RĪGAS TEHNISKĀ UNIVERSITĀTE

Sistēmu analīze un zināšanu iegūšana

Sistēmas robežas un dekompozīcija

DSP344 - SAZI

Studiju programma “Datorsistēmas”

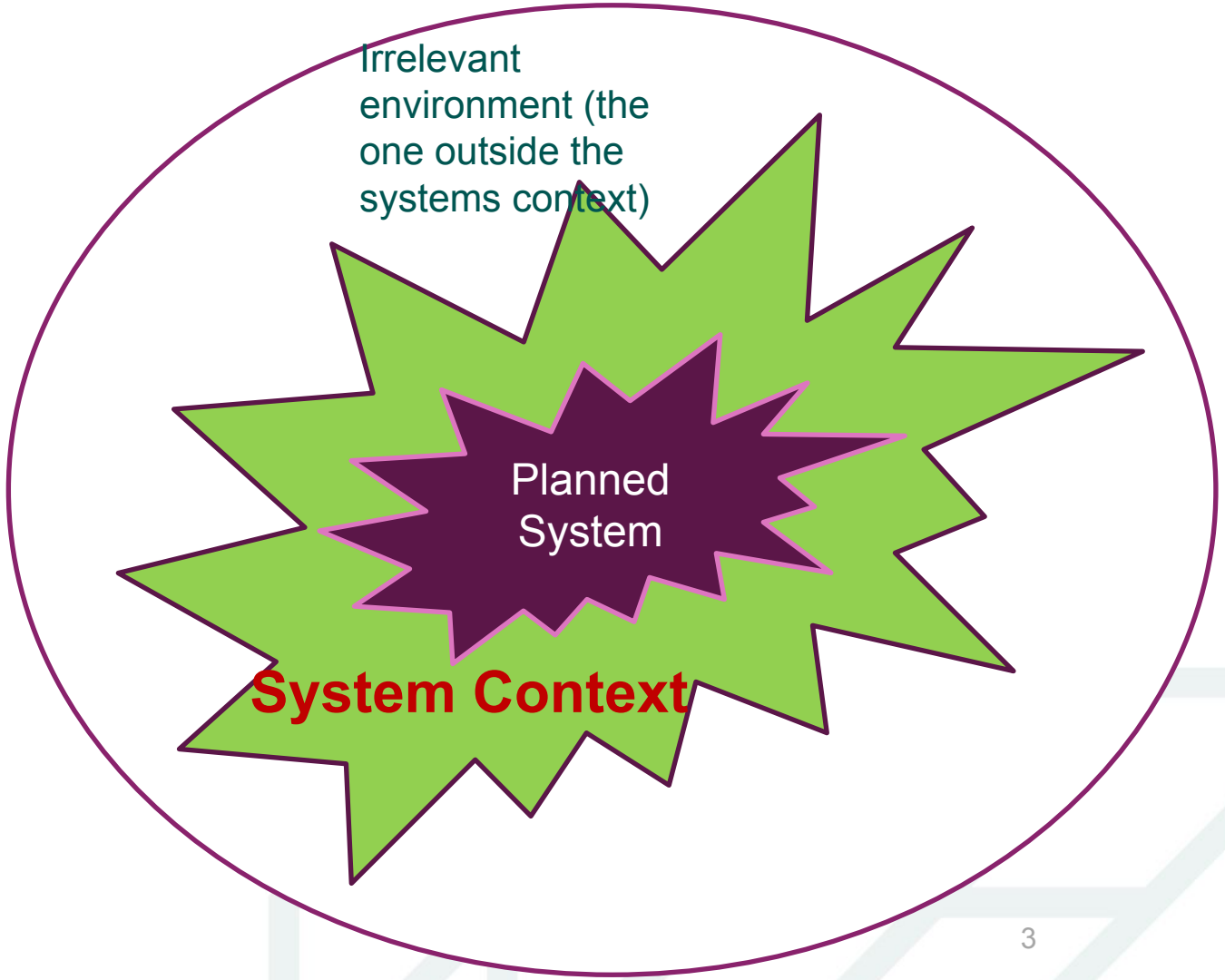
12 lekcijas
12 patstāvīgie darbi
4 “lielie” praktiskie darbi
Nepieteikts darbs auditorijā
EKSĀMENS

Sistēmas un konteksta robežas

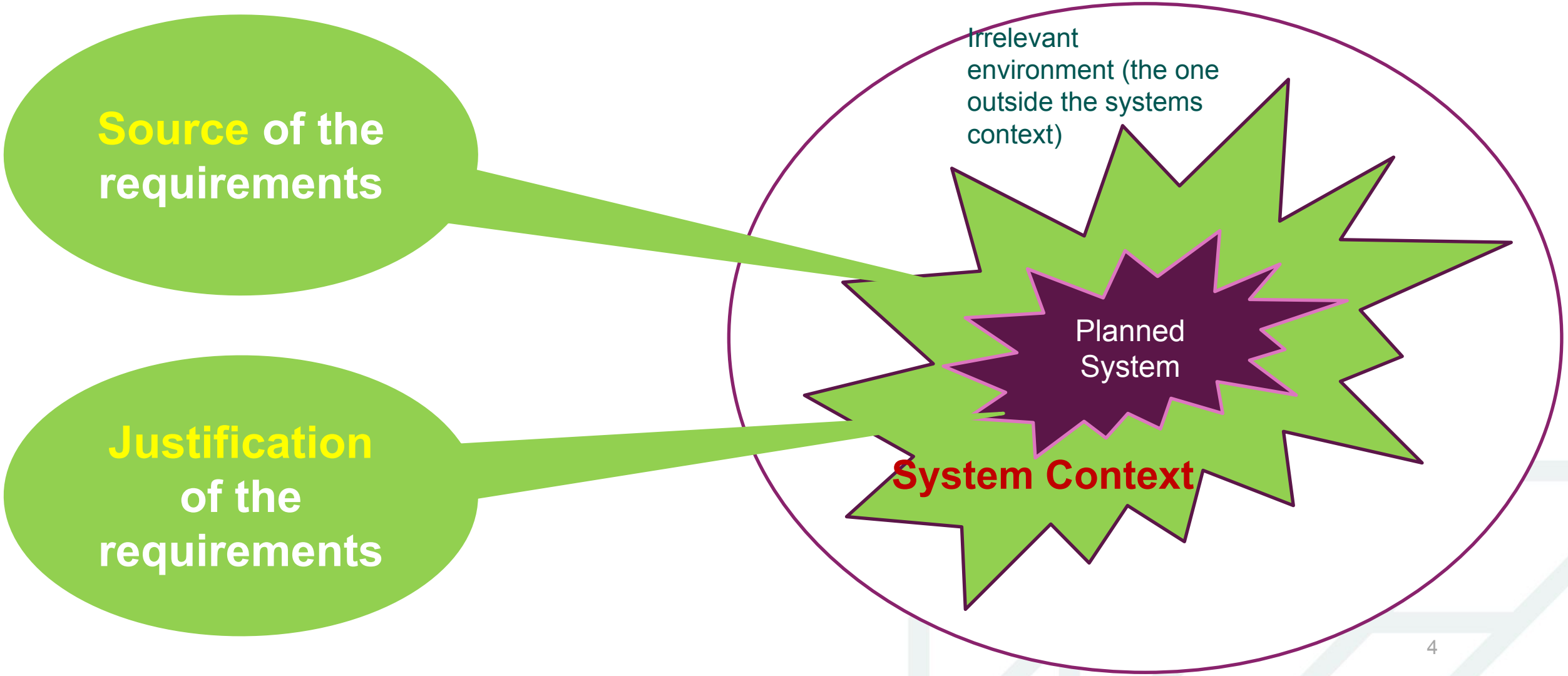
The systems context in requirements engineering

The systems context is **the part of system environment,** relevant for defining, understanding, and implementing the systems requirements

K. Pohl. Requirements Engineering: Fundamentals, Principles and Techniques, 2010



The systems context – source and justification for the requirements; i.e., prerequisite for definition of correct systems requirements.

