



UNIVERSITY OF CAPE TOWN

Department of Computer Science

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Advanced Software Design SCRUM

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slides and material taken from prof edwin blake & Melissa Densmore



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INTRODUCTION

Introduction

Scrum Outline

Scrum Flow

Scrum Meetings

Process Artefacts

Possible Problems

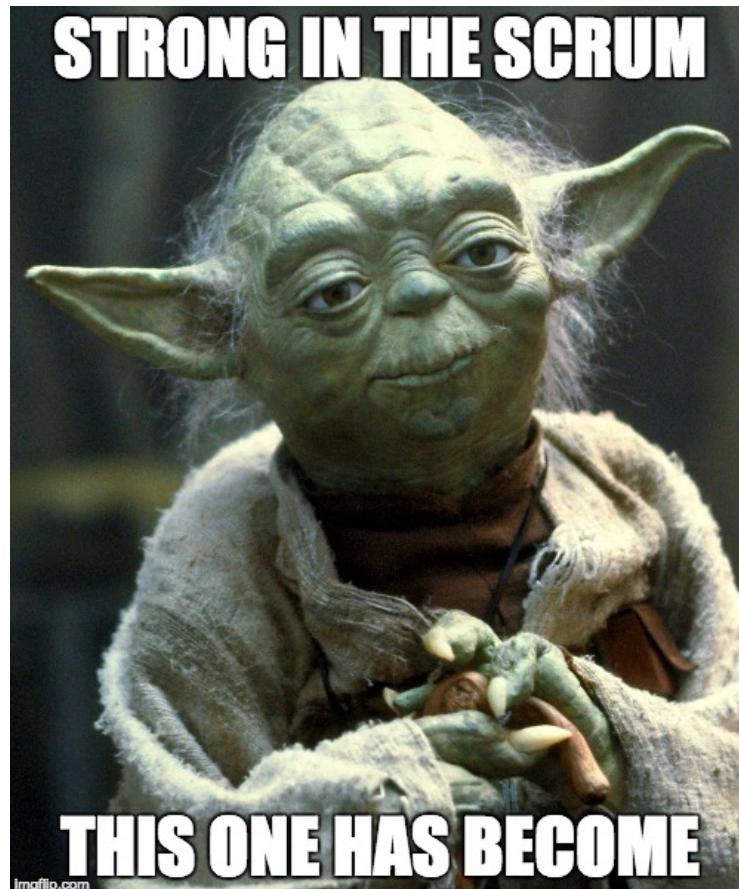
Final Words



Agile Project Management

3

- OK: there is not much of an advance plan, so how do you manage the agile development process?



What is Scrum

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- Not an acronym.
- Very little to do with rugby.
- Simple to implement
- Designed to increase productivity
- Mature: goes back to 1995.
- Scalable
 - can be used on projects of any size.



What is Scrum

II

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- Scrum is a **project management process**.
- It is a lightweight development process to
 - Manage and control software and product development
- Embraces iterative and incremental practices
- Not “artefact-driven”
 - No large requirements documents, analysis specifications, design documents.
 - Requires very few artefacts
 - It does require discipline
- Concentrates achieving results

Warning Once Again!

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- No silver bullet ...
 - ▣ That is, it ain't a technique that compensates for lack of training or experience
- Scrum is not a panacea for all known development ills
 - ▣ a hot topic in the software and games industry.



Scrum

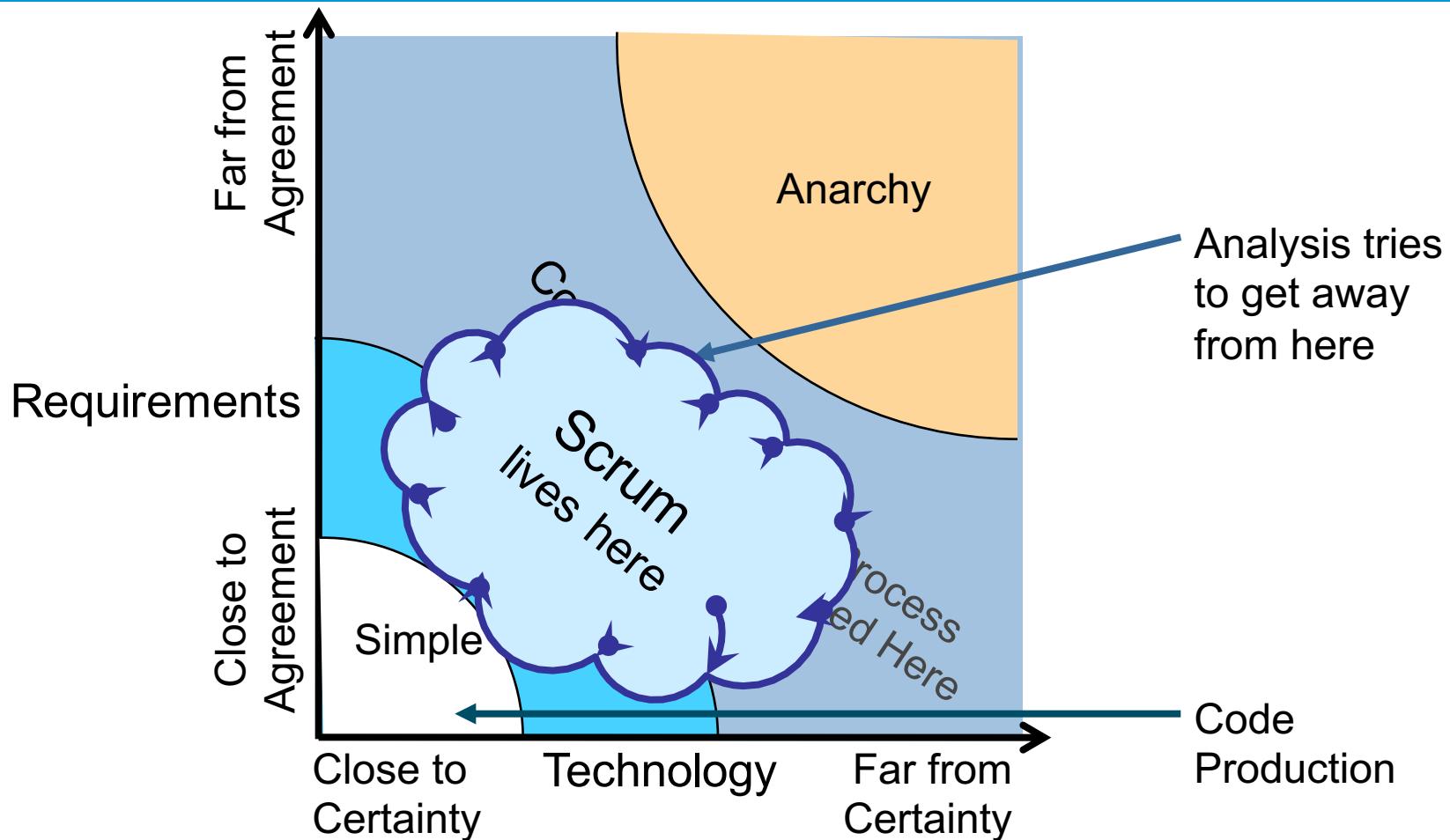
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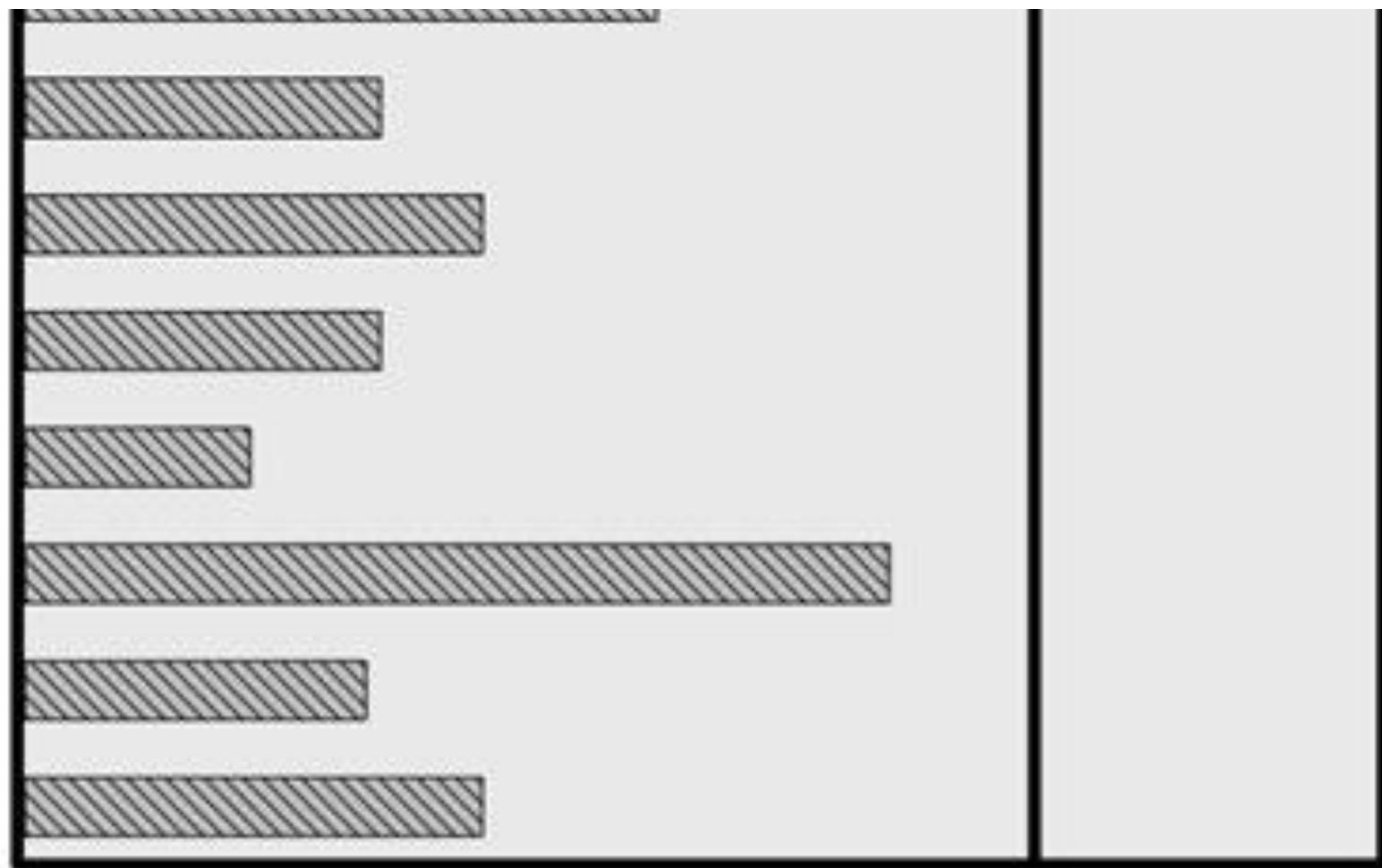
Why Scrum?

