Project Development (IV_SYP_PRE)

Effort Estimation

Unit 10

Effort Estimation vs. Scheduling

Effort vs. Scheduling – A Very Rough Sketch (1)

- Pre-work: Define a tasks to be done and one or more criteria per task to be satisfied in order to clearly indicate that the task is finished

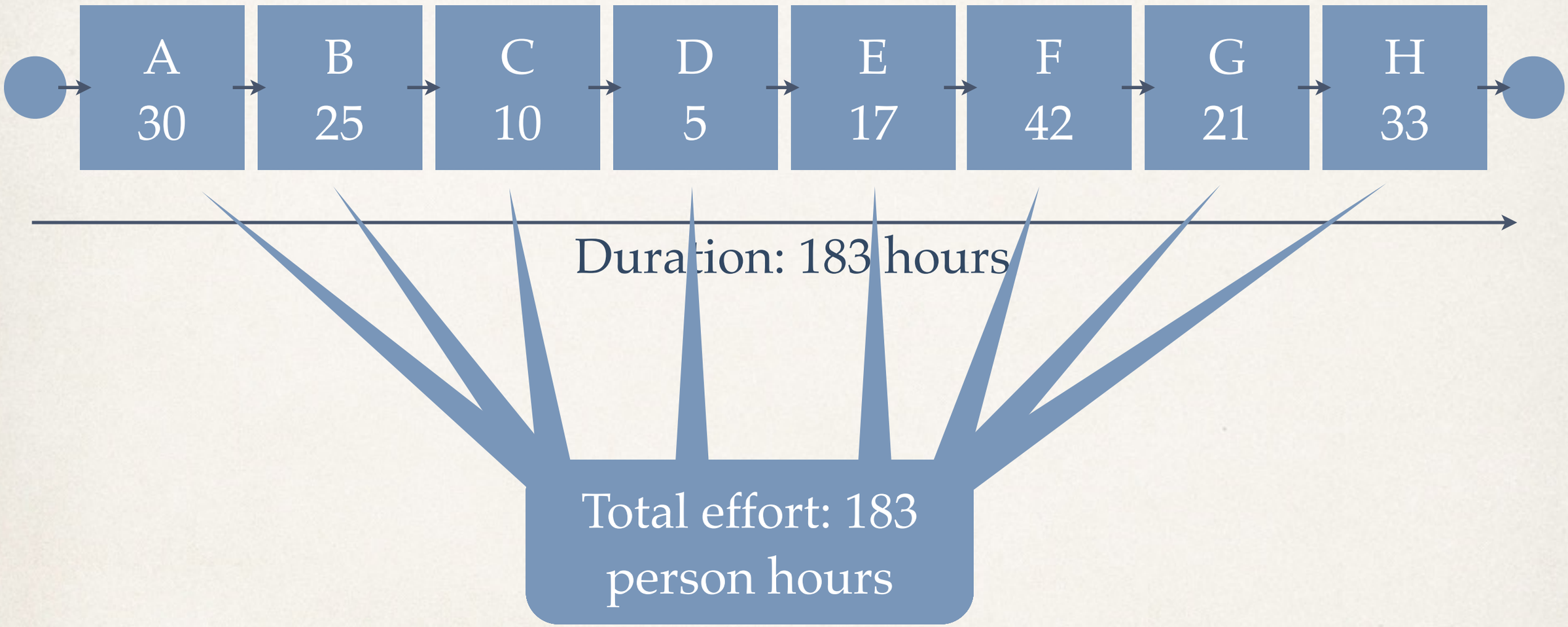
- Effort
  - Ask one or more experts: “How much time would one single person need to accomplish this task?”
  - Align these estimations to get a single and plausible number
  - Alternatively ask: “How much time took this (or a similar) task in another project we did in our company

- Do this for all of your tasks in your project

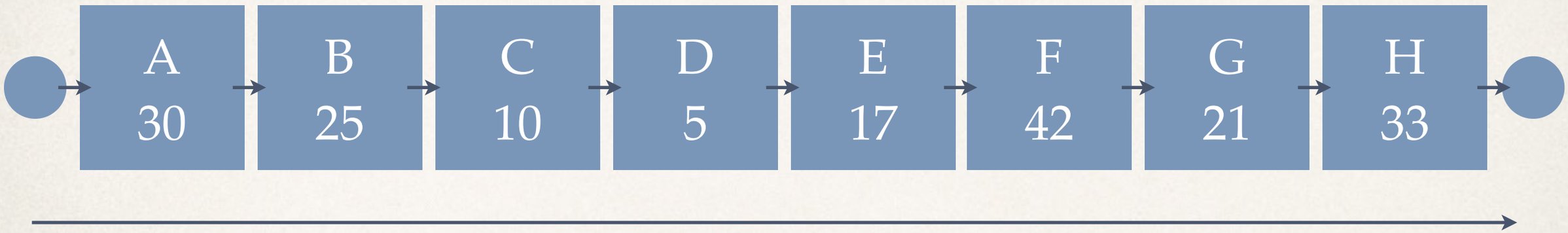
Effort vs. Scheduling – A Very Rough Sketch (2)