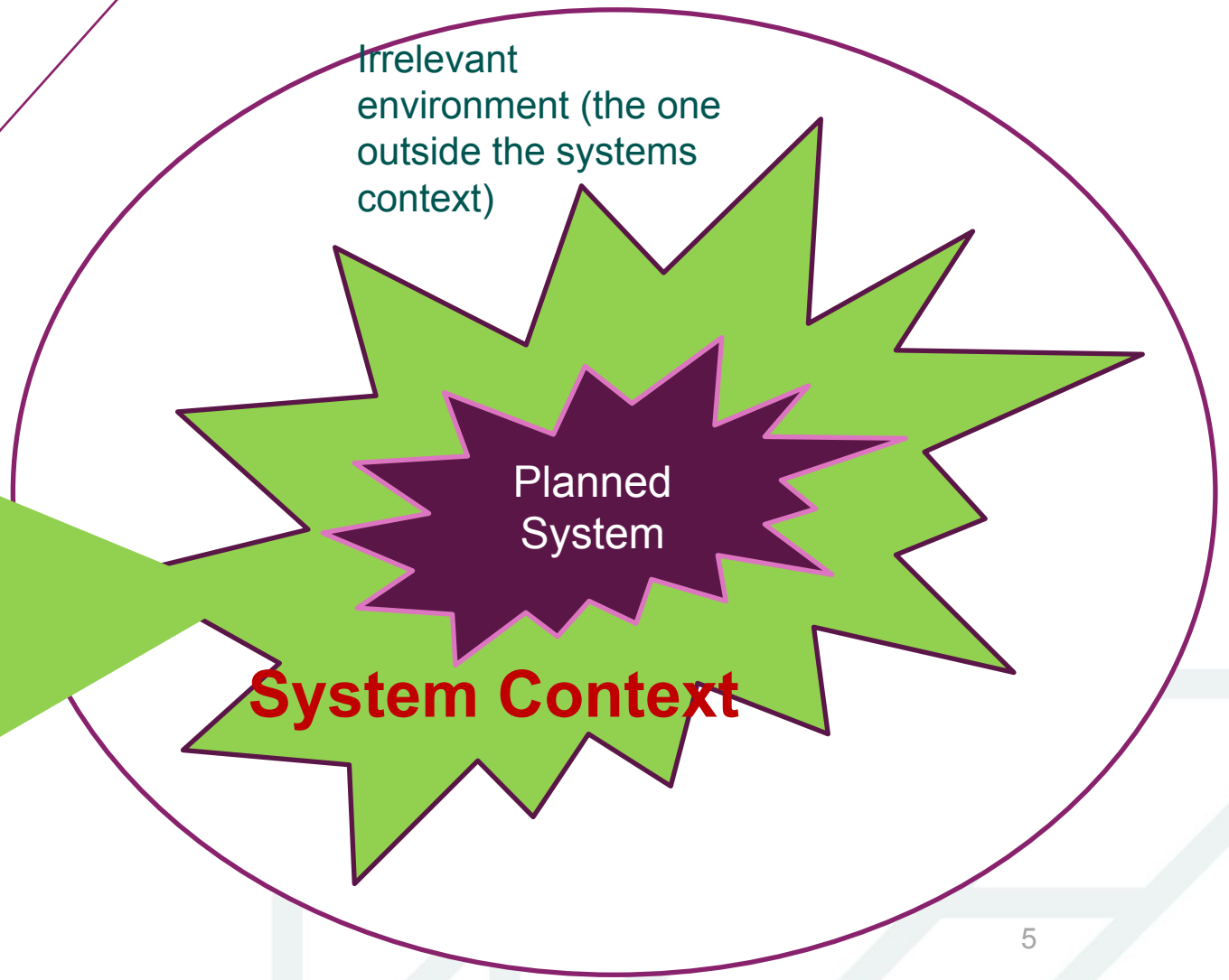


Context Objects referred to as Context Aspects

- People (stakeholder or groups of stakeholders)
- Systems in operation (technical systems, software, hardware)
- Processes (technical or physical processes, business processes)
- Events (technical or physical)
- Documents (e.g., laws, standards, system documentation)

You may consider also:

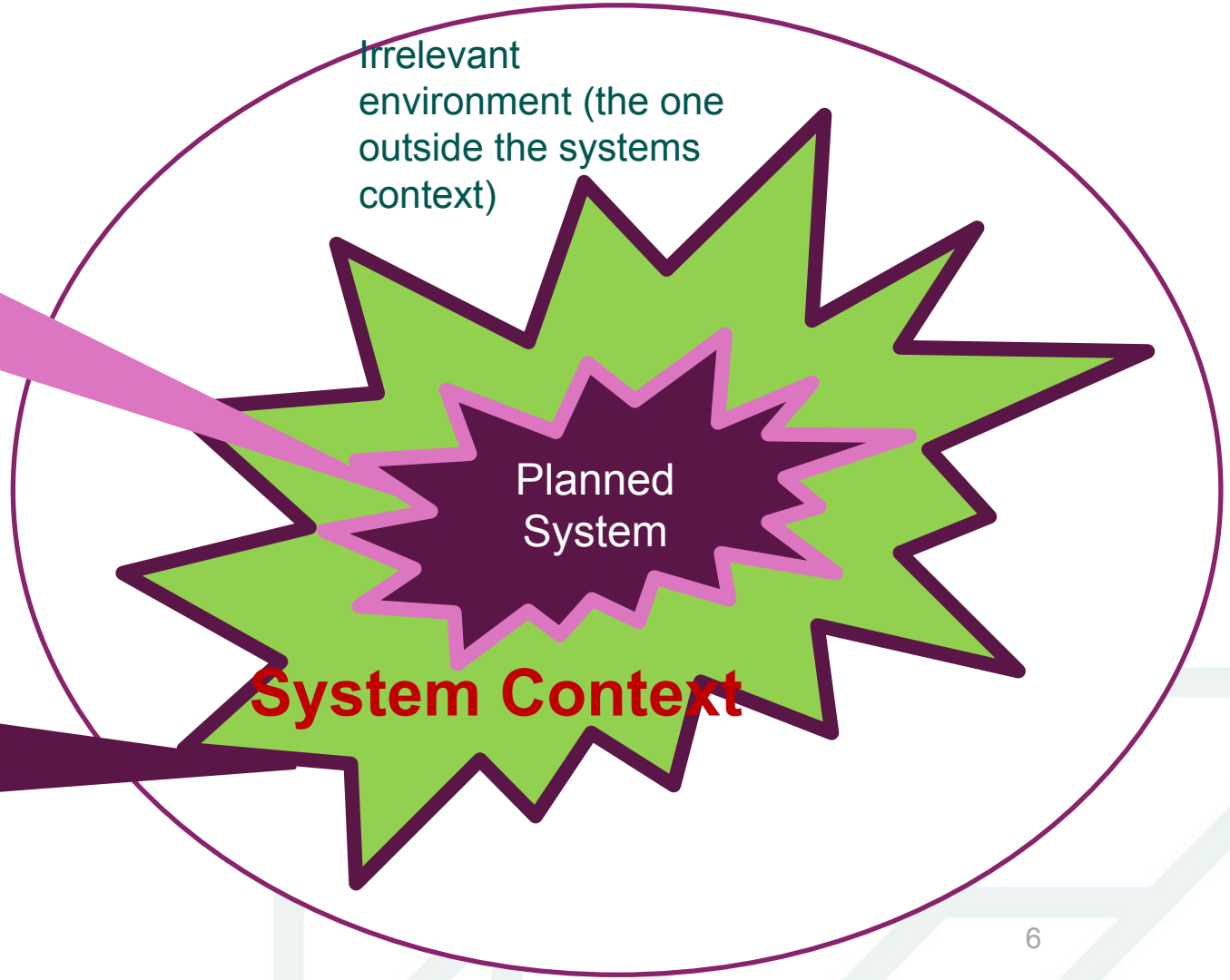
- Non technical systems such as administrative systems
- Physical laws



