

e-Business

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This book is a work in progress and it is revised weekly.
Your feedback and suggestions are invited and welcomed
as they are important part of the revision process.
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Contents

CONTENTS

Book Jacket



Abstract

This book attempts to introduce undergraduate students to the nature and requirements for conducting business online. It starts with a discussion of the nature of business and the challenges and potential of the online environment, followed by a review of common methods of modelling business, and a study of open source business solutions. The final chapter focuses on emerging trends and sea-changes in e-Business. This book is currently a work in progress that is also comparing the process of book writing in both LeanPub markdown and Rstudio Bookdown

About the Author

Robert Batzinger is an emeritus instructor in Computer Science at Payap University. He holds an undergraduate degree in Organic Chemistry, masters degree in Computer Science and Applied Mathematics, doctoral degree in Pathobiology and post-doctoral training in Chemical carcinogenesis. As such, he has been involved in numerous scientific and technical projects for over 50 years. He has published laboratory research in such fields as virology, organic chemistry, anthelmithics, and chemical mutagenesis. He also developed software to manage the financial and academic records of schools, support the development of publications in non-Roman scripts of Asia and Canada, and monitor the progress of multiple development projects. He has held administrative and advisory roles in various organizations and businesses, and has been instrumental in establishing web presence for many of them. He is currently developing data science and machine learning applications to address critical business management problems.

Front Matter



Dedication

Now to him who is able to do far more abundantly than all that we ask or think, according to the power at work within us.

– Eph 3:20 (ESV)

ขอให้พระเกี้ยรติมีแด่พระองค์ผู้ทรงสามารถทำทุกสิ่งได้
มากยิ่งกว่าที่เราทูลขอหรือคิด โดยถูกฐานจาก
ที่ทำกิจอยู่ภายในเรา
– เอเฟซัส 3:20 (THSV11)

Acknowledgements

The development of this book would not have been possible without the feedback and suggestions of colleagues and students. While I acknowledge that I am responsible for any remaining errors in this book, my students, referees, and readers have contributed immensely to the development of this book. I would like to acknowledge the impact of Ms. Phatnaree Srisomphan in helping to shape both the curriculum of this course and the nature of this book. I am also grateful for the support and encouragement of my wife Khajohn, especially in those long critical sessions when I was struggling to forge and edit the text of this manuscript.

Colophon

The cover is a photograph of the Financial District from the Marina Bay in Singapore. The amazing metamorphosis of this central business district from swamp land into a thriving financial center of the Region is representative of the current sea-changes in business driven by technological and social developments. Similarly, today's developers of business systems are sowing seeds that will change the future, much like Sir Raffles' vision for a seaport has grown into today's Singapore.

While early drafts of this book were written in Leanpub Flavored Markdown, this book was developed in RStudio using the **bookdown** package (?) (which was built on top of R Markdown and **knitr** (?). It was edited in RStudio and later compiled and published online simultaneously as an HTML website, a printable document in PDF and electronic book EPUB format with only 3 clicks of the mouse.

The cover, front matter, and Chapter 4 photos were downloaded from Pixabay. The extra reading, discussion and exercise sidebar icons were created by Freepik and used as per Creative Commons 3.0 License. Network and flow diagrams were created with yEd from yWorks. (?)

Preface

Advances and developments in Computer Science (CS) are driven by the need to create applications that effectively address real-world problems. Successful software development starts with a deep understanding of the problem domain from the users perspective and developing an application that is intuitive and easy to use. Breakthroughs in understanding the nature of a problem domain create new opportunities for addressing the needs of computer users. It is now common practice to integrate end users into software development and testing teams, as the resulting products tend to be more intuitive and successful.

In CS, our graduates will go on to develop applications and solutions for clients who, for the most part, have not studied CS, but who are experts in other problem domains. Courses that help students to explore and understand the basic issues in other problem domains are at the heart of our liberal arts education which balances professional skills with general knowledge needed to function effectively in the market place. As a part of this effort to introduce CS students to e-Business from a Business/IT perspective, we offer a course with the following course description. It is taught in Thai using English-based resources.

CS340 ชุรุกิจอิเล็กทรอนิกส์: หลักการการดำเนินธุรกิจโดยใช้สื่ออิเล็กทรอนิกส์ การวางแผนทรัพยากรขององค์กร การบริหารความสัมพันธ์ลูกค้า และการสื่อสารผ่านโซเชียลมีเดียทั้งภายในและภายนอกองค์กร

CS340 E-BUSINESS: Principles of business operations using information technology. This includes a discussion of Enterprise Resource Planning (ERP), Customer Relationship Management (CRM) and the use of social media to communicate both within and outside the organization.

This book is the product of that course and started as a collection of class slides, notes, and exercises. The content of this book continues to evolve in response to student feedback as well as changes in the software industry and conversations with business leaders and software developers. The basic design of this book is meant to parallel the outline of the corresponding course, as given below:

Chapter 1: General principles. A discussion of the key principles that define and characterize business both in the real world and in cyberspace.

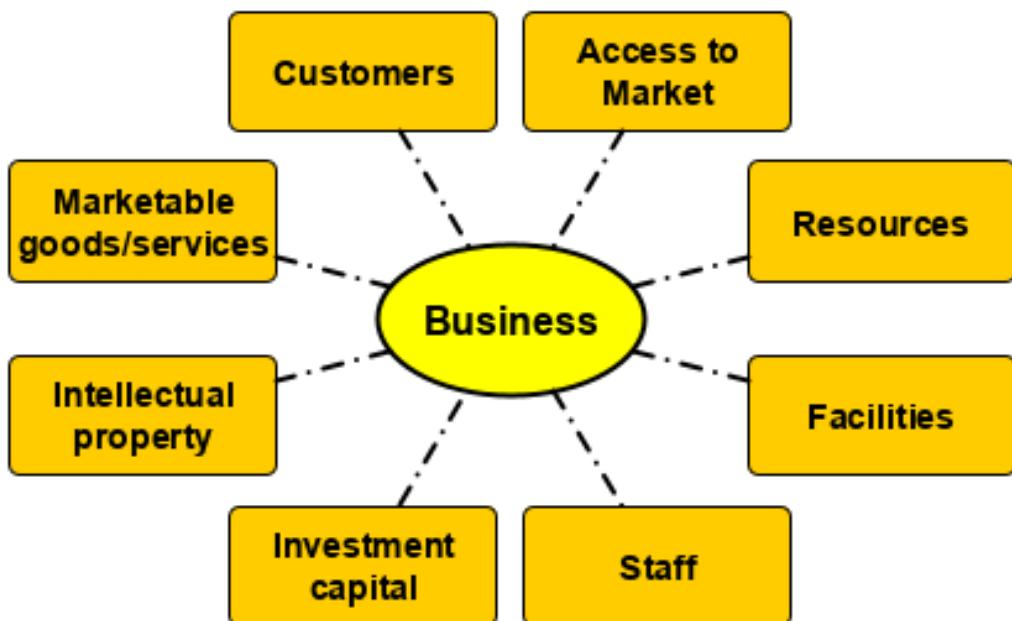
Chapter 2: Business modeling. A discussion of leading methods used to create software models of the key transactions and activities that take place in business in general and in e-business in particular.

Chapter 3: e-Business systems. A survey of the concepts and functions of key open-source, online business systems. Each system is studied to determine how solutions are provided by addressing mission-critical questions using available data resources.

Chapter 4: Emerging Technologies. A discussion of futuristic e-Business technologies and practices that have already had an impact on how business is conducted worldwide.

Chapter 1

GENERAL PRINCIPLES



As an introduction to the context surrounding e-Business, this chapter will explore the nature, need and management of business processes and components.

1.1 Essentials of Business

Business is a set of interactions in which goods and services are provided and compensation is rendered. In essence, businesses developing the means for acquiring marketable goods or services that customers will purchase in sufficient qualities to make the endeavor worthwhile. Ideally, a start-up aims to seek fair compensation for goods and services rendered in the most effective and efficient manner. Businesses become sustainable when the compensation meets the short-term and long-term requirements of the business. Most business fail because of an inability to develop and maintain a market demand that leads to sales that meet or exceed their expenses. Balancing the demands and requirements of each component of business requires timely management decisions based on accurate information. As the speed and volume of businesses grow within the global economy, rapid communication and acknowledgement of detailed information has given rise to many e-Business practices and applications designed to support the operation and growth of business. This book will attempt to explore the context and use of common e-Business techniques and applications. The following sections will help to describe the context of IT services within a modern large scale enterprise, particularly those operating in Thailand.



Exercise: The Nature of Business

Discuss how the following premises would impact the nature, as well as the potential for long-term success of businesses.

1. Business is all about making lots and lots of money quickly by any means possible.
2. Business is about fair compensation for goods and service to both suppliers and customers.
3. Business is the process of copying the industry leaders to provide similar goods and services at a fraction of the cost.
4. Business provides special opportunities for myself, my friends and relatives at the expense of our customers.

1.1.1 Business processes

Individual businesses are generally centered around a core set of goods and services which address the specific needs of clients creating a sense of value and desire. Good design and pre-market testing help to define the nature of the products and services. At the same time, controlling production and distribution costs make it possible to deliver goods and services at a suitable price point for customers to consider purchase. Careful supply chain and operations management develops a network of contracts and business transactions with suppliers and distributors that ensures that the flow of materials, products and cash occur on time and on budget.



Exercise: Match market principles to market characteristics

Principles	Characteristics
(A) Access to market	____ Consumer preference
(B) Brand recognition	____ Supply of raw materials
(C) Customer pool	____ Distinctive goods and services
(D) Investment capital	____ Investors and stock holders
(E) Resources	____ Location and traffic
(F) Market value	____ Steady market demand

1.1.2 Core Activities of a Business

Business requires coordinated teamwork of specialists in various departments to achieve efficiency and effectiveness on a large scale.

- **Finance:** mid-term and long-range financial planning to ensure that there is an adequate supply of money available to

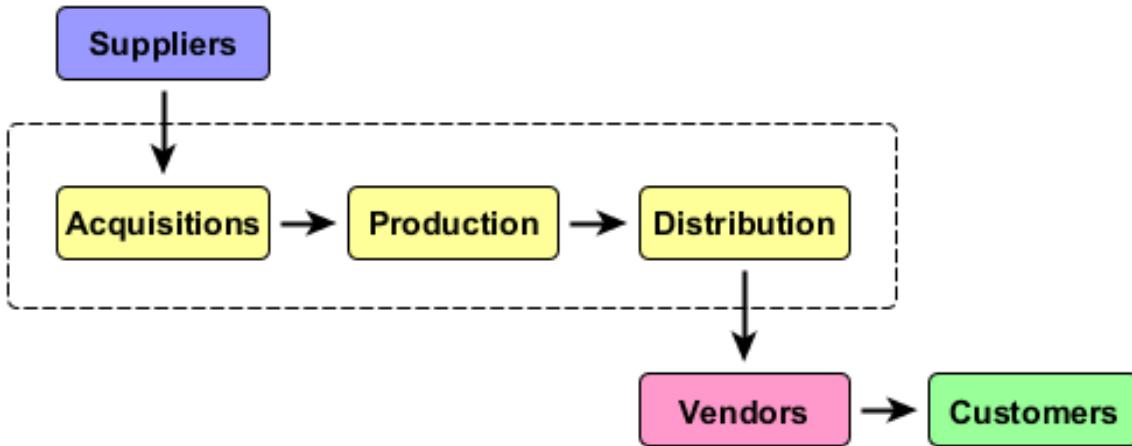


Figure 1.1: Key Business Processes

- **Accounting:** a record of financial commitments and compensations for the purpose of tracking movement of value across the organization and throughout the production process
- **Marketing:** getting groups of potential customers and consumers interested in products and services.
- **Sales:** selling products and services to customers maintain records to assist forecasting future demand and market growth
- **Operations:** systems to acquire resources, produce, package and deliver products
- **Management:** sets the direction and pace of business endeavors

1.1.3 Support functions

As businesses grow in size, various support functions are required to keep the core business running. These functions include the following:

- **Management Information Systems:** collect, analyze and distribute mission-critical information to key administrators
- **Human Resources:** attract, hire, train and retain effective employees
- **Legal Department:** ensure compliance with laws and regulations
- **Investor Relations:** communications with shareholders to attract support and investments
- **Customer Relations:** after sales care of customers and encouragement of brand loyalty
- **Facilities Management:** maintenance of facilities and equipment to maximize the utility and value of capital investments in equipment and infrastructure.



Exercise: Key business concepts

Create a mindmap that illustrates the relationship between the following sets of terms, along with their Thai translations.

- **Key business components:** Access to market; Resources; Value; Investment capital; Marketable goods and services; Customers
- **Core business activities:** Finance; Accounting; Marketing; Sales; Operations; Management.
- **Support functions:** Management information systems; Human resources; Legal department; Investor relations; Customer relations; Facilities management

1.2 Understanding the role of IT in business

As IT Departments become integrated into the business strategy, they provide tools, information and communication systems that can play a transformative role in the nature of the business. Enterprise Architecture tend to grow as IT Department move along these evolutionary steps. (?), (?)

1.2.1 The Establishment of an IT Department

1. Understand the business strategy
2. Translate into an IT strategy
3. Create transparency for IT developments
4. Define IT target picture
5. Define the roadmap for implementing IT
6. Harmonize and govern
7. Obtain feedback and refine
8. Coach and mentor

Among IT Managers, there appears to be 2 major approaches to understanding the nature of business and IT's function: using IT to redesign the business or engineering the current organization. The political implications of the approach chosen can be immense and often the success of an IT manager will depend on the level of support from those that manage the IT department manager.

Architecting the Business	Reverse-Engineering the Organization
* Identification of growth areas	* Divisions and business lines
Profitability of goods and services	* Group level vs divisions
Geographic/demographic opportunities	* Reportings lines
Geopolitical aspects	* Matrix organizations
Acquisitions and divestitures	* Hidden org chart/loyalties

1.2.2 Business views of the role of IT

Business managers have 4 main approaches to managing IT based on the main focus of the business administration.

Focus	Role	Reports to	Common strategy	Levers
Cost of IT	Cost Center	CFO	Outsource IT	Cost cutting
Return on investment	Asset	COO	Harmonize / Rationalize	Economies of scale
Business value of IT	Partner	CDO	Insource IT	Economies of Efficiency
Speed / innovation	Enabler	CEO	IT = business	Economies of Speed

IT Strategy provides a road map of where IT developments and operations are going. This is derived from an understanding of the nature of the business and is not restricted by current realities. The IT strategy is as much a definition of what IT intends to do as well as what it will not do. Above all, an effective IT Business strategy does not conform to a vendor's product road map. However, successful strategies must recognize the IT Operating Model that the business gives to IT. (?)

