Agile Development
An Introduction to Scrum
Software Engineering and Architecture

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The Scrum in Rugby

- The scrum is a popular way of restarting play from the middle of the field during a game of rugby union football. In a scrum, the two teams of forwards lock shoulders and push against each other, attempting to gain ground and kick the ball to their scrum-half with their feet. The ball is then passed to the backs who try to advance with it or kick for goal. In this international match between Wales and New Zealand a player for the Welsh team (in red) makes a diving pass to his backs (not shown), while players for the New Zealand team—the All Blacks—look on.

Literature and Links

- [Schwaber] Agile Software Development with Scrum, Ken Schwaber, Mike Beedle, 2002, ISBN 0-13-207489-3
- [Kniberg] Scrum and XP from the Trenches. How we do Scrum. An agile war story, Henrik Kniberg, 2007, ISBN: 978-1-4303-2264-1

- www.mountaingoatsoftware.com/scrum
- www.scrumalliance.org
- www.controlchaos.com

Scrum in 100 words

- Scrum is an **agile process** that allows us to focus on delivering the **highest business value** in the **shortest time.**
- It allows us to **rapidly** and **repeatedly** inspect actual **working software** (every two weeks to one month).
- The business sets the **priorities.** Teams **self-organize** to determine the best way to deliver the highest priority features.
- Every two weeks to a month anyone can see **real working software** and decide to release it as is or continue to enhance it for another sprint.

Scrum has been used by…

- Microsoft
- Yahoo
- Google
- High Moon Studios
- Lockheed Martin
- Philips
- Siemens
- Nokia
- Capital One
- BBC
- Intuit
- Nielsen Media
- First American Real Estate
- BMC Software
- Ipswitch
- John Deere
- Lexis Nexis
- Sabre
- Salesforce.com
- Time Warner
- Turner Broadcasting
- Oce

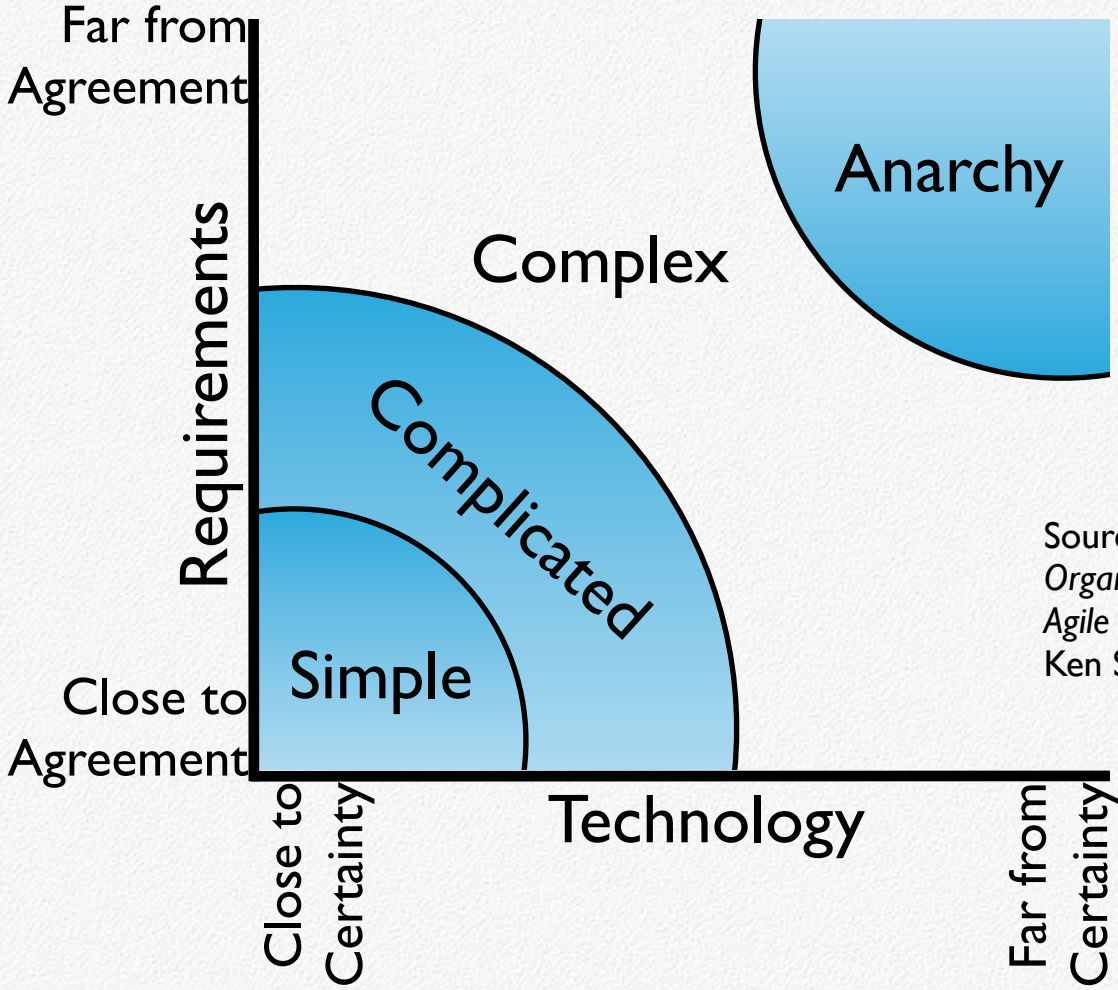
Scrum has been used for…

- Commercial software
- In-house development
- Contract development
- Fixed-price projects
- Financial applications
- ISO 9001-certified applications
- Embedded systems
- 24x7 systems with 99.999% uptime requirements
- The Joint Strike Fighter
- Video game development
- FDA-approved, life-critical systems
- Satellite-control software
- Websites
- Handheld software
- Mobile phones
- Network switching applications
- ISV applications
- Some of the largest applications in use

Characteristics

- **Self-organizing** teams
- Product progresses in a series of month-long "**sprints**"
- Requirements are captured as items in a list of "**product backlog**"
- **No specific engineering practices** prescribed
- Uses generative rules to create an **agile environment** for delivering projects
- One of the "agile processes"

Project noise level

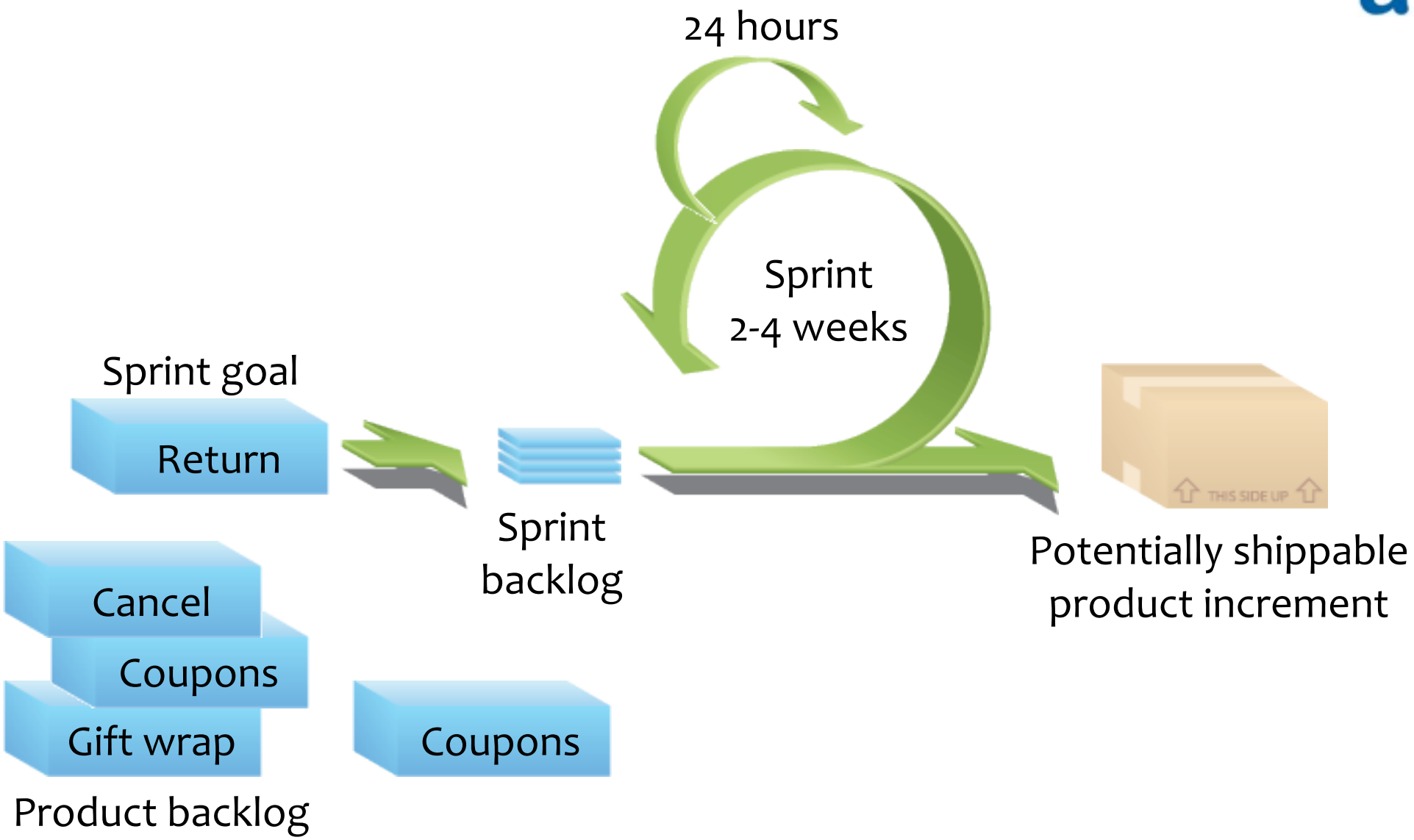


Source: *Strategic Management and Organizational Dynamics* by Ralph Stacey in *Agile Software Development with Scrum* by Ken Schwaber and Mike Beedle.

