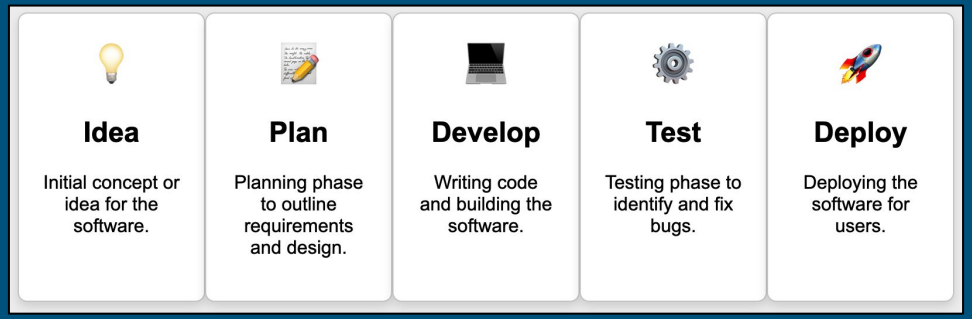
Software Development Process

COM/CSC 271
Week 2: Process & Design

Software Development Life Cycle (SDLC)

- Every piece of software goes through a similar path from idea to launch day.
- The **software development life cycle (SDLC)** describes a process for planning, creating, testing, and deploying software.
    - Each step creates an **output**–whether an idea, document, diagram, or piece of working software–which is then used as the **input** for the next step and so on until you hit your goal.



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Why Use SDLC?

Benefits of Using an SDLC:

- Gives a clear process and guides your development steps.
- Makes building new tools cheaper, more efficient, and less stressful.
- Defines communication channels and expectations between developers and project stakeholders.
- Sets clear roles and responsibilities for your entire team (designers, developers, project managers).
- Provides an agreed-upon “definition of done” for each step to avoid scope creep and keep the project moving.
- Formalizes how to handle bugs, feature requests, and updates.

Without SDLC, easy to fall into the following traps:

- Poor collaboration and communication among team members.
- Poor or no estimation of time to complete project.
- Missing or poorly planned features or functionality.
- Poor or no prioritization of features.
- Inability to add or remove members from the project.
- Lead to changes in the project’s scope at any point after the project begins (scope creep).
- Software doesn't actually meet the needs of users.

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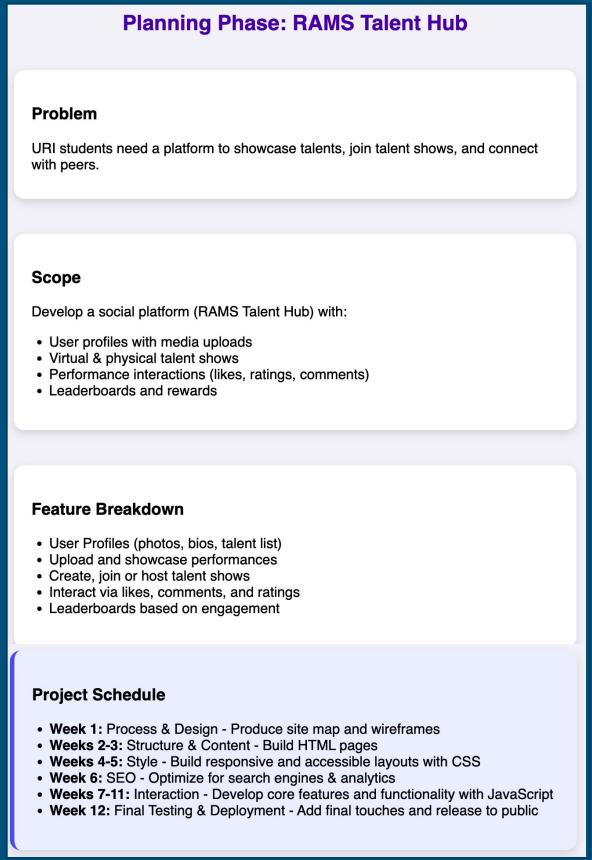
Planning Phase

- A plan is put together, breaking down the project into smaller tasks, usually with dates when each task needs to be completed.
- This phase consists of:
  - Defining the problem and scope of the project.
  - Developing an effective outline for the upcoming development cycle.
  - Catching problems before they affect development.
  - Securing the funding and resources needed to make the plan happen.
  - Setting the project schedule.



Planning Phase: RAMS Talent Hub

Problem

URI students need a platform to showcase talents, join talent shows, and connect with peers.

