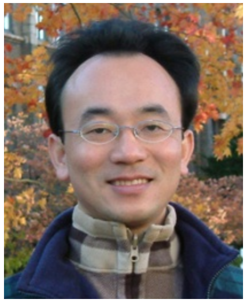
軟體工程
(Software Engineering)

軟體工程概論
(Introduction to Software Engineering)

1091SE01
MBA, IM, NTPU (M5118) (Fall 2020)
Tue 2, 3, 4 (9:10-12:00) (B8F40)



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2020-09-15

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Publications Co-Chairs, IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2013-)

Program Co-Chair, IEEE International Workshop on Empirical Methods for Recognizing Inference in TExt (IEEE EM-RITE 2012-)

Publications Chair, The IEEE International Conference on Information Reuse and Integration (IEEE IRI)

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Solutions Architect
Associate

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NTPU
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軟體工程
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Contact Information

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國立臺北大學
109學年度第1學期
課程大綱
Fall 2020 (2020.09 - 2021.01)

- 課程名稱：**軟體工程 (Software Engineering)**
- 授課教師：戴敏育 (Min-Yuh Day)
- 開課系所：資管所碩士班
- 開課資料：選修 半學年 3 學分 (3 Credits, Elective)
- 上課時間：週二 2, 3, 4 (9:10-12:00)
- 上課教室：商8F40 (台北大學三峽校區)

教學目標

1. 瞭解軟體工程基本概念、與研究議題。
2. 具備軟體工程實務操作能力。
3. 進行軟體工程相關之資訊管理研究。

Course Objectives

1. Understand the fundamental concepts and research issues of software engineering.
2. Equip with Hands-on practices of software engineering.
3. Conduct information systems research in the context of software engineering.

內容綱要

- 本課程介紹軟體工程基本概念、研究議題、與實務操作。
- 課程內容包括
  1. 軟體工程概論
  2. 軟體產品與專案管理：軟體產品管理，原型設計
  3. 敏捷軟體工程：敏捷方法、Scrum、極限程式設計
  4. 功能、場景和故事
  5. 軟體架構：架構設計、系統分解、分散式架構
  6. 基於雲的軟體：虛擬化和容器、軟體即服務
  7. 雲端運算與雲軟體架構
  8. 微服務架構：RESTful服務、服務部署
  9. 安全和隱私
  10. 可靠的程式設計
  11. 測試：功能測試、測試自動化、測試驅動的開發、程式審查
  12. DevOps和程式碼管理：程式碼管理和DevOps自動化
  13. 軟體工程個案研究

Course Outline

- This course introduces the fundamental concepts, research issues, and hands-on practices of software engineering.
- Topics include
  1. Introduction to Software Engineering
  2. Software Products and Project Management: Software product management and prototyping
  3. Agile Software Engineering: Agile methods, Scrum, and Extreme Programming
  4. Features, Scenarios, and Stories
  5. Software Architecture: Architectural design, System decomposition, and Distribution architecture
  6. Cloud-Based Software: Virtualization and containers, Everything as a service, Software as a service
  7. Cloud Computing and Cloud Software Architecture
  8. Microservices Architecture, RESTful services, Service deployment
  9. Security and Privacy
  10. Reliable Programming
  11. Testing: Functional testing, Test automation, Test-driven development, and Code reviews
  12. DevOps and Code Management: Code management and DevOps automation
  13. Case Study on Software Engineering

資訊管理研究所
系核心能力
(Core Competence)

- 資訊科技新知探索與系統開發應用 90 %
- 網路行銷企劃能力
- 論文寫作與獨立研究能力 10 %

校四大基本素養
(Four Fundamental Qualities)

- 專業 (Professionalism)
  - 創意思考與問題解決 (Creative thinking and Problem-solving) 30 %
  - 綜合統整(Comprehensive Integration) 30 %
- 人際 (Interpersonal Relationship)
  - 溝通協調 (Communication and Coordination) 10 %
  - 團隊合作 (Teamwork) 10 %
- 倫理 (Ethics)
  - 誠信正直(Honesty and Integrity) 5 %
  - 尊重自省(Self-Esteem and Self-reflection) 5 %
- 國際觀 (International Vision)
  - 多元關懷 (Caring for Diversity) 5 %
  - 跨界宏觀 (Interdisciplinary Vision) 5 %

商學院學習目標
(College Learning Goals)

- Ethics/Corporate Social Responsibility
- Global Knowledge/Awareness
- Communication
- Analytical and Critical Thinking

系所學習目標
(Department Learning Goals)

- Information Technologies and System Development Capabilities
- Research capabilities

課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
1	2020/09/15	軟體工程概論 (Introduction to Software Engineering)
2	2020/09/22	軟體產品與專案管理：軟體產品管理，原型設計 (Software Products and Project Management: Software product management and prototyping)
3	2020/09/29	敏捷軟體工程：敏捷方法、Scrum、極限程式設計 (Agile Software Engineering: Agile methods, Scrum, and Extreme Programming)
4	2020/10/06	功能、場景和故事 (Features, Scenarios, and Stories)
5	2020/10/13	軟體架構：架構設計、系統分解、分散式架構 (Software Architecture: Architectural design, System decomposition, and Distribution architecture)
6	2020/10/20	軟體工程個案研究 I (Case Study on Software Engineering I)

課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
7	2020/10/27	基於雲的軟體：虛擬化和容器、軟體即服務 (Cloud-Based Software: Virtualization and containers, Everything as a service, Software as a service)
8	2020/11/03	雲端運算與雲軟體架構 (Cloud Computing and Cloud Software Architecture)
9	2020/11/10	期中報告 (Midterm Project Report)
10	2020/11/17	微服務架構：RESTful服務、服務部署 (Microservices Architecture, RESTful services, Service deployment)
11	2020/11/24	軟體工程產業實務 (Industry Practices of Software Engineering)
12	2020/12/01	安全和隱私 (Security and Privacy)