IT Operating Models

Integration	Minimal Standards	Highly Standardized
High	Coordination	Unification

Integration	Minimal Standards	Highly Standardized
	<ul style="list-style-type: none"> * Unique business units * Examples: Merrill Lynch, Toyota * Key IT capability: <ul style="list-style-type: none"> - access to shared data - standard technology interfaces 	<ul style="list-style-type: none"> * Single business with global standards * Examples: Delta Airlines, Pepsi * Key IT capability: <ul style="list-style-type: none"> - enterprise systems to reinforce standards - provide access to global data
Low	<p>Diversification</p> <ul style="list-style-type: none"> * Independent business units * different customers/expertise * Examples: Johnson & Johnson, GE * Key IT capability: <ul style="list-style-type: none"> - provide economies of scale - do not limit independence 	<p>Replication</p> <ul style="list-style-type: none"> * Independent but similar business units * Example: Marriott, CEMEX * Key IT capability: <ul style="list-style-type: none"> - provide standard infrastructure and app - maximize global efficiencies

1.2.3 Software to facilitate business interactions

As a business grows, so does the complexity of the interactions between its departments. There is a complex web of interactions within a modern business organization. Management focuses on the control, operation, and development of a business. Financiers use investments to maximize opportunities to grow the business. Production engineers tune the processes needed to deliver products, But the key concern for IT is the nature and volume of information to be analyzed, shared and communicated in a timely fashion, as shown in the following diagram:

Even with over 50 years of intensive development to reduce the complexity of doing business, new software tools and apps are still emerging at an astounding rate. The following sidebars attempt to classify common software systems found in medium to large size enterprises into 2 basic types of business systems.

- **Enterprise Resource Planning (ERP):** data systems that store and communicate operational data in a way facilitates reporting and future planning.
- **Enterprise Resource Management (ERM):** software systems that facilitate the monitor and manage interaction and the use of resources.

1.3 Essentials of Business Quality Management

Businesses are driven by an active communication chain that drives the business process. The effectiveness of teamwork and management depends on effective communication. However, the communication chain can be interrupted by bottlenecks in the flow of data, inconsistent or misleading reporting, and other communication breakdowns. Quality standards help ensure that processes related to production and quality control are subject to timely, data-driven management. In essence the ability of a business to fix a problem depends on the quality of communications that provide access to the description of the true nature and extend of the problem and knowledge of possible remedies.

Meaningful communication requires a reciprocal interaction between the speaker and the listener. As shown in the following table, social norms and good ethicite depend on transmission of a message and an appropriate response. The communication chain is lost when messages in either direction are lost or

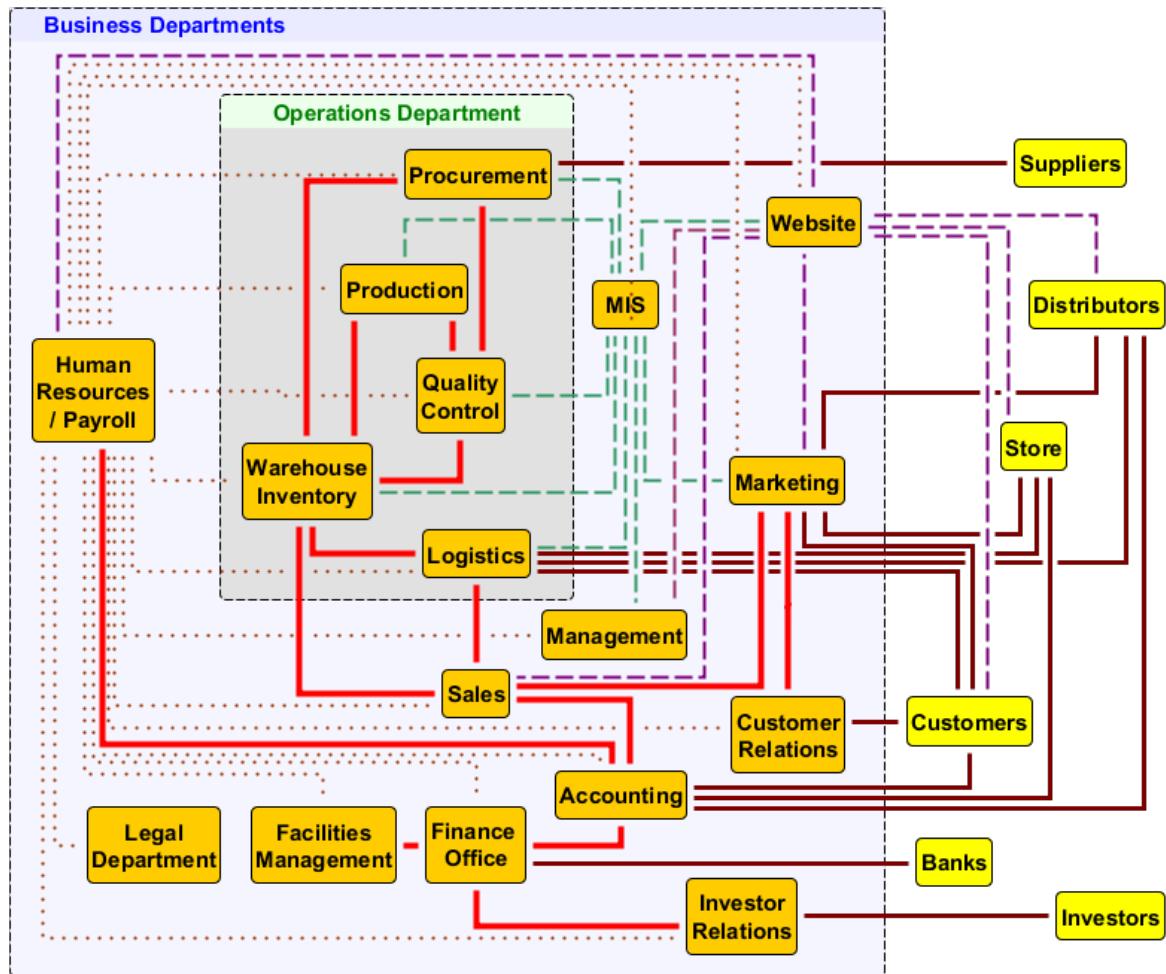


Figure 1.2: Interactions between business departments

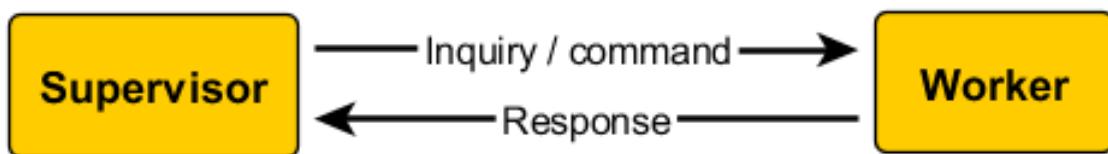


Figure 1.3: Communication Chain

ERP Software Systems



- **CONTENT MANAGEMENT SYSTEM (CMS):**
 - Collections of guides, rulebooks, forms, and procedure guidelines
 - Blogs, newsletter, announcements
 - Catalogues, price lists
 - Documentation of intellectual property and licenses
- **PRODUCT INFORMATION MANAGEMENT (PIM):**
 - Manual, troubleshooting guides
 - Parts list, equivalences
 - Price lists and stock inventory
 - Photos and promotional materials
- **Accounting Information System (AIS):**
 - Revenue: cash inflow (sales)
 - Expenditure: cash outflow (payroll, equipment)
 - Conversion: work-in-progress transactions (raw material, precursor inventory)
 - Administrative: reporting (income statement, balance sheet, cash flows)

CRM Software systems



- **B2B: Business-to-business software:** manages workflow with suppliers and partners
 - Directory of suppliers and products
 - Social media confirmation of quality
- **B2C: Business-to-consumer software:** serve the needs of individual customers particularly in regards to customer history, order status, and billing information.
 - Online store
 - Product manuals, product information
 - Delivery tracking
- **Human Resources Management (HRM):**
 - Payroll, bonuses, raises
 - Staff work experience, Performance appraisal, skill tests
 - Flight risk, employee satisfaction
 - Education, training
- **Marketing Automation Platform (MAP):**
 - CRM: Customer Relationship Management - purchase history, rewards, interests,
 - MCP: Marketing Campaign Planning - Ad words, analytics, costs, contracts, effectiveness

misinterpreted. The growing use of social media with its emphasis on icons or one word responses has often been blamed for the reduction in quality of personal verbal and written skills. Interaction with customers and suppliers depends on clear and effective communication.

Initiation message	Response message
Greeting	Acknowledgement
Question	Response
Proposal	Acceptance/Rejection
Command	Action
Accusation	Acceptance/Rebuttal

1.3.1 ISO9000/ISO9001

ISO 9000 was first published in 1987 by the International Organization for Standardization (ISO). The derivative quality standards help organizations address the needs of customers and while meeting relevant statutory and regulatory requirements.(?) The ISO9001 standards provide guidance and tools for companies and organizations who want to ensure that their processes regularly deliver products and services that meet customer's requirements. It also defines the requirements for certification against these standards which are reviewed and revised every 5 years.(?)

- **Point 1:** **Clear customer understanding** of the goods or services offered within a business contract.
- **Point 2:** **Verification of intended results** to ensure that the terms of the business contract were met.
- **Point 3:** **Prevention of undesired effects** that might cause delays or problems in the delivery of goods and services
- **Point 4:** **Improve performance** based on the information gathered



An example of an ISO9001 compliant transaction

Discuss what points of the ISO9001 standard is satisfied by the follow stages of a simple business transaction at a restaurant.

1. The customer enters a restaurant and is given a menu with pictures of the food.
2. The waiter takes the order and repeats the order back to the customer for confirmation.
3. The waiter brings the food and doubles check that the order is complete.
4. The waiter comes back to check if everything is okay.
5. The cashier checks that all was well when the bill is paid.
6. The whole transaction is recorded and the receipt gives a website for feedback.
7. The customer's feedback on the website is analyzed for patterns of service that could be improved.

1.4 Changes to Business

Businesses today have unprecedented opportunities to rapidly address issues that arise. Such advances in such fields as deep machine learning, Big Data analytics, Internet of Things, collective intelligence, online payment and social media are creating a reality that was only hinted at by the 1999 book ***Business at the speed of thought.*** (?) Businesses that were market leaders in the past, but failed to keep pace with the changes, suddenly find themselves bankrupt and replaced by new competitors. In 500BC, Heraclitus of Ephesus once penned the warning that "Change is the only constant in life" but he words ring true as an accurate description of today's business environment.

**Exercise: ISO9001 and MacDonalds**

Worldwide MacDonald is a successful multinational enterprise run by staff most of which are under the age of 21 and yet it is a certified ISO9001 company. When a customer orders food at any MacDonald outlet in the world, the interaction between the customer and the counter staff is always the same.

- Create a swim lane workflow diagram to describe the information flow in the conversation between the customer, the counter staff, the kitchen staff, the accounting system, and the point-of-sale computer system.
- Identify how the basic principles of ISO9001 principles for quality management are addressed by this basic operating procedure..

1.4.1 Open Organization

Since ISO9000 was first published in 1987, it has been revised and replaced by a long list of international standards that define and specify how various aspects of business, hardware, and software are to be implemented. Each new standard built on the principles already established and addresses the weaknesses of previous standards. (?) While these developments help to ensure consistent service and quality, something else was needed to empower staff to collectively think and implement creative solutions to challenges. Jim Whitehurst at RedHat.com invested considerable effort to address this problem. He started with the realization that “the best practices in creating open source software also translate well into managing an entire company.” By embracing open source values and creating a new open standard for communities, he showed how leaders can successfully create “a rebooted, redesigned, reinvented organization suitable for the decentralized, empowered, digital age.”(?) In creating the open organization, he and his colleagues have documented a shift that is changing in the way businesses are organized, managed and run.

Traditional values	Post-Modern values
Loyalty to the organizational hierarchy	Loyalty to the mission, purpose and values of the company
Compliance	Focus creativity to create solutions
Predictability	Adaptability to change
Efficiency	Effectiveness
Plan, Prescribe, Execute	Envision, Prioritize, Implement, Adjust

Successful, innovative organizations demonstrate the following core principles which form the basis for the core elements of open organizations. (?)

- The best ideas come from anywhere.
- The best ideas should always win.
- Contribution matters more than title.

Although every open organization is unique, there is a common core of elements that characterize open organizations. Each core element is composed of a different dataset to be gathered, distributed, and combined in powerful and productive ways.

- **Transparency:** Workers have access to all pertinent information and willingly disclose and discuss their work. Workers can access and review the processes and arguments that lead to decisions and are free to comment and respond to them. Successes and failures are valued for the lessons they provide.
- **Inclusivity:** Protocols and procedures are developed to encourage constructive discussion from diverse perspectives. Leaders actively seek to include voices not present in the dialog. Technology is used to ensure and encourage access to discussion forums.
- **Adaptability:** Feedback mechanisms provide access for suggestions from members of the organizations and outside members.
- **Collaboration:** The organization adheres to the principle that working together produces better results. Products of development are made available to other projects to use creatively.
- **Community:** Shared values and principles that guide decision making are clear and obvious to members of the organization. All workers are encouraged and empowered to make meaningful

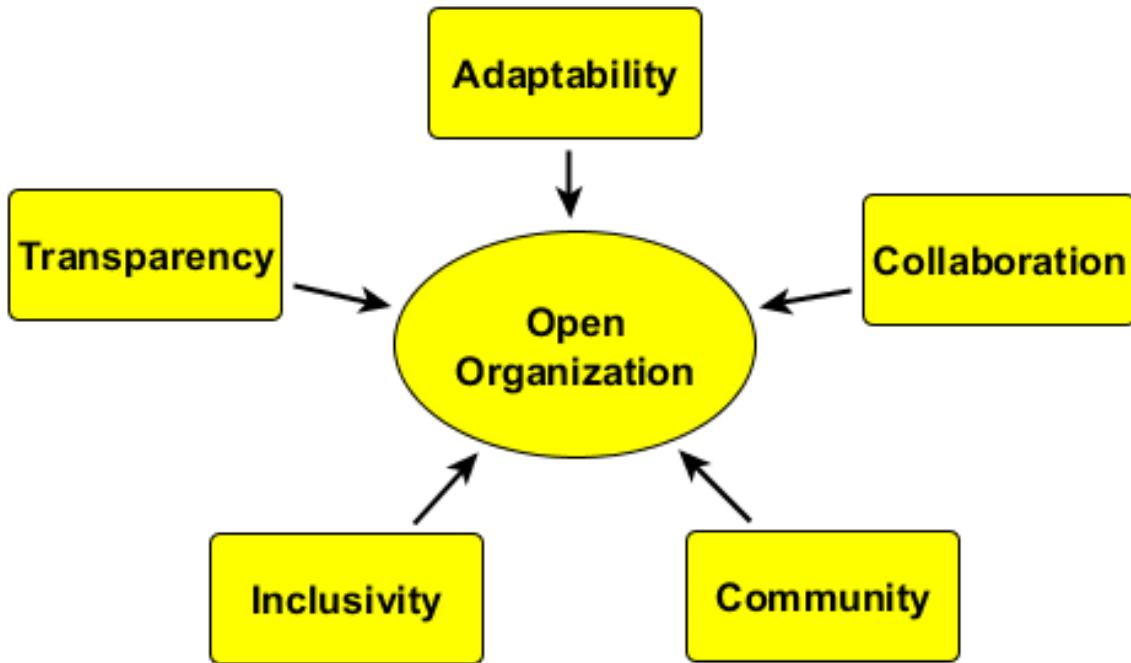


Figure 1.4: Core elements of open organizations

- **Greater agility:** resulting from the synergy that arises when members share a common vision and work together toward common goals.
- **Faster innovation:** because ideas from both inside and outside the organization receive more equitable consideration and rapid experimentation
- **Increased engagement:** as members clearly see connections between their particular activities and an organization's overarching values, mission, and spirit.

