

# CAPSTONE LECTURE 1

*Agile / Scrum*



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# WHY A SOFTWARE DESIGN METHODOLOGY?

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- In *ye olden days*, we thought hardware would be the hard part of computing
- Simple programmers would just implement the specs handed to them by the wise mathematicians and the powerful hardware designers
- They would just need to know how to type, really.



# WHY A SOFTWARE DESIGN METHODOLOGY?

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- We now know this is not the case, of course.
- We've learned that having some sort of structure allows us to develop software more effectively.
  - “Effectively” can mean different things in different domains and to different people!
  - An “effective” nuclear power controller will have very different benchmarks than an “effective” social media app.
  - Many different methodologies have been created which focus on different aspects of software development

# WHY A SOFTWARE DESIGN METHODOLOGY?

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- Different methodologies have different trade-offs. Examples:
  - Speed of Development vs Quality of Software
  - Documentation vs Dynamic Communication
  - Up-front Design vs Flexibility in Design
  - Feature Flexibility vs Planning
  - Adaptive Estimation vs Prescriptive Estimation
  - Risk-Averse vs Risk-Aware
  - Iterative vs Sequential

# WHY A SOFTWARE DESIGN METHODOLOGY?

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- Our methodology: Agile / Scrum
  - This is not the end-all, be-all of software development methodologies, but for the projects in this class, it fits well
  - Relatively lightweight
  - Flexible
  - Focus is on understanding customer needs

# AGILE MANIFESTO

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

# SCRUM

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- Almost certainly the most popular agile methodology, although far from the only one...
- Extreme Programming (XP)
- Lean Software Development (LSD)
- Dynamic Systems Development Method (DSDM)
- Feature-Driven Development (FDD)
- Agile Unified Process (AgileUP)
- Crystal {Clear, Yellow, Orange, Red, Maroon}

# SCRUM

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- Not an acronym!
- Comes from a rugby scrum - everyone on team moving in one direction
- Teams are almost entirely self-managed
- Three roles
  - Product owner - Act as representative for the customer
  - Scrum master - They act as a “firewall” for the outside world and a centralized place to ask for help / facilitate meetings / etc.
  - Team - Everyone else: QA, developers, etc.



# SCRUM

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- Product-focused, end-user focused
  - Transparency - Work should be visible to those who need to see it
  - Inspection - Work should be examined regularly to ensure that the team is on the right path, or are doing things in a suboptimal manner
  - Adaptation - Work should be modifiable as requirements and limitations are better understood

# USER STORIES

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- A description in “plain language” that states what the user needs the software to do
- Related to requirements, but not exactly the same!
- Often in the *Connextra template*:
  - As a <role>  
I want <feature>  
So that <reason>

# USER STORIES

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- Examples:

- As a manager

- I want the software to display the current status of each engineer

- So that I can more effectively write status reports

- As an Engineer

- I want the ability to enter my daily status on a web page

- So that I can update my manager on my status more easily

- As a user of Excel

- I want a keyboard shortcut to select text

- So that I can quickly grab text without spending extra time reaching for my mouse

# USER STORIES

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- Allows us to not only see what they want, but more importantly, *why*
- Gives us further flexibility if what they say they want is difficult/impossible, but can do something else that gives them the same result, or if there is a better way to achieve that objective

# PRODUCT BACKLOG

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- List of all items to be done
- In the beginning, should be all user stories
- Should be prioritized
- Differs from a Software Requirements Specification in that this is a living document - it will change as defects are added, user stories modified or removed, etc.
- Think of it as a kind of mixed to-do list / software specification



# SPRINTS

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- Software development is split into “sprints” - iterations of 2 - 3 weeks where work is done from the backlog (our sprints will be two weeks)
- At the beginning of the sprint, there is a sprint planning session where it's determined which user stories will be worked on and who will work on which ones
- These are not set in stone! Some may run over or you may work on extra. There are various ways of estimating how much work can be done in a sprint (story points, velocity, etc.) but we will not use them for “our version” of Scrum
- This session is facilitated by the Scrum Master

# SPRINTS

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- At every point, and ESPECIALLY at the end of the sprint, you should have WORKING software
- It does not need to be feature-complete, but compiles, runs, etc.
- Adding a feature means it has met “the definition of done”
  - Code
  - Documentation
  - Integration
  - Testing

# STANDUPS

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- Standups - usually daily and very short communications with the rest of the team during the sprint
  - What have I done in the last 24 hours?
  - What do I plan to do in the next 24 hours?
  - Do I need any help or have any blockers?
- You can probably do this 3x/week, probably not necessary for every day
- However, this is up to you
- Facilitated by scrum master

# RETROSPECTIVES

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- At the end of each sprint, the team comes together to discuss:
  - What went well?
  - What could go better?
  - What can we do different in the next sprint?
- Once again facilitated by the scrum master

# SPRINTS, STANDUP AND RETROSPECTIVES

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- For our class, every other Friday (end of sprint), we will meet in class and have:
  - Retrospective on previous sprint
  - Sprint planning for next sprint
  - Before leaving, Scrum Master and I will discuss results of sprint planning
- Scrum Master position will change each sprint (different person each sprint).
  - Old scrum master handles retrospective; new scrum master handles sprint planning



# WELCOME TO SPRINT 1

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- You can't put together a backlog yet, but over the next two weeks:
  - Meet with the customer. I recommend face-to-face interaction.
  - Write up the needs of the customer in at least eight - ten user stories
  - Make basic decisions on software architecture (language, frameworks, tools, etc.)
  - Write up project proposal document and prepare “walking skeleton”

# WELCOME TO SPRINT 1

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- “Walking skeleton” - The basic “skeleton” of the software. A “Hello, world!” with test framework, basic code, etc. just to show that the basic system is set up on everybody’s machines and that the software tools work (git, compiler, testing framework, etc)
- Please use GitHub or GitLab.
  - Make a private repository and add me (username: laboon on both services) as a collaborator
  - Have your walking skeleton program up and running by the end of the sprint (two weeks from today)

**MOST IMPORTANTLY...**

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**Have fun!**