

Agenda

1. Story Time
2. Group Project Info
2. Project Management
3. Methodologies
4. Project Management Tools
5. Crafting a Vision Statement

The Three Bricklayers



A Few Reminders

Reminders on Lab

- Lab Attendance is mandatory
- If you know you must miss, make arrangements to attend another section
- Lab work should be completed during the lab
- Policy on late submissions of lab work
 - This was a problem last semester
 - TA meeting Friday at 1:00
- We are working on grading rubrics for each lab assignment

A Few Reminders

Reminders on Homework

- Homework assignments will appear on the Moodle site at the beginning of the week (Monday)
- Homework assignments will be due on Sunday of the NEXT week at 11:59 p.m. – giving you almost two weeks to complete the assignment
- You should see Homework # 1 appear on Monday
- Homework #1 is about Linux shell scripting and using Regex. Individual or pair.

A Few Reminders

- **Office Hours**
 - TA team meeting Friday at 1:00
 - Office hours will be finalized and posted by end-of-day Friday

Objective:

To give students the opportunity to practice using software development methods and tools.

Specifics:

Team formation.

- 5 or 6 students per team
- From the same lab section
- Team composition -- determined by the staff (TA, CAs, & Instructor) based on survey responses.
- Hopefully ready Monday

Requirements

- A working software application
 - Includes a “front-end” user interface, a backend database, and a “middle layer” that connects them.
 - Includes user/password login management
- Documentation of your development processes
- Use of a git repository for ALL deliverables
- Milestones – evidence of progress along the way
- Each milestone has specific required deliverables
- Work as a team
- Follow a “methodology”

Grading Components

- A working software application
 - includes a “front-end”, middle layer, and a backend database
 - User login account/password management
- Documentation of the development processes
- Milestones – evidence of progress along the way:
 - Milestones 1-3 and 5-7 are submitted and graded as a team
 - Adjustments based on Participation
 - Milestone # 4 (Individual Interviews)
 - Milestone # 8 (Peer Evaluations)
 - Github “commits”

Group Project Info

Milestones

Milestone 1	40 points	Project Proposal
Milestone 2	35 points	Agile Client demo and write up of milestones and retrospective
Milestone 3	50 points	Database Design
Milestone 4	45 points	Unit Testing
Milestone 5	25 points	1-on-1 Student Meetings (Individual)
Milestone 6	40 points	Project Presentations
Milestone 7	50 points	Final Project Report and Product Functionality
Milestone 8	15 points	Final Reflection (individual)

