An Introduction to Agile/Scrum

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Cyber Security Workshop

February 29, 2020

Today's Goals

Give you the big picture, concepts, and keywords of Agile/Scrum

- Contrast Agile with traditional waterfall methods
- Answer why we should care?

Ground Rules

I’m not going to be rigorous in history or definitions.

I’m likely to make extreme statements to make the point.

We will talk software development, but Agile can be used for anything.

CREDITS

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Other portions are credited as appropriate.

Additional material by Jeff Pulcini

Mountain Goat Software, LLC

Problem Statement

What we have been doing is not working.

We are faced with…

- Producing more and better output with shrinking budgets
- Maximize the actual and perceived value we deliver
- Keep up with the pace of change in the market

How did we get here?

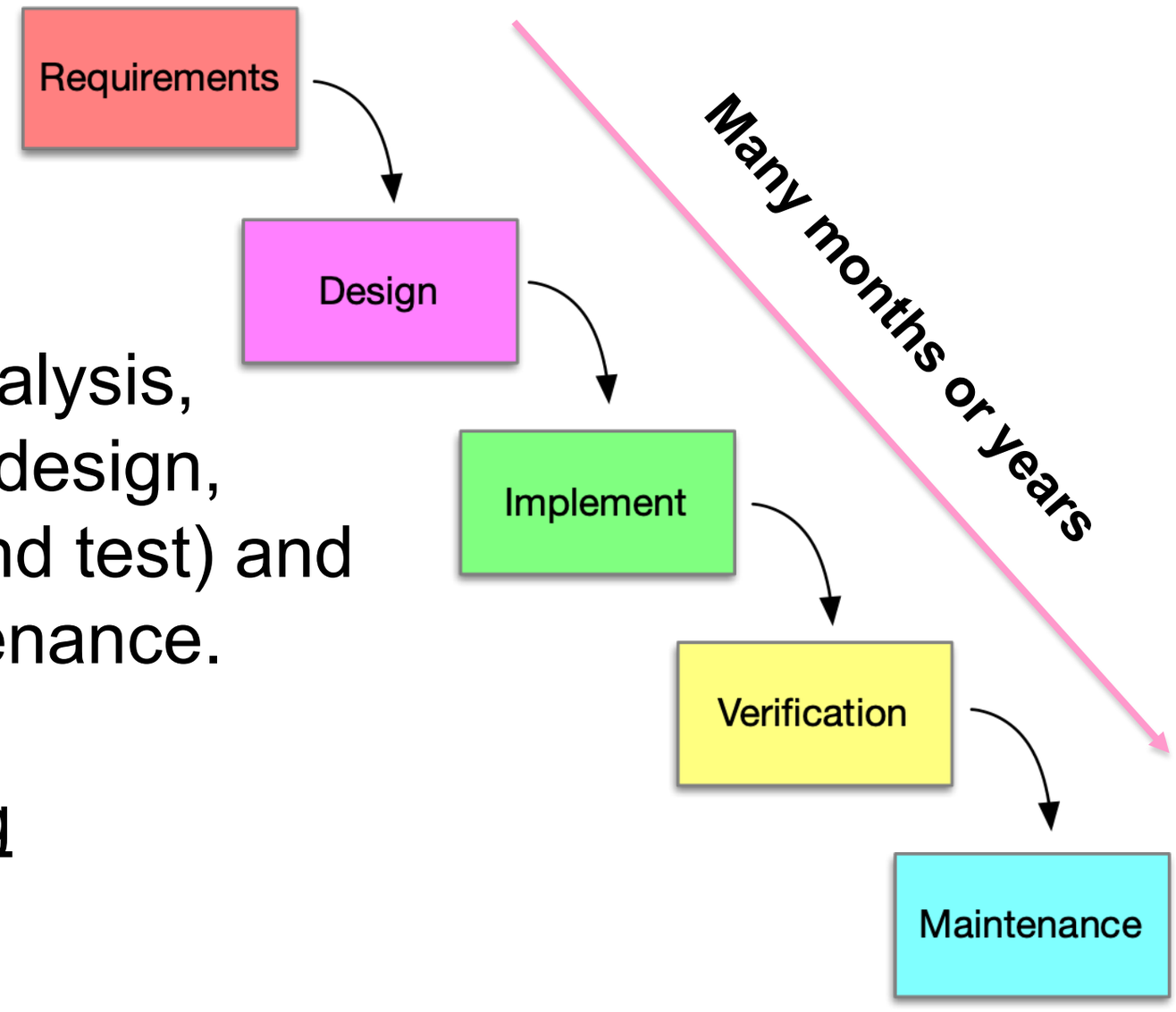
Adapted from a presentation by Evan Campbell, Slide 32
http://agilecommons.org/files/4e9f355ad9/Agile_Fncl_Impact_Slides.pdf

Waterfall Project Management Methodology

- A step-wise approach to product delivery

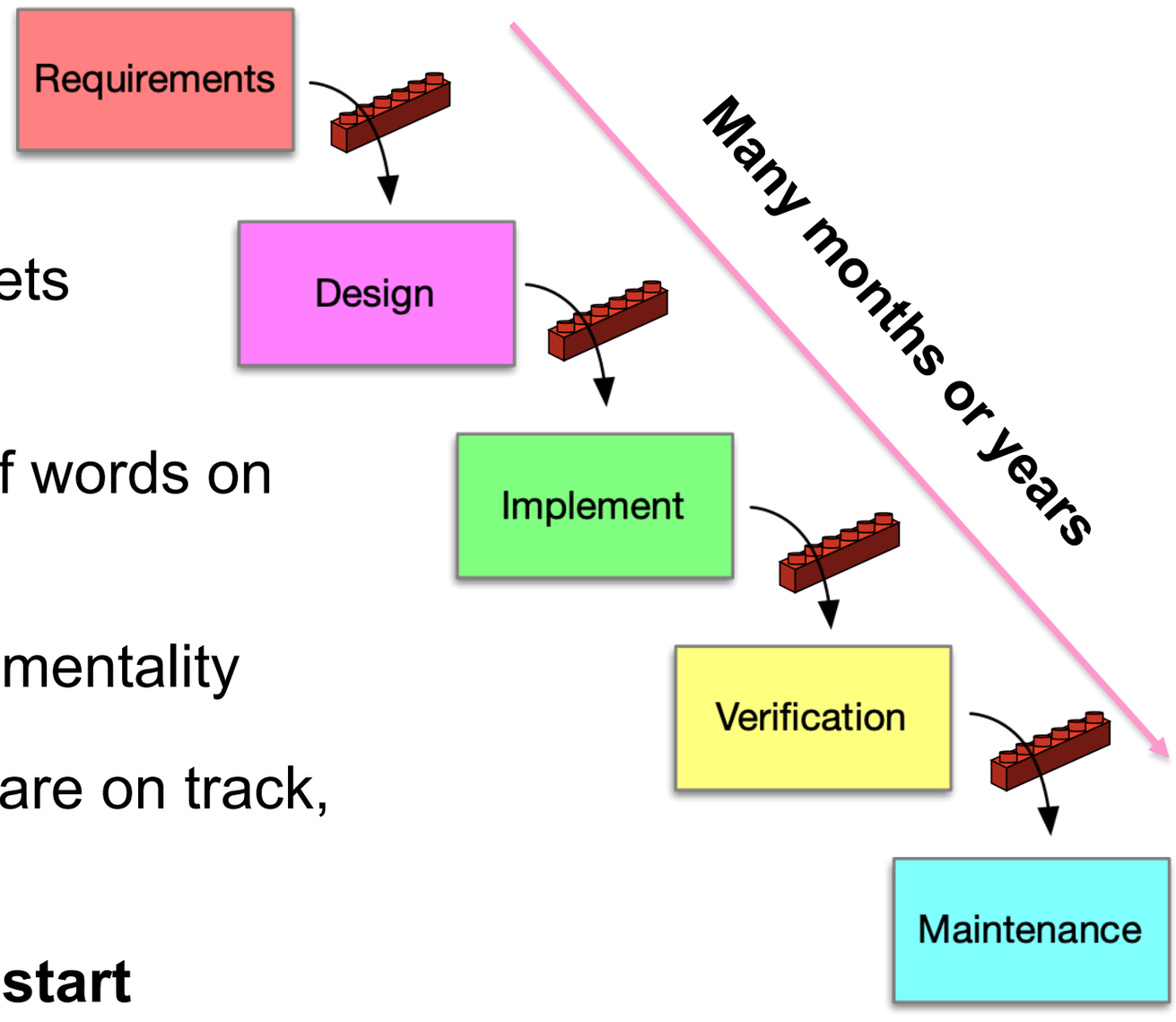
- It is a or relay race of analysis, requirements definition, design, Implementation (code and test) and then delivery and maintenance.

