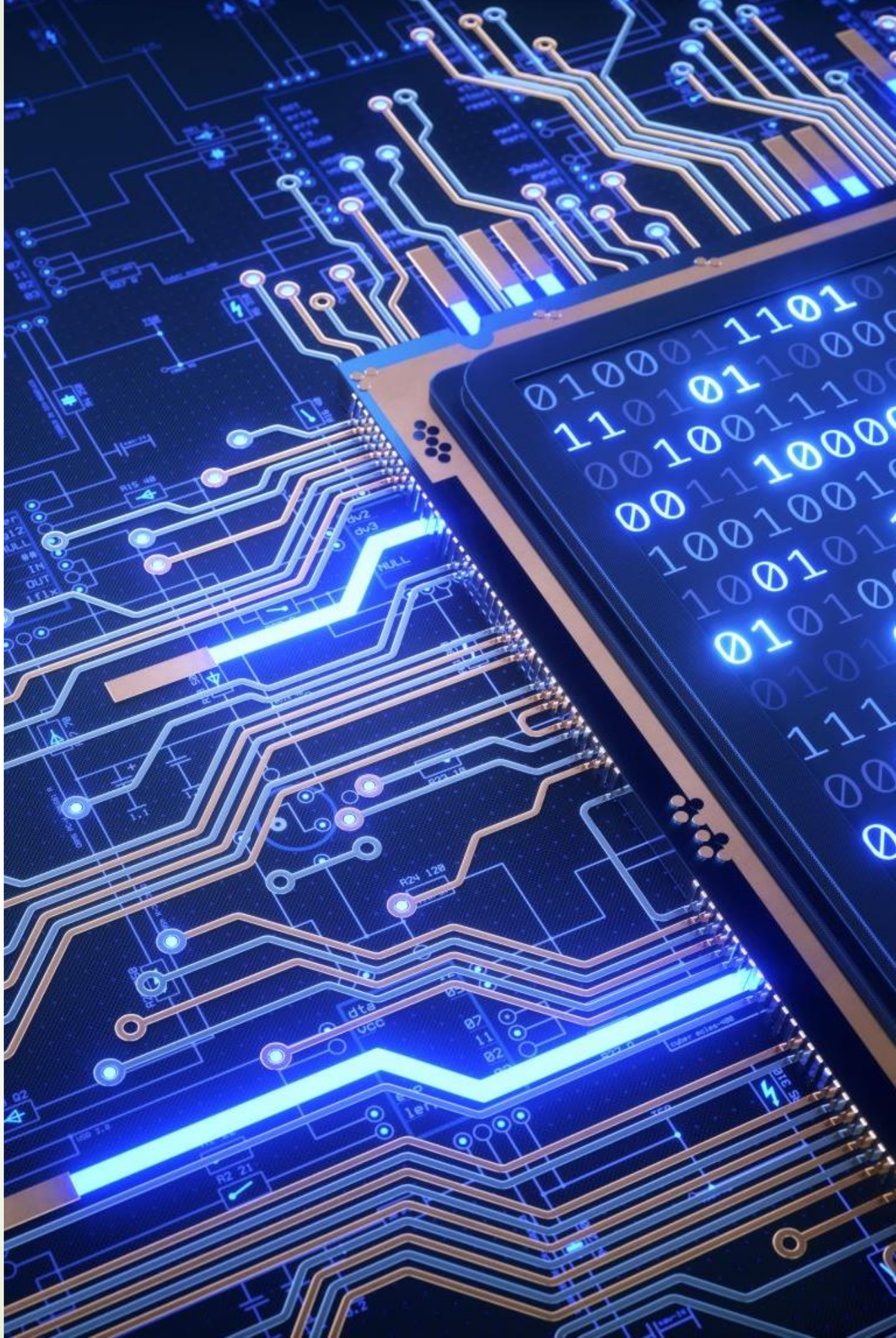
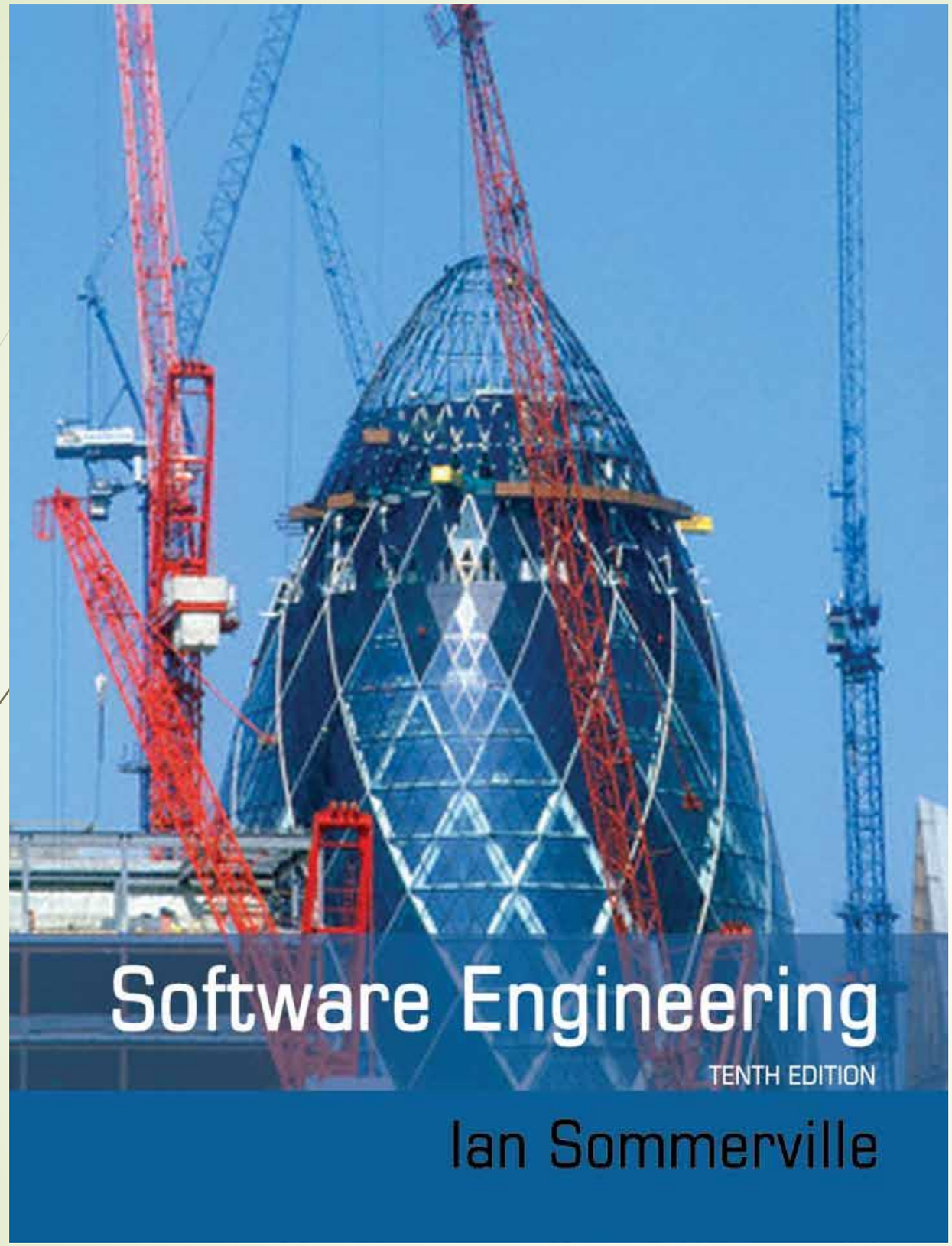
CENG302 YAZILIM MÜHENDİSLİĞİ DERSİ

HAFTA3





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Case Studies

All of the case studies that are shown here are used in the book. I have deliberately not used a single case study throughout the book as there is no single example that can illustrate all of the topics covered in the book.

iLearn: A digital learning environment

In 2012, I was invited to become part of a group developing a specification and architectural design for a digital…

Mentcare: A mental health support system

This case study focuses on the requirements for a system that I have called the Mentcare system, which is a real system…

A personal insulin pump

This case study discusses the control software for a personal insulin pump, which is used by diabetics to mimic the…

A wilderness weather station

This case study is based on the software for a wilderness weather station that collects weather information in remote…

Airbus 340 flight control system

This case study describes the architecture of the Airbus 340 flight control system, a safety critical system that…

Ariane 5 launch accident

This case study describes the accident that occurred on the initial launch of the Ariane 5 rocket, a launcher developed…