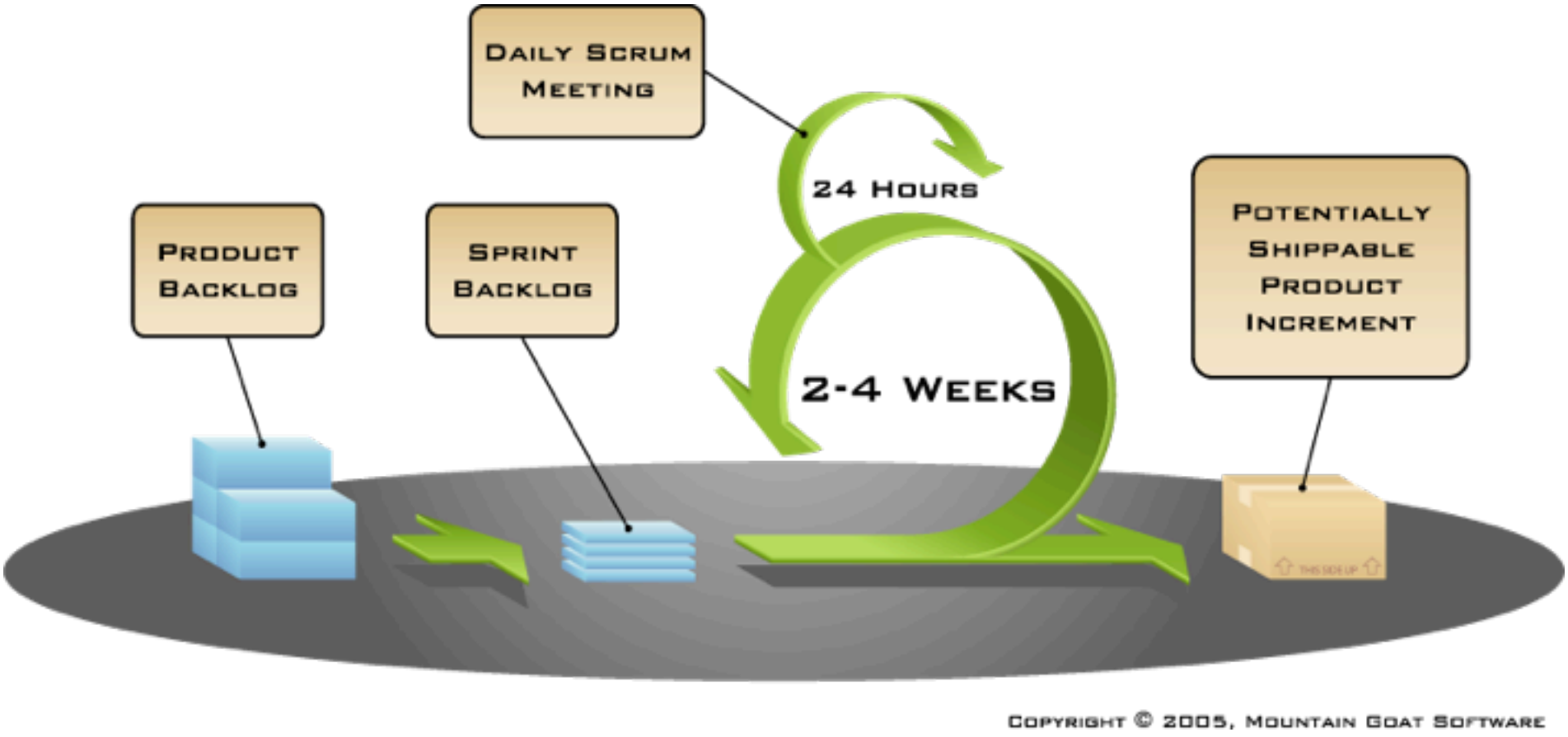
Project noise category

- **Process Control Theory**: Two approaches to control and manage processes
  - Defined process control model: Simple processes with unobtrusive noise, repeatable
  - Empirical process control model: Complex, noisy processes, not repeatable
- Noise category indicates what process should be used
- Attention: Almost no system development process is so simple, has so little noise, for the defined process control model to be appropriate!
- Empirical processes are managed through frequent inspection and adaptive control

Scrum



Putting it all together



Product backlog

This is the **product backlog**

- The requirements
- A list of all desired work on the project
- Ideally expressed such that each item has value to the users or customers of the product
- Prioritized by the product owner
- **Reprioritized at the start of each sprint**

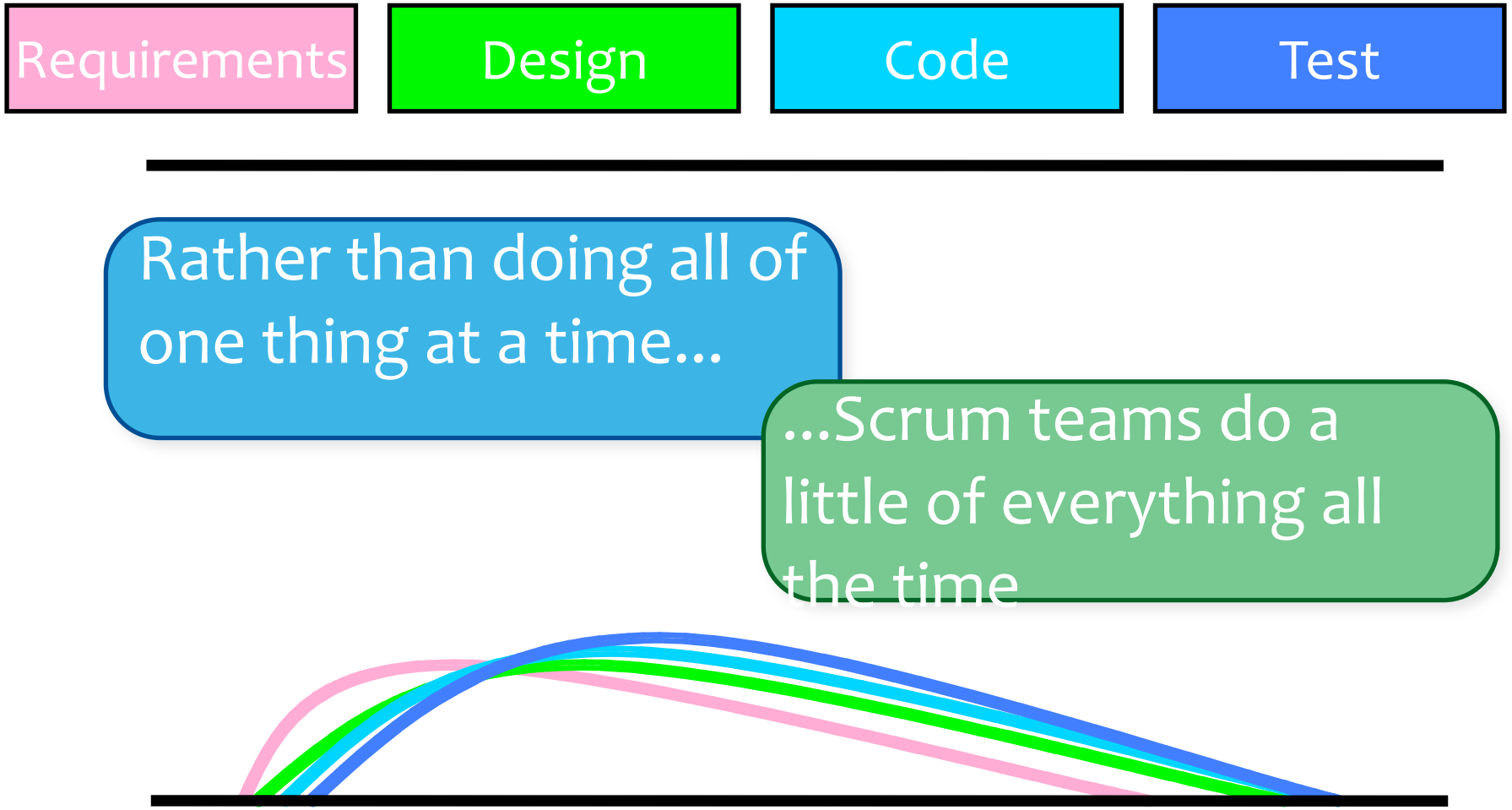
Product backlog: an example

Backlog item	Estimate
Allow a guest to make a reservation	3
As a guest, I want to cancel a reservation.	5
As a guest, I want to change the dates of a reservation.	3
As a hotel employee, I can run RevPAR reports (revenue-per-available-room)	8
Improve exception handling	8
…	30
…	50

