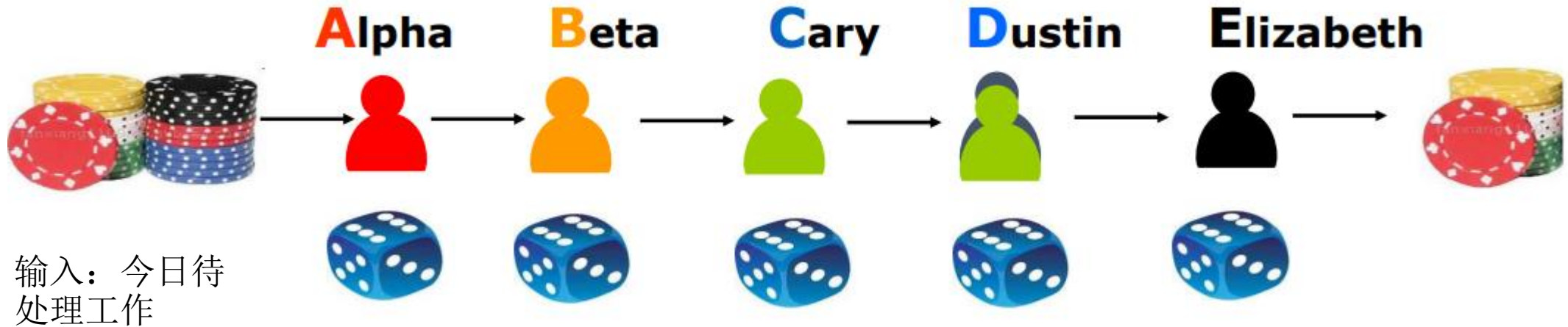
职能型组织结构的缺陷 Deficiencies in the functional organizational structure

- 职能型的组织结构存在难以克服的缺陷 Functional organizational structures have shortcomings that are difficult to overcome
  - 不是追求客户和组织价值最大化，而是部门内部价值最大化 It is not the pursuit of maximizing the value of customers and the organization, but the maximization of value within the department
  - 合作、协作能力差 Poor ability to cooperate and collaborate
  - 部门之间尚未建立起无缝隙的互动机制 There is no seamless interaction between departments
  - 部门界限分明造成了组织流程的割裂 Clearly defined departments have led to fragmentation of organizational processes
- **流程不是为用户设计，而是内部管理所需 Processes are not designed for users, but are required for internal management**
  - **用户适应组织的流程 The process of adapting the user to the organization**
  - **用户办事像"迷途的羔羊" Users act like "lost lambs"**

妳在找這東西嗎？

很多时候，办事像打RPG游戏，要在正确的时间和地点，拿着正确的物品去找NPC，否则就只能再跑一趟。
A lot of times, running errands is like playing an RPG game, you have to find NPCs at the right time and place, with the right items, otherwise you have to run again.

2. 什么是业务流程再造

What is business process reengineering

- 什么是流程再造？ What is business process reengineering?
  - 企业再造（Re-engineering）/企业流程再造（BPR, Business Process Re-engineering）
  - 以工作流程为中心，重新设计企业的经营、管理及运作方式。
    Redesign the way you operate, manage and operate your business with a workflow-centric approach.

- 没有流程管理的企业管理运营状况： Enterprise management operations without process management
- 一般企业正常工作中，有85％的人没有为企业发展创造价值。In the normal work of ordinary enterprises, 85% of people do not create value for the development of enterprises

  - 其中5％的人看不出来是在工作； 5% of them don't see that they are working
  - 25％的人似乎在等待什么； 25% seem to be waiting for something
  - 30％的人只是在为库存而工作（增加库存）； 30% are just working for inventory (increasing inventory);
  - 最后还有25％的人是以低效率的方法和标准在工作。 Finally, 25% of people work with inefficient methods and standards.

  —— Michael Hammer

- The founders of this theory were originally Professor Michael Hammer and James Champy, both associated with the Massachusetts Institute of Technology (MIT).

- "To fundamentally rethink and thoroughly reform business processes in order to make dramatic improvements in the operational benchmarks of modern enterprises, such as cost, quality, service, and speed" is the core idea behind this theory. In other words, it involves "starting over and redesigning."

- The core of business process reengineering is to focus on business processes oriented towards customer satisfaction. The central concept is to break away from the traditional approach of organizing departments by function within a company and instead place business processes at the center. This involves redesigning the company's management processes, comprehensively reevaluating its operational procedures, aiming for global optimization rather than individual optimization.

任何流程都比没有流程强，好流程比坏流程强。

但是即使是好流程也需要改善。

"Any process is better than no process, and a good process is better than a bad process, but even a good process can be made better."

迈克·哈默

Michael Hammer

3. 信息技术驱动的业务流程再造
IT-driven business process reengineering

- 通过信息技术的应用对组织流程进行根本性重新思考并彻底重新设计。Fundamental rethinking and radical redesign of organizational processes through the application of information technology.

- 信息技术与信息系统可以把传统的专业型工作转为流程型工作。Information technology and information systems can transform traditional professional work into process-oriented work.
  - 例如：很多财会类的数据处理 A lot of data processing for accounting purposes

- 基于信息技术的流程自动化与标准化可以缓解流程的统计波动。

- IT-based process automation and standardization can mitigate statistical fluctuations in processes

- 基于个案经理或流程团队的设计可以消除依存关系对流程效率的影响。

- A case manager or process team-based design can eliminate the impact of dependencies on process efficiency.

IT-driven management process reengineering

- Distinguishing between information/data processes and physical processes, information technology transforms physical processes into information/data processes.

- Computing/processing capabilities enable computers to accurately perform a vast amount of work.

- Real-time printing/interaction technology makes interactions faster and more efficient.

- Backend auditing technology supported by big data (human + machine) reduces human resource consumption.

- Database technology collects all relevant information at once when it is generated and provides consistent data for subsequent processes.