課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
13	2020/12/08	軟體工程個案研究 II (Case Study on Software Engineering II)
14	2020/12/15	可靠的程式設計 (Reliable Programming)
15	2020/12/22	測試：功能測試、測試自動化、 測試驅動的開發、程式碼審查 (Testing: Functional testing, Test automation, Test-driven development, and Code reviews)
16	2020/12/29	DevOps和程式碼管理： 程式碼管理和DevOps自動化 (DevOps and Code Management: Code management and DevOps automation)
17	2021/01/05	期末報告 I (Final Project Report I)
18	2021/01/12	期末報告 II (Final Project Report I)

教學方法與教學活動
(Teaching methods and activities)

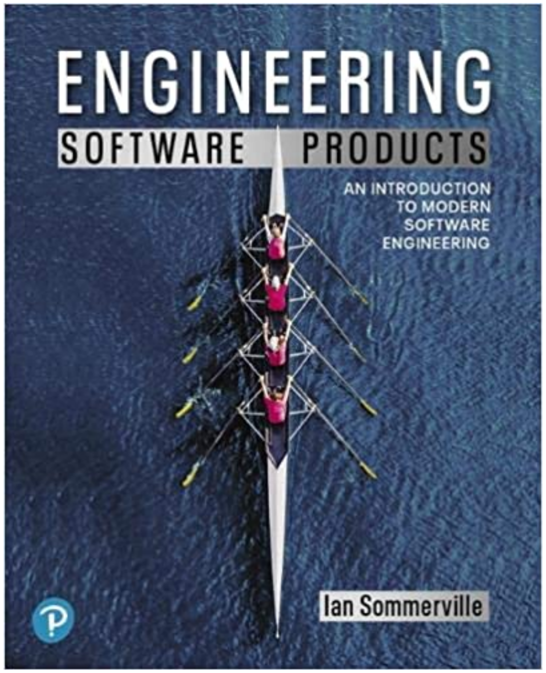
- 講授 (Lecture)
- 討論 (Discussion)
- 實 習 (Practicum)

評量方式
(Evaluation Methods)

- 個人報告 (Individual Presentation) 60 %
- 團體報告 (Group Presentation) 10 %
- 個案分析報告 (Case Report) 10 %
- 課堂參與 (Class Participation) 10 %
- 作業 (Assignment) 10 %

指定用書
(Required Texts)

- Ian Sommerville (2019),
  Engineering Software Products:
  An Introduction to Modern Software Engineering,
  Pearson.



參考書目 (Reference Books)

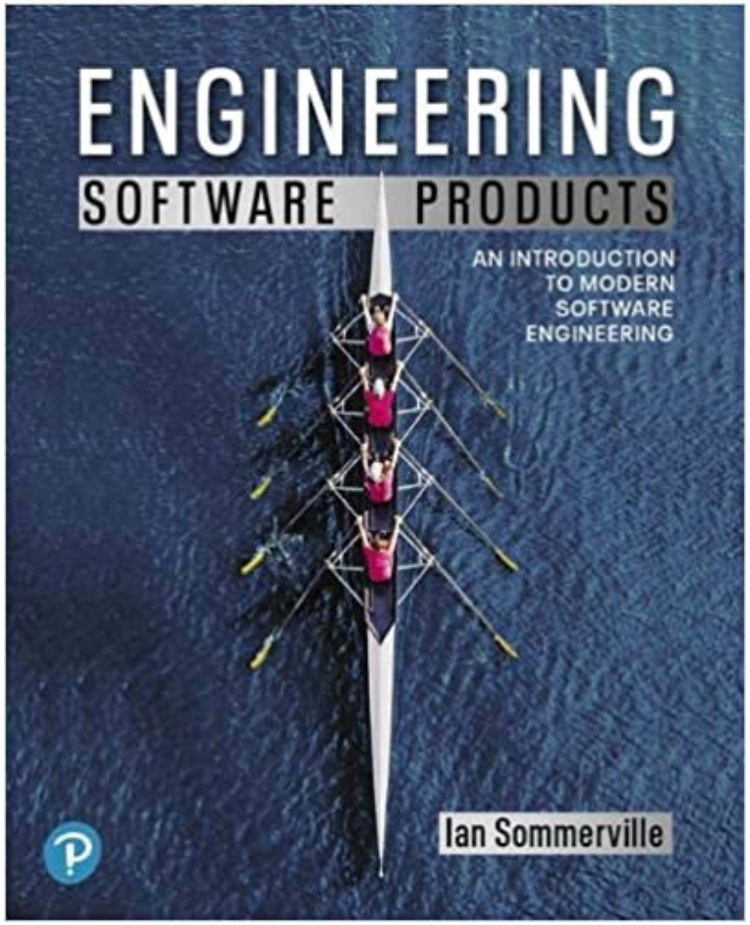
- Ian Sommerville (2015),
  Software Engineering,
  10th Edition, Pearson.
- Titus Winters, Tom Manshreck, and Hyrum Wright (2020),
  Software Engineering at Google: Lessons Learned from Programming Over Time, O'Reilly Media.

Ian Sommerville (2019),

Engineering Software Products:

An Introduction to Modern Software Engineering,

Pearson.