Complexity

8

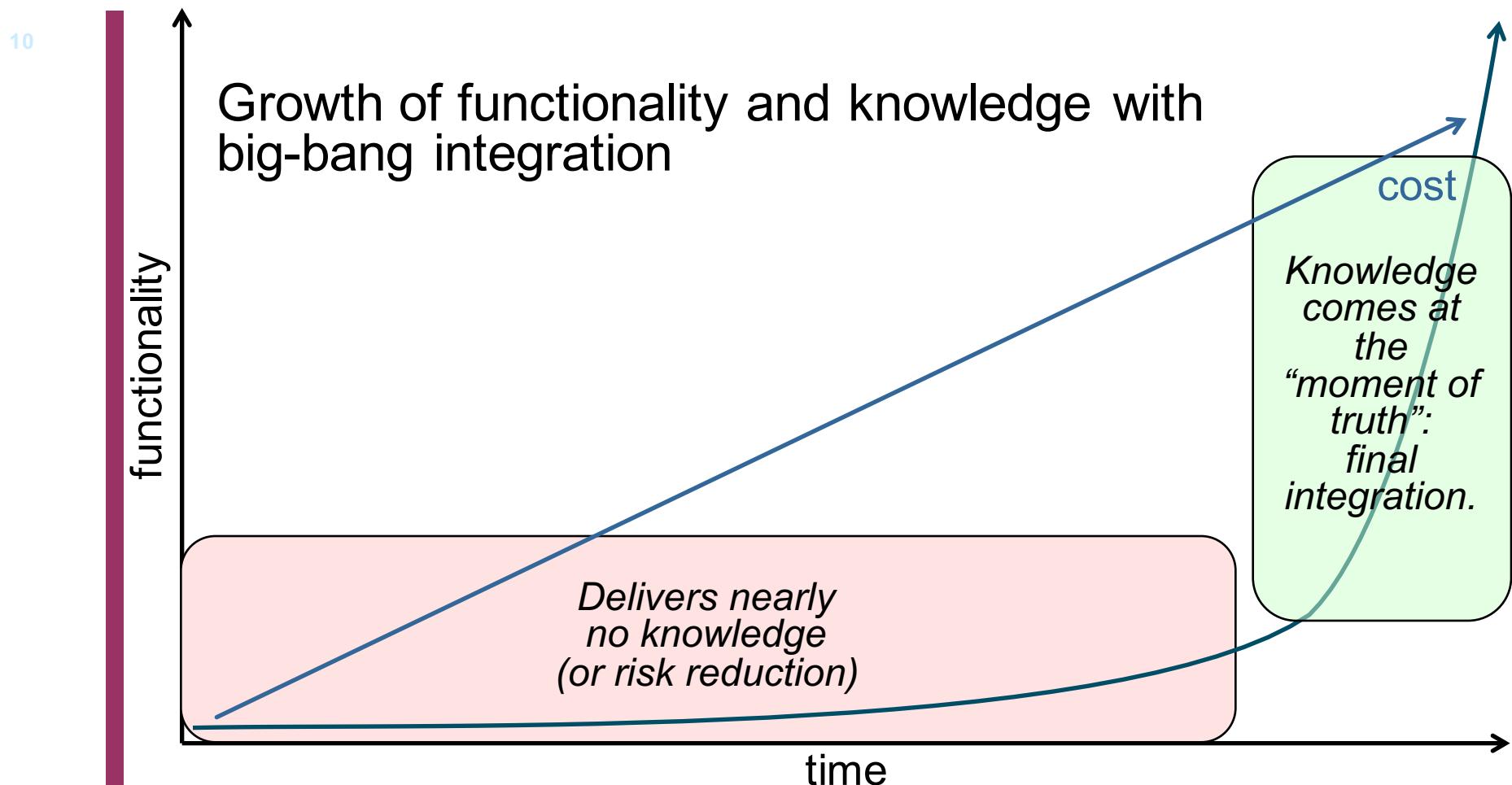


Waterfall – Sample Project



Progress after eight months

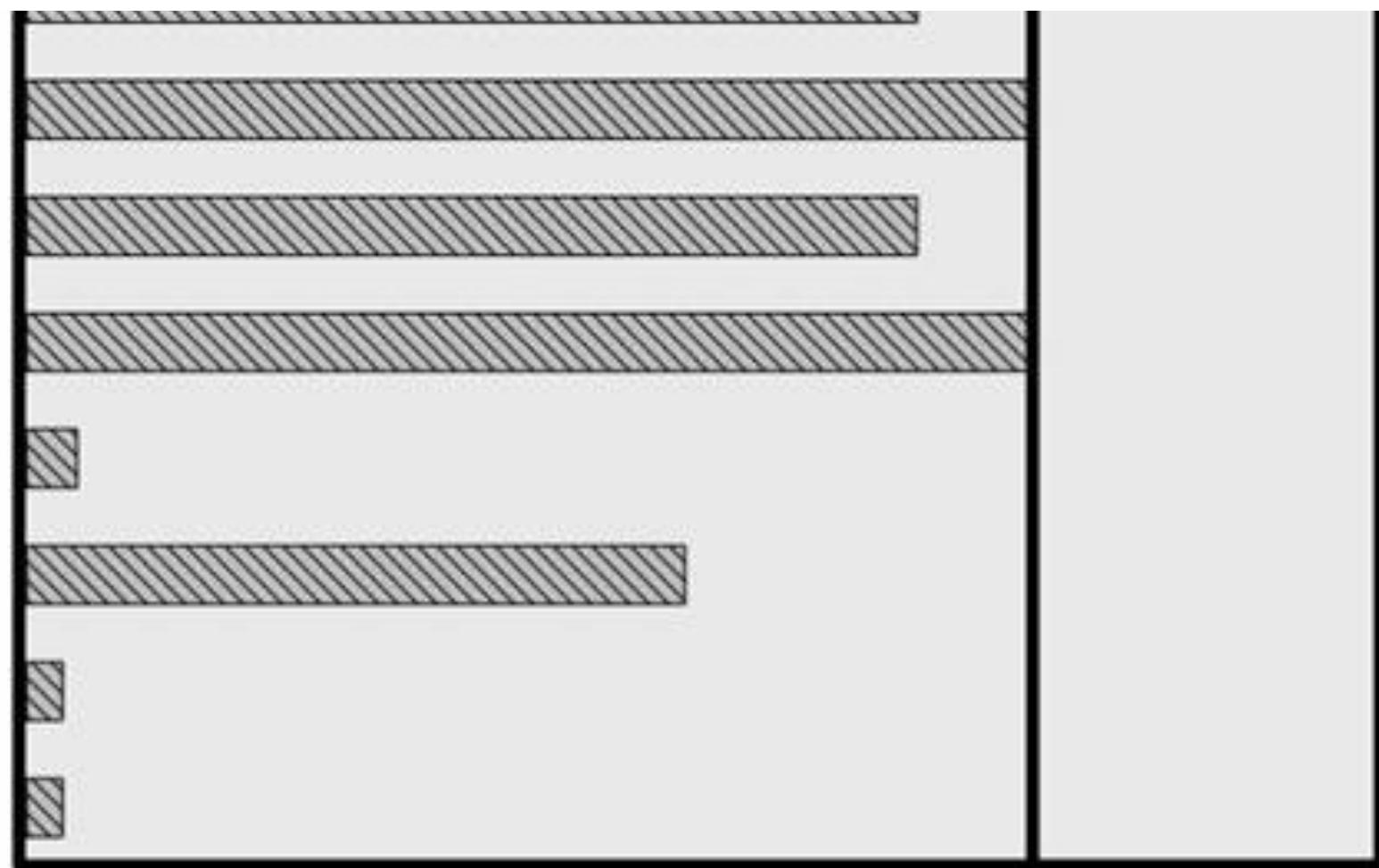
Waterfall: Finished functionality



Waterfall is a late-learning strategy

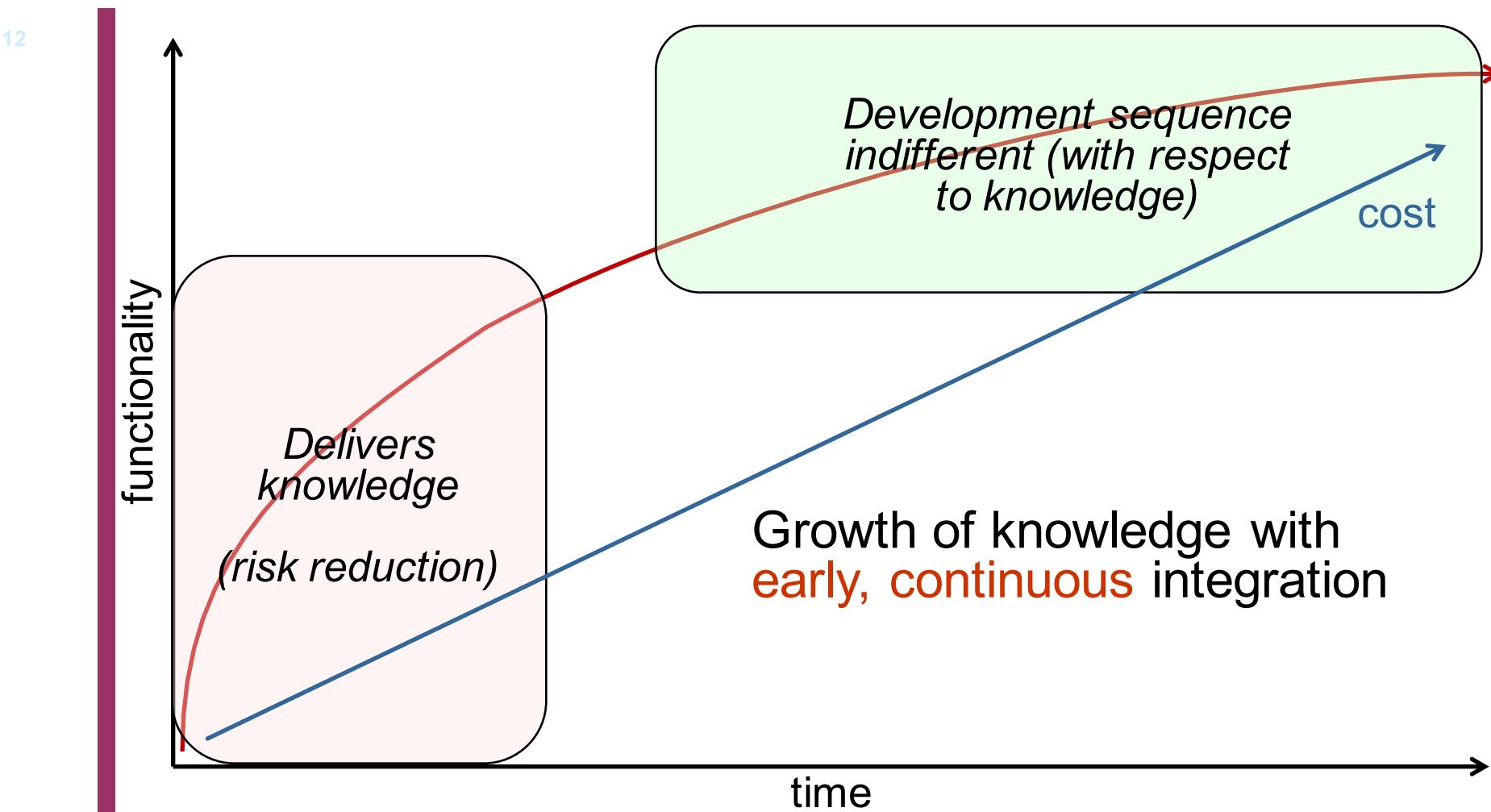
Delays true understanding of the software system

