Politechnika Wrocławska

SOFTWARE PROJECT IN MANAGEMENT

2019/2020

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Traditional and modern methods in IT project management

AGENDA

- Cascade approach

- Spiral approach

- Incremental approach

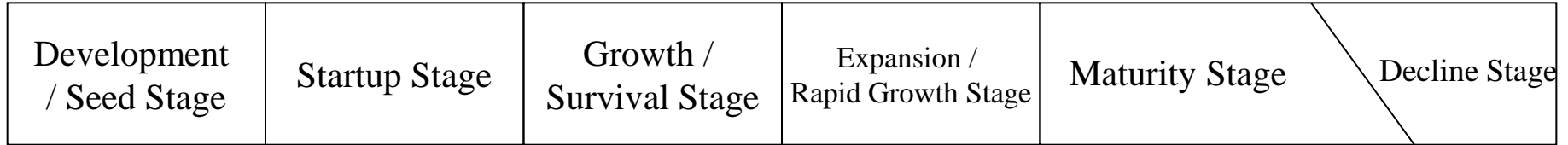- Iterative approach

- Agile approach

PROJECT LIFE-CYCLE AND PRODUCT LIFE-CYCLE

- **Project life-cycle** – the total number of project stages carried out in the specified order, from the project concept up to its completion

- **Product life-cycle** – a set of product stages conducted according to the established sequence, from the project conception up to its completion along with its use up to its abandonment
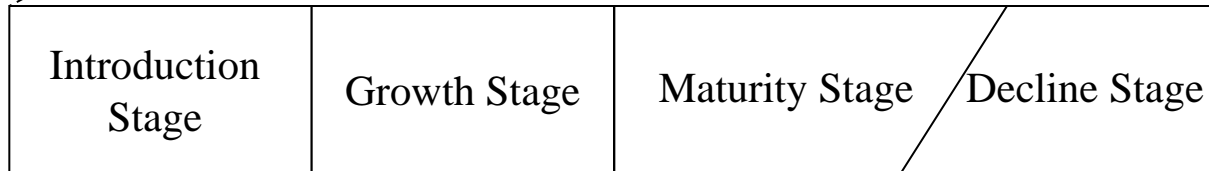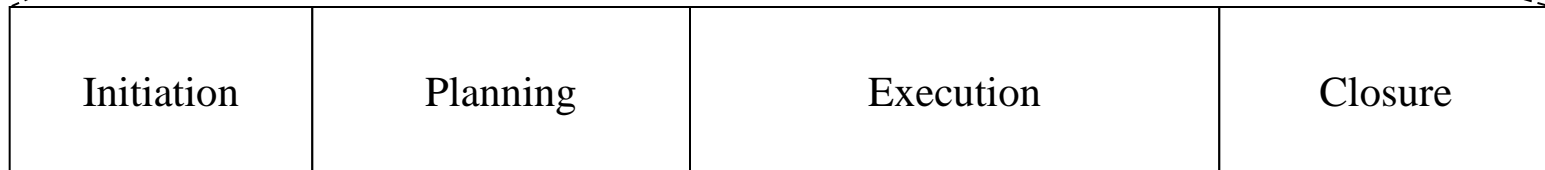
LIFE-CYCLE DEPENDENCIES

Life-cycle of organization

Development / Seed Stage	Startup Stage	Growth / Survival Stage	Expansion / Rapid Growth Stage	Maturity Stage	Decline Stage