System boundary and context boundary

System boundary defines **which aspects will be covered by the planned system** and which aspects are part of this system's environment

Context boundary identifies **the part of the environment that has a connection to the system to be developed**



Concept aspects restrict interpretation of requirements

- Directly
  - E.g. *Partners of several universities* use the system will clarify the availability issues of the information
- Indirectly
  - The *personal data protection law* will clarify which personal data can be exposed, which cannot.

Suggestions

- Context information shoud be systemically **documented**
  - Establish project guidelines for documenting context information
    - Which context aspect should be documents
    - What should be the documentation format
    - Relationship types to interrelate context information to requirements
    - Responsibilities for context documentation
- Systematically consider **changes** in the context and adjust requirements accordingly

Notes

- The notion “aspect” in the context aspect might be applied differently e.g.:
  - Requirements sources
  - Context objects
  - Properties and relationships between context objects
- In Pohl’s book the following facets are suggested for structuring the context information
  - Subject facet
  - Usage facet
  - IT system facet
  - Development facet

Sistēmas un tās konteksta robežu noteikšana

Determinig system and context boundaries

System boundary and context boundary

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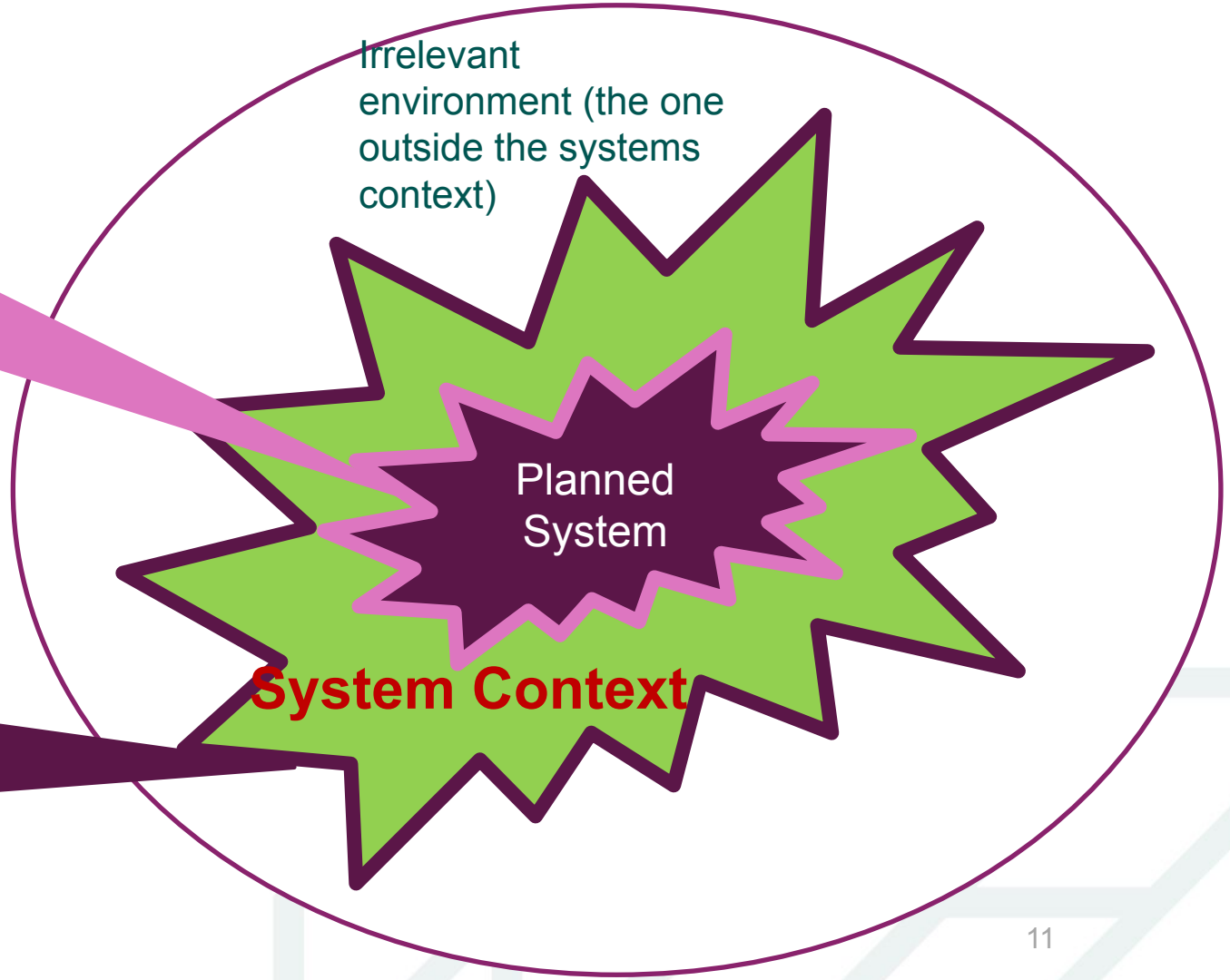
Context boundary identifies **the part of the environment that has a connection to the system to be developed**



Definitions from K. Pohl's book Requirements Engineering, Fundamentals, Principles , and Techniques, Springer 2010

