



CMPE 331 Software and Software Engineering

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(Source: Pressman, R. *Software Engineering: A Practitioner's Approach*. McGraw-Hill, 2005
& Sommerville, I. (2004). *Software Engineering*. International computer science series. ed: Addison Wesley)

Agile Software Development

- Agile methods
- Agile development techniques
- Agile project management
- Scaling agile methods

Agenda

- Introduction

- What is Agile Methodology?

- What is Scrum?

- History of Scrum

- Functionality of Scrum

- Components of Scrum

- Scrum Roles
- The Process
- Scrum Artifacts

- Scaling Scrum

- Q & A Session

Introduction

Classical methods of software development have many disadvantages:

- *huge effort during the planning phase*
- *poor requirements conversion in a rapid changing environment*
- *treatment of staff as a factor of production*

➤ *New methods:*

Agile Software Development Methodology

What is Agile ?

- Agile proponents believe
 - Current software development processes are too heavyweight or cumbersome
 - Too many things are done that are not directly related to software product being produced
 - Current software development is too rigid
 - Difficulty with incomplete or changing requirements
 - Short development cycles (Internet applications)
 - More active customer involvement needed
 - CMM focuses on process

Contd...

- Agile methods are considered
 - Lightweight
 - People-based rather than Plan-based
- Several agile methods
 - No single agile method
 - XP most popular
- No single definition
- Agile Manifesto closest to a definition
 - Set of principles
 - Developed by Agile Alliance

Agile Manifesto

A Statement of Values

- **Individuals and interactions** over processes and tools
- **Working software** over comprehensive documentation
- **Customer collaboration** over contract negotiation
- **Responding to change** over following a plan
- <http://www.agilemanifesto.org>

Agile Methods

- Agile methods:
 - Scrum
 - Extreme Programming
 - Adaptive Software Development (ASD)
 - Dynamic System Development Method (DSDM)
 - ...
- Agile Alliance (www.agilealliance.org)
 - A non-profit organization promotes agile development

Scrum



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. Our teams self-manage 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 for another iteration.

History of Scrum

- **1995:**
 - analysis of common software development processes → not suitable for empirical, unpredictable and non-repeatable processes
 - Design of a new method: Scrum by Jeff Sutherland & Ken Schwaber
 - Enhancement of Scrum by Mike Beedle & combination of Scrum with Extreme Programming
 - **1996:**