Life-cycle of the product

Introduction Stage	Growth Stage	Maturity Stage	Decline Stage

Life-cycle of project

Initiation	Planning	Execution	Closure

PROJECT LIFE-CYCLE OF SOFTWARE GENERATION

1. Identification of both business problems and project objectives

2. Determining the information requirements

7. Implementation and evaluation of the system

3. Analysis of the needs of the system

6. Testing and upkeep of the system

4. Designing the recommended system

5. Creating and documenting the software
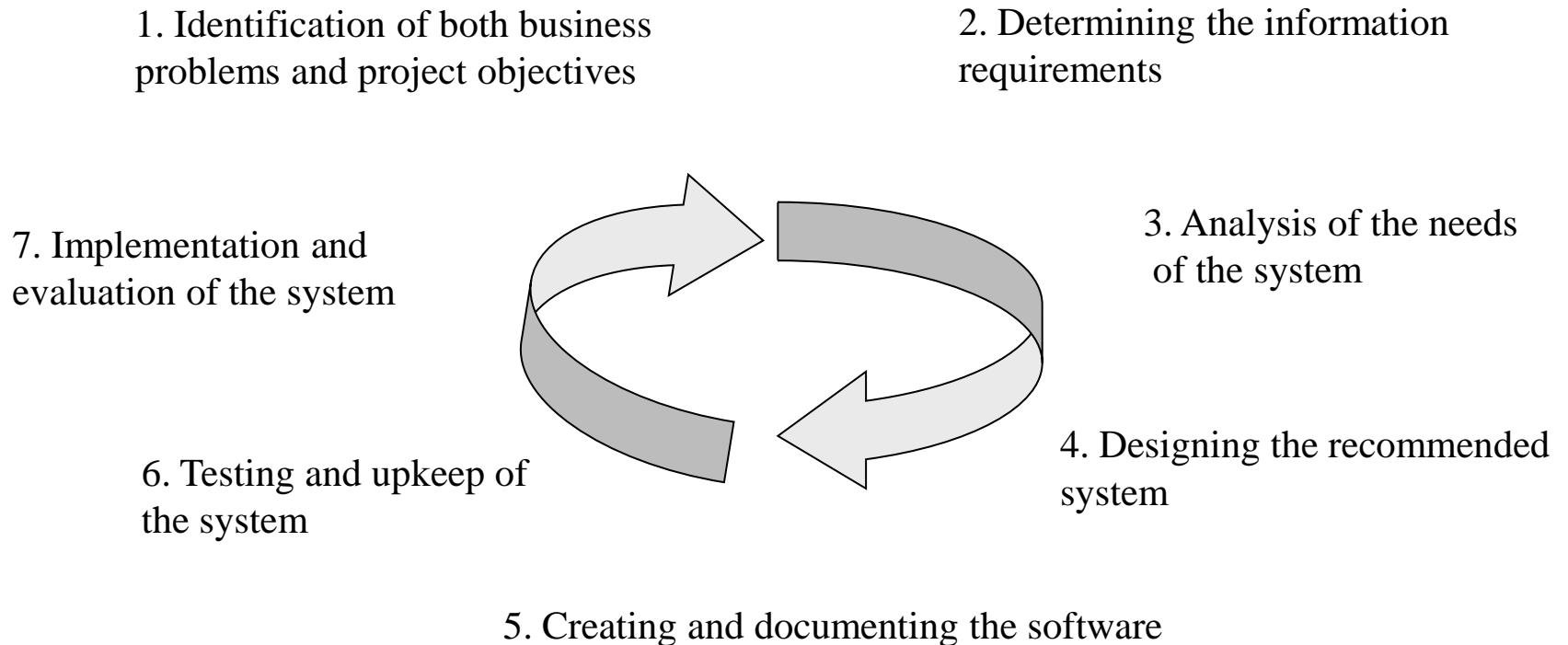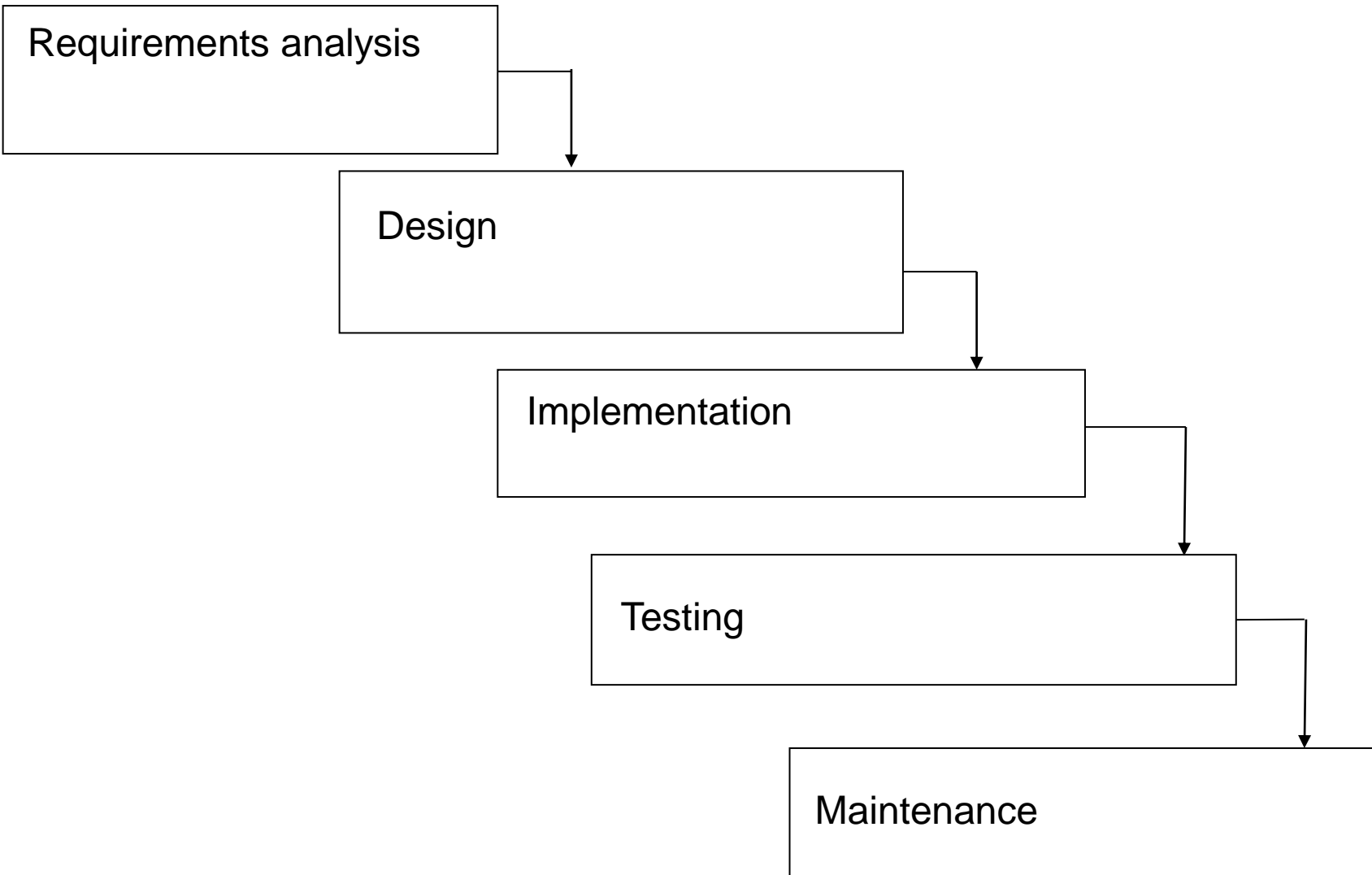
CASCADE APPROACH

- It puts a strong emphasis on initial planning and control with very limited flexibility.

- This approach can be classified as "controlled by plan" or "predictable" because it uses pre-planning for cost estimation and schedule of the project.

- It usually puts emphasis on controlling changes throughout the project to manage the scope of work and ensure that initial estimations and schedules remain valid.

CASCADE MODEL

Requirements analysis

Design

Implementation

Testing

Maintenance

ADVANTAGES AND DISADVANTAGES OF CASCADE MODEL

- Sequential approach
- Divides the complex process into several steps
- Facilitates the tracing and control of process: each step is governed by the criteria for accepting and for moving on to the next step
- Assures full documentation
- Draws attention to immediate products
- Suitable for short-lasting process

- No verification between the stages
- Huge time delay between termination of requirements specification and the moment of implementation
- Assumption as for making correct specification of requirements at the beginning of the work – excludes the possibility of the application of this model for a process with unknown initial requirements

SPIRAL APPROACH

- This model combines the features of a cascade and prototype model.