- Sustem Boundary

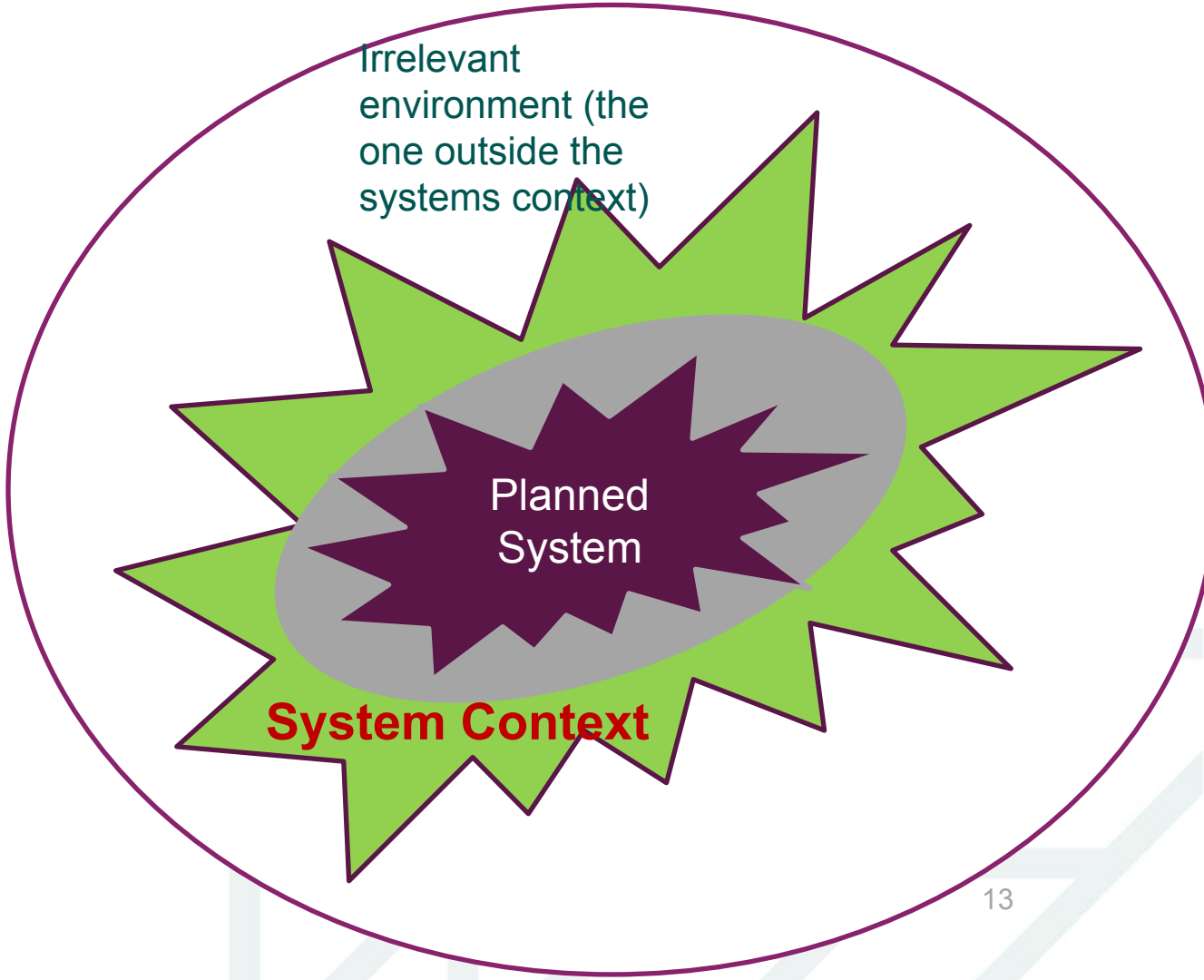
The systems bundary separates the system to be developed from the system context. The system boundary separates the parts that belong to the system and ***can hence be changed during the development process*** from the parts of the system that cannot be changed during the development process

- Context boundary

The context bundary ***separates the relevant part of systems environment from the irrelevant*** part. … it separates the the system context from the irrelevant environment which contains all those aspects that do not need to be considered during systems development

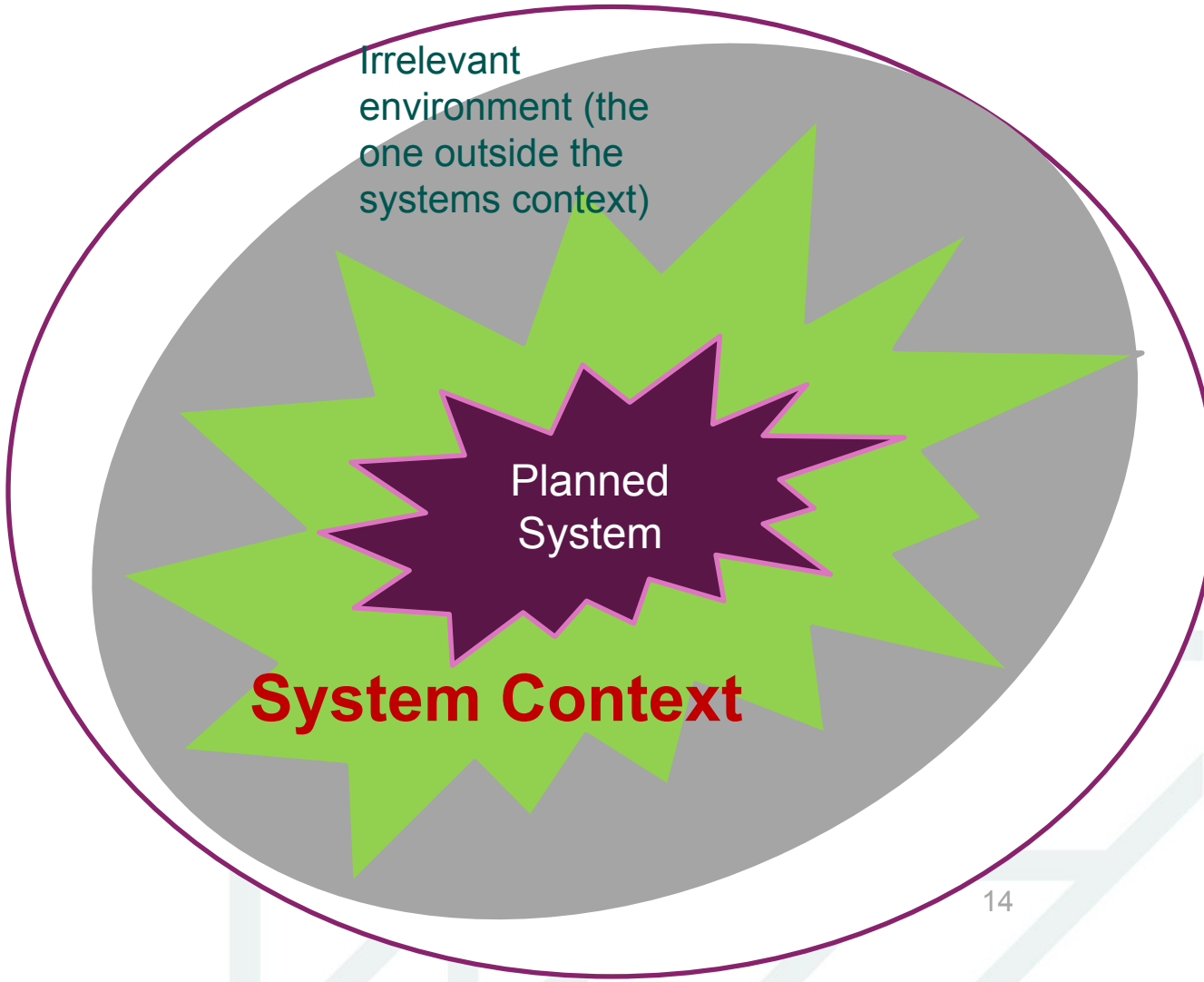
Grey zone of system boundary

- Real boundary usually can be precisely defined only towards the end of the requirements process
- Interfaces of the system lay on this boundary
- before the final decisions not all desired functions and qualities of the planned system are known
- Grey zone shows where possibly the systems boundary (and what interfaces) can be
- The grey zone itself can change during the requirements process



Grey zone of context boundary

- Context boundary can change over time (e.g. changing legal regulations)
- Thus context boundary has grey zone, which shows where context boundary coud be
- Context boundary grey zone comprises the identified aspects of the environment for which, at a particular time, **it is unclear**, whether these aspects have a relation to the planned system or not
- The context boundary grey zone can change during the requirements process