Sprints

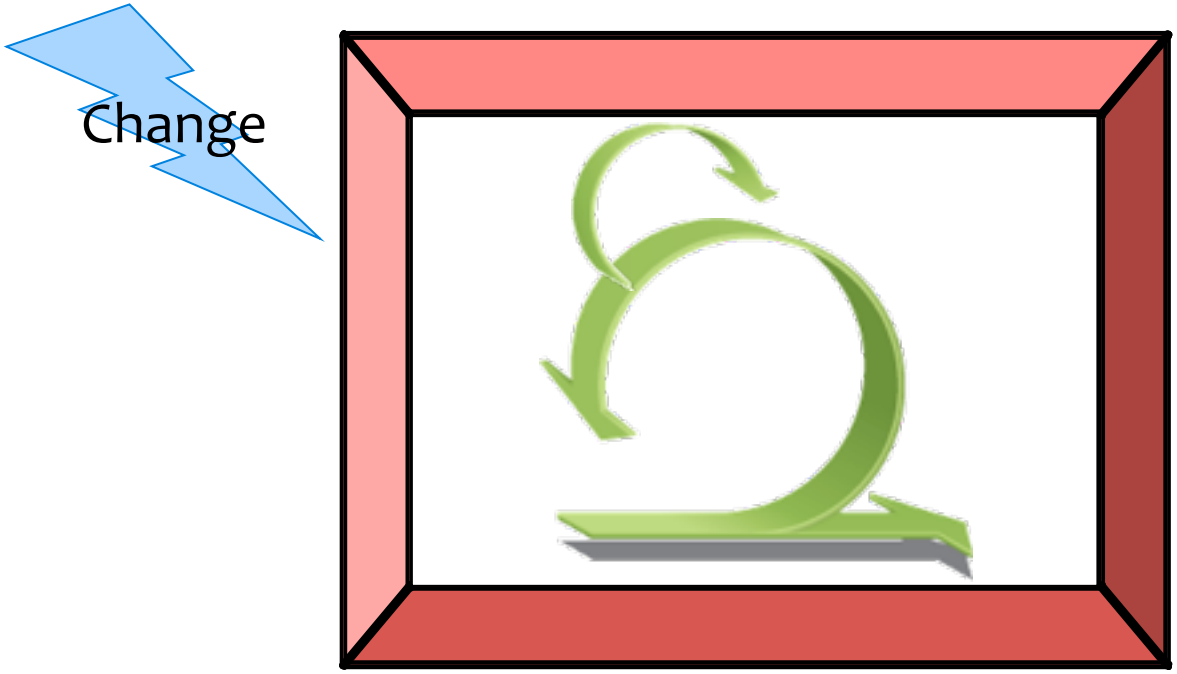
- Scrum projects make progress in a series of “sprints”
  - Analogous to Extreme Programming iterations
- Typical duration is 2–4 weeks or a calendar month at most
- A constant duration leads to a **better rhythm**
- Product is **designed**, **coded**, and **tested** during the sprint

Sequential vs. overlapping development



Source: Takeuchi; Nonaka: *The New New Product Development Game*. Harvard Business Review, January 1986.

No changes during a sprint



Plan sprint durations around how long you can commit to keeping change out of the sprint (Typically 2…4 weeks)

Scrum framework

Roles

- Product owner
- ScrumMaster
- Team

Ceremonies

- Sprint planning
- Sprint review
- Sprint retrospective
- Daily scrum meeting

Artifacts

- Product backlog
- Sprint backlog
- Burndown charts

Roles

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Product owner

- Define the **features** of the product
- Decide on **release date** and **content**
- Be responsible for the **profitability** of the product (ROI)
- **Prioritize** features according to **market value**
- **Adjust** features and priority every iteration, as needed
- **Accept or reject work results**

Scrum Master

- Responsible for **enacting Scrum values** and practices
- **Removes impediments**
- Ensure that the team is fully functional and productive
- Enable close cooperation across all roles and functions
- **Shield the team** from external interferences

Team

- Typically 5-9 people
- **Cross-functional:**
  - Programmers, testers, user experience designers, etc.
- Members should be full-time
  - May be exceptions (e.g., database administrator)
- Teams are **self-organizing**
  - Ideally, no titles but rarely a possibility
- **Membership should change only between sprints**

Ceremonies

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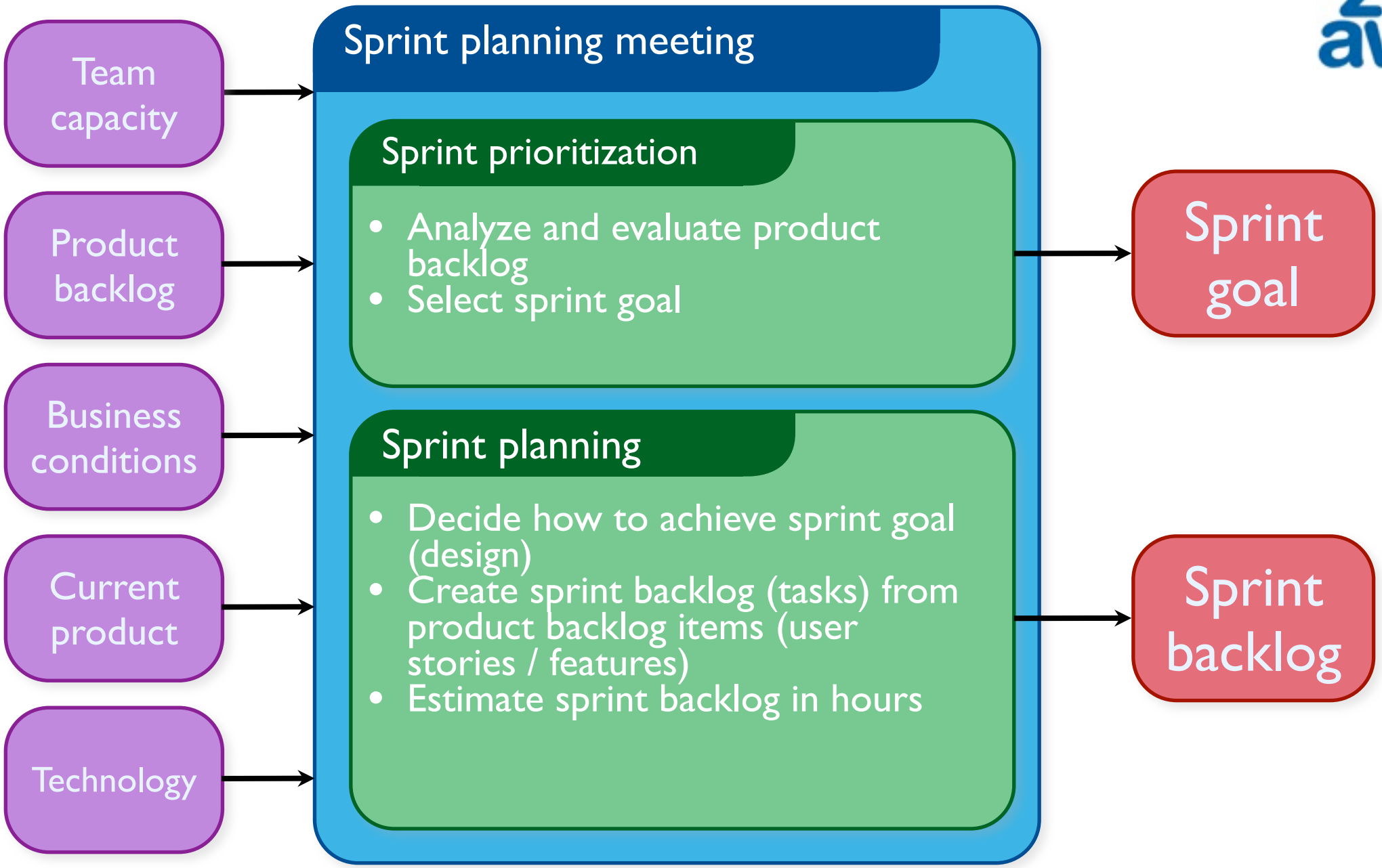


The sprint goal

A short statement of what the work will be focused on during the sprint:

Database Application

Make the application run on SQL Server in addition to Oracle.

Life Sciences

Support features necessary for population genetics studies.

Financial Services

Support more technical indicators than company ABC with real-time, streaming data.

Sprint planning

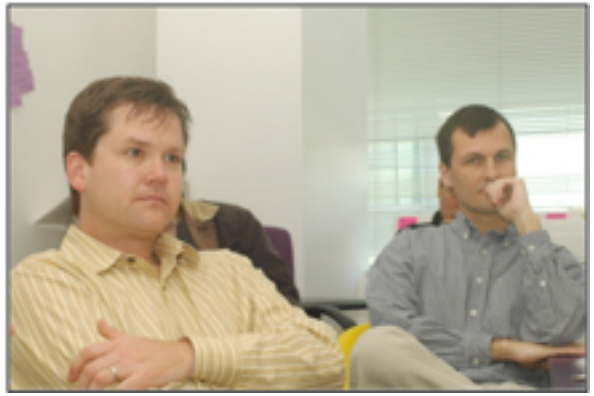
- Team selects items from the product backlog they can commit to completing
- Sprint backlog is created
  - **Tasks** are identified and each is estimated (1-16 hours)
  - Collaboratively, not done alone by the ScrumMaster
- High-level design is considered

As a vacation planner,
I want to see photos
of the hotels.