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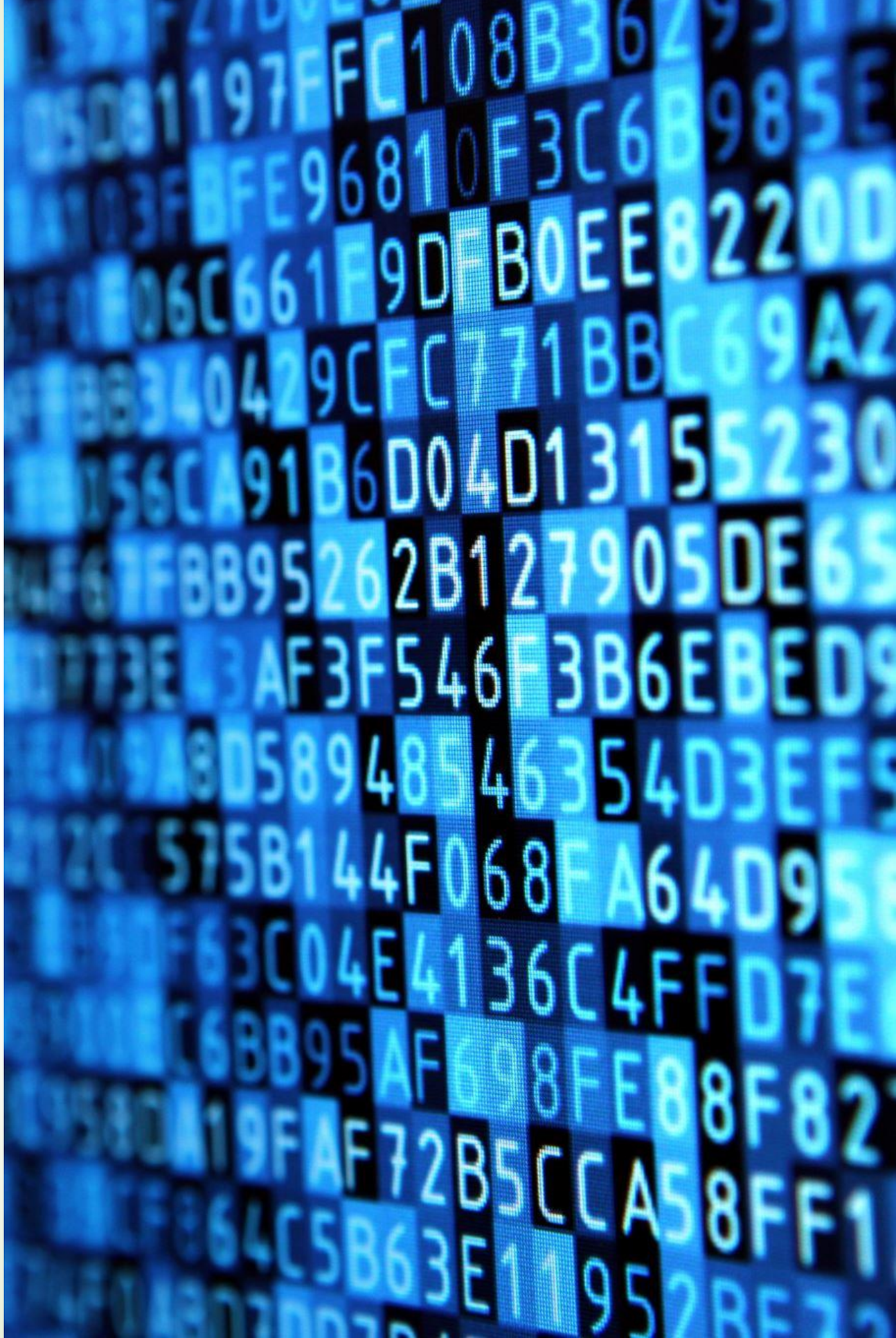
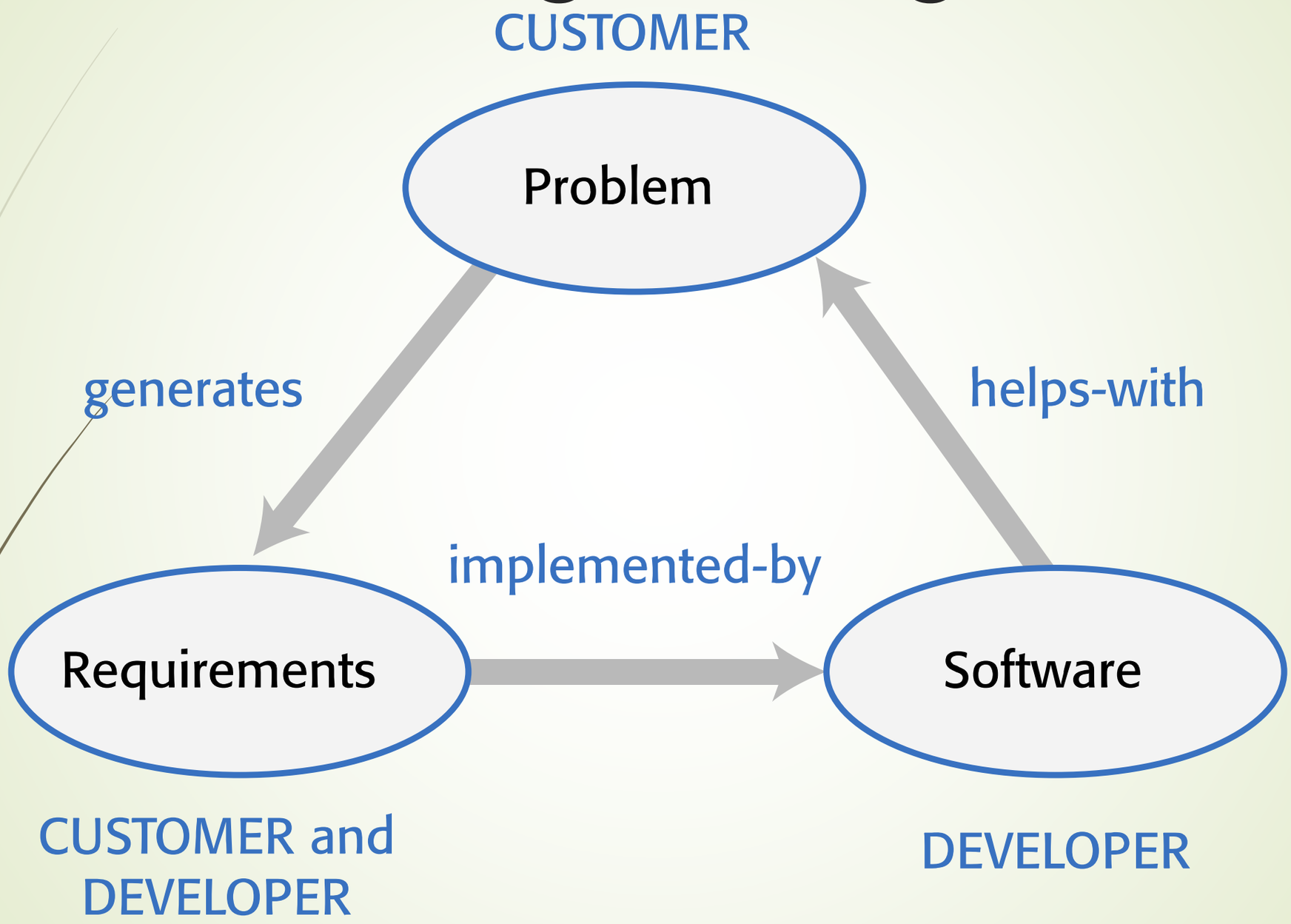
Software products



Software products

- Software products are generic software systems that provide functionality that is useful to a range of customers.
- Many different types of products are available from large-scale business systems (e.g. MS Excel) through personal products (e.g. Evernote) to simple mobile phone apps and games (e.g. Sudoku).
- Software product engineering methods and techniques have evolved from software engineering techniques that support the development of one-off, custom software systems.
- **Custom software systems** are still important for large businesses, government and public bodies. They are developed in dedicated software projects.

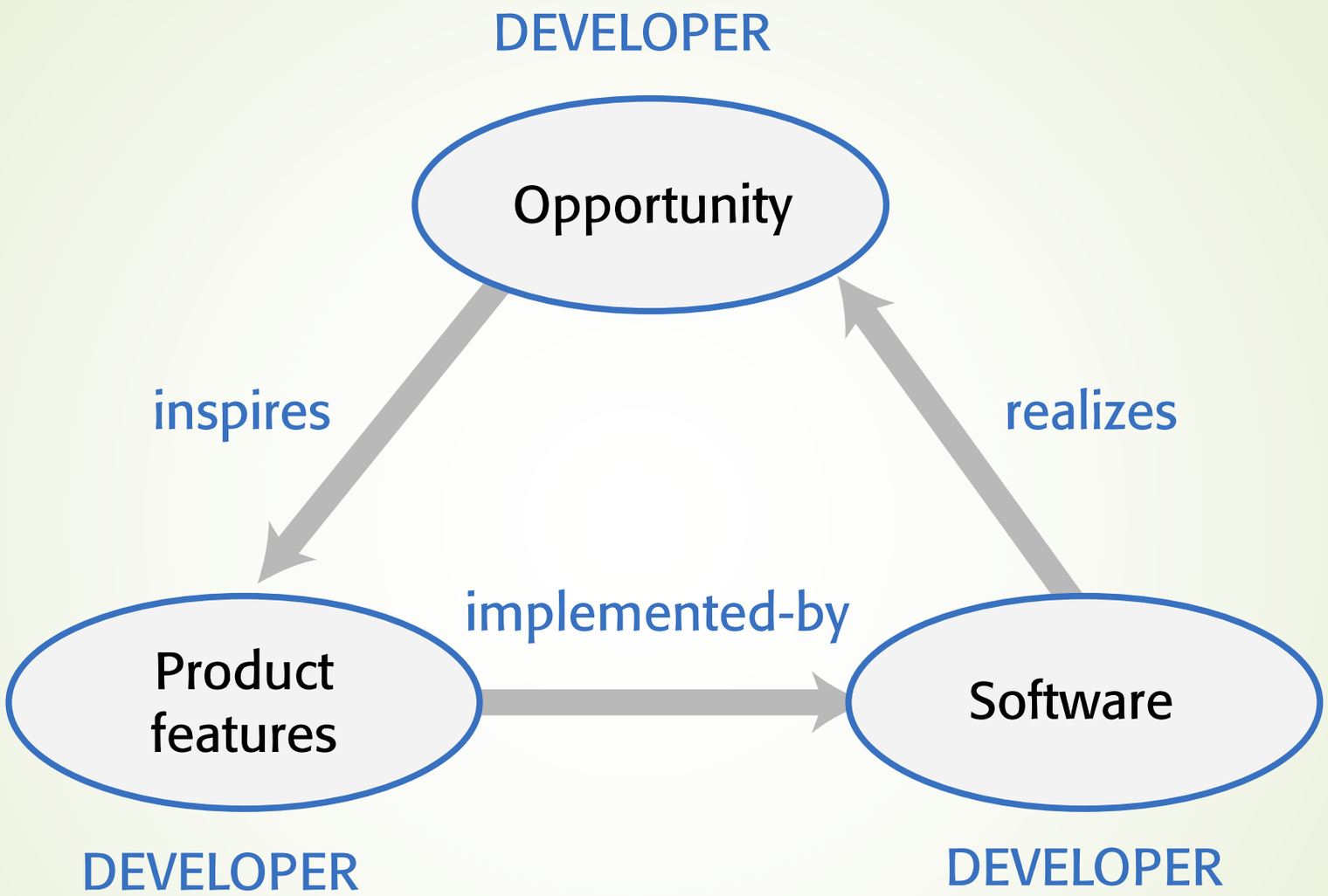
Figure 1.1 Project-based software engineering



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.

Figure 1.2 Product software engineering



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.

Table 1.1 Software product lines and platforms

- ***Software product line***
  A set of software products that share a common core. Each member of the product line includes customer-specific adaptations and additions. Software product lines may be used to implement a custom system for a customer with specific needs that can't be met by a generic product.

- ***Platform***
  A software (or software+hardware) product that includes functionality so that new applications can be built on it. An example of a platform that you probably use is Facebook. It provides an extensive set of product functionality but also provides support for creating 'Facebook apps'. These add new features that may be used by a business or a Facebook interest group.

Software execution models

- ***Stand-alone*** The software executes entirely on the customer's computers.
- ***Hybrid*** Part of the software's functionality is implemented on the customer's computer but some features are implemented on the product developer's servers.
- ***Software service*** All of the product's features are implemented on the developer's servers and the customer accesses these through a browser or a mobile app.