1.4.2 The changing nature of customers

Advances in technology have changed both the ability to produce product and the nature of markets. The internet and social media have exposed individuals to a wider range of products and vendors. This creates new desires and expectations in customers and increased competition among business. At the same time, social changes are impacting markets, particularly as youth explore new careers, lifestyles, technologies, and life goals.

Today's businesses need to be as versatile and diverse as the customers and markets they serve. In the past, only businesses with a large customer base were about to benefit from economies of scale. However, online services have made it possible for businesses to support both mass distribution to millions of consumers while at the same time of catering to the diverse needs of individual customers that number in the millions.

In addition, social media provide a forum for expressing opinions without being held accountable for the view expressed. Generally, the rewards for being liked help to regulate the web but increasing courts are given the power to litigate on defamation cases where rumors have caused damage. Nonetheless, social media continue to have an impact on Brand and Product Marketing, particularly in the following ways.

1. Word-of-mouth referrals from trusted acquaintances are powerful endorsements and attractions.
2. Customer testimonials are often decisive in purchasing decisions.
3. Community discussion of the products being developed increases trust in the company.
4. False testimonies are a problem: fakes entries attempt to oversell a product or provide complaints in an attempt to destroy the company.



Working as a developer within an open organization

Increasingly large IT development center like Google, Oracle and Apple are becoming open organizations to encourage and value innovation. Each worker in those companies is expected to do his/her part in contributing to the development effort. However, young IT staff have a very high rate of turn over as they are often foreign to working in environments that productively focus creativity to solve issues. This mismatch was the inspiration behind a recent blog concerning the five laws that development engineers should know. (?)

1. **Forget the phrase ‘I do not know’:** Treat every task as an opportunity to learn and dedicate the time needed to become an expert
2. **Read the manual! :** Documentation was written for a purpose. Do not waste colleague’s time.
3. **Search before asking:** Do not contribute to the problems but contribute to the solution.
4. **Anything is possible:** Anything is possible in this space with proper time, coordination, and effort. Trust by verifying new ideas
5. **Acknowledge technical debt:** Technical debt is the result of decisions that made sense at the time someone made them but cause problems because they are not based on reality.



Changing indicators of success in Singapore

The most common indicators of success mentioned in conversation with Singapore voters in 2000 was compare to the list compiled from conversations with Singaporean youth in 2018. (?), (?)

Level	Traditional success indicators	Goals of Singapore Youth
1	Career / Work	Emotional well being
2	Finance / Money	Personal learning / Skill development
3	Studies / Degrees	Family
4	Family	Finance / Money
5	House / Belongings	Spirituality

Top 10 Life Goals Important to Singapore Youth

Goals	Percent
Home ownership	70%
Strong family relationships	70%
Learning / acquiring new skills	62%
Successful career	59%
Earn lots of money	46%
Help less fortunate	41%
Contribute to society	40%
Get married	36%
Have children	35%
Good religious life	31%



Discussion: Impact of changes in life goals on business

1. How do you think changes in life goals of youth will impact the market place?
2. Based on these changes, which products would be expected to have the greatest increases or decreases in demand in the next 10 or 20 years?
3. What aspirations of Thai youth have changed in the last 10 years?
4. What impact will these changes have on the Thai economy?

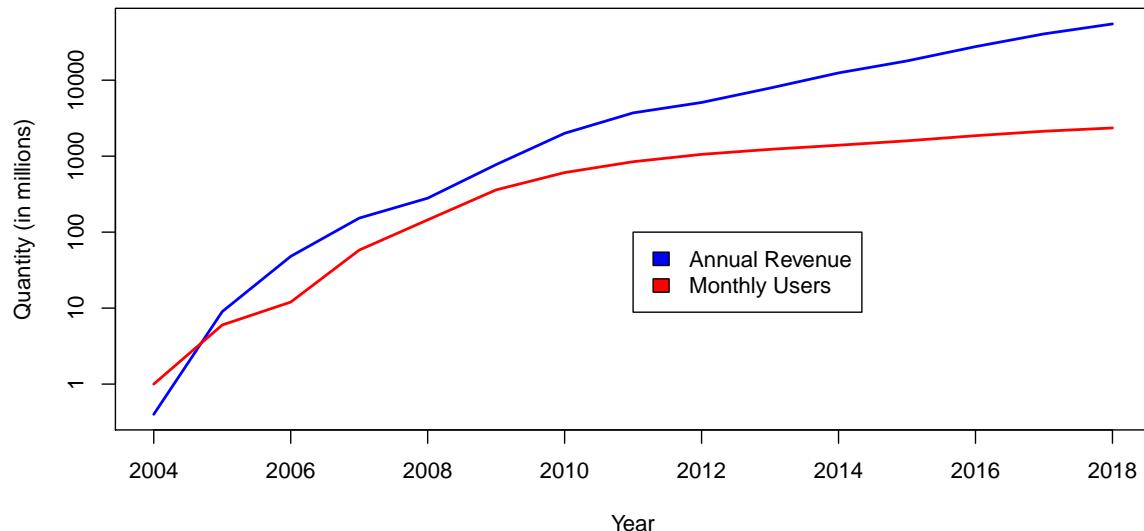


Given the changes in the nature of the online market, discuss how the following approaches help to target the population to focus on those who are most likely to purchase. For each of these approaches, identify the nature of a particular market for which it would be more effective than the others.

1. Search engine ads based on topics being searched
2. Social media ads based on shared views and ideas
3. Personal profiling to drive the user experience at a website based on specific interests and preferences expressed

markets world-wide. In the following graph, the number of users grows linearly while their revenues grow exponentially. (?)

Facebook Statistics



New generation 7-11 (Seven Eleven)

View this news clip about a new Seven Eleven outlet that opened in Pattaya with a new look that is in keeping with the era of Thailand 4.0. The store is full of sensors, monitors and systems to create a modern, futuristic, efficient shopping and eating environment complete with innovations to improve energy-saving and user convenience. Watch the video (?) and list the number of ways computers have been used to change the user experience.

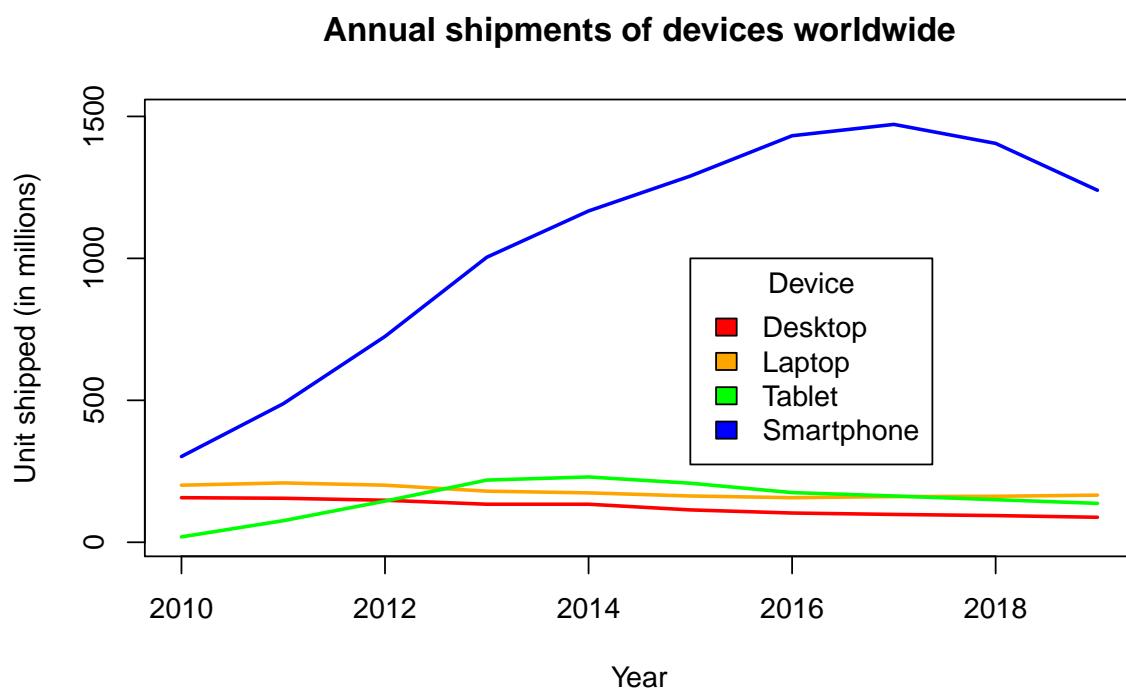


The mobile phone market Review the statistics of the performance of leading mobile phone producers since 1994 [TNW2019] and discuss the following:

- What factors contributed to the fall of market leaders?
- How will President Trump's technology embargo on China effect this market?
- Is there room for new competitors in this market?

1.5.1 Growth of the Internet and e-commerce

As the following graph shows, the types of devices used to access the internet have also changed in the past decade.



The trend has been to using mobile devices for shopping, and surfing for possibilities. There appears to be some resistance to using mobile devices to order online.

	Computer	Tablet	Smartphone
E-commerce traffic	53.9%	12.4%	33.7%
Volume of Retail sales	76.9%	12.4%	10.7%

With the development of the world wide web in the 1990s, online commerce has been gaining advantage over corresponding brick and mortar firms, especially for the following reasons:

1. The customer has access to more information to make better purchasing decisions
2. The customer can shop 24x7
3. The customer can track the progress of order fulfillment.
4. Customers can find and provide feedback verified through social media.
5. The functions of e-commerce can be purchased and updated to keep development costs low and to maximize economies of scale

However, the elderly are more resistant to adopt online shopping, but there is growing acceptance.

Adoption of online shopping by age of internet user

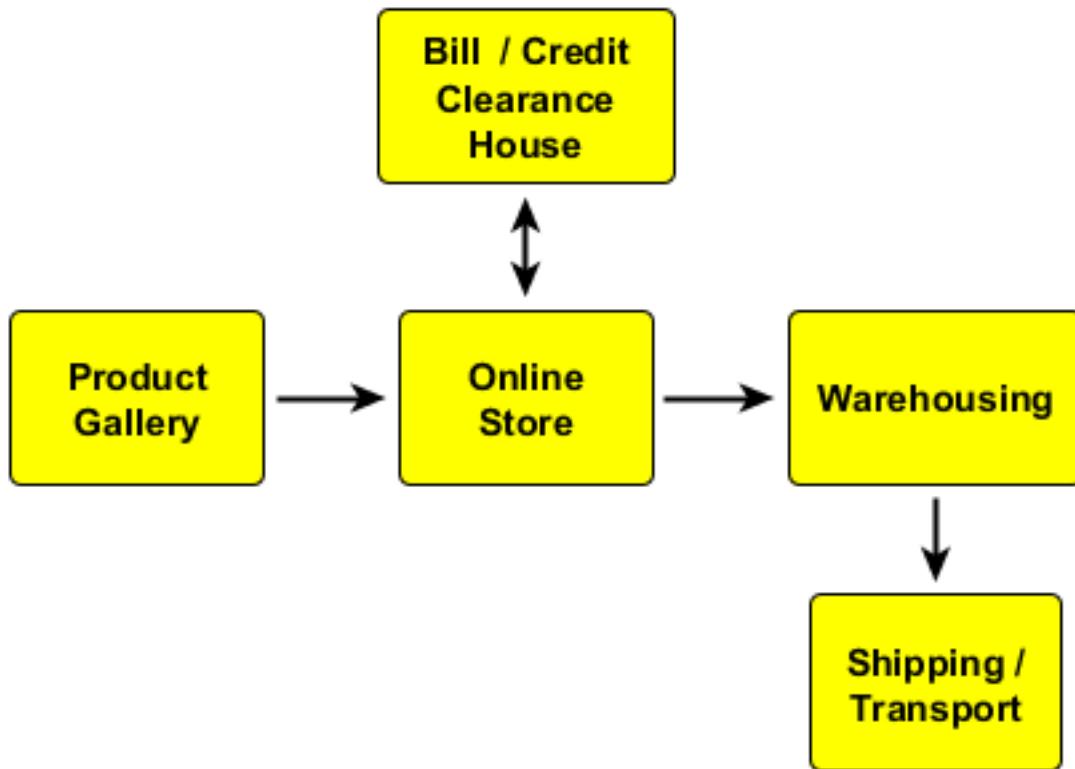


Figure 1.5: Business Functions of E-Commerce

Frequency	18-29	30-39	40-49	50-64	>65
Once per week	35%	37%	23%	17%	11%
Once per month	41%	35%	35%	38%	31%
Once per year	24%	28%	42%	45%	50%
Never	0%	0%	0%	0%	8%

1.5.2 The e-shopping customer experience

As shown by the table below, The process of shopping for goods online has many similarities to shopping at traditional brick and mortar shops. These similarities have contributed to rapid growth in online purchases which in 2018 totaled \$2,489 trillion worldwide. This represents about 8.8% of all sales worldwide. (?)