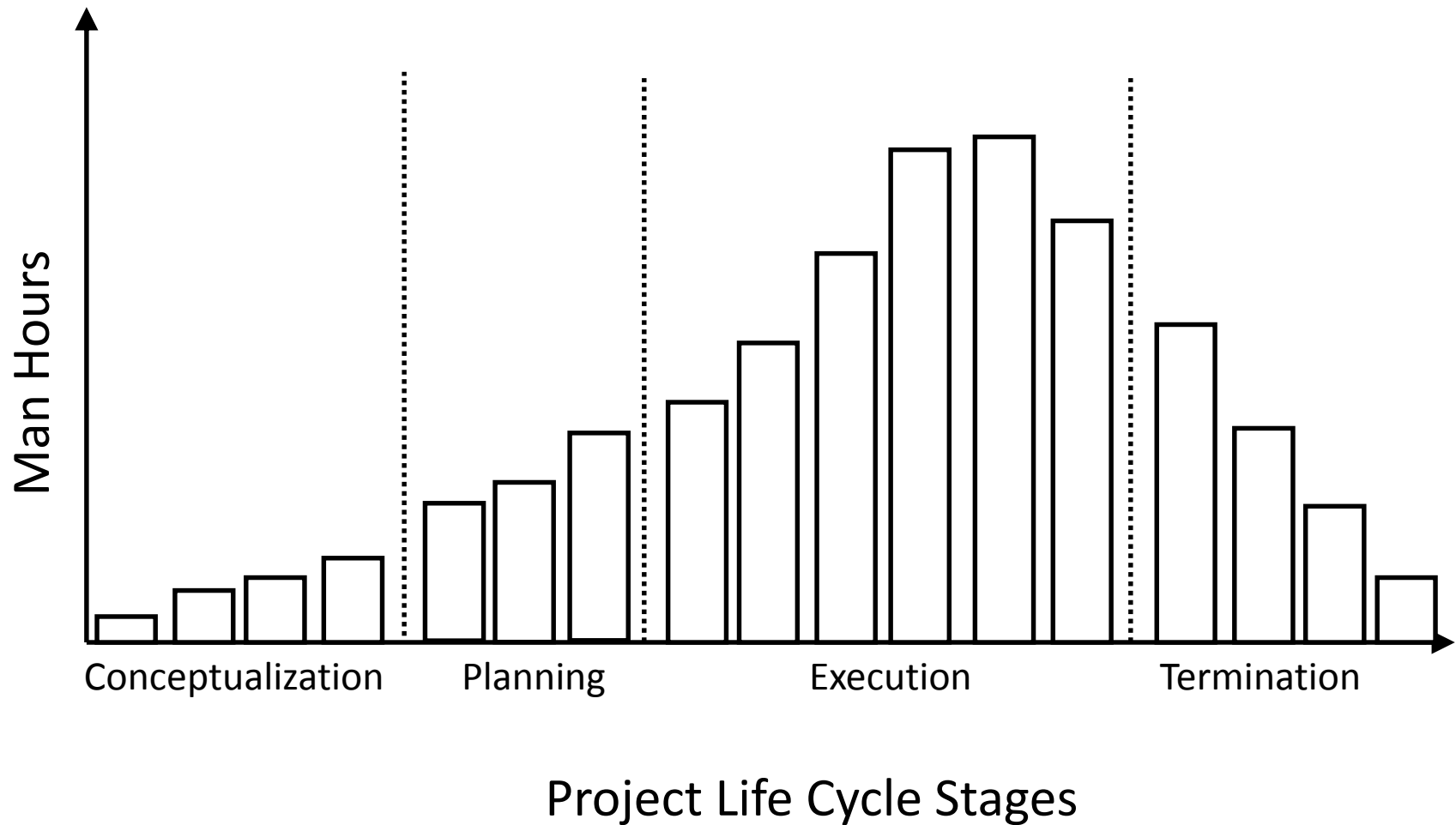
Project Management

- **How do we as organizations advance and grow?**
 - Through PROJECTS
- **IT Project Failure Rates?**
 - 50%, 65%, 70% ?
 - [Statistics](#)
- **The role of Project Manager**
 - A relatively recent addition to the workforce
 - Outside civil engineering and construction
 - [Jobs](#)
 - A structured, scientific discipline
 - [PMI](#) Certification is a big PLUS
 - Requires solid people skills

- **What is a project?**
 - A series of tasks
 - Has a distinct beginning and a distinct end
 - Goal oriented
 - Bound by time, cost and quality
 - Requires resources (human and material)
 - Solves problems; satisfies needs
 - Stems from a larger strategy/vision
 - Has a customer and/or sponsor (\$\$)
 - Distinct from a PROCESS

- **The project life cycle?**
 - Typical Phases:
 - Inception/Conceptualization
 - Planning
 - Execution
 - Termination

Project Management



- **How do we define success**
 - On time
 - On budget
 - Meets objectives
- **Triple Constraint Model**
 - Time, Cost, Scope
- **Quadruple Constraint Model**
 - Add Customer Satisfaction

Project Management

- Projects must be delivered within cost
- Projects must be delivered on time
- Projects must meet the agreed scope – no more, no less
- Projects must also meet customer quality requirements



Figure 1. The Triple Constraint

- **Scope**

- Easily understood as a sum of REQUIREMENTS

“If it can’t do....., I don’t want it.”

“It must be able to”

“I want a system that will”

What’s IN; What’s OUT

- **What is SCOPE?**
 - Everything about a project
 - The work that must be done
 - The results that will be delivered
 - The solution provided
- **Scope must be managed**
 - Scope → Requirements
 - Projects fail mostly due to unmanaged scope
 - Undefined requirements
 - Poorly defined requirements
 - Shifting requirements (“Scope Creep”)

- **Work Breakdown Structure (“WBS”)**
 - A deliverable-oriented grouping of project elements which organizes and defines the total scope of the project
 - “Drill-Down” to tasks
 - Each descending level represents an increasingly detailed definition of a project component
 - A component may be a product or service

WBS -- Make pies for Thanksgiving Dinner

Deliverable 1

WP1

WP2

Define Pie Menu

Interview Mom

Document Menu

1.1

1.2

Deliverable 2

WP1

WP2

WP3

Groceries

Shopping List

Check Inventory

Purchase

2.1

2.2

2.3

Deliverable 3

WP1

WP2

WP3

WP4

Crusts

Measure ingredients

Make Dough

Roll Dough

Install in pie pan

3.1

3.2

3.3

3.4

Project Management

Deliverable 4

WP1

Filling

Mix Pumpkin Filling

4.1

WP2

Mix Pecan Filling

4.2

Deliverable 5

WP1

Bake

Place pies in oven

5.1

WP2

Set Timer

5.2

WP3

Bake

5.3

WP4

Remove from oven

5.4

Deliverable 6

WP1

Finish

Set out pies to cool

6.1

Project Management

- **Key Factors for Successful Project Management**
 - Assign a Project Manager
 - Create a Thorough WBS
 - Carefully Manage Scope/Requirements Changes
 - Good communication among team

Project Management “Methodologies”

- “...ology” means “the study of ...”
biology, mythology, zoology, anthropology, pathology
- In this case, there are many methods of managing projects.
- If we study each method, we can describe this study as
“project management methodology”
- However, the term has morphed into referring to ***the method*** itself, not so much the study of the method

There are many PM Methodologies

SDLC (system development life cycle)

Waterfall

PMBOK (Project Management Body of Knowledge)

Agile

Iterative

Spiral

Xtreme

We will look at TWO

SDLC (system development life cycle)

Waterfall

PMBOK (Project Management Body of Knowledge)