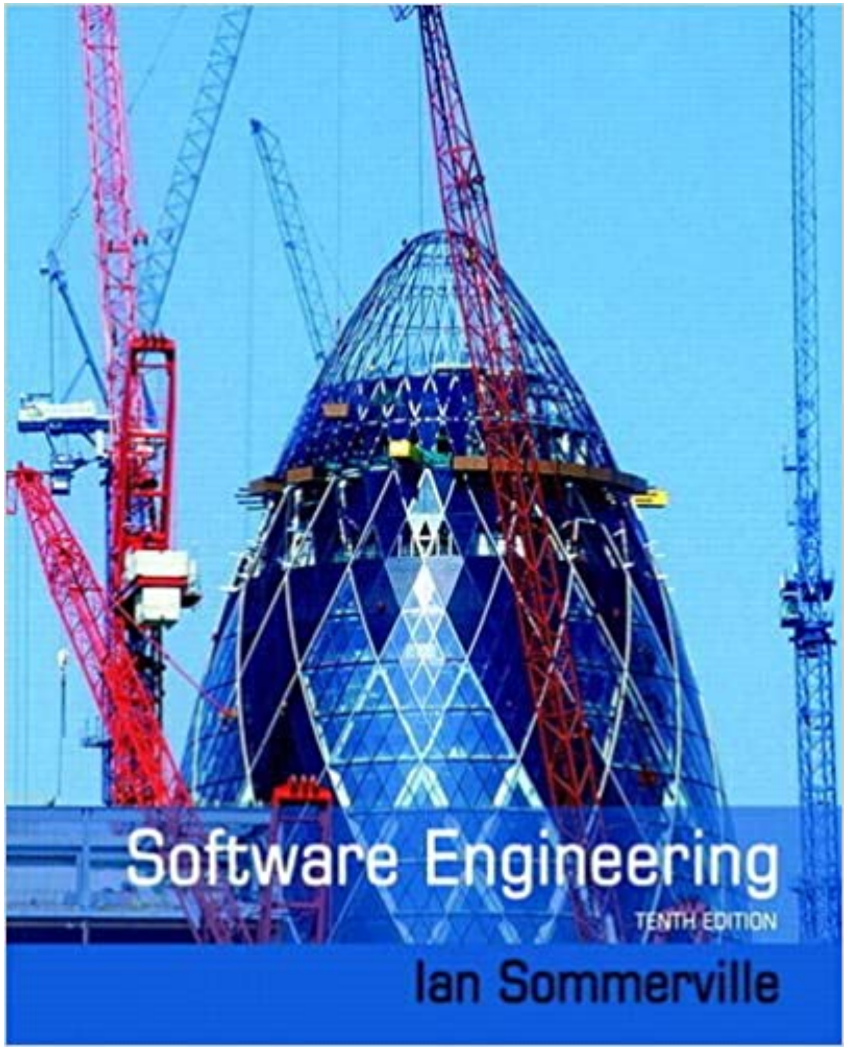


Source: https://www.amazon.com/Engineering-Software-Products-Ian-Sommerville/dp/013521064X

Ian Sommerville (2015),

Software Engineering,

10th Edition, Pearson.



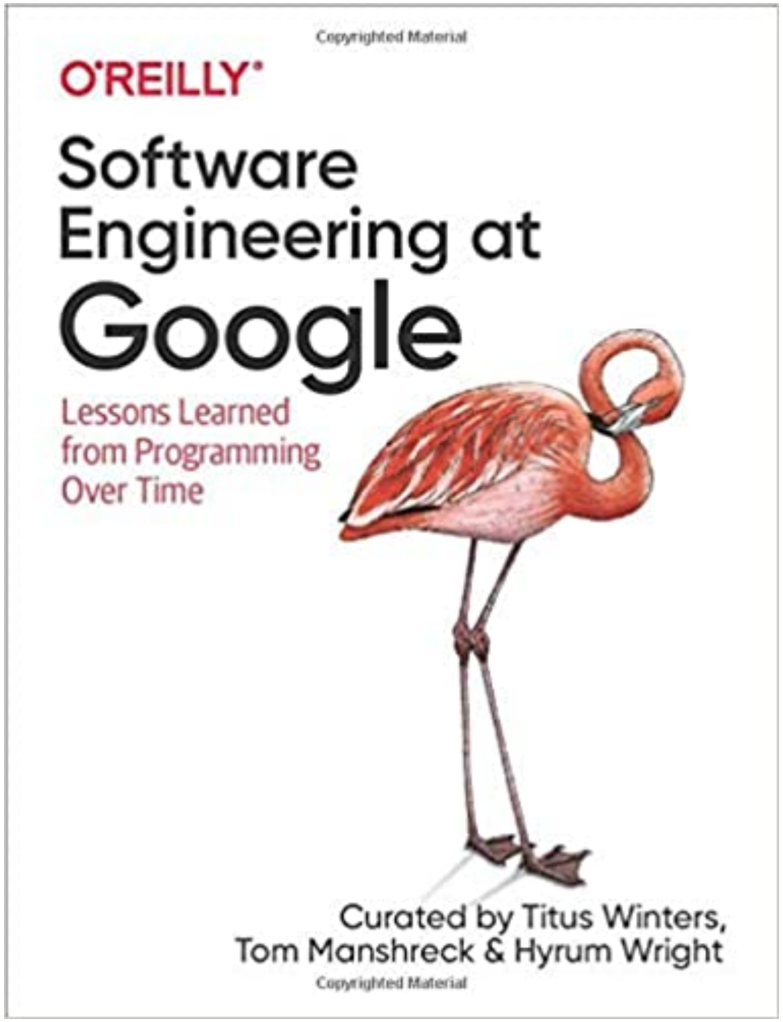
Source: https://www.amazon.com/Software-Engineering-10th-Ian-Sommerville/dp/0133943038

Titus Winters, Tom Manshreck, and Hyrum Wright (2020),

Software Engineering at Google:

Lessons Learned from Programming Over Time,

O'Reilly Media.



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Software Engineering at Google

Lessons Learned from Programming Over Time

Curated by Titus Winters, Tom Manshreck & Hyrum Wright

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Source: https://www.amazon.com/Software-Engineering-Google-Lessons-Programming/dp/1492082791