Scope

Develop a social platform (RAMS Talent Hub) with:

- User profiles with media uploads
- Virtual & physical talent shows
- Performance interactions (likes, ratings, comments)
- Leaderboards and rewards

Feature Breakdown

- User Profiles (photos, bios, talent list)
- Upload and showcase performances
- Create, join or host talent shows
- Interact via likes, comments, and ratings
- Leaderboards based on engagement

Project Schedule

- **Week 1:** Process & Design - Produce site map and wireframes
- **Weeks 2-3:** Structure & Content - Build HTML pages
- **Weeks 4-5:** Style - Build responsive and accessible layouts with CSS
- **Week 6:** SEO - Optimize for search engines & analytics
- **Weeks 7-11:** Interaction - Develop core features and functionality with JavaScript
- **Week 12:** Final Testing & Deployment - Add final touches and release to public

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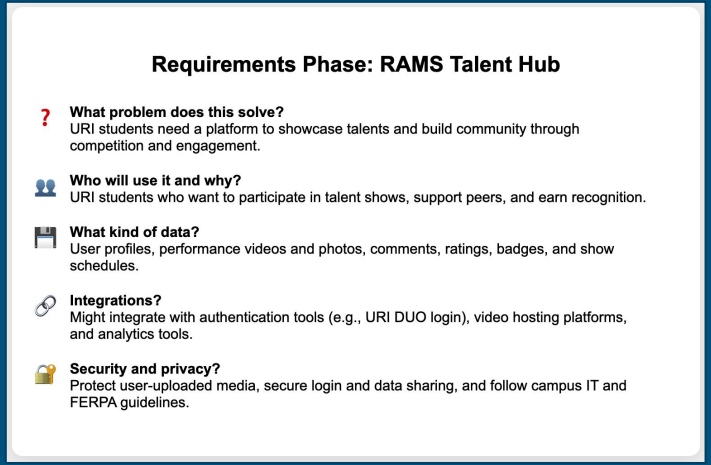
Requirements Phase

- Gathering all the specific details required for the software as well as determining the first ideas for prototypes.
- This phase consists of asking questions about the specifics around this project:
  - What problem does this solve?
  - Who is going to use it and why?
  - What sort of data input/output is needed?
  - Will you need to integrate with other tools?
  - How will you handle security and privacy?



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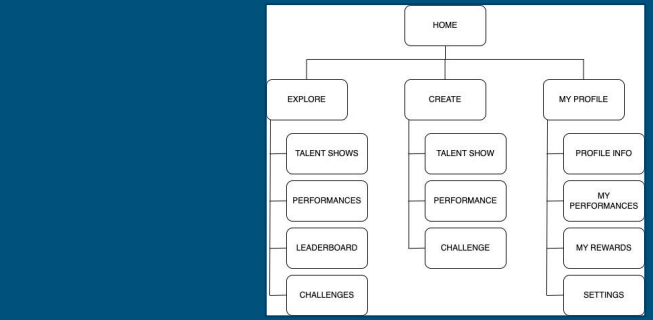
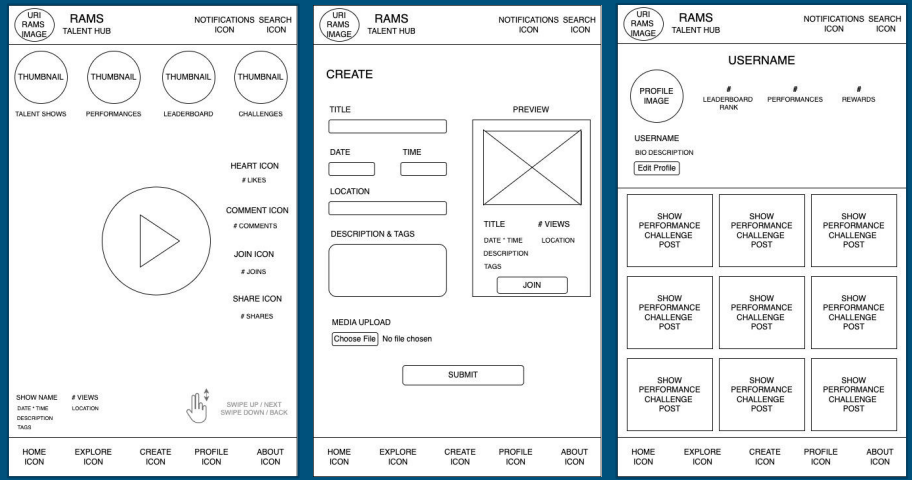
Design Phase

- Designers or software engineers put a design together to be reviewed to make sure it is what the user wants and that it will work.
- During the design phase you document the ideas with words and sketches of how a program is supposed to work, what are the parts, what are the inputs and outputs, and how it flows.
- This stage helps your team and your client validate ideas and get valuable feedback before you commit your ideas to code.
    - Much easier and cheaper to change than written code! If changes need to be made, you simply change the sketches and documentation.