- Product delivery is a “big bang”/“all or nothing”

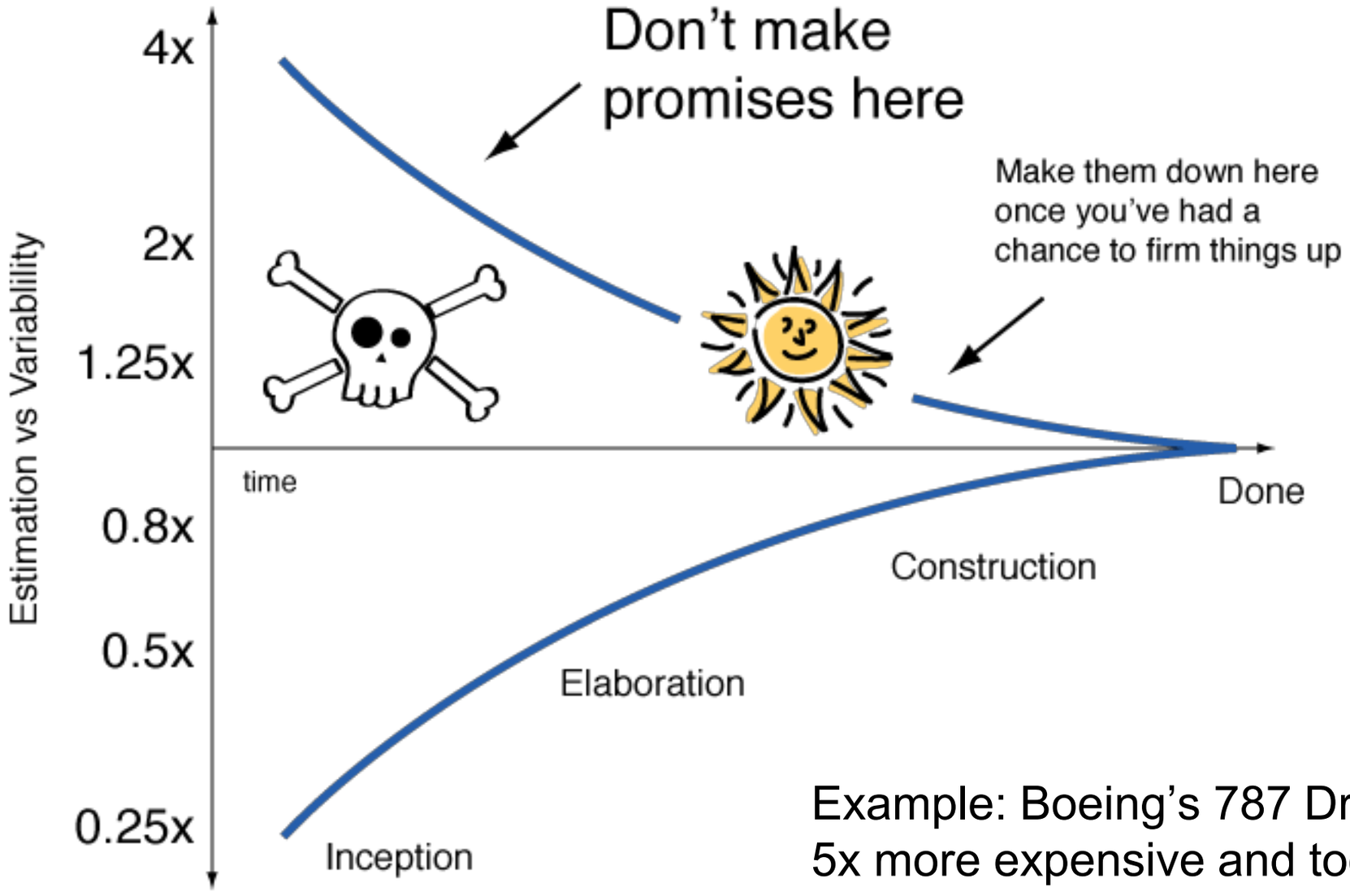


Downside of This Approach

- Focus is primarily on process, not people
- Long development cycles
- Unresponsive to changing markets (and thus users needs)
- Formal communications, Lots of words on paper
- Each step fosters a them vs. us mentality
- Plan based - We measure if we are on track, not what we have done
- **You know the least when you start**



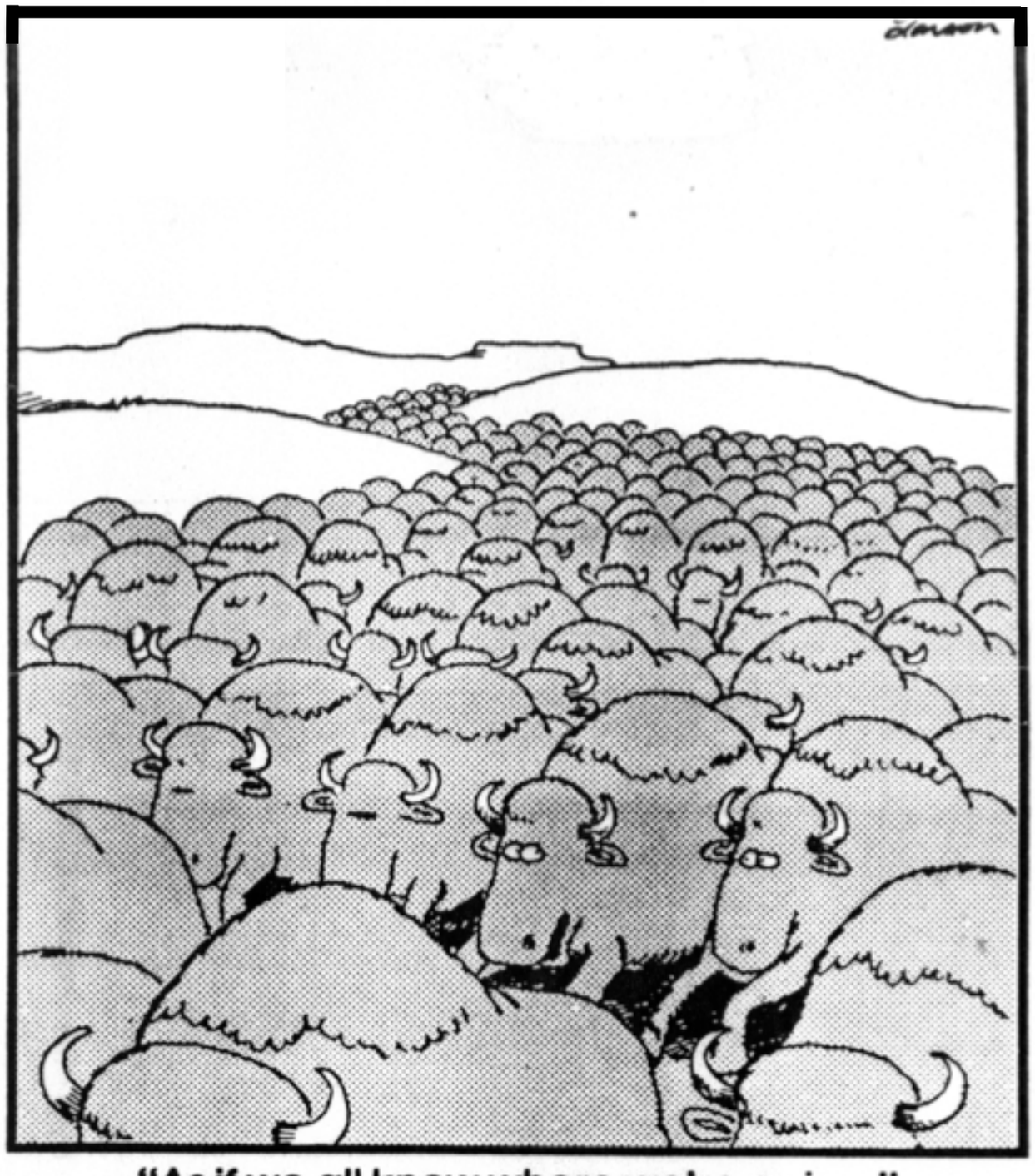
Cone of Uncertainty



Example: Boeing’s 787 Dreamliner was 5x more expensive and took twice as long to deliver than original estimates.

As described by Steve McConnel, Software Estimation: Demystifying the Black Art

You know the least when you start your project



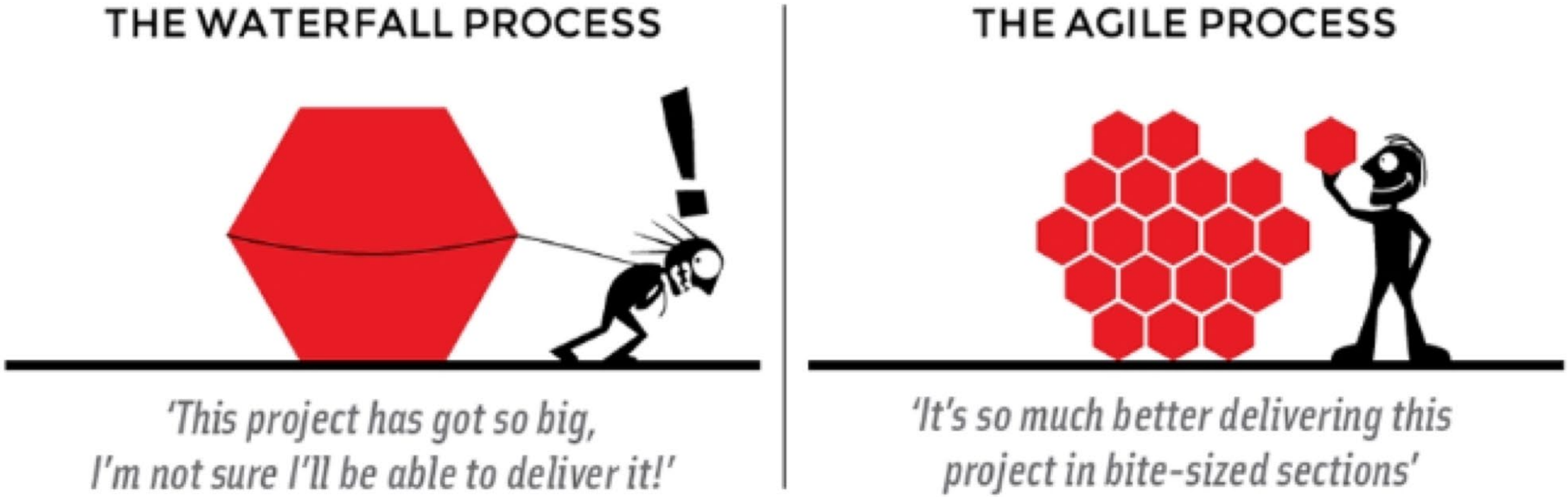
"As if we all knew where we're going."

We’re losing the relay race

“The… ‘relay race’ approach to product development…may conflict with the goals of maximum speed and flexibility. Instead a holistic or ‘rugby’ approach—where a team tries to go the distance as a unit, passing the ball back and forth—may better serve today’s competitive requirements.”