业务系统/生产系统Business Systems/Production Systems

信息化 Informatization

```
┌─────────────────────┐
│      外部接口         │
│                     │
│  External Interface │
└─────────────────────┘
```

```
┌──────────────────┐        ┌──────────────┐
│    前端输入        │        │   处理系统     │          ╭──────────╮
│                  │───────▶│              │◀───────▶│  业务数据库 │
│  Front-end Input │        │  Processing  │          │          │
└──────────────────┘        │   Systems    │          │ Business │
┌──────────────────┐        └──────────────┘          │Databases │
│    前端输出        │               │                  ╰──────────╯
│                  │◀──────────────┘
│ Front-end Output │
└──────────────────┘
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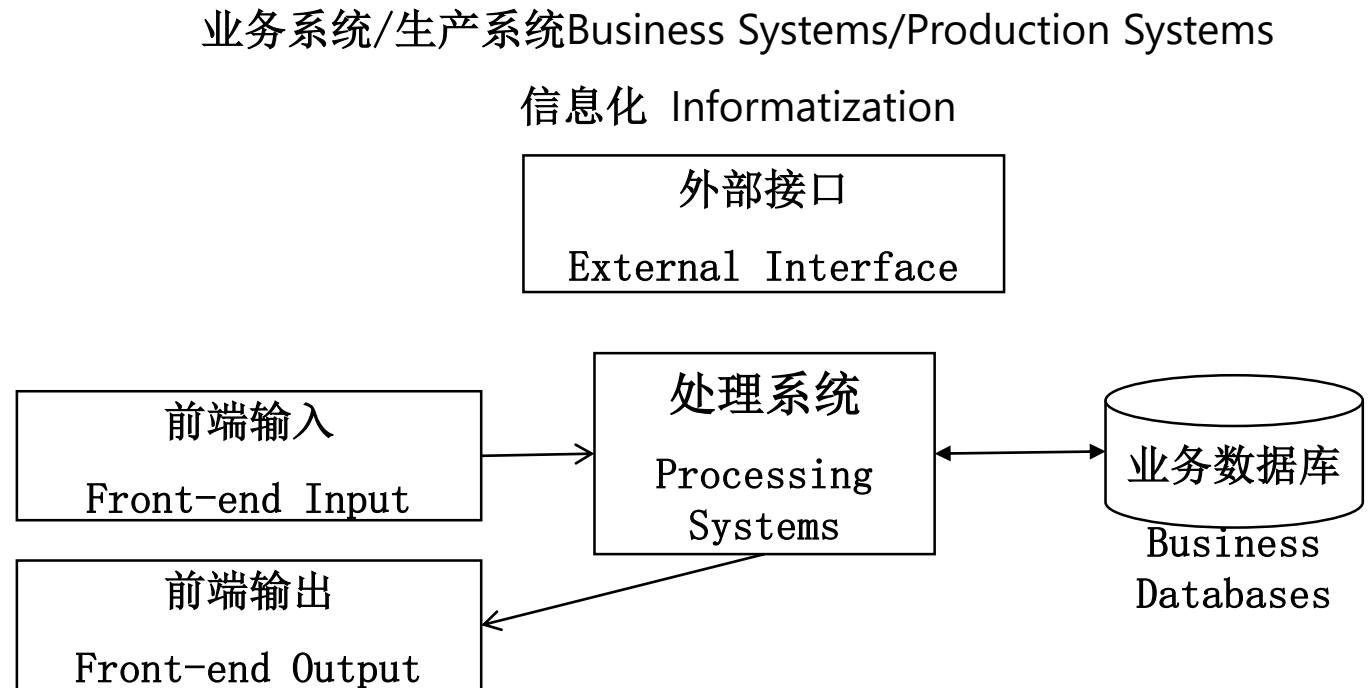
案例：福特的采购管理流程再造

Case in point: Ford's procurement management process reengineering

现状：1980s，Ford财务部门有500+人，而Mazda仅5人

Status: In the 1980s, Ford had 500+ people in the finance department, while Mazda had only 5

目标：减少Ford财务部门人员，降低成本 Object: to reduce the number of people in Ford's finance department and reduce costs

orders
1. 订单

采购部门
Purchasing department

6. 数据对比 Data comparison

2. 订单数据 Order data

4. 发票 invoice

供应商
vendor

财务部门 Finance Department

7. 付款
payment

5. 收货清单
Receipt list

3. 货物
goods

Warehousing sector

仓储部门

Ford
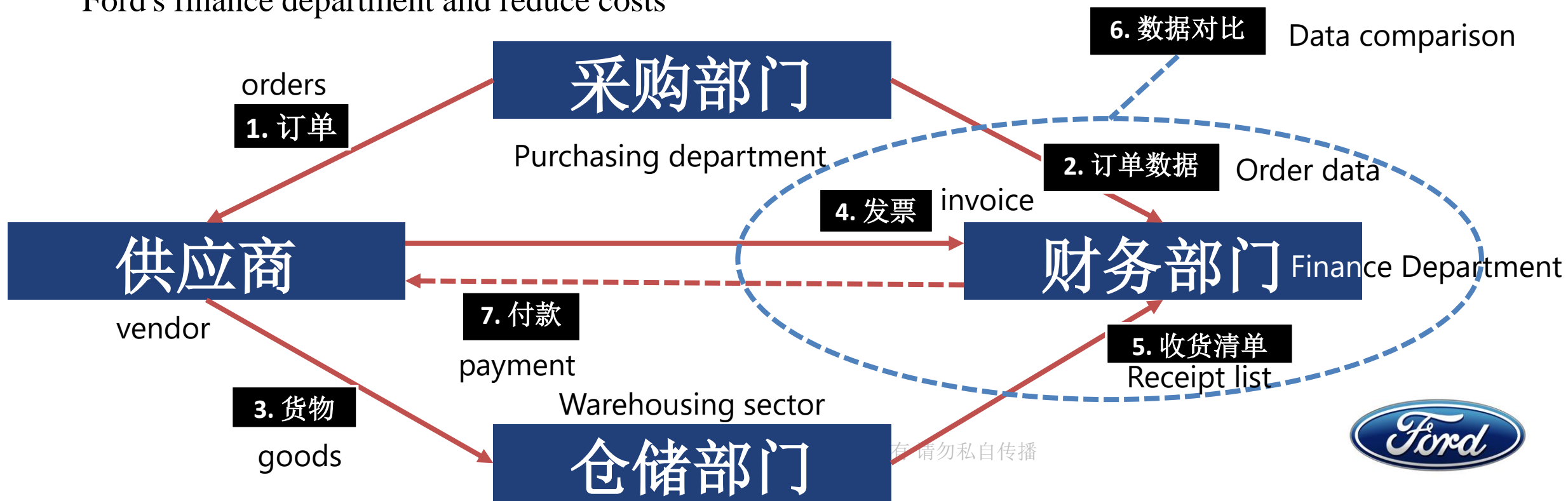
- 再造后的采购管理流程 Procurement management process after reengineering

orders

1. 订单

采购部门

Purchasing department

Order data

2. 订单数据

Online database

6. 查看收货确认

供应商

财务部门

在线数据库

7. 付款

Check the receipt confirmation

vendor

payment

Finance Department

6. 查看收货确认

3. 货物

3. 收货清单

Receipt list

goods

仓储部门

Warehousing sector
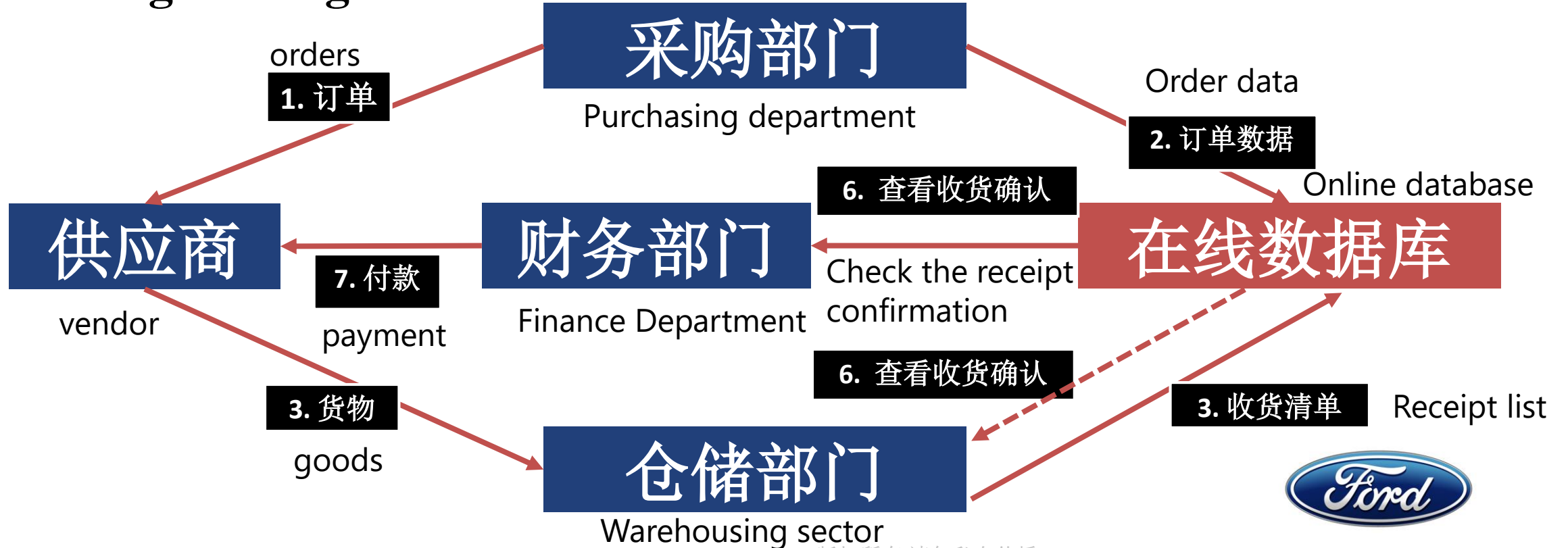
4. 信息系统的内核是管理逻辑

The core of information systems is management logic

信息化系统是管理思想的体现

The information system is the embodiment of management thinking

生产管理系统中的管理思想 Management ideas in the production management system

管理方法 Management Methods	说明 DESCRIPTION
MRPⅡ	Manufacturing Resource Plan 制造资源计划
ERP	Enterprise Resource Plan 企业资源计划
JIT	Just In Time 准时制生产
OPT	Optimized Production Technology 最优化生产技术
Agile	Agile manufacturing 敏捷制造

生产管理系统的发展史

The history of the development of the production management system

MRP

闭环 MRP

MRPII

ERP

ERPII

20世纪60年代

60s of the 20th century

20世纪70年代

70s of the 20th century

20世纪80年代

80s of the 20th century

20世纪90年代

90s of the 20th century

21世纪

21st century

MRP (物料需求计划)　Material Requirements Planning

- R.H. Wilson: The economic batch concept proposed in 1915, along with the method for determining reorder points using statistical methods introduced in 1934, gradually formed the classical production and inventory system.

- To address the limitations of "order point management" and reduce the capital tied up in raw material inventory, in 1965, Joseph A. Orlicky and Oliver W. Wight, among others, introduced a new management concept called Material Requirements Planning (MRP). It involves determining the quantity and order timing of raw materials and components based on product demand and product structure while effectively reducing inventory while ensuring production needs are met.

- MRP during this phase can be defined as: "Using various data such as Master Production Schedule (MPS), Bill of Materials (BOM), Inventory, and Open Orders, material requirements for the future are calculated, and orders are supplemented and modified accordingly."