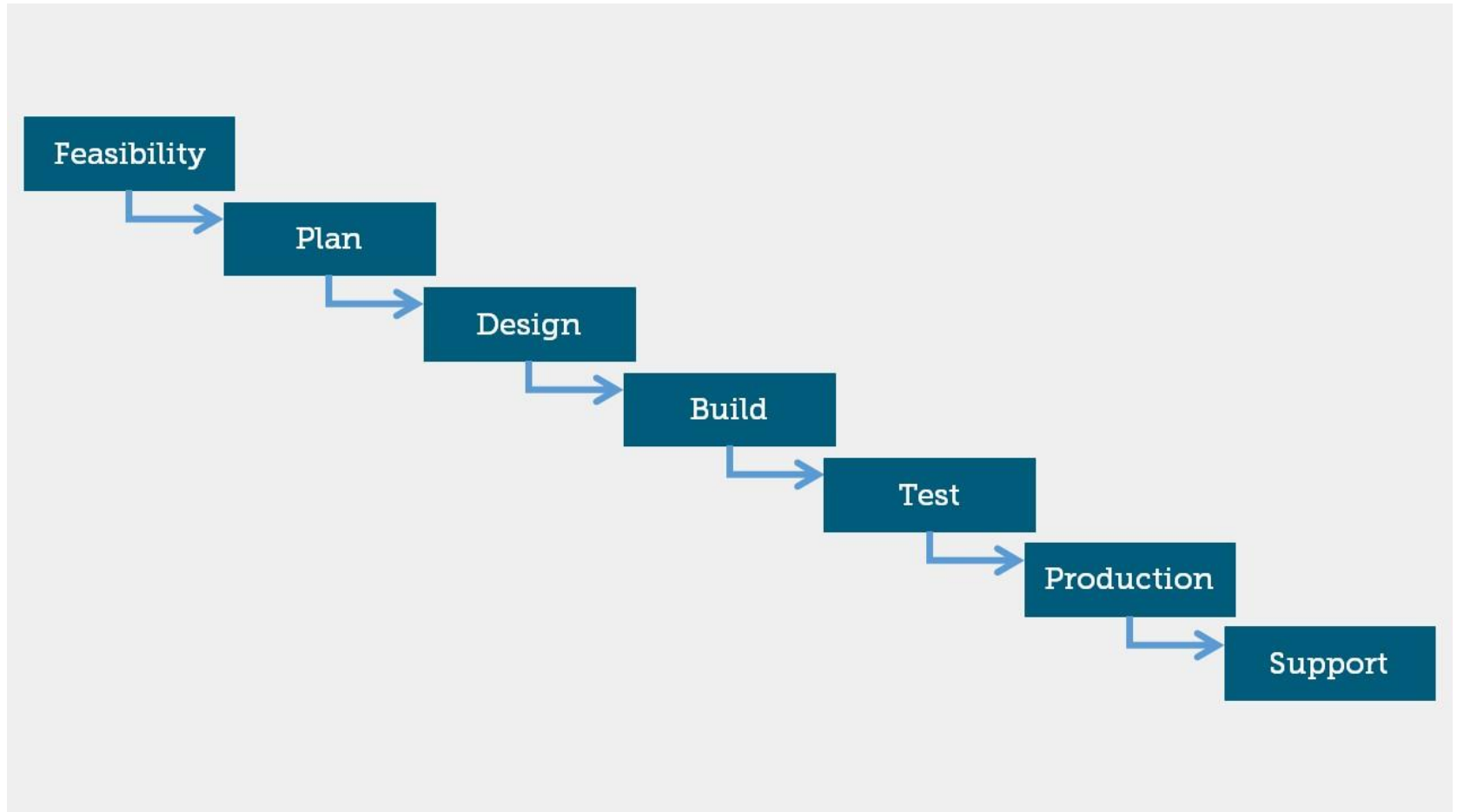
Agile

Iterative

Spiral

Xtreme

Why “waterfall”?



Benefits of Waterfall

- Project sponsors get a clear picture of the complete final product
- Project sponsors get an accurate, detailed estimate of the cost of the project
- A “GO/NO GO” decision is made at the end of each phase
- Requires a detailed and accurate Work Breakdown Structure early-on in the project
- The scope of the project is locked down at that time, and should remain unchanged until solution delivery
- Any changes to scope must be strictly managed
- A decision to change scope demands renegotiating the project timeline and costs

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Benefits of Waterfall

This is precisely why so many IT projects fail, and why software development project managers have embraced AGILE

remain unchanged until solution delivery

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- **Waterfall Challenges**

- A successful project demands a detailed and accurate Work Breakdown Structure early-on
- The scope of the project is locked down at that time, and should remain unchanged until solution delivery
- Changes to scope, even when well-managed, will extend project timeline and costs
- Once requirements are defined, customers are much less engaged during the design and construction phases
- Customers must wait until the project is over to enjoy any tangible benefit from the project