- First model to explain why iteration matters, how iteration could be used effectively. The term spiral refers successive iterations outward from a central starting point

- Each phase consists of four stages:
    1. Determine objectives alternatives constraints
    2. Evaluate alternatives identify, resolve risks
    3. Develop, veryfy next-level product
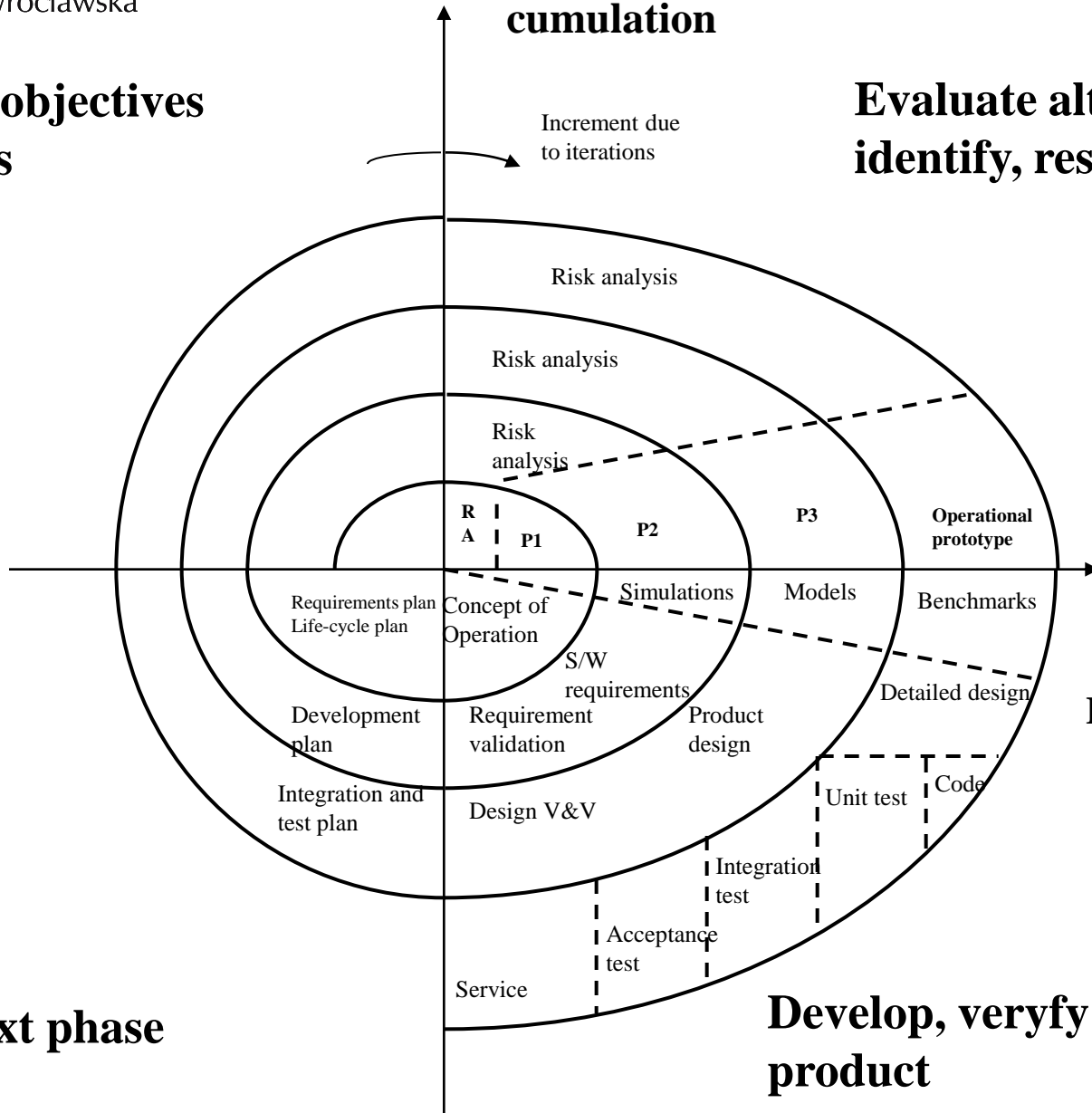   4. Plan next phase

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Costs cumulation

Determine objectives alternatives constraints

Evaluate alternatives identify, resolve risks

Increment due to iterations

Risk analysis

Risk analysis

Risk analysis

Review of the parts

R A   P1   P2   P3   Operational prototype

Simulations   Models   Benchmarks

Requirements plan Life-cycle plan   Concept of Operation

S/W requirements

Detailed design

Development plan   Requirement validation   Product design

P1,2,3 - prototypes

Integration and test plan   Design V&V   Unit test   Code

Integration test

Acceptance test

Service

Plan next phase

Develop, veryfy next-level product

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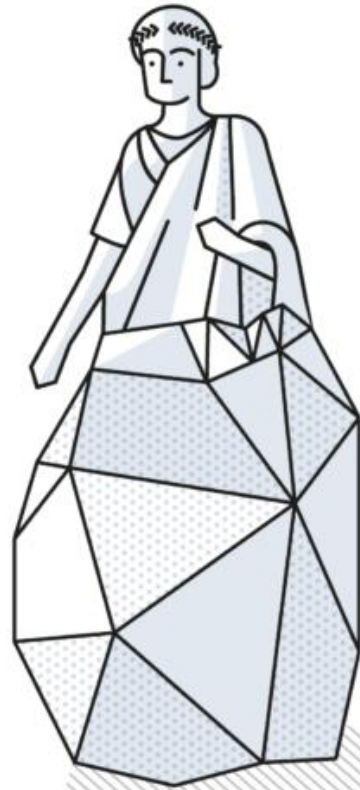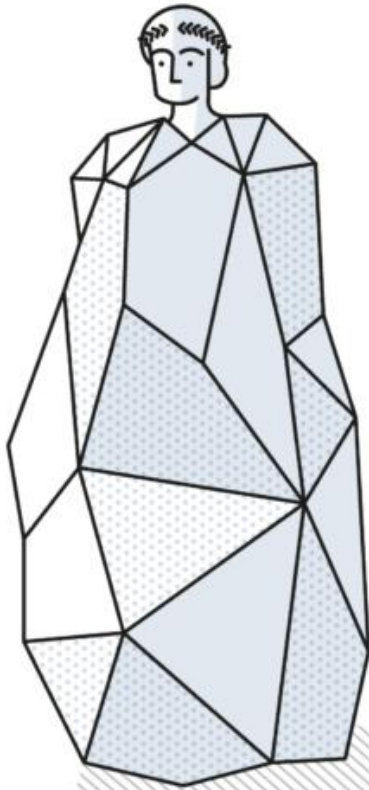# ADVANTAGES AND DISADVANTAGES OF SPIRAL MODEL