- Time
- Define a start time for your project
- Analyze the dependencies between your tasks
- Analyze the availability of resources (team members, machines, etc.) in your project
- Arrange your tasks according to the dependencies and resources

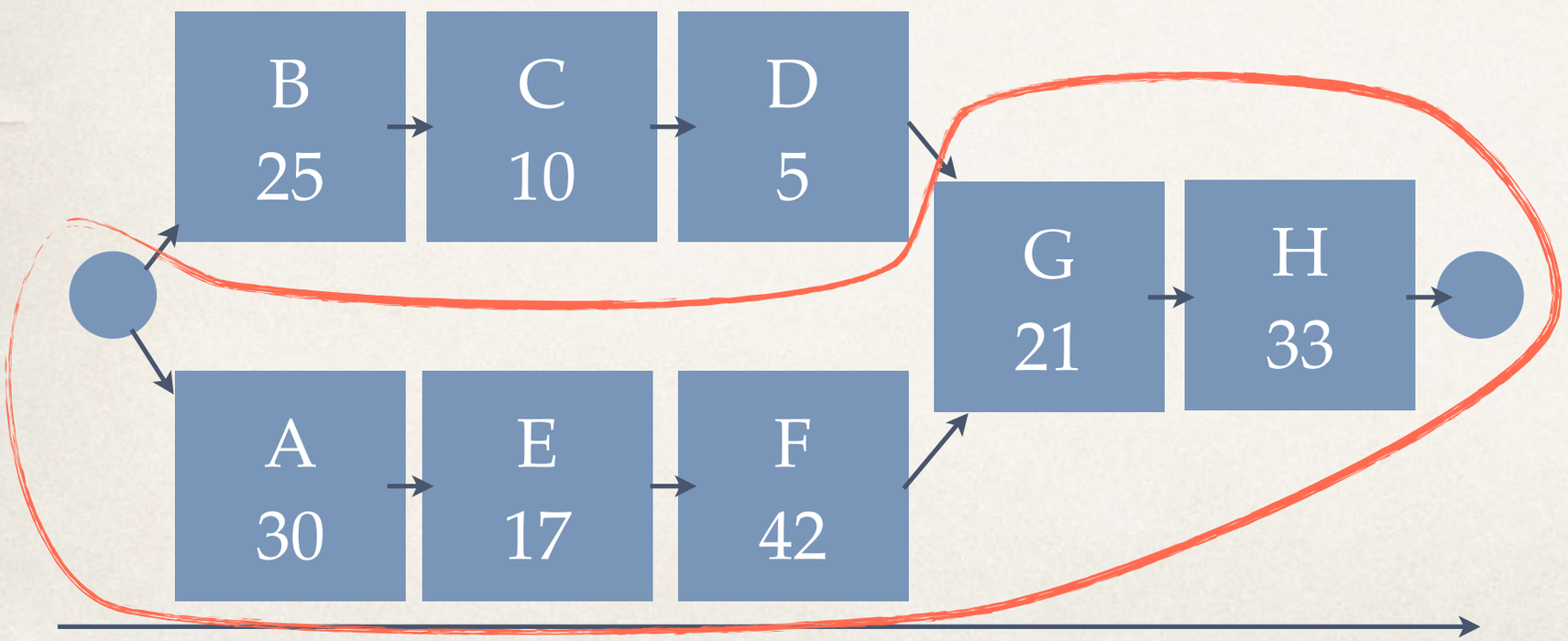
A Graphical Example



A Graphical Example



Duration: 183 hours



Duration: 143 hours

Effort Estimation in Little

A Simple Planning and Monitoring Sheet (PM-Sheet)

Task	Orig. Est.	Curr. Est.	Effort	Remain	Responsible

A Small Exercise to Start With

- Sit down in your team
- Agree on the most important things to be accomplished in your project (tasks) in the next week
- Make sure that every team member understands every task
- Agree on one or more criteria per task which have to be fulfilled in order to indicate whether this task is finished (acceptance criteria)
- Prioritize the tasks roughly
- Document the tasks, their acceptance criteria and prios

A Small Exercise to Start With – cont'd

- Find out, how many person hours your team can spend on your project during the next week (hours pool)
- Estimate the effort (in person hours) to accomplish these tasks
  - Start your estimations with the highest prio tasks and go along the way down following the falling prios
- Stop the effort estimation as soon as your estimations reach the hours pool
- Document the effort estimations and your hours pool in the PM-Sheet

During the Week

- Every team member
  - When you take over a task out of the PM-sheet write your name as responsible to this task
  - Monitor your working time on the project in the PM-sheet
  - Re-estimate the remaining time necessary to accomplish the task you are currently working on
- Project lead
  - If a new tasks comes up or a tasks becomes obsolete, update the PM-sheet

A Small Exercise to Start With – One Week Later

- Check, whether your planned tasks are finished by testing the actual results against the acceptance criteria
- Compare these results with the remaining time as monitored in your planning sheet
- Analyze the entries for every planned task
  - Does the original estimation differ from the current estimation?
  - If so: why did it grow or shrink?