Code the middle tier (8 hours)
Code the user interface (4)
Write test fixtures (4)
Code the foo class (6)
Update performance tests (4)

Sprint review

- Team presents what it accomplished during the sprint
- Typically takes the form of a demo of new features or underlying architecture
- Informal
  - 2-hour prep time rule
  - No slides
- Whole team participates
- **Invite the world**

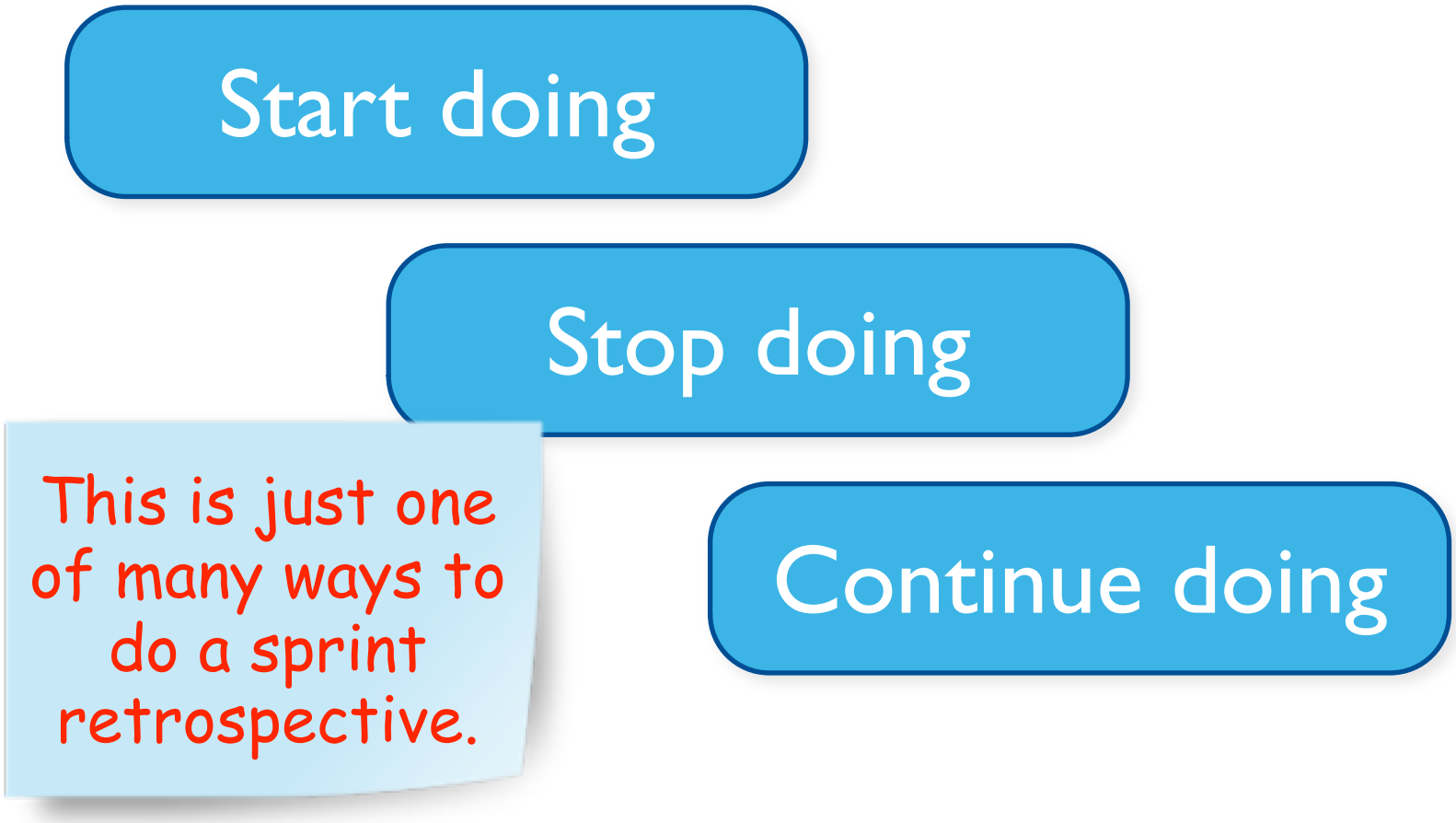


Sprint retrospective

- **Periodically take a look at what is and is not working**
- Typically 15–30 minutes
- Done after every sprint
- Whole team participates
  - ScrumMaster
  - Product owner
  - Team
  - Possibly customers and others

Sprint retrospective: Start / Stop / Continue

Whole team gathers and discusses what they'd like to…



Chickens and Pigs

A chicken and a pig are together when the chicken says, “Let’s start a restaurant!” The pig thinks it over and says, “What would we call this restaurant?” The chicken says, “Ham n’ Eggs!”
The pig says, “No, thanks. I’d be commit-ted, but you’d only be involved!”

- Team members commit to goals. They are pigs because they are committed.
- Everybody else is a chicken.
- Chickens can attend Daily Scrums, but are not allowed to interfere!

Daily scrum meeting

- Parameters
  - Daily
  - 15-minutes
  - Stand-up
- Not for problem solving
  - Whole world is invited
  - Only team members, ScrumMaster, product owner can talk (→ chickens and pigs)
- Helps avoid other unnecessary meetings

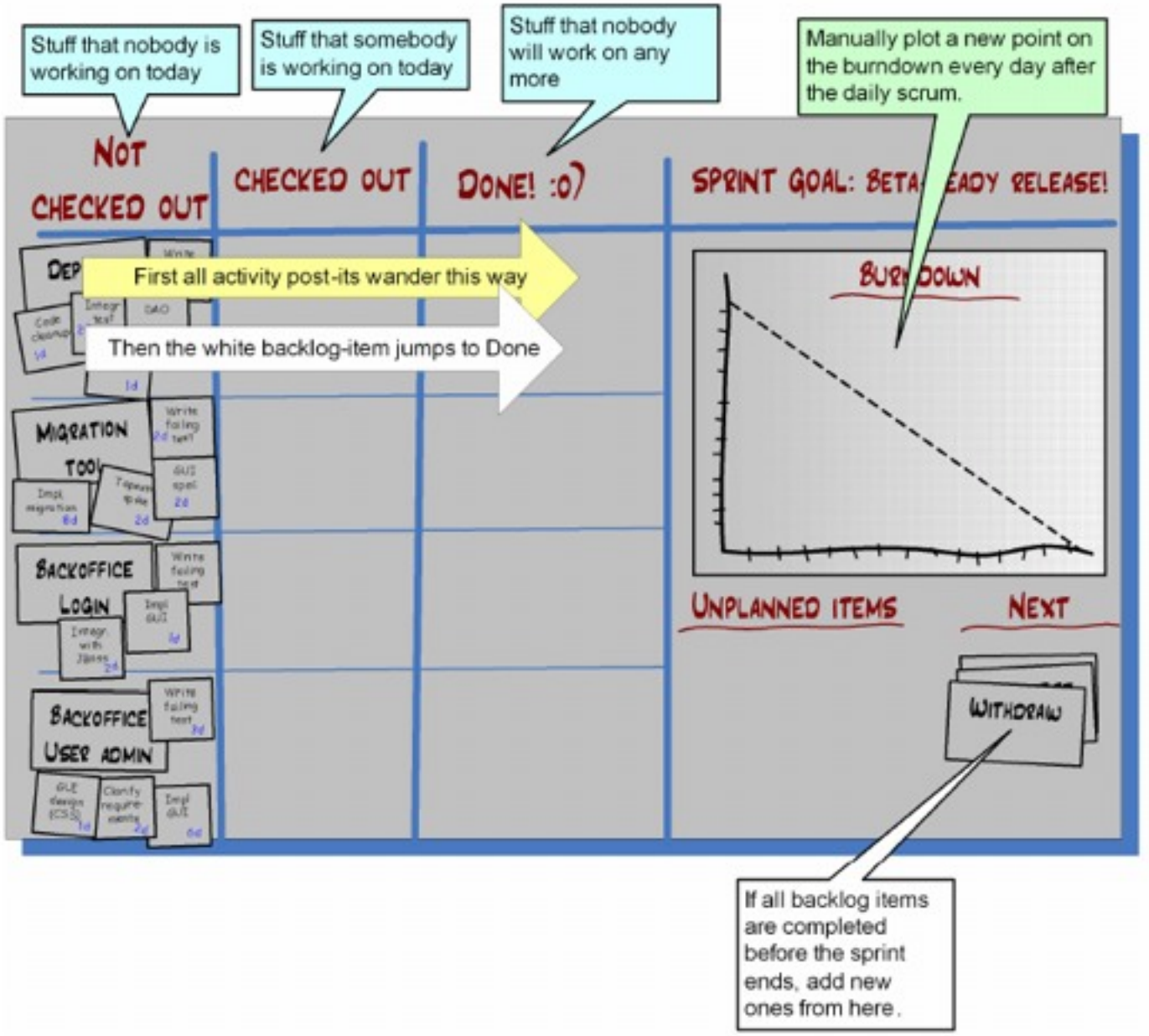
Daily Scrum Meeting

Everyone answers three questions:

1. What did you do yesterday?
2. What will you do today?
3. Is anything in your way?

These are *not* status for the ScrumMaster
They are commitments in front of peers