Hirotaka Takeuchi and Ikujiro Nonaka, “The New New Product Development Game”, *Harvard Business Review*, January 1986.

Waterfall vs. Agile



From various sources from the internet

Process Comparison

- At a high level, *both processes are equivalent*
- The *difference* is in *execution and philosophy*
- Waterfall is Command and Control - Agile is about communications and personal responsibility
- Agile and Scrum are Empirical Project Management
  - Based on Statistical Process Control (Shewhart and Deming) and Lean Manufacturing
  - Frequent Inspect and Adapt Cycles

Agile

Some definitions
Changing our mindset

The Agile Manifesto

"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	**Process 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 on the items on the right, we value the items on the left more."

Source: www.agilemanifesto.org

12 Agile Principles

1. **Our highest priority is to satisfy the customer** through early and continuous delivery of valuable software.

2. **Welcome changing requirements**, even late in development. Agile processes harness change for the customer's competitive advantage.

3. **Deliver working software frequently**, from a couple of weeks to a couple of months, with a preference to the shorter timescale.

4. **Business people and developers must work together daily throughout the project**.

5. **Build projects around motivated individuals**. Give them the environment and support they need, and trust them to get the job done.

6. The most **efficient and effective method of conveying information** to and within a development team **is face-to-face conversation**.

7. **Working software is the primary measure of progress.**

8. **Agile processes promote sustainable development.** The sponsors, developers, and users should be able to maintain a **constant pace indefinitely.**

9. Continuous **attention to technical excellence** and good design enhances agility.

10. **Simplicity**--the art of **maximizing the amount of work <u>not</u> done**--is essential.

11. The best architectures, requirements, and designs emerge from **self-organizing teams**.

12. At regular intervals, **the team** reflects on how to become more effective, then **tunes and adjusts its behavior** accordingly.

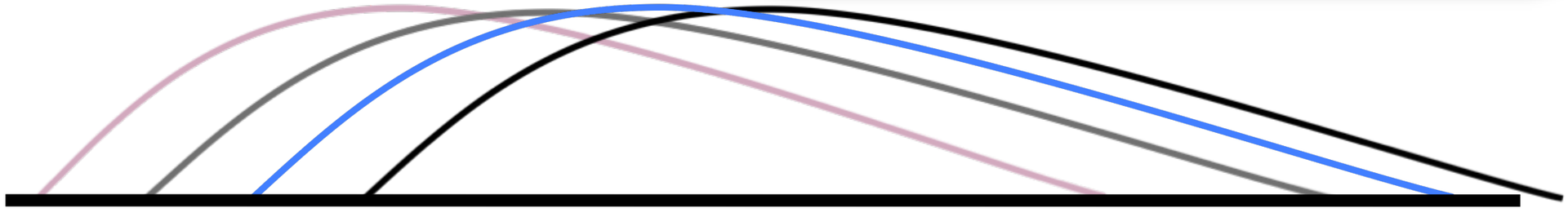
Source: http://agilemanifesto.org/principles.html

Sequential vs. overlapping development

Requirements | **Design** | **Code** | **Test**

Rather than doing all of one thing at a one time...

...Scrum teams do a little of everything all the time



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

Scrum – The Big Picture

The Big Picture

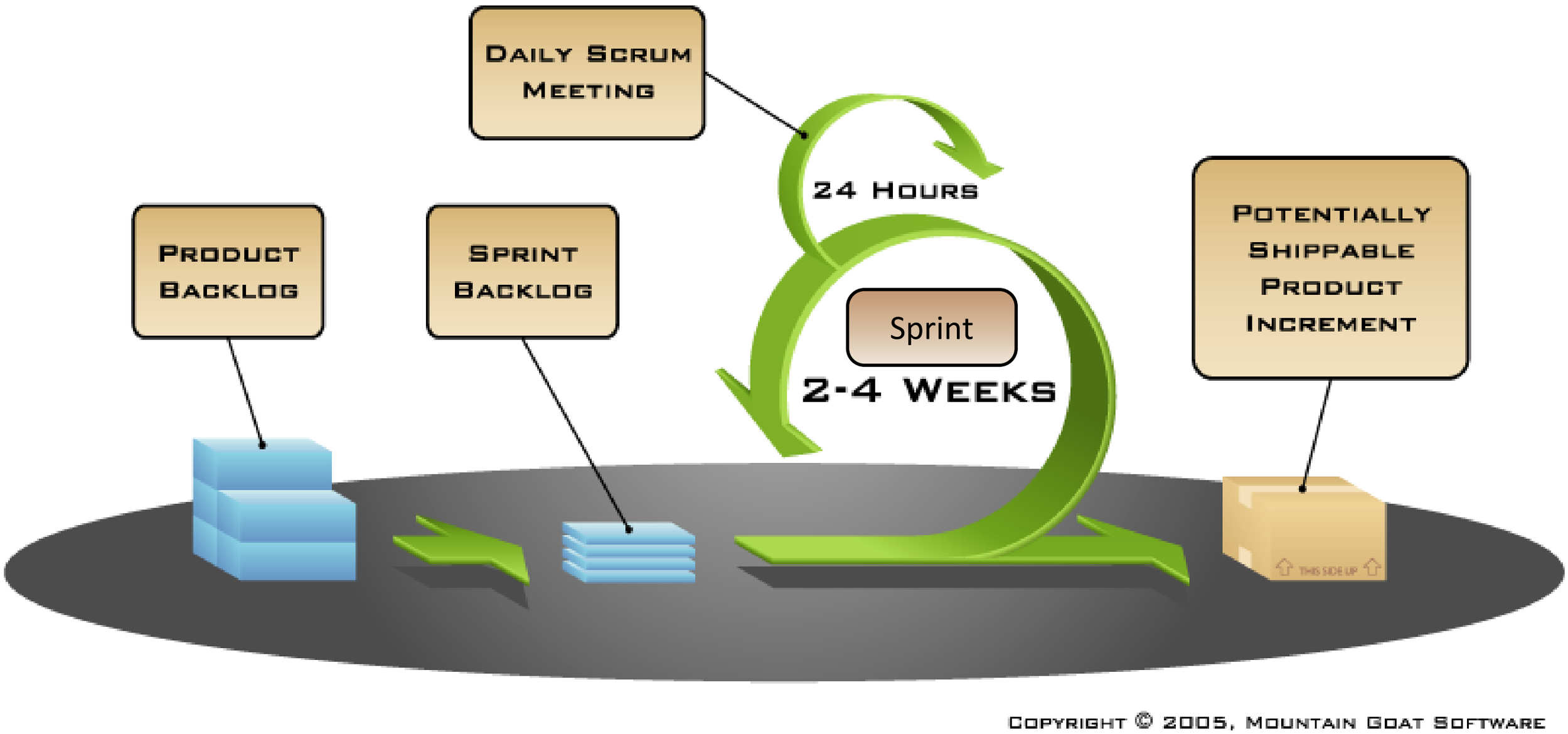
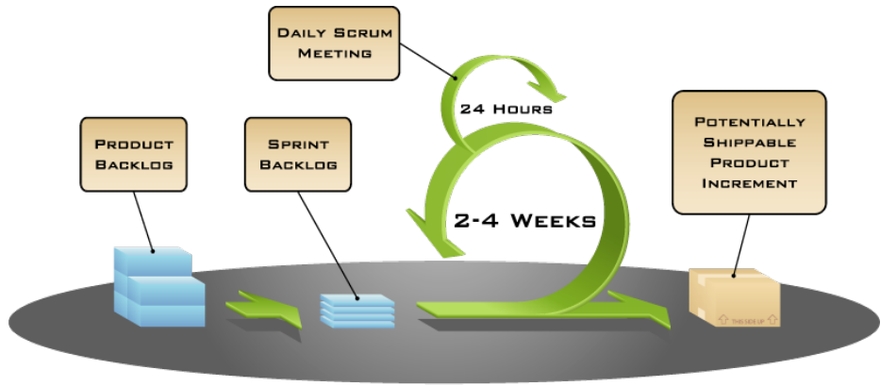


Image available at www.mountaingoatsoftware.com/scrum

Characteristics



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

Generative Rules

- Think of the word “general”. Dee Hock, former CEO of Visa said.

“Simple, clear purpose and principles give rise to complex and intelligent behavior. Complex rules and regulations give rise to simple stupid behavior.”

- Jim Donehey, former CIO of Capital One used four rules to help ensure everyone was working toward the same shared goals:
  - **Always align IT with the activities of the business**
  - **Use good economic judgment**
  - **Be flexible**
  - **Have empathy for the other in the organization**

Scrum Details

Scrum Framework

Team Roles

- Product owner
- ScrumMaster
- Team

Now they are called EVENTS!