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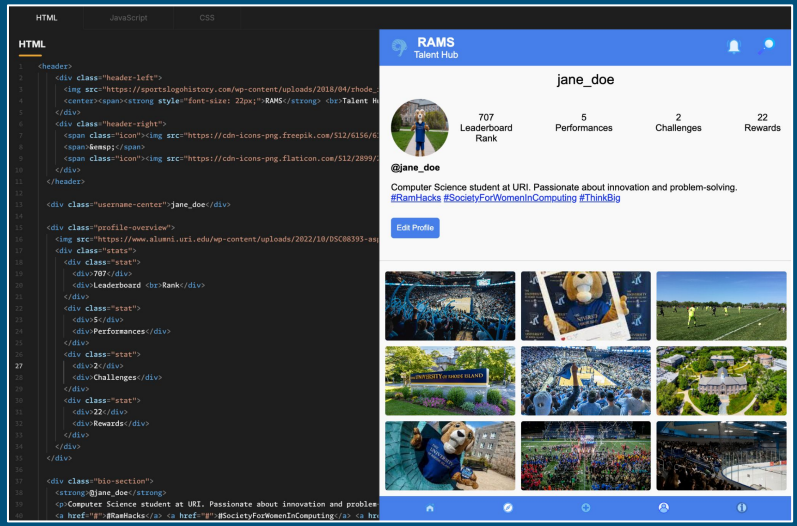
Development Phase

- This is the code writing phase.
- The development stage is the part where developers actually write code and build the application according to the earlier design documents and outlined specifications.
- Developers will choose the right programming code to use based on the project specifications and requirements.
- The goal of this phase is to stick to the plan, and build clean and efficient software.



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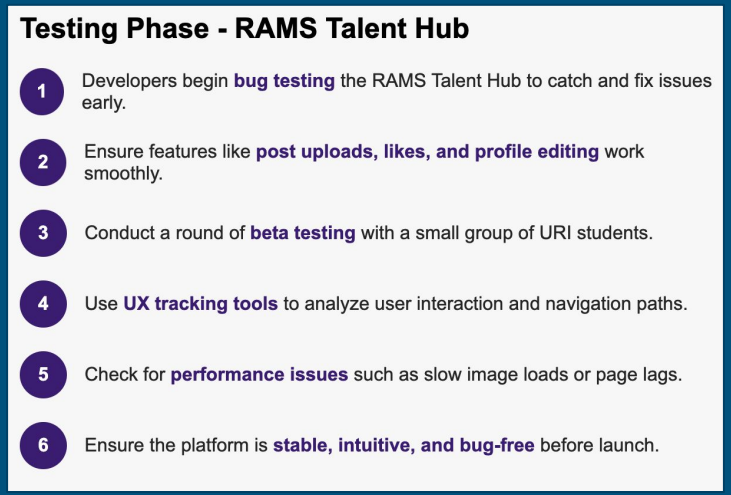
Testing Phase

- During the testing stage, developers will go over their software with a fine-tooth comb, noting any bugs or defects that need to be tracked, fixed, and later retested.
- Testing varies in length—it could be quick for minor updates or take weeks for major ones!
- Once all planned features are in place, deeper testing begins:
    - Releasing the product to a small group of beta testers.
    - Using UX tools to track how users interact with it.
- It is important to make sure you are not shipping buggy software to real customers!



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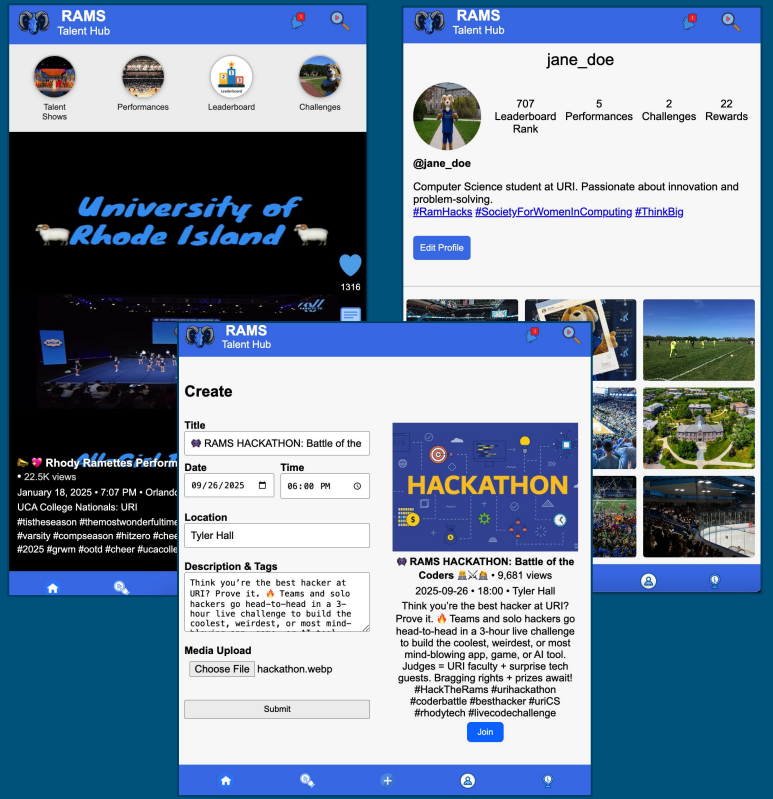
Deployment & Maintenance Phase