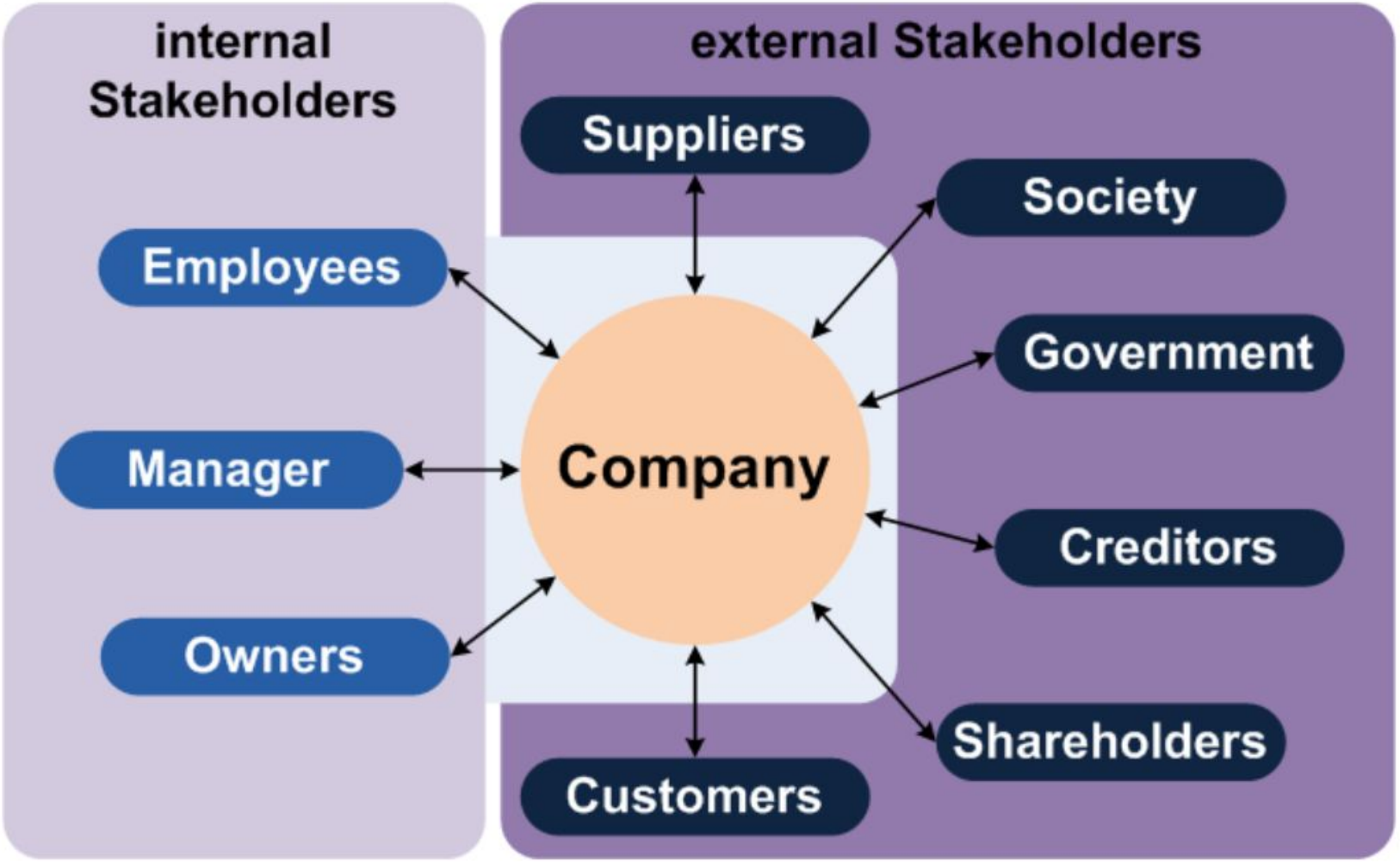
Suggestions from K. Pohl's book Requirements Engineering, Fundamentals, Principles , and Techniques, Springer, 2010 concerning system boundary

- Determine explicitly which aspects **belong to** the system
- Determine which aspects are **outside** the system boundary
- When defining systems boundary involve all relevant **stakeholders**
- Try to reach **agreement** about the systems boundary. If cannot decide – put the item in the grey zone
- **Check periodically, whether the system boundary is still valid**. Pay attention to needed extensions or reductions of the boundary. If the systems boundary need to be adjusted, verify whether the adjustment **impacts** already defined requirements.

Stakeholders

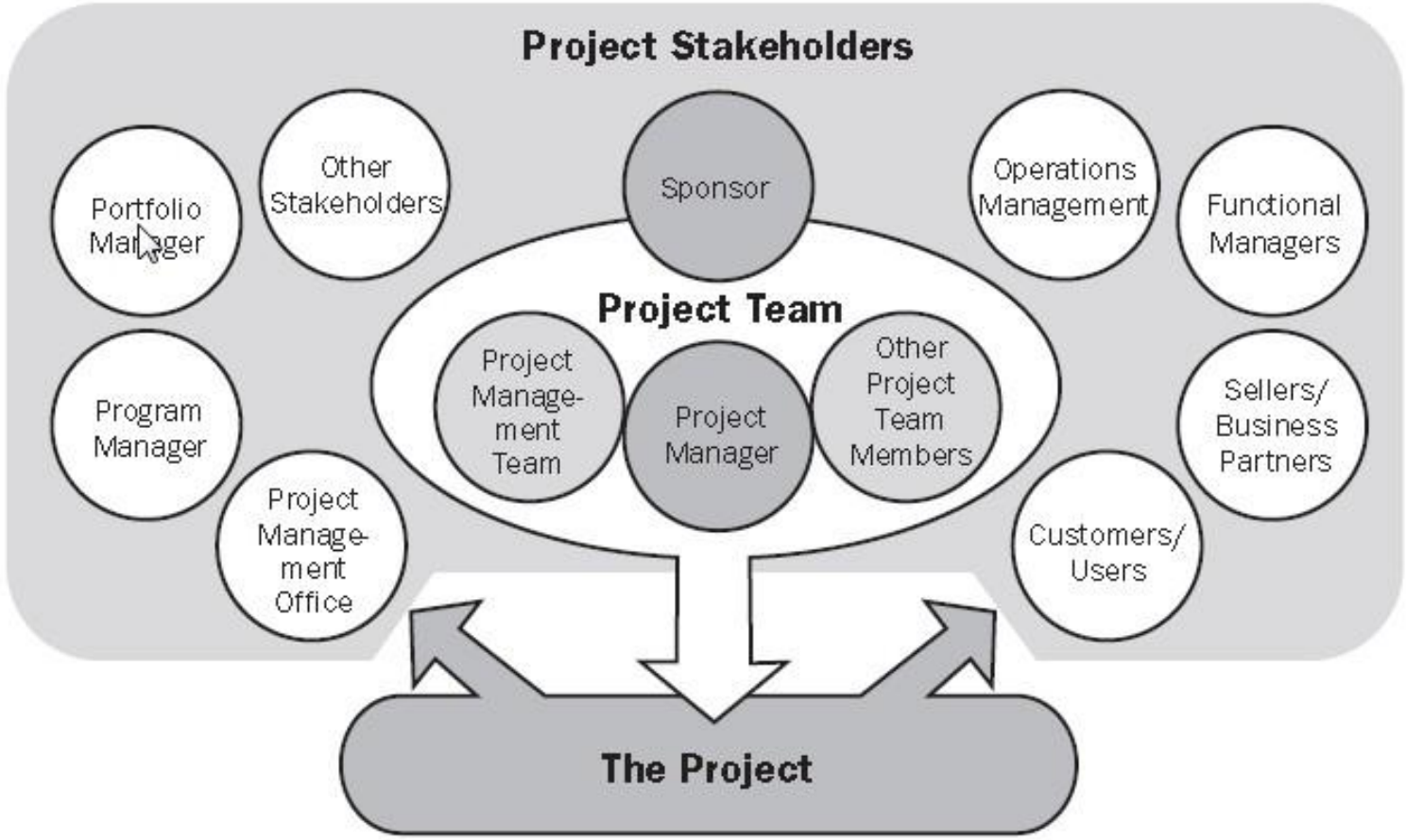
A stakeholder is anybody who can **affect or is affected by** an organisation, strategy or project