~~Ceremonies~~

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

Artifacts

- Product backlog
- Sprint backlog
- Burndown charts

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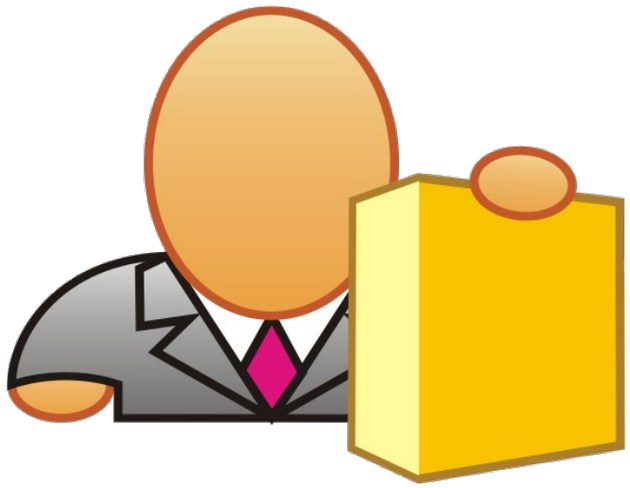
Product Owner

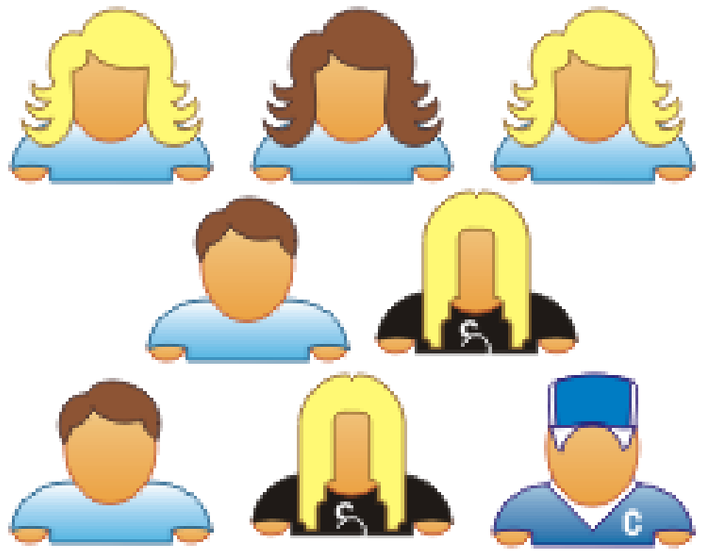


- Define the features of the product
- Decide on release date and content
- Be responsible for the profitability of the product (ROI)
- Prioritize features according to market value
- Adjust features and priority every iteration, as needed
- Accept or reject work results

The Scrum Master

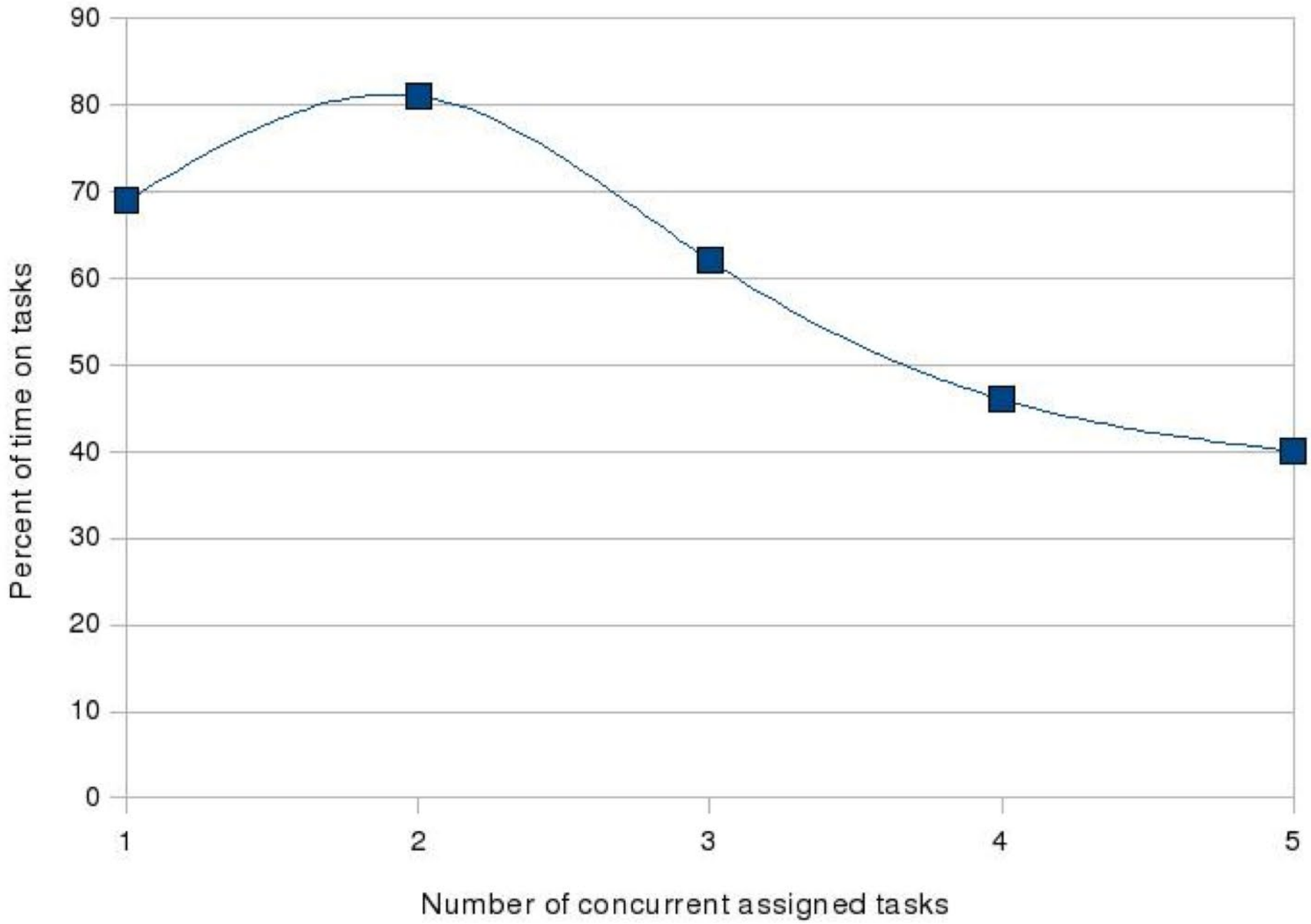
- Represents management to the project
- Responsible for enacting Scrum values and practices
- Removes impediments
- Ensure that the team is fully functional and productive
- Enable close cooperation across all roles and functions
- Shield the team from external interferences
- The ScrumMaster differs from a Project Manager in that he does not exercise command and control

The Team



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

The Myth of Multitasking



from a 1990's Harvard Study by Steven C.Wheelwright and Kim B.Clark

Testing Multitasking

1. Take paper and pen and prepare to write down the following in three columns HORIZONTALLY.

   A a 1 THEN
   B b 2
   C c 3
   -------continue until Z, z and 26---------
   Z z 26

2. Everybody turns on stop watch using their smart phone and begin
3. When done, record your time.

4. Reset stop watch and repeat the same exercise, BUT this time go VERTICALLY.
   Complete capital A to Z first, then go for a-z, and then 1-26.
5. When done, record your time.

Was There a Difference?

From Jeff Sutherland's book *Scrum: The Art of Doing Twice the Work in Half the Time*

Scrum framework

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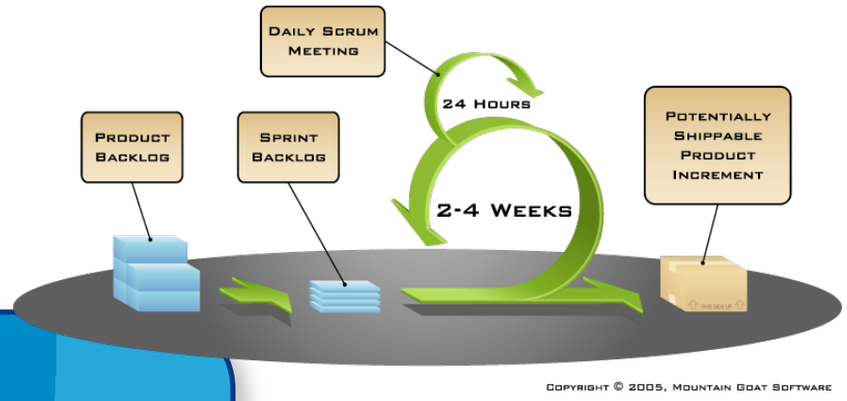
Sprint Planning



Team capacity

Product backlog

Business conditions

Current product

Technology

Sprint planning meeting

Sprint prioritization

- Analyze and evaluate product backlog
- Select sprint goal

Sprint planning

- Decide how to achieve sprint goal (design)
- Create sprint backlog (tasks) from product backlog items (user stories / features)
- Estimate sprint backlog in hours

Sprint goal

Sprint backlog

The Sprint Goal

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

Life Sciences

Support features necessary for population genetics studies.

Database Application

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

Financial services

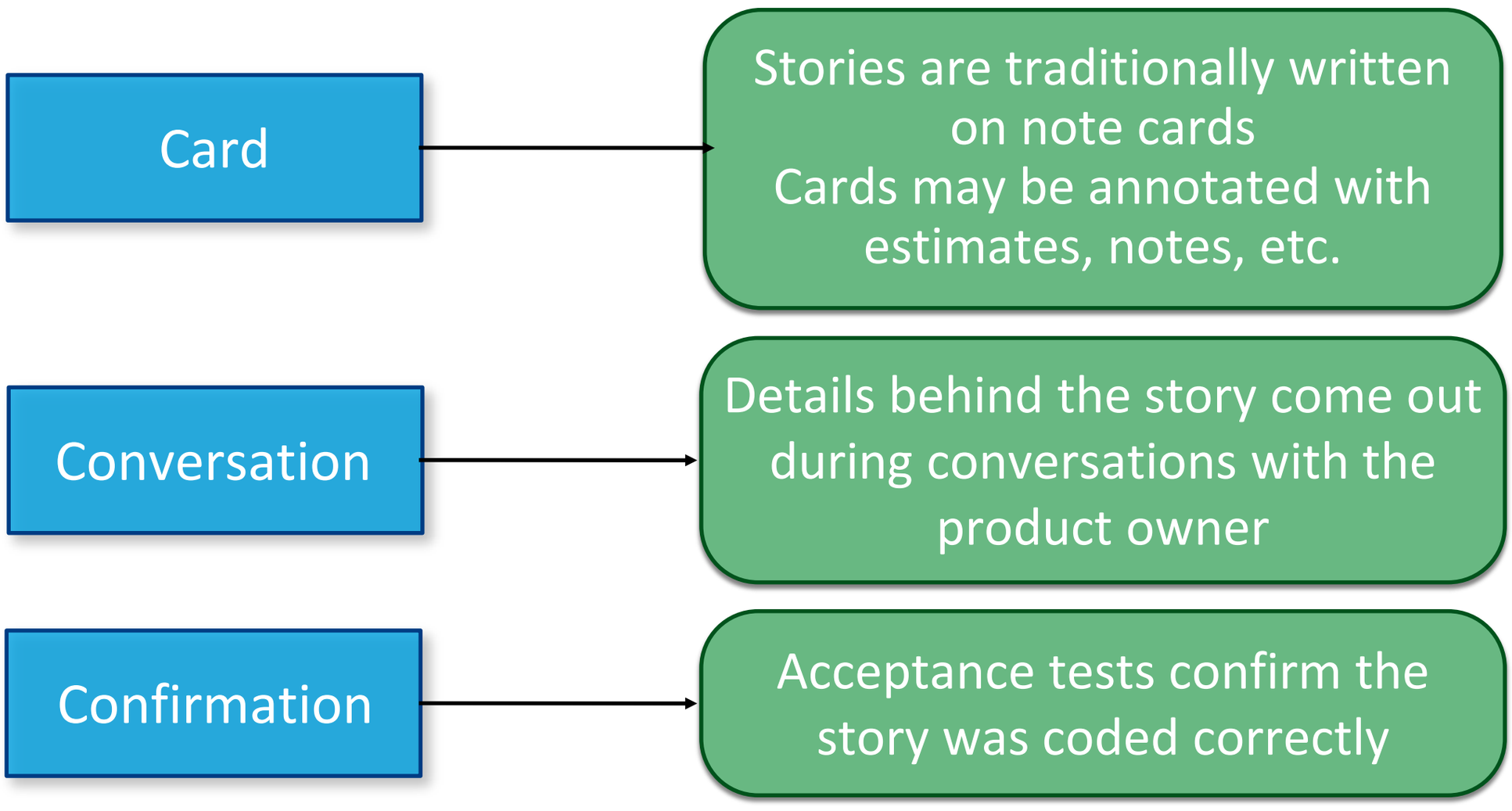
Support more technical indicators than company ABC with real-time, streaming data.