- Evolution model, repetitiveness based on prototyping
- Application for big projects
- Each circuit refers ti one element of the product: concept, requirements, project, code
- Enables changes in the development of the project – management of modifications
- Risk management is a must
- Early elimination of errors
- Reuse of earlier created parts
- Each cycle is terminated by the review carried out by the key team members
- Multiple repetition of surveys reading analysis of the market
- The head of the process is required to process and huge amount of knowledge along with experience
- Difficulties in developing and controlling the contract
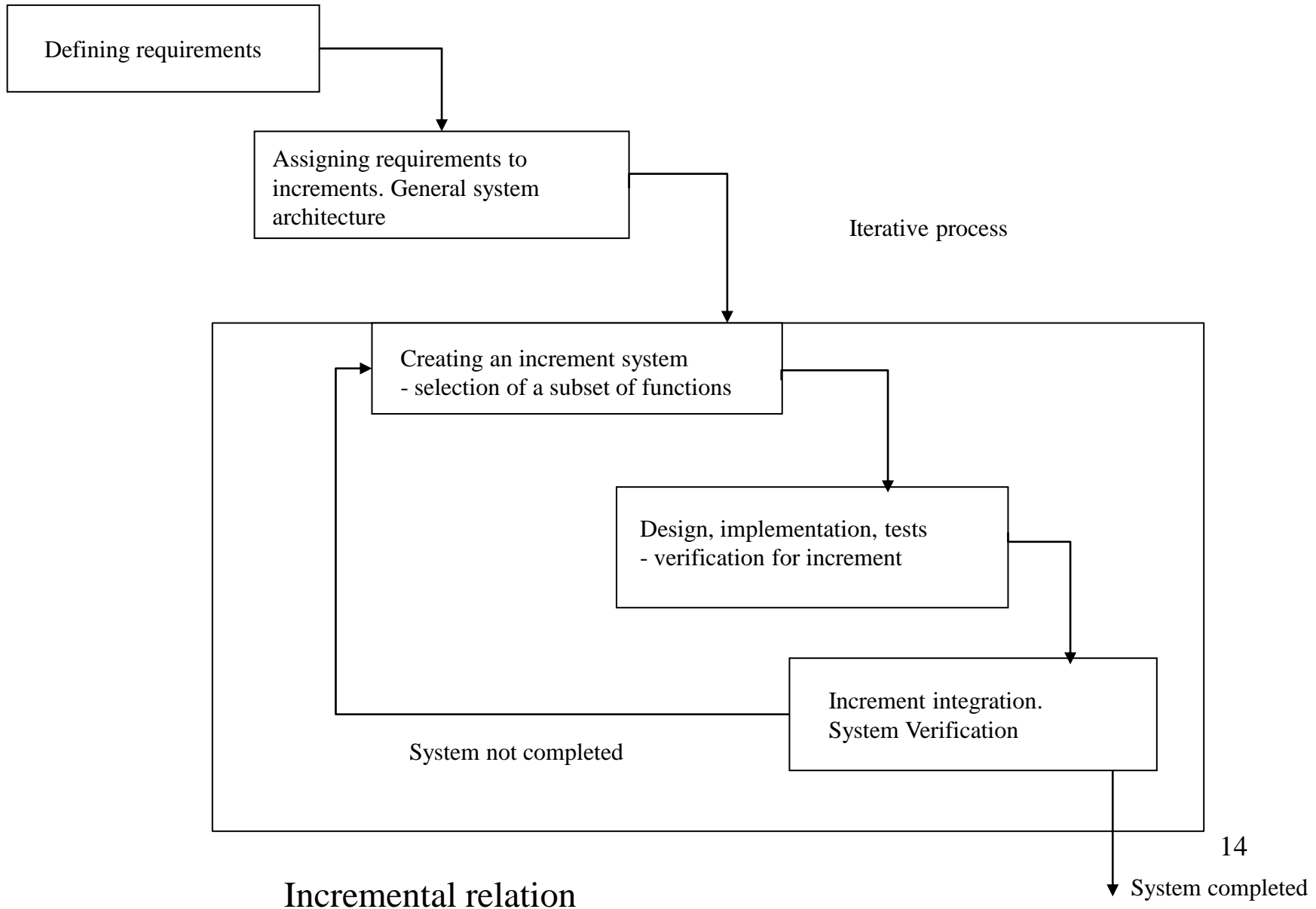
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INCREMENTAL APPROACH

- It requires a clear vision of the product, the implementation of which is carried out in repetitive, short steps of constant length, usually lasting 1 or 2 weeks.