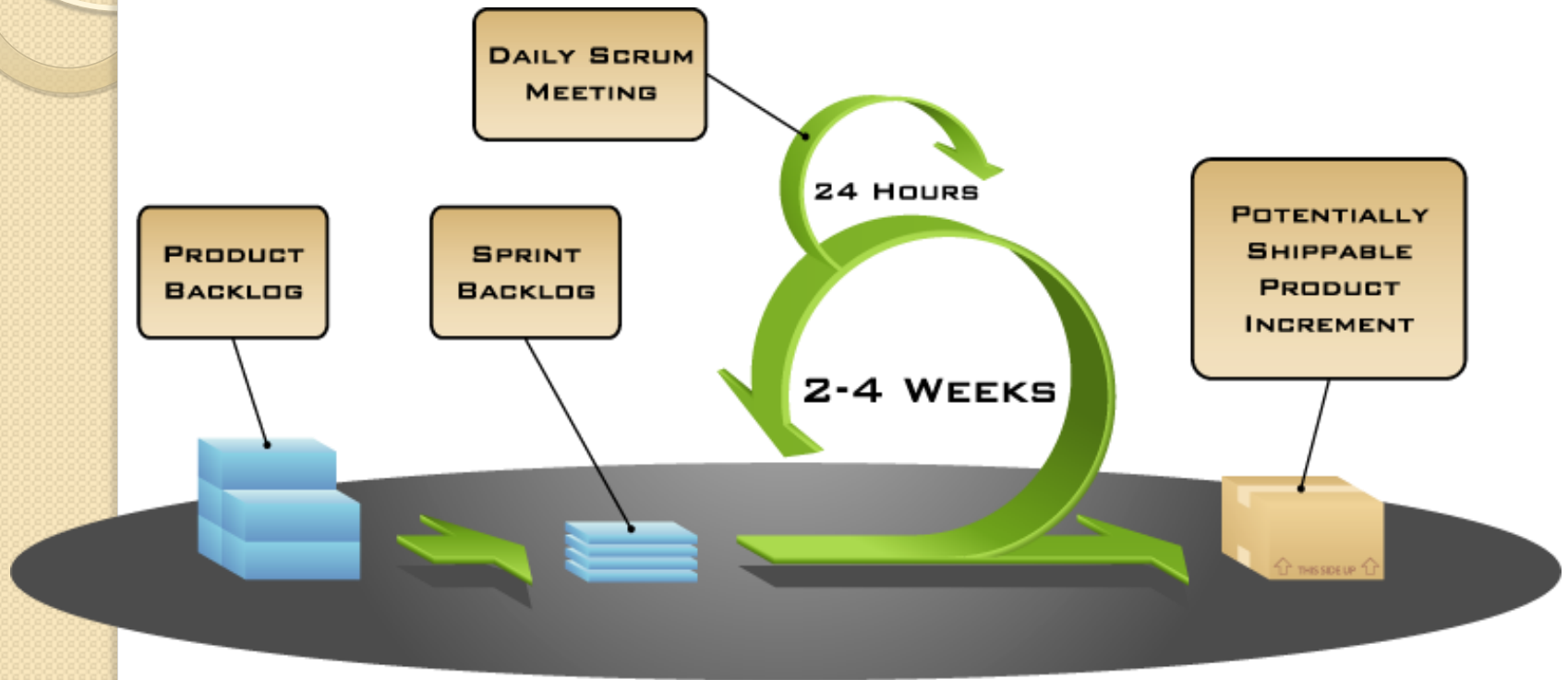
introduction of Scrum at OOPSLA conference
 - **2001:**

publication “Agile Software Development with Scrum” by Ken Schwaber & Mike Beedle
- Successful appliance of Scrum in over 50 companies
Founders are members in the Agile Alliance

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”

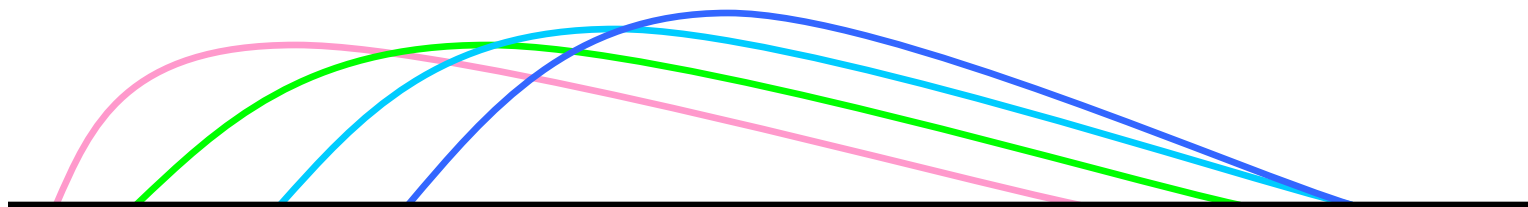
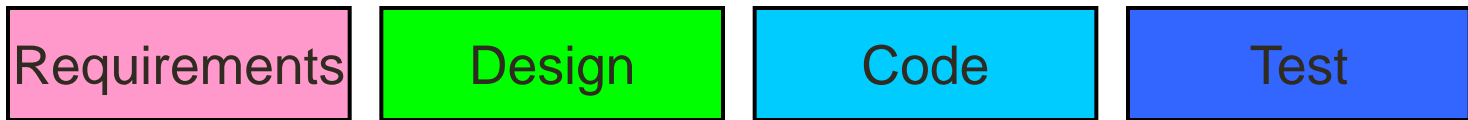
How Scrum Works?