```
                        ┌─────────────┐
                        │  主生产计划  │
                        │   （MPS）    │
                        └──────┬──────┘
                               │
                               ▼
┌─────────────┐        ┌─────────────┐        ┌─────────────┐
│  物料清单   │───────▶│ 物料需求计划 │◀───────│  库存记录   │
│   （BOM）   │        │   （MRP）    │        │   到货计划  │
└─────────────┘        └──────┬──────┘        └─────────────┘
                               │
                ┌──────────────┴──────────────┐
                ▼                              ▼
        ┌─────────────┐                ┌─────────────┐
        │ 车间作业计划 │                │ 采购供应计划 │
        │   加工单    │                │   采购单    │
        └─────────────┘                └─────────────┘
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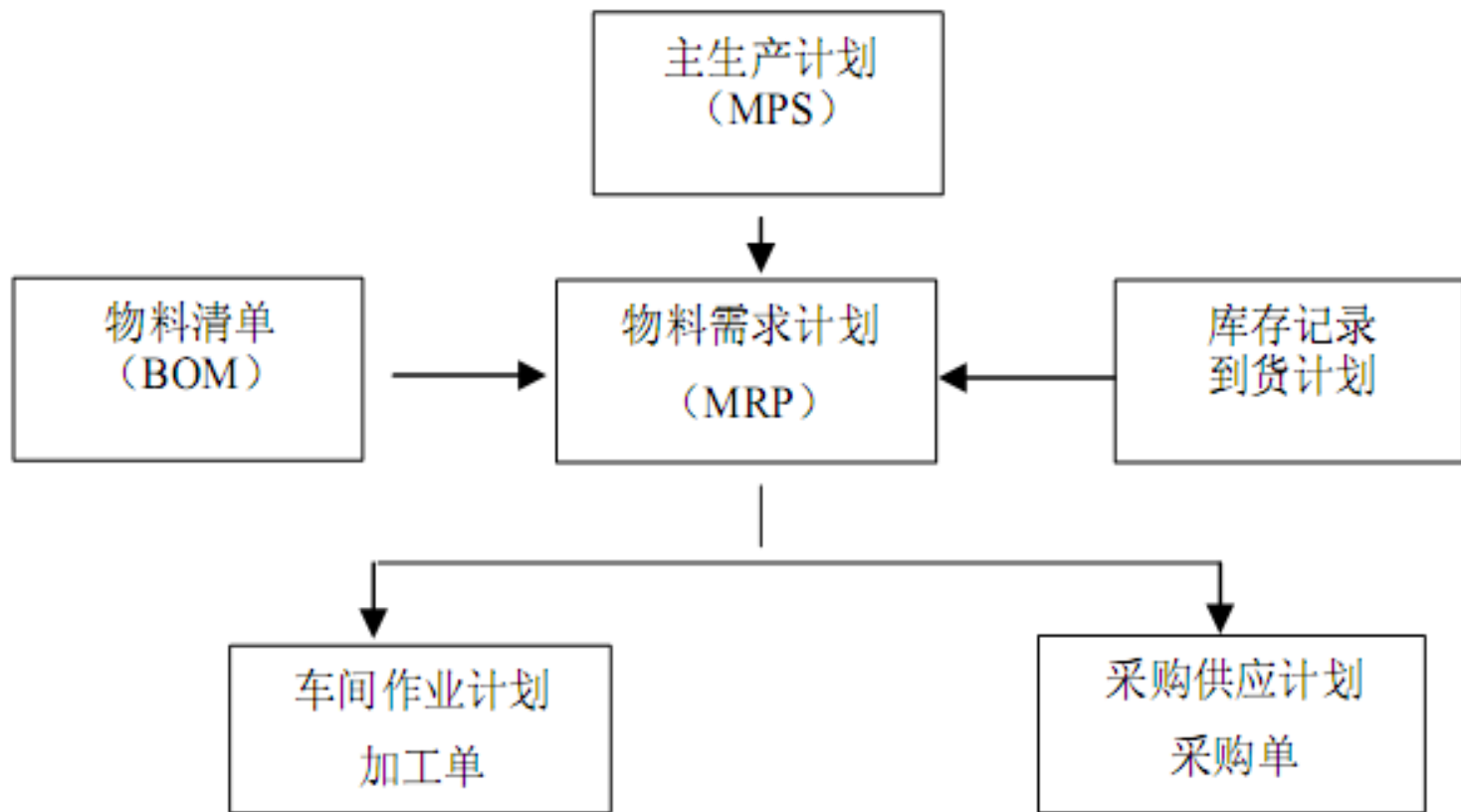
加工计划包括：   采购计划包括：
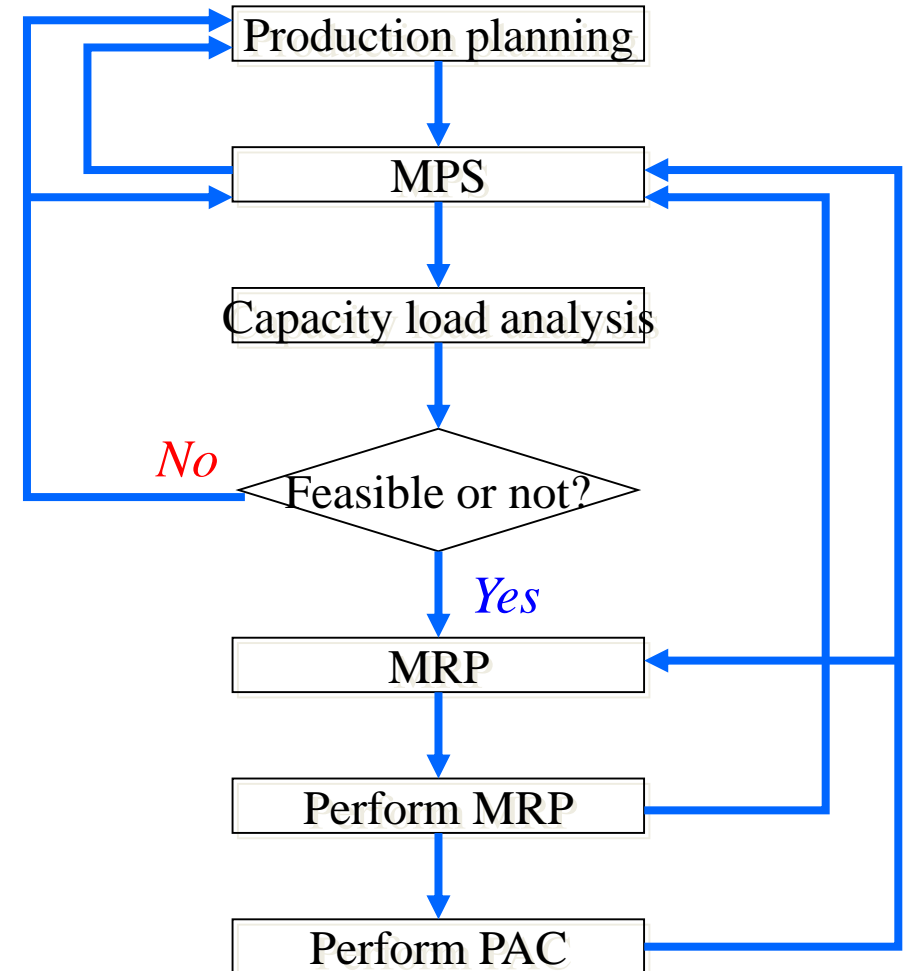 ● 　开始时间和完工时间   ● 　订货需求和到货时间
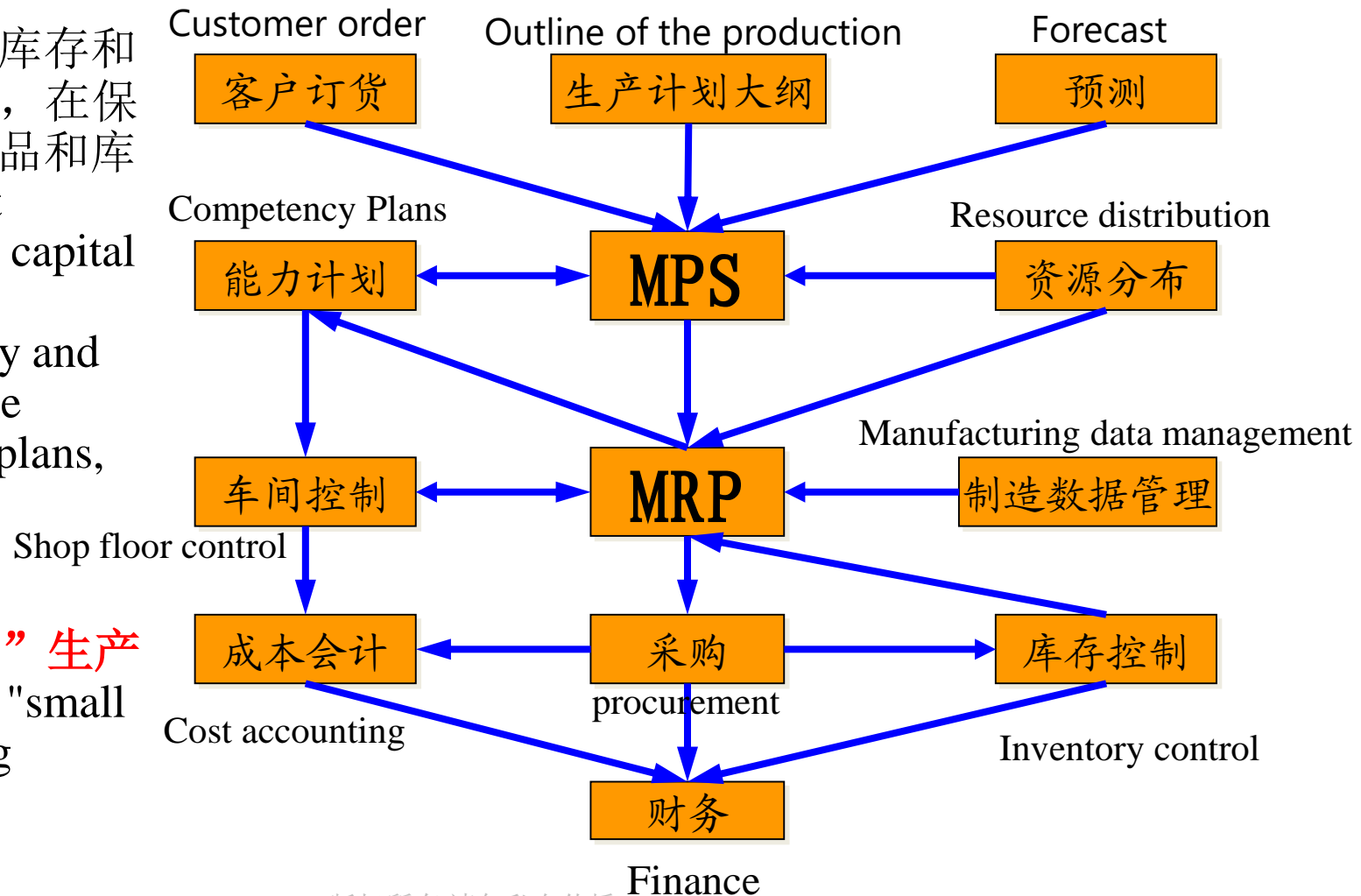 ● 　需求数量   ● 　需求数量