User Stories

Feature #1 - Publish Trainings
Who: As a manager
What: I want to publish trainings
Why: In order to make them available to customers

What is a User Story

A user story describes functionality that will be valuable to either a user or purchaser of a system or software*

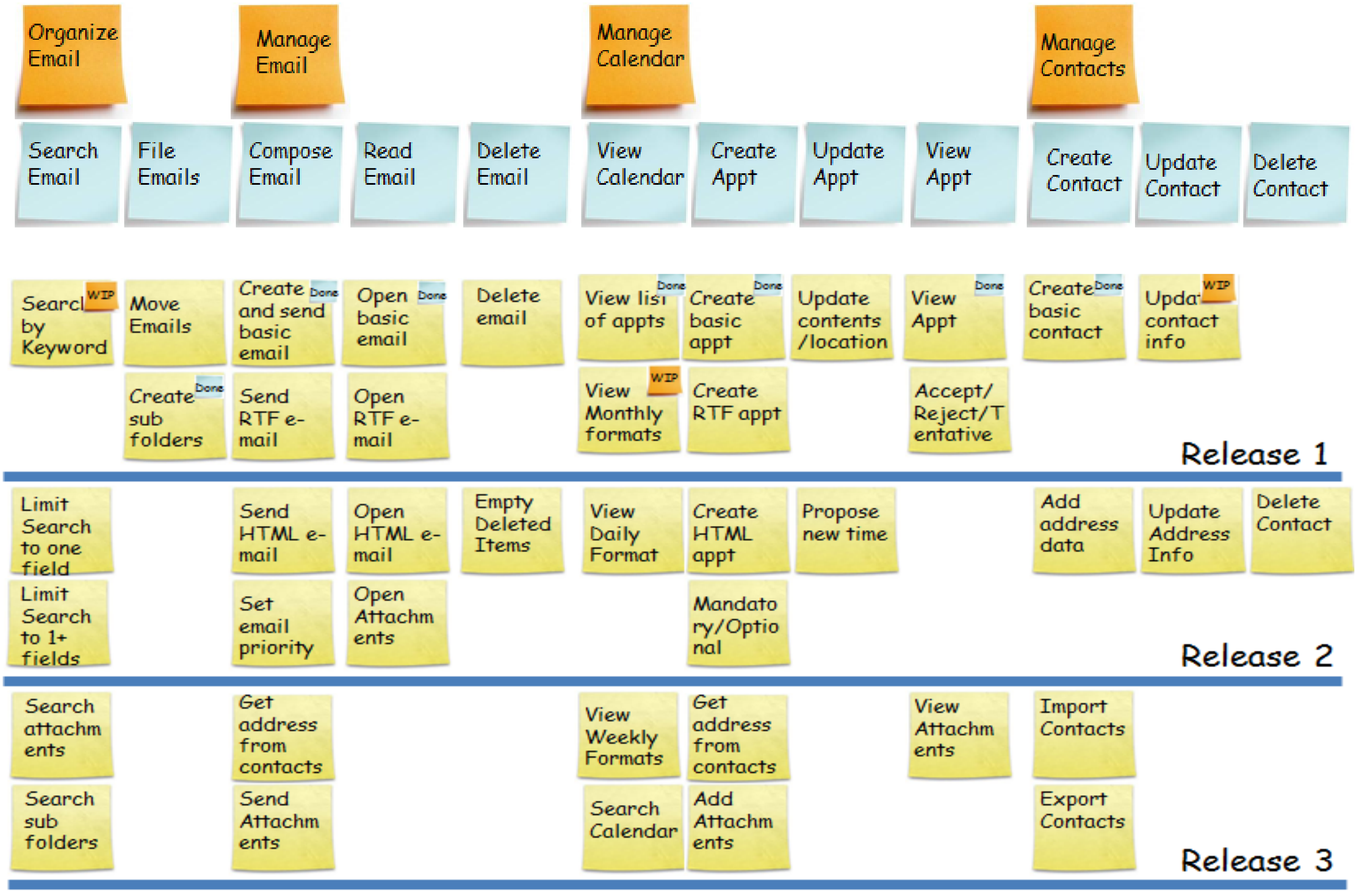


*Mike Cohn, User Stories Applied

Ron Jeffries http://xprogramming.com/articles/expcardconversationconfirmation/

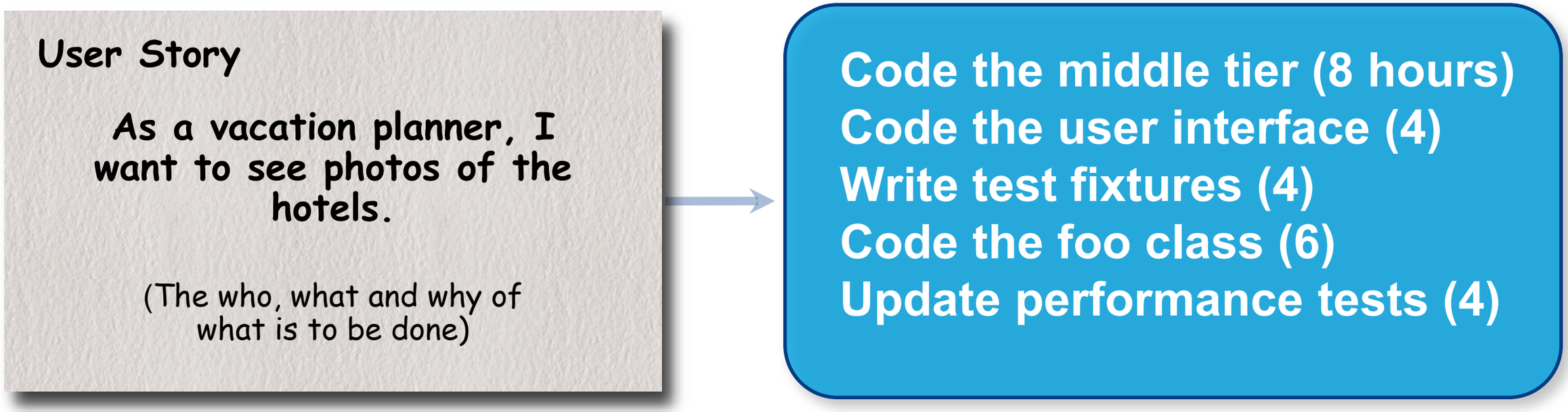
Requirements Collection / User Stories

- **"Big Stories" to Small Stories**

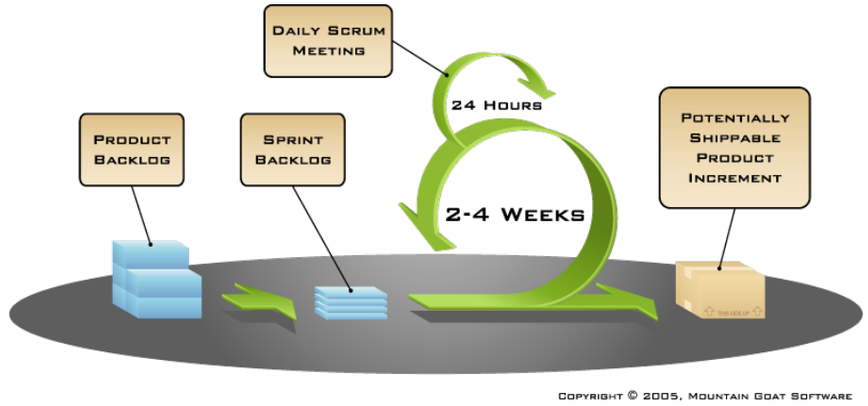


Sprint Planning

- Team selects User Stories from the product backlog they can commit to completing
- Sprint backlog is created
  - Tasks are identified and each is estimated (1-16 hours)
  - Done Collaboratively, not alone by the Scrum Master/Product Owner
- High-level design is considered