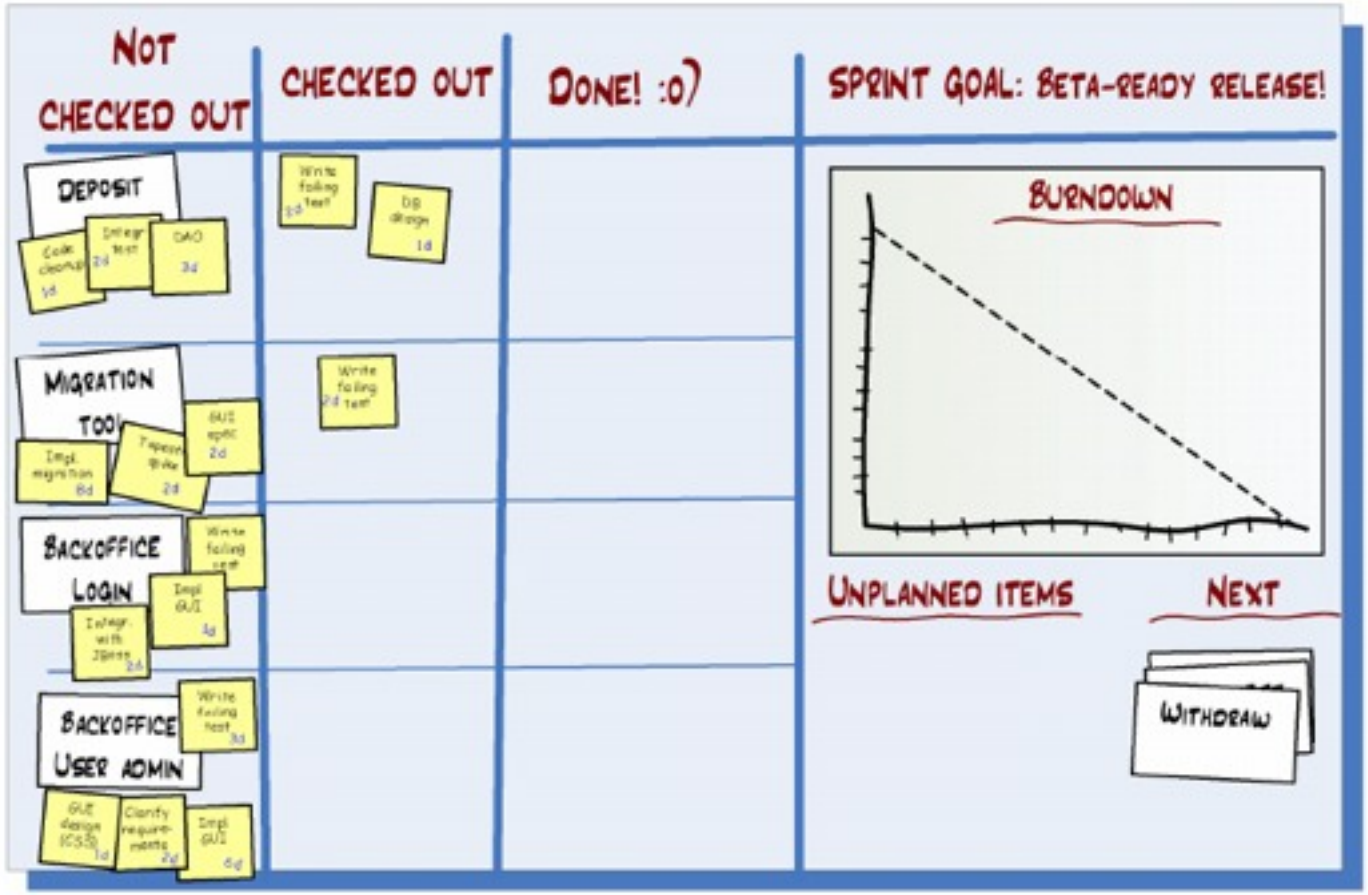
How the Task board works



Source:[Kniberg]

After the first daily scrum

- After the first daily scrum, the taskboard might look like this
- three tasks have been "checked out", i.e. the team will be working on these items today.



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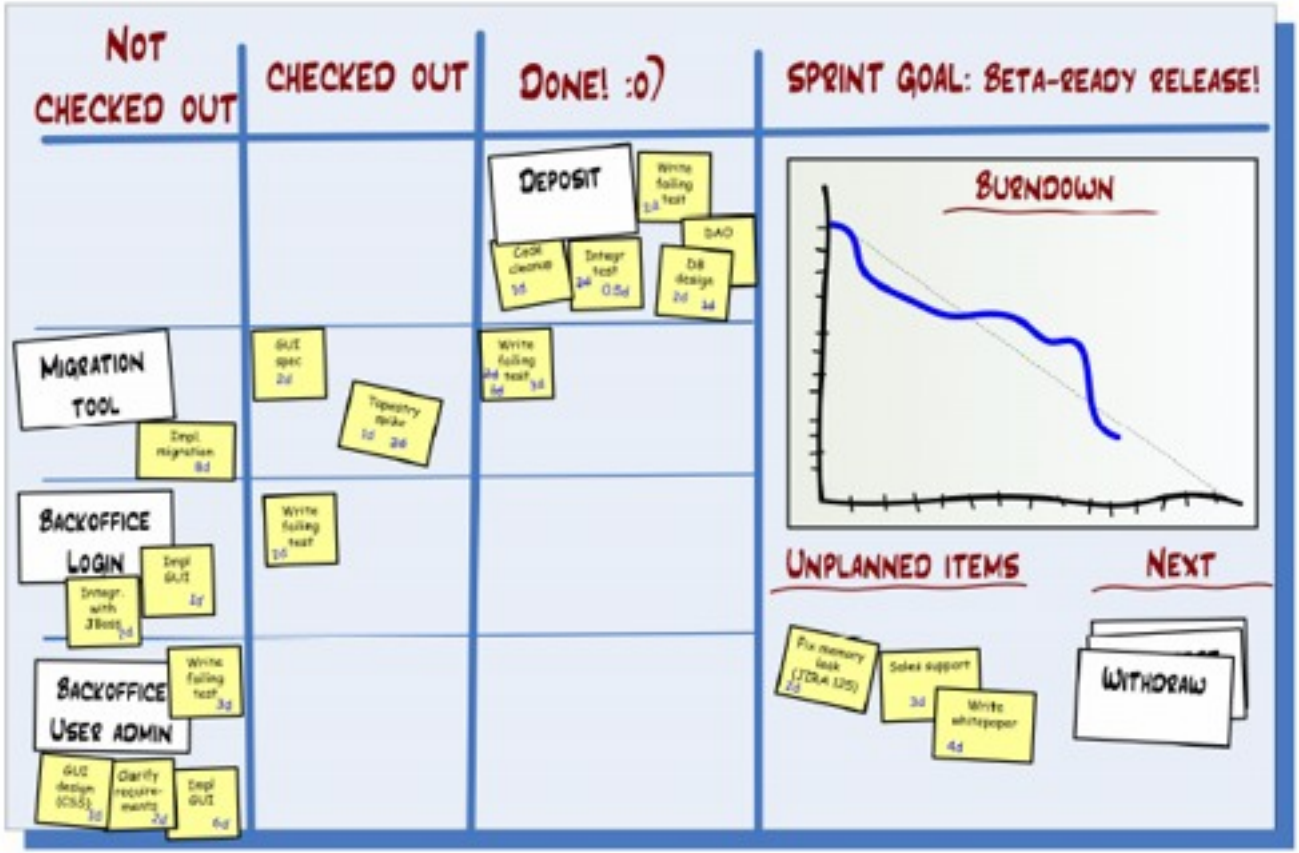
After a few more days

- A few days later the taskboard might look something like this:



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Artifacts

Roles

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- Sprint burndown charts

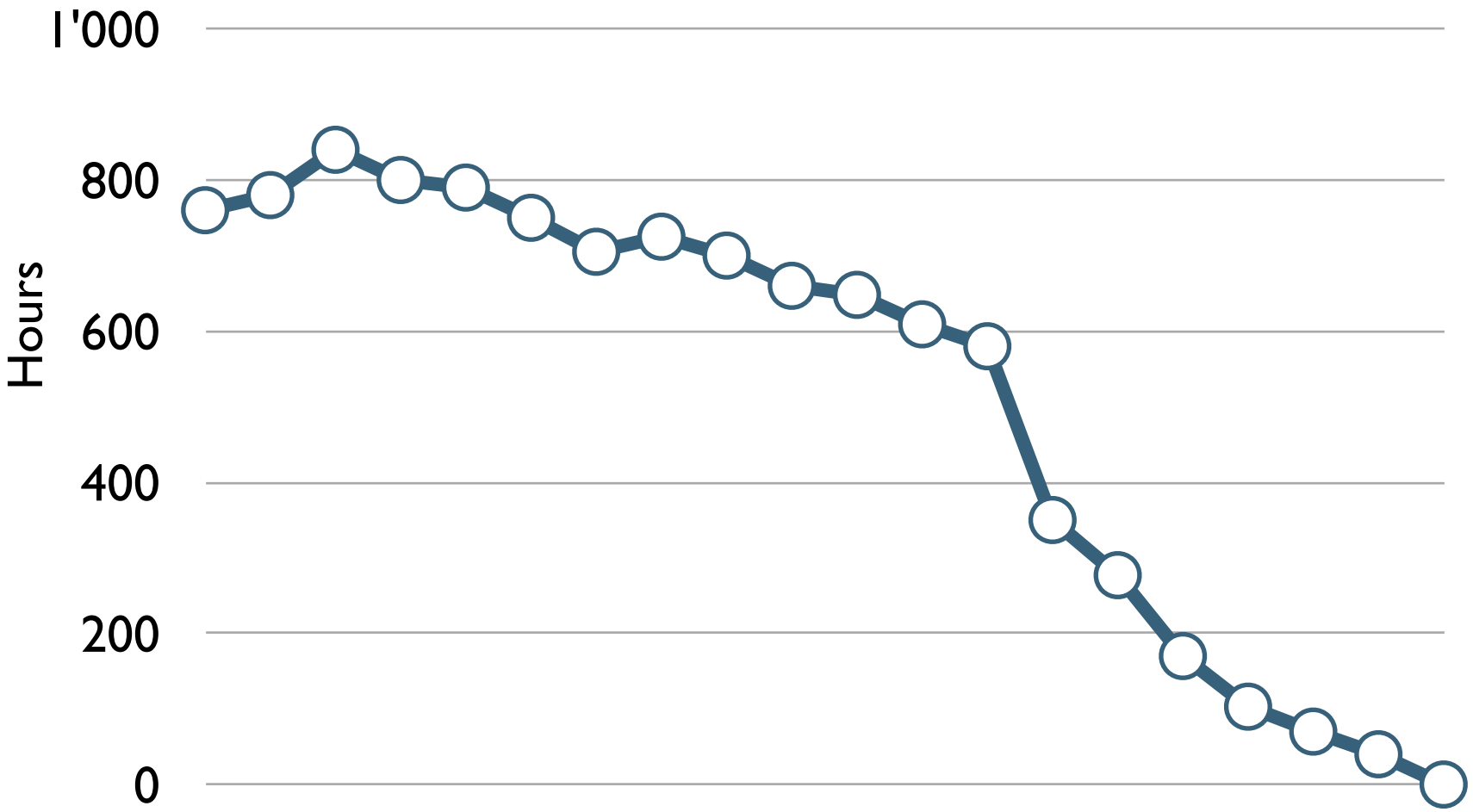
Managing the sprint backlog

- Individuals sign up for work of their own choosing
  - Work is never assigned
- **Estimated work remaining is updated daily**
- Any team member can add, delete or change the sprint backlog
- **Work for the sprint emerges**
- If work is unclear, define a sprint backlog item with a larger amount of time and break it down later
- Update work remaining as more becomes known