Closed-loop MRP

- 20世纪70年代：针对物料需求计划管理方式的不足，发展了闭环式MRP（Close Loop MRP）70s of the 20th: in view of the shortcomings of the material requirements planning management method, the closed-loop MRP (Close Loop MRP) was developed.

- 与物料需求计划管理方式不同，闭环式MRP强调以下特点：Different from the MRP management method, closed-loop MRP emphasizes the following characteristics:

  - 采用反馈形成闭环控制，使管理能及时适应主生产计划的改变，又能适应现场情况的变化。 Feedback is used to form a closed-loop control, so that the management can adapt to the changes in the main production plan in a timely manner, and can adapt to the changes in the on-site situation.

  - 加强了各系统之间的联系，更进一步体现了管理信息系统的整体性。 Linkages between systems have been strengthened and the integrity of the MI system has been further reflected.

Production planning → MPS → Capacity load analysis → Feasible or not?

No → (back to Production planning / MPS)

Yes → MRP → Perform MRP → Perform PAC

MRPII（制造资源规划）

- MRPII 的管理目标是：通过反馈库存和车间**在制品信息**，制定生产计划，在保证按期供货的前提下，减少在制品和库存的资金占用。 The management objective of MRPII is to reduce the capital occupation of work in process and inventory by feeding back inventory and work-in-progress information on the workshop, formulating production plans, and ensuring on-time delivery.

- MRPII **适用于"小批量、多品种"生产制造企业**。 MRPII. is suitable for "small batch, multi-variety" manufacturing enterprises.