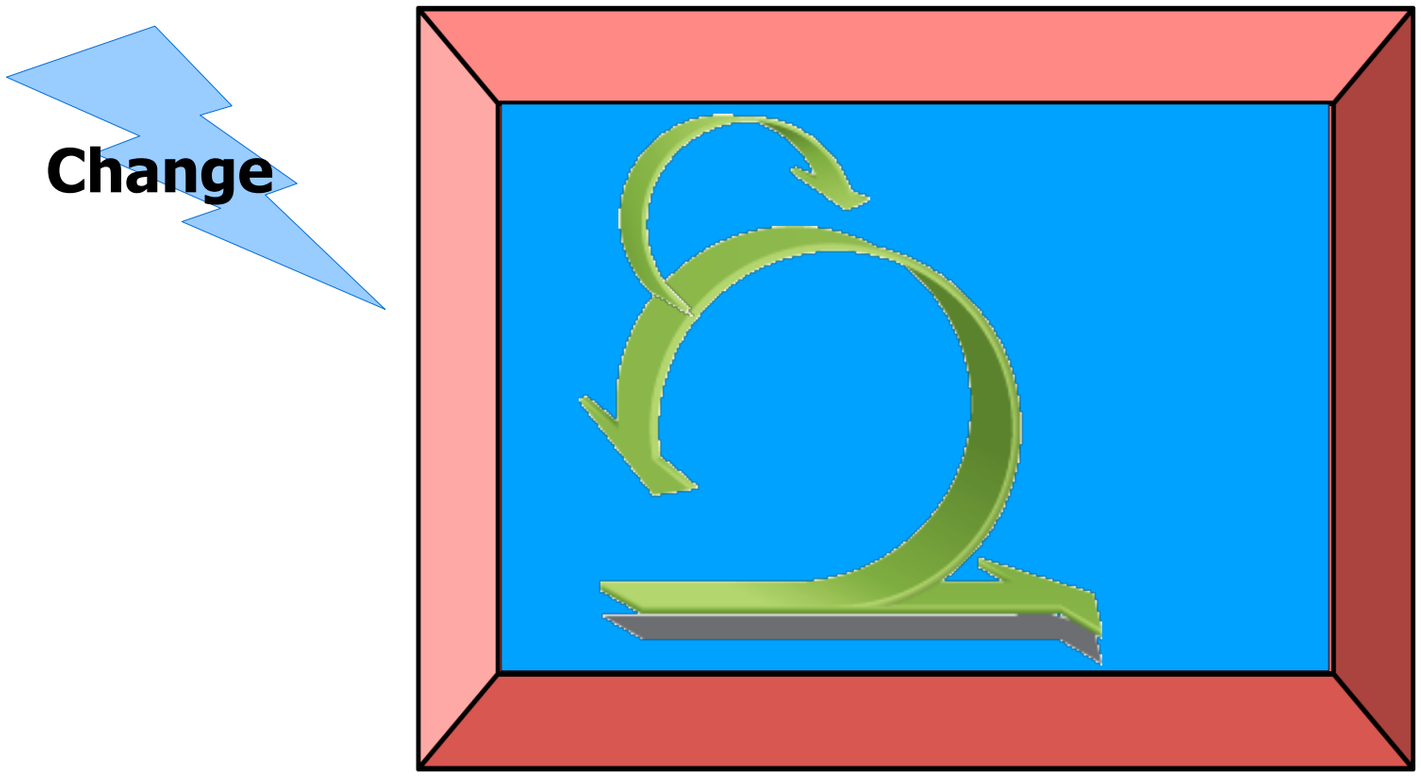


Sprints



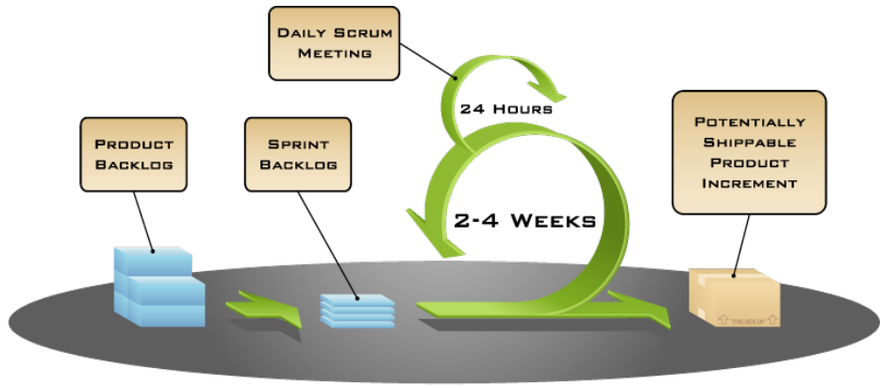
- Scrum projects make progress in a series of “sprints”
- Typical duration is 2–4 weeks or a calendar month at most
- A constant duration leads to a better rhythm
- Product is designed, coded, and tested during the sprint

No changes during a sprint



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

The Daily Scrum



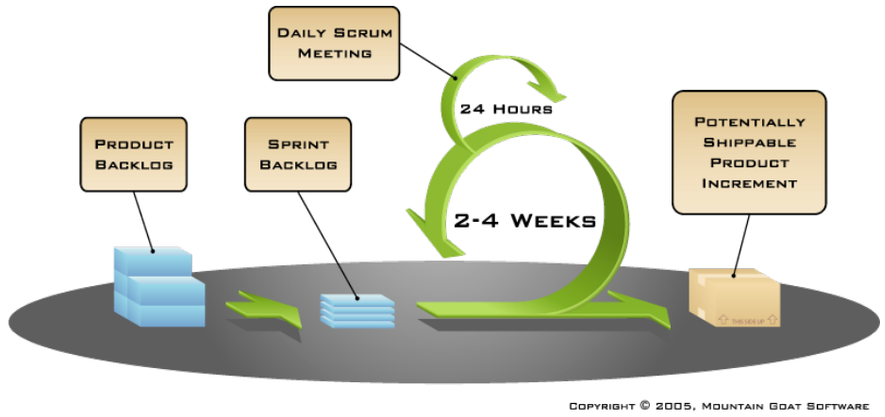
- Parameters
  - Daily
  - 15-minutes
  - Stand-up
- Not for problem solving
  - Whole world is invited
  - Only team members, ScrumMaster, product owner, can talk
- Helps avoid other unnecessary meetings

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

The Sprint Review



- Invite the world
- Whole team participates
- Informal
  - 2-hour prep time rule
  - No slides

- Team presents what it accomplished during the sprint
- Typically takes the form of a demo of new features or underlying architecture

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

Start / Stop / Continue

- Whole team gathers and discusses what they'd like to:

Start doing

Stop doing

Continue doing

This is just one of many ways to do a sprint retrospective.

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Product Backlog

This is the product backlog

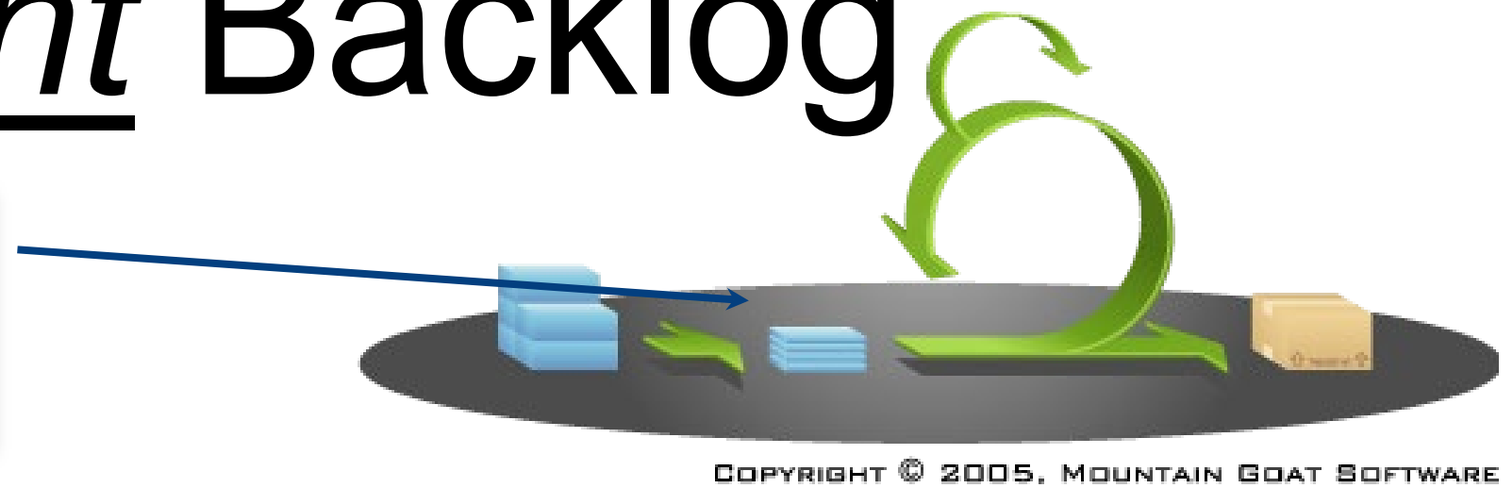
- The requirements
- A list of all desired work on the project
- Ideally expressed such that each item has value to the users or customers of the product
- Prioritized by the product owner
- Reprioritized at the start of each sprint

A Sample Product Backlog

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

Sprint Backlog

This is the sprint backlog



- One or more Product Backlog items make up the Sprint Backlog.
- The work is decomposed into tasks and hours.
- If work is unclear, define a sprint backlog item with a larger amount of time and break it down later.
- Individuals sign up for work - work is never assigned.
- Estimated work remaining is updated daily as more becomes known.
- Any team member can add, delete or change the sprint backlog.