- **Waterfall Challenges**

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- **Waterfall Challenges**

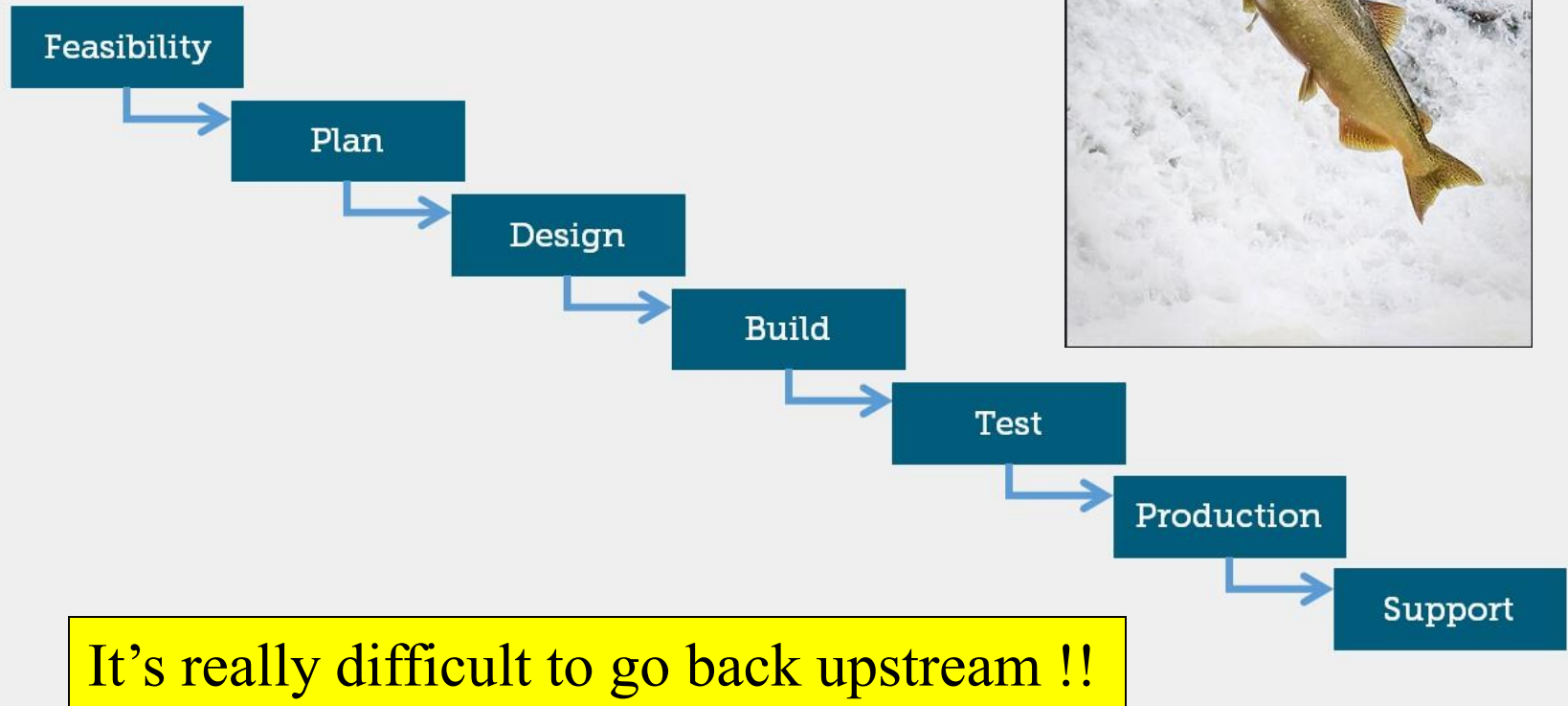
- A What if “We don’t know...” accurate
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- O **me change the budget or timeline?**
- **What if they want to see results before** less engaged during the design and construction ph
- C **we’re ready?**
- any tangible benefit from the project

Project Management

- The “Waterfall” model



The Agile “Manifesto”

“On February 11-13, 2001, at The Lodge at Snowbird ski resort in the Wasatch mountains of Utah, seventeen people met to talk, ski, relax, and try to find common ground.

What emerged was the Agile ‘Software Development’ Manifesto. Representatives from Extreme Programming, SCRUM, DSDM, Adaptive Software Development, Crystal, Feature-Driven Development, Pragmatic Programming, and others sympathetic to the need for an alternative to documentation driven, heavyweight software development processes convened.”

<http://agilemanifesto.org/>

The Agile “Manifesto”

- Focused on Software Development Projects

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	processes 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 in the items on the right, we value the items on the left more."

The “Manifesto” -- Twelve key principles

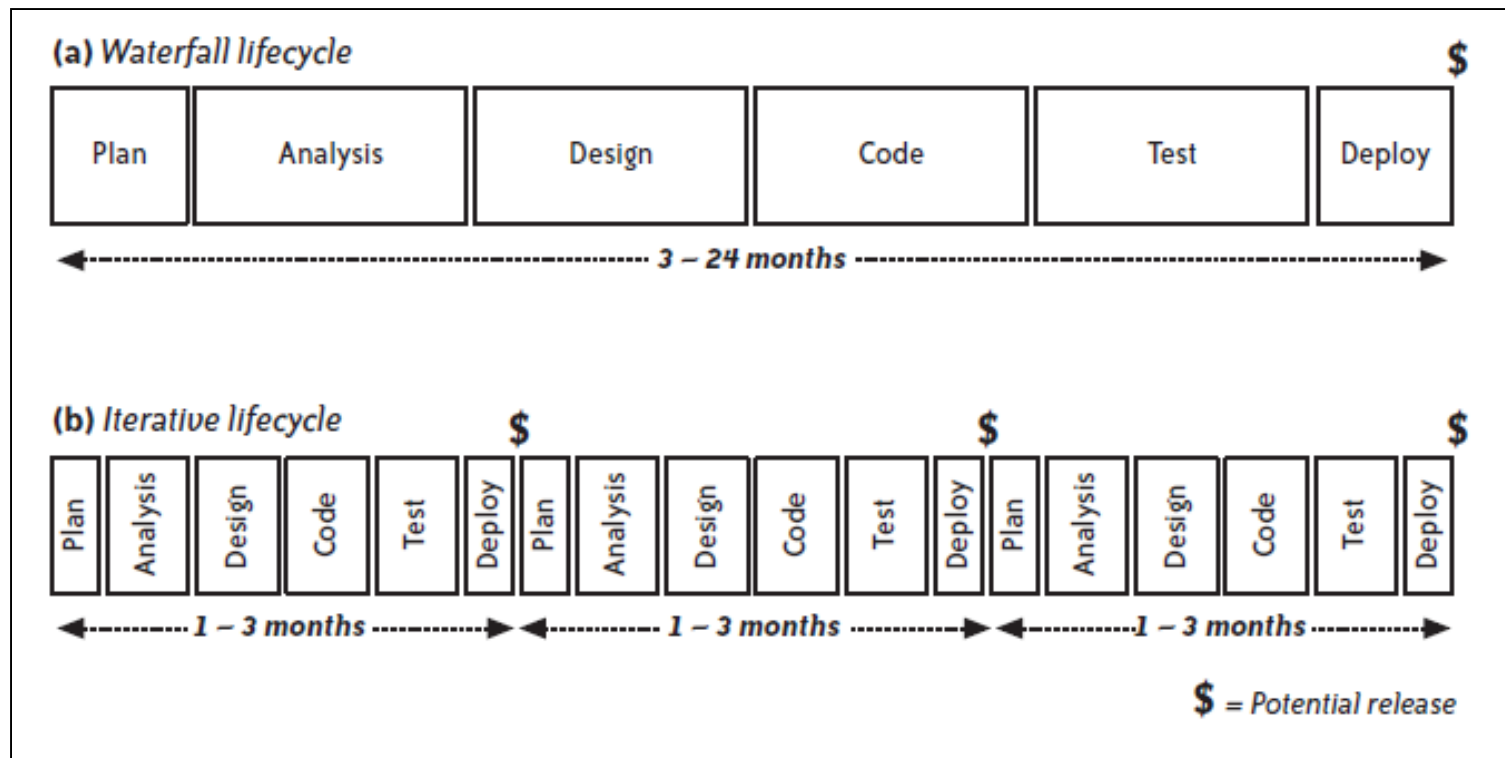
1. Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.
2. Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.
3. Deliver working software frequently, from a couple of weeks to a couple of months, with a preference for the shorter timescale.
4. Business people and developers work together daily throughout the project.
5. Build projects around motivated individuals, give them the environment and support they need
6. The most efficient and effective method of conveying information with and within a development team is face-to-face conversation.