Stage	Brick and Mortar	Electronic world
Customer finds the store.	Ads and billboards	Google and Facebook Ads; Referrals from blogs
Customer shops for items of interest	Window shopping	Search the website

Stage	Brick and Mortar	Electronic world
Customer searches for information on the products	Check packaging and sales staff	Internet searches and social media recommendations
Customer chooses items for purchase	Places them in a cart or shopping basket	Virtual transfer of items to an electronic shopping cart
Customer checkouts the selected items for purchase	The customer takes the shopping cart to the check out counter	The virtual cart is checked out creating a preliminary bill complete with shipping information
The financial institution identifies and authenticates the payer	The customer swipes a credit card or ATM card	The customer logs into to e-banking, e-payment or credit card services
The customer transfers funds to the vendor.	The customer signs the electronic receipt or pays cash	The customer verifies and authorizes payment
The financial institution send payment verification.	ATM or Credit card service authenticates the transaction or the cashier	The financial institution sends a secure memo to the e-store that payment was made.
The vendor sends a pick-list order to the fulfillment center.	The storekeeper faxes the order to the warehouse	The fulfillment center is notified of the order and its payment and picks the items
The fulfillment center sends the goods to the shipper.	The items are boxed and set aside for pickup	The items are boxed and sent to the shipper.
The fulfillment center updates the order status.	The customer is called to pick up his order.	The online system is updated and the customer can track its location.
The shipper delivers the goods.	The counter staff check the delivery items and turns them over to the customer.	The shipper delivers the goods.
The customer takes possession of the goods.	The customer picks up the bags and leaves	The customer signs for the goods and the tracking system is updated.



1.6 Hybrid businesses

Online shopping giant Amazon has recently merged with Target a traditional department store chain. Explain why this merger is a good idea and what benefits the customer gains from it.

Chapter 2

BUSINESS SOFTWARE MODELS

This chapter will explore some common approaches used to model the network of interactions that occur for business processes. These models not only help to provide deeper understanding of the nature of a business process but can facilitate the development of systems to collect and analyze the data associated with the process.

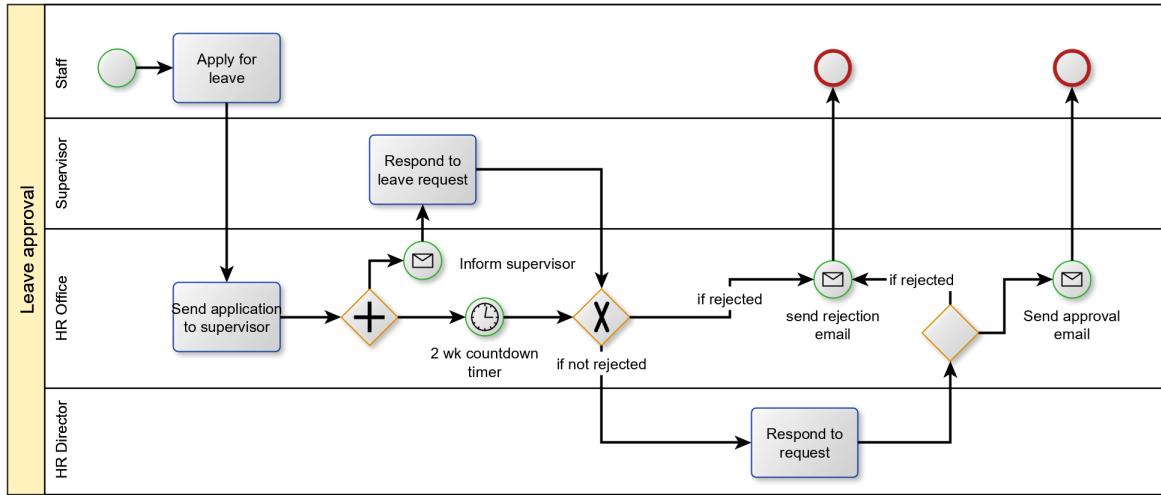


Figure 2.1: Leave approval using Joget

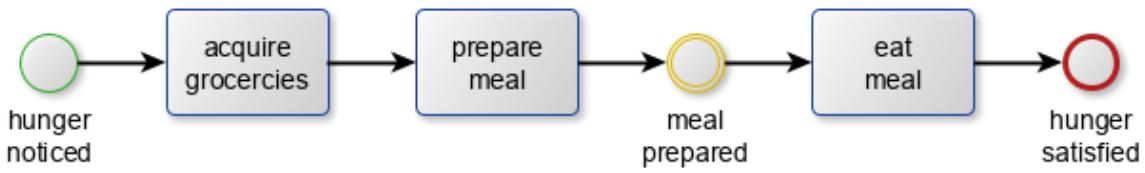
2.1 Business Process Model (BPM)

There are many good reasons for using BPMN to model business processes. (?)

- **Recognized Standard:** BPMN is owned by an institution and is supported by many software products. Third party BPMN editors are available in the form of desktop apps like yEd (?) or online services like Camunda. (?)
- **Simplicity:** BPMN is based on a system of graphic symbols that easy to learn.
- **Power of expression:** BPMN reduces descriptions of complex process work flows to a graphic model that is easy to grasp.
- **Implementation in IT:** BPMN was developed to support technical implementation of processes (“Process Automation”). The more important IT becomes in a company, the more helpful BPMN can be, especially when process changes can be accomplished by a simple change of line.

2.1.1 A simple example

A BPMN model described a process from the beginning (a light or green circle) to the end (a dark red circle). Blocks of tasks leading to key events are specified in sequential order.



2.1.2 Notation

Naming conventions help to improve the readability of the process:

- **Tasks:**

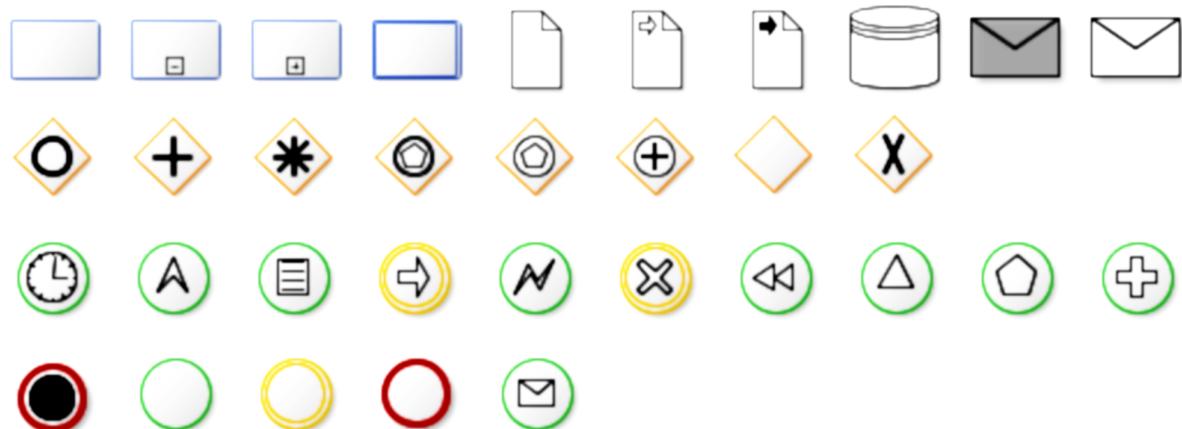


Figure 2.2: yEd BPMN Symbol Palette

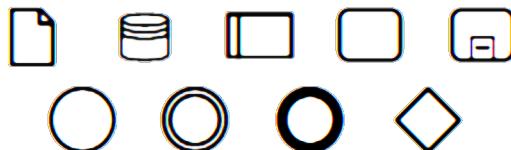


Figure 2.3: Cawemo BPMN Symbol Palette

- shown as a rounded rectangle
- described as a [verb] + [object]
- *Acquire groceries* is better than *first take care of shopping for groceries*

- **Events:**

- description of milestones and achievements
- described as something that has already happened
- *hunger noticed* is better than *I begin to feel hungry*

2.1.3 Symbols

BMP Software provide a palette of objects to describe various aspects of a process.

Symbol	Description
	Start Event: Start of the process chain
	End Event: The end of the process chain
	Event Message Catch: wait for a message event
	Event Message Throw: sending a message event

Symbol	Description
	Task: Work to be done
	XOR Gateway: choice of a action stream
	Parallel Gateway: initiate simultaneous action stream
	Swim lanes: separate the process by roles or actors

2.1.4 Sample Business Process Models



Correcting a bug in process flow

Identify and correct the flaw in this process so that the grass can be weeded, cut and watered in that order but only as required.

2.2 BPMN Model Simulation

BP Model simulators allow process designers to test their model. The general approach is to use a task generator that creates and processes tasks at rates equal to the measured performance in the work place. Data is collected to measure the rate of utilization and work flow at all stages of the model in order to identify issues like bottlenecks and irregularities in the work loads of individual employees. Simulation test are usually conducted in 3 phases:

Stage	Description	Purpose
Modeling	Simple visual model of the business process	Specify the individual roles and the business logic of the process
Simulation	Run task generation and execution according to measured performance	Test the model based on work place rates of service
Analysis	Creates a dashboard of performance indicators	Verifies process design; Identifies opportunities for process improvement; Helps to maximize employee utilization; Provides for performance-based estimates of cost

Online services such as <http://www.bpsimulator.com> provide a useful means for testing a process design through the display of the model, test results dashboard and performance indicators for each stage of the process. The design is actually a translation of a BPMN model into a Event-driven Process Chain (EPC). However, additional key details are required to quantify the capacity and number of resources available. These details are saved in the attributes for each node as shown in the next section.

2.2.1 BP Simulator Model Components

The following table is adapted from the online help of BPSimulation. (?)