Scrum – Sample Project



Progress after eight months

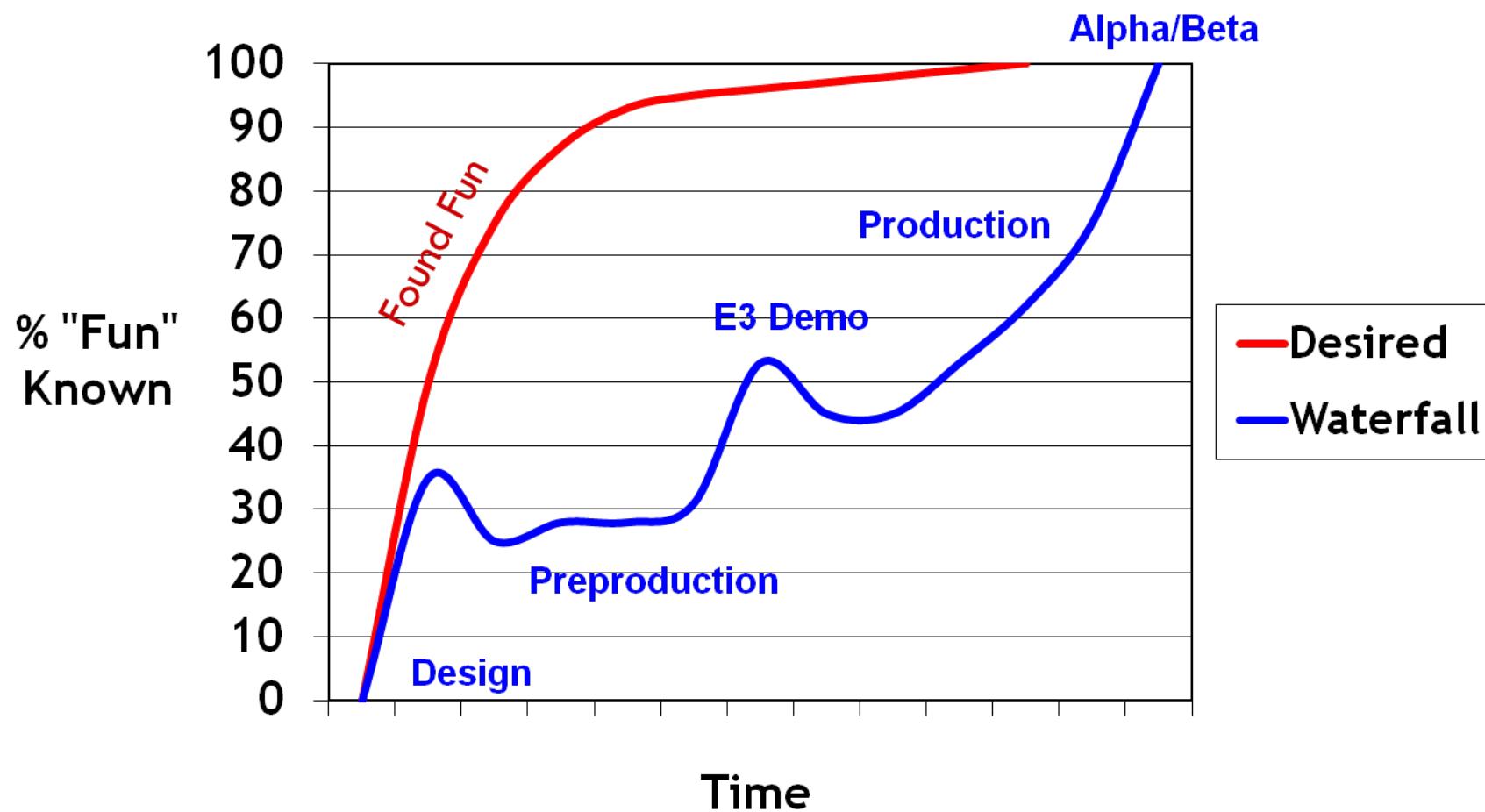
Scrum: Finished functionality



It pays to learn early in the project

Up front design does not reduce risk as much as we think

In Games We Want to Find Fun First



Powerful tool in game production, enables:

- testing and evaluating gameplay earlier in the development cycle
- not being afraid to make changes.



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SCRUM OUTLINE

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Process Artefacts

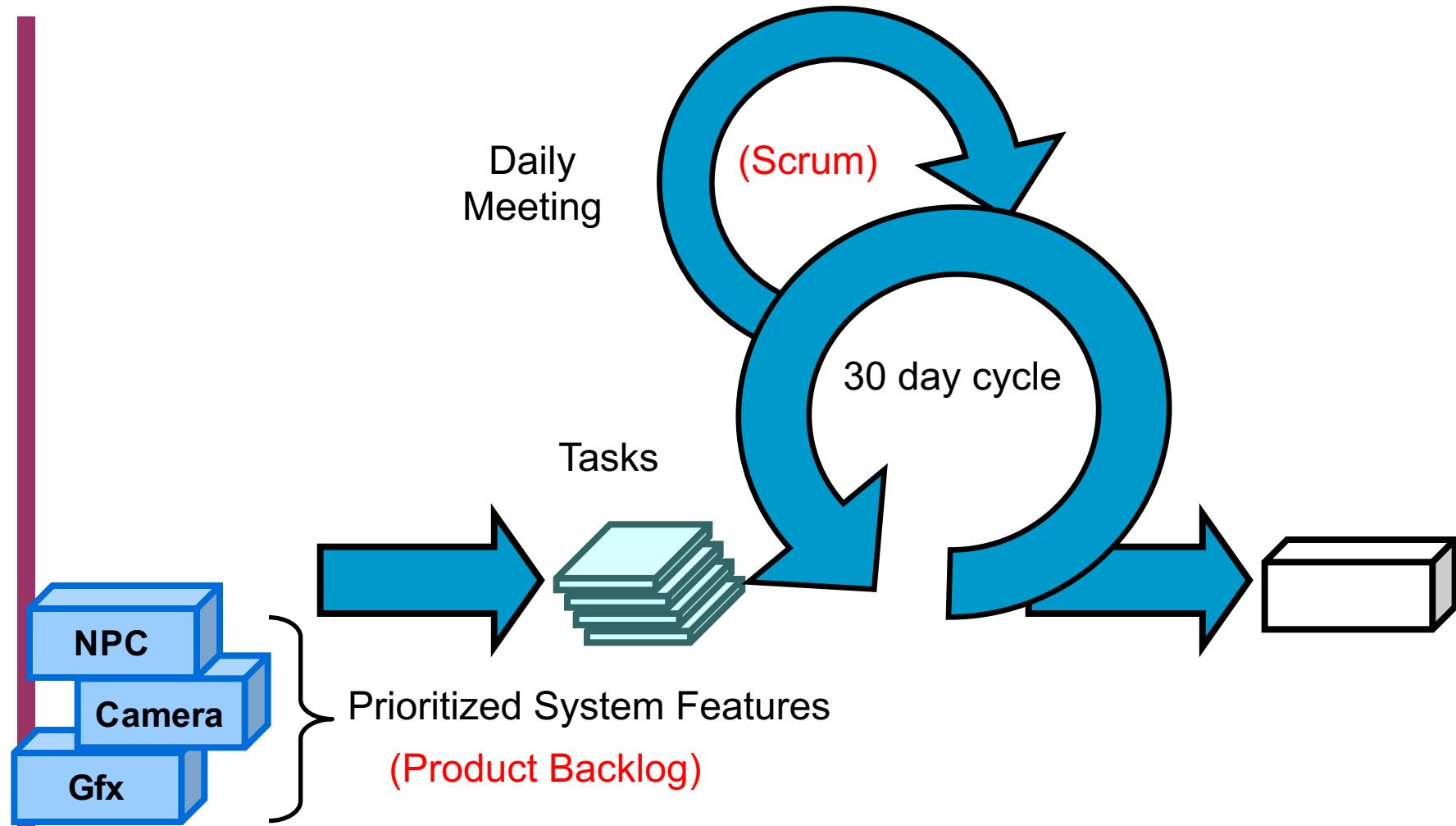
Possible Problems

Final Words



Scrum Skeleton

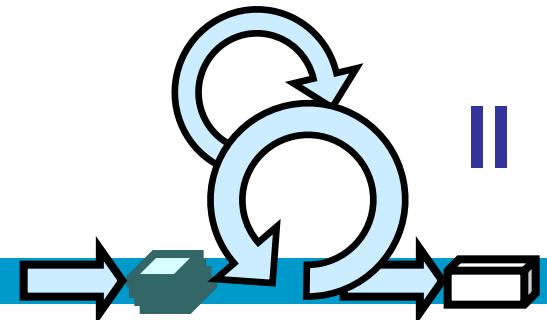
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Scrum hangs all its practices on an iterative, incremental process skeleton.

Scrum Skeleton

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- The lower circle represents an iteration of development that occur one after another.
 - Output of each iteration is an increment of product.
- The upper circle represents the daily inspection that occurs during the iteration
 - individual team members meet to inspect each others' activities and make appropriate adaptations.
- Driving the iteration is a list of requirements.
- This cycle repeats until the project is complete.

Scrum Skeleton

III

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- Product features are broken down into individual tasks by programmer team
- Worked on for an iteration of (two weeks to) a month
- Account for their tasks and to each other in a daily meeting.
- End of the iteration a product review occurs of all work done in that iteration
- Project directors and publishers determine how to prioritize the next iteration based on the work done in the latest

- The heart of Scrum lies in the iteration.
- The team
 - takes a look at the requirements
 - considers the available technology
 - evaluates its own skills and capabilities
 - determines how to build the functionality, modifying its approach daily as it encounters new complexities, difficulties, and surprises.
 - figures out what needs to be done and selects the best way to do it.
- This creative process is the heart of the Scrum's productivity.

Scrum Roles

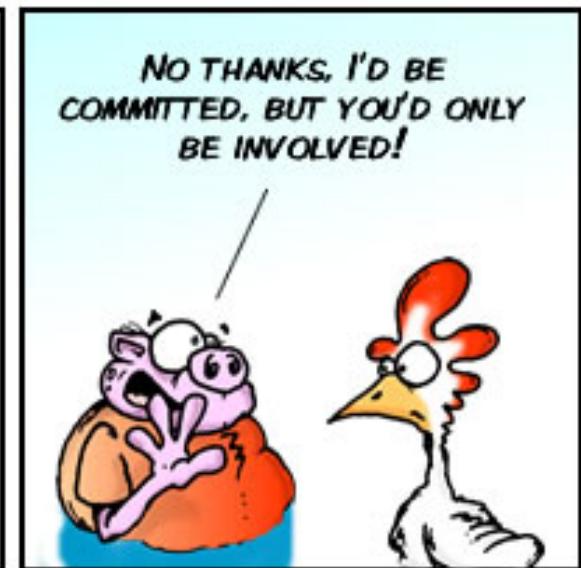
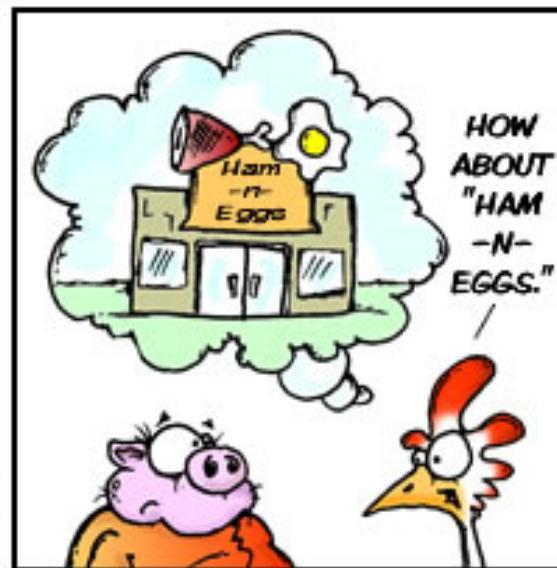
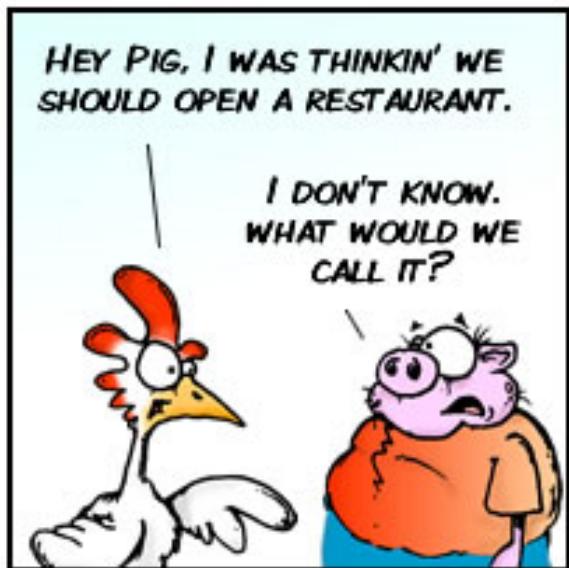
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- There are only three SCRUM roles

1. Product Owner
2. Team
3. ScrumMaster.

- All involved are either Chicken or Pig

- Pig ≡ Players, Committed, Accountable, Responsible
- Chicken ≡ Spectators, Interested, Consults, Informed (management!)



Product Owner

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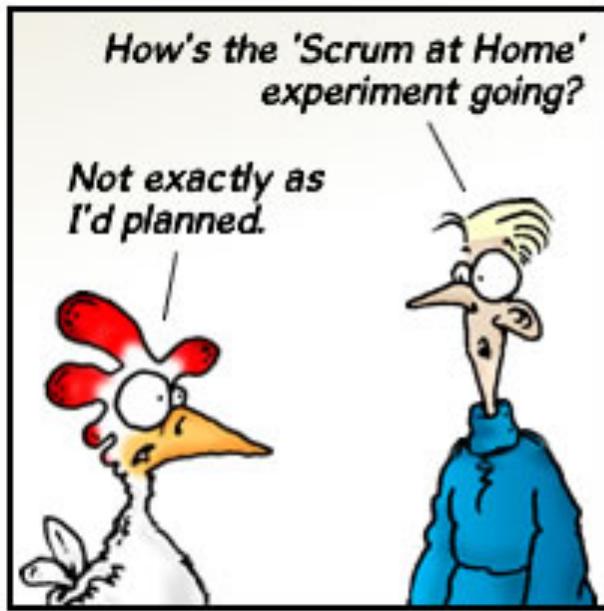
- Represent the interests of everyone with a stake in the project and its resulting system.
 - achieves initial and ongoing funding
 - creates
 - the project's initial overall requirements
 - return on investment (ROI) objectives
 - release plans.