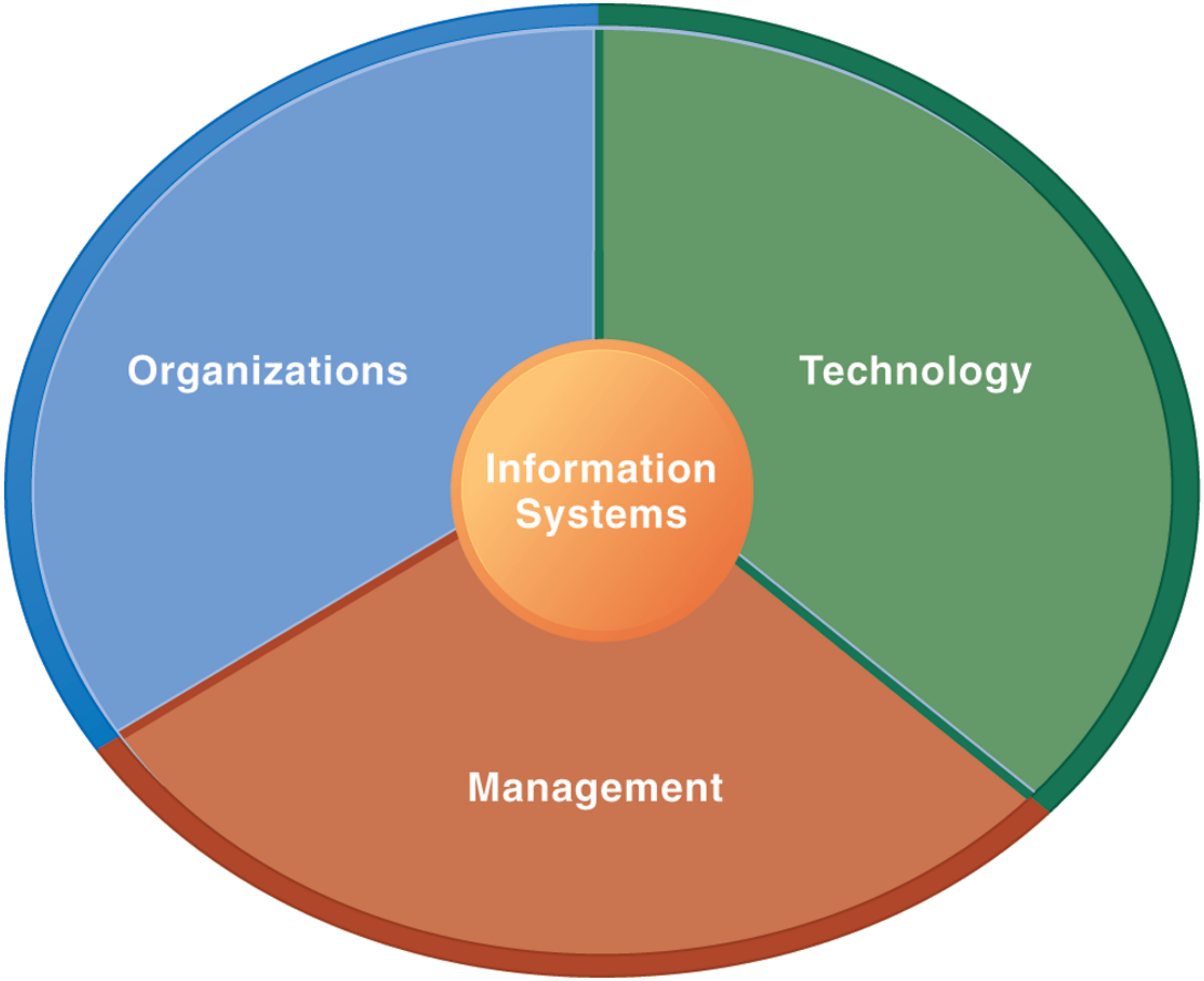
Software Engineering

Information Management

Management Information Systems (MIS)

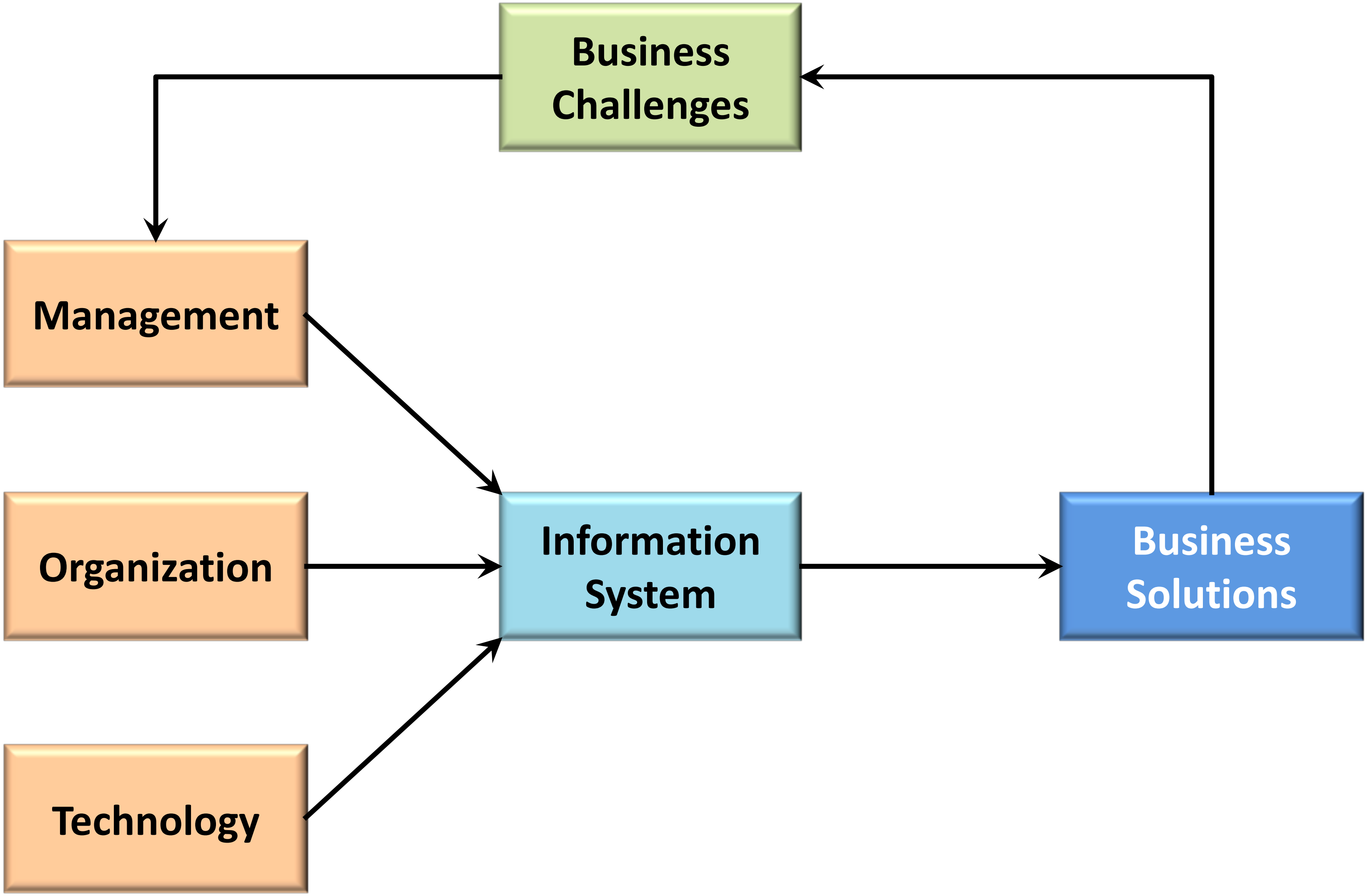
Information Systems

Information Management (MIS) Information Systems



Source: Kenneth C. Laudon & Jane P. Laudon (2014), Management Information Systems: Managing the Digital Firm, Thirteenth Edition, Pearson.