A Small Exercise to Start With – Retrospective

- What did you learn for a next iteration?
- What went good? Why?
- What went bad? Why?
- Which things have to happen again in the next iteration?
- Which things must not happen again in the next iteration?

Structuring the Whole Project

A Bigger Picture

- So far we only estimated small entities
- If we estimate a complete project on this basis, we would never end
- Try a slightly different approach

There Is Nothing Without Requirements

- Collect the requirements in a product backlog
- Basis should be the requirements documented in the system spec

ID	Prio	Epic	User Story	COS (Criteria of Satisfaction)	Effort
CAL01	1	Calendar	As a student I want to add an internal event	Invalid values: start after end, empty title, notification e-mail to be sent to all class mates	3
CAL02	2	Calendar	As a student I want to cancel an internal event	Notification mail to all class mates	1
CAL03	2	Calendar	As a teacher I want to add an internal event	Only classes which are assigned to teacher may be selected; all acceptance criteria from CAL01 have to be fulfilled	5
…	…	…	…	…	…
…	…	…	…	…	…

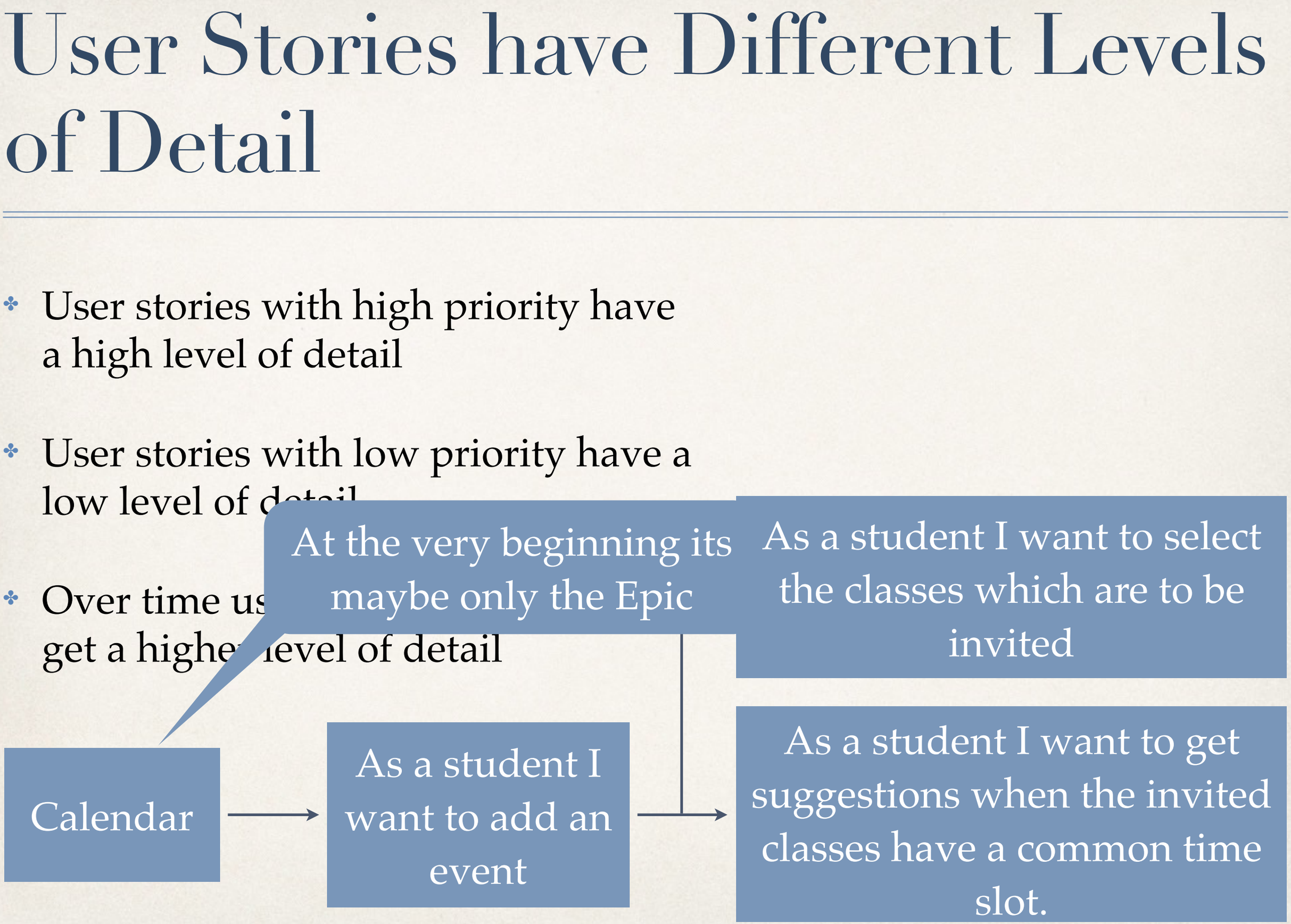
User Story

- One to two sentences
- Criteria of satisfaction

- INVEST
  - Independent
  - Negotiable
  - Valuable
  - Estimable
  - Small
  - Testable