- Each step consists of a small piece of analysis, design, proper implementation and testing

INCREMENTAL APPROACH

INCREMENTAL APPROACH

Defining requirements

Assigning requirements to increments. General system architecture

Iterative process

Creating an increment system - selection of a subset of functions

Design, implementation, tests - verification for increment

Increment integration. System Verification

System not completed

Incremental relation

System completed

THE CONSEQUENCES OF AN INCREMENTAL APPROACH

- partial opportunity to gather feedback on our product,

- partial possibility to receive the product earlier than planned,

- partial opportunity to spend less money than planned,

- partial ability to reduce project risks.
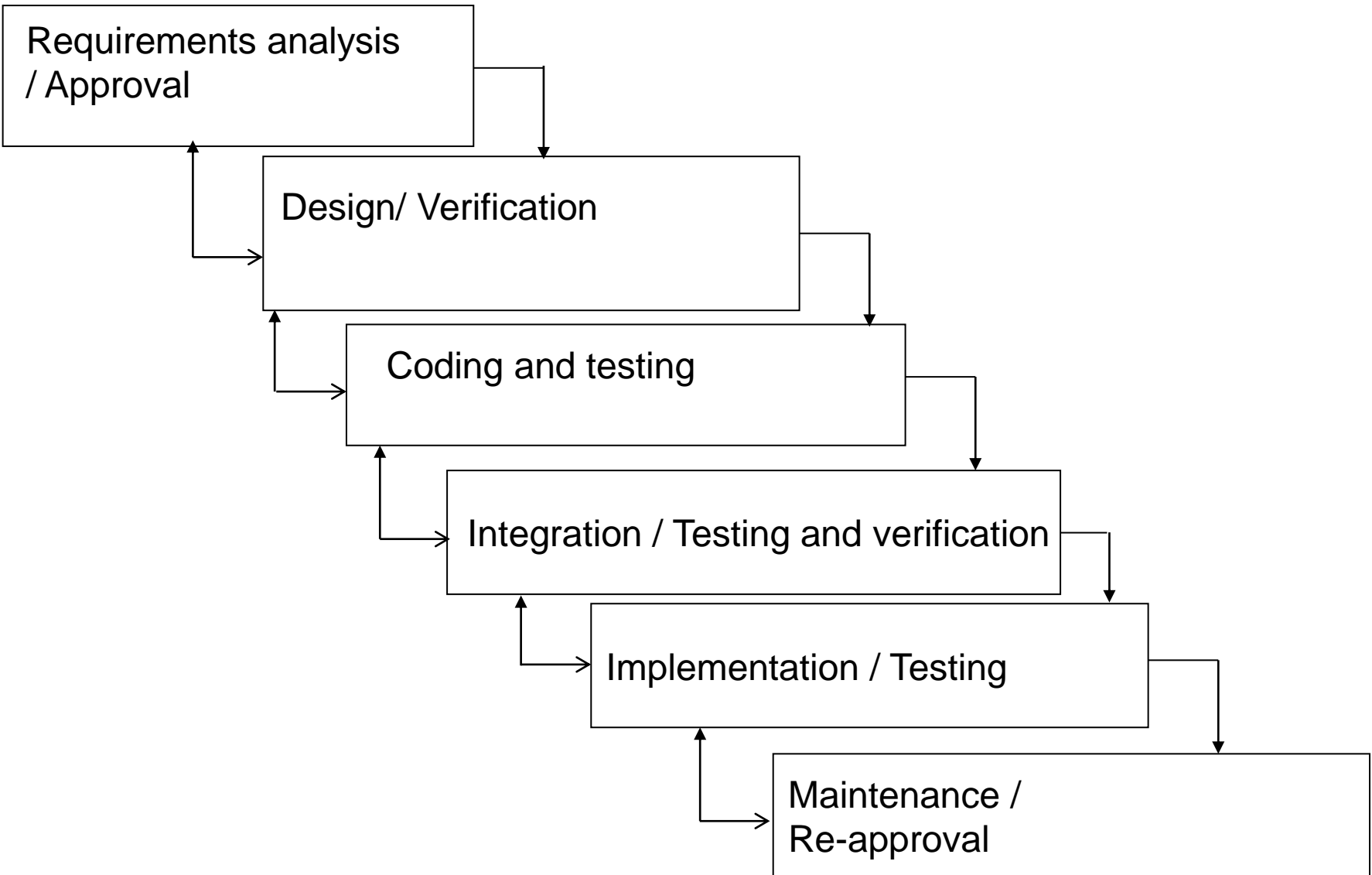
ITERATIVE APPROACH

- Requirements and the project are being modified by series of iterations leading to obtainment of the system satisfying the evolving needs of the client

- „Feedback" sessions and the rule of mutual learning

- Increase in the understanding of requirements definition
- Easier management of modifications
- Enabling the commencement of application creation within a subset of requirements – analysis for each immediate product
- Early neutralization of threats
- Increasing the possibilities of reusing the code
- Easier adjustment of the end product to the changing requirement

ITERATIVE APPROACH

AGILE247.PL
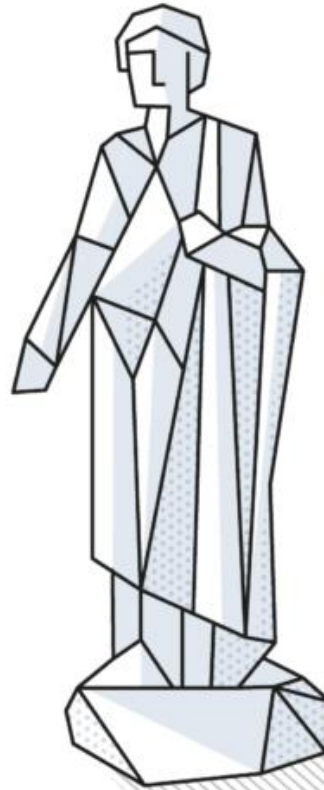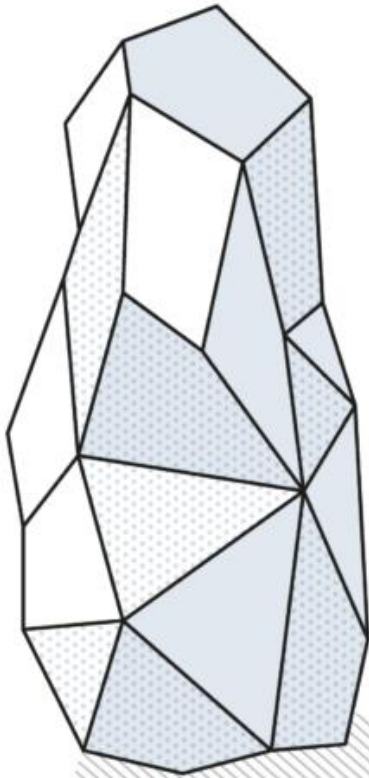
MODIFIED CASCADE MODEL

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THE CONSEQUENCES OF ITERATIVE APPROACH

- opportunity to gather feedback on our product,

- possibility of receiving the product earlier than planned,

- opportunity to spend less money than planned,

- early reduction of project risks.