The “Manifesto” -- Twelve key principles

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 not 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

Project Management

**Plan the entire project up front
VS
Incremental, iterative development cycles**



Project Management

Traditional

Design up front

Fixed scope

Deliverables

Freeze design as early as possible

Low uncertainty

Avoid change

Low customer interaction

Conventional project teams

Agile

Continuous design

Flexible scope

Features/requirements

Freeze design as late as possible

High uncertainty

Embrace change

High customer interaction

Self-organized project teams

Prototyping

Build it, assess it, modify it, repeat

1. Continuous integration, verification, and validation of the product.
2. Frequent demonstration of progress to increase the likelihood that the end product will satisfy customer needs.
3. Early detection of defects and problems.

Agile Model

1. Focus on customer value
2. Iterative and incremental delivery
3. Experimentation and adaptation
4. Self-Organization
5. Continuous Improvement

The “Scrum” Method

- The product is composed of “Features” as described by one or more “User Stories”
- A feature delivers functionality to the customer according to the function described in a user story
- Features and user stories are prioritized by their perceived highest value
- Team tackles the highest priorities first
- Priorities of “feature backlog” are re-evaluated after each iteration
- Each “sprint” produces fully functional features
- Each feature involves analysis, design, build and test

Roles

- Product Owner
 - Acts on behalf of the customer
 - Keeper of the feature backlog
 - Keeps the team focused on priority objectives
 - Final authority on requirements
 - Decides when a feature is complete

Roles

- Team
 - Builds the feature
 - 5 – 9 people
 - Self-organizing
 - No roles or titles
 - Input to sprint planning

Roles

- Scrum Master
 - Facilitator
 - Resolves issues
 - Keeps team on process
 - More “coach” than “manager”

Meetings

- Built around Sprints
 - A sprint runs a maximum of 4 weeks
 - A sprint team has 5-9 people
- Daily Scrum
 - Same time & place, 15 minutes max
 - All Stand
 - Tasks & Blocks on white board
 - Questions
 - What have you done since the last scrum?
 - What will you do before the next scrum?
 - What is blocking you?

Scrum Master

- Does NOT assign daily tasks to team
- The team decides amongst themselves
- Master of the process, not of the team
- At the end of a sprint, team reviews the product/feature
- At the end of a sprint, team reviews the process in a “retrospective”

Product Backlog

- Prioritized list of features/requirements
- A prioritized list of work to be accomplished
- Owned by the product owner