Sprint backlog: an example

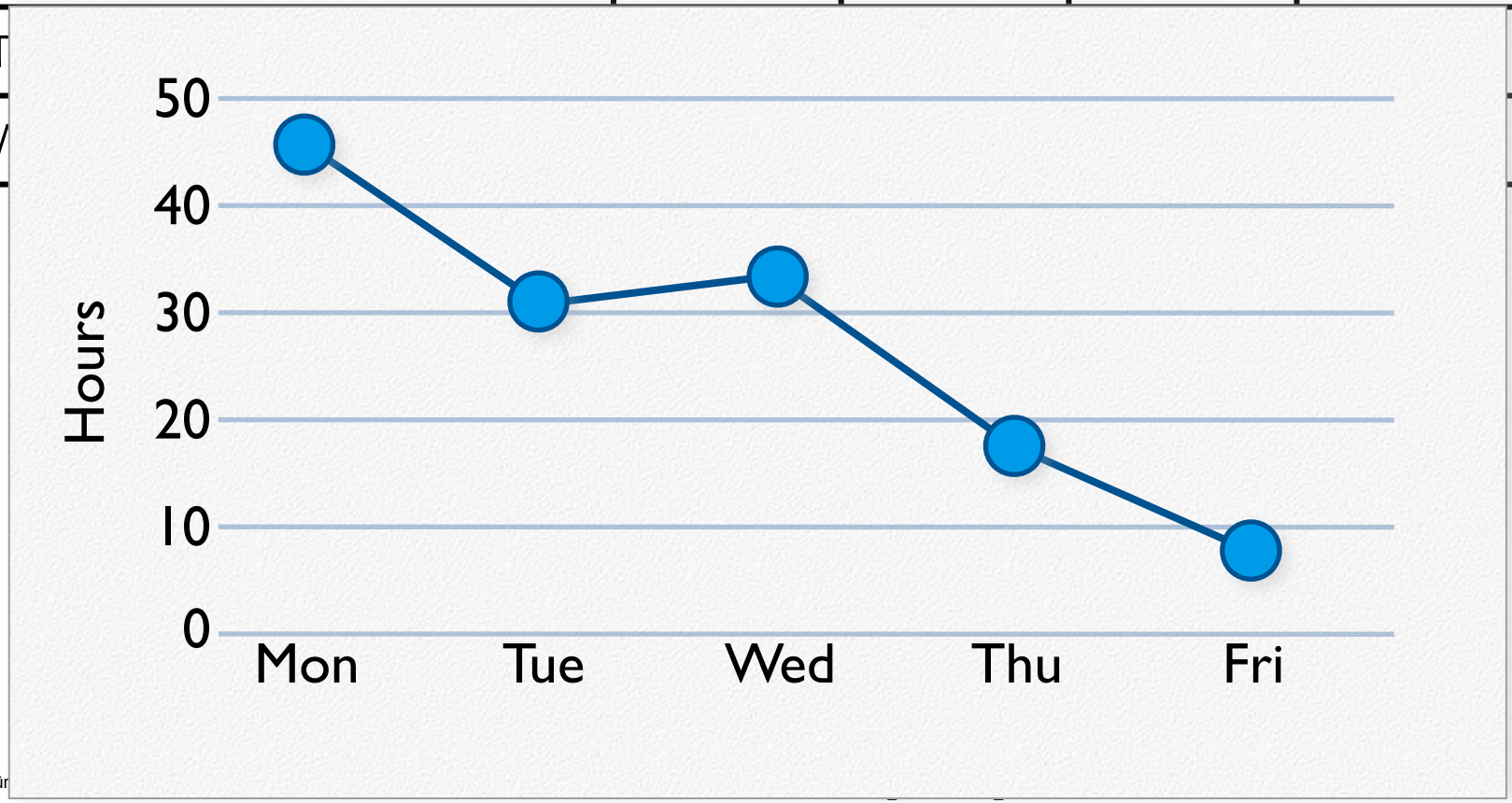
Tasks	Mon	Tue	Wed	Thu	Fri
Code the user interface	8	4	8		
Code the middle tier	16	12	10	4	
Test the middle tier	8	16	16	11	8
Write online help	12				
Write the foo class	8	8	8	8	8
Add error logging			8	4	

Sprint burndown chart: an example 1/2

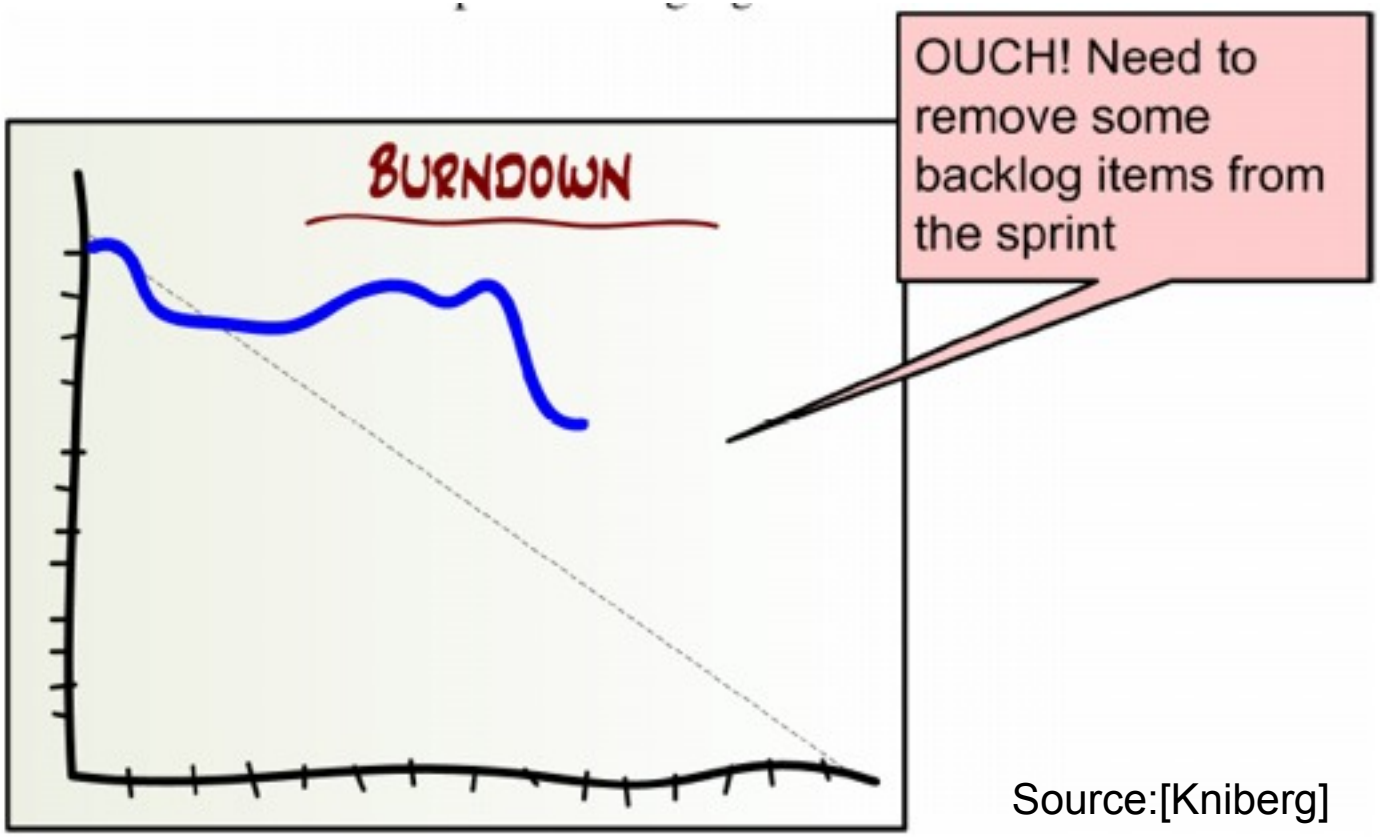


Sprint burndown chart: an example 2/2

Tasks	Mon	Tue	Wed	Thu	Fri
Code the user interface	8	4	8		
Code the middle tier	6	12	10	4	
T					8
V					