- The deployment phase is launching your software to all your users and releasing it into the appropriate market.
- The software product will need updates from time to time because a user found a bug or something changed (like the operating system) so the program needs to be updated.
- Developers must now move into a maintenance mode and begin practicing any activities required to handle issues reported by end-users.
    - Basic upkeep and maintenance of your software to ensure uptime and customer satisfaction.
    - As people begin to use your software, they will undoubtedly find bugs, request new features, and ask for more or different functionality.



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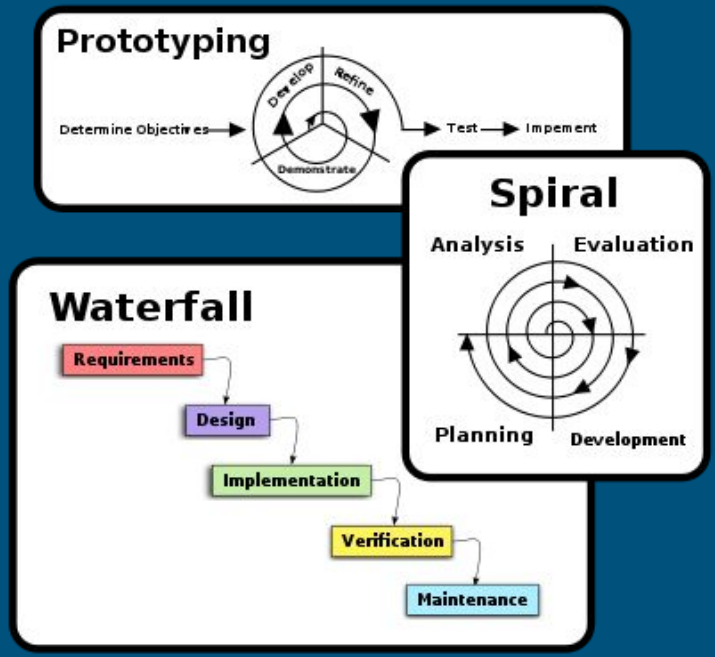
Software Development Processes

- The software development life cycle is more of a guideline for building software.
  - How you check off each phase, when and in what order is up to you.
- Over the years, a number of different **software development processes** have been formalized to tackle more and more complex projects.
  - Which process you use depends on your goals, the size of the project and your team, and other factors.



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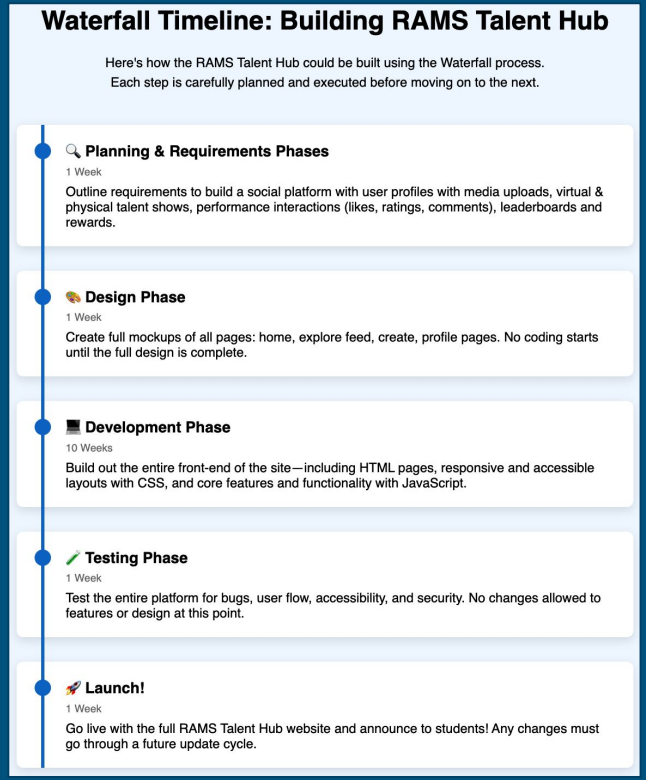
Waterfall