Customer order
客户订货

Outline of the production
生产计划大纲

Forecast
预测

Competency Plans
能力计划

MPS

Resource distribution
资源分布

车间控制

MRP

Manufacturing data management
制造数据管理

Shop floor control

成本会计

采购

库存控制

Cost accounting

procurement

Inventory control

财务

Finance

JIT（准时制生产）

- JIT is a corporate management method represented by Kanban at Toyota Corporation of Japan

- The goal of JIT is to achieve "just in time" production with zero inventory.

|	JIT	MRPII
Exist	Inventory is a disadvantage and should be minimized	Inventory is a resource that is necessary to protect against some uncertainties in the future
Batch	The quantity immediately needed for production	Calculate the batch size with a certain formula
Production lead time	As less as possible	Not strict
WIP inventory	Cancel the waiting queue for processing	It's a need
Vendor	Collaborator	Two contradictory parties
Quality	Zero rejects	Scrap is allowed
Equipment repairs	Planned repairs are expected	Equipment repairs are necessary
Leading time	The shorter, the better	As long as possible
Employee	High quality requirements	accordance with the law

OPT（最优化生产技术）

- Pursue a balance of logistics, not a balance of capabilities.

- The level of utilization of non-bottleneck resources is determined not only by their own potential, but also by some other constraints in the system.

- Production does not always equate to efficient use of resources.

- One hour lost on bottleneck resources equals one hour lost to the entire system.

- It doesn't make much sense to save an hour on non-bottleneck resources.

- The bottleneck determines the output and inventory of the system.

- The transfer lot is not always equal to the processing lot.

- The processing batch size should be variable, not fixed.

- Prioritization is done by considering all the constraints of the system.

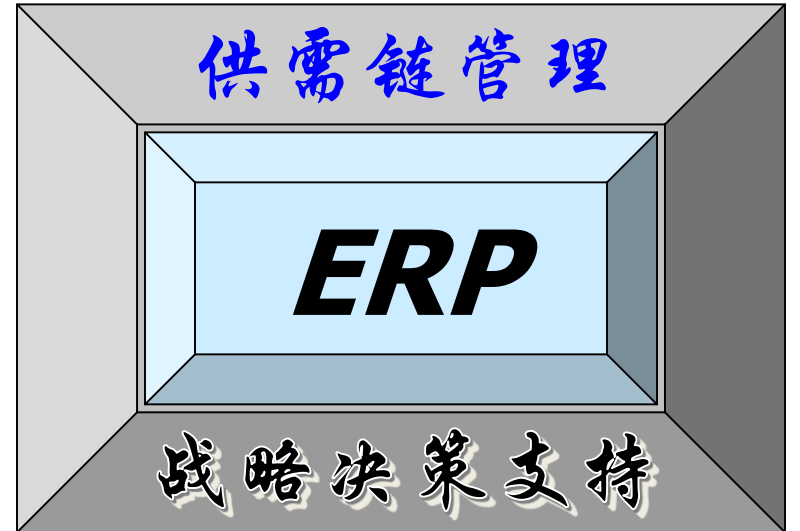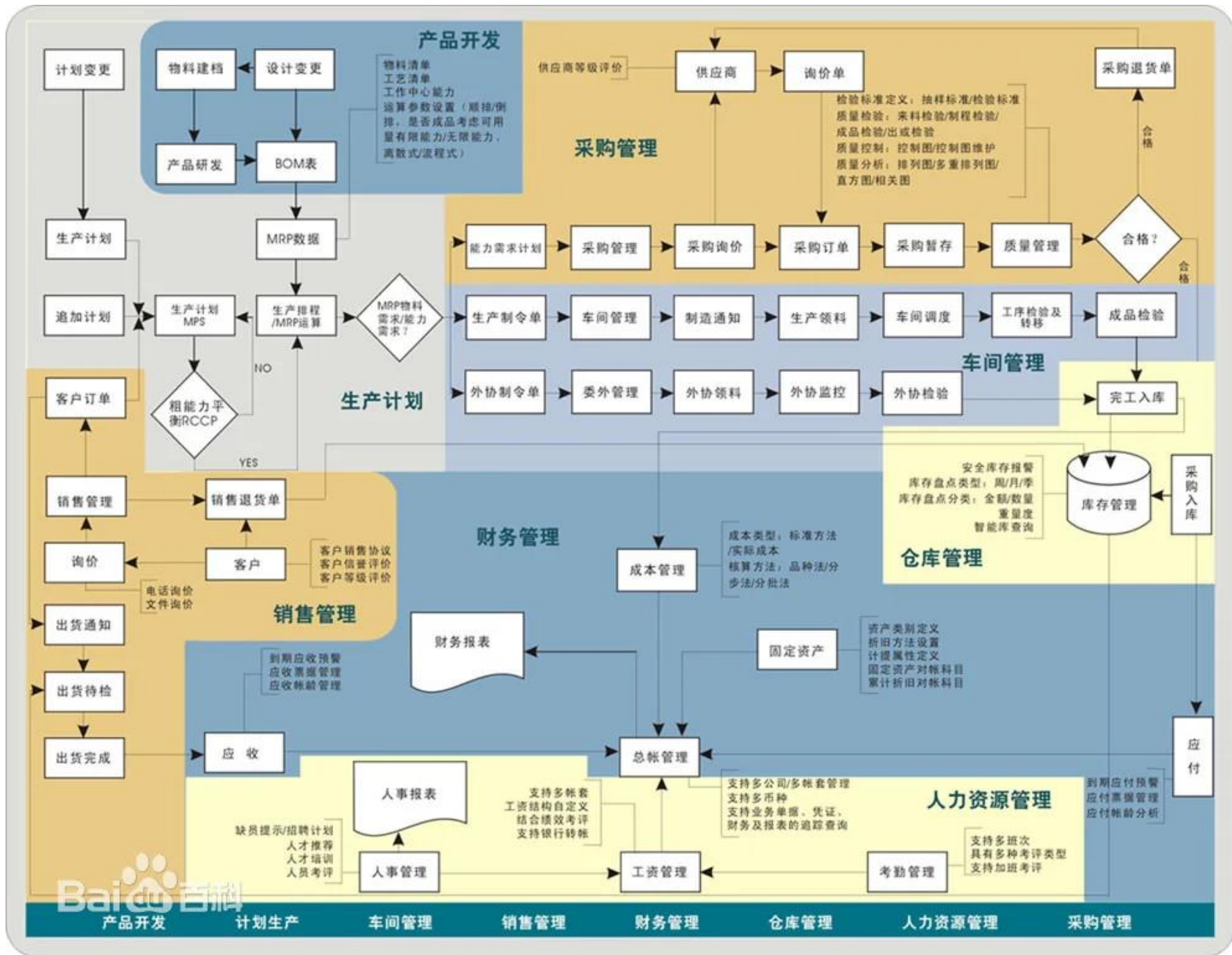| Management thinking	MRPII/JIT	OPT
Focus on the core	Safeguard the operation	Optimize logistics and make the most of resources
Cost factor	Inventory problems formed in order to ensure production capacity	The degree to which the overall logistics of the system is balanced
Implementation measures	Reasonable control of inventory	Optimize bottlenecks in production

Agile（敏捷制造）

- Agile manufacturing, as a manufacturing philosophy, aims to enhance the agility of enterprises, enabling them to promptly meet diverse market demands. As a management concept, its core revolves around maximizing resource utilization through virtual enterprises and fully leveraging fleeting market opportunities.

- The purpose of Agile enterprises is to improve resource utilization and achieve agility in production.

- Agile manufacturing is implemented with the support of three major resource pillars: innovative organizational and management structures, advanced manufacturing technologies (primarily driven by information technology and flexible intelligent technology), and technically knowledgeable management personnel.