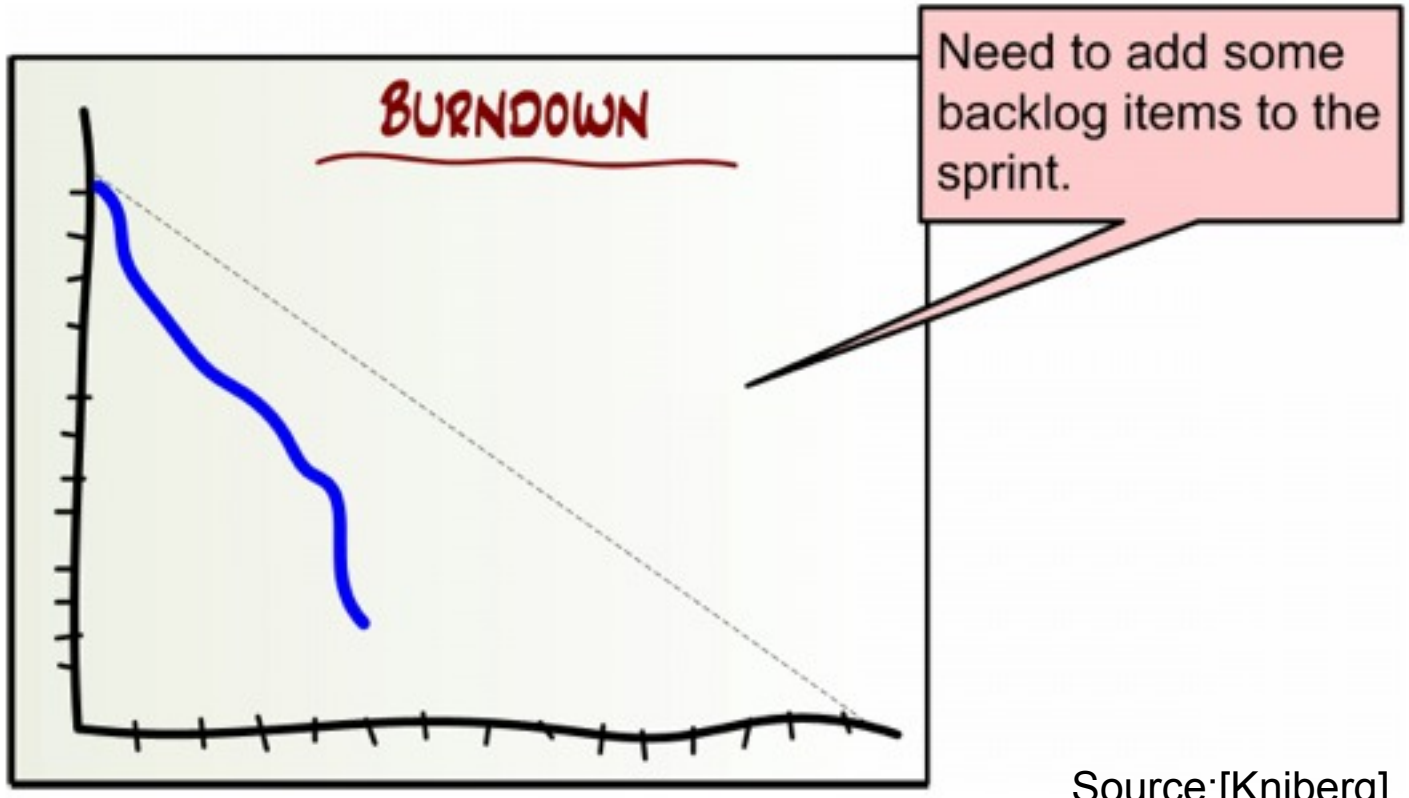
Taskboard warning signs



Source:[Kniberg]

- Taskboard gives indication of how well the sprint is progressing.
- Scrum master makes sure that the team acts upon warning signs

Taskboard warning signs



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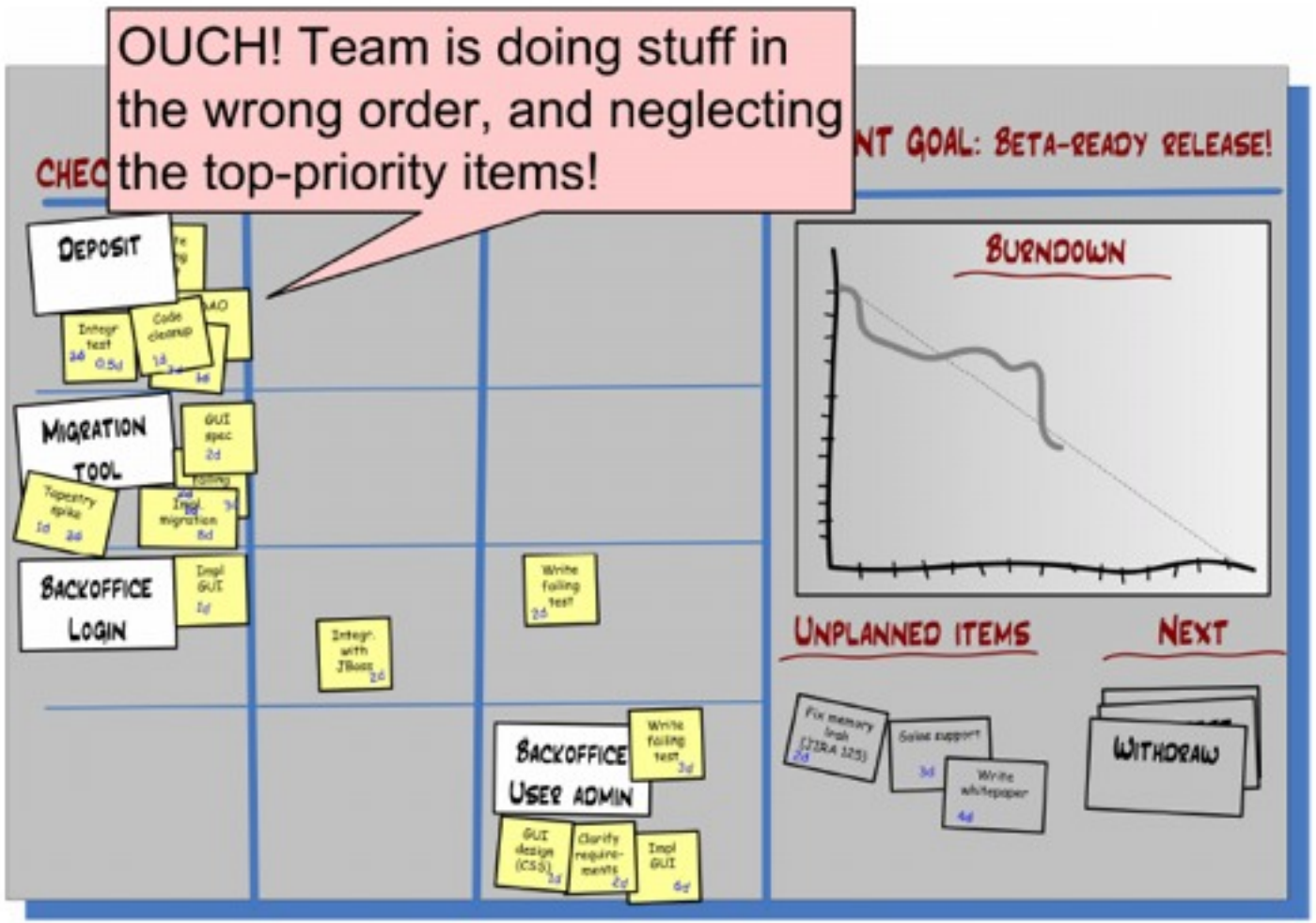

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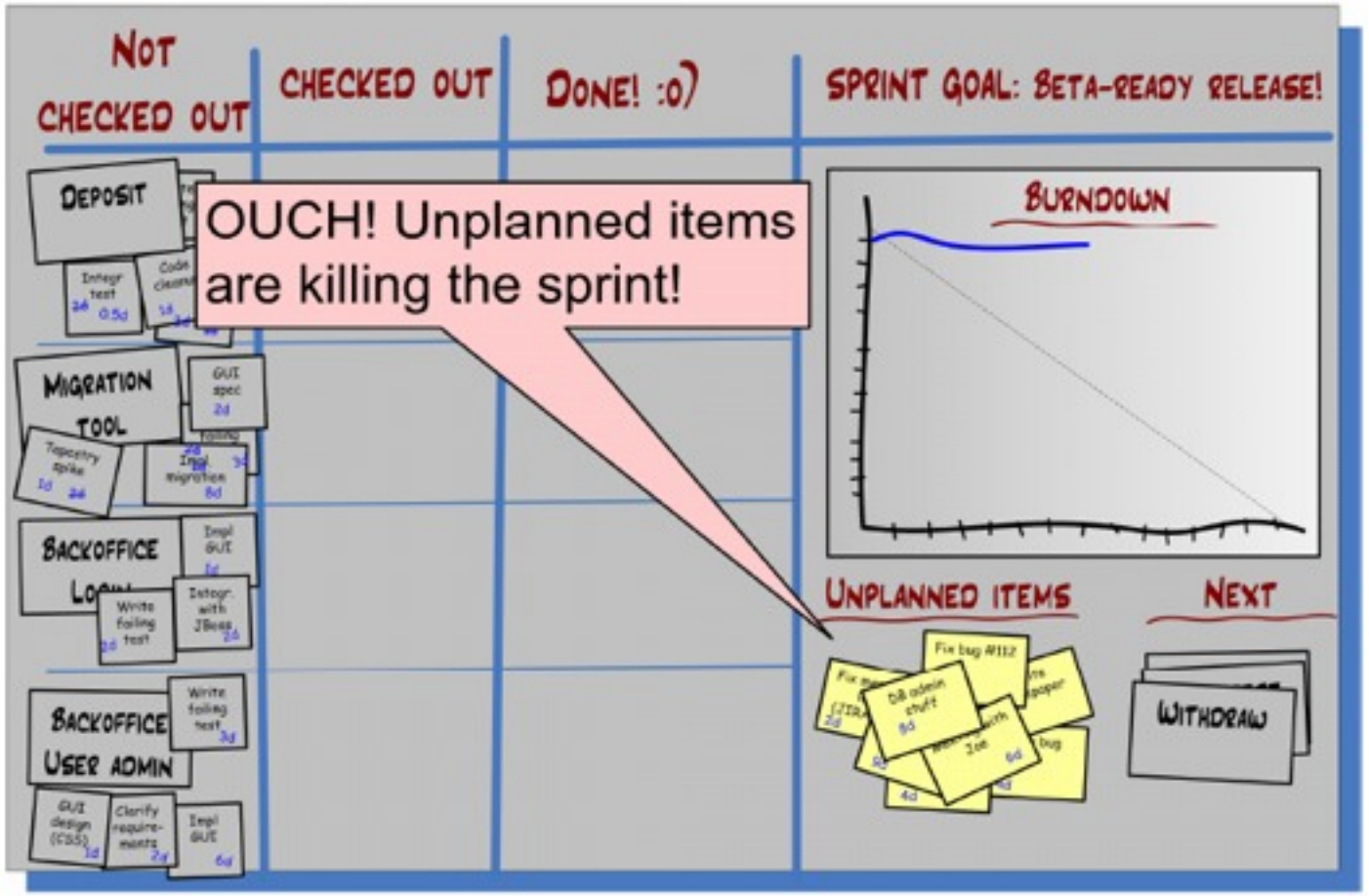
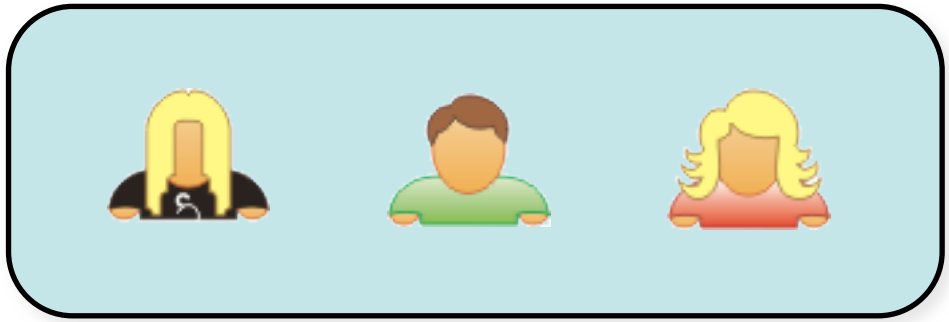