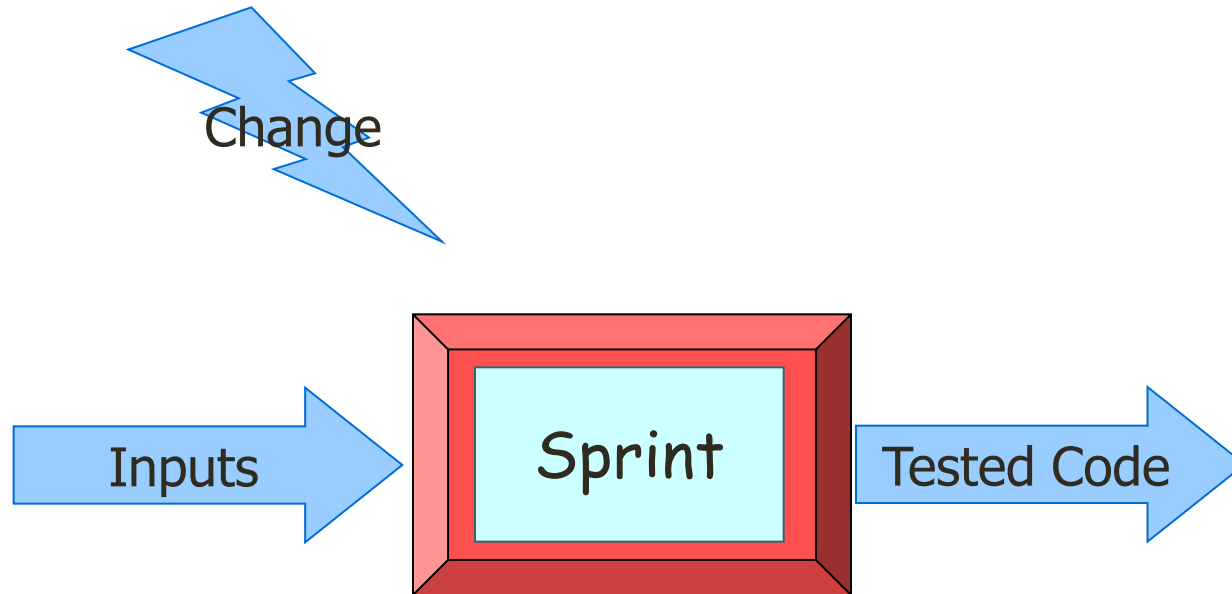
Sprints

- Scrum projects make progress in a series of “sprints”
 - Analogous to XP iterations
- Target duration is one month
 - +/- a week or two
 - But, a constant duration leads to a better rhythm
- Product is designed, coded, and tested during the sprint

Sequential vs. Overlapping Dev.



No changes during the sprint



- Plan sprint durations around how long you can commit to keeping change out of the sprint

Scrum Framework

- **Roles** : Product Owner, ScrumMaster, Team
- **Ceremonies** : Sprint Planning, Sprint Review, Sprint Retrospective, & Daily Scrum Meeting
- **Artifacts** : Product Backlog, Sprint Backlog, and Burndown Chart

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.

The Scrum Master

- Represents management to the project
- 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