User Stories have Different Levels of Detail

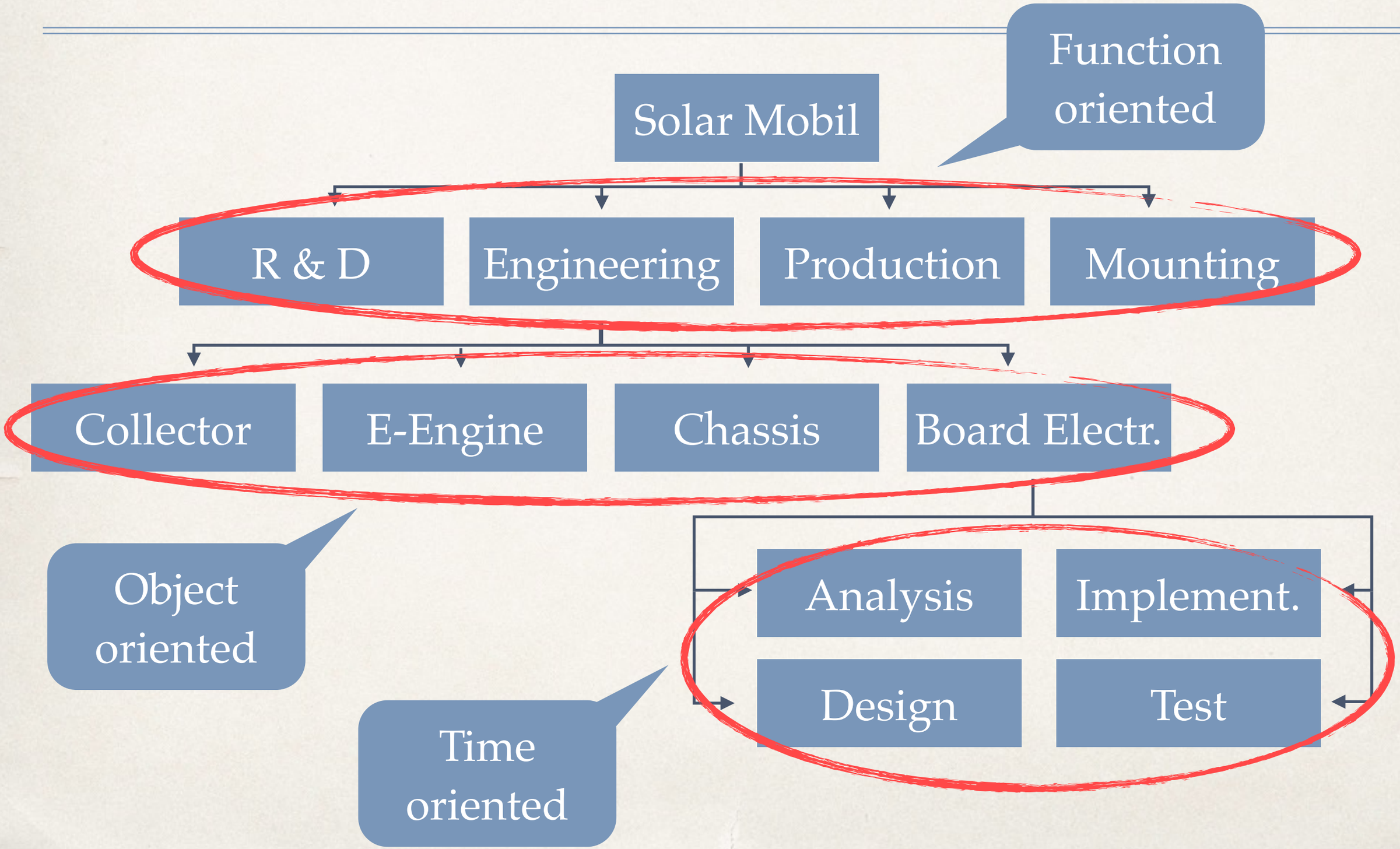
- User stories with high priority have a high level of detail
- User stories with low priority have a low level of detail
- Over time us… get a highe… level of detail



An Even Bigger Picture

- It is difficult to describe a complete project even on this level of detail
- The next three sprints are maybe fine with this approach but then?
- Let's start off with something rougher
  - Work breakdown structure
  - Story map