Figure 1.3 Software execution models

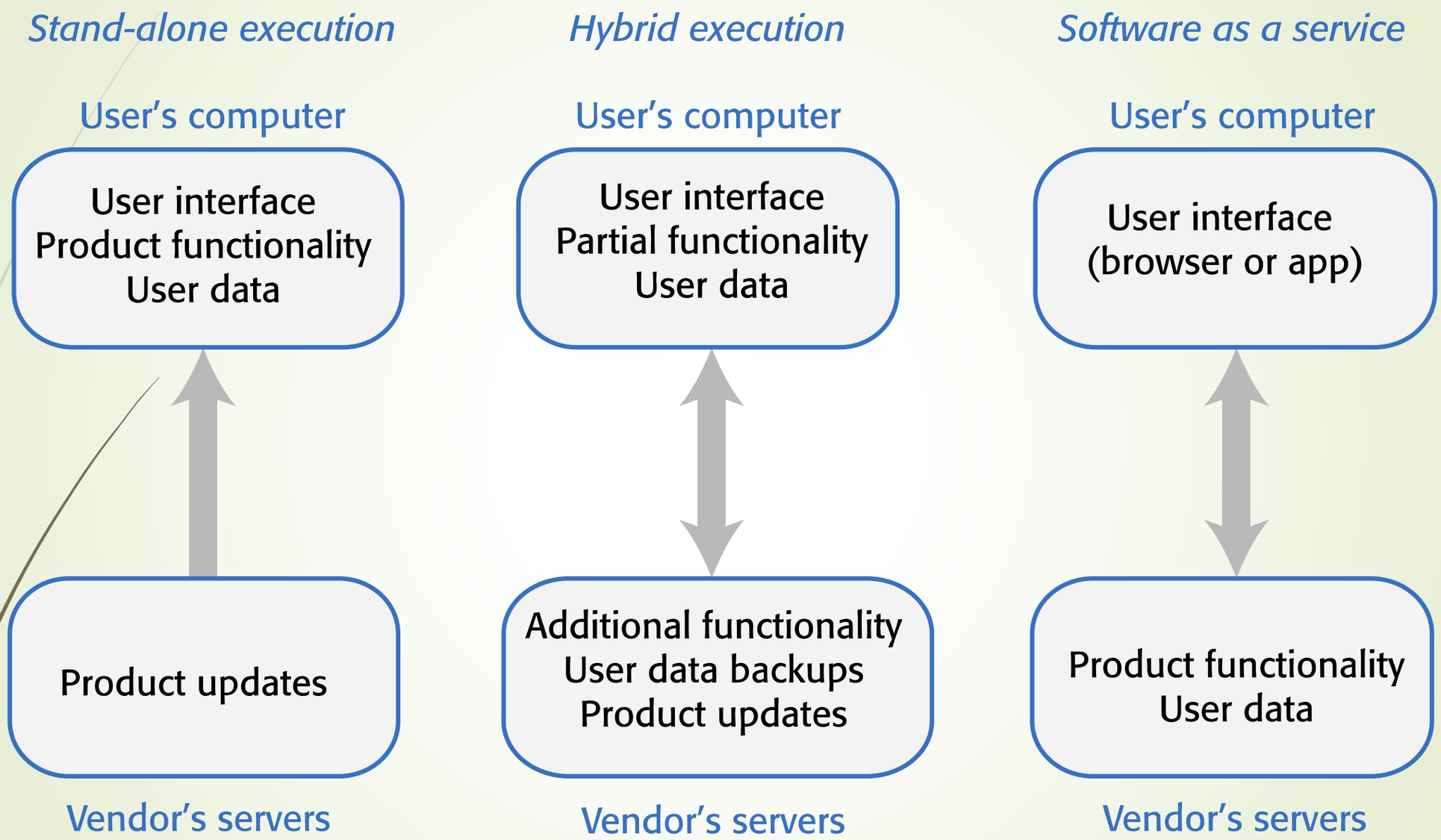


Figure 1.3 Software execution models

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

Comparable software development

- The key feature of product development is that there is no external customer that generates requirements and pays for the software. This is also true for other types of software development:
  - ***Student projects*** Individuals or student groups develop software as part of their course. Given an assignment, they decide what features to include in the software.
  - ***Research software*** Researchers develop software to help them answer questions that are relevant to their research.
  - ***Internal tool development*** Software developers may develop tools to support their work - in essence, these are internal products that are not intended for customer release.

15 DK ARA

The product vision

- The starting point for software product development is a ‘product vision’.
- Product visions are simple statements that define the essence of the product to be developed.
- The product vision should answer three fundamental questions:
  - What is the product to be developed?
  - Who are the target customers and users?
  - Why should customers buy this product?

Moore's vision template

- FOR (target customer)
- WHO (statement of the need or opportunity)
- The (PRODUCT NAME) is a (product category)
- THAT (key benefit, compelling reason to buy)
- UNLIKE (primary competitive alternative)
- OUR PRODUCT (statement of primary differentiation)

Moore's vision template

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Hedef Müşteri: Ürününüzün hedef kitlesi kimdir?

İhtiyaç veya Fırsat: Ürününüz hangi spesifik problemleri, ihtiyaçları veya fırsatları ele alır?

Ürün Adı: Ürününüzün adı nedir?

Ürün Kategorisi: Ürününüz hangi kategoriye girer?

Temel Fayda: Ürününüzü gerekli veya arzu edilir kılan ana fayda nedir?

Rekabetçi Alternatif: Ana rakibiniz kimdir?

Temel Farklılık: Ürününüz rakiplerinden nasıl farklılaşır?

Vision template example

"**FOR** a mid-sized company's marketing and sales departments **WHO** need basic CRM functionality, THE CRM-Innovator is a Web-based service **THAT** provides sales tracking, lead generation, and sales representative support features that improve customer relationships at critical touch points. **UNLIKE** other services or package software products, **OUR** product provides very capable services at a moderate cost."

Table 1.2 Information sources for developing a product vision

- ***Domain experience***
  The product developers may work in a particular area (say marketing and sales) and understand the software support that they need. They may be frustrated by the deficiencies in the software they use and see opportunities for an improved system.

- ***Product experience***
  Users of existing software (such as word processing software) may see simpler and better ways of providing comparable functionality and propose a new system that implements this. New products can take advantage of recent technological developments such as speech interfaces.

- ***Customer experience***
  The software developers may have extensive discussions with prospective customers of the product to understand the problems that they face, constraints, such as interoperability, that limit their flexibility to buy new software, and the critical attributes of the software that they need.

- ***Prototyping and playing around***
  Developers may have an idea for software but need to develop a better understanding of that idea and what might be involved in developing it into a product. They may develop a prototype system as an experiment and 'play around' with ideas and variations using that prototype system as a platform.

Table 1.3 A vision statement for the iLearn system

- **FOR** teachers and educators **WHO** need a way to help students use web-based learning resources and applications, **THE** iLearn system is an open learning environment **THAT** allows the set of resources used by classes and students to be easily configured for these students and classes by teachers themselves. **UNLIKE** Virtual Learning Environments, such as Moodle, the focus of iLearn is the learning process rather than the administration and management of materials, assessments and coursework. **OUR** product enables teachers to create subject and age-specific environments for their students using any web-based resources, such as videos, simulations and written materials that are appropriate.
- Schools and universities are the target customers for the iLearn system as it will significantly improve the learning experience of students at relatively low cost. It will collect and process learner analytics that will reduce the costs of progress tracking and reporting.

Different types of computer software

Web genelindeki kaynaklardan

Multimedia

Web browsers

Word Processors

Database software

Spreadsheet

Educational software

Graphics software

Presentation software

Utility software

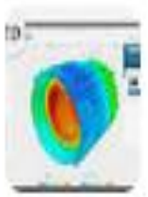
Communication

Device driver

Firmware

Open source

Shareware



Simulation software

Software development

Freeware

Operating system

System software

Vision template example

"**FOR** a mid-sized company's marketing and sales departments **WHO** need basic CRM functionality, THE CRM-Innovator is a Web-based service **THAT** provides sales tracking, lead generation, and sales representative support features that improve customer relationships at critical touch points. **UNLIKE** other services or package software products, **OUR** product provides very capable services at a moderate cost."

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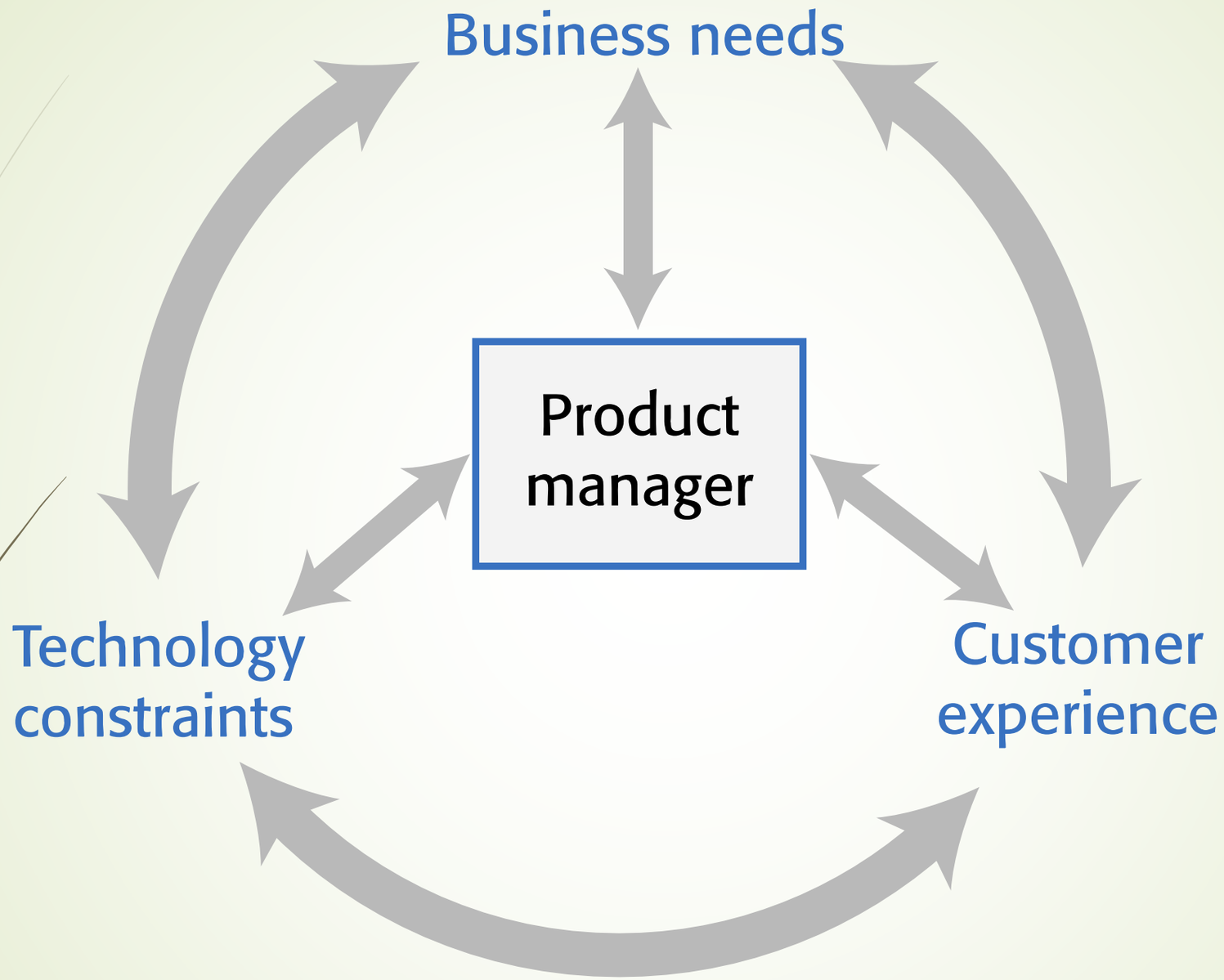
15 DK ARA

Software product management

- Software product management is a business activity that focuses on the software products developed and sold by the business.
- Product managers (PMs) take overall responsibility for the product and are involved in planning, development and product marketing.
- Product managers are the **interface between the organization, its customers and the software development team**. They are involved at all stages of a product's lifetime from initial conception through to withdrawal of the product from the market.
- Product managers must look outward to customers and potential customers rather than focus on the software being developed.