- By consolidating flexible production technologies, skilled and knowledgeable labor, and fostering collaboration within and between companies through a shared infrastructure, Agile manufacturing enables rapid responses to swiftly changing market demands and progress. It stands out from other manufacturing approaches due to its heightened responsiveness and agility.
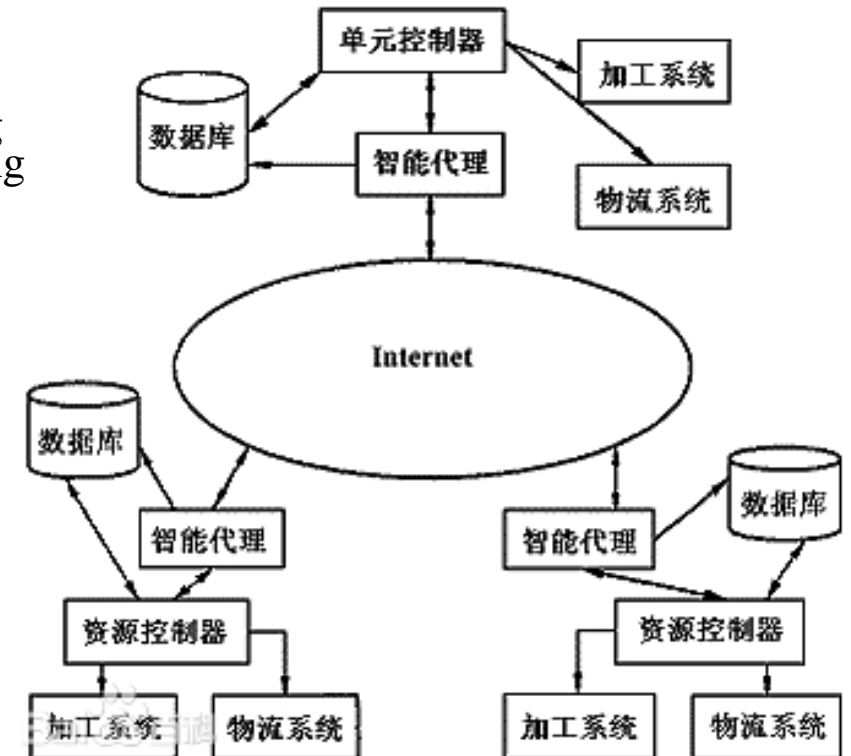
ERP

- ERP是在现代管理技术、计算机技术进步的新技术条件下MRPII发展的结果。 ERP is the result of the development of MRPII under the new technology conditions of modern management technology and computer technology progress.

- ERP突破了MRPII的局限，把供需链内的供应商等外部资源也看做是企业的重要资源集成进系统。ERP breaks through the limitations of MRPII., and integrates external resources such as suppliers in the supply and demand chain as important resources of the enterprise into the system.

- ERP对MRPII作了以下几方面的扩充：ERP has expanded MRPII. in the following ways:

  - 对外延伸：增加了供需链管理和战略决策支持两方面的功能 External extension: The functions of supply and demand chain management and strategic decision support have been added

  - 对内精化：主张以精益方式改造企业生产管理系 Internal refinement: advocate the transformation of enterprise production management system in a lean way
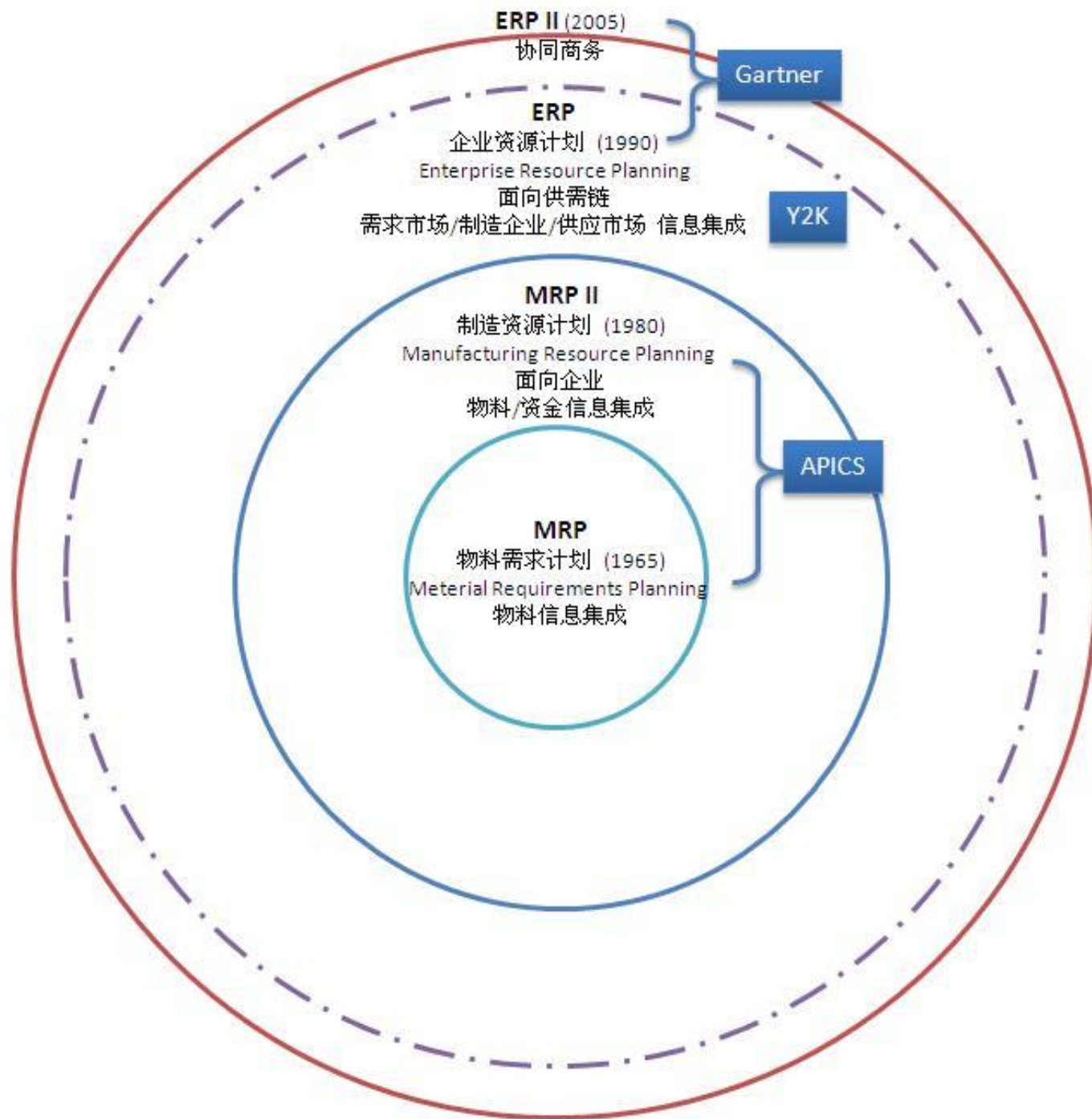
供需链管理

ERP

战略决策支持

ERP系统管理流程图

产品开发
- 计划变更
- 物料建档 → 设计变更
- 产品研发 → BOM表
- 物料清单／工艺清单／工作中心能力／运算参数设置（顺排/倒排、是否成品考虑可用量有限能力/无限能力，离散式/流程式）
- MRP数据

采购管理
- 供应商等级评价 → 供应商 → 询价单 → 采购退货单
- 检验标准定义：抽样标准/检验标准
- 质量检验：来料检验/制程检验/成品检验/出或检验
- 质量控制：控制图/控制图维护
- 质量分析：排列图/多重排列图/直方图/相关图
- 能力需求计划 → 采购管理 → 采购询价 → 采购订单 → 采购暂存 → 质量管理 → 合格？ 合格

生产计划
- 生产计划
- 追加计划
- 生产计划MPS → 生产排程/MRP运算 → MRP物料需求/能力需求？
- 粗能力平衡RCCP
- NO / YES

车间管理
- 生产制令单 → 车间管理 → 制造通知 → 生产领料 → 车间调度 → 工序检验及转移 → 成品检验
- 外协制令单 → 委外管理 → 外协领料 → 外协监控 → 外协检验 → 完工入库