Product Owner and Product Backlog

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- List of requirements is called the Product Backlog.
- Product Owner uses the Product Backlog to ensure the most valuable functionality is produced first and built upon
 - ▣ achieved by frequently prioritizing the Product Backlog to queue up the most valuable requirements for the next iteration.



Scrum Team

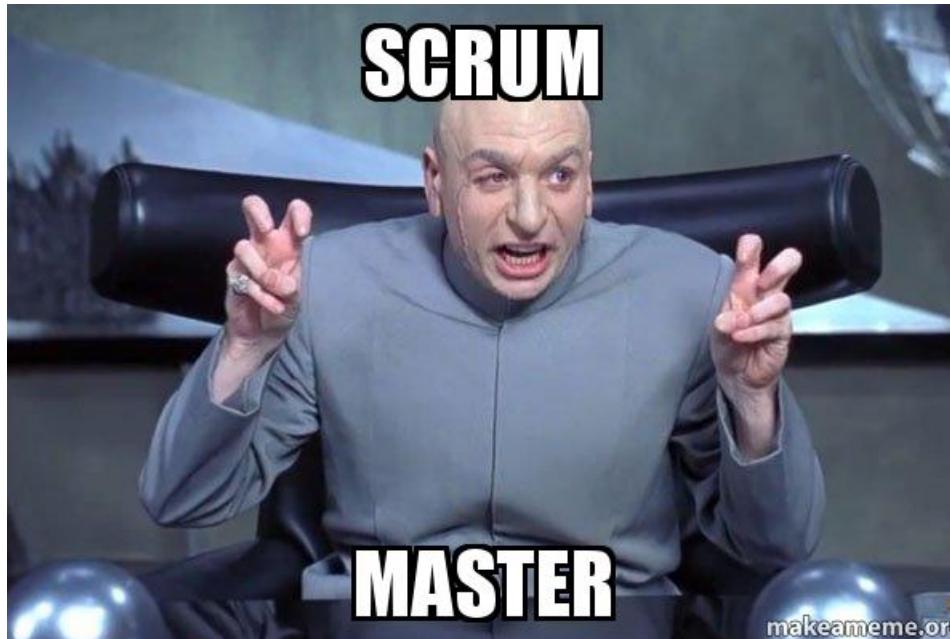
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- Typically will be ten or fewer
 - larger teams can work well if they understand how to organise and manage themselves.
- Responsible for developing functionality.
- Are self-managing, self-organizing, and cross-functional
- Responsible for deciding how to turn Product Backlog into an increment of functionality within an iteration
- Managing their own work to do so.
- Members are collectively responsible for the success of each iteration and the project as a whole

ScrumMaster

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- Responsible for the Scrum process
 - teaching Scrum to everyone involved in the project
 - implementing Scrum so that it fits within an organization's culture and still delivers the expected benefits
 - ensuring that everyone follows Scrum rules and practices.



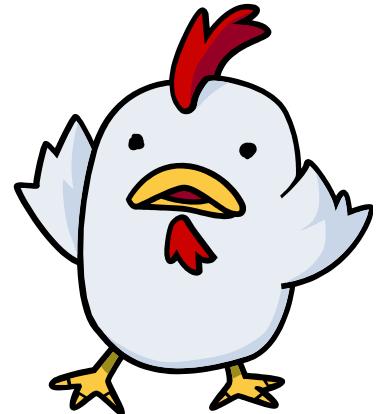
Scrum: empower Pigs and remove Chickens

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a Pig is “someone who makes a personal commitment to the success of the project”



One perspective is that Scrum is all about getting rid of the Chickens!





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SCRUM FLOW

Introduction

Scrum Outline

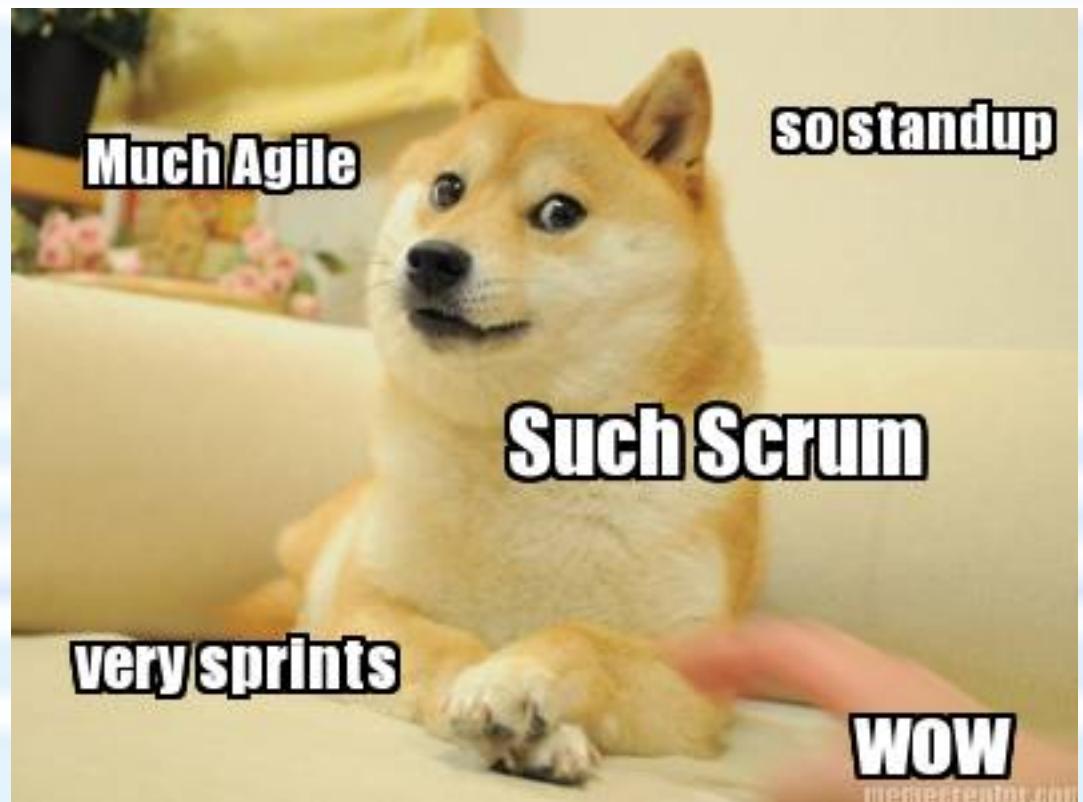
Scrum Flow

Scrum Meetings

Process Artefacts

Possible Problems

Final Words



Scrum Rules

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- ScrumMaster ensures everyone on a project follows the rules
- Hold the process together so everyone knows how to play
 - ▣ If rules aren't enforced, people waste time figuring out what to do
 - ▣ If the rules are disputed, time is lost while everyone waits for resolution
- The rules have worked in thousands of successful projects
- To change rules, use Sprint retrospective meeting:
 - ▣ Changes should originate from the Team, not management
 - ▣ Changes should be entertained if and only if the ScrumMaster is convinced everyone involved understands how Scrum works.
 - ▣ No rule changes until the ScrumMaster determines this stage has been reached

Scrum Flow

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- Any project starts with a vision
 - In XP terms the “System Metaphor”
 - Leads to the logical architecture
- The Product Owner produces the Product Backlog
 - List of functional and non-functional requirements when turned into functionality deliver the vision.
 - Prioritized with the items most likely to generate value as top priority and divided into proposed releases.

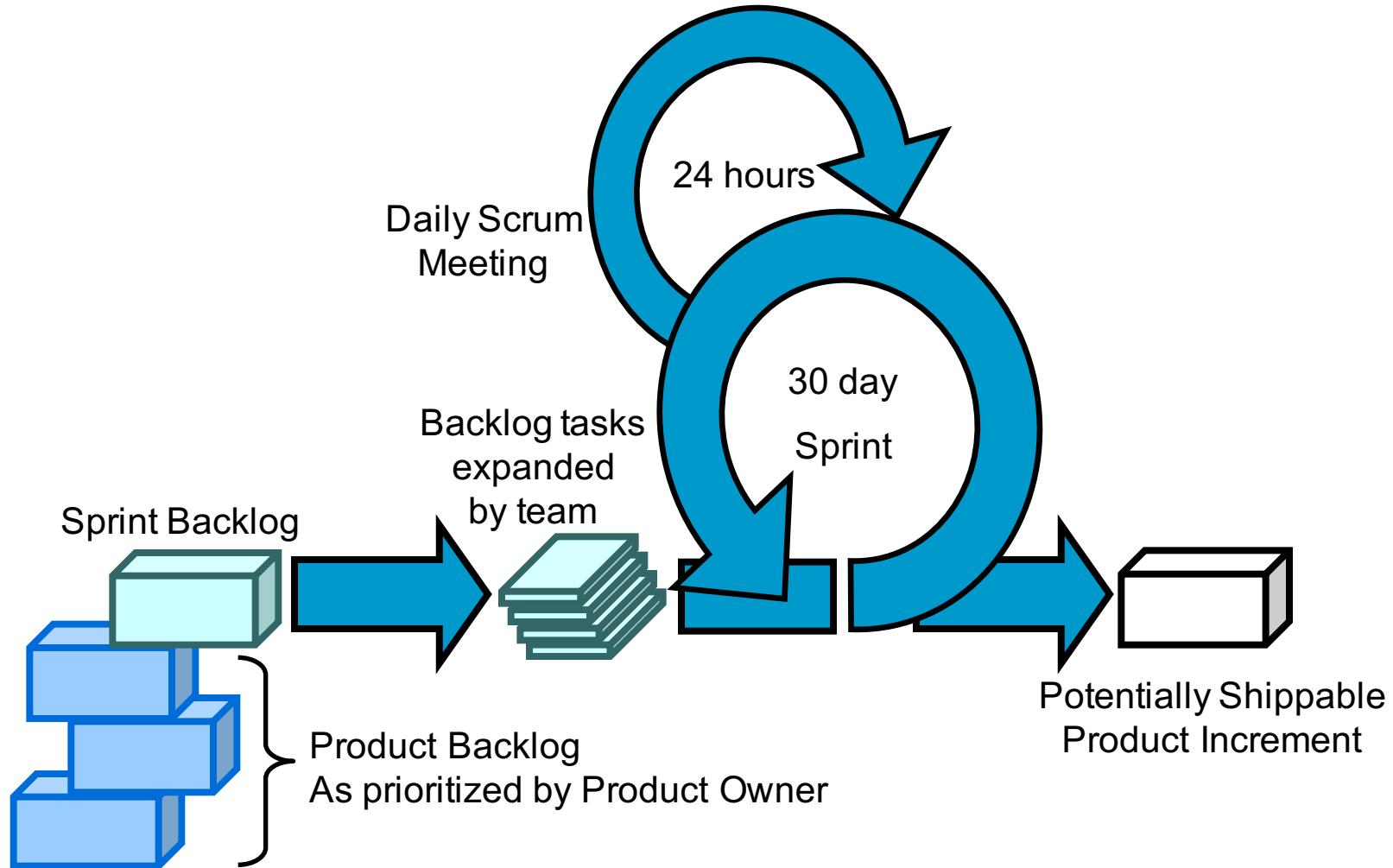
Scrum Flow — Sprints

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- Work is done in Sprints.
 - ▣ iteration of 30 consecutive calendar days.
 - ▣ initiated with a Sprint planning meeting
 - the Product Owner and Team collaborate about what will be done for the next Sprint.
 - Selecting from the highest priority Product Backlog
 - Product Owner tells the Team what is desired,
 - Team tells the Product Owner how much it believes it can turn into functionality over the next Sprint.
 - Cannot last longer than eight hours
 - Prevent hand-wringing about what is possible.
 - ▣ Goal is to get to work, not to think about working