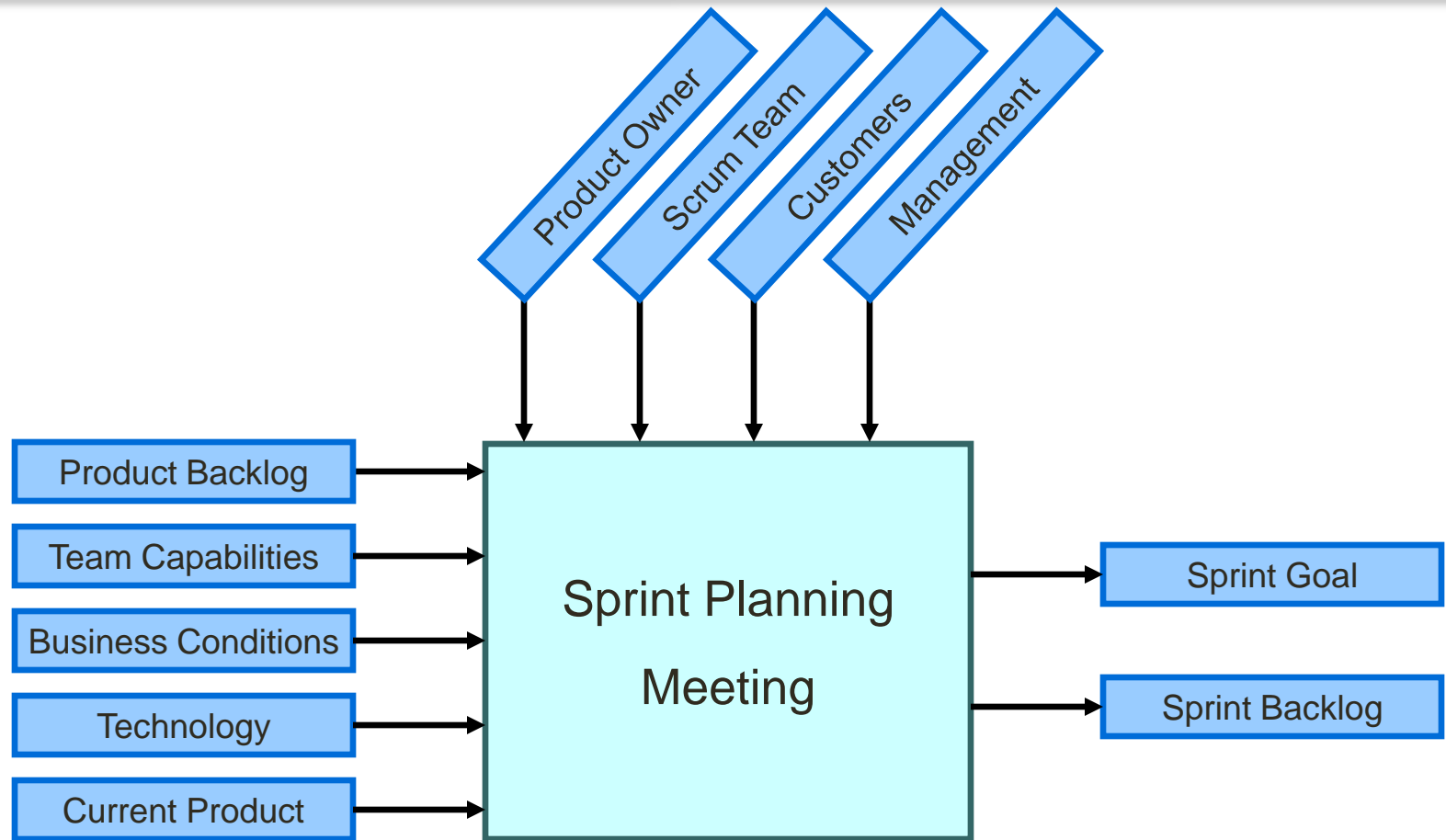
Scrum Team

- Typically 5-10 people
- Cross-functional
 - QA, Programmers, UI Designers, etc.
- Members should be full-time
 - May be exceptions (e.g., System Admin, etc.)
- Teams are self-organizing
 - What to do if a team self-organizes someone off the team??
 - Ideally, no titles but rarely a possibility
- Membership can change only between sprints

Ceremonies

- Sprint Planning Meeting
- Sprint
- Daily Scrum
- Sprint Review Meeting

Spring Planning Meeting



Parts of Sprint Planning Meeting

- 1st Part:
 - Creating Product Backlog
 - Determining the Sprint Goal.
 - Participants: Product Owner, Scrum Master, Scrum Team
- 2nd Part:
 - Participants: Scrum Master, Scrum Team
 - Creating Sprint Backlog

Pre-Project/Kickoff Meeting

- A special form of Sprint Planning Meeting
- Meeting before the begin of the Project

Sprint

- A month-long iteration, during which is incremented a product functionality
- NO outside influence can interfere with the Scrum team during the Sprint
- Each Sprint begins with the Daily Scrum Meeting