销售管理
- 客户订单
- 销售管理 → 销售退货单
- 询价 ← 客户
- 客户销售协议/客户信誉评价/客户等级评价
- 电话询价/文件询价
- 出货通知
- 出货待检
- 出货完成

财务管理
- 成本管理
- 成本类型：标准方法/实际成本
- 核算方法：品种法/分步法/分批法
- 财务报表
- 固定资产
- 资产类别定义/折旧方法设置/计提属性定义/固定资产对帐科目/累计折旧对帐科目
- 到期应收预警/应收票据管理/应收帐龄管理
- 应收
- 总帐管理
- 支持多公司/多帐套管理/支持多币种/支持业务单据、凭证、财务及报表的追踪查询
- 到期应付预警/应付票据管理/应付帐龄分析
- 应付

仓库管理
- 安全库存报警/库存盘点类型：周/月/季/库存盘点分类：金额/数量/重量度/智能库查询
- 库存管理 ← 采购入库

人力资源管理
- 人事报表
- 缺员提示/招聘计划/人才推荐/人才培训/人员考评
- 人事管理
- 支持多帐套/工资结构自定义/结合绩效考评/支持银行转帐
- 工资管理
- 支持多班次/具有多种考评类型/支持加班考评
- 考勤管理

产品开发　计划生产　车间管理　销售管理　财务管理　仓库管理　人力资源管理　采购管理

ERPII

- ERP II (Enterprise Resource Planning II) is a new concept proposed in 2000 by the American research and consulting firm Gartner Group, building upon the original ERP framework. Gartner defines ERP II as a business strategy and a set of industry-specific application systems that support and optimize collaboration and financial processes within and between enterprises to create value for customers and shareholders.

- To distinguish it from ERP's focus on internal management, Gartner introduces the concept of "Collaborative Commerce" when describing ERP II. Collaborative Commerce (or C-Commerce) refers to the electronic interaction of business processes within a company, between the company and its business partners, and between the company and its customers. To make ERP processes and systems adapt to this change, companies have placed more demands on ERP in terms of processes and external factors, leading to the concept of "ERP II."

ERP II (2005)
协同商务

Gartner

ERP
企业资源计划 (1990)
Enterprise Resource Planning
面向供需链
需求市场/制造企业/供应市场 信息集成

Y2K

MRP II
制造资源计划 (1980)
Manufacturing Resource Planning
面向企业
物料/资金信息集成

APICS

MRP
物料需求计划 (1965)
Meterial Requirements Planning
物料信息集成

讨论 Discussion

- 一个生产企业，是否应当选择最先进的生产制造系统，如ERPII？

Should a manufacturer choose a state-of-the-art manufacturing system, such as ERPII?

- 采购一套生产制造管理系统可能会带来什么问题？

What problems may arise from purchasing a manufacturing management system?

- 如果生产制造系统不适合企业实际情况，该怎么办？

What if the manufacturing system is not suitable for the actual situation of the enterprise?

5. 信息系统最终要和人打交道

Information systems ultimately deal with people

1. Theories of Information Systems Applications

- Game theory, also known as game theory and game theory, is not only a new branch of modern mathematics, but also an important discipline of operations research.

- Game theory is a mathematical theory and method that studies the interaction between formulaic incentive structures, and is a mathematical theory and method for studying phenomena with the nature of struggle or competition. Game theory considers the predictive and actual behaviors of individuals in a game and studies their optimization strategies. Biologists use game theory to understand and predict certain outcomes of evolutionary theory.

- Cost-benefit analysis:
  - Cost: learning cost, vested interest, uncertainty cost
  - Benefits: The organization is running more efficiently (maybe more pay?)

技术接受模型
Technology Acceptance Model

- Technology Acceptance Model (TAM)
  - Davis, F. D. (1985). <u>A technology acceptance model for empirically testing new end-user information systems: Theory and results,</u> Massachusetts Institute of Technology.
  - Davis, F. D. (1989). "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology." <u>MIS Quarterly</u> **13**(3): 319-340.

Source: http://arnetminer.org/person/fred-d-davis-374349.html
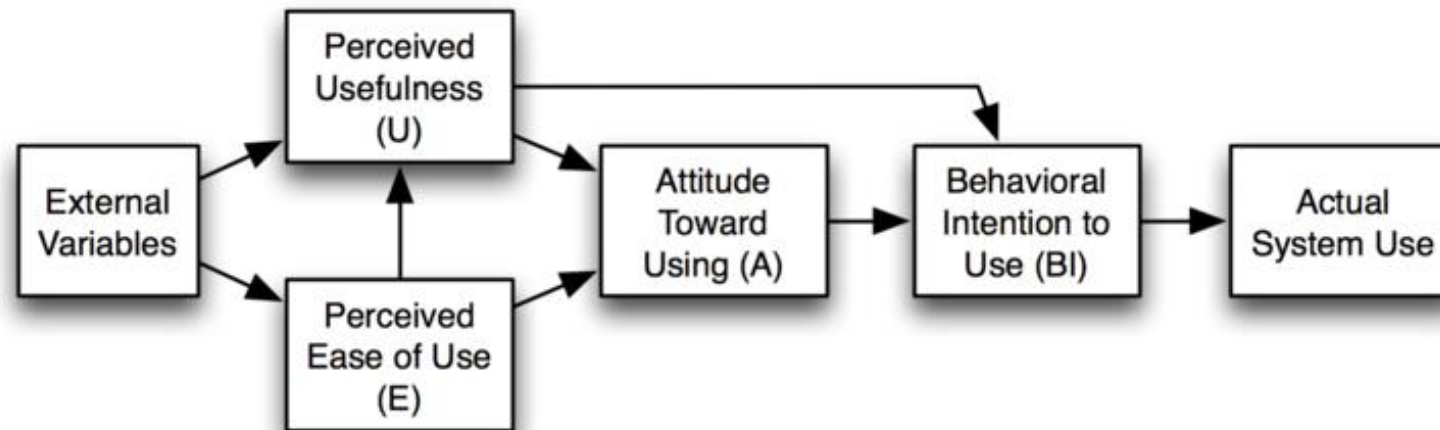
2. Knowledge-sharing platform

- Knowledge sharing, as the name suggests, is the act of sharing and delivering valuable information between people through various communication methods. Compared with other means of production, knowledge information does not have exclusivity and will not be lost in the exchange process, but it can be continuously accumulated, superimposed and iterated in the process of sharing and transmission, so as to complete the infinite replication and dissemination of marginal cost tends to zero and realize value-added.

- Classification: External, Internal

- Examples: Society – Zhihu, Douban, Bilibili;

Internally

- Knowledge sharing within the enterprise is to share and communicate the knowledge within the enterprise in a certain way, disseminate the information that employees already know in various departments, release the value of the intangible assets of the enterprise in the enterprise, improve the work efficiency of employees, and help employees complete their work better and faster

为什么要知识共享？
Why Knowledge Sharing?

- 知识是一种资源 Knowledge is a resource

- 知识能够产生知识 Knowledge begets knowledge

- 一旦创造出来，知识就可以被连接、共享、存储，并在未来重新情境化被进一步的利用。

Once created, knowledge can be connected, shared, stored, and recontextualized in the future for further use

- 具体而言，在企业内部进行知识共享可以：Specifically, knowledge sharing within an enterprise can:

1、增强员工所在领域的专业技能 Enhance the professional skills of employees in their field

2、有助于员工职业发展 Contribute to the career development of employees

3、促进部门间沟通交流：很多情况下，公司团队都是孤岛工作，由于每个小组无法了解其他小组的运作方式，需要部门间合作时变得格外困难，通过更好了解组织和每个团队的贡献，释放新的工作潜力，打破孤岛局面。Facilitate inter-departmental communication: In many cases, corporate teams work in silos, making it particularly difficult to collaborate between departments because each team does not understand how the other groups operate, so unlock new work potential and break down silos by better understanding the organization and each team's contributions.