Sprint backlog

- List of individual sprints
- Tied to product backlog
- Owned by the team

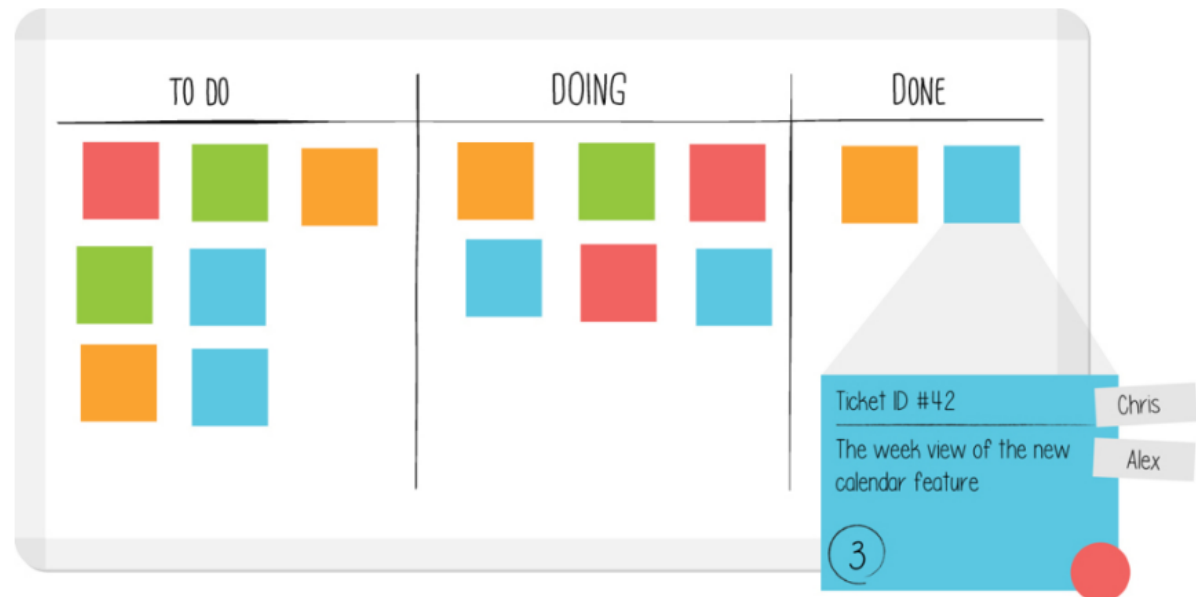
Resistance to Agile

- Agile PM does not satisfy top management's desire for controlling budget, scope and schedule
- Many of the agile principles -- including self-organizing and intense collaboration – may run counter to corporate culture
- Requires a knowledgeable Scrum Master to keep teams focused on proper methods

Project Management

Kanban

- A method for managing work
- Visual, on a board
- Tracking work
 - Planned
 - In-Progress
 - Complete



A physical Kanban board with a basic, three-step workflow

Project Management

“The Kanban technique emerged in the late 1940s as Toyota's re-imagined approach to manufacturing and engineering.

Line-workers displayed colored kanbans — actual cards — to notify their downstream counterparts that demand existed for parts and assembly work. (Kanban is the Japanese word for "visual signal" or "card.")

The system's highly visual nature allowed teams to communicate more easily on what work needed to be done and when.

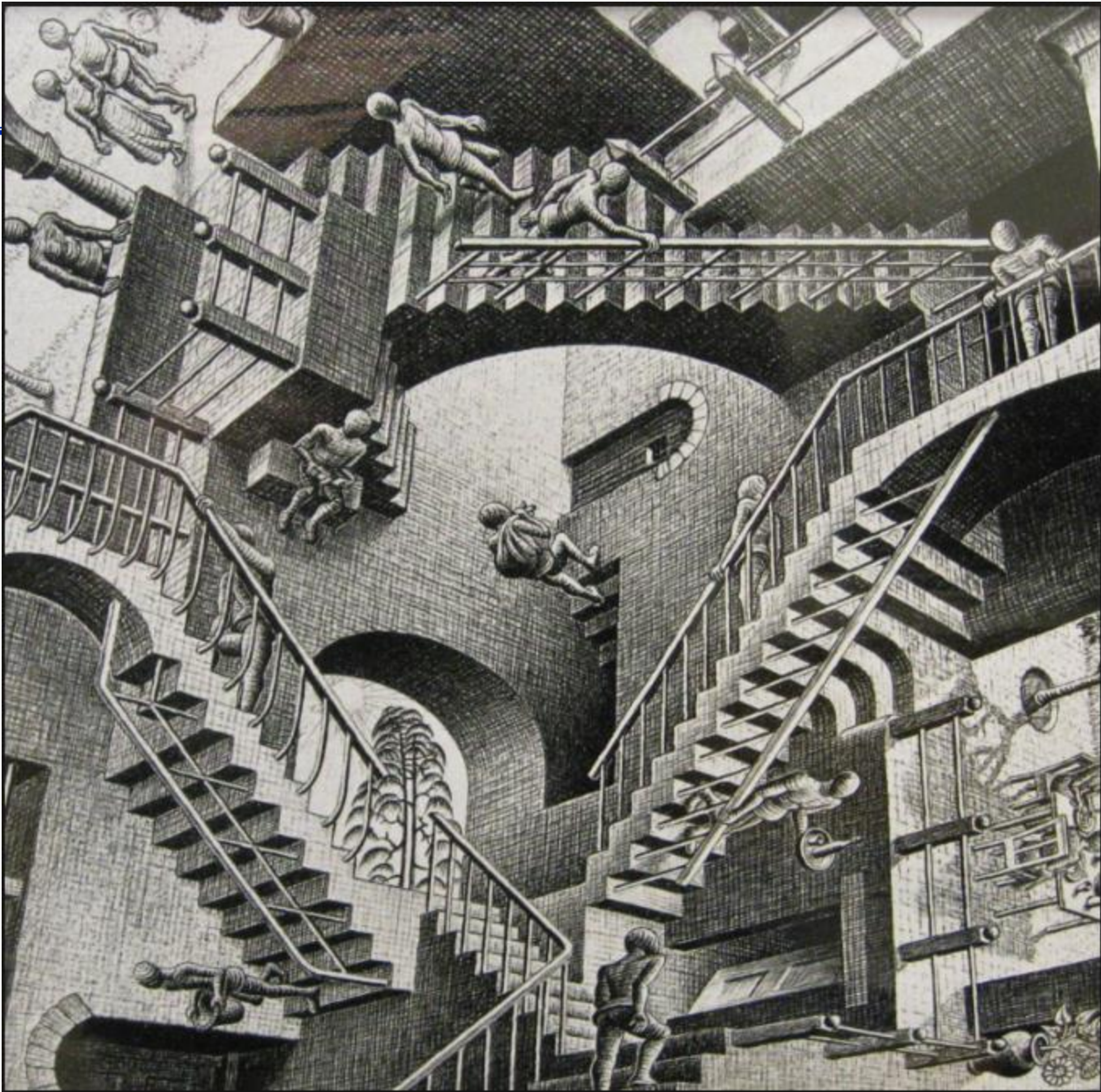
It also standardized cues and refined processes, which helped to reduce waste and maximize value.”