- **Waterfall** is one of the oldest and most traditional models for building software.
- Follows each step of the software development lifecycle **in a strict, linear sequence**.
  - You must finish one phase completely—like planning—before moving to the next—like design.
  - Each step waits for the one before it to be fully complete.
- In order to complete a project, you **first** need to **know everything** that **needs to be done** and **in what order**.
  - Design and develop all features of software in one fell swoop!



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Waterfall

✅ **Who It's For:**

- Teams with rigid structures and documentation needs.
- Works best when your goals, requirements, and technology stack are unlikely to radically change during the development process.
- Best suited for larger organizations (like government agencies) that require sign-offs and documentation on all requirements and scope before a project starts.

🚫 **Who It's NOT For:**

- If you are testing a new product, need user feedback mid-stream, or want to be more dynamic in your development process.
- Slow and does not adapt well to change.
- Won't be creating and testing prototypes and changing your mind along the way.
- Might end up committing to the wrong path without knowing it until launch day.

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Agile & Scrum

- **Agile** and its most popular methodology—**Scrum**—take a dynamic, iterative approach to development.
- Teams work in **“Sprints”** of 2 weeks to 2 months to build and release usable software to customers for feedback.
- **Agile** is all about moving fast, releasing often, and responding to the real needs of your users, even if it goes against what is in your initial plan.
    - Moving in one direction with the understanding that you will change course along the way.

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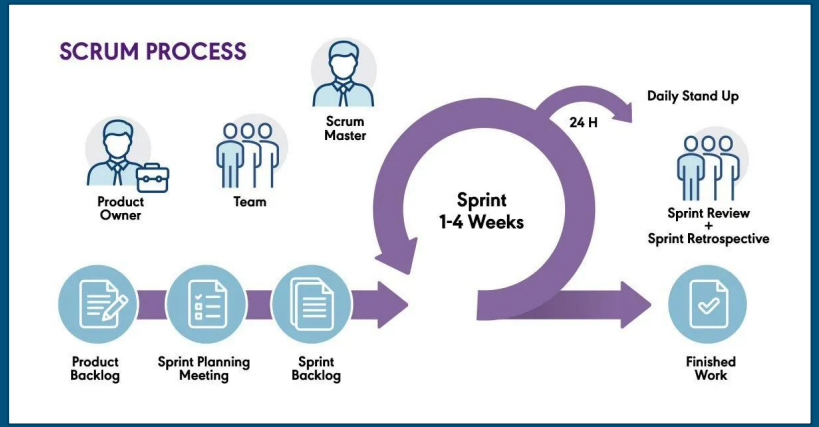
Scrum

- **Scrum** is a methodology of Agile.
- Scrum recommends breaking things into small pieces of work and timeboxing our development cycles.
- Scrum sets roles like:
  - **Product Owner:** Defines product vision, priorities, accepts & rejects work performed.
  - **Team:** Builds the product and its features.
  - **Scrum Master:** Keeps the process running smoothly and the team on track, sets sprint duration and removes impediments.



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Agile & Scrum

✅ **Who It's For:**

- Dynamic teams doing continuous updates to products.
- Allows tighter feedback loops throughout the software development process so you can adapt and react to real customer needs.
- Favored by most startups and technology companies testing new products or doing continuous updates to long-standing ones.
- As testing takes place after each small iteration, it is easier to track bugs or roll back to a previous product version if something more serious is broken.

🚫 **Who It's NOT For:**

- Team's with extremely tight budgets and timelines.
- Projects can easily go over their initial timeframe or budget, create conflicts with existing architecture, or get derailed by mismanagement.
- Agile and Scrum takes dedication and a solid understanding of the underlying process to pull off properly.
    - Important to have at least one dedicated Scrum master on your team to make sure sprints and milestones are being hit and the project does not stall out.

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Processes & Plans Are Just Guesses

- Every software development process and method comes down to five basic principles:
  - Know what you're building and why.
  - Choose the process that feels right for you and your team's goals.
  - Design and build working software.
  - Put it in users' hands and listen to their feedback.
  - Use that feedback to make it better.

- Remember, it's a lifecycle. If you don't get it right the first time around, understand why it didn't work, try a different process and start again.

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