What are the difficulties in knowledge sharing?

- Less contribution: public goods;

- Difficult to manage: Knowledge (resource) contributions must be managed at different levels of the organization, and if not properly managed, it is easy to stifle the generation of new knowledge.

- Specifically, there are four aspects involved:

(1) Human analysis, the subject of knowledge sharing. Human nature determines that people tend to do things that are beneficial to themselves; knowledge sharing will break the monopoly of knowledge; the process of knowledge exchange, sharing and learning itself is easily limited.

(2) The object of knowledge sharing - the analysis of knowledge. Under the conditions of the new economy, knowledge has become a resource that can bring benefits and benefits. In order for knowledge as capital and private property to be fully shared, sufficient incentives are needed; Tacit knowledge exists in people's minds, including values, ways of thinking, experience, vision, etc., which is not easy to be recognized, not easy to measure its value, and its characteristics limit its large-scale accumulation and dissemination.

(3) Knowledge Management Fact-Facter – Analysis of the Organization. Too many organizational levels will lead to poor channels for knowledge exchange and sharing, slow information transmission and serious information distortion, etc., the lack of organizational culture construction will affect knowledge sharing, and the design of organizational incentive system will affect knowledge sharing.

(4) Tools for knowledge sharing – analysis of knowledge management techniques. Through the establishment of a knowledge base, the application of search engine, collaborative filtering, intelligent agent, expert system and other advanced knowledge management technology. Through interconnection, it can greatly facilitate the exchange and sharing of knowledge between employees across time and space. This has certain requirements for the material and technical foundation, computer network and communication system of the enterprise.

Reference：http://www.360doc.com/content/06/0925/14/7579_216133.shtml

企业内部的知识共享难在哪儿？
What is the difficulty in sharing knowledge within the enterprise?

- 一方面，当企业内部竞争过于激烈时，员工出于对自身利益的保护，会把知识作为个人的资产与竞争优势，设置分享壁垒；

On the one hand, when the internal competition is too fierce, employees will take knowledge as their personal asset and competitive advantage to protect their own interests, and set up sharing barriers.

- 另一方面，组织进行分享并非毫不费力，智力、体力与情绪的消耗，意味着它不是简单的信息输出，更是分享者与参与者交流、碰撞，校验、丰富与更新知识的过程，还包括对于彼此既有认知的推翻与重组。行业内的代理、零售企业中，此类阻力可想而知。

On the other hand, it is not effortless for organizations to share, and the consumption of intellectual, physical and emotional means that it is not a simple output of information, but also a process of communication, collision, verification, enrichment and updating of knowledge between sharers and participants, as well as the overthrow and reorganization of each other's existing cognitions. Among the agents and retail enterprises in the industry, such resistance can be imagined.

3. 钱不是万能的
Money is not everything

我们的研究： Our research:
Yuewen Liu*, Juan Feng* (2021) Does Money Talk? The Impact of Monetary Incentives on User-Generated Content Contributions. Information Systems Research 32(2):394-409.

完***包

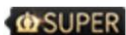★★★★★

听说到了北洋也不好找线索。果然是找到了一张他小时候的照片。眸光瞬间变得柔软。

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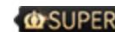Reward the review text and images:
对评论文字和图片进行奖励：（某水乳品牌）

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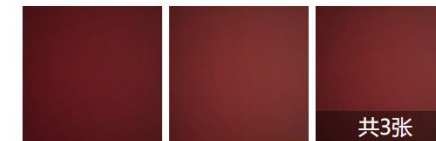SUPER

★★★★★

在用着还行希望宝宝喜欢

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SUPER

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哦哦哦哦哦哦哦哦哦哦哦哦

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论文下载链接

商业实践1：Infosys Technologies

- A global software services company based in India.

- "An IT company like ours can not survive if we don't have mechanism store use the knowledge that we create…." Learn once, use anywhere" is our motto. The vision is that every instance of learning with in Infosys should be available to every employee."

Infosys Technologies

In the early 1990s, Infosys began to transform employee knowledge into a resource for the entire organization (see the summary plan in Table 1). In 1992, Infosys encouraged employees to document their work experiences in written form, covering various topics including technology and software development, as well as life and behavior in foreign cultures. These experiential knowledge pieces, known as Body of Knowledge (BOKs), were then shared among all employees in hard-copy format. This initiative represented one of Infosys' early efforts to systematically capture the knowledge generated by employees as a natural byproduct of their daily work.

Table 1. Knowledge Management Initiatives at Infosys Technologies

Year	KM Initiatives
Since 1980s	• Employees hired for learnability, not just for technical knowledge.
1992	• Bodies of knowledge (BOKs) initiative launched.
1996-97	• Corporate intranet (Sparsh) launched. • Technical bulletin boards, BOKs and repositories offered through Sparsh. • CMM Level 4 certification attained.
1998	• People Knowledge Map implemented on Sparsh.
1999	• CMM Level 5 certification attained. • Central KM group chartered. • Company-wide KM program launched with emphasis on web/repository based approach.
2000-01	• Central knowledge portal (KShop) launched. • Customization tools for KShop entry pages offered; Local repositories integrated with KShop; corporate data made available on KShop. • Knowledge currency units (KCU) incentive scheme launched to jumpstart contributions to KShop. • Forms and project templates changed to enable knowledge extraction using automated tools.
2002	• Modified KCU incentive scheme implemented. • Project tracking tool implemented on KShop. • KM Prime and Knowledge Champion roles instituted. • Initiative to promote story telling and accounts of war games launched.

Intended and Unintended Consequences

- These measures began to yield results, especially after the introduction of the KCU incentive system. For instance, within the first year of implementing the KCU program, over 2,400 new knowledge assets, including project proposals, case studies, and reusable software code, were contributed to Kshop (the sharing platform). Nearly 20% of Infosys employees had contributed at least one knowledge asset. The KM group generated 130,000 KCUs (Knowledge Contribution Units, points that can be converted into currency) and distributed them to employees who contributed and were responsible for reviewing the quality of submissions.

- As these events unfolded, the KM group started to question whether the KCU incentive scheme might be too successful. One issue was related to information overload among employees, resulting in particularly high search costs for reusable knowledge.

- If there is information overload and limited quality, the opportunity to obtain useful information decreases over time. For instance, if someone searches the sharing platform, retrieves three documents, spends 2 to 3 days reading them, only to find them unhelpful, they might start to question the value of the knowledge-sharing platform, considering it a waste of time. Some employees complained that they found it faster and more effective to ask people they knew for help when working on tasks, rather than searching within the knowledge-sharing platform.

6. 信息化是一把手工程

Informatization is the first hand project

如何理解 信息系统是一把手工程？

How to understand "Informatization is the first hand" project

- 项目投资决策权在"一把手" The decision-making power of project investment is the "first hand"

- 业务流程再造的决策权在"一把手" The decision-making power of business process reengineering is the "first hand"

- 业务流程再造的推动者是"一把手" The promoter of business process reengineering is the "first hand"
  - 打破个人既得利益 Break down personal vested interests
  - 部门之间的协调和联动 Coordination and linkage between departments

- 系统应用的推动者是"一把手" The promoter of system application is the "first hand"
  - 系统的应用与个人的利益挂钩 The application of the system is linked to the interests of individuals

- 一把手的理解与支持是项目成功的必须因素 The understanding and support of the "first hand" is a necessary factor for the success of the project

管理信息系统的难度，

不亚于浴火重生。

伟大的背后都是苦难

——罗曼·罗兰

The difficulty of managing information systems is no less than being reborn from the ashes.

谢谢！

Thank you for your attention.

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