<https://leankit.com/learn/kanban/kanban-board/>

Scrum & Kanban

- Both embrace principles of agile development
- Both encourage
 - early and frequent delivery
 - self-organized teams
 - continuous improvement
 - high quality
 - prioritizing of requirements based on business value

Break



Project Management Tools

Why a PM Tool?

- Document “deliverables” (a.k.a. features, requirements)
- Capture the WBS as features/tasks
- Plan the work
- Schedule the work
- Assign work to teams or individuals
- Plan sprints/work packets
- Track and report progress toward completion

Are you Agile? Your tool must

- support people over process
- facilitate collaboration

Project Management Tools

Creating a Project Plan

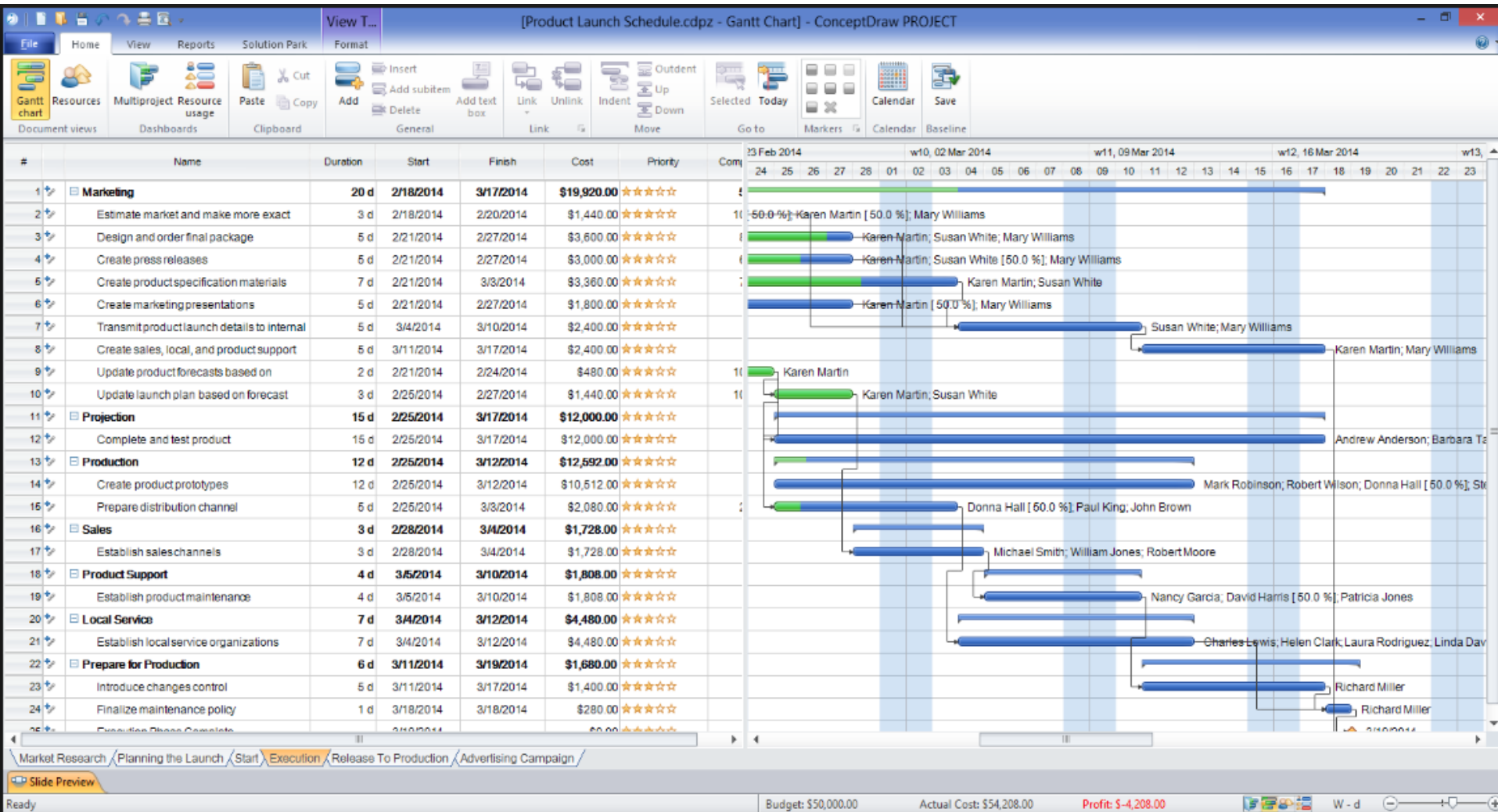
- GANTT chart
 - WBS
 - Predecessors/Successors
 - Resource Assignments
 - Duration
 - Calendar

Creating a GANTT chart



Henry Gantt

Project Management Tools



Project Management Tools

Some PM tools to look at:

- [Asana](#)
- [Freedcamp](#)
- [Trello](#)
- [Wrike](#)

(there are many more, but most cost \$\$ after a 30-day free trial)

Project Management Tools

Going Deeper:

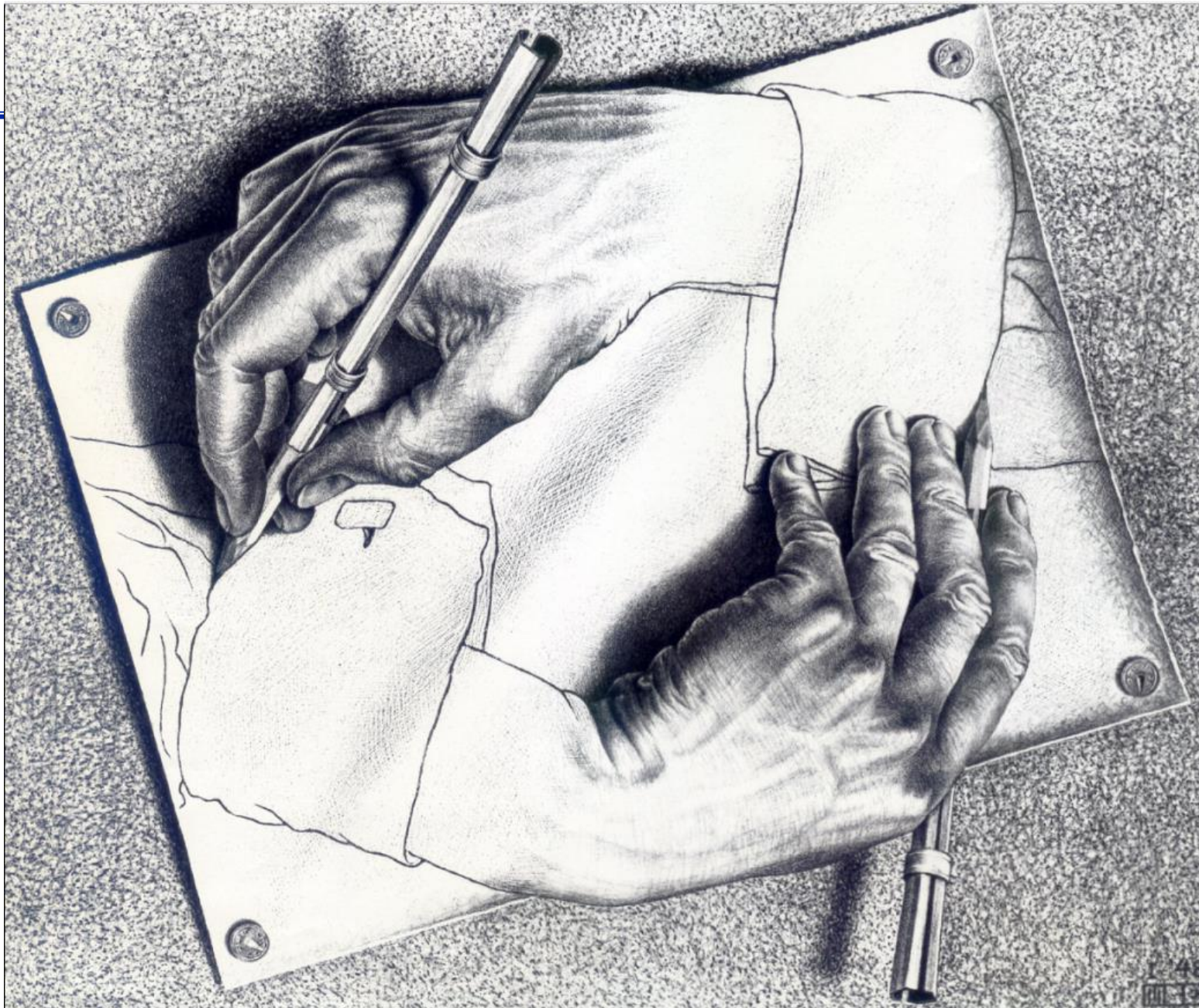
Kanban overview:

<https://www.youtube.com/watch?v=jf0tlbt9lx0>

<https://www.youtube.com/watch?v=N3BoLRVXoI0>

Scrum overview:

<https://www.youtube.com/watch?v=9TycLR0TqFA>



Crafting a Vision Statement

A vision statement is

- A company's roadmap
- Indicates who and what we want to be and become
- Sets a defined direction for company growth
- Builds loyalty and enthusiasm

Your Team/Project's Vision Statement is a
Required Deliverable for Milestone One

Crafting a Vision Statement

What makes a good vision statement?

(There is no industry-wide consensus...)

- Should be concise. Easy to read, remember, and repeat.
- Clear. Sets a primary goal.
- Future oriented. Where are we going rather than current state.
- Stable. Not subject to market and technology changes.
- Challenging. Not easily achieved.
- Abstract. Enough to encompass the entire organization
- Inspiring. Motivates team members to follow.

Crafting a Vision Statement

Amazon's vision statement:

“To be Earth’s most customer-centric company, where customers can find and discover anything they might want to buy online.”

Tesla's vision statement:

“to create the most compelling car company of the 21st century by driving the world’s transition to electric vehicles.”

Facebook's vision statement:

“People use Facebook to stay connected with friends and family, to discover what’s going on in the world, and to share and express what matters to them.”

Crafting a Vision Statement

CU Boulder's vision statement:

“To be a leader in addressing the humanitarian, social, and technological challenges of the twenty-first century.

IKEA's vision statement:

“To create a better everyday life for many people.”

Nordstrom's vision statement:

“Offer the customer the best possible service, selection, quality, and value.”

Google's vision statement:

“to provide access to the world's information in one click.”

Crafting a Vision Statement

A “Product Vision Statement”

(from Crossing the Chasm, by Geoffrey Moore)

For [target customer]
Who [statement of the need]
The [product name] is a [product category]
that [key benefit, compelling reason to buy].
Unlike [primary competitive alternative],
our product [statement of primary differentiation]

Crafting a Vision Statement

An [aged] example from Blackberry

For business e-mail users who want to better manage the increasing number of messages they receive when out of the office,

BlackBerry is a mobile e-mail solution that provides a realtime link to their desktop e-mail for sending, reading and responding to important messages.

Unlike other mobile e-mail solutions, BlackBerry is wearable, secure, and always connected.