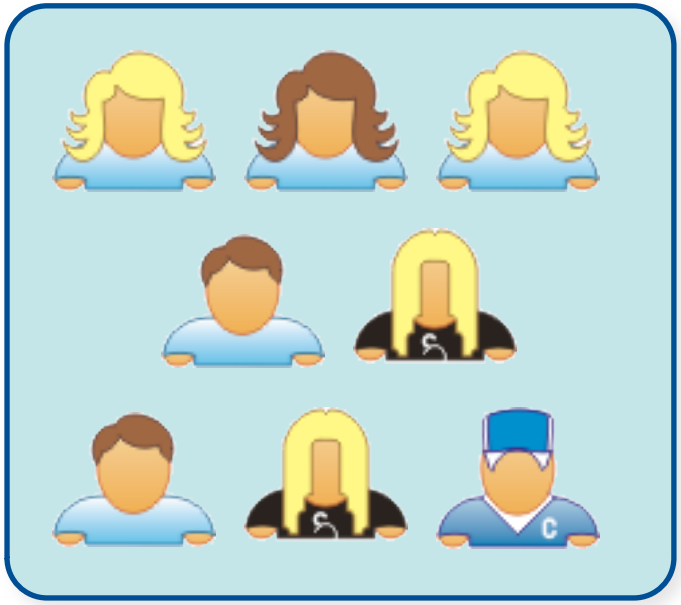
Source:[Kniberg]

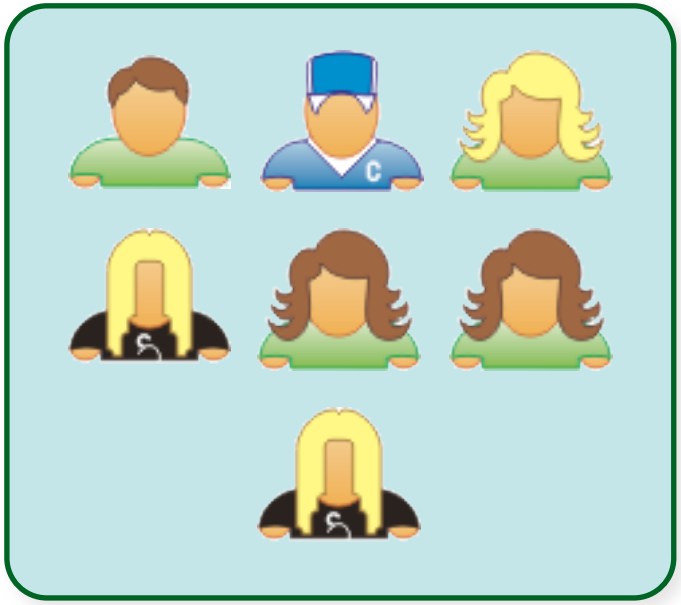
Scalability

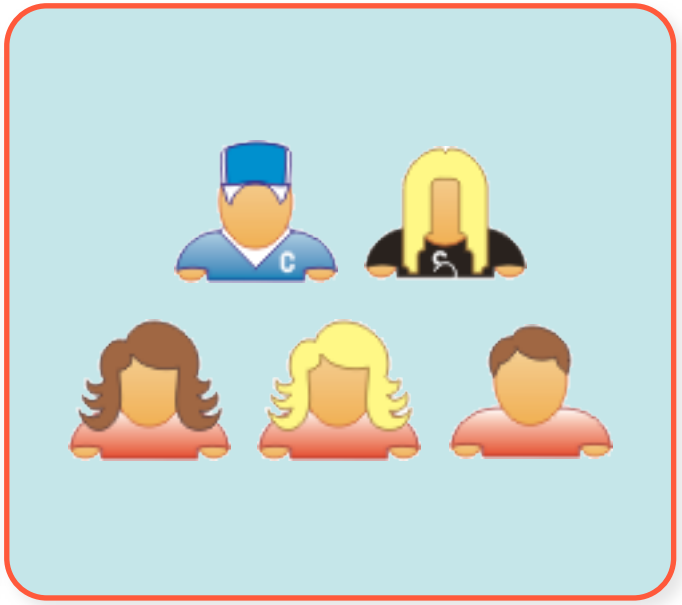
- Typical individual team is 7 ± 2 people
  - Scalability comes from teams of teams
- Factors in scaling
  - Type of application
  - Team size
  - Team dispersion
  - Project duration
- Scrum has been used on multiple 500+ person projects

Scaling through the scrum of scrums

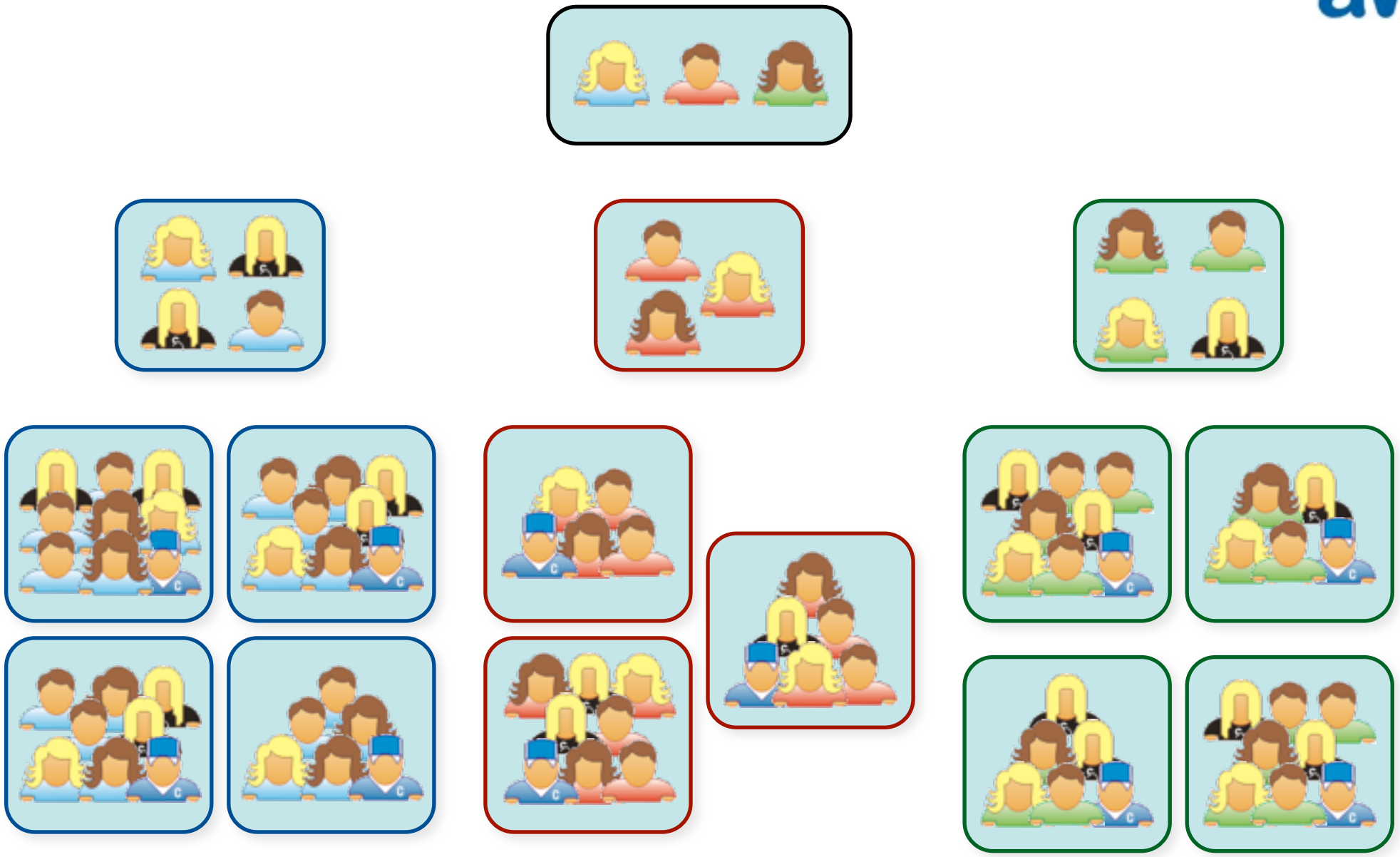








Scrum of scrums of scrums



Scrum

- Is results-oriented
- Is commitment-driven
- Is value-focused
- Empowers and respects teams