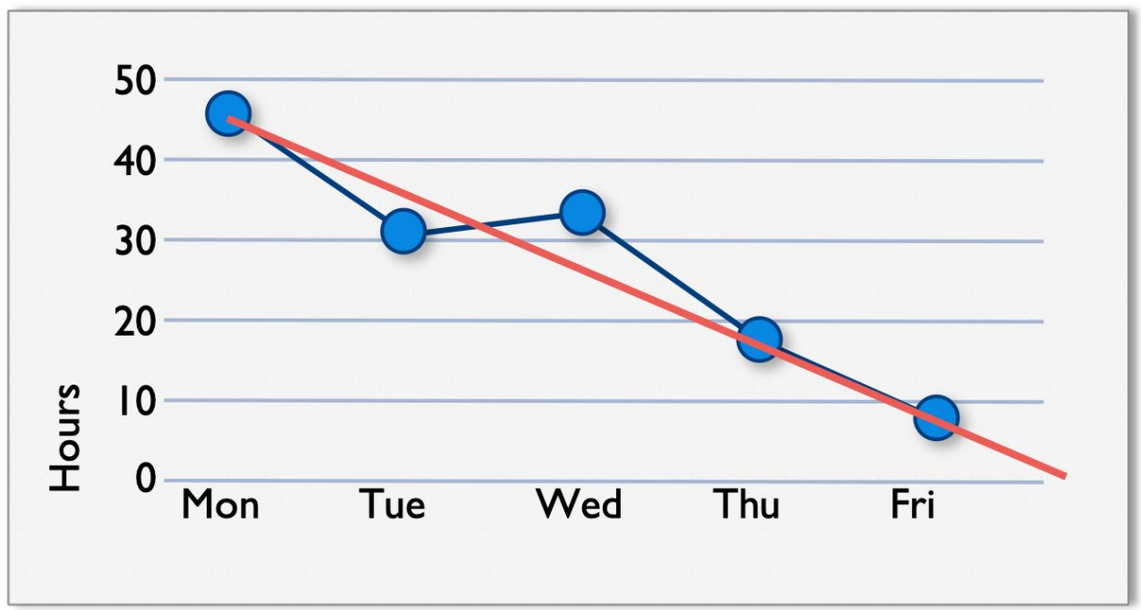
A Sprint Backlog

Tasks	Mon	Tues	Wed	Thur	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	

Burndown Example

Tasks	Mon	Tues	Wed	Thur	Fri
Code the user interface	8	4	8		
Code the middle tier	16	12	10	7	
Test the middle tier	8	16	16	11	8
Write online help	12				
	44	32	34	18	8

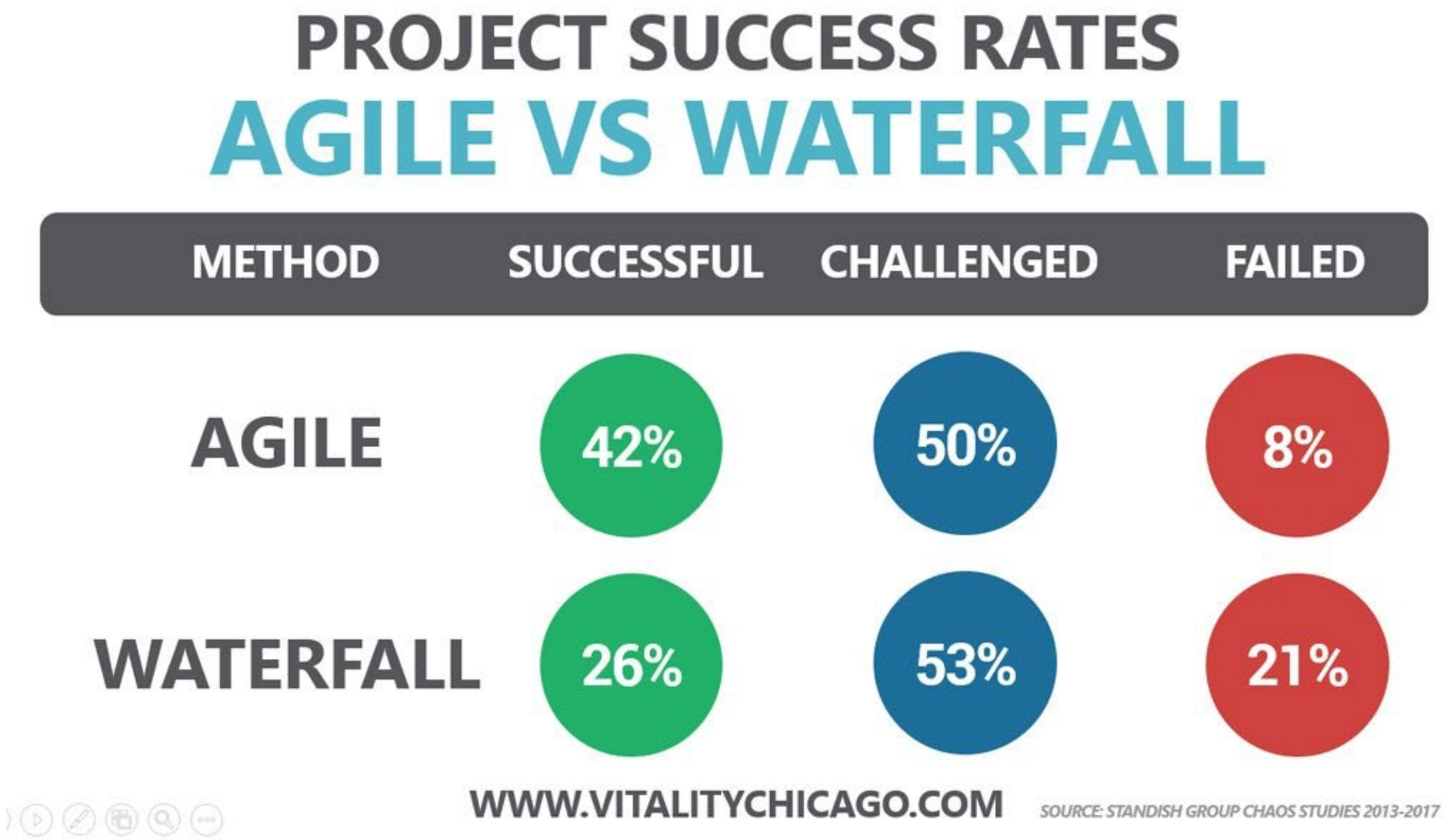
Ideal



Why do this?

Reasons for Adopting Agile Success Rates

April 1, 2018



https://vitalitychicago.com/blog/agile-projects-are-more-successful-traditional-projects/

Bottom Line

- Agile projects are 2X more likely to succeed
- Agile projects are1/3 less likely to fail than waterfall projects

The Standish Group has conducted surveys of IT project success and failure rates every 2 years since 1994.

Source: Standish Group Chaos Study 2018

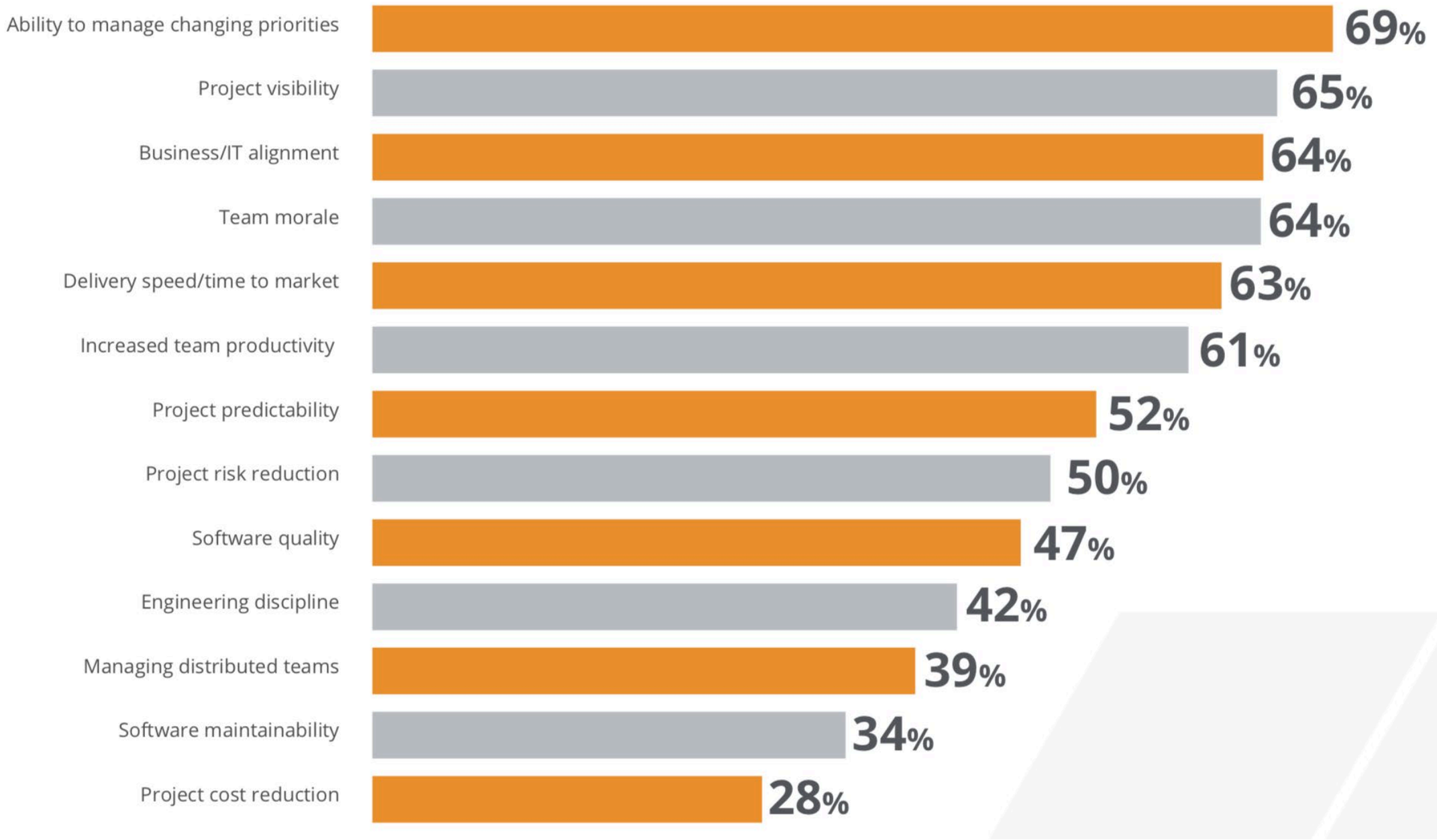
Reasons for Adopting Agile Shifts in Industry Attitudes