Sprints

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SCRUM MEETINGS

Introduction

Scrum Outline

Scrum Flow

Scrum Meetings

Sprint Planning

Daily Scrum

Sprint Review

Process Artefacts

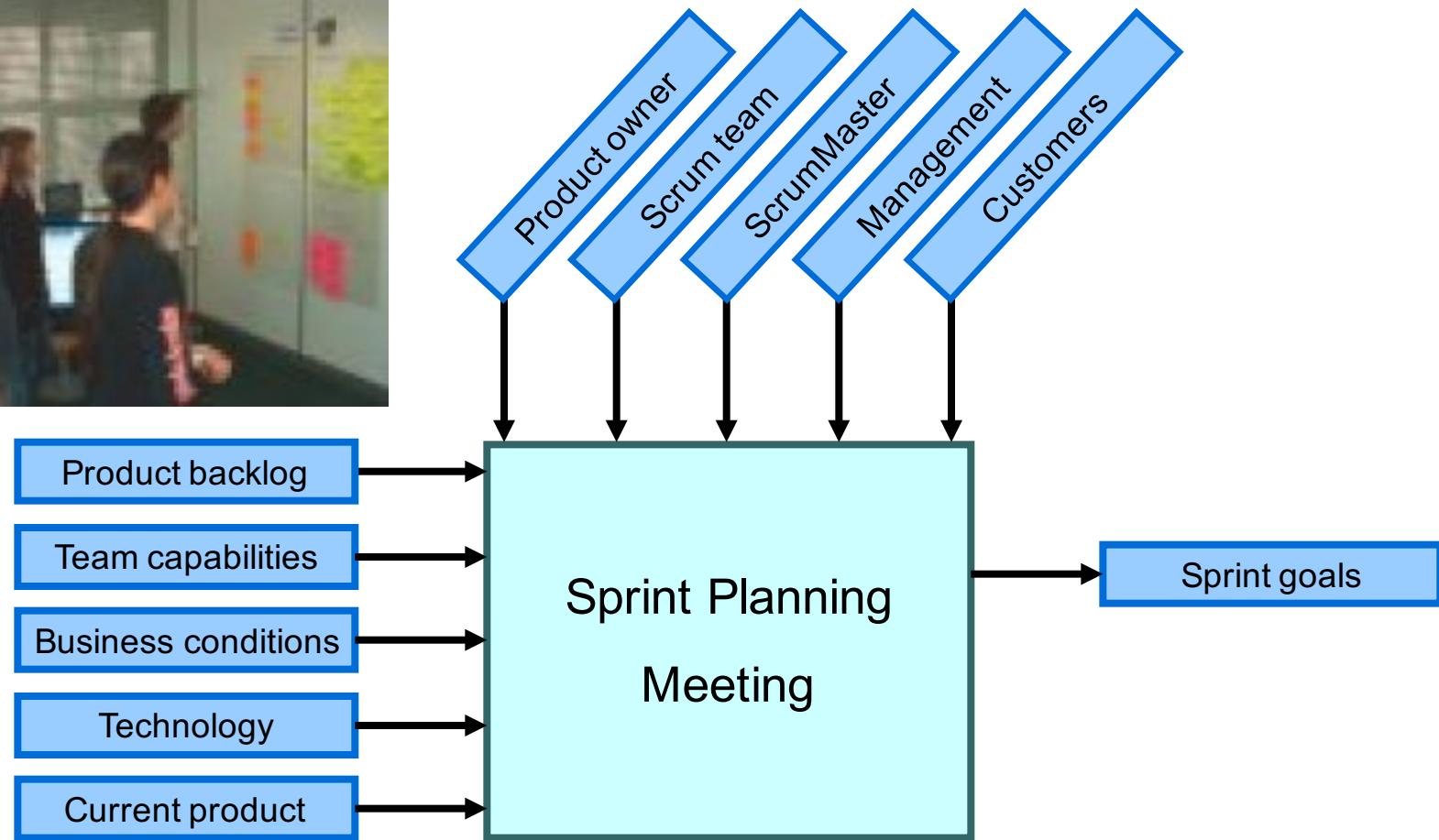
Possible Problems

Final Words



Sprint Planning Meeting

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Sprint Planning Meeting: Time-Boxed

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- Sprint planning meeting is time-boxed to 8 hours
 - consists of two segments time-boxed to 4 hours each.
 - The first segment is for selecting Product Backlog;
 - the second segment is for preparing a Sprint Backlog.



Sprint Planning Meeting

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- The goal of the first segment is for the Team to select those Product Backlog items that it believes it can commit to turning into an increment of potentially shippable product functionality.
- The Team will demonstrate this functionality to the Product Owner and stakeholders at the Sprint review meeting at the end of the Sprint.
- The Team can make suggestions, but the decision of what Product Backlog can constitute the Sprint is the responsibility of the Product Owner.
- The Team is responsible for determining how much of the Product Backlog that the Product Owner wants worked on the Team will attempt to do during the Sprint.

Sprint Planning Meeting —

First four hours — deciding what to do

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- Product Owner presents the highest priority Product Backlog to the Team.
- Team questions the content, purpose, meaning, and intentions of the Product Backlog.
- Team selects as much Product Backlog as it believes it can turn into a completed increment of shippable product functionality by the end of the Sprint.
- Time-boxing the segment to 4 hours means this is all of the time available for analysing the Product Backlog.
- Further analysis must be performed during the Sprint.
- Large-grained, high-priority Product Backlog with imprecise estimates might not be thoroughly understood during this part of the Sprint planning meeting
 - might result in the Team not being able to complete all of the Product Backlog that it selects.

Sprint Planning Meeting — Second four hours — Planning the Sprint

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- Team is responsible for managing its own work
 - ▣ Needs a tentative plan to start the Sprint.
 - ▣ Chosen tasks are placed in a Sprint Backlog
 - ▣ Tasks in the Sprint Backlog emerge as Sprint evolves
- Product Owner is available to answer questions from the Team
- Team work out how to turn the selected Product Backlog into an increment of potentially shippable product functionality.
 - ▣ Every one else only observes or answers questions for more information
- Output of the 2nd segment is a list: the Sprint Backlog
 - ▣ tasks, task estimates, and assignments.
- Task list might not be complete
 - ▣ it must be complete enough to have commitment of all Team members
 - ▣ carries them through the first part of the Sprint,
 - ▣ while the Team devises more tasks in the Sprint Backlog.

Daily Scrum Meeting

I

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- Time-boxed to 15 minutes
 - No matter how many team members.
- Held in the same place at the same time every work day.
 - best is first thing in the day so members think of what they did the day before and what they plan to do today.
- All Team members are required to attend.
 - If a Team member can't attend, the absent member must either attend by telephone or by having another Team member report on the absent member's status.

Daily Scrum Meetings – don't do this

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Daily Scrum Meeting

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- Why daily?
 - “How does a project get to be a year late?”
 - “One day at a time.”
 - Fred Brooks, *The Mythical Man-Month*
 - Scrum creates daily visibility of issues
- Team members must be prompt.
 - ScrumMaster starts the meeting at the appointed time, regardless of who is present.
 - Any members who are late pay \$1 (=R10?) to the ScrumMaster immediately.



Daily Scrum Meeting

III

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- ScrumMaster goes round the room until everyone has reported
- Each Team member responds to *only* 3 questions
 1. What have you done since the last Daily Scrum?
 2. What will you do on the project between now and the next Daily Scrum meeting?
 3. What stands in the way of your meeting your commitments to this Sprint and this project?
- Purpose
 - Synchronize the work of all Team members daily
 - Schedule any meetings needed to help progress

Daily Scrum Meeting

IV

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- Team members should not digress into issues, designs, discussion of problems, or gossip.
- The ScrumMaster is responsible for moving the reporting along briskly, from person to person.
- In the Scrum, only one person talks at a time
 - The one who's reporting their status!
 - Everyone else listens — no side conversations
- If a Team member reports something of interest to other members or needs assistance, any Team member can *arrange a meeting afterwards* for interested parties

Sprint has started, the clock is ticking toward the 30-day Sprint time-box

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- Chickens are not allowed to talk, make observations, make faces, or otherwise make their presence in the Daily Scrum obtrusive
- Chickens stand on the periphery of the Team so as not to interfere with the meeting.
- If too many chickens attend, the ScrumMaster can limit attendance so the scrum can stay orderly and focused
- Chickens aren't allowed to talk to Team members after the meeting for clarification or to give advice or instructions
- Pigs or chickens who cannot or will not conform to these rules
 - can be excluded from the meeting (chickens) or
 - removed from the Team (pigs).

Sprint: Time-Boxed

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- Sprint is time-boxed to 30 consecutive days
 - time needed for a Team to build something of significant interest to the Product Owner and stakeholders and bring it to a state where it is potentially shippable.
 - the maximum time to do work without artefacts and documentation to support thought processes.
 - maximum time that most stakeholders will wait
 - without losing interest in the Team's progress
 - without losing their belief that the Team is doing something meaningful.

Sprint

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- During the Sprint
 - The Team can seek outside advice, help, information, and support.
 - No one can provide advice, instructions, commentary, or direction to the Team.
 - The Team is self-managing.
- The Team has committed to the Product Backlog .
 - No one is allowed to change the Product Backlog during the Sprint.
 - The Product Backlog is frozen until the end of the Sprint.

Changing Product Backlog in a Sprint

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- If the Team feels unable to complete all the committed Product Backlog
 - can consult with the Product Owner on which items to remove.
 - If so many items require removal that the Sprint has lost its value, the ScrumMaster can terminate the Sprint, as previously stated.
- If the Team determines that it can address more Product Backlog
 - can consult with the Product Owner on which additional Product Backlog items can be added.

Non-Viable Sprint

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- If the Sprint proves not to be viable, the ScrumMaster can terminate the Sprint and initiate a new Sprint planning meeting.
- The ScrumMaster can make this change if requested by the Team or Product Owner.
- The Sprint can prove to be not viable
 - if the technology proves unworkable,
 - if the business conditions change so that the Sprint will not be of value to the business,
 - if the Team is interfered with during the Sprint by anyone outside the Team.

Team Responsibilities During a Sprint

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- The Team members have two administrative responsibilities during the Sprint:
 - attend the Daily Scrum meeting,
 - keep the **Sprint Backlog up-to-date** and available in a public folder on a public server, visible to all.
- New tasks must be added to the Sprint Backlog as they are conceived, and the running, day-to-day estimated hours remaining for each task must be kept up-to-date.

Sprint Review Meeting

I

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- Time-boxed to 4 hours.
 - The Team should not spend more than 1 hour preparing for the Sprint review.
 - The purpose is for the Team to present to the Product Owner and Stakeholders functionality that is done.
 - Done usually means that the functionality is completely engineered and could be potentially shipped or implemented.
 - If “done” has another meaning, make sure that the Product Owner and stakeholders understand it.

Sprint Review Meeting

II

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- Functionality that isn't "done" cannot be presented.
 - Artefacts that aren't functional cannot be presented except when used in support of understanding the demonstrated functionality.
- Functionality should be presented on the Team workstations
- The Sprint review starts with a Team member presenting the Sprint goal, the Product Backlog committed to, and the Product Backlog completed.
- Different Team members can then discuss what went well and what didn't go well in the Sprint.

Sprint Review Meeting

III

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- Sprint review is spent with Team members presenting functionality, answering stakeholder questions, and noting changes that are desired.
- At the end of the presentations, the stakeholders are polled to get their impressions, any desired changes, and the priority of these changes.
- The Product Owner discusses with the stakeholders and the Team potential rearrangement of the Product Backlog based on the feedback.
- Stakeholders are free to voice any comments, observations, or criticisms regarding the increment of potentially shippable product functionality between presentations.

Sprint Review Meeting

IV

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- Stakeholders can identify functionality that wasn't delivered or wasn't delivered as expected and request that such functionality be placed in the Product Backlog for prioritization.
- Stakeholders can identify any new functionality that occurs to them as they view the presentation and request that the functionality be added to the Product Backlog for prioritization.
- At the end of the Sprint review, the ScrumMaster announces the place and date of the next Sprint review to the Product Owner and all stakeholders.

Sprint Retrospective Meeting

I

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- The Sprint retrospective meeting is time-boxed to 3 hours.
- Attended only by the Team, ScrumMaster, and the Product Owner (optional)
- Start the meeting by having all Team members answer two questions:
 - ▣ What went well during the last Sprint?
 - ▣ What could be improved in the next Sprint?
- ScrumMaster writes down the Team's answers in summary form.
- The Team prioritizes in which order it wants to talk about the potential improvements.