TOOLS - THE TRADITIONAL APPROACH

Primavera P6 Professional Project Management

MS Project

MODERN METHODS IN IT PROJECT MANAGEMENT

PROJECT MANAGEMENT BY MEANS OF ADAPTATION

- Project management by means of adaptation – a set of methodologies, labeled as agile or light and the tools applied to management of complex and innovative projects mainly IT ones.

- Creation of the new approach was a response to low flexible methods for IT project management being considered as formal and low effective.

- The paper entitled "Manifest for agile software development" (2001) initiated deep transformation within programming environments, also made in other areas of project management

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MANIFESTO FOR AGILE SOFTWARE DEVELOPMENT

- *We are uncovering better ways of developing software by doing it and helping others do it.*

- *Through this work we have come to value:*

  – *Individuals and interactions over processes and tools*
  – *Working software over comprehensive documentation*
  – *Customer collaboration over contract negotiation*
  – *Responding to change over following a plan*

- *That is, while there is value in the items on the right, we value the items on the left more.*

https://agilemanifesto.org/

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AGILITY AND ADAPTABILITY

1. Critical points of the agile team in project

    1. 2 up to 8 people per room

    2. Clint's experts on the spot

    3. One-month increases

    4. Fully automated regression tests

    5. Experienced programmers

2. Adaptability – the need for an analysis of past actions

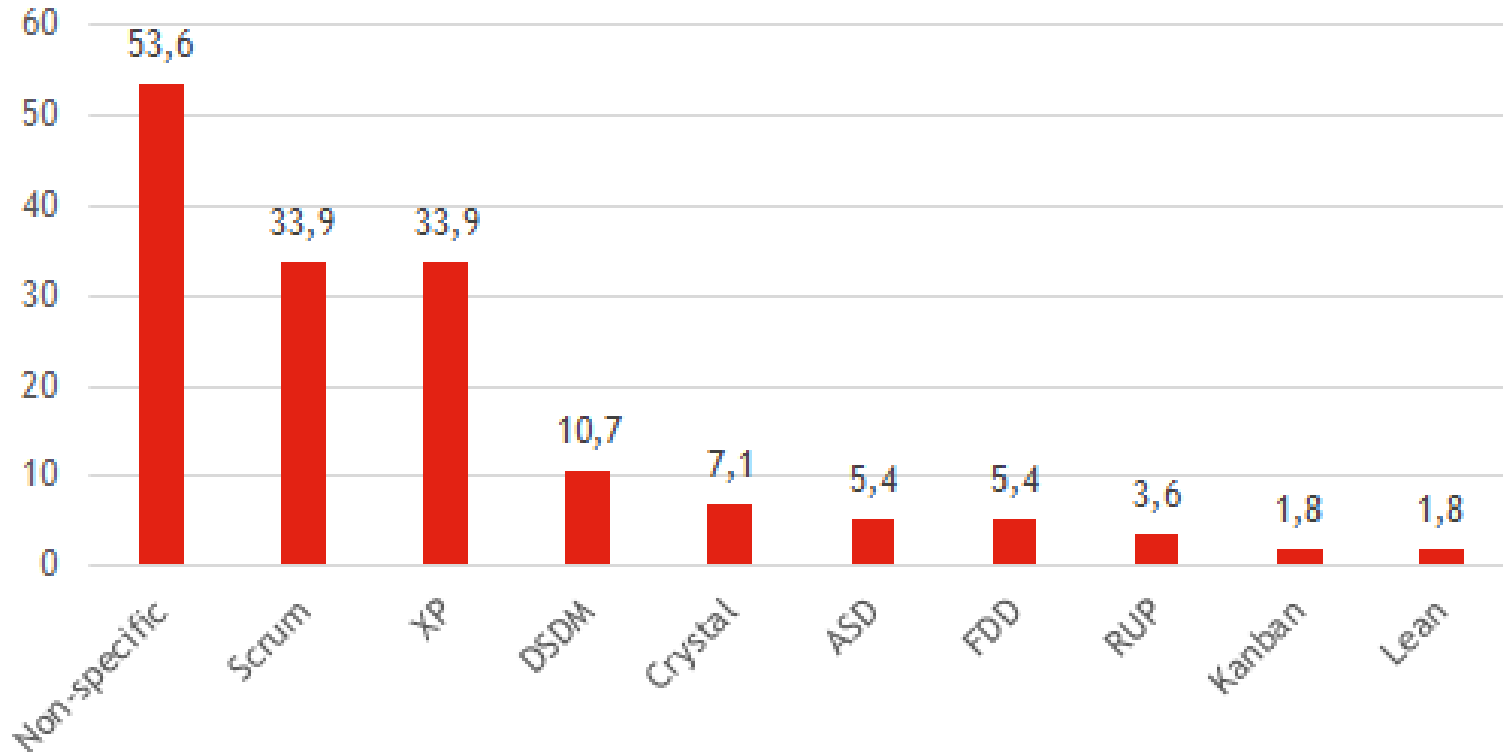# CHARACTERISTIC FEATURES OF AGILE METHODOLOGIES

- Features
  - Limitation on the number of documents
  - Iterative planning in a shorter time-frame
  - Constant cooperation with the client
  - Openness to changer
  - Small project team
  - No division into projects phases
  - Getting the requirements by means of an executable code

- Advantages
  - Fast issuing the working product, each construction lasts 2 up to 10 weeks
  - Contractor and user directly realize themselves the requirements (completeness and cohesion)
  - In any moment of the development process the client possesses a working version of the product (with the limited product functionality)

- Inappropriate for
  - Teams exceeding 50 peoples
  - Products that perform functions of critical security
  - Contracts with the specified range

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EXAMPLES OF AGILE METHODOLOGIES

- Extreme Programing (XP)

- Scrum, Kanban, Crystal, Lean Software Development (LSD)

- Dynamic Systems Development Method (DSDM)

- Adaptive Software Development (ASD)