Daily Scrum

- Parameters
 - Daily
 - 15-minutes
 - Stand-up
 - Not for problem solving
- Three questions:
 1. What did you do yesterday
 2. What will you do today?
 3. What obstacles are in your way?
- Chickens and pigs are invited
 - Help avoid other unnecessary meetings
- Only pigs can talk

Daily Scrum

- Is NOT a problem solving session
- Is NOT a way to collect information about WHO is behind the schedule
- Is a meeting in which team members make commitments to each other and to the Scrum Master
- Is a good way for a Scrum Master to track the progress of the Team

Scrum FAQs

- Why daily?
 - “How does a project get to be a year late?”
 - “One day at a time.”
 - Fred Brooks, The Mythical Man-Month.
- Can Scrum meetings be replaced by emailed status reports?
 - No
 - Entire team sees the whole picture every day
 - Create peer pressure to do what you say you’ll do

Sprint Review Meeting

- 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
- Participants
 - Customers
 - Management
 - Product Owner
 - Other engineers



Sprint Retrospective Meeting

- Scrum Team only
- Feedback meeting
- Don't skip for the first 5-6 sprints!!!

Product Backlog

- A list of all desired work on the project
 - Usually a combination of
 - story-based work (“let user search and replace”)
 - task-based work (“improve exception handling”)
- List is prioritized by the Product Owner
 - Typically a Product Manager, Marketing, Internal Customer, etc.

Product Backlog

- Requirements for a system, expressed as a prioritized list of Backlog Items
- Is managed and owned by a Product Owner
- Spreadsheet (typically)
- Usually is created during the Sprint Planning Meeting
- Can be changed and re-prioritized before each PM

Sample Product Backlog

	Item #	Description	Est	By
Very High				
	1	Finish database versioning	16	KH
	2	Get rid of unneeded shared Java in database	8	KH
		- Add licensing	-	-
	3	Concurrent user licensing	16	TG
	4	Demo / Eval licensing	16	TG
		Analysis Manager		
	5	File formats we support are out of date	160	TG
	6	Round-trip Analyses	250	MC
High				
		- Enforce unique names	-	-
	7	In main application	24	KH
	8	In import	24	AM
		- Admin Program	-	-
	9	Delete users	4	JM
		- Analysis Manager	-	-
	10	When items are removed from an analysis, they should show up again in the pick list in lower 1/2 of the analysis tab	8	TG
		- Query	-	-
	11	Support for wildcards when searching	16	T&A
	12	Sorting of number attributes to handle negative numbers	16	T&A
	13	Horizontal scrolling	12	T&A
		- Population Genetics	-	-
	14	Frequency Manager	400	T&M
	15	Query Tool	400	T&M
	16	Additional Editors (which ones)	240	T&M
	17	Study Variable Manager	240	T&M
	18	Haplotypes	320	T&M
	19	Add icons for v1.1 or 2.0	-	-
		- Pedigree Manager	-	-
	20	Validate Derived kindred	4	KH
Medium				
		- Explorer	-	-
	21	Launch tab synchronization (only show queries/analyses for logged in users)	8	T&A
	22	Delete settings (?)	4	T&A

From Sprint Goal to Sprint Backlog

- Scrum team takes the Sprint Goal and decides what tasks are necessary
- Team self-organizes around how they'll meet the Sprint Goal
 - Manager doesn't assign tasks to individuals
- Managers don't make decisions for the team
- Sprint Backlog is created

Sprint Backlog during the Sprint

- Changes
 - Team adds new tasks whenever they need to in order to meet the Sprint Goal
 - Team can remove unnecessary tasks
 - But: Sprint Backlog can only be updated by the team
- Estimates are updated whenever there's new information

Sprint Backlog

- A subset of Product Backlog Items, which define the work for a Sprint
- Is created **ONLY** by Team members
- Each Item has it's own status
- Should be updated every day

Sprint Backlog

- No more than 300 tasks in the list
- If a task requires more than 16 hours, it should be broken down
- Team can add or subtract items from the list. Product Owner is not allowed to do it