http://www.stakeholdermap.com/stakeholder-definition.html

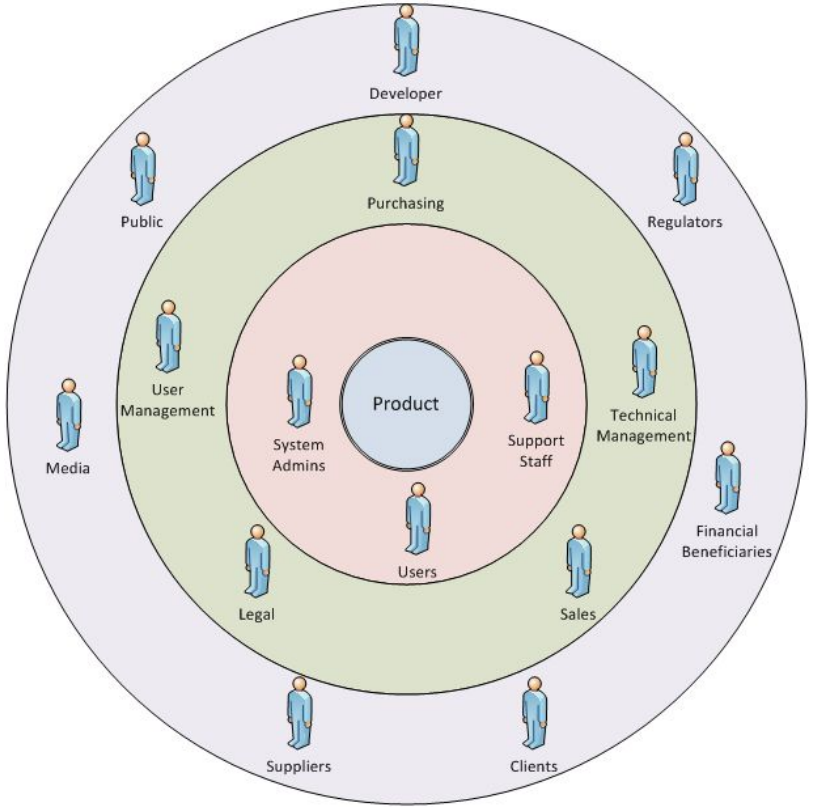


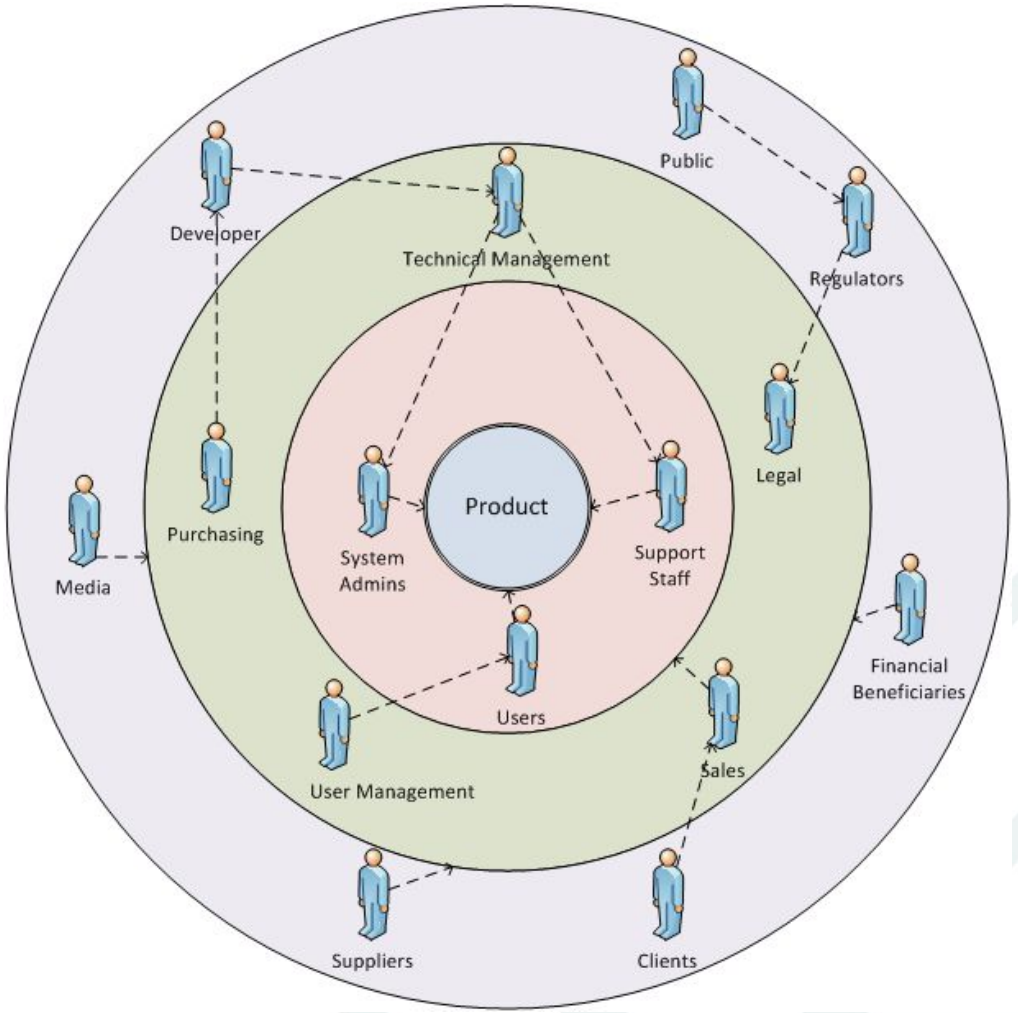
https://www.boundless.com/accounting/textbooks/boundless-accounting-textbook/introduction-to-accounting-1/overview-of-key-elements-of-the-business-19/business-stakeholders-internal-and-external-117-6595/images/stakeholders/

Dažādas ieinteresēto klasifikācijas



Stakeholder onion model (sīpol-modelis)





http://www.bawiki.com/wiki/techniques/stakeholder-onion-diagram/

Suggestions from K. Pohl's book Requirements Engineering, Fundamentals, Principles , and Techniques, Springer, 2010 concerning system context boundary

- Use appropriate **structuring scheme** to separate step by step systems context from irrelevant environment
- **If unsure** of relevance – put the item into **grey zone**
- If an aspect (object) is considered as irrelevant – **document it as irrelevant** one – to have an opportunity to re-check it later
- If new (e.g. functional) requirements are discovered, **check** whether formerly irrelevant aspects are still irrelevant (if the aspect is relevant – it shall affect at least one goal or scenario)
- **Iterate** these steps as the system and context boundaries influence the definition of goals and scenarios.