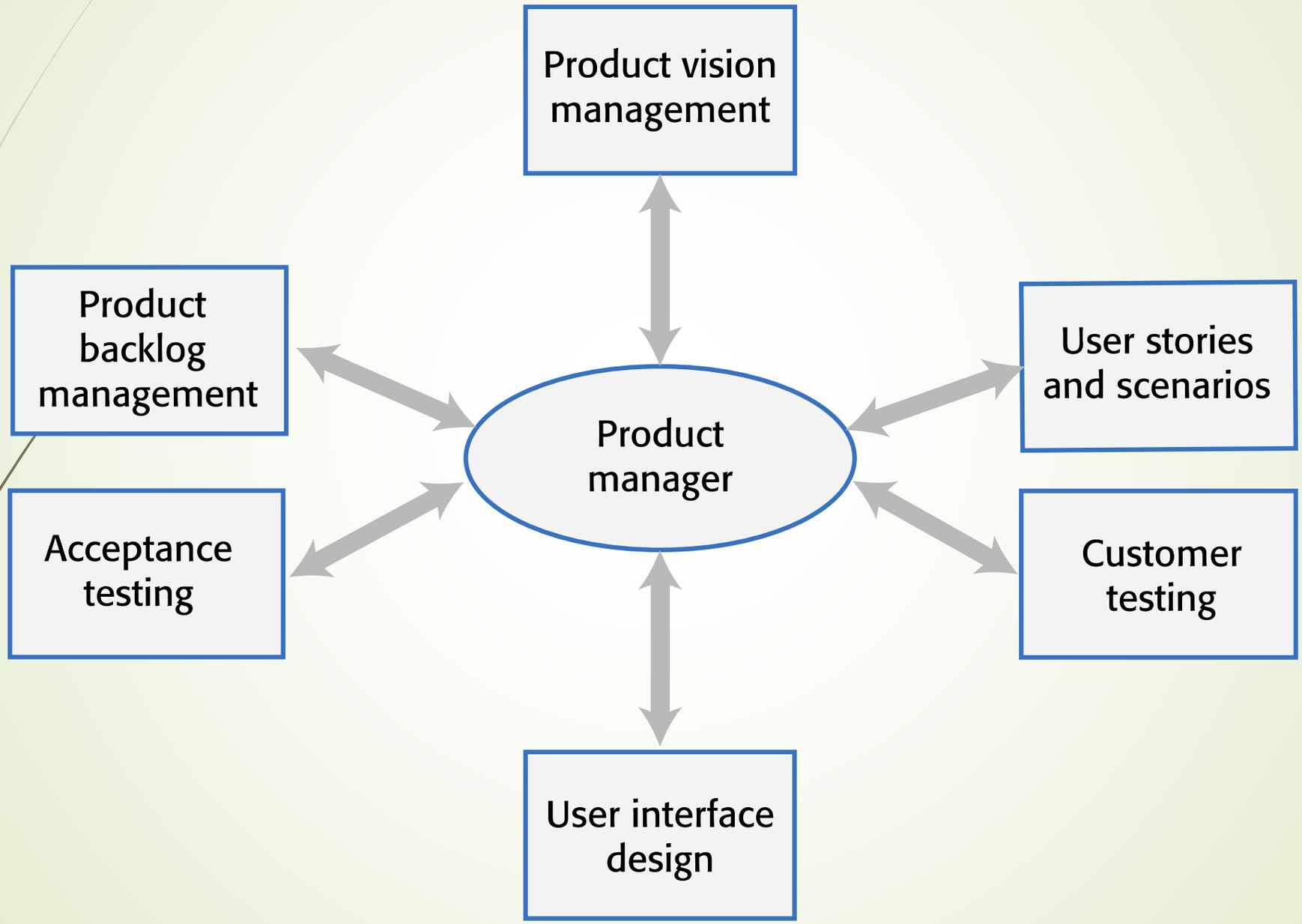
Figure 1.4 Product management concerns



Product management concerns

- ***Business needs*** PMs have to ensure that the software being developed meets the business goals of the software development company.
- ***Technology constraints*** PMs must make developers aware of technology issues that are important to customers.
- ***Customer experience*** PMs should be in regular contact with customers and potential customers to understand what they are looking for in a product, the types of users and their backgrounds and the ways that the product may be used.

Figure 1.5 Technical interactions of product managers



Technical interactions of product managers

- Product vision management
  - The product manager may be responsible for helping with the development of the product vision. The should always be responsible for managing the vision, which **involves assessing and evaluating** proposed **changes against the product vision**. They should ensure that there is no 'vision drift'

- Product roadmap development
  - A product roadmap is a plan for **the development, release and marketing** of the software. The PM should lead roadmap development and should be the ultimate authority in deciding if changes to the roadmap should be made.

- User story and scenario development
  - User stories and scenarios are used to refine a product vision and identify product features. Based on his or her knowledge of customers, the PM should lead the development of stories and scenarios.

Technical interactions of product managers

- Product backlog creation and management
  - The product backlog is a prioritized 'to-do' list of what has to be developed. PMs should be involved in creating and refining the backlog and deciding on the priority of product features to be developed.
- Acceptance testing
  - Acceptance testing is the process of verifying that a software release meets the goals set out in the product roadmap and that the product is efficient and reliable. The PM should be involved **in developing tests of the product features that reflect how customers** use the product.
- Customer testing
  - Customer testing involves taking a release of a product to customers and getting feedback on the product's features, usability and business. PMs are involved **in selecting customers to be involved** in the customer testing process and working with them during that process.
- User interface design
  - Product managers should understand **user limitations** and act as surrogate users in their interactions with the development team. They should evaluate user interface features as they are developed to check that these features are not unnecessarily complex or force users to work in an unnatural way.

Product prototyping

- Product prototyping is the process of developing an early version of a product to test your ideas and to convince yourself and company funders that your product has real market potential.
  - You may be able to write an inspiring product vision, but your potential users can only really relate to your product when they see a working version of your software. They can point out what they like and don't like about it and make suggestions for new features.
  - A prototype may be also used to help identify fundamental software components or services and to test technology.
- Building a prototype should be the first thing that you do when developing a software product. Your aim should be to have a working version of your software that can be used to demonstrate its key features.
- You should always plan to throw-away the prototype after development and to re-implement the software, taking account of issues such as security and reliability.

Two-stage prototyping

- ***Feasibility demonstration*** You create an executable system that demonstrates the new ideas in your product. The aims at this stage are to see if your ideas actually work and to show funders and/or company management the original product features that are better than those in competing products.
- ***Customer demonstration*** You take an existing prototype created to demonstrate feasibility and extend this with your ideas for specific customer features and how these can be realized. Before you develop this type of prototype, you need to do some user studies and have a clearer idea of your potential users and scenarios of use.