- Feature Driven Development (FDD)

THE MOST COMMONLY USED AGILE METHODS

Campanelli, A. S., & Parreiras, F. S. (2015). Agile methods tailoring–A systematic literature review. *Journal of Systems and Software*, *110*, 85-100

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METODA SCRUM

- **Literature**:

    1. Cockburn A., *Agile Software Development. Gra zespołowa*, Helion 2008
    2. Schwaber K., *Sprawne zarządzanie projektami metodą Scrum*, Microsoft Press 2005.
    3. Schwaber K., Sutherland J., *SCRUM guide – Przewodnik po metodyce SCRUM*, tlum. A. Gajewska, T. Włodarek, 2010

- **Basic assumptions:**
- Iterations – mostly at 30 day intervals
- Incremental software development
- Empiric control of the process: control of the process: transparency, control, adaptation
- Self – organizing project team
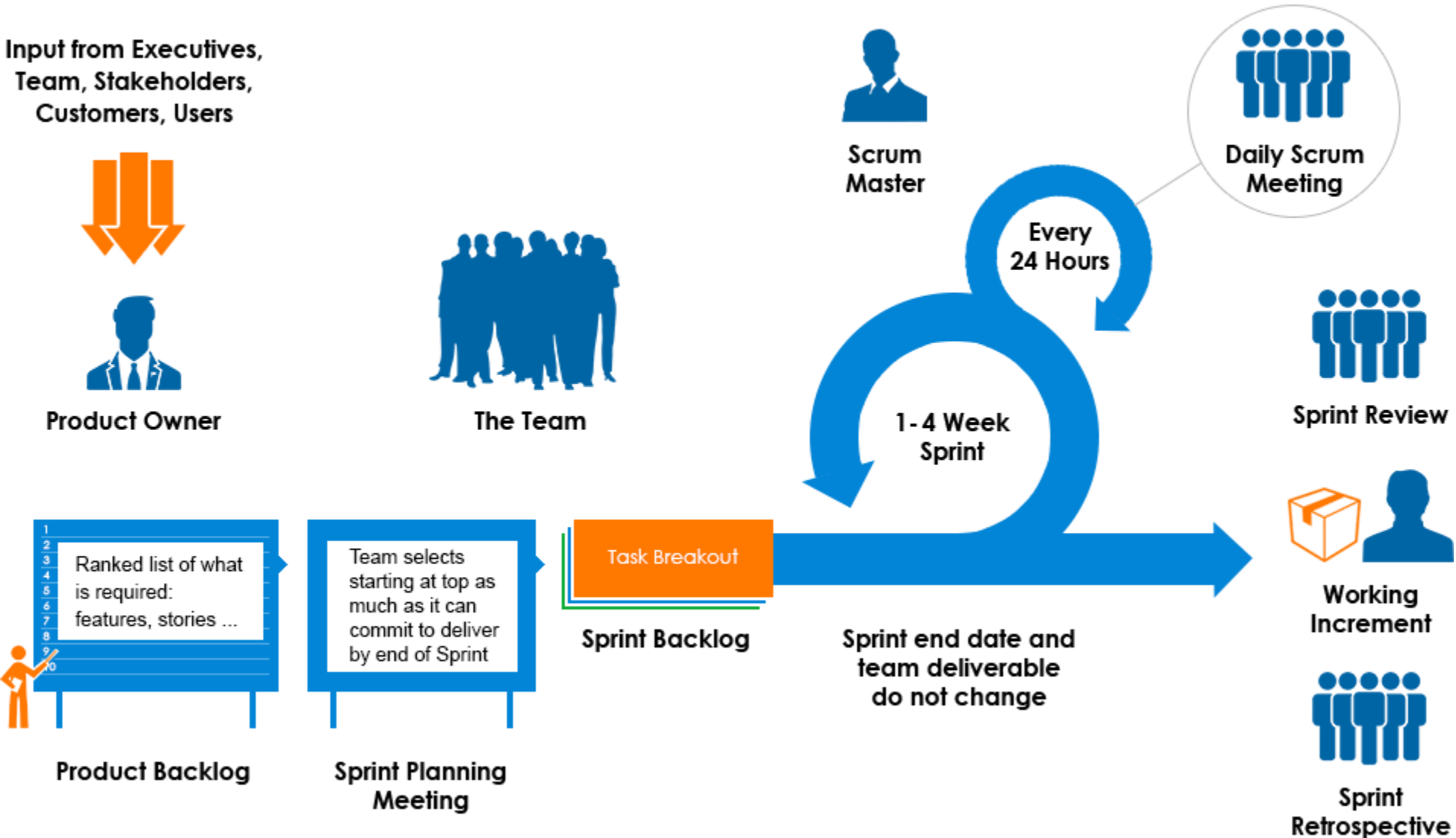
- **Tools**:
- **ATLASSIAN JIRA**

SCRUM

- is a flexible (agile) software development model based on many small teams working in an intensive and interdependent way.

- covers real-time decision making based on events and information received.

THE SCRUM PROCESS

SCRUM AS A FRAMEWORK OF THE PROCESS

- The method as a set of practices and roles

- Main roles:
  - Scrum Master,
  - Product Owner,
  - Development Team

- **Product owner**
  - Is the owner of the success definition, represents the organization as well as interested parties of the project.
  - Supervise the product from the sprint to the sprint in order to assure the highest yield on investment and deliver a certain value to the organization.
  - Manages the ROI by determining the priorities and the issuing the plans he is the only owner of the product backlogs. He… the project development plan by setting the priorities of backlogs.
  - Eliminates errors of existence of many bosses, different opining and disturbances.

ROLES WITHIN THE SCRUM

- **Master**
- One person in the team undertakes the role of a master – she facilitates the everyday teamwork, she does nothing else. Neither while burden is to play the role of a master full-time
- The master is responsible for assuring that the team emanates the corporate ideals and it works according to the rules of the Scrum method
- Is the shield of the project team against aggressive clients, making sure that the team does not exceed the obligations of the actual sprint
- Master becomes responsible for removing any obstacles being reported by the team during the meeting
- The role of a master is usually assumed by the head of the project or by the head of the technical team, but it can also be any person being a member of the team of the project management.