Fundamental MIS Concepts



Business Challenges

Management

Organization

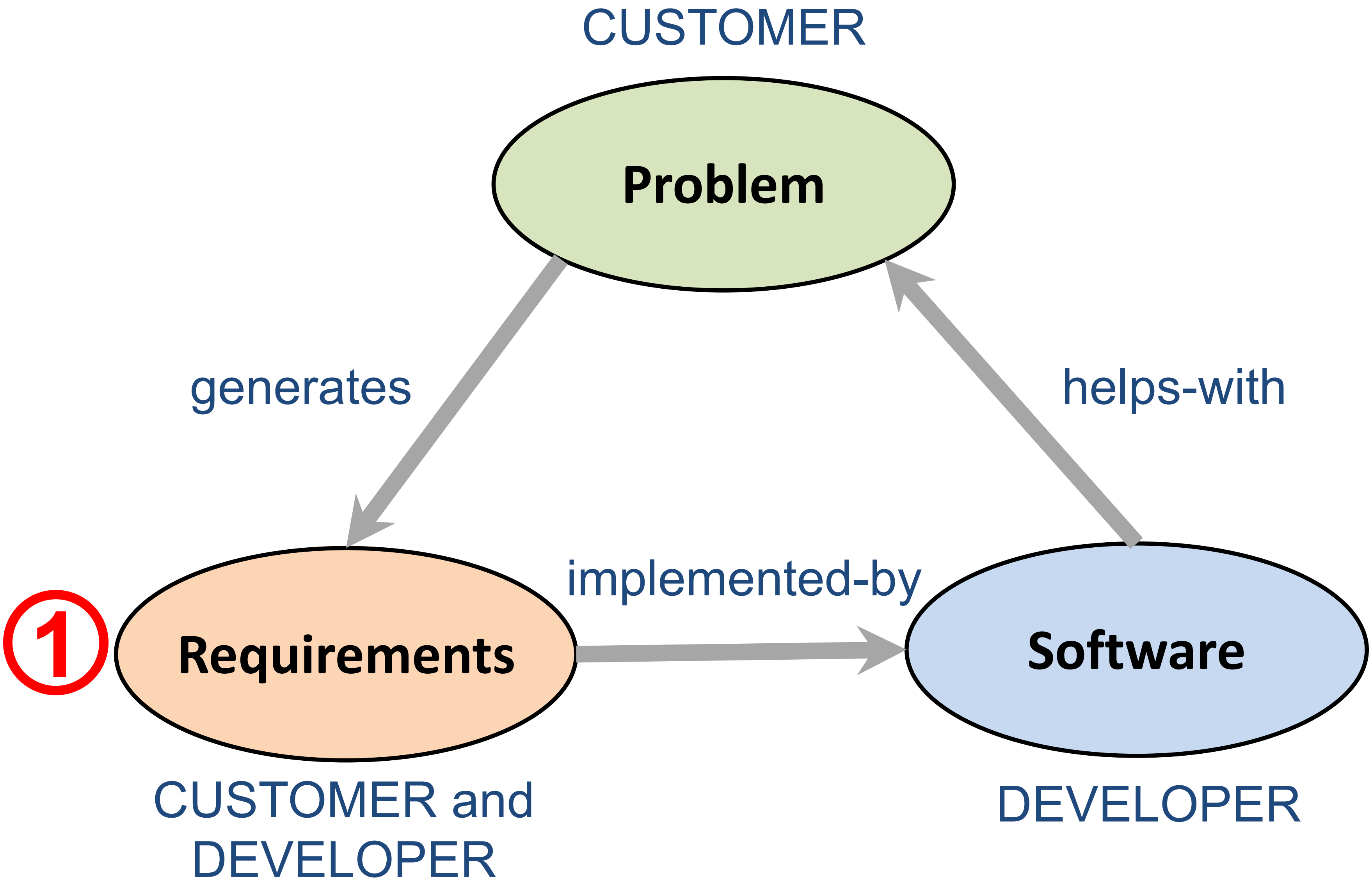
Technology

Information System

Business Solutions

Source: Kenneth C. Laudon & Jane P. Laudon (2014), Management Information Systems: Managing the Digital Firm, Thirteenth Edition, Pearson.

