D0020E PROJECT IN COMPUTER SCIENCE 2022/2023 LECTURE 6.2: MODELING

Ulf Bodin

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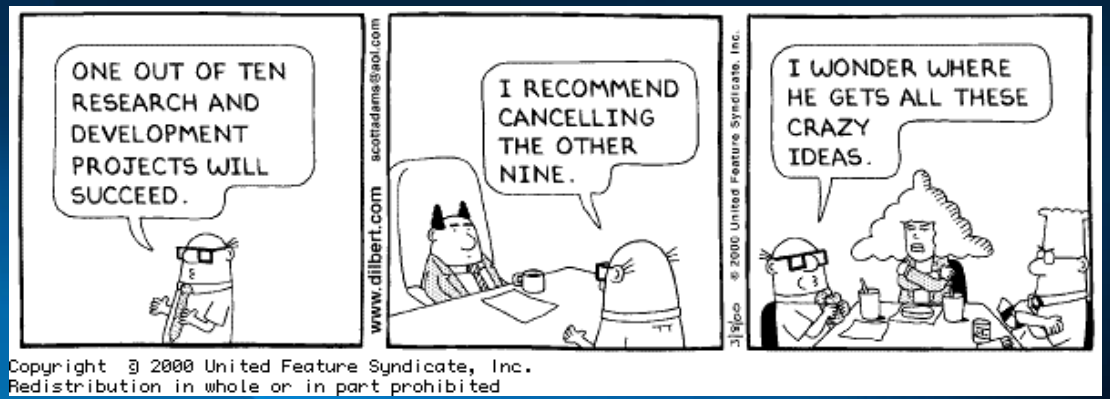

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This part of the lecture

- The beginning of the development process... ✔
  - The Uniform Modeling Language (UML) ✔
  - The System Expert and The User Group ✔
  - Actors ✔
  - Use Cases ✔
  - Use Case Diagrams ✔
  - Activity Diagrams
  - Storyboards
  - Roles and Responsiblities

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Activity Diagrams

- An activity diagram shows flow control within a system

- An activity diagram is a special case of a