Most popular means for modeling contexts and boundaries

- Data Flow Diagrams (DFD)
  - Sources and thinks in the system environment
  - Data flows from the sinks to the sources

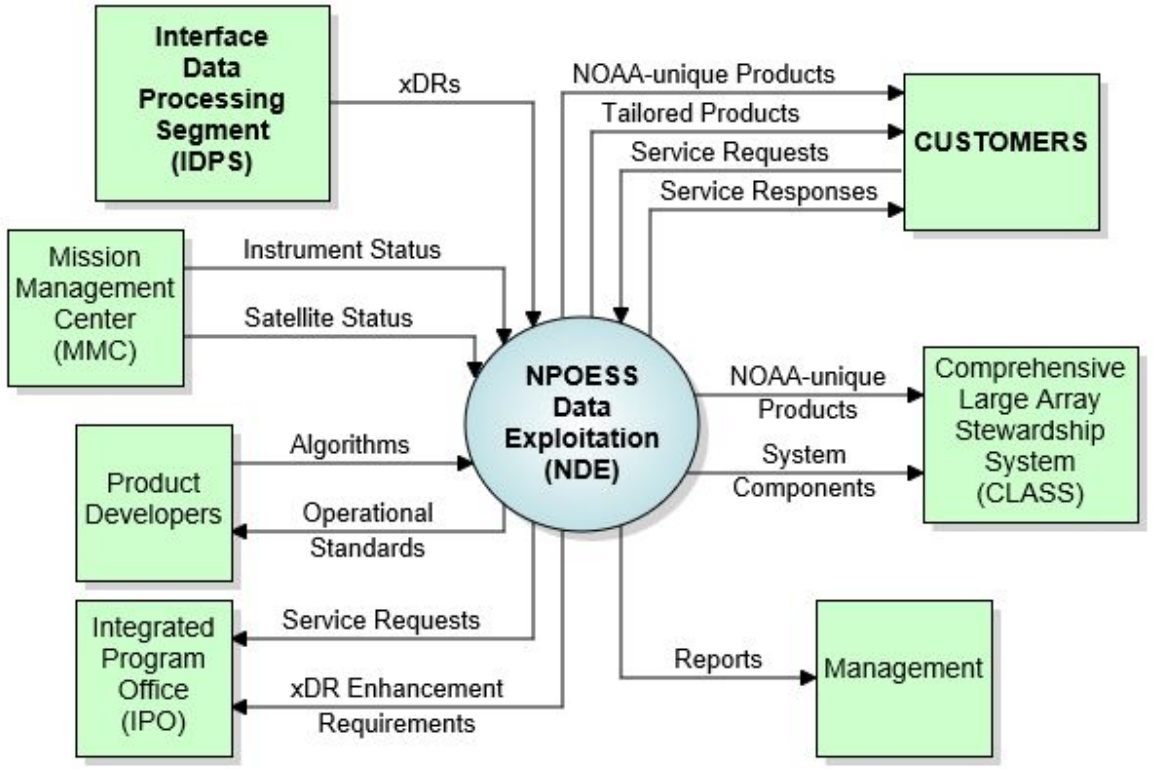
Usually – the systems context is shown by context level DFDs

- Use Case Diagrams (UCD)
  - Actors (e.g. people and other systems) in the system environment
  - Actor use relations

Usually the systems context is shown by systems Use Case Diagrams while business Use case Diagrams also can be used

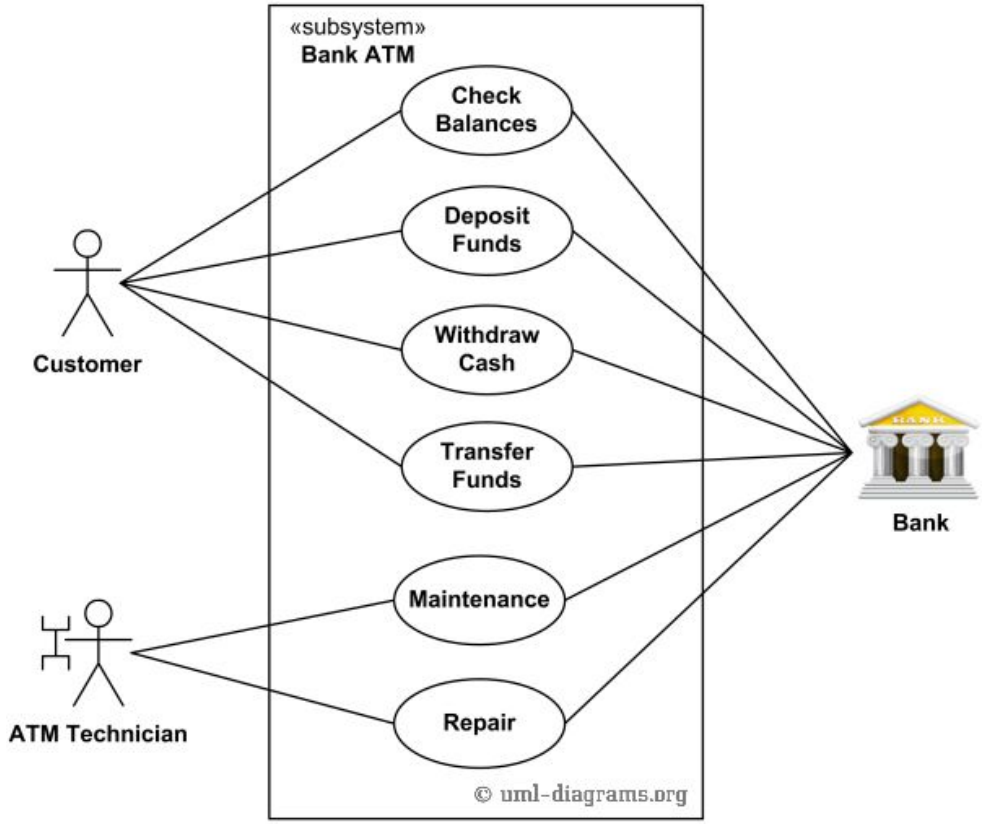
DFD and UCD

- DFD



Source unknown

- UCD



More details about context modeling

Pages 15-18 in
Handbook of Requirements Modeling IREB Standard,
available at
https://www.ireb.org/content/downloads/14-handbook-cpre-advanced-level-requirements-modeling/ireb_cpre_handbook_requirements-modeling_advanced-level-v1.3.pdf

Sistēmas dekomopozīcija morfoloģiskā funkcionālā

https://www.google.lv/search?q=decomposition&biw=1280&l

systems decomposition - G...