Project-based software engineering



CUSTOMER

Problem

generates

helps-with

① Requirements

implemented-by

Software

CUSTOMER and DEVELOPER

DEVELOPER

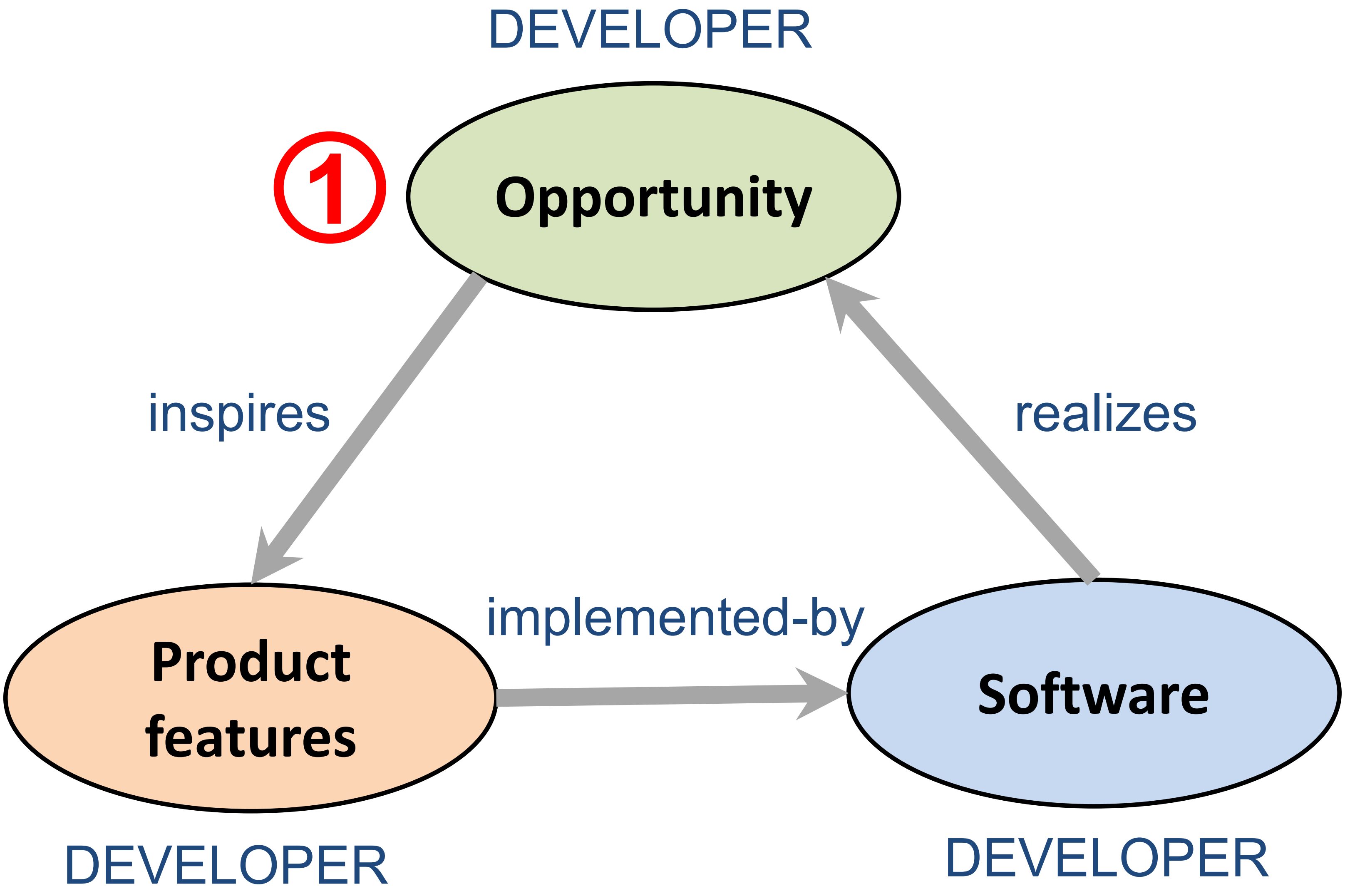
Source: Ian Sommerville (2019), Engineering Software Products: An Introduction to Modern Software Engineering, Pearson.

Project-based software engineering

- The starting point for the software development is a set of 'software requirements' that are owned by an external client and which set out what they want a software system to do to support their business processes.
- The software is developed by a software company (the contractor) who design and implement a system that delivers functionality to meet the requirements.
- The customer may change the requirements at any time in response to business changes (they usually do). The contractor must change the software to reflect these requirements changes.
- Custom software usually has a long-lifetime (10 years or more) and it must be supported over that lifetime.

Source: Ian Sommerville (2019), Engineering Software Products: An Introduction to Modern Software Engineering, Pearson.

Product software engineering



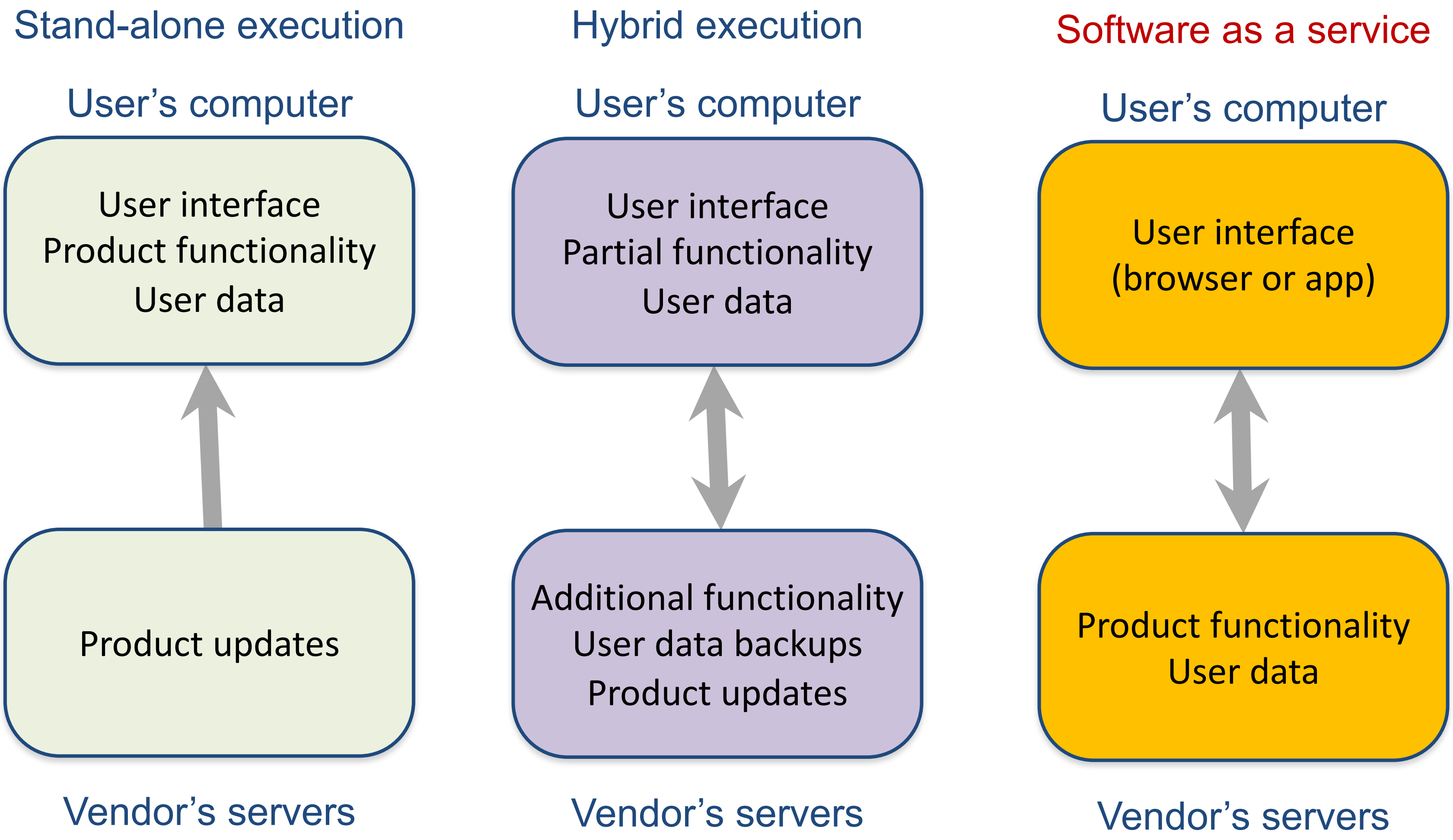
Source: Ian Sommerville (2019), Engineering Software Products: An Introduction to Modern Software Engineering, Pearson.