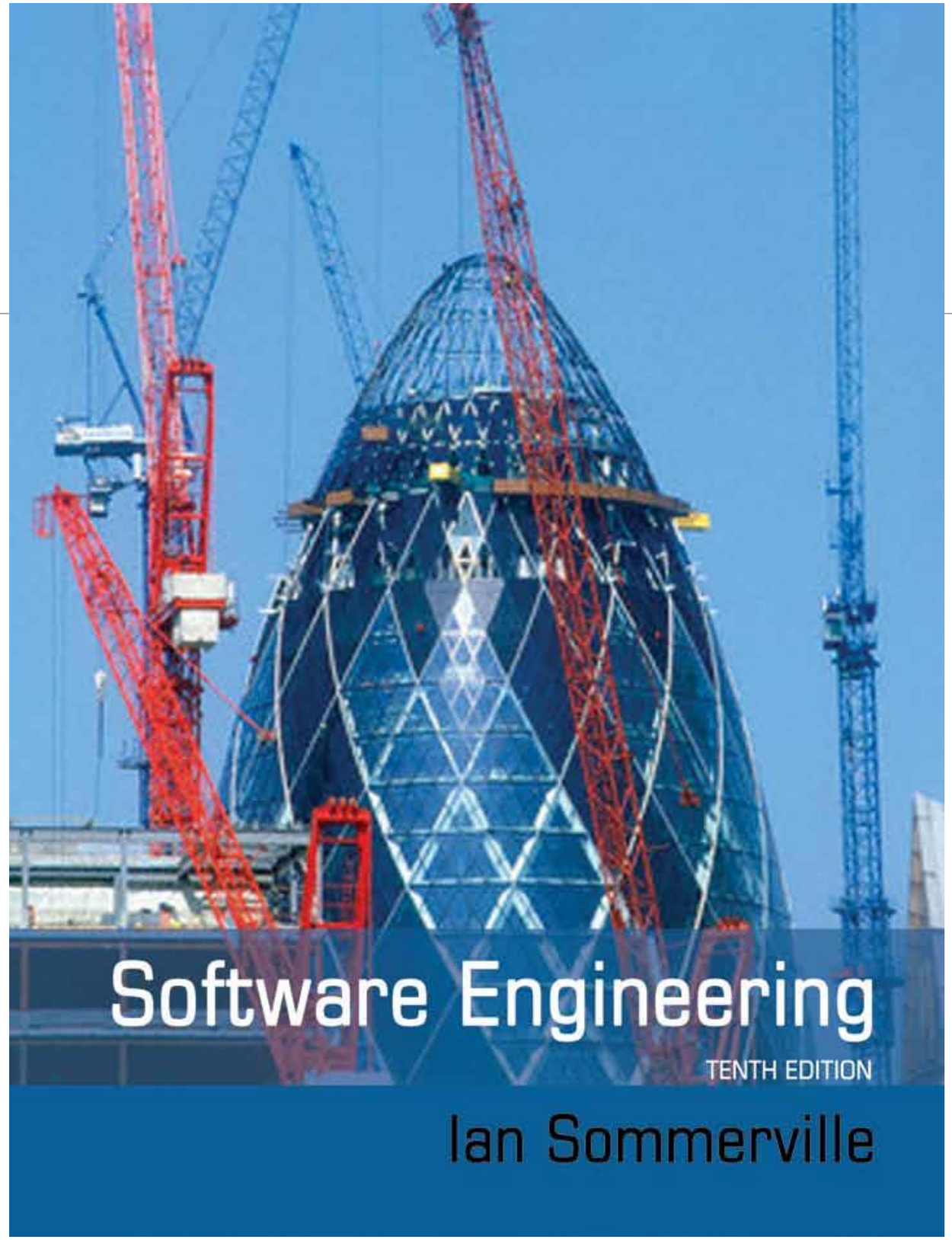
Key points 1

- Software products are software systems that include general functionality that is likely to be useful to a wide range of customers.
- In product software engineering, the same company is responsible for deciding on the features that should be part of the product and the implementation of these features.
- Software products may be delivered as stand-alone systems running on the customer's computers, hybrid systems or service-based systems. In hybrid systems, some features are implemented locally and others are accessed over the Internet. All product features are remotely accessed in service-based products.
- A product vision should succinctly describe what is to be developed, who are the target customers for the product and why they should buy the product that you are developing.
- Domain experience, product experience, customer experience and an experimental software prototype may all contribute to the development of the product vision.

Key points 2

- Key responsibilities of product managers are product vision ownership, product roadmap development, creating user stories and the product backlog, customer and acceptance testing and user interface design.
- Product managers work at the interface between the business, the software development team and the product customers. They facilitate communications between these groups.
- You should always develop a product prototype to refine your own ideas and to demonstrate the planned product features to potential customers

Features, scenarios and stories



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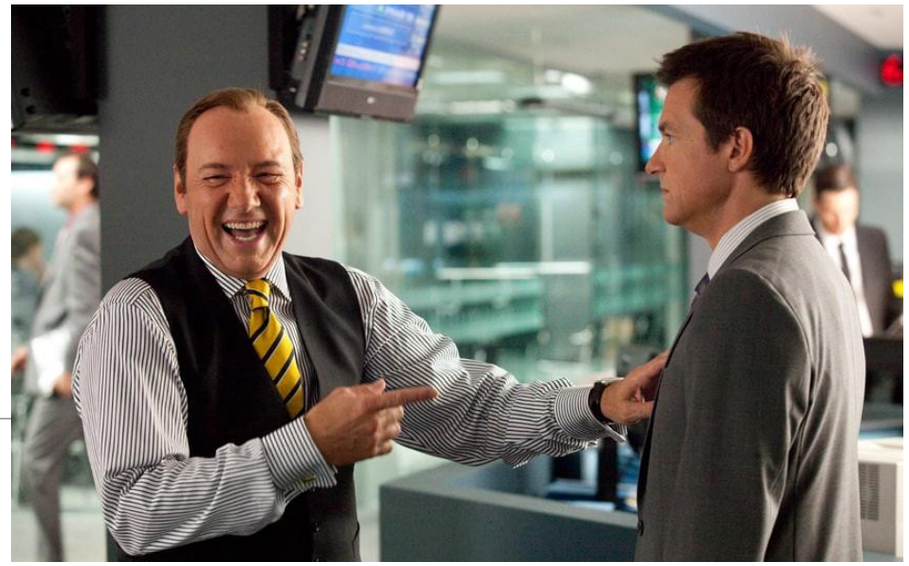
Software products

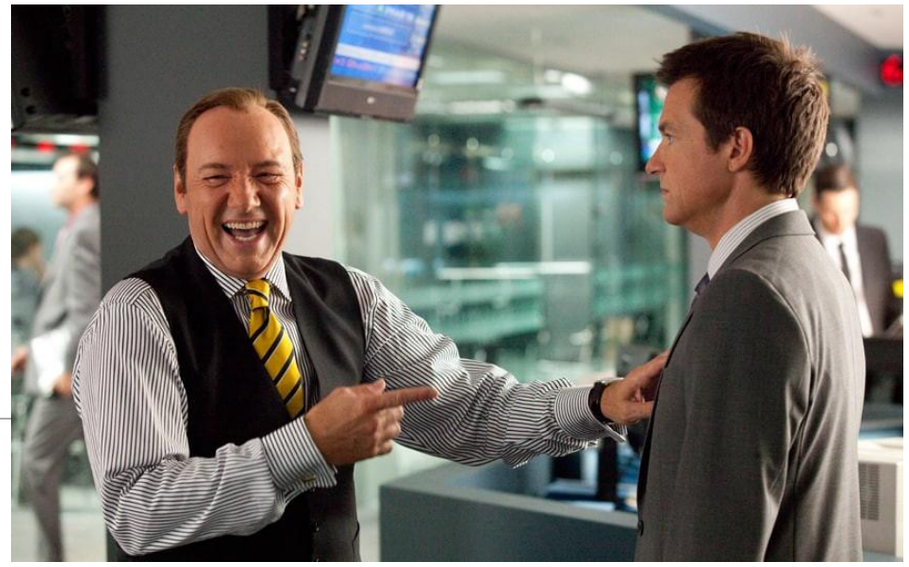


There are three factors that drive the design of software products

- Business and consumer needs that are not met by current products
- Dissatisfaction with existing business or consumer software products
- Changes in technology that make completely new types of product possible

In the early stage of product development, you are trying to understand, what product features would be useful to users, and what they like and dislike about the products that they use.

Software products



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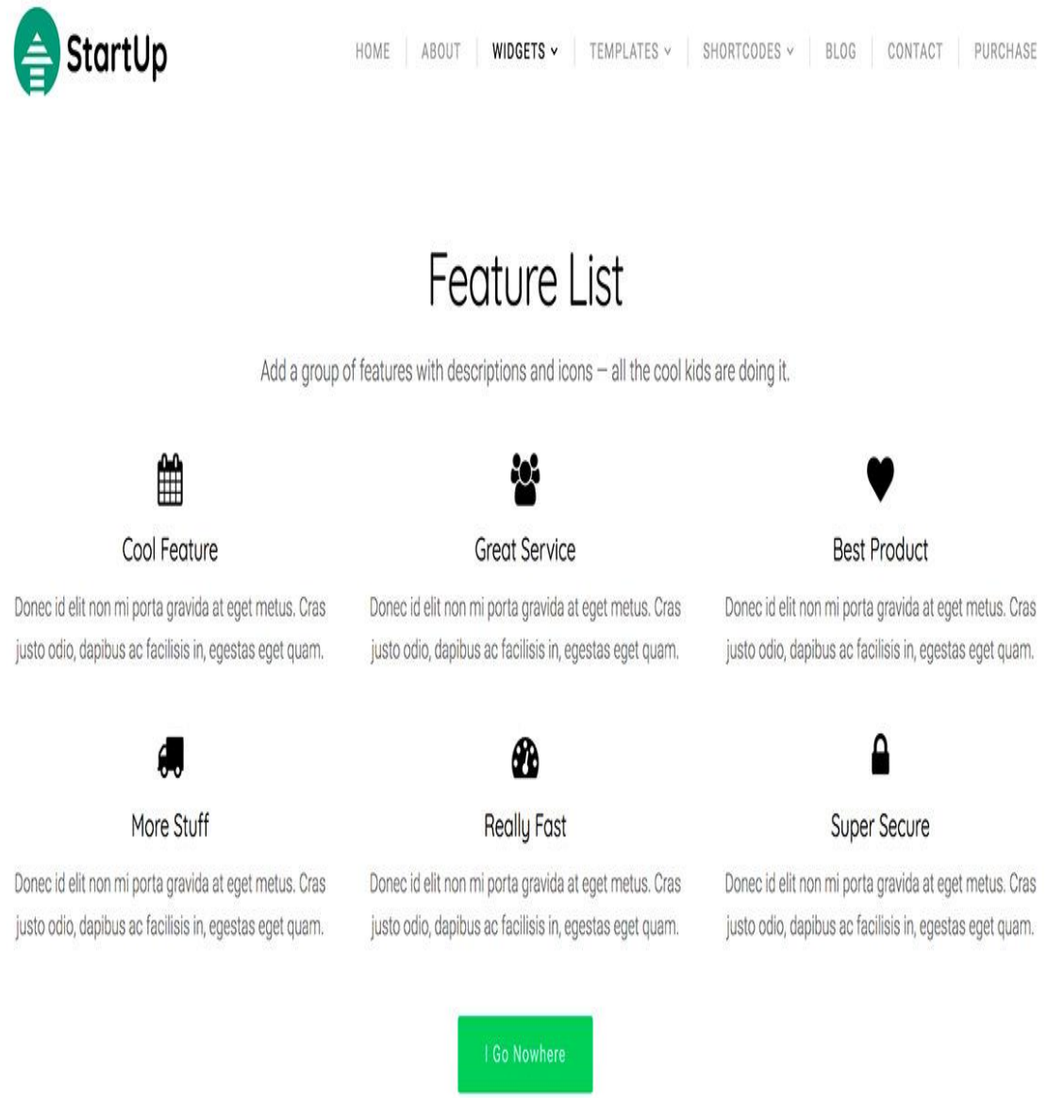
In the early stage of product development, you are trying to understand, what product features would be useful to users, and what they like and dislike about the products that they use.

Software features

A feature is a fragment of functionality such as a ‘print’ feature, a ‘change background feature’, a ‘new document’ feature and so on.

Before you start programming a product, you should aim to create a list of features to be included in your product.

The feature list should be your starting point for product design and development.



User understanding

It makes sense in any product development to spend time trying to understand the potential users and customers of your product.

A range of techniques have been developed for understanding the ways that people work and use software.

- These include user interviews, surveys, ethnography and task analysis.
- Some of these techniques are expensive and unrealistic for small companies.

Informal user analysis and discussions, which simply involve asking users about their work, the software that they use, and its strengths and weaknesses are inexpensive and very valuable.