Work Breakdown Structure



Story Maps

Calendar	Forum	FTP	Epic	Epic …	Epic

Time →

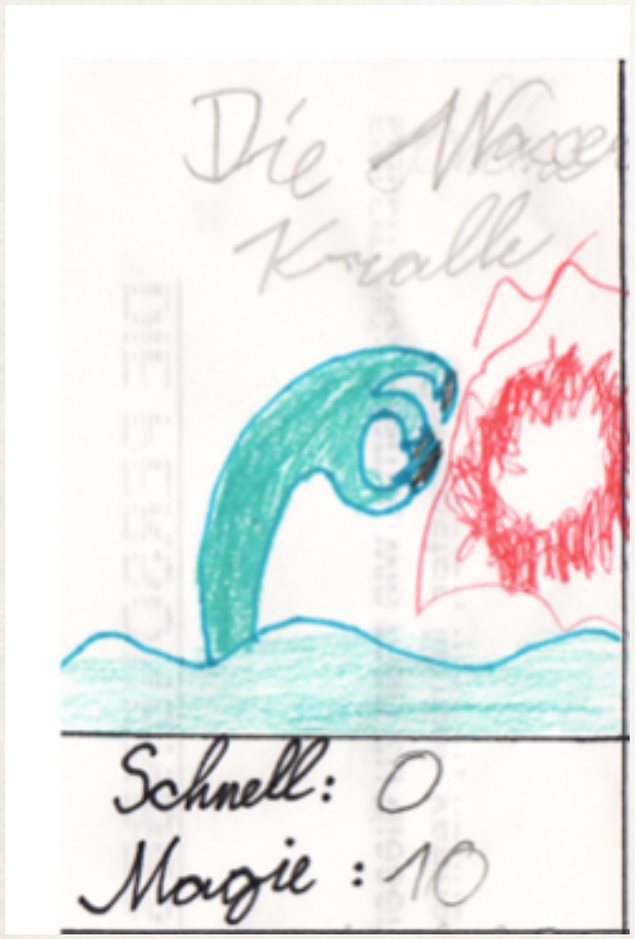
CAL01	FOR01	FTP01	STORY	STORY	STORY
CAL02	FOR02	FTP02	STORY	STORY	STORY
CAL03	FOR03	FTP03	STORY	STORY	STORY
CAL04	FOR04	FTP04	STORY	STORY	STORY
CAL05		FTP05	STORY		STORY
…		…			…

Effort Estimation for the Whole Project

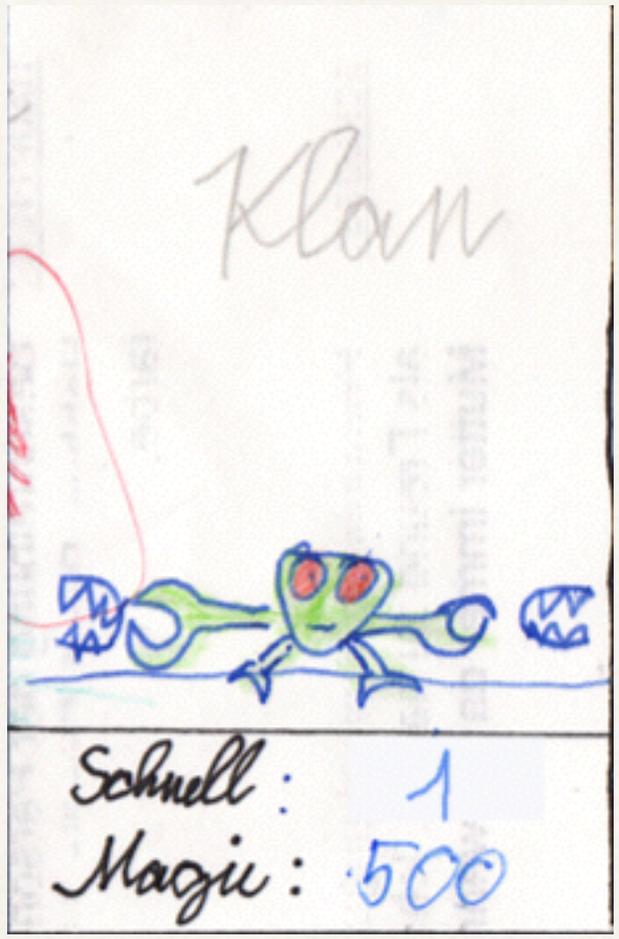
Effort Estimation of the Bigger Entities

- The bigger entities can’t be estimated in hours
- Estimation in days or story points

Story Points



No effort



Very small effort

Small effort:
approx. double of a
very small effort

Story Points – continued

Middle effort: Very small + small effort

Large effort: Small + middle effort

Very large effort: Middle + large effort

Story Points – finished

Huge effort: Large +
very large effort

Distance of Story Points

- 0, 1, 2, 3, 5, 8, 13
- The Fibonacci Sequence
- Increasing distances
  - Reliefs the team from guessing around whether a specific story has an effort of 21 or 25 hours
  - ATTENTION: If effort is 13 for a high number of stories, the team most probably doesn't understand a large part of the project