Product software engineering

- The starting point for product development is a business opportunity that is identified by individuals or a company. They develop a software product to take advantage of this opportunity and sell this to customers.
- The company who identified the opportunity design and implement a set of software features that realize the opportunity and that will be useful to customers.
- The software development company are responsible for deciding on the development timescale, what features to include and when the product should change.
- Rapid delivery of software products is essential to capture the market for that type of product.

Source: Ian Sommerville (2019), Engineering Software Products: An Introduction to Modern Software Engineering, Pearson.

Software execution models



Stand-alone execution

User's computer

User interface
Product functionality
User data

Product updates

Vendor's servers

Hybrid execution

User's computer

User interface
Partial functionality
User data

Additional functionality
User data backups
Product updates

Vendor's servers

Software as a service

User's computer

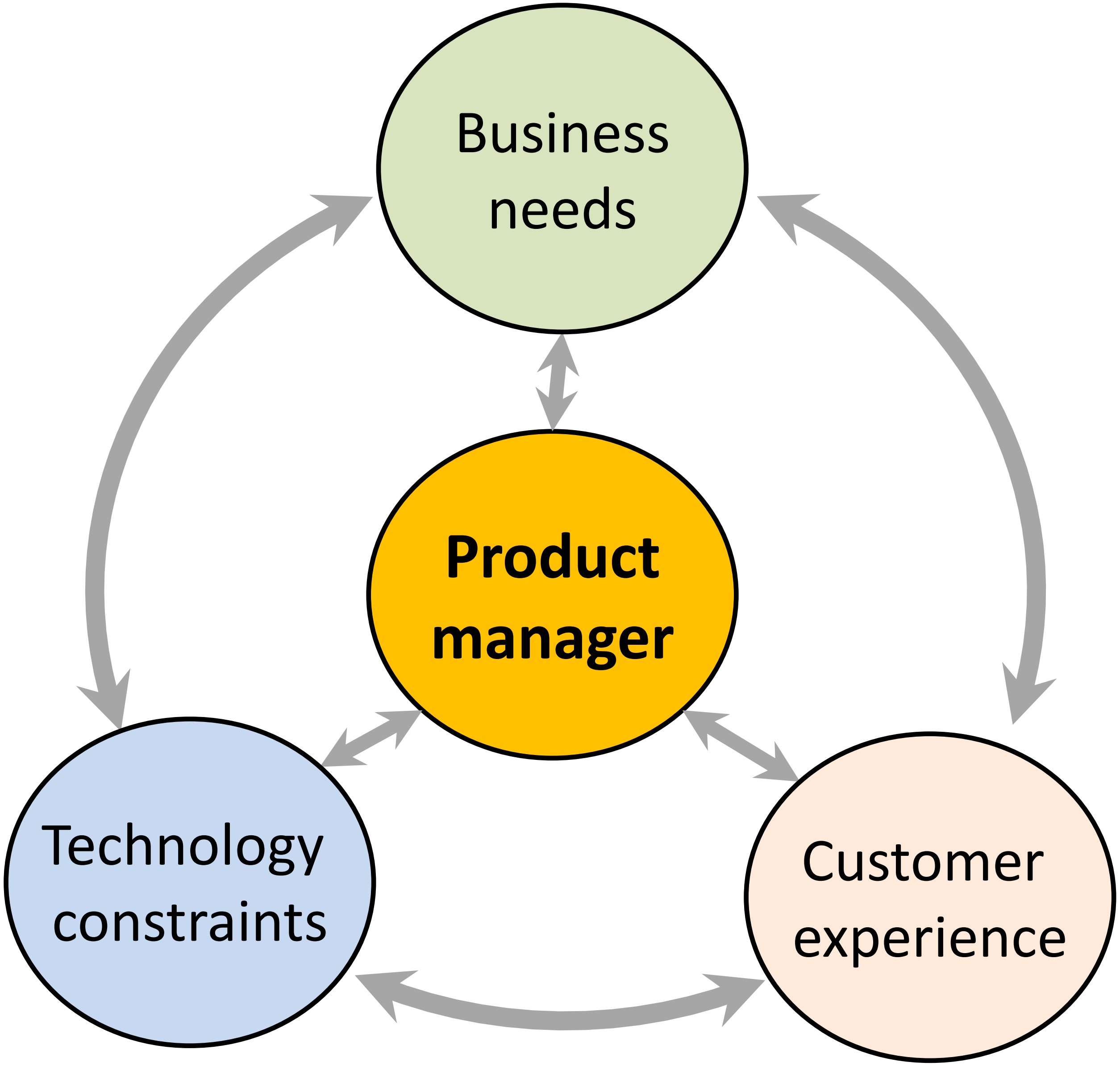
User interface
(browser or app)