Figure 3.1 From personas to features

Personas

A way of representing users

inspire

Natural language descriptions of a user interacting with a software product

Scenarios

are-developed-into

inspire

Stories

Natural language descriptions of something that is needed or wanted by users

Features

define

Fragments of product functionality

Figure 3.2 Feature description

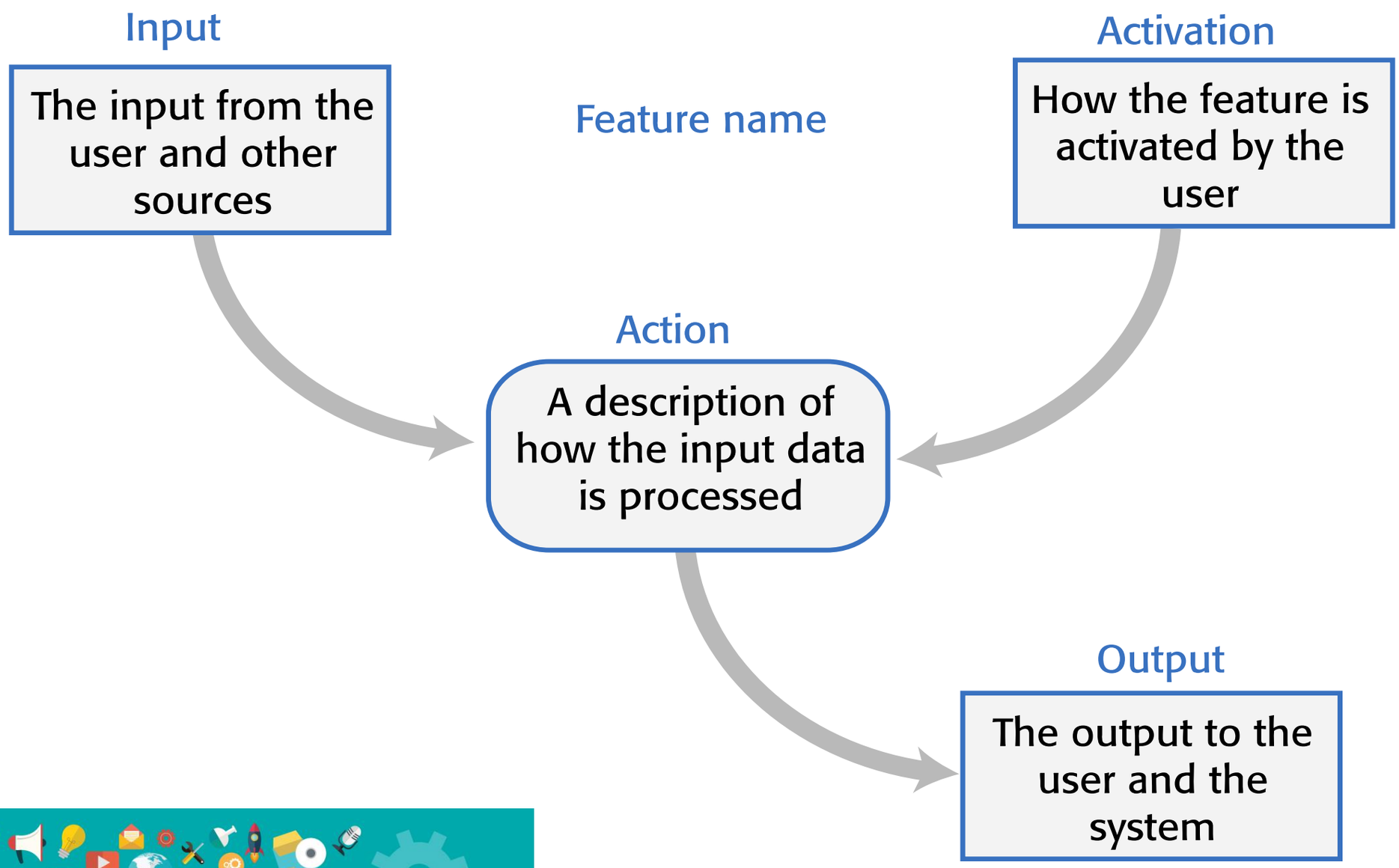


Figure 3.3 The ‘New Group’ feature description

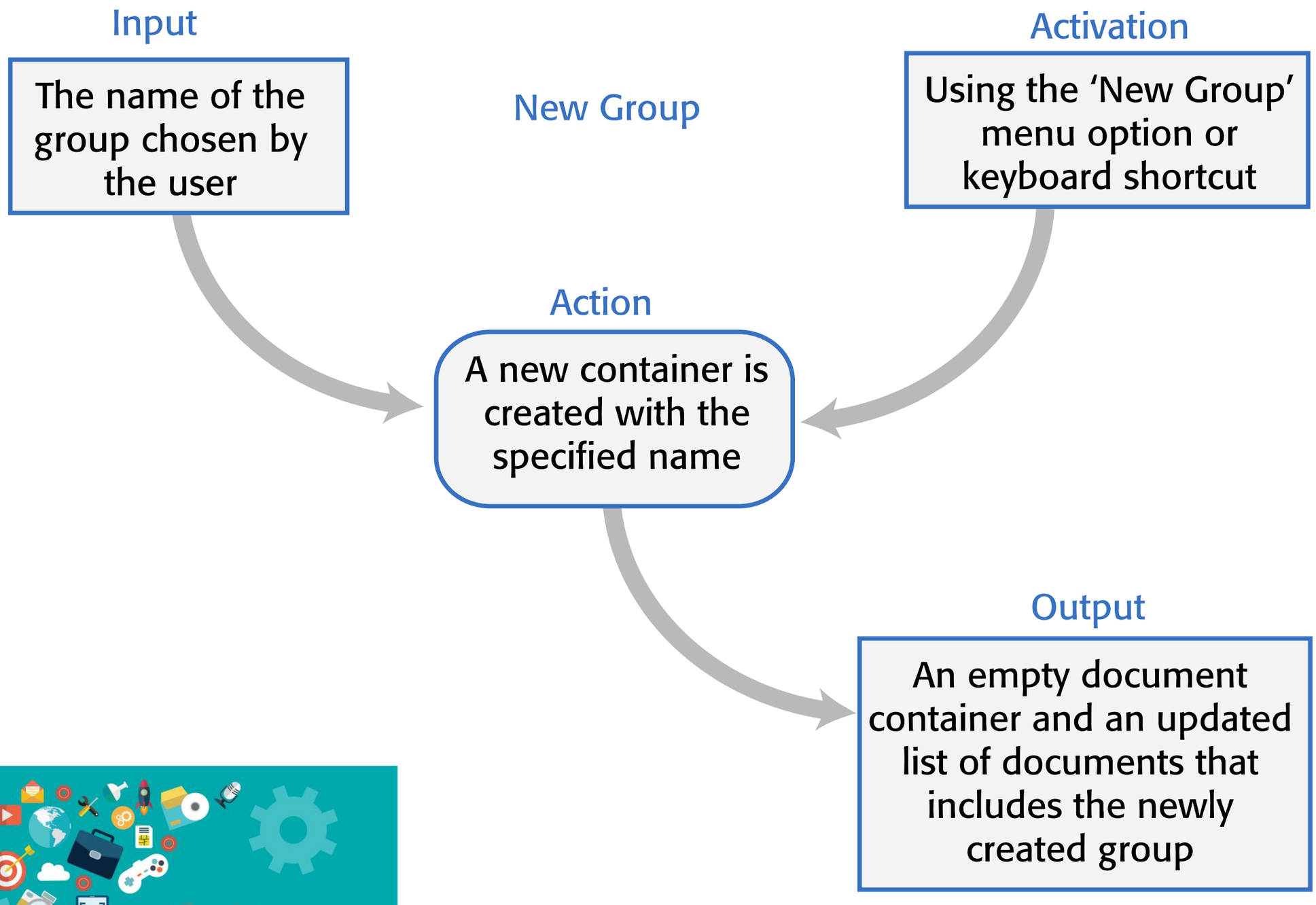


Figure 3.2 Feature description ‘Kaydet’ özelliği

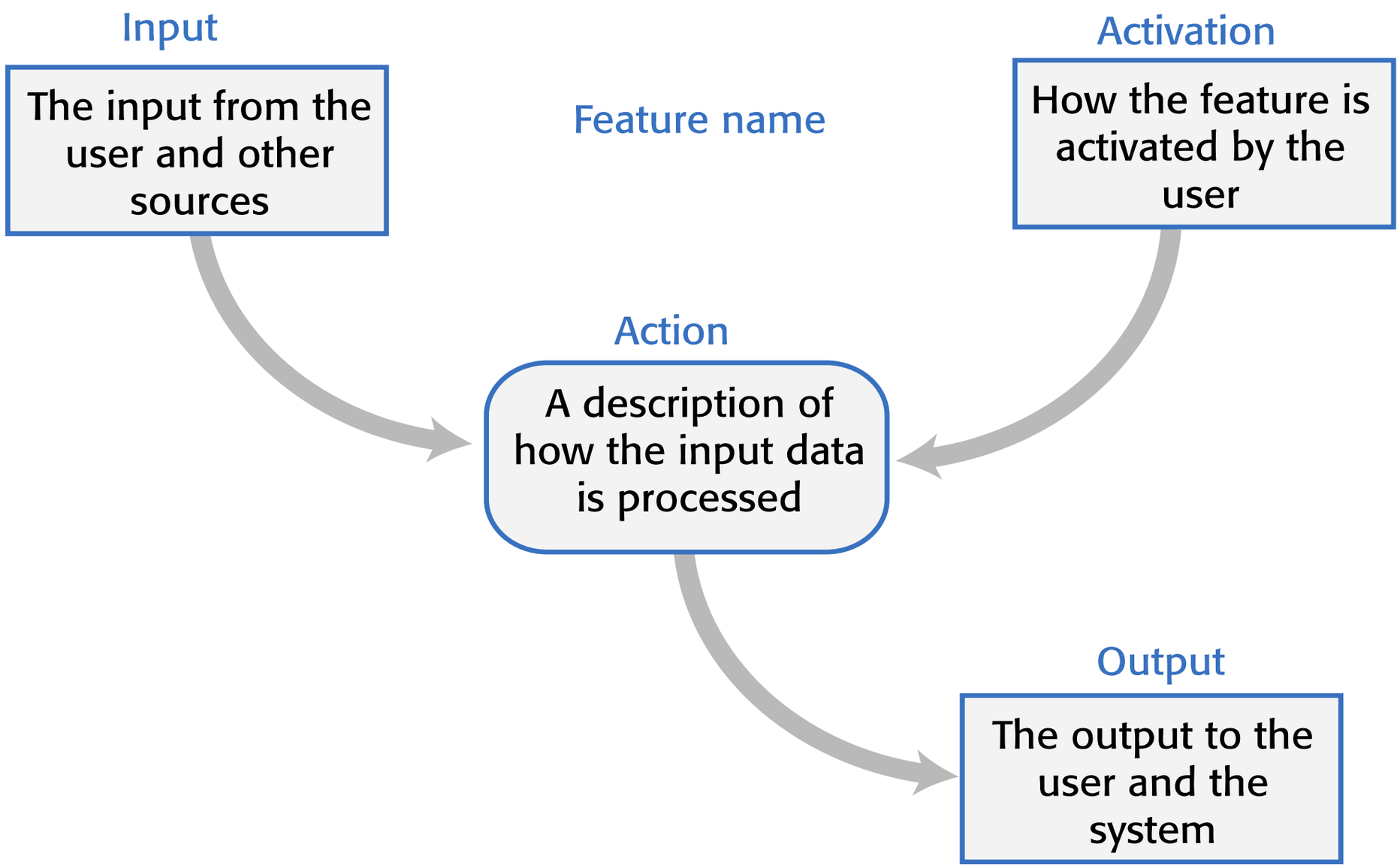


Figure 3.2 Feature description ‘Kaydet’ özelliği- Android Video Kamera

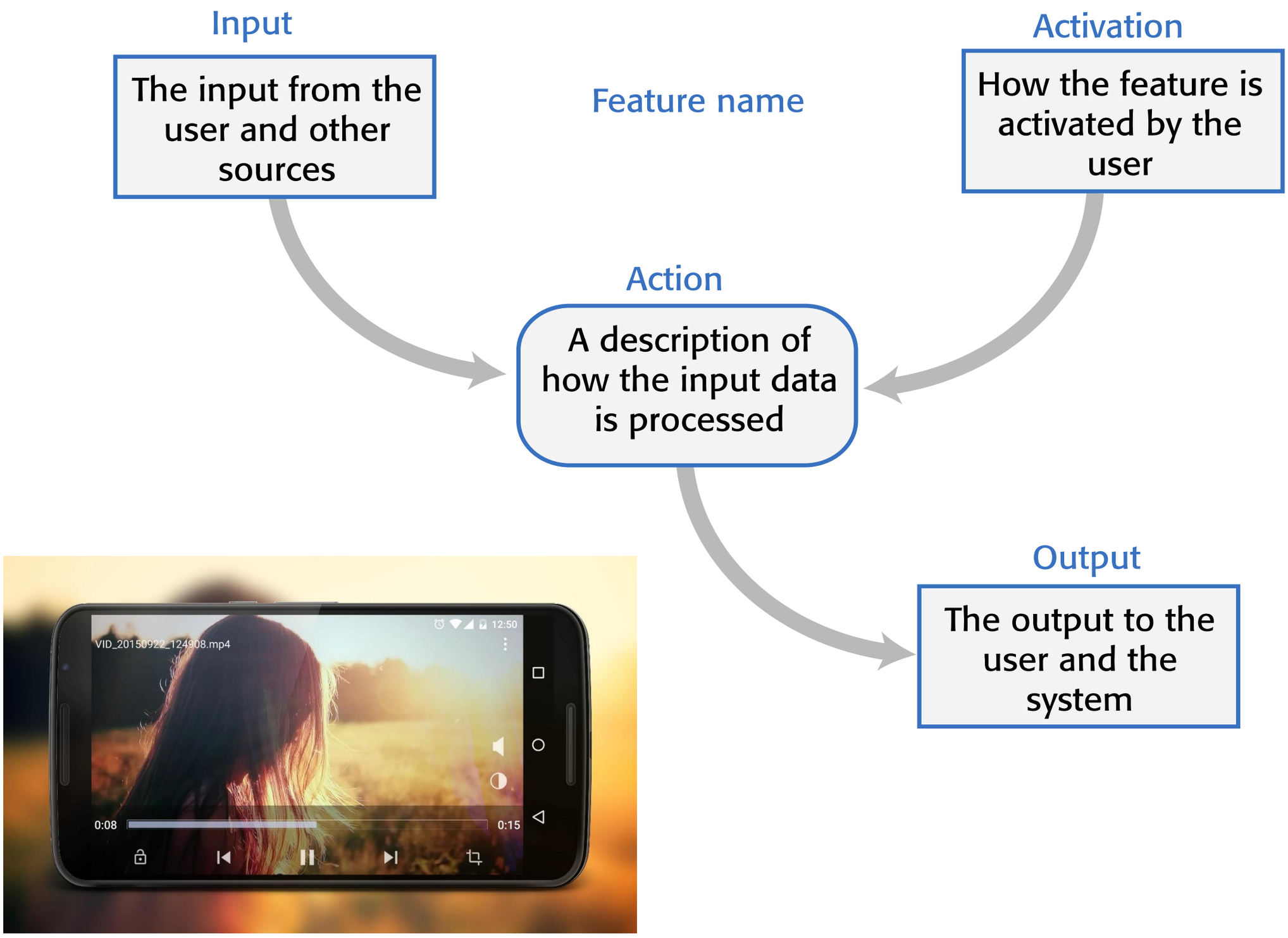


Figure 3.2 Feature description ‘Kaydet’ özelliği- Tarayıcı sayfası

Input

The input from the user and other sources

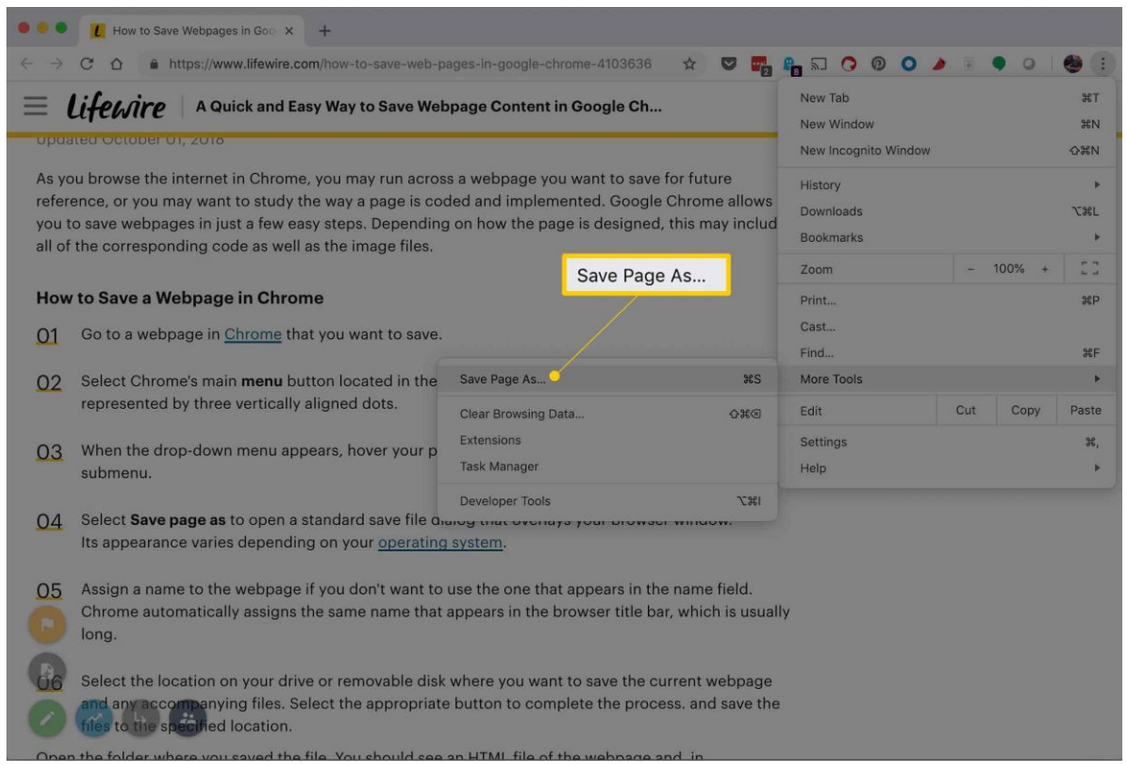
Feature name

Activation

How the feature is activated by the user

Action

A description of how the input data is processed



Output

The output to the user and the system

Personas

You need to have an understanding of your potential users to design features that they are likely to find useful and to design a user interface that is suited to them.

Personas are ‘imagined users’ where you create a character portrait of a type of user that you think might use your product.

- For example, if your product is aimed at managing appointments for dentists, you might create a dentist persona, a receptionist persona and a patient persona.

Personas of different types of user help you imagine what these users may want to do with your software and how it might be used. They help you envisage difficulties that they might have in understanding and using product features.

Table 3.1 A persona for a primary school teacher

Jack, a primary school teacher

Jack, age 32, is a primary school (elementary school) teacher in Ullapool, a large coastal village in the Scottish Highlands. He teaches children from ages 9-12. He was born in a fishing community north of Ullapool, where his father runs a marine fuels supply business and his mother is a community nurse. He has a degree in English from Glasgow University and retrained as a teacher after several years working as a web content author for a large leisure group.

Jack's experience as a web developer means that he is confident in all aspects of digital technology. He passionately believes that the effective use of digital technologies, blended with face to face teaching, can enhance the learning experience for children. He is particularly interested in using the iLearn system for project-based teaching, where students work together across subject areas on a challenging topic.

Persona descriptions

A persona should ‘paint a picture’ of a type of product user. They should be relatively short and easy-to-read.

You should describe their background and why they might want to use your product.

You should also say something about their educational background and technical skills.

These help you assess whether or not a software feature is likely to be useful, understandable and usable by typical product users.