Changes from 2018 to 2019

- Less about increasing productivity (51% compared to 55%)
- More about improving team morale (34% compared to 28%)
- Less about reducing project risk (28% compared to 37%)
- More about reducing project costs (41% compared to 24%)

Source: 13th-annual-state-of-agile-report.pdf - 2019 - https://www.stateofagile.com/#ufh-c-473508-state-of-agile-report

Benefits of Adopting Agile



Source: 13th-annual-state-of-agile-report.pdf - 2019 - https://www.stateofagile.com/#ufh-c-473508-state-of-agile-report

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
- HR improvement projects
- Sales and Marketing projects
- Training and Education
- Video game development
- FDA-approved, life-critical systems
- Satellite-control software
- Websites
- Mobile phones
- Network switching applications
- ISV applications
- Some of the largest applications in use

Agile Principles in Action

The Troubled HH60W Program

“The team had a moment whether we decided we’re all in, and we’re going to to do whatever it takes,” Roper tells Aviation Week. “We’re going to follow the rules, but we’re going to slim them down to the minimum set necessary to keep us focused on delivering on time.”

Will Roper, Air Force acquisition executive

The “old school” methods shaved 4 months from the deployment test program.

Aviation Week & Space Technology/October 28-November 10, 2019

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Scrum Has Been Used By

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

6

Stories emphasize the user's goals not the system's attributes.

What are we building?

1. The product shall have a gas engine.
2. The product shall have four wheels.
    2.1. The product shall have a rubber tire mounted to each wheel.
3. The product shall have a steering wheel.
4. The product shall have a steel body.

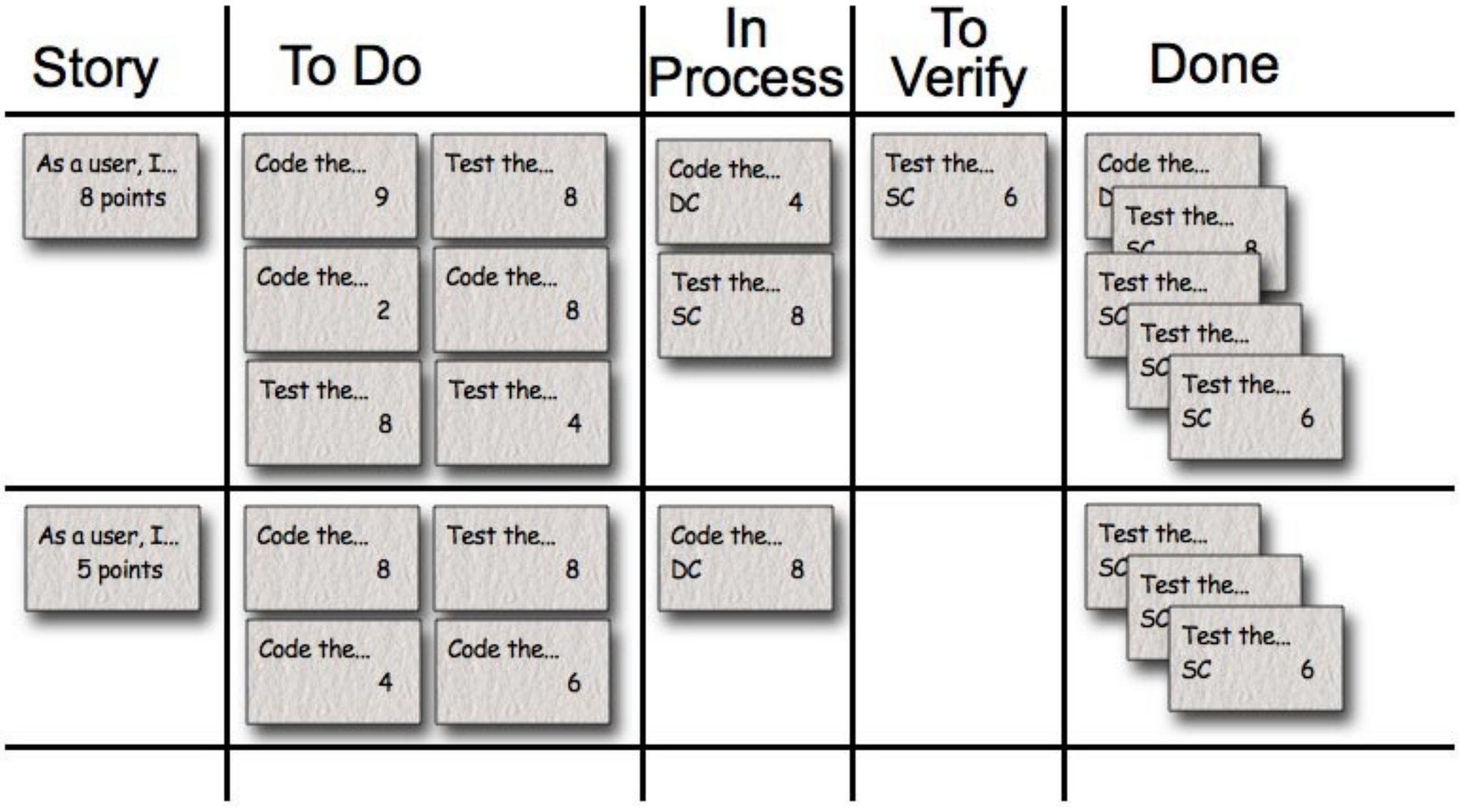
Source: Adapted from *The Inmates are Running the Asylum* by Alan Cooper (1999).


YAMAHA
GRIZZLY
MAXXIS

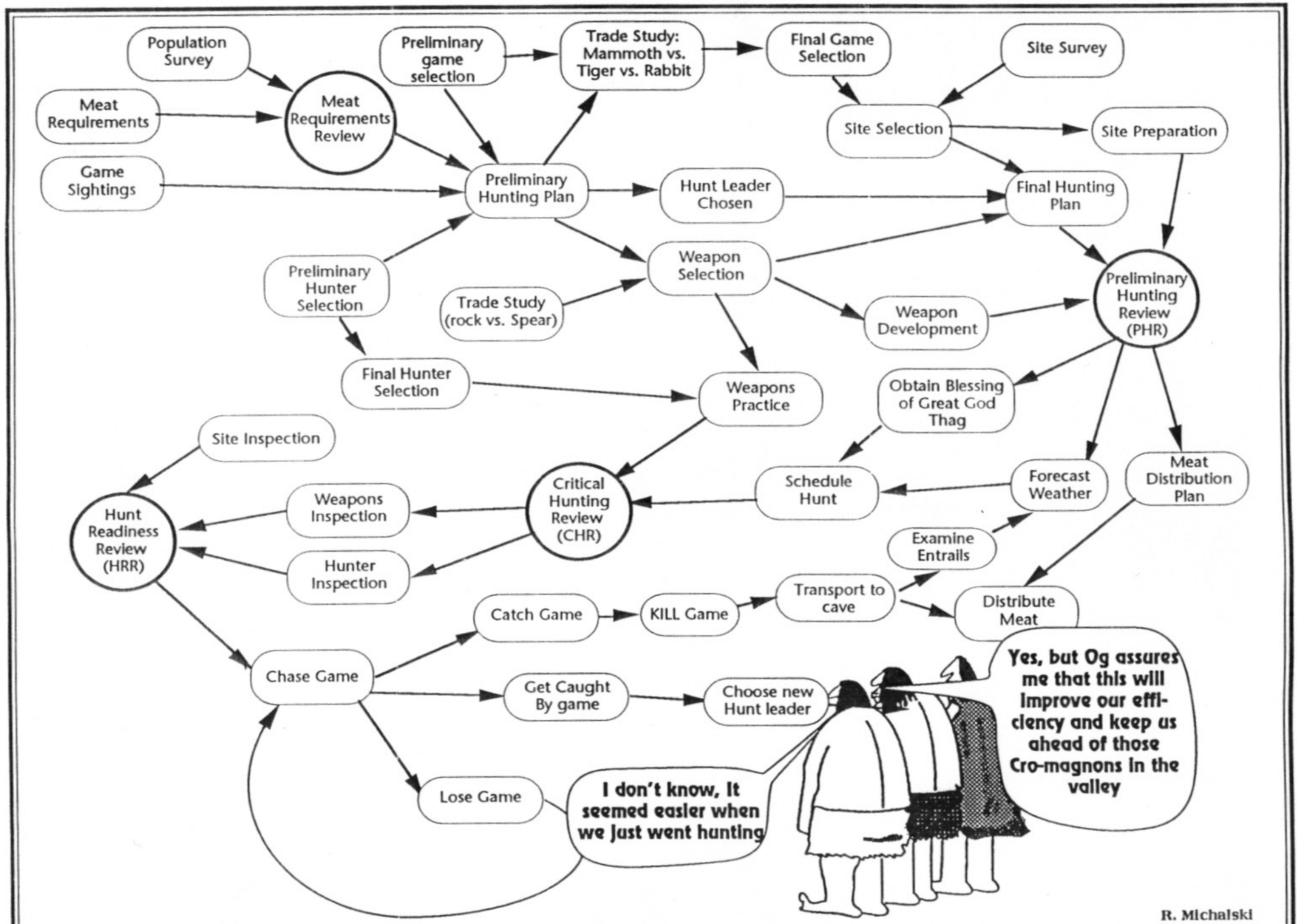

cross


M1A2 SEP

Example Task Board



Reproduced from http://www.mountaingoatsoftware.com/agile/scrum/task-boards



• Why the Neanderthals became extinct •