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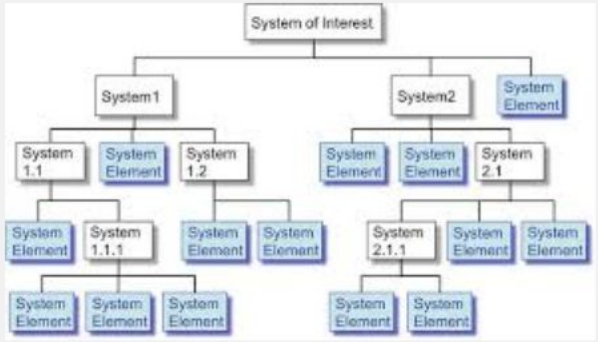

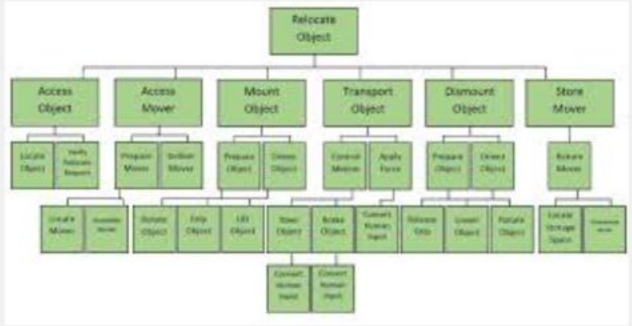

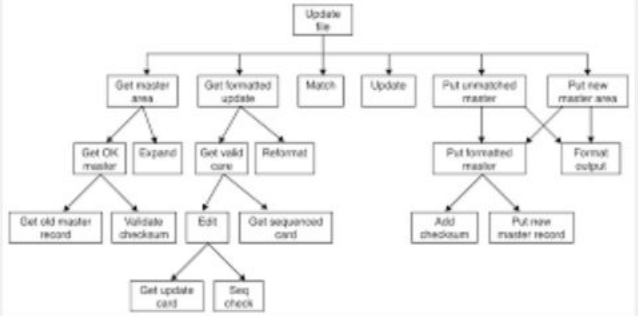

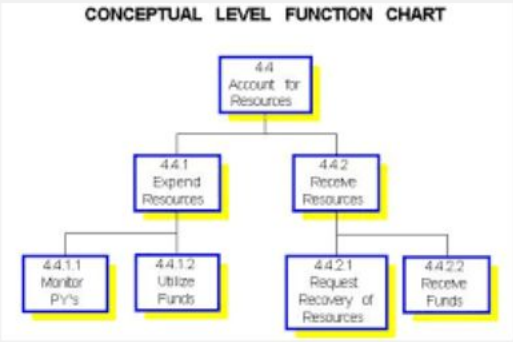

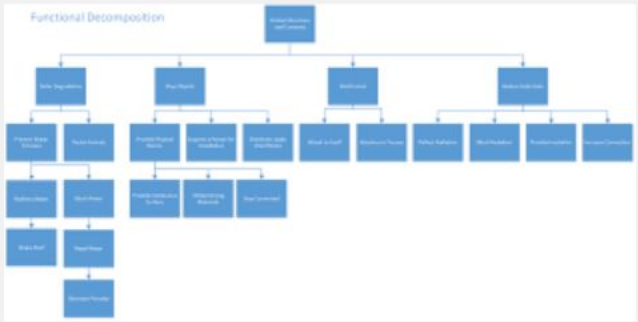

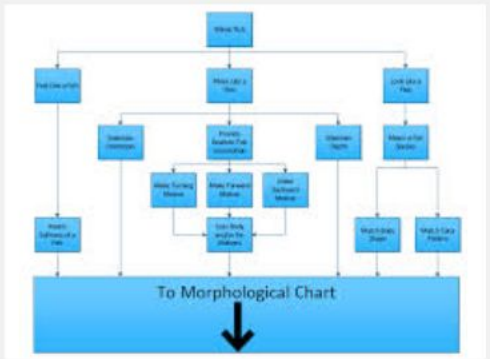

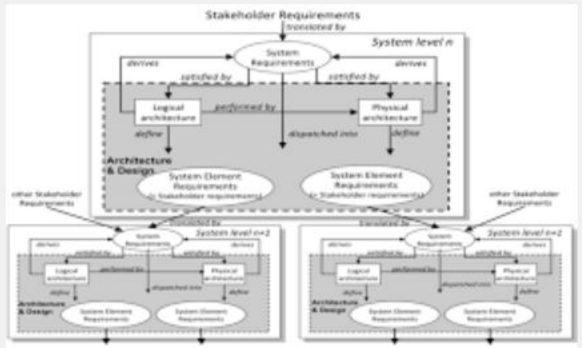

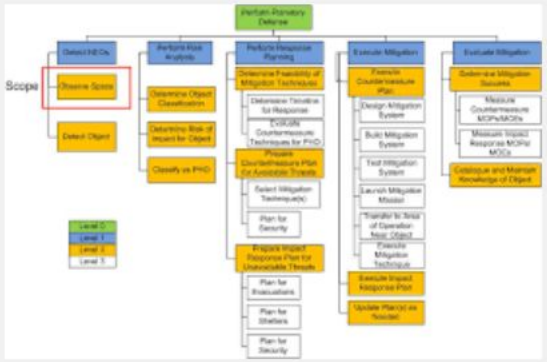

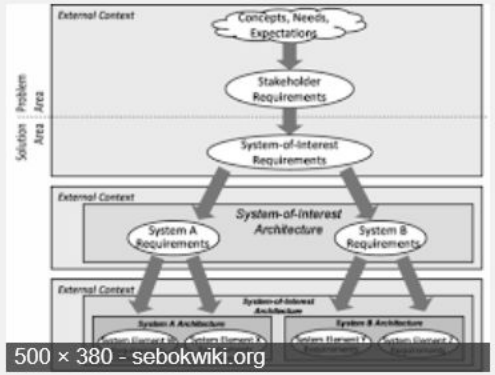

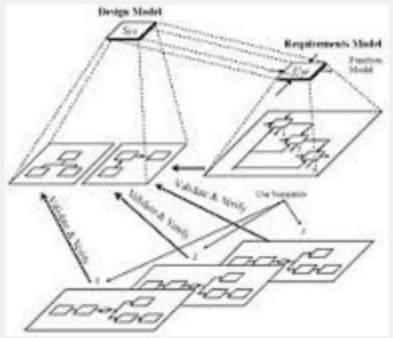

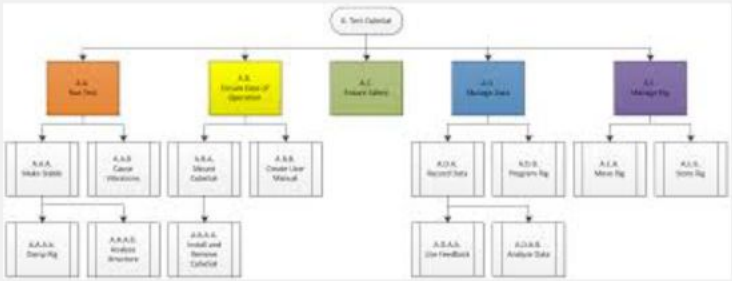

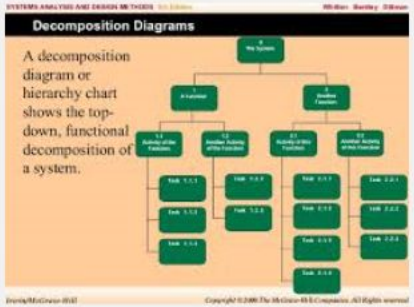

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Morfoloģiskā dekompozīcija (sadalīšana pa izpildošiem vai apstrādājamiem (dati) objektiem)

Cik dažādos veidos var veikt dekompozīciju?

Funkcionālā dekompozīcija: funkciju sadalīšana pa apakšfunkcijām

Kādas ir galda funkcijas?
Kā tās var sadalīt sīkāk?

Kādas ir biznesa funkcijas?
Kā tās var sadalīt sīkāk?

Kādas ir programmatūras funkcijas?
Kā tās var sadalīt sīkāk?