Figure 3.4 Persona descriptions

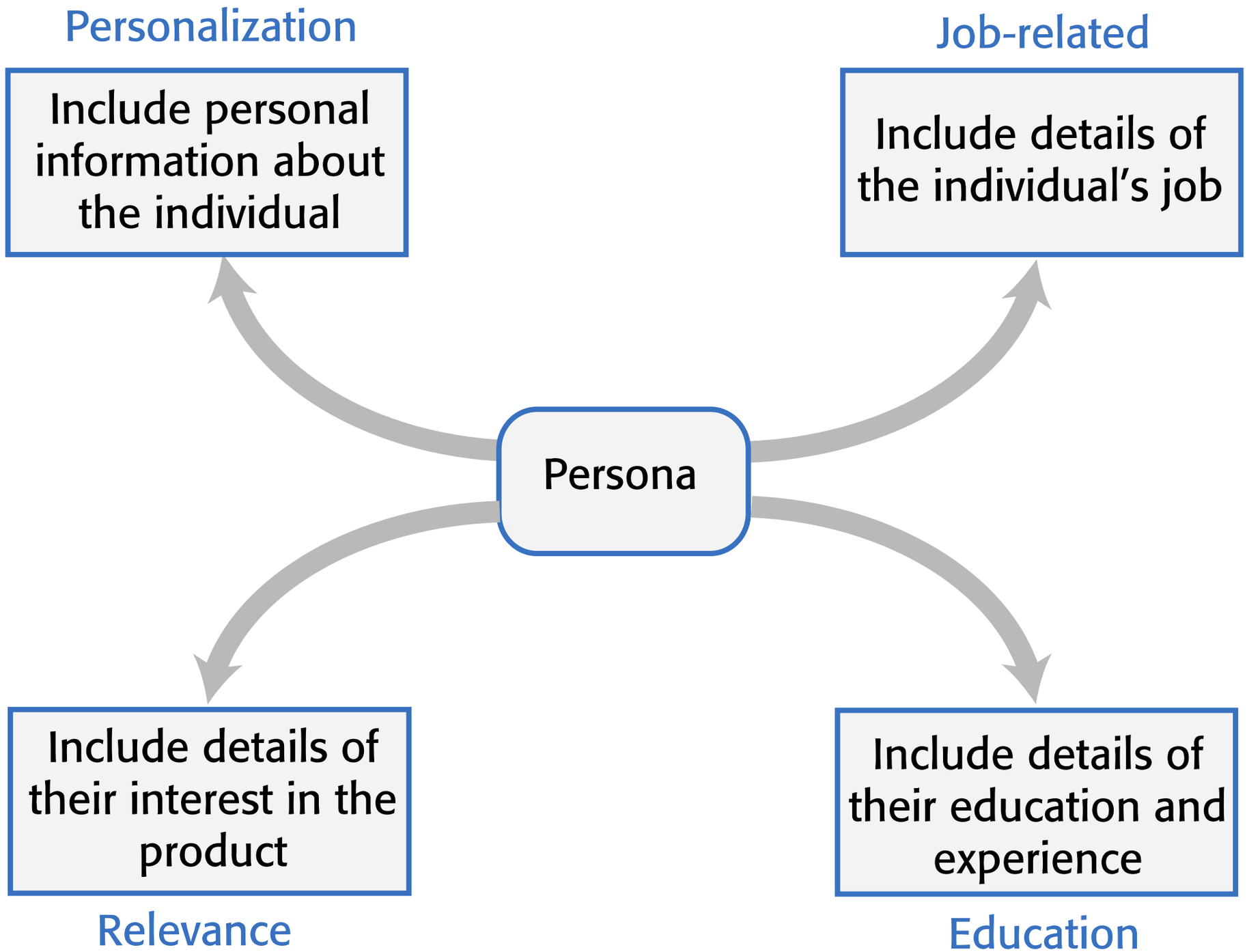
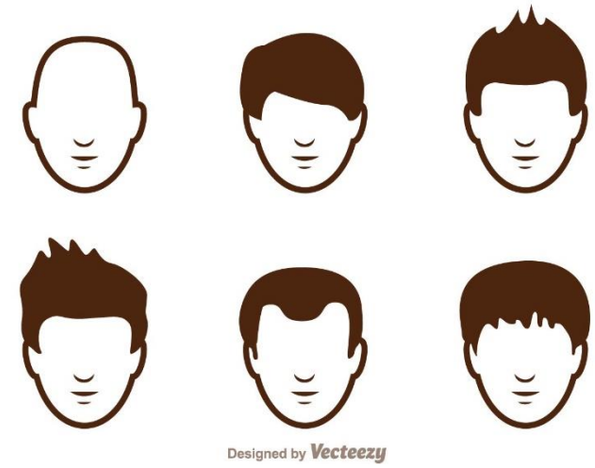


Table 3.2 Aspects of a persona description

Personalization

You should give them a name and say something about their personal circumstances. This is important because you shouldn't think of a persona as a role but as an individual. It is sometimes helpful to use an appropriate stock photograph to represent the person in the persona. Some studies suggest that this helps project teams use personas more effectively.

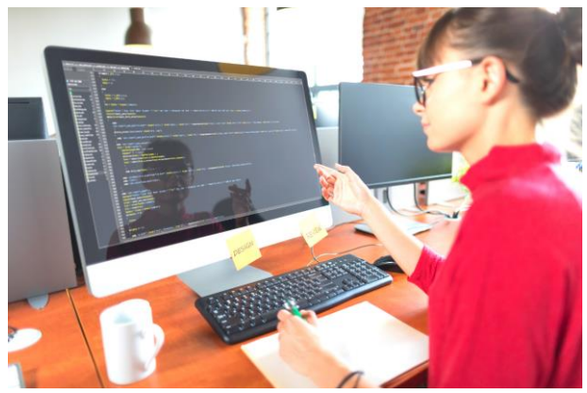


Job-related

If your product is targeted at business, you should say something about their job and (if necessary) what that job involves. For some jobs, such as a teacher where readers are likely to be familiar with the job, this may not be necessary.

Education

You should describe their educational background and their level of technical skills and experience. This is important, especially for interface design.



Relevance

If you can, you should say why they might be interested in using the product and what they might want to do with it.

Table 3.3 A persona for a history teacher

Emma, a history teacher

Emma, age 41, is a history teacher in a secondary school (high school) in Edinburgh. She teaches students from ages 12 to 18. She was born in Cardiff in Wales where both her father and her mother were teachers. After completing a degree in history from Newcastle University, she moved to Edinburgh to be with her partner and trained as a teacher. She has two children, aged 6 and 8, who both attend the local primary school. She likes to get home as early as she can to see her children, so often does lesson preparation, administration and marking from home.

Emma uses social media and the usual productivity applications to prepare her lessons, but is not particularly interested in digital technologies. She hates the virtual learning environment that is currently used in her school and avoids using it if she can. She believes that face-to-face teaching is most effective. She might use the iLearn system for administration and access to historic films and documents. However, she is not interested in a blended digital/face-to-face approach to teaching.

- Kişileştir (somutlaştır),
- Mesleği,
- Eğitimi,
- Yazılımla ilgisi

example: customer persona

SYS. ADMIN SAM

PROGRESSIVE | EFFICIENT | ANALYTICAL | IMPATIENT

AGE: 32
OCCUPATION: System Administrator
EDUCATION: B.S. Computer Science
EXPERIENCE IN ROLE: 7 Years
STATUS: Single
TIER: First Time User
ARCHETYPE: The Realist

"I want streamlined communication/ processes across the company so I don't waste my time on trivial tasks that colleagues could easily perform themselves"

MOTIVATIONS

- INCENTIVE
- FEAR
- ACHIEVEMENT
- GROWTH
- POWER
- SOCIAL

RESPONSIBILITIES

Monitoring and configuration of networked systems

Installing and maintaining application software

Managing user accounts and access rights

PERSONALITY

- Extrovert — Introvert
- Sensing — Intuition
- Thinking — Feeling
- Analytical — Creative

GOALS

Auto alert & corrected issues

Real time advanced network mapping

Predictive analysis & custom reports

Configuration management

FRUSTRATIONS

Lack of documentation/change management and inter-disciplinary communication

Wasted time/lack of progress

User error - users who don't document error messages

TECHNOLOGY

- IT & Internet
- Software
- Mobile Apps
- Social Networks

https://community.atlassian.com/t5/Marketplace-Apps-Integrations/Customer-Personas-How-to-Write-Them-and-Why-You-Need-Them-in/ba-p/759228

example: customer persona

https://community.atlassian.com/t5/Marketplace-Apps-Integrations/Customer-Personas-How-to-Write-Them-and-Why-You-Need-Them-in/ba-p/759228

Table 3.4 A persona for an IT technician

Elena, a school IT technician

Elena, age 28, is a senior IT technician in a large secondary school (high school) in Glasgow with over 2000 students. Originally from Poland, she has a diploma in electronics from Potsdam University. She moved to Scotland in 2011 after being unemployed for a year after graduation. She has a Scottish partner, no children, and hopes to develop her career in Scotland. She was originally appointed as a junior technician but was promoted, in 2014, to a senior post responsible for all the school computers.

Although not involved directly in teaching, Elena is often called on to help in computer science classes. She is a competent Python programmer and is a ‘power user’ of digital technologies. She has a long-term career goal of becoming a technical expert in digital learning technologies and being involved in their development. She wants to become an expert in the iLearn system and sees it as an experimental platform for supporting new uses for digital learning.

Persona benefits

The main benefit of personas is that they help you and other development team members empathize with potential users of the software.

Personas help because they are a tool that allows developers to ‘step into the user’s shoes’.

- Instead of thinking about what you would do in a particular situation, you can imagine how a persona would behave and react.

Personas can help you check your ideas to make sure that you are not including product features that aren’t really needed.

They help you to avoid making unwarranted assumptions, based on your own knowledge, and designing an over-complicated or irrelevant product.

Deriving personas

Personas should be based on an understanding of the potential product users, their jobs, their background and their aspirations.

You should study and survey potential users to understand what they want and how they might use the product.

From this data, you can then abstract the essential information about the different types of product user and use this as a basis for creating personas.

Personas that are developed on the basis of limited user information are called proto-personas.

- Proto-personas may be created as a collective team exercise using whatever information is available about potential product users. They can never be as accurate as personas developed from detailed user studies, but they are better than nothing.

BRANDI TYLER

MUNRO AMERICAN

PROFILE Narrow Feet

GENDER Female

AGE 36

LOCATION Los Angeles, CA

OCCUPATION Receptionist; $38k

"It's SO difficult to buy shoes that fit my feet."

MOTIVATIONS

Brandi gets very emotional about shopping for shoes in retail stores because she rarely can find a pait that fits her narrow feet. Recently, she's turned to online shopping to avoid the hassle of shopping in stores. Brandi found Munro after Googling "narrow width shoes" and reading other reviews online about the company.

GOALS

- Needs an SS (4A) width shoe
- Would like to purchase several pairs to fit occasion, style, and color
- Hoping to find that she doesn't have to sacrifice style or options when searching by fit

FRUSTRATIONS

- Not being able to filter available shoes by width
- Getting far fewer options when she applies width filter
- No other recommended shoes when she's looking at a pair she particularly likes

REAL MUNRO CUSTOMERS

"My whole life has been a choice between fit and style - when I was younger, I went for style & my feet killed me. As an adult, I tried for fit & the styles were for 95 year olds. This shoe is the 1st time I could get both."

"I wear a 4A and I have struggled my entire life finding shoes narrow enough for my feet and more so in recent years. I stumbled onto this Munro brand sandal and was shocked to find it comes in up to a 4A width and it actually fit and is like wearing a glove! I now have two pairs in different colors."

"Love these slides so much I went out and bought two more pairs. I have very narrow feet and they fit perfectly. They're very stylish and I get compliments whenever I wear them."

PERSONALARINIZI OLUŞTURUN


A101
HARCA
HARCA
BİTMEZ
hakmar
express
M
MİGROS
watsons
BİM
gratis
ŞOK
Carrefour
TERZEN