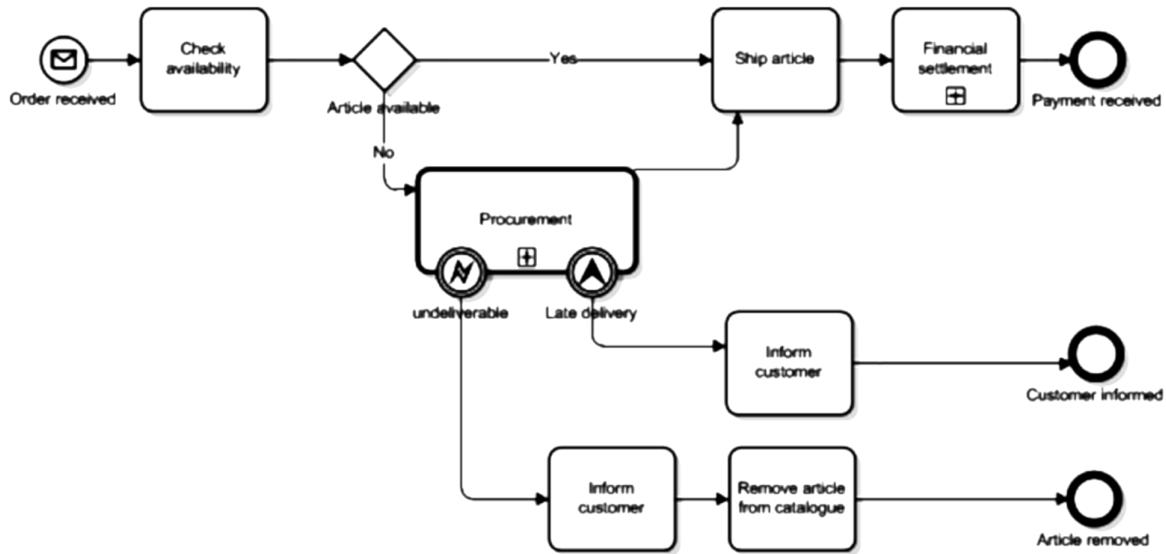


Figure 2.4: Order Fulfillment Processing

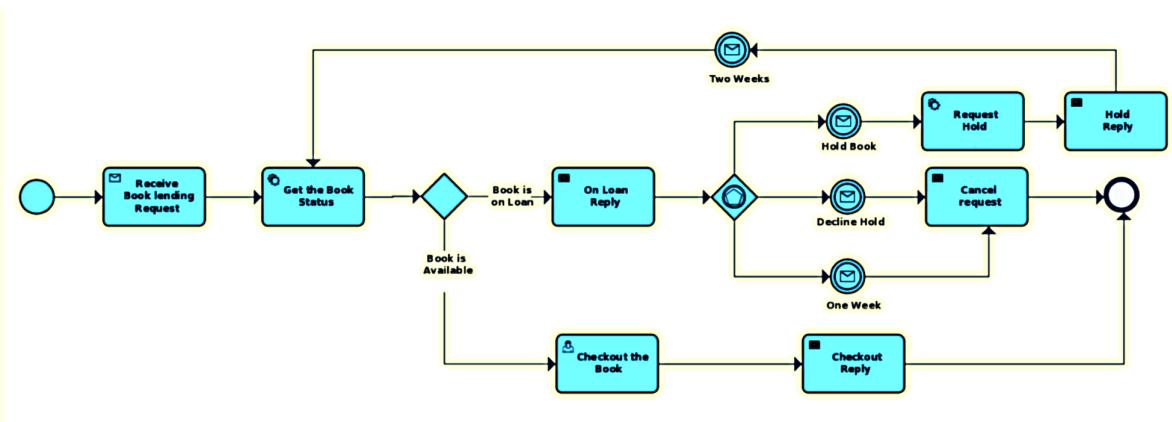


Figure 2.5: Book Checkout at the Library

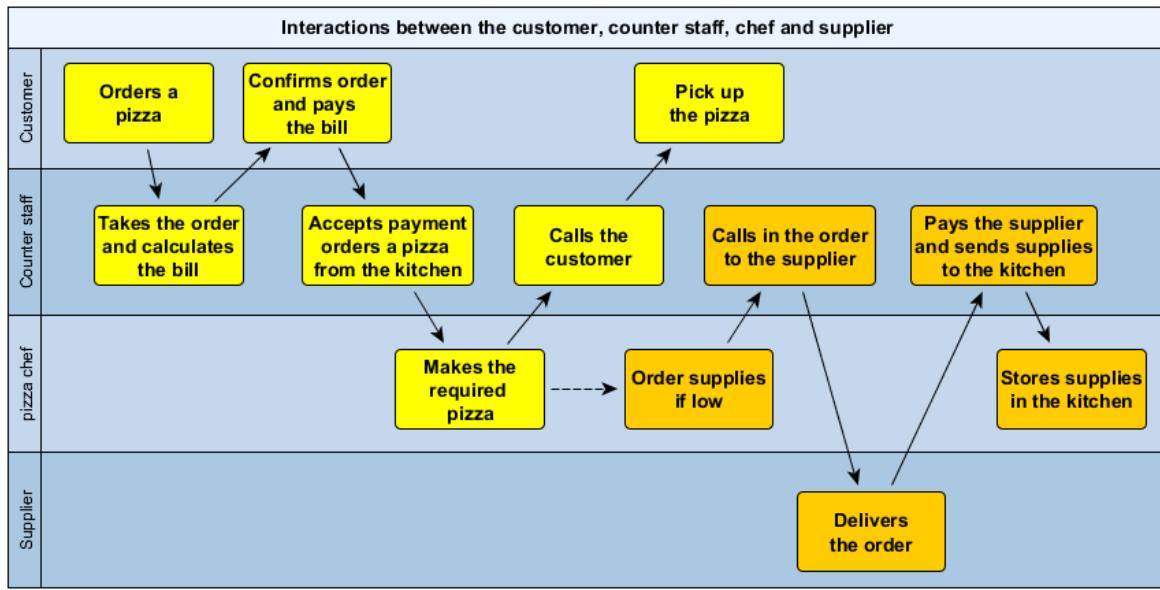


Figure 2.6: Pizza ordering

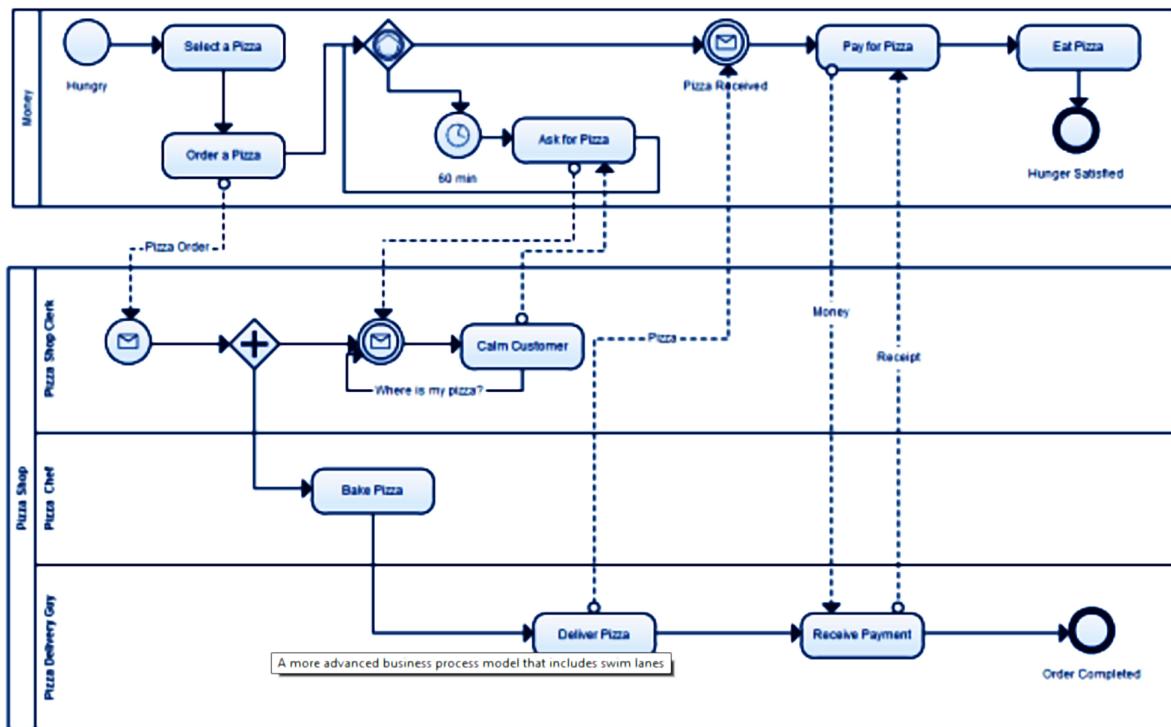


Figure 2.7: Pizza shop

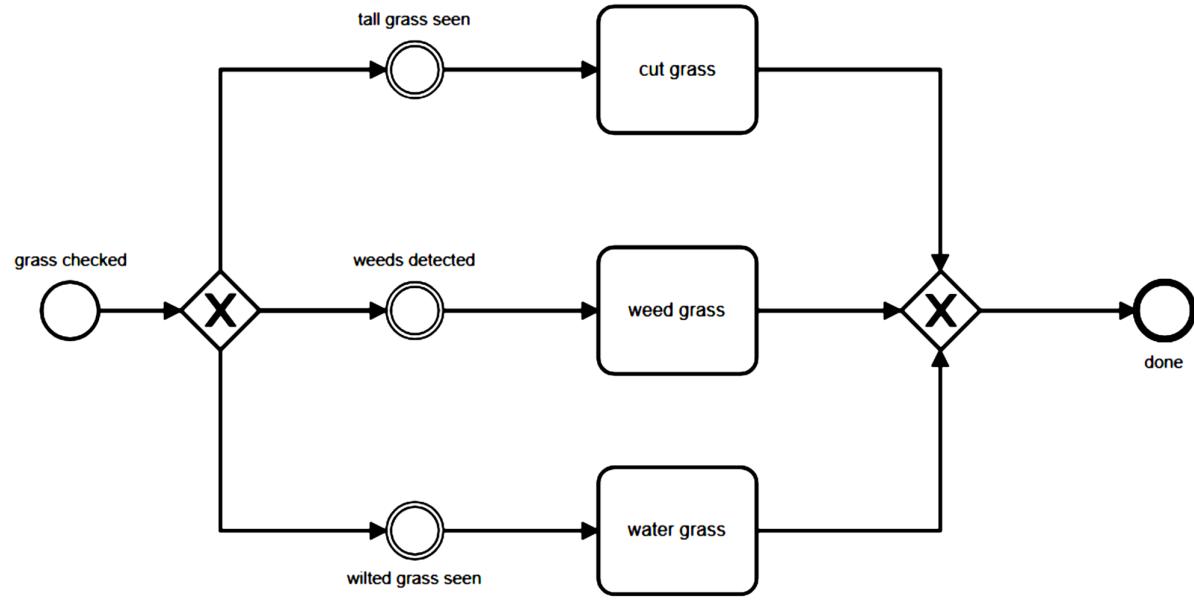
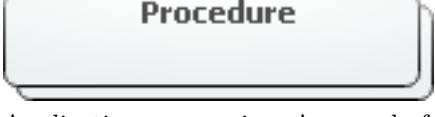
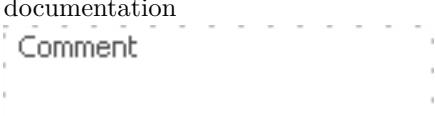


Figure 2.8: Cutting the grass

Object Description	Example
Function: Set of targeted actions to be performed by one or more executors in one role	Function
Execute: Position or role of those responsible for the execution of the function	Repair of water supply; Acceptance payment; Sending a message Motorman; Board member
Resource: Service or tools needed to perform the function	Resource
Tasks Generator: Generator global tasks of the business process of a certain type with a certain interval for the simulation purposes	Task Generator
Checkpoint: Auxiliary element for monitoring the process parameters at different stages its execution and control of tasks flow	Check Point
Event: Cause or an intangible result of a function	Completing the approval stage; Completion of the process because of inconsistencies detected Client's visit; An error was detected

Object Description	Example
Regulate: Regulate document directly related to the order, conditions or results of the function	 Manuals; Federal Law
Input: Material or information necessary to perform the function	 Form; Statement
Output: Material or information generated or acquired additional properties as a result of the function	 Part; Conclusion
Procedure: Set of performance features for a particular purpose	 Applications processing; Approval of documentation
Comment: Auxiliary element model for clarifications or comments	 Temporary condition; Proposed improvements

2.2.2 Linking objects together

All objects in the model should be at least one link to another object. To create a link between objects, you must first double-click on the object - the source of links, and then click on the object - the recipient, link will be created with an arrow on the side of the second object. Link means a direct impact or relationship of one object from another. Not all objects can be linked to each other. The group of objects: Tasks Generator, Function, Events, Procedure and Check Point can be suppliers (predecessors) or consumers (followers) of each other. Other objects only as the impact on function, as shown below the diagram:

With this extra data it is possible to simulate a day at work. The statistics collected help to pinpoint bottlenecks and limiting resources. The system provides a dashboard to summarize the results.

The model uses generators to simulate the volume of the demand for needs. Data comes from the functions and key check points of the model that monitor the workflow that passes these nodes. The executor nodes determine the capacity of the system. Performance is varied by changing the number of individuals in the role of executors.

2.2.3 An example: A Petrol Station**

Starting with the BPMN of a simple model of the processes behind getting gas at the petrol station.

results in a simulated model within the BPSimulator.