THE ROLES WITHIN THE SCRUM

- **The Development team**
  - A group of roughly 7 people with interdisciplinary background, who do several jobs e.g. they work as analysts , designers, programmers, testers etc.
  - It has assigned responsibility for supplying the product.

- **Members of the project so-called "piglets"**
  - The owner of the product, in the case of the lack of the regular involvement is included in the set "chickens"
  - Master
  - Team: architect, programmer, analyst, tester, expert …

- **Remaining interested parties of the project – so-called "chickens",**
  - Possess no formal responsibility.
  - Are no part of the Scrum process, but they are interested in the project (clients, sales, people, policy-makers of environment creation).
  - They take part in the sprint review meetings.
  - During the meeting they have no right to suggest what the team should do.

MAIN ARTIFACTS OF THE SCRUM

- **Product Backlog – the product register**
- The List of functional project requirements, being sorted according to the priorities along with these expectal deadlines for conclusion and implementation
- Estimations are given in days and the higher the position in the product backlog queue is, the more precise these estimates are.
- Priorities of the position should be fixed on the basis of the highest corporate value being calculated using the ROI method
- The list in the pipeline develops and evolves.
- **Sprint Backlog – the register of the backlog of the sprint**
- Register of task, which the Scrum team binds itself to their completion in the current sprint
- The items of the backlog of sprint come from the registry of the product backlog
- The team acts according to priorities set by the product owner and ones estimations relating to their time-frame
- The critical thing is that it is the very team that chooses the items from the backlog list, because the team binds itself to completion of these tasks
- Burn down – a chart showing the remaining work to complete the sprint.

ITERATION WITHIN THE SCRUM – THE SPRINT

- **Sprint**
- Sprint is the time devoted to working out one increment on the product. This is the method called " time boxing": time, expenditure and range. More important is the range the fact of not meeting the deadline.
- Sprint includes the design, programming, testing and documentation.
- Just after the start of the Sprint team can add or remove items from the registry sprint backlog.
- If attainment of the goal of the sprint makes no sense, than what follows is the so-called abnormal termination of the sprint.

- **The sprint of the issue**
- Issuing the software for operation (production) requires a special type of sprint called" the sprint of the issue".
- To the sprint is dedicated the team for the sprint of the issue.

- **Sprint planning meeting**
- The aim is to draw up the backlog register of the sprint.
- The product owner describes the properties with the highest priority, and the team decides on the range of their responsibility and what can be supplied within a given sprint. This takes place within 2 subsequent meetings (4 hours).
- The team plans tasks to be carried out, whose set makes the backlog register of the sprint.

THE DAILY SCRUM

- Everyday meetings lasting for 15 minutes, the main thing is that these take place on a everyday basis at the same time and place.

- In the course of the meeting the Scrum team is sitting opposite each other in a circle and each team member asks with the following three questions:

  1. What progression have you made since the last Scrum session?
  2. What are you going to do up to the next Scrum session?
  3. What problems are still nagging you while doing your work?

A SPRINT REVIEW

- AT the end of each sprint a meeting reviewing the sprint. In the course of this meeting the scrum team demonstrous what Has been concluded within the phase of this sprint, normally it is a form of presenting the New functions.

- It is advised that meetings reviewing the sprint be informal, on principle the use of Power point slides is not allowed and AT most two hours are permitted to be devoted to the preparation for this meeting. The conference should not become a nuisance for the team, it should be a natural result of the sprint.

- Participants on the meetings reviewing the sprint: product owner, the Scrum team, master, management, clients and engineers from Rother Project

- In the course of this meeting the Project is being compared with the objective of the sprint fixed during the meeting entitled planning the sprint, but the main thing is that the objective of the sprint be attained.

RETROSPECTION OF THE SPRINT

- This kind of the meeting is covered by a master to discuss the concluded sprint and it aims at determining what can be modified In the next sprint, so that the work will be more pleasant and more productive.

- The discussion may be about everything what influences the team work: processes, practices, Communications, environment, tools.

- The Scrum should be perceived as framework which ought In team to be adequately adjusted to a given project, team and the concrete situation.

- Retrospection of the sprint is an important tool, which facilitates constant improvement of the team on throughout the project life cycle.

THE ADVANTAGES OF USING THE SCRUM METHOD

•Assures the highest cooperate values at the early project stage, avoiding at the same time unrealistic requirements as well as unnecessary work (waste elimination)

•Improves clients satisfaction

•Supplies the approach being led by the clients

•Focuses on the speed of delivery

•Assures openness and transparency for clients

•Removes obstacles systematically by means of the priorities

•Improves keeping the workers by facilitating and promoting self-organization, communication within the team, education and development

•The effects the Microsoft company obtained from the Scrum: fourfold increase in average effectiveness and twelvefold better quality

EXTREME PROGRAMMING

- XP tries to reduce the cost of changing requirements through many short software development cycles, instead of one such as the cascade model.

- According to this methodology, changes are a natural, unavoidable and indicated aspect of the project and should be included in the project plans instead of trying to create an unchanging set of requirements.

EXTREME PROGRAMMING

Four basic steps:

1. Creating source code
   – Testing
   – Unit tests
2. Acceptance tests

3. Listening

4. Projects

EXTREME PROGRAMMING
VALUES

- Communication

- Simplicity

- Feedback

- Courage

- Respect

THE COMPARISON

	Cascade	Spiral	Iterative	Scrum
Defined process	required	required	required	required
The final product	determined during planning	determined during planning	determined during the project	determined during the project
Project cost	determined during planning	partly variable	determined during the project	determined during the project
Date of completion	determined during planning	partly variable	determined during the project	determined during the project
Responding to changing market needs	at the planning stage	mainly at the planning stage	at the end of each iteration	at every stage
Team flexibility, creativity	limited	limited	limited	unlimited during the iteration
Transfer of knowledge	training before the project	training before the project	training before the project	teamwork during the project
Probability of success	low	Medium low	Medium	High

Schwaber, K. (1997). Scrum development process. In *Business object design and implementation* (pp. 125). Springer, London.