Story Points – Characteristics

- Team specific
  - Different teams will estimate a different amount of points
- Relative
  - One estimation has no meaning

Effort Estimation w/ Story Points – The Planning Poker

- Prerequisite: Every team member has a stack of cards (one from each kind)
- Select a small story at first
- Product Owner explains story
- Team clarifies story (ask and discuss)
- Every team member selects a card from his / her stack reflecting his opinion concerning the effort
- All team members unhide their cards at the same time

The Planning Poker – continued

- If all team members estimate the same effort, we are done
- If not
  - The member with the smallest estimate explains his/her reasons
  - The member with the highest estimate explains his/her reasons
- Then a new round of estimation starts

Putting it all Together

SCRUM

Scrum Master

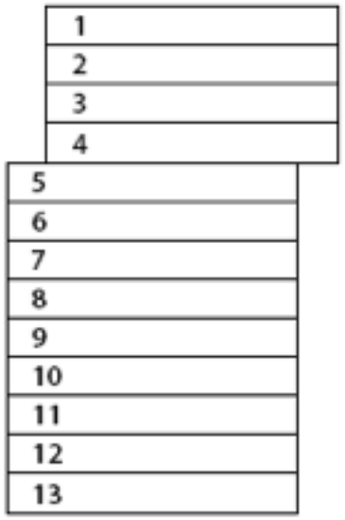
Daily Scrum Meeting

Product Owner

The Team

Sprint

Sprint Review



Product Backlog

Sprint Planning Meeting

No Changes

(in Duration or Deliverable)

Potentially Shippable Product

Sprint Retrospective

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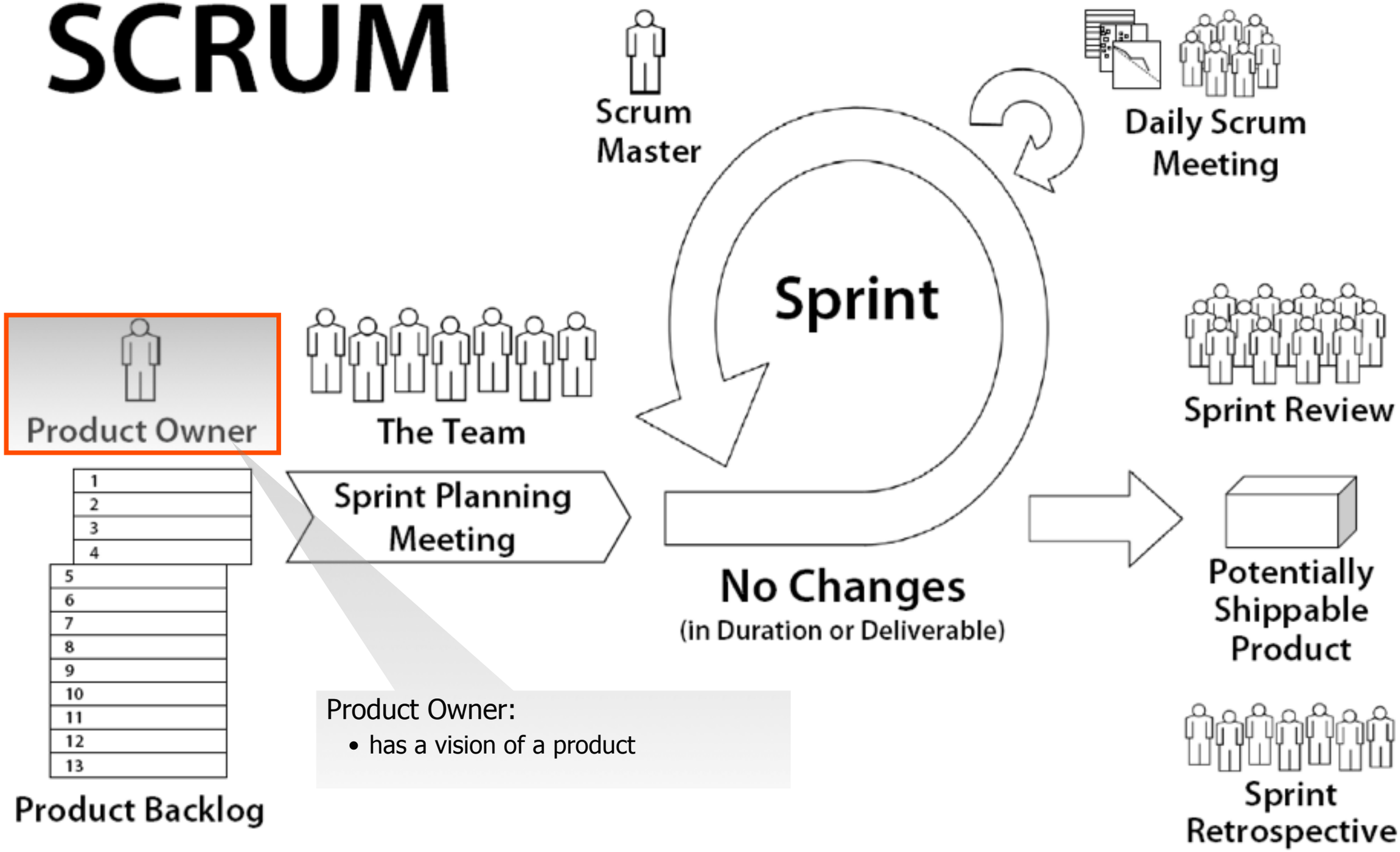
SCRUM