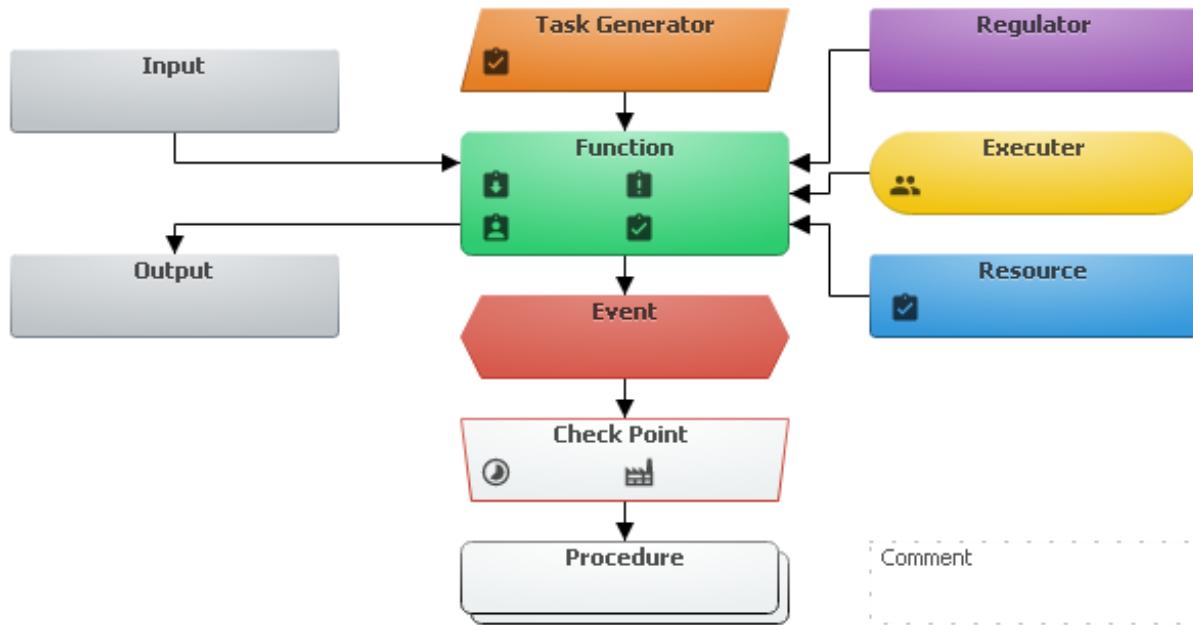


Figure 2.9: Linking of Objects



Figure 2.10: Dashboard of Test Results

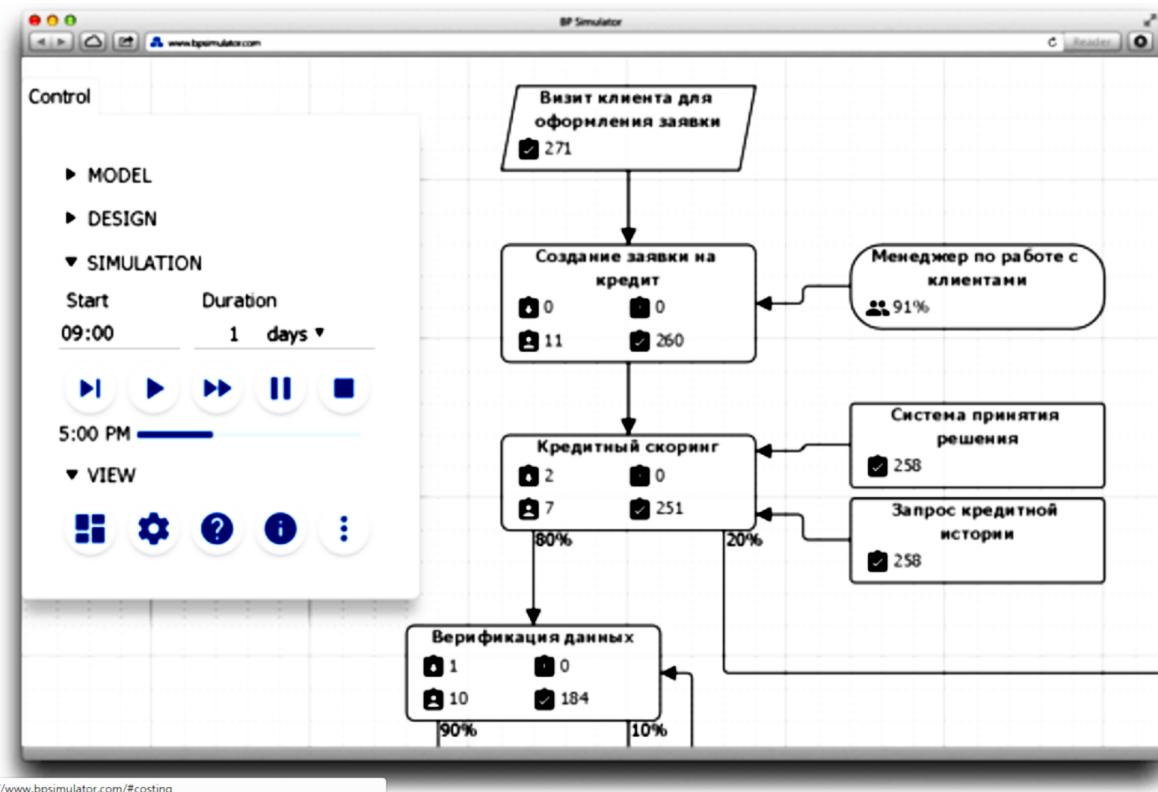


Figure 2.11: Performance indicators

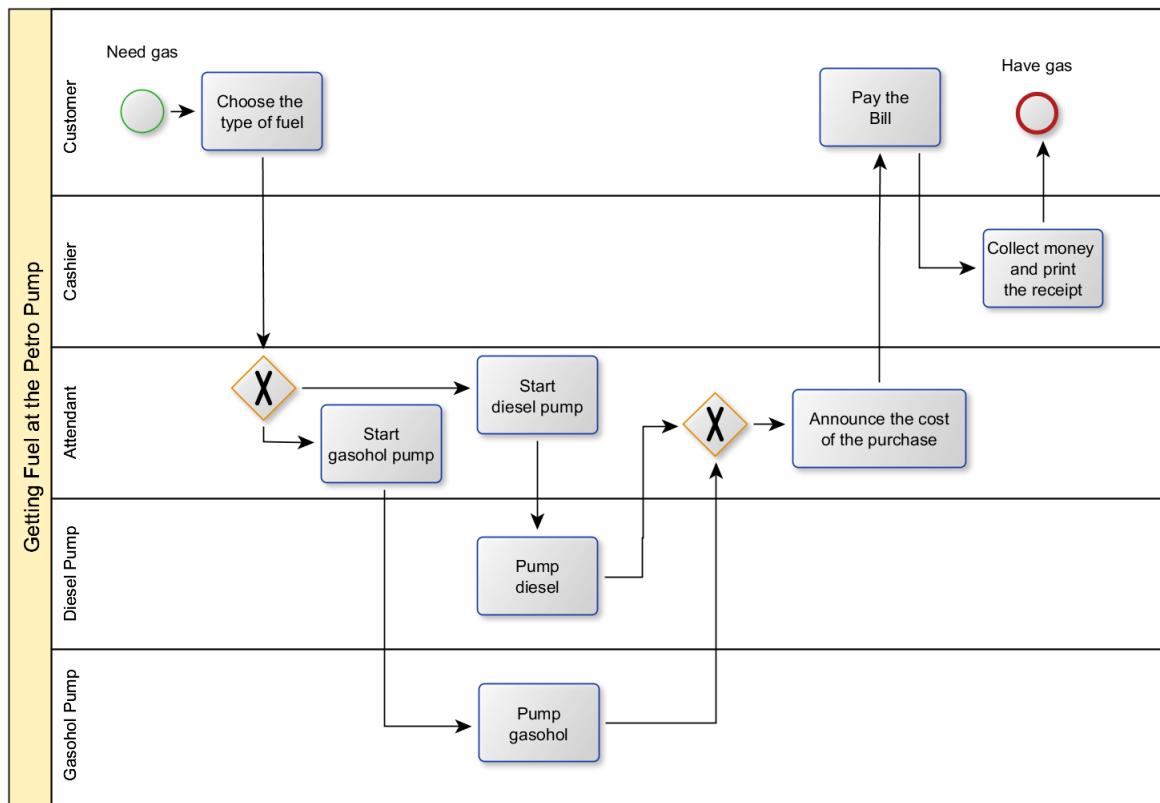


Figure 2.12: The Gas Station

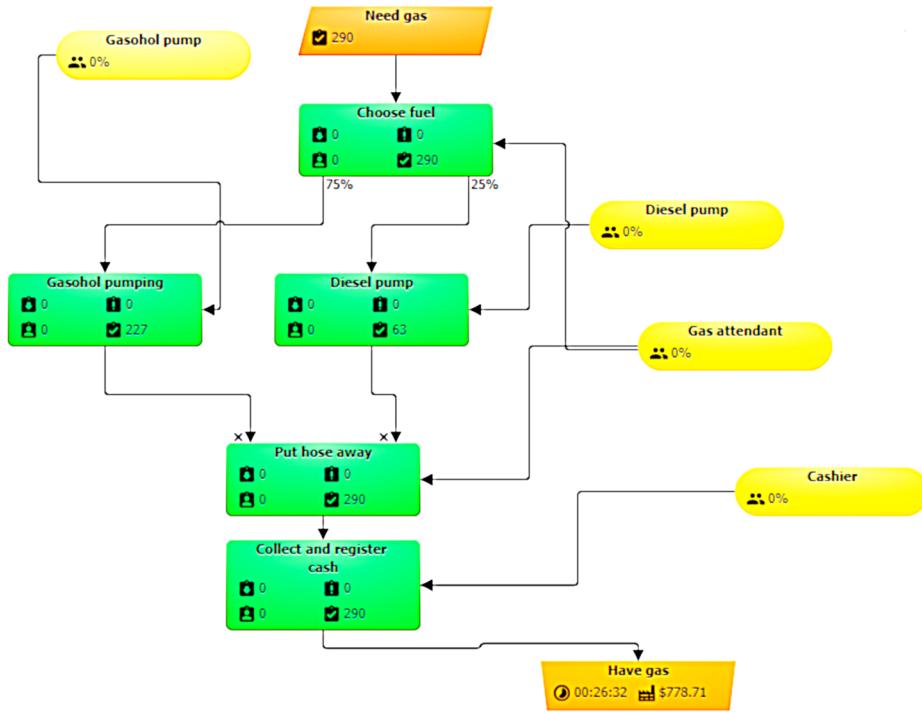


Figure 2.13: Getting Fuel Simulation

The simulation was run in the scenario of only have one cashier, one attendant, one gasohol pump, one diesel pump and 290 customers who arrive.

Starting	Ending	Number	Hourly Rate
6:00	8:59	90	30
9:00	14:59	90	15
15:00	18:59	90	25
19:00	20:00	20	10

As shown in the dashboard, the average queue is 16 min.



Exercise: Improving performance of a petrol station

Using the sample model of a petrol station, determine a proper mix of men and machines that will reduce the queue time to less than 2 mins at the minimum cost.

2.3 Enterprise Resource (ERP)

The purpose of Enterprise Resource Planning (ERP) is to harness business data in a way that allows integrated management of core business processes. This business-management software is typically designed as a suite of integrated applications which collect, store, manage, and interpret data from a wide range of business activities. By managing the critical information of all business processes, ERP provides opportunities to support data-driven management decisions in such areas as cash flow, resources usage, inventory of raw materials, and the status of business commitments such as project milestones, orders fulfilment, purchase order payments, and staff compensation. The system facilitates the sharing of data across divisions of the business, such as manufacturing, purchasing, sales, accounting, and human resources.

2.3.1 Building Blocks

2.3.2 ProjectFedena.com: an example of an ERP

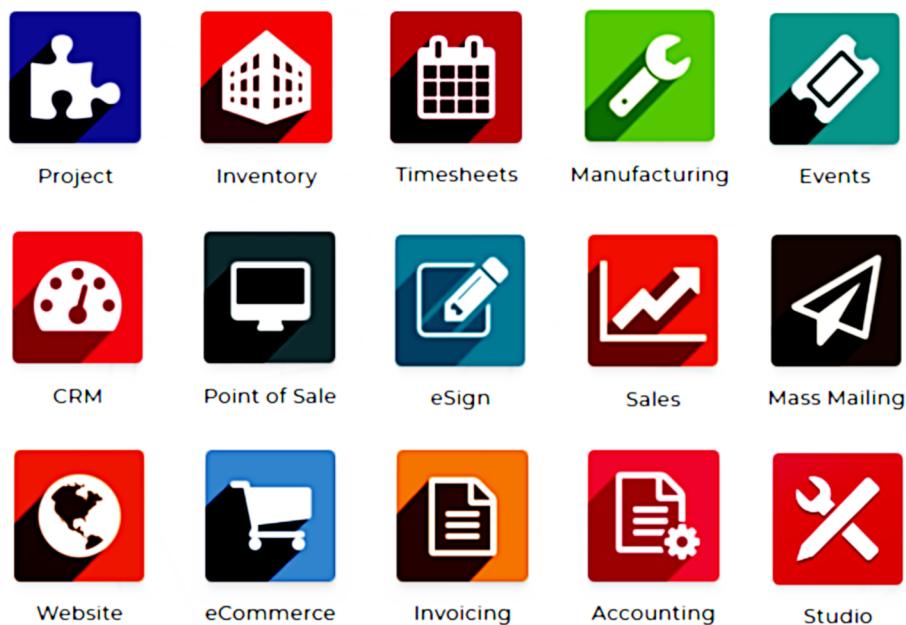


Figure 2.15: OODO ERP Modules

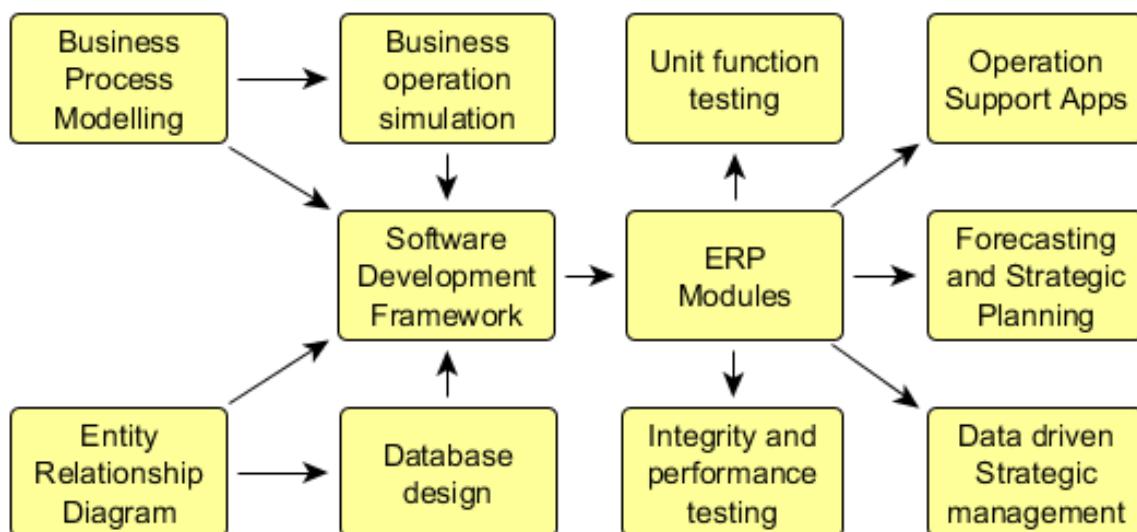


Figure 2.16: Business System Software Development

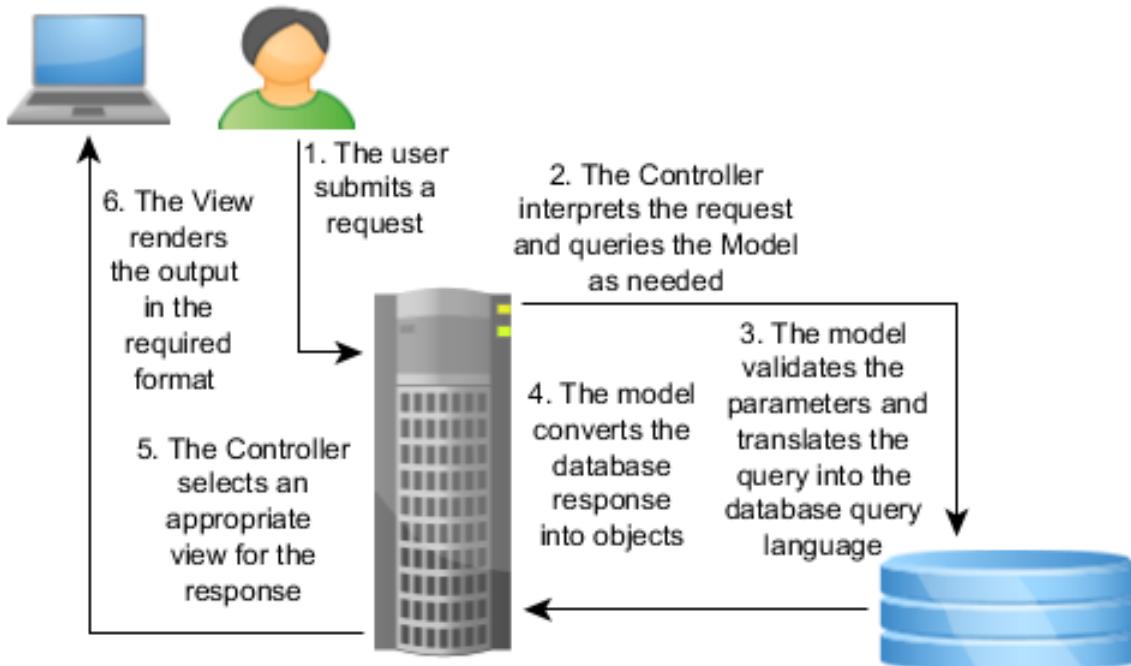


Figure 2.17: MVC Communications

2.3.3 The MVC Framework

- **Model:** Defines the structure and nature of data used by the system includes permissions, validation and list of field attributes.
- **View:** Renders outputs according to the limitations of the media such as web, email, sms, mobile, graphic image, json and xml.
- **Controller:** Parses the user request into data queries and passes the response to the appropriate view. User requests are generally variants of the standard types of database functions: create, show, edit, update and delete.
- **Helpers:** calculates basic conversions including support for foreign languages.