Product functionality
User data

Vendor's servers

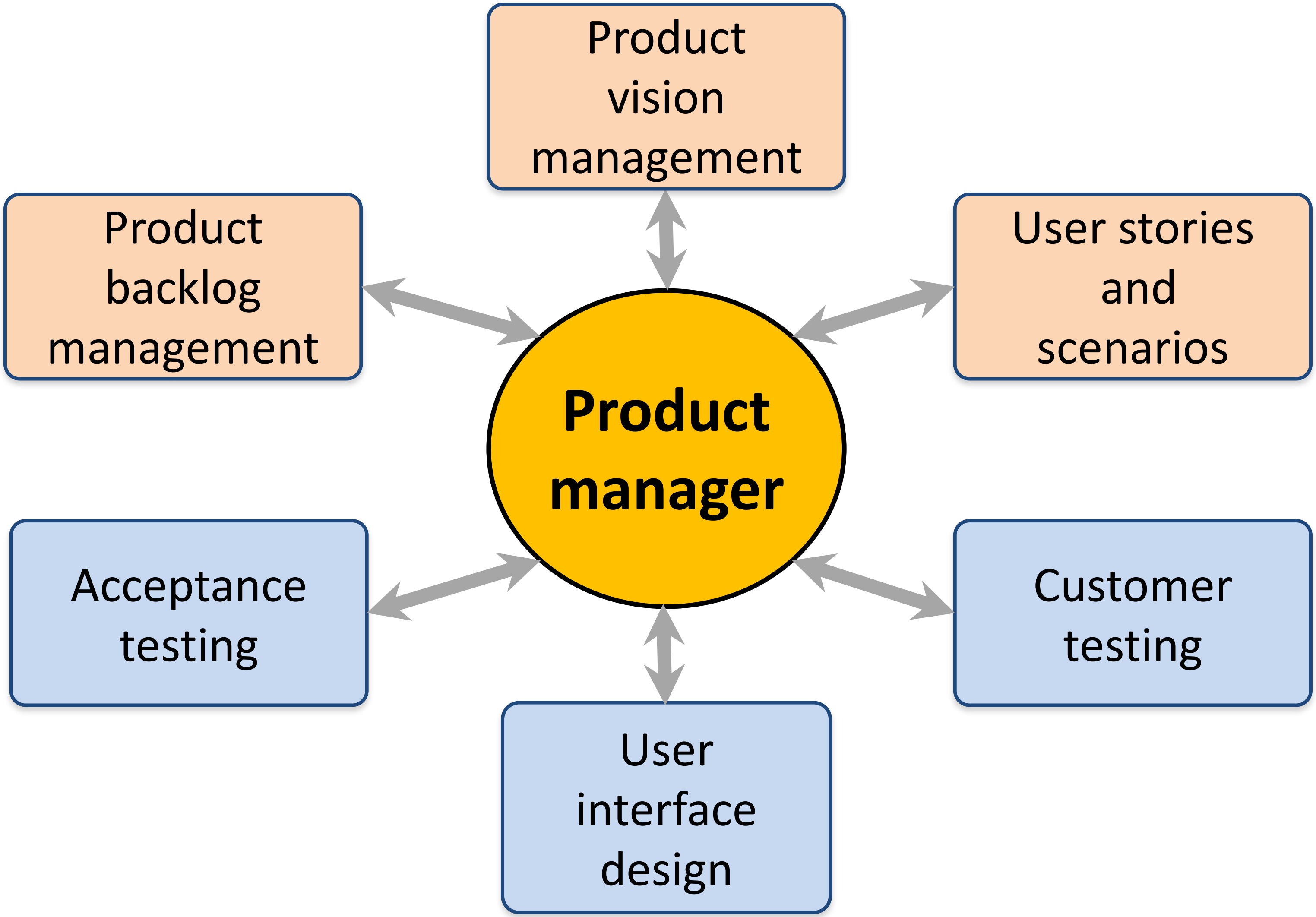
Source: Ian Sommerville (2019), Engineering Software Products: An Introduction to Modern Software Engineering, Pearson.

Product management concerns



Source: Ian Sommerville (2019), Engineering Software Products: An Introduction to Modern Software Engineering, Pearson.

Technical interactions of product managers



Product manager

Product vision management

Product backlog management

User stories and scenarios

Acceptance testing

Customer testing

User interface design

Source: Ian Sommerville (2019), Engineering Software Products: An Introduction to Modern Software Engineering, Pearson.

Marketing

Marketing

“Meeting needs profitably”

Source: Philip Kotler and Kevin Lane Keller (2016), Marketing Management, 15th edition, Pearson.

Marketing

“**Marketing** is an organizational function
and a set of processes for
creating, communicating, and delivering
value to customers and
for managing customer **relationships**
in ways that benefit the organization and
its stakeholders.”

Source: Philip Kotler and Kevin Lane Keller (2016), Marketing Management, 15th edition, Pearson.

Marketing Management

Marketing Management

“**Marketing management** is the
art and science
of choosing target markets
and getting, keeping, and growing
customers through
creating, delivering, and communicating
superior **customer value**.”

Source: Philip Kotler and Kevin Lane Keller (2016), Marketing Management, 15th edition, Pearson.

Marketing Management

1 Understanding Marketing Management

2 Capturing Marketing Insights

3 Connecting with Customers

4 Building Strong Brands

5 Creating Value

6 Delivering Value

7 Communicating Value

8 Conducting Marketing Responsibly for Long-term Success

Source: Philip Kotler and Kevin Lane Keller (2016), Marketing Management, 15th edition, Pearson.

Summary

- This course introduces the fundamental concepts, research issues, and hands-on practices of software engineering.
- Topics include
  1. Introduction to Software Engineering
  2. Software Products and Project Management: Software product management and prototyping
  3. Agile Software Engineering: Agile methods, Scrum, and Extreme Programming
  4. Features, Scenarios, and Stories
  5. Software Architecture: Architectural design, System decomposition, and Distribution architecture
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