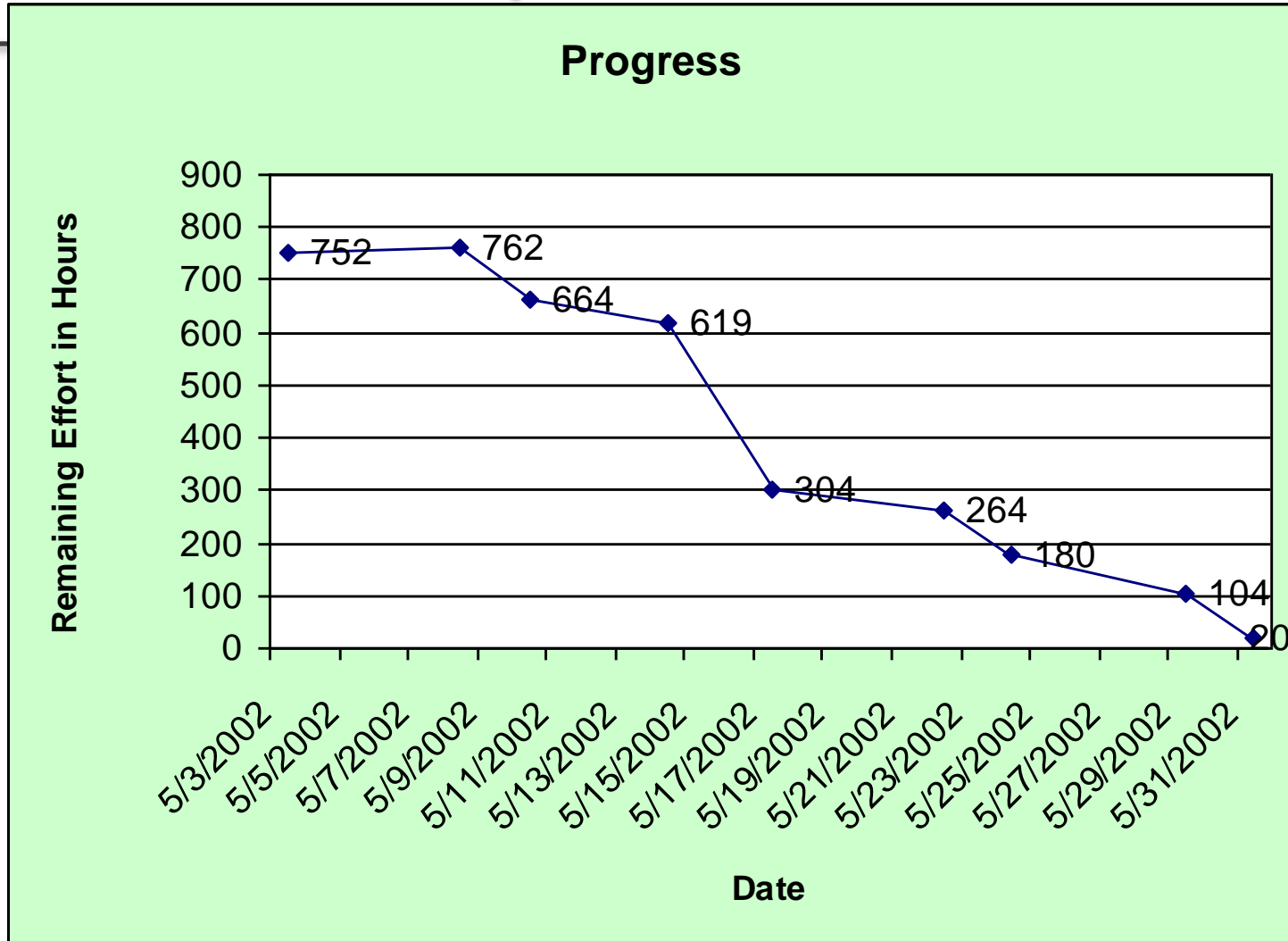
Sample Sprint Backlog

		Days Left in Sprint	15	13	10	8	
Who	Description		7/22/2002	7/24/2002	7/26/2002	7/31/2002	
Total Estimated Hours:		554	458	362	270	0	
-	User's Guide	-	-	-	-	-	
SM	Start on Study Variable chapter first draft	16	16	16	16		
SM	Import chapter first draft	40	24	6	6		
SM	Export chapter first draft	24	24	24	6		
Misc. Small Bugs							
JM	Fix connection leak	40					
JM	Delete queries	8	8				
JM	Delete analysis	8	8				
TG	Fix tear-off messaging bug	8	8				
JM	View pedigree for kindred column in a result set	2	2	2	2		
AM	Derived kindred validation	8					
Environment							
TG	Install CVS	16	16				
TBD	Move code into CVS	40	40	40	40		
TBD	Move to JDK 1.4	8	8	8	8		
Database							
KH	Killing Oracle sessions	8	8	8	8		
KH	Finish 2.206 database patch	8	2				
KH	Make a 2.207 database patch	8	8	8	8		
KH	Figure out why 461 indexes are created	4					

Sprint Burn down Chart

- Depicts the total Sprint Backlog hours remaining per day
- Shows the estimated amount of time to release
- Ideally should burn down to zero to the end of the Sprint
- Actually is not a straight line
- Can bump UP

Sprint Burndown Chart



Release Burndown Chart

- Will the release be done on right time?
- X-axis: sprints
- Y-axis: amount of hours remaining
- The estimated work remaining can also burn up