The Model implements the ERD. This example comes from the Subject Model class definition.

```

belongs_to :batch
belongs_to :elective_group
has_many :timetable_entries,:foreign_key=>'subject_id'
has_many :employees_subjects
has_many :employees ,:through => :employees_subjects
has_many :students_subjects
has_many :students, :through => :students_subjects
has_many :grouped_exam_reports
has_and_belongs_to_many_with_deferred_save :fa_groups
validates_presence_of :name, :max_weekly_classes, :code,:batch_id
validates_presence_of :credit_hours,
  :if=>:check_grade_type
validates_numericality_of :max_weekly_classes

```

```
validates_numericality_of :amount,:allow_nil => true
validates_uniqueness_of :code, :case_sensitive => false
```

2.3.4 Unit testing

This is done through a series of Assertions that tried against the functions of a class:

```
class SimpleNumber

  def initialize(num)
    raise unless num.is_a?(Numeric)
    @x = num
  end

  def add(y)
    @x + y
  end

  def multiply(y)
    @x * y
  end
end

require_relative "simple_number"
require "test/unit"

class TestSimpleNumber < Test::Unit::TestCase

  def test_simple
    assert_equal(4, SimpleNumber.new(2).add(2) )
    assert_equal(6, SimpleNumber.new(2).multiply(3) )
  end
end
```

2.3.5 Available assertions:

Assertion	Description
assert(boolean, [message])	True if boolean
assert_equal(expected, actual, [message])	True if expected == actual
assert_not_equal(expected, actual, [message])	True if expected != actual
assert_match(pattern, string, [message])	True if string =~ pattern
assert_no_match(pattern, string, [message])	True if string !~ pattern
assert_nil(object, [message])	True if object == nil
assert_not_nil(object, [message])	True if object != nil
assert_in_delta(expected_float, actual_float, delta, [message])	True if (actual_float - expected_float).abs <= delta
assert_instance_of(class, object, [message])	True if object.class == class
assert_kind_of(class, object, [message])	True if object.kind_of?(class)

Assertion	Description
<code>assert_same(expected, actual, [message])</code>	True if <code>actual.equal?(expected)</code> .
<code>assert_not_same(expected, actual, [message])</code>	True if not <code>actual.equal?(expected)</code> .
<code>assert_raise(Exception,...) {block}</code>	True if the block raises one of the listed exceptions.
<code>assert_nothing_raised(Exception,...) {block}</code>	True if the block does not raise one of the listed exceptions.
<code>assert_throws(expected_symbol, [message]) {block}</code>	
<code>assert_nothing_thrown([message]) {block}</code>	True if the block throws (or doesn't) the <code>expected_symbol</code> .
<code>assert_respond_to(object, method, [message])</code>	True if the object can respond to the given method.
<code>assert_send(send_array, [message])</code>	True if the method sent to the object with the given arguments return true.
<code>assert_operator(object1, operator, object2, [message])</code>	Compares the two objects with the given operator, passes if true

2.4 Behavior driven Development

Advantages:

- **Single source of truth:** Specifications, tests and documentation are in the same document.
- **Living documentation:** Because they're automatically tested by Cucumber, your specifications are always bang up-to-date.
- **Customer focus:** Cucumber helps business and IT collaborate to build a shared understanding of the business goals

(?) supports Behaviour-Driven Development(BDD) by reading executable specifications written in plain text and validating that the software does what those specifications say. The specifications consists of multiple examples, or scenarios written in Gherkin. (?)

The primary keywords are:

- `Feature`
- `Example` (`Scenario` and `Scenario Outline` are synonyms)
- Steps: `Given`, `When`, `Then`, `And`, `But`
- `Background`
- `Combinations` (`Examples` is a synonym)
- `"..."` (Doc Strings)
- `|` (Data Tables)
- `@` (Tags)

- # (Comments)

Examples follow this same pattern:

- Describe an initial context (Given steps)
- Describe an event (When steps)
- Describe an expected outcome (Then steps)

2.4.1 A working example of specs in Cucumber

Feature: A simple banking program

Background:

```
Given a customer named "DrBob"  
And I have logged in as "DrBob"
```

Scenario: Balance checking

```
Given my account has a balance of $430  
Then my account should show a balance of $430
```

Scenario: Account deposit

```
Given my account has a balance of $400  
When I deposit $30  
Then my account should show a balance of $430
```

Scenario: Account withdraw

```
Given my account has a balance of $500  
When I withdraw $70  
Then my account should show a balance of $430
```

Scenario Outline: deposits

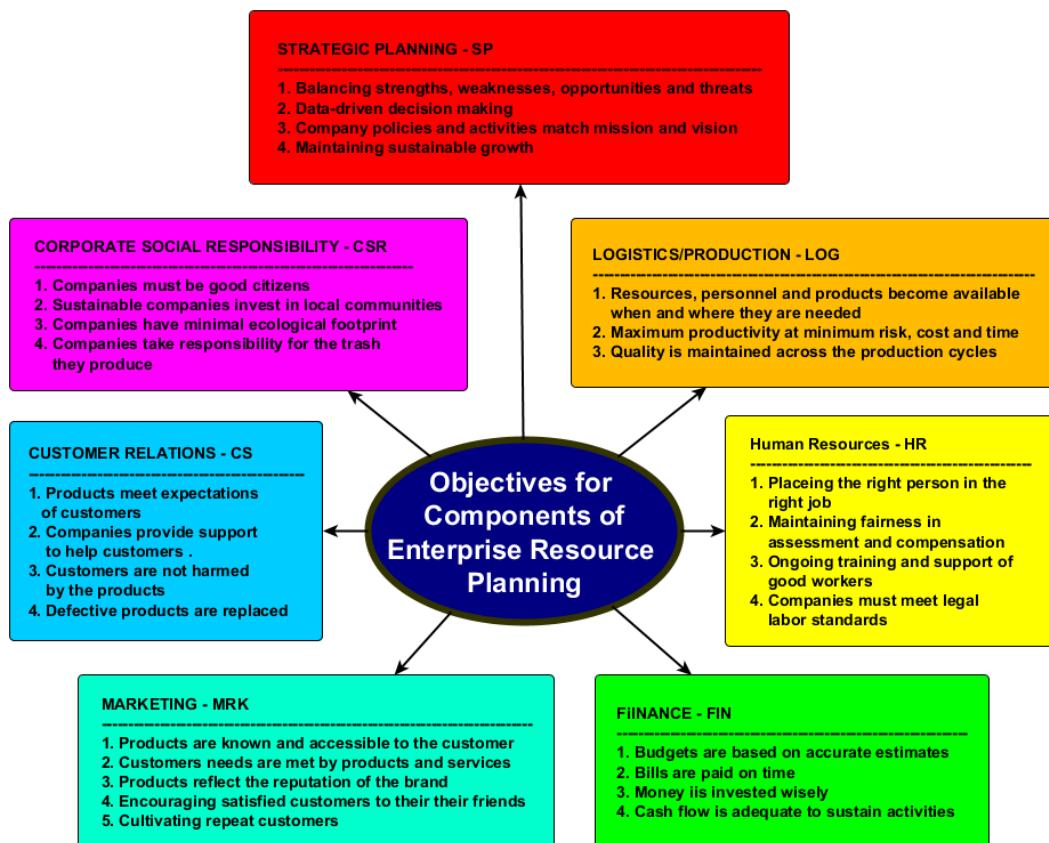
```
Given there are <start> dollars in the account  
When I deposit <added> dollars  
Then I should have <left> dollars
```

Examples:

start	added	left
12	5	7
20	5	15

Chapter 3

BUSINESS SOFTWARE SYSTEMS



This chapter will explore the network of frameworks, systems and applications that comprise the fabric of e-Business. In this study, each software component will be introduced by its context, requirements and examples of current open-source solutions.

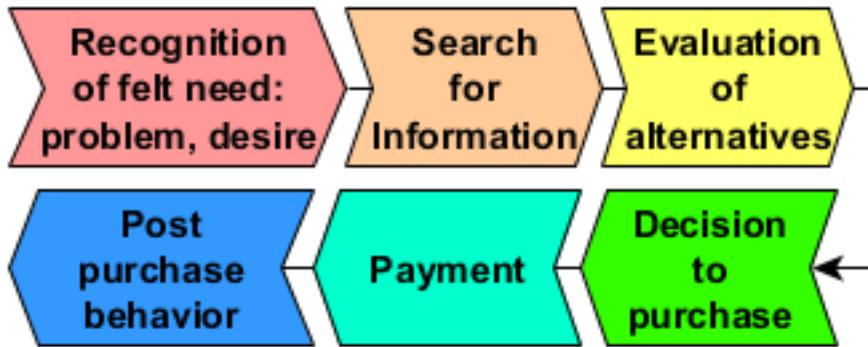


Figure 3.1: Stages in customer purchase decision making

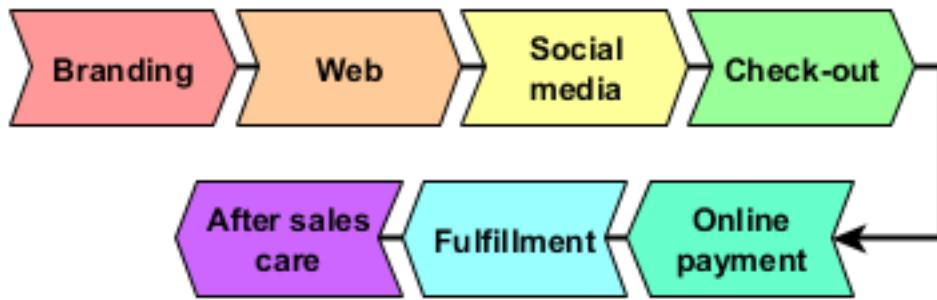


Figure 3.2: Business support of shoppers

3.1 Online Store

An online store attempts to match or exceed the level of customer support provided in brick and mortar stores. However, the personal distance and anonymity of the internet makes this goal harder to achieve. However, online stores like Amazon, Lazada and Alibaba owe their success to their ability to create trust among their community of buyers and sellers. These companies act as arbitrators between customers and vendors, reducing the risk of doing business between unknown parties. Because trust is so essential to business transactions, many internet shops began as product listings on one of these large marketing systems, or as an online service to the customers of their brick and mortar chains.

3.1.1 Stages in Customer Purchasing Decisions

Marketers have long studied the process and requirements of customers before, during and after making a purchase. In a market place that abounds in choices, customers must choose between the multiple alternatives. Shopping whether in the physical world or online is at best a weak attempt at making a rational decision between the choices, because complete analysis is needed to identify the true optimal decision is incredibly complex. (?) However, the urgency of the need drives the buyer to settle for an apparent good choice. However, the internet changes this by providing more information on which to base a rational decision. (?) observed 5 stages in a purchasing decision. A sixth stage has been added here to cover the financial transaction constraints imposed by online monetary systems.

3.1.2 Business Processes to Support Shoppers

3.1.3 Steps of check out and order fulfillment

- Login: links to shopping cart and history
 - Establish an account with the vendor
 - Add items to the shopping cart
- Shopping cart check out
 - Conducts an inventory check of items in shopping cart
 - Determines the mode of shipping
 - Calculates bill
- Renumeration via bank transfer
 - Determines the method of payment
 - Login onto financial service
 - Confirms the transaction
 - SMS validation code to telephone
 - Conducts and records the transaction
 - Send payment confirmation to the vendor



** Online Payment Methods Used in Thailand

Credit card and bank fraud so common in Thailand that most banks and credit card companies do not provide the guarantees for purchases and other consumer protection that consumers in other countries enjoy. In essence, Thai financial firms assume no risk and carry no insurance against bank and credit card fraud. Despite the barriers against credit card usage, there are online payment systems used for e-commerce in Thailand as shown in the following table.

Type and example	Benefits	Drawbacks
Credit card	Convenient, international standard	
Bank transfer		
ATM		
Online payment company: Paypal, Alipay		
Payment service 7-Eleven, Thailand Postal Service		The payment collection service charges the vendor a high commission and their systems could be hacked.
Mobile phone credits AIS, TOT		Reimbursement depends on the policies of the phone company; Stolen phone transactions may have to be refunded.
Cash on delivery: Lazada		The receiver can refuse the delivery and the goods are returned damaged in shipment
Cryptocurrency: BitCoin		The market value is not pegged to that of physical currency

- Send a shipping request to the Fulfillment Center
 - Pick list and shipping manifest



Figure 3.3: Characteristics of a Good Employee

- Print shipping label
- Send pick up order to delivery service
- Shipping
 - Record shipment pickup
 - Register the shipment
 - Track the shipment
 - Record the delivery

3.2 Customer Relations Management

3.2.1 Post sales service

- Unpacking instructions
- Installation instructions
- User instructions
- Troubleshooting guide
- Technical support hotline
- Service center locations

3.3 Measuring the effectiveness of websites

3.4 Human Resources Management

3.4.1 Assessing Personal Temperment

Every person is unique and represents a unique set of strengths and weaknesses. At the same time the every job requires different set of characteristics. The role of HR is to attempt to collectin information meant to measure and ascertain how suited an applicant is for a job opening. In theory the goal is to play the right person in the job. However as implied by the following word cloud, fitness of applicants for a job has many dimensions and is hard to measure accurately.

3.4.1.1 Belbin Team Roles

Research showed that the most successful teams were made up of a diverse mix of behaviours; they had access to all nine Belbin Team Roles. A Team Role was defined by Dr Meredith Belbin as “A tendency to behave, contribute and interrelate with others in a particular way”. The value of Belbin Team Role theory lies in enabling an individual or team to benefit from self knowledge and adjust according to the demands being made by the external situation. (?) The concept was derived from a study of factors leading to success or failure of teams competing in Business Games at Henley Management College, England. Managers taking part in the exercise were given a battery of psychometric tests and put into teams of varying composition. As time progressed different clusters of behaviour were identified as underlying the success of the teams. These successful clusters of behaviour were then given names. Hence the emergence of nine Team Roles shown with the distribution among British managers: (?)

**Exercise: Employee selection criteria**

The following are redacted from ads for IT jobs in Chiang Mai posted on LinkedIn in 2018. For each of the job descriptions propose the top 4 characteristics that should be used to identify a suitable candidate:

1. **Software Developer:** At XXX, we pursue greatness for our clients while reaching our own potential as well. To achieve this, we are building a team of people who can work independently, who push themselves to find creative solutions, who collaborate naturally, and who, above all, value doing good work. We are looking for new members for our team who can craft web and mobile applications that fit inside a larger communications, business, and product strategies. We focus on the problems to be solved instead of lists of functional requirements. The applications we develop are always part of larger strategy and help us foster close partnerships with our clients and the users of our applications. Together we work to amplify the effectiveness of our clients and accelerate their growth.
2. **Data scientist:** At YYY, we work closely with business users to identify business problems and develop solutions using data science techniques. To this end, we design and implement data models to explain and solve critical problems using such techniques as data mining, statistical modeling, and machine learning. We are looking for a worker who can provide insightful visualization and explanation of trends in client data and recommend the next course of action to be taken by decision makers and their colleagues.
3. **Robotics Engineer:** We are seeking a Robotic Engineer with technical leadership expertise to optimize the expansion of our paint robot program by improving the efficiency, productivity and quality of our program. You will be responsible for program operation, fault recovery procedures, troubleshooting and all around leadership of a state-of-the-art program to triple the paint volume of our previous model. In addition, you will contribute to improvements in Robot Safety, graphic user interface, electrostatic paint application, robot pathing, robotic fluid delivery systems, and the training of the next generation of program operators.
4. **Solutions Architect:** At WWW, we are looking for someone with a passion to help customers design large distributed systems using the world's most advanced cloud computing technologies. This job requires someone who can communicate, consult, and provide leadership while helping to guide major projects to success. We are hiring a Solutions Architect who can think strategically about business, product, and technical challenges and who will own technical engagement with customers on projects, working cross-organizationally to facilitate adoption and use of the cloud platform. At the same time, the job will involve developing a deep expertise in the cloud technologies and contributing to the know-how in the construction of applications and services on the cloud platform.