Product Owner:

- has a vision of a product

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Sprint Review

1
2
3
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11
12
13

Product Backlog

Sprint Planning Meeting

No Changes
(in Duration or Deliverable)

Potentially Shippable Product

Product Backlog:
- Holds all features and requirements

Sprint Retrospective

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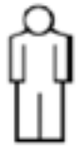
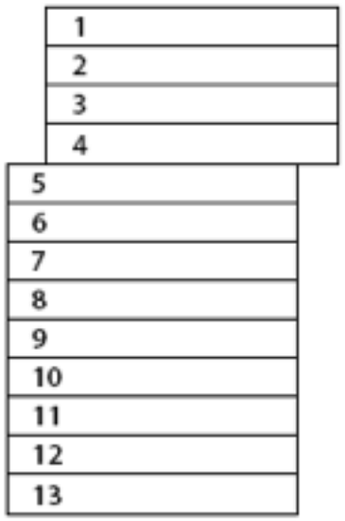


Product Owner

The Team

Sprint

Sprint Review



Product Backlog

Sprint Planning Meeting

No Changes

(in Duration or Deliverable)

Potentially Shippable Product

Sprint:

- Typical duration (2 - 6 weeks)
- Within these features are implemented

Sprint Retrospective

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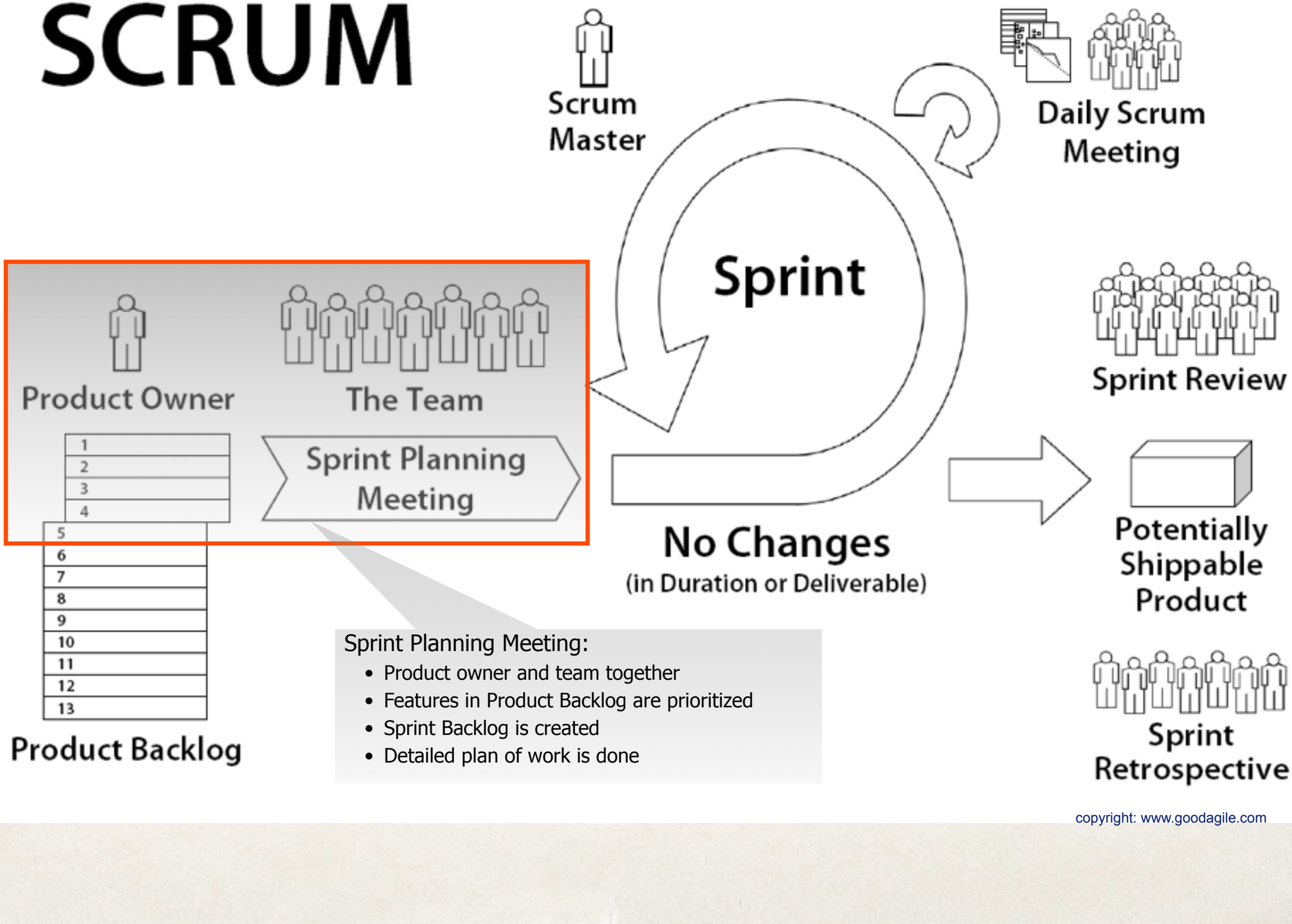