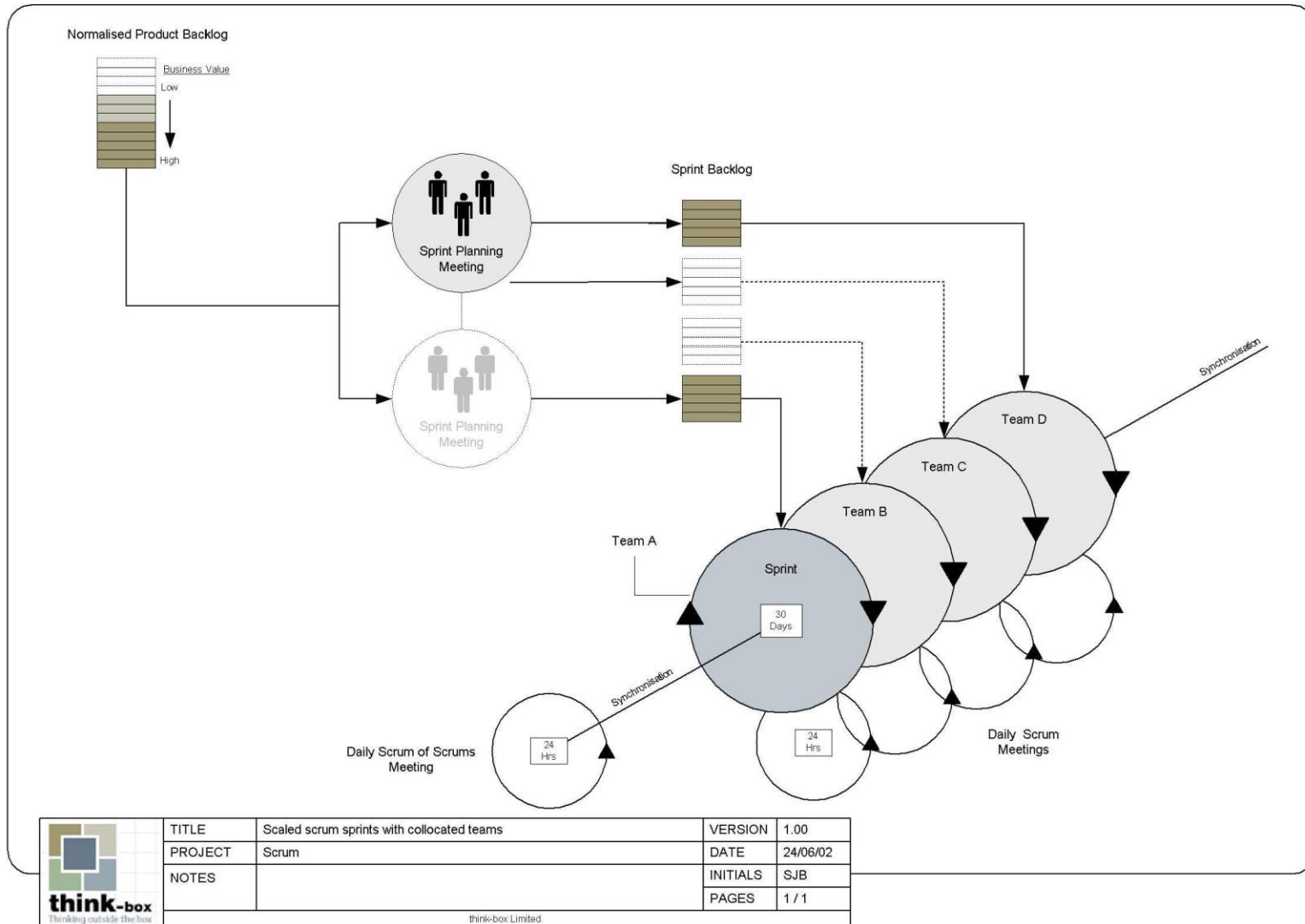
Product Burndown Chart

- Is a “big picture” view of project’s progress (all the releases)

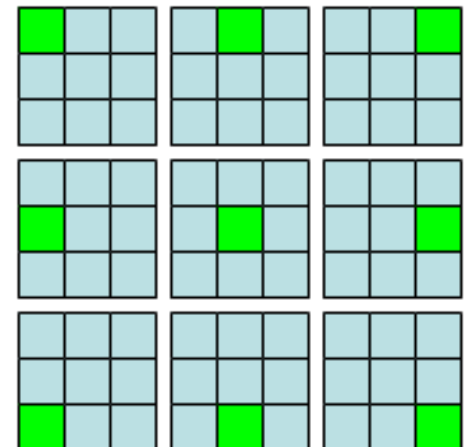
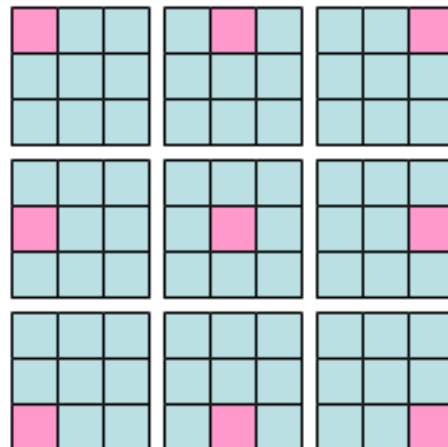
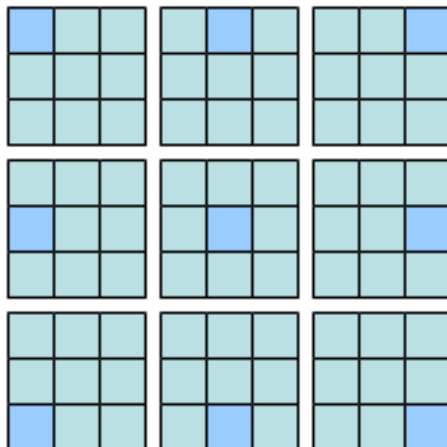
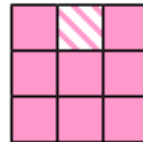
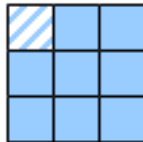
Scalability of Scrum

- A typical Scrum team is 6-10 people
- Jeff Sutherland - up to over 800 people
- "Scrum of Scrums" or what called "Meta-Scrum"
- Frequency of meetings is based on the degree of coupling between packets

Scalability of Scrum



Scalability of Scrum



Pros/Cons

§ Advantages

- § *Completely developed and tested features in short iterations*
- § *Simplicity of the process*
- § *Clearly defined rules*
- § *Increasing productivity*
- § *Self-organizing*
- § *each team member carries a lot of responsibility*
- § *Improved communication*
- § *Combination with Extreme Programming*

§ Drawbacks

- § *“Undisciplined hacking” (no written documentation)*
- § *Violation of responsibility*
- § *Current mainly carried by the inventors*