Sprint Retrospective Meeting

II

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- The ScrumMaster is not at this meeting to provide answers, but to facilitate the Team's search for better ways for the Scrum process to work for it.
- Actionable items that can be added to the next Sprint should be devised as high-priority non-functional Product Backlog.



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PROCESS ARTEFACTS

Introduction

Scrum Outline

Scrum Flow

Scrum Meetings

Process Artefacts

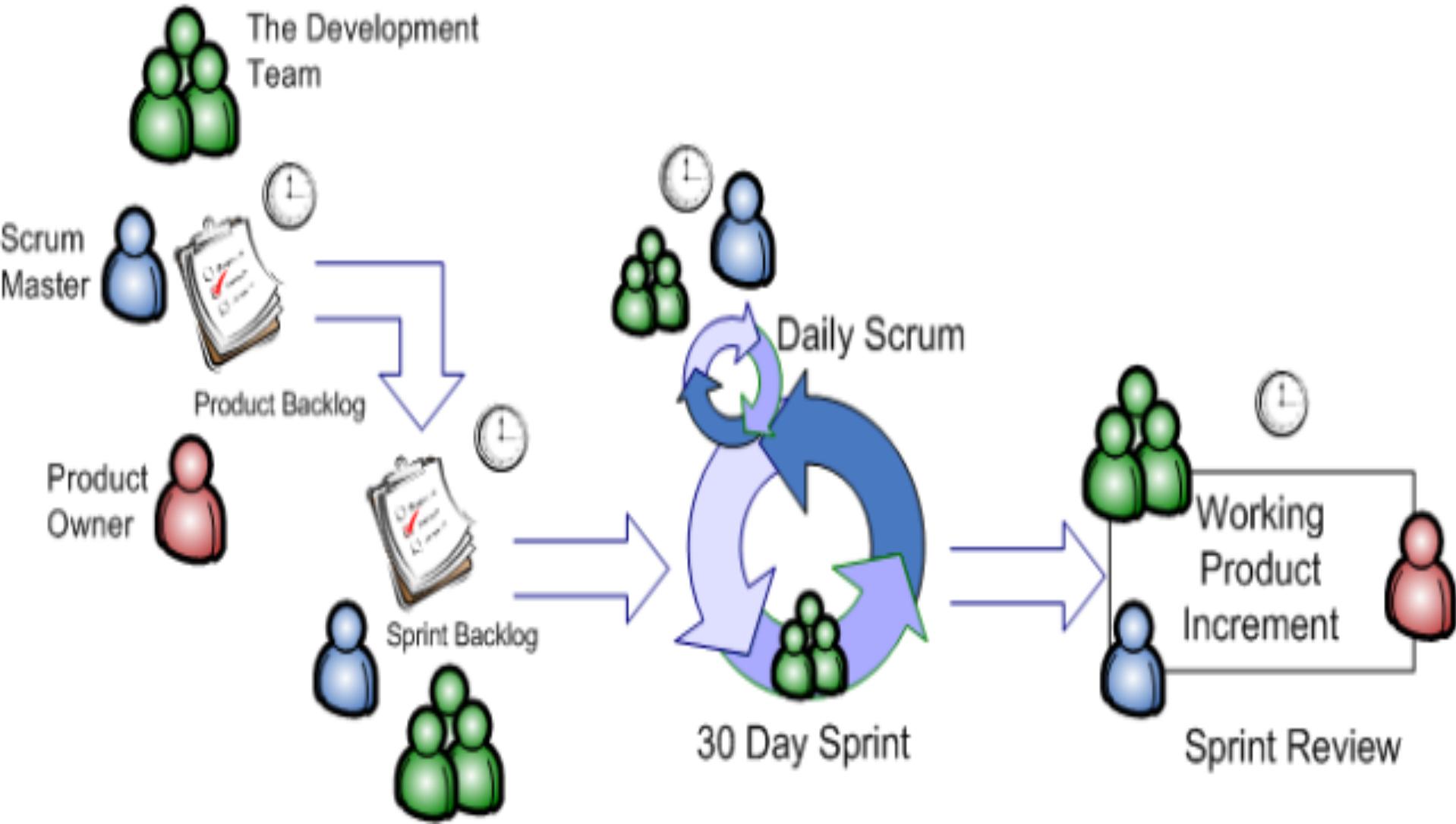
Possible Problems

Final Words



Process Overview

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Scrum's Artefacts

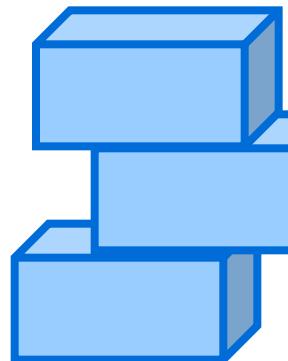
55

- Scrum has few artefacts
 - ▣ Product Backlog
 - ▣ Sprint Backlog
 - ▣ Burndown Charts
- Can be managed using an Excel spreadsheet
 - ▣ More advanced / complicated tools exist:
 - Expensive
 - Web-based – no good for the project manager who travels
 - Still under development

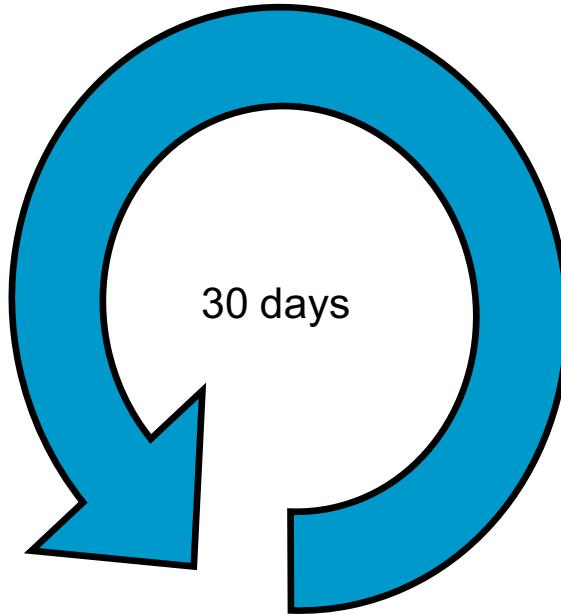
Product Backlog

I

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Product Backlog
As prioritized by Product Owner



Product Backlog

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- Prioritised list of first cut refinements.
- The Product Owner is free to
 - adjust the order in which Product Backlog items are developed
 - add new items
- This brings in the concept of agility and change

Sample Product Backlog

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Backlog item	Estimate (person-weeks)
Break props into separate rigid bodies	1
Arrow projectiles stick to environment	0.5
Ragdolls can lose limbs	2
NPCs avoid dynamite thrown at them	4
Improve exception handling	0.5

Sprint Backlog

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- List of the things that will be “done” during the Sprint
- Each item has an estimate of how long it should take to complete, usually measured in hours.
- During the Sprint’s 30 day period, the Project Team must update the Sprint Backlog
- Keeping the Sprint Backlog updated is key:
 - not only does it allow us to work out how fast a team can work (their velocity), it is an early warning indicator.

Sprint Backlog

1

Sprint Backlog Update

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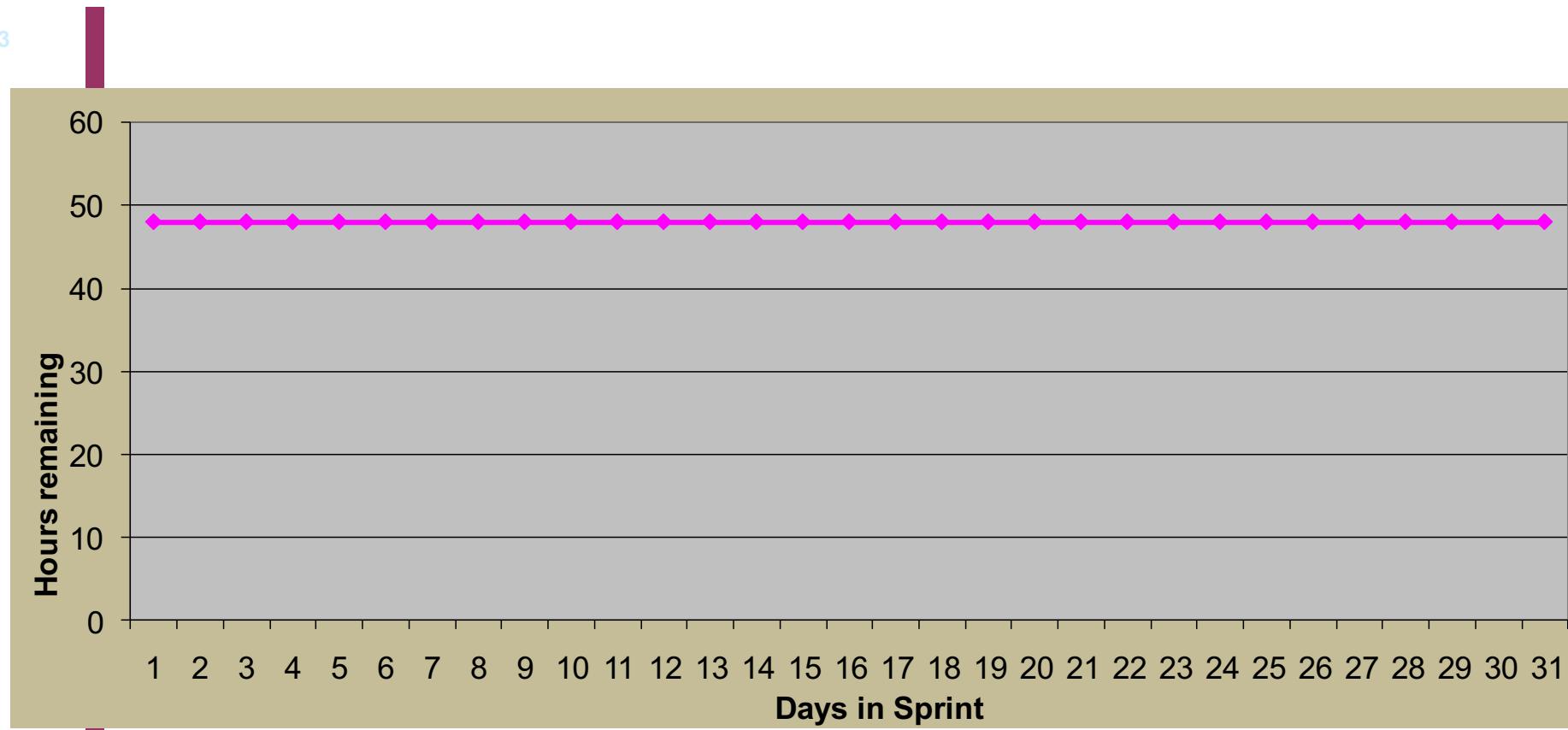
Sprint 1												
9/8/2006	Sprint Day	Hours							Remaining			
		Mo	Tu	Wed	Thur	Fri	Sat	Sun	Mon	Tue	Wed	Thur
		152	144	136	124	116			112	106	96	84
19 days work in this sprint												
Backlog												
ID	Item	Description	Owner	Estimate								
1	Minor	Remove bad formatting in login screen	GJ	8	8	4	2	0				
2	Minor	Correct legacy code in reports	KJ	8	8	4	0					
3	Minor	Modify user file handling	CM	20	20	16	8	4	2		0	
4	Minor	Add network code for error cases	CM	40	40	36	32	30	26		24	20
5	Minor	Add company logos to all screens	DB	20	18	16	12	12	12		12	12
6	Major	Add algorithm to remove jitter	JG	56	56	56	56	56	56		56	56
7	Major	Change Design for workflow	DC	72	64	60	60	60	56		56	50
8	Super	Supervision/Guidance	CAM	32	32	28	28	24	24		22	20