	Roles	Belbin Types	
Action-oriented:	Shaper 2.3%	Implementer 11.4%	Completer Finisher 3.6%
People-oriented:	Co-ordinator 26.2%	Teamworker 18.2%	Resource Investigator 33.2%
Thinking-oriented:	Plant 3.7%	Monitor Evaluator 0.5%	Specialist 0.8%

This doesn't mean that every team requires nine people. Most people will have two or three Team Roles that they are most comfortable with. Team Roles develop and mature. These may change with experience and conscious attention. Different Team Roles may come to the fore in response to the needs of particular situations.

Role Description	Strengths	Allowable weaknesses	Concerns
Resource Investigator: Uses their inquisitive nature to find ideas to bring back to the team.	Outgoing, enthusiastic. Explores opportunities and develops contacts.	Might be over-optimistic, and can lose interest once the initial enthusiasm has passed.	They might forget to follow up on a lead.
Teamworker: Helps the team to gel, using their versatility to identify the work required and complete it on behalf of the team.	Co-operative, perceptive and diplomatic. Listens and averts friction.	Can be indecisive in crunch situations and tends to avoid confrontation.	They might hesitate to make unpopular decisions.
Co-ordinator: Needed to focus on the team's objectives, draw out team members and delegate work appropriately.	Mature, confident, identifies talent. Clarifies goals.	Can be seen as manipulative and might offload their own share of the work.	They can over-delegate, leaving themselves little work to do.
Plant: Tends to be highly creative and good at solving problems in unconventional ways.	Creative, imaginative, free-thinking, generates ideas and solves difficult problems.	Might ignore incidentals, and may be too preoccupied to communicate effectively.	They could be absent-minded and forgetful.
Monitor Evaluator: Provides a logical eye, making impartial judgements where required and weighs up the team's options	Sober, strategic and discerning. Sees all options and judges accurately.	Sometimes lacks the drive in a dispassionate way, and ability to inspire others and can be overly critical.	They could be slow to come to decisions.
Specialist: Brings in-depth knowledge of a key area to the team.	Single-minded, self-starting and dedicated. They provide specialist knowledge and skills.	Tends to contribute on a narrow front and can dwell on the technicalities.	They can overload colleagues with technical information.

Role Description	Strengths	Allowable weaknesses	Concerns
Shaper: Provides the necessary drive to ensure that the team keeps moving and does not lose focus or momentum.	Challenging, dynamic, thrives on pressure. Has the drive and courage to overcome obstacles.	Can be prone to provocation, and may sometimes offend people's feelings.	They could risk becoming aggressive and bad-humoured in their attempts to get things done.
Implementer: Needed to plan a workable strategy and carry it out as efficiently as possible.	Practical, reliable, efficient. Turns ideas into actions and organises work that needs to be done.	Can be a bit inflexible and slow to respond to new possibilities.	They might be slow to relinquish their plans in favour of positive changes.
Completer Finisher: Most effectively used at the end of tasks to polish and scrutinise the work for errors, subjecting it to the highest standards of quality control.	Painstaking, conscientious, anxious. Searches out errors. Polishes and perfects.	Can be inclined to worry unduly, and reluctant to delegate.	They could be accused of taking their perfectionism to extremes.

3.4.1.2 Big 5 Behavioral Types

Behavioral Characteristic	Low end	High end
Openness to experience: Appreciation for art, emotion, adventure, unusual ideas curiosity, variety of experience and intellectual curiosity, creativity and a preference for novelty and variety.	consistent, cautious (Accountants)	inventive, curious(Artists)
Conscientiousness: A tendency to be organized and dependable, show self-discipline, act dutifully, aim for achievement, and prefer planned rather than spontaneous behavior.	easy-going, careless, sloppy. (Graffiti artist)	efficient, organized, stubborn. (Engraver)
Extraversion: Energy, positive emotions, surgency, assertiveness, sociability and the tendency to seek stimulation in the company of others, talkativeness and is often perceived as attention-seeking and domineering.	solitary, reserved, shy, introvert. (Hermit)	outgoing, energetic, boisterous, extravert. (Cheerleader)
Agreeableness: A tendency to be compassionate and cooperative rather than suspicious and antagonistic towards others. It related to a trusting and helpful nature.	challenging, detached, rigid. (Prosecutor)	friendly, compassionate, helpful. (Social worker)
Neuroticism: Neuroticism identifies certain people who are more prone to psychological stress and a tendency to experience unpleasant emotions easily.	confident	secure, cool (Air traffic controller)

3.4.1.3 Myers Briggs Test

The 16 personality types that were developed by Isabel Briggs Myers and Katharine Cook Briggs, which was built on the work of Carl Jung in the early 1900s. Based on the 4 dimensions of Carl Jung's theory of personality types:

Dimension	Extremes
Energizes	Extroversion (E) vs Internal (I)
Perceives information	Sensing (S) vs Intuitive (N)
Decision making	Thinking (T) vs Feeling (F)
World view	Judging (J) vs Perceiving (P)

Myers Briggs Test has been administered to a large number of people helping to validate the value of this instrument for a number of applications. Generally successful workers tend to gravitate to specific careers based on their personality profile as shown in the next sections. (?)

3.4.1.3.1 Analysts:

- **INTJ** (2.1%) - The Mastermind/The Scientist – Independent, original, analytical, and determined with an exceptional ability to turn theories into solid plans of action. Creative perfectionists who prefer to do things their own way, INTJs perform well in non-social roles that require them to think theoretically. Common careers: Investment banker, Personal financial advisor, Software developer, Economist, Executive
- **INTP** (3.3%) - The Thinker – Logical, original, creative thinkers. Can become very excited about theories and ideas. Independent and creative problem-solvers, INTPs gravitate toward roles that require them to be theoretical and precise. Common careers - Computer programmer, software designer, Financial analyst, Architect, College professor, Economist
- **ENTJ** (1.8%) - The Commander – Assertive and outspoken - they are driven to lead. Excellent ability to understand difficult organizational problems and create solid solutions. Natural leaders who are logical, analytical, and good strategic planners, ENTJs gravitate toward authoritarian roles that require them to be organized and efficient. Common careers: Executive, Lawyer, Market research analyst, Management consultant, Venture capitalist
- **ENTP** (3.2%) - The Debater – Creative, resourceful, and intellectually quick. Good at a broad range of things. Enterprising creative people who enjoy new challenges, ENTPs excel in risky roles that require them to be persistent and non-conformist. Common careers: Entrepreneur, Real estate developer, Advertising creative director, Marketing director, Politician/political consultant

3.4.1.3.2 Diplomats:

- **INFJ** (1.5%) - The Counselor/The Protector – Quietly forceful, original, and sensitive. Tend to stick to things until they are done. Thoughtful, creative people driven by firm principles and personal integrity, INFJs do well in behind-the-scenes roles that require them to communicate on a personal level. Common careers: Therapist/counsellor, Social worker, HR diversity manager, Organization development consultant, Customer relations manager
- **INFP** (4.4%) - The Idealist – Quiet, reflective, and idealistic. Interested in serving humanity. Sensitive idealists motivated by their deeper personal values, INFPs excel in roles that require them to be compassionate and adaptable. Common careers: Graphic designer, Psychologist/therapist, Writer/editor, Physical therapist, HR development trainer

- **ENFJ** (2.5%) - The Giver – Popular and sensitive, with outstanding people skills. Externally focused, with real concern for how others think and feel. People-lovers who are energetic, articulate, and diplomatic, ENFJs excel in cooperative roles that require them to be expressive and logical. Common careers: Advertising executive, Public relations specialist, Corporate coach/trainer, Sales manager, Employment/HR specialist
- **ENFP** (8.1%) - The Champion/The Inspirer – Enthusiastic, idealistic, and creative. Able to do almost anything that interests them. Curious and confident creative types who see possibilities everywhere, ENFPs perform well in expressive roles that require them to be alert and communicative. Common careers: Journalist, Advertising creative director, Consultant, Restaurateur, Event planner

3.4.1.3.3 Sentinels:

- **ISTJ** (11.6%) - The Inspector/The Duty Fulfilled - Serious and quiet, interested in security and peaceful living. Hard workers who value their responsibilities and commitments, ISTJs excel in behind-the-scenes roles that require them to be reliable. Common careers: Auditor, Accountant, Chief financial officer, Web development engineer, Government employee
- **ISFJ** (13.8%) - The Nurturer/ – Quiet, kind, and conscientious, puts the needs of others above self-interest. Modest and determined workers who enjoy helping others, ISFJs do well in roles that require them to provide services to others without being in a position of authority. Common careers: Dentist, Elementary school teacher, Librarian, Franchise owner, Customer service representative
- **ESTJ** (8.7%) - The Supervisor/The Guardian – Practical, traditional, and organized. Likely to be athletic. Realists who are quick to make practical decisions, ESTJs perform well in social roles that require them to lead. Common careers: Insurance sales agent, Pharmacist, Lawyer, Judge, Project manager
- **ESFJ** (12.3%) - The Provider/The Caregiver – Warm-hearted, popular, and conscientious. Tend to put the needs of others over self-interest. Gregarious traditionalists motivated to help others, ESFJs gravitate toward social roles that require them to care for the well-being of others. Common careers: Sales representative, Nurse/healthcare worker, Social worker, Public relations account executive, Loan officer

3.4.1.3.4 Explorers:

- **ISTP** (5.4%) - The Craftsman / The Mechanic - Quiet and reserved, interested in how and why things work. Straightforward and honest people who prefer action to conversation, ISTPs perform well in utilitarian roles that require them to make use of tools. Common careers: Civil engineer, Economist, Pilot, Data communications analysis, Emergency room physician
- **ISFP** (8.8%) - The Composer/The Artist – Quiet, serious, sensitive and kind, avoids conflict. Warm and sensitive types who like to help people in tangible ways, ISFPs do well in roles that require them to be sympathetic and attentive. Common careers: Fashion designer, Physical therapist, Massage therapist, Landscape architect, Storekeeper
- **ESTP** (4.3%) - The Doer – Friendly, adaptable, action-oriented. focused on immediate results. Pragmatists who love excitement and excel in a crisis, ESTPs excel in high-stakes roles that require them to be resourceful. Common careers: Detective, Banker, Investor, Entertainment agent, Sports coach

- **ESFP** (8.5%) - The Performer – People-oriented and fun-loving, they make things more fun for others by their enjoyment. Lively and playful people who value common sense, ESFPs gravitate toward roles that require them to be expressive and interact with others. Common careers: Child welfare counselor, Primary care physician, Actor, Interior designer, Environmental scientist

3.4.1.4 Hofstede survey on cultural dimensions

By studying expat workers' work performance in large multinational corporations, Hofstede was able to identify key cultural differences in the way people approach work. (?)

- Power distance: perceived ability to make a difference
- Individualism: individual vs collective: tendency to think in terms of I vs We.
- Gender balance: masculinity vs femininity
- Avoidance of Uncertainty: tolerance of risk
- Long term orientation: perception of urgency
- Indulgences vs restraint: attitude towards acquired wealth

3.4.2 Performance appraisal

Performance Appraisal is the systematic evaluation of the performance of employees in order to understand the abilities of a person for further growth and development. (?) Performance appraisal is generally done in systematic ways which are as follows:

- The supervisors measure the pay of employees and compare it with targets and plans.
- The supervisor analyses the factors behind work performances of employees.
- The employers are in position to guide the employees for a better performance.

3.4.3 Objectives of Performance Appraisal

Performance Appraisal is done with following objectives in mind:

- To maintain records in order to determine compensation packages, wage structure, salaries raises, etc.
- To identify the strengths and weaknesses of employees to place right men on right job.
- To maintain and assess the potential present in a person for further growth and development.
- To provide a feedback to employees regarding their performance and related status.
- To provide a feedback to employees regarding their performance and related status.
- It serves as a basis for influencing working habits of the employees.
- To review and retain the promotional and other training programmes.

3.4.3.1 Advantages of Performance Appraisal

It is said that performance appraisal is an investment for the company which can be justified by following advantages:

1. **Promotion:** Performance Appraisal helps the supervisors to chalk out the promotion programmes for efficient employees. In this regard, inefficient workers can be dismissed or demoted in case.
2. **Compensation:** Performance Appraisal helps in chalking out compensation packages for employees. Merit rating is possible through performance appraisal. Performance Appraisal tries to give worth to a performance. Compensation packages which include bonus, high salary rates, extra benefits, allowances and pre-requisites are dependent on performance appraisal. The criteria should be merit rather than seniority.

3. **Employees Development:** The systematic procedure of performance appraisal helps the supervisors to frame training policies and programmes. It helps to analyse strengths and weaknesses of employees so that new jobs can be designed for efficient employees. It also helps in framing future development programmes.
4. **Selection Validation:** Performance Appraisal helps the supervisors to understand the validity and importance of the selection procedure. The supervisors come to know the validity and thereby the strengths and weaknesses of selection procedure. Future changes in selection methods can be made in this regard.
5. **Communication:** Because communication between employees and employers effects morale and productivity, effective performance appraisal facilitates will stimulate communication that will impact a business in the following ways:
 - The employers can better understand and accept the skills, nature and needs of subordinates.
 - The subordinates can also better understand the workplace ethos as they grow in their trust and confidence in their superiors.
 - Appraisals provide 2-way feedback that helps to build and maintain cordial and congenial labour-management relationship.
 - As a shared experience across the workplace, appraisals develop the spirit of work and help boost the morale and esprit du cours of the employees.
6. **Motivation:** Performance appraisal serves as a motivation tool. Through evaluating performance of employees, a person's efficiency can be determined if the targets are achieved. This very well motivates a person for better job and helps him to improve his performance in the future.

3.4.4 HR System software

HR data generally holds a wealth of information that can be used to predict employee retention, turnover and satisfaction. However this information must be mined from the data by applying data science and machine learning techniques. While numerous commercial HR systems exist in the market placethat have been developed. OrangeHRM ¹ is an open-source product tha provide the basic functions for addressing the following issues:

- Employee retention
- Job performace appraisal and incentives
- Employee development
- Job-Employee fit: Right person for the job
- Payroll, benefits and overtime



****Exercise: Product Review: OrangeHRM Human Resource Management System**

1. Login as admin to the online demo and determine the amount of information that is management by this system by answering the following for the Webmaster of the corporation:
 - Name and name of spouse/children
 - Name of supervisor
 - Level of salary
 - Results of last appraisal
2. Login as employee and determine what information is available to employees and what updates they can make online.
3. What are the benefits and dangers of having such information online?

¹**Home page:** <https://www.orangehrm.com/>; **Demo:** <https://orangehrm-demo-6x.orangehrmlive.com/>