Sprint Planning Meeting:

- Product owner and team together
- Features in Product Backlog are prioritized
- Sprint Backlog is created
- Detailed plan of work is done

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Sprint Review

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Product Backlog

Sprint Planning Meeting

No Changes
(in Duration or Deliverable)

Potentially Shippable Product

Sprint Retrospective

No Changes:

- Planned features for a sprint must not be changed

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Scrum Master

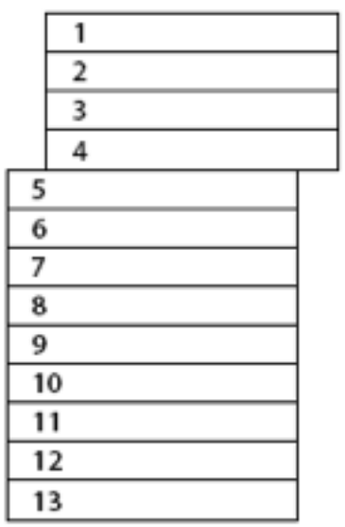
Daily Scrum Meeting

Product Owner

The Team

Sprint

Sprint Review



Product Backlog

Sprint Planning Meeting

No Changes

(in Duration or Deliverable)

Potentially Shippable Product

Daily Scrum Meeting:

- Daily meeting to exchange progress, next step, impediments (problems)
- Progress update in Burndown Chart

Sprint Retrospective

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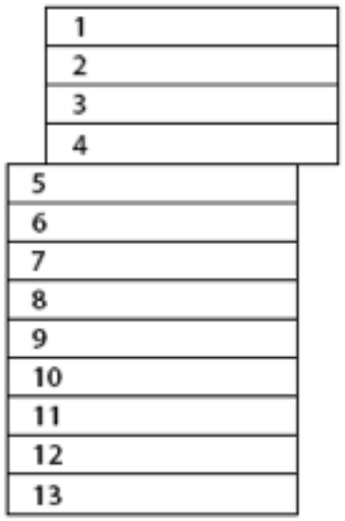
SCRUM

Daily Scrum
Meeting

Product Owner

The Team



Product Backlog

Sprint Planning
Meeting

Sprint

No Changes
(in Duration or Deliverable)

Potentially
Shippable
Product

Sprint Review

Scrum Master:

- Handles organizational issues
- Resolves impediments

Sprint
Retrospective

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SCRUM

Scrum Master

Daily Scrum Meeting

Product Owner

The Team

Sprint Review

Product Backlog

Sprint Planning Meeting

Sprint

No Changes

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Product:

- Every sprint results in „shipable" software

Sprint Retrospective

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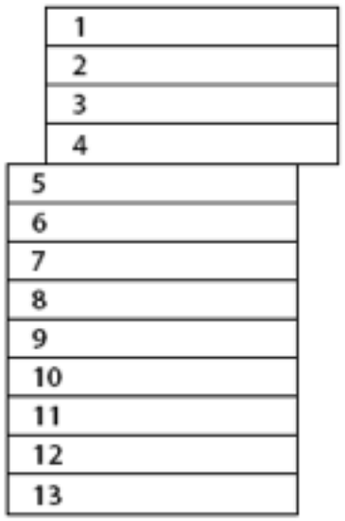

Product Backlog

Sprint Planning Meeting

Sprint

Sprint Review

No Changes

(in Duration or Deliverable)

Potentially Shippable Product

Sprint Review:

- Results of sprint are reviewed
- Stakeholders sign off the implemented features

Sprint Retrospective

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Product Backlog

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Potentially Shippable Product

Sprint Retrospective

Sprint Retrospective:

- Internal review of work in last sprint
- List of Oks and NGs
- Continuous improvement of work

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Traditional Methods

- Formal estimation models
  - Function Points
- Expert estimations
  - Group estimation, Work breakdown structure based models
- Combination-based estimations
  - Mechanical combination