Burndown Charts

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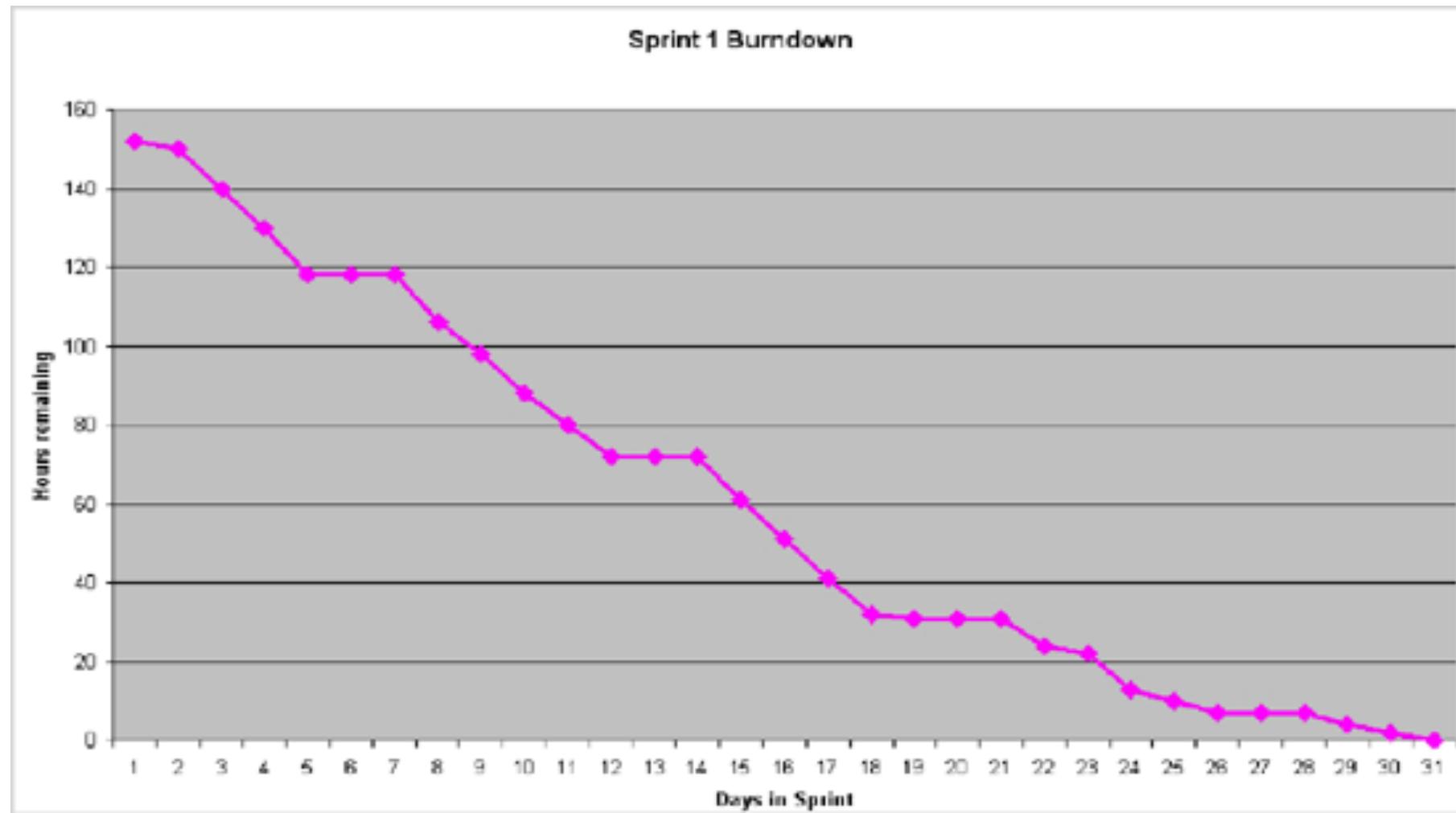
- These are used to identify the rate that work is being completed.
- Graphical representation of the sprint backlog
- It illustrates the work done.
- Demonstrate a steady drive to zero hours remaining:
 - ▣ it represents a pace of work that should be sustainable.
 - ▣ however, some work takes longer than others,
 - ▣ some are even shorter,
 - ▣ may not be a perfect straight line.
- Initially in a sprint there is no work done so the chart is as follows

Burndown Example



No work being performed

Burndown Chart

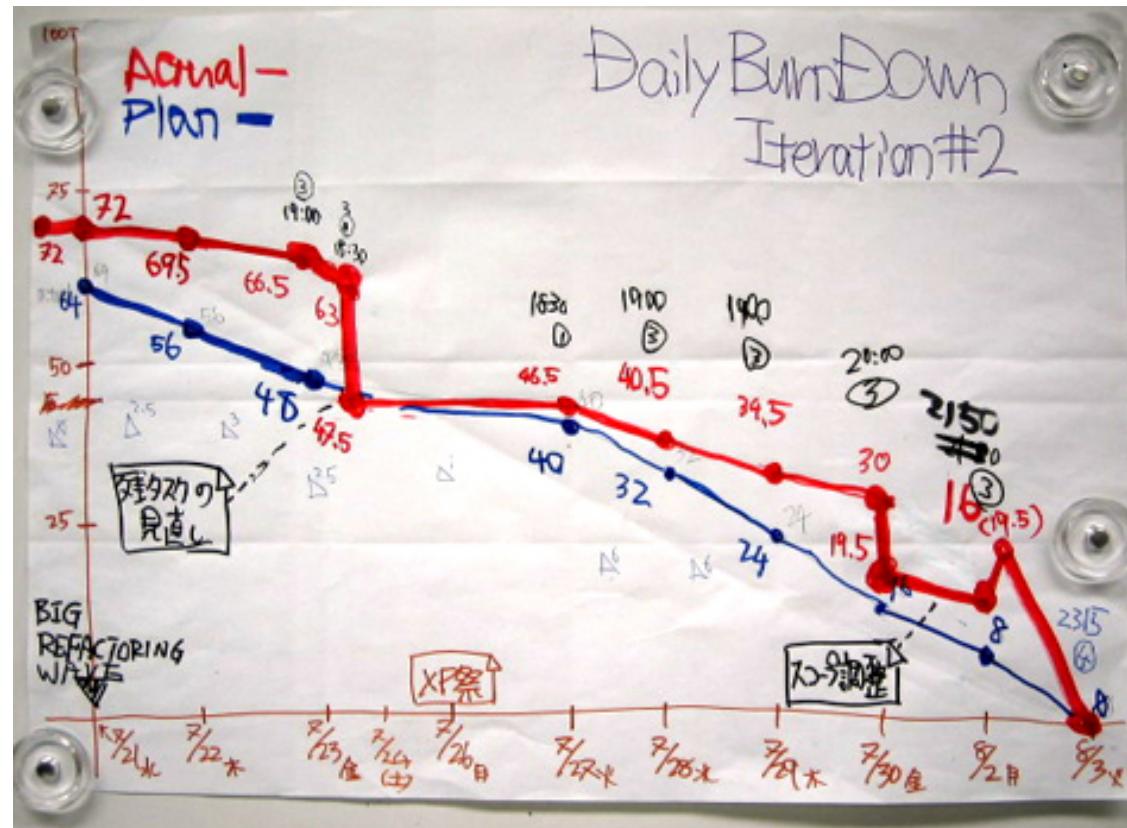


Ideally the chart should look something like this.

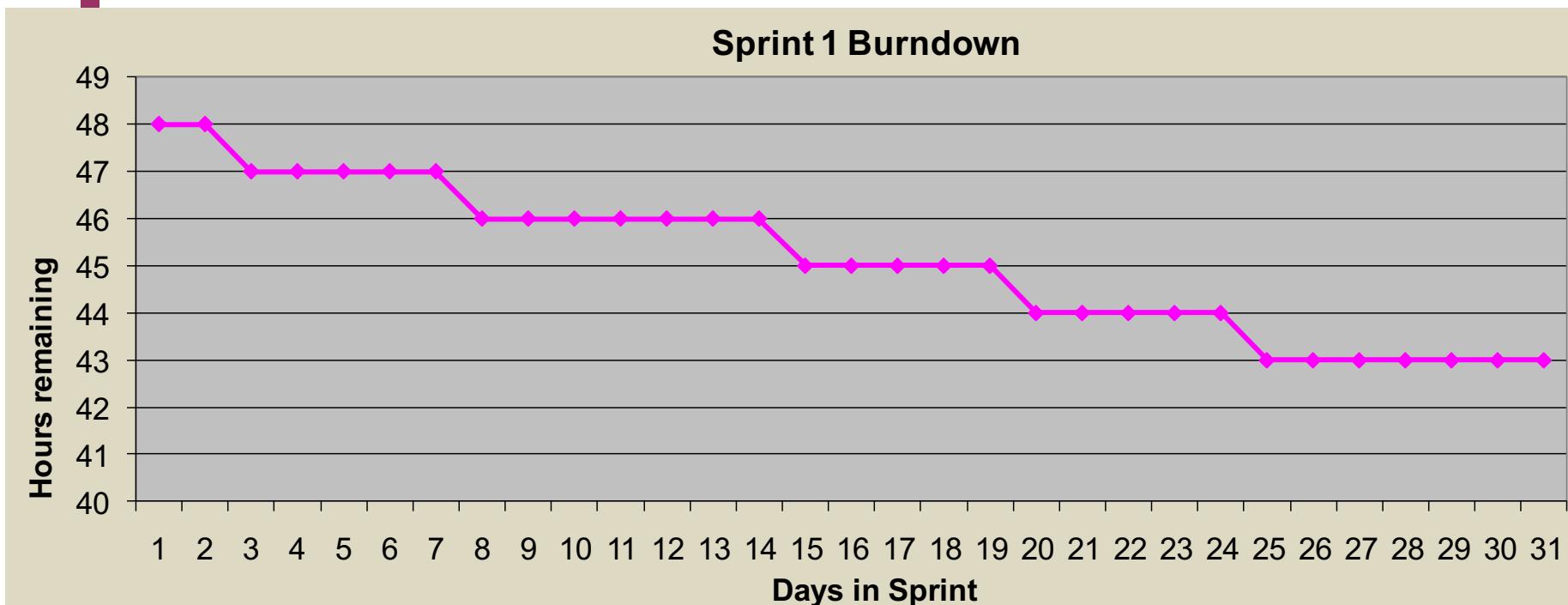
Burndown Chart

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- It is easy to see whether the work is being done in time.
- The following indicates it is not being done fast enough



Burndown Example

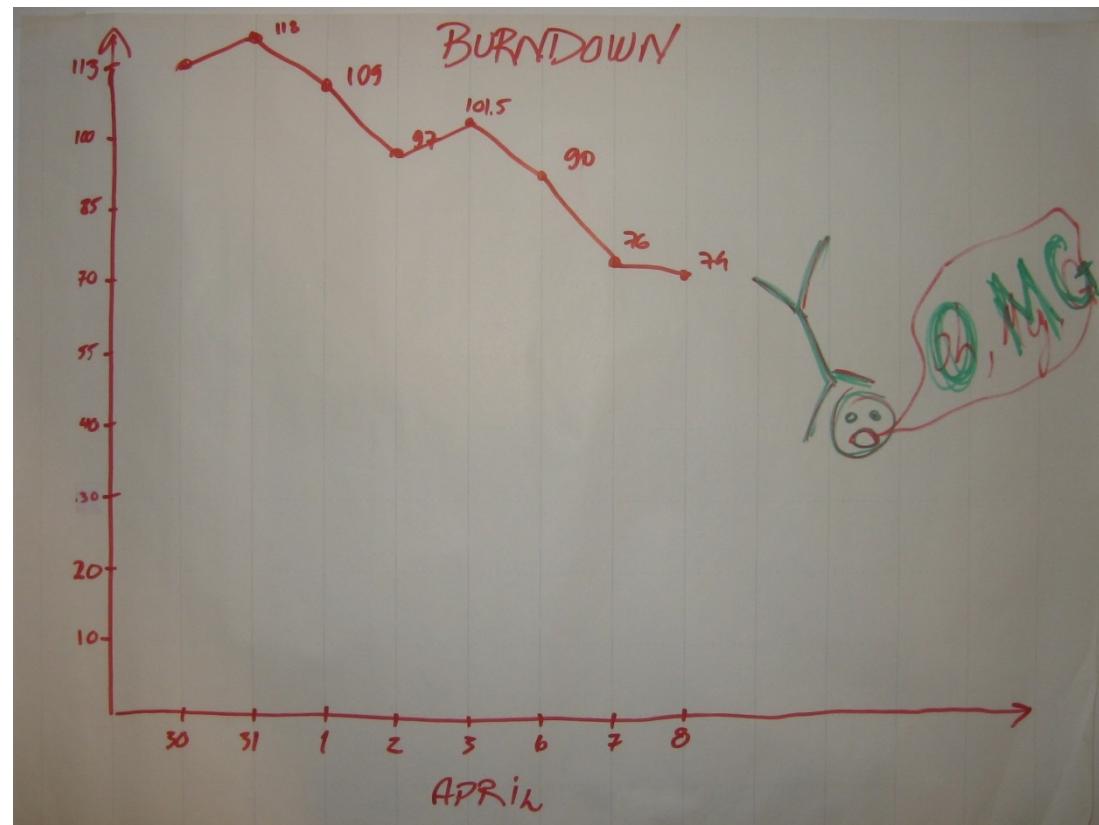


Work being performed, but not fast enough

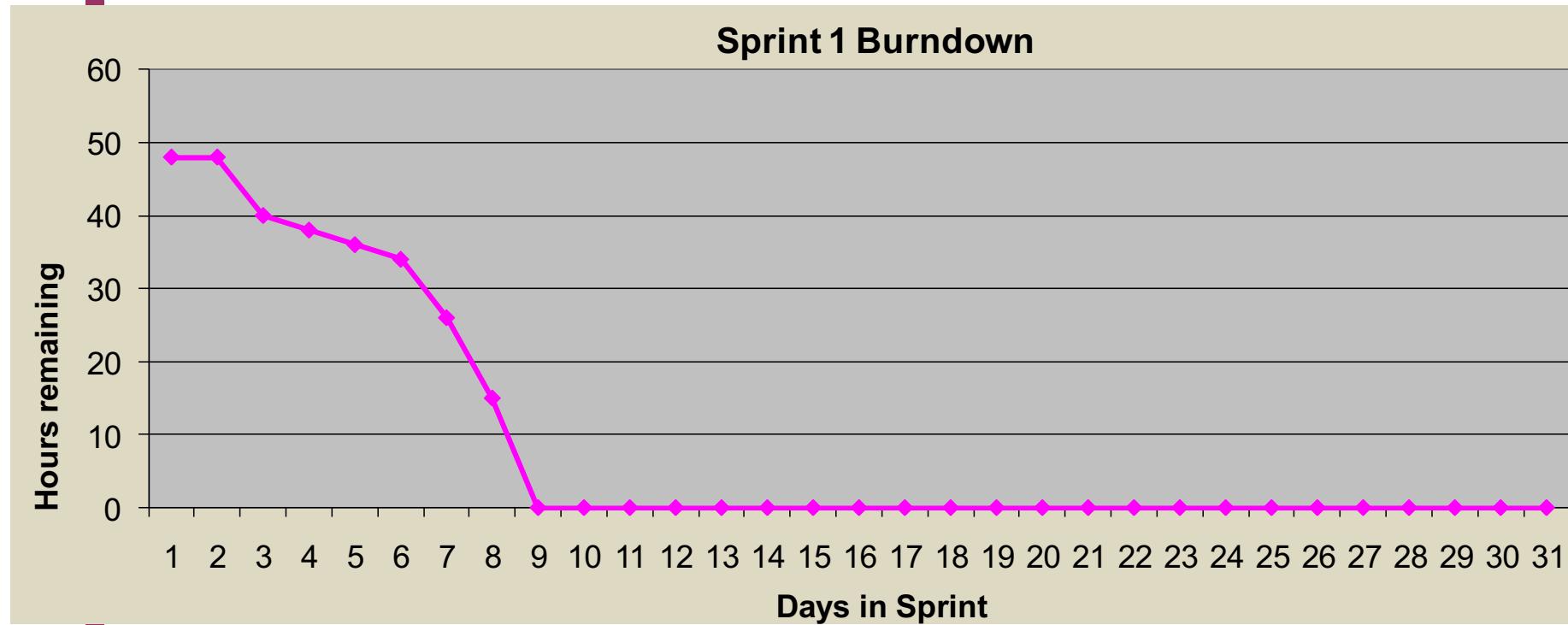
Burndown Chart — work too slow

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- The reasons for this could be:
 - inexperienced developers
 - impediments which cannot be overcome
 - distractions
 - holidays
 - bad planning



Burndown Chart

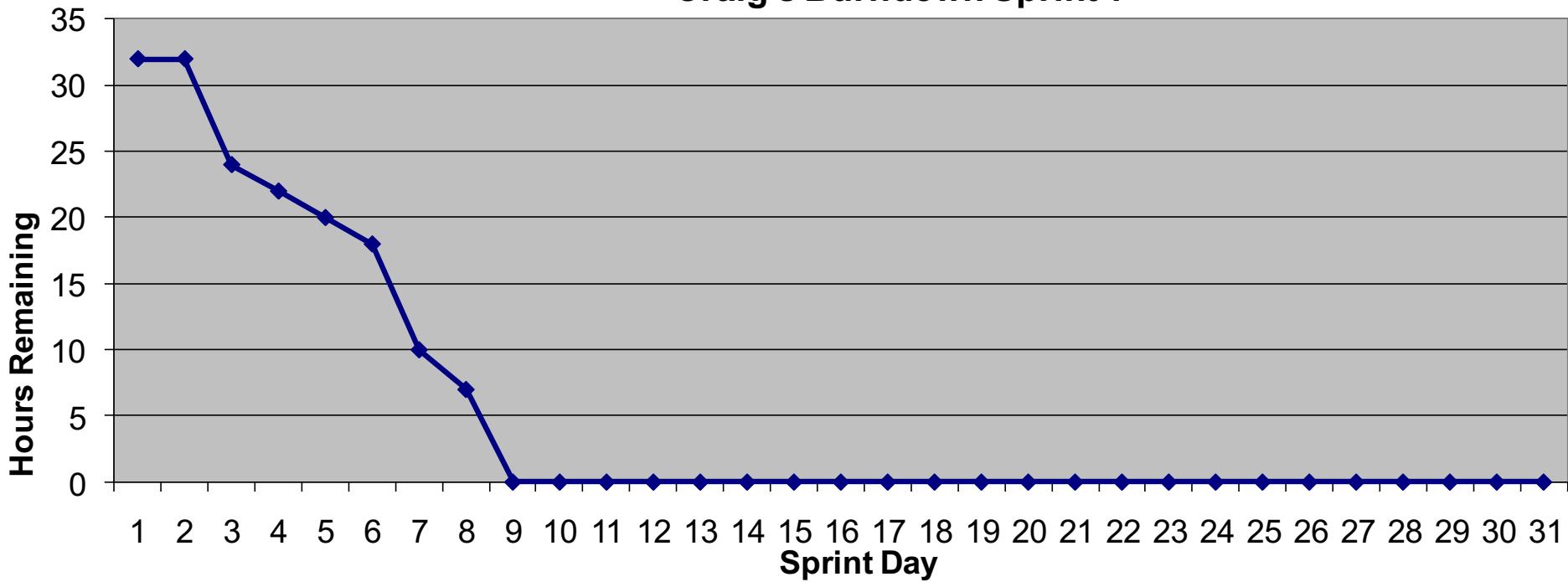


Alternatively the work could be being done too fast

Individual Burndown Charts

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Craig's Burndown Sprint 1





POSSIBLE PROBLEMS

Introduction

Scrum Outline

Scrum Flow

Scrum Meetings

Process Artefacts

Possible Problems

Final Words



What can go wrong: *Loss of Rhythm*

I

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- Sprints are not always the same length.
- On a well-executed Scrum project the team establishes a natural rhythm.
- Each sprint must be the same length.



What can go wrong: *Loss of Rhythm*

II

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- If sprints are sometimes two weeks and sometimes four weeks then the natural rhythm is never established.
- Sprints then begin to feel like arbitrary units of time with endpoints selected more by outside forces rather than designed to enhance the overall productivity of the team.
- When sprint duration is allowed to vary teams have a harder time selecting the right amount of work for the sprint backlog, which results in less commitment to completing all of the items in the sprint.

What can go wrong: Talking Chickens

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- Chickens attending the daily Scrum are allowed to ask questions or make observations.
 - ▣ During the daily Scrum the only participants allowed to speak are the pigs, chickens attend and observe but are not allowed to speak.
 - ▣ Allowing chickens to talk can be a slippery slope. If a chicken is allowed to make a comment one time (when the comment is useful), how do we later prevent a chicken from commenting (when the comment may not be useful)?
- Not allowing chickens to talk during the daily meeting is one of Scrum's simple rules.
- Of course one comment from a chicken may not hurt -but it will lead to others and then there will be no easy place to draw the line.

What can go wrong: *Missing Pigs*

I

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- Not all pigs attend the daily Scrum meeting.
 - Some companies have “flex time.”
 - Every company used to have a starting time when everyone was expected to be at work.
 - Flex time, and the night work habit of developers, makes it common to have some members of a team late.

What can go wrong: Missing Pigs

II

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- it can be difficult for a team meet for a daily Scrum every day.
 - a daily meeting, at the same time in the same place each day help a project establish and maintain its rhythm.
 - If too many pigs miss daily Scrums too often then perhaps the meeting is too long or deviating from the three standard questions.
- When run well the daily Scrum should not exceed fifteen minutes and should be of value to each pig.
 - There can be specific deadlines that requires people to skip a daily Scrum
 - only when the situation bad
 - when too many pigs miss meetings is there a problem

What can go wrong: Specialized Job Roles

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- A project team has specialized job roles such as Architect, Designer, DBA, or Tester.
- Scrum teams need to have a “we’re all in this together attitude.”
 - This can be undermined if a team has specialized job descriptions or roles.
- It is simplistic to think that everyone can be a DBA and everyone can write server-side J2EE or .Net code.
- A successful Scrum team does not need to be comprised entirely of generalists.
 - However, each specialist must accept general responsibility for the system as a whole.

What can go wrong: *The Daily Scrum is For the ScrumMaster*

I

77

- The Daily Scrum feels like a status update from the team members to the ScrumMaster.
- It feels as though it exists solely for the ScrumMaster.
- ScrumMaster takes notes about who committed to what work and why some other task wasn't completed.
- These daily meetings feel like status meetings

What can go wrong: *The Daily Scrum is For the ScrumMaster*

II

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- Two main purposes of the daily Scrum
 - ▣ to provide a coordination mechanism for everyone on the project.
 - Everyone hears where everyone else is.
 - ▣ Each team member makes commitments in front of his peers.
 - ▣ If the commitment is not fulfilled it is not the ScrumMaster's to rebuke the team member.
 - They should feel bad enough.

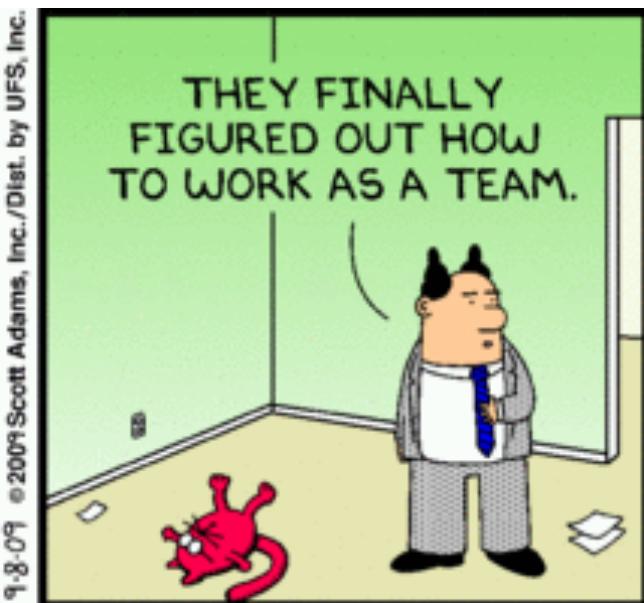
What can go wrong: ScrumMaster Assigns Work

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- Work is assigned by the ScrumMaster rather than signed up for by developers.
 - ▣ Self-organization is one of the underlying principles of Scrum.
 - ▣ When a ScrumMaster assigns work it undermines the responsibility developers assume when they are allowed to self-organize around the achievement of a goal.
 - ▣ Even an occasional assignment from a ScrumMaster can do a lot of damage.
 - ▣ Teams need to feel completely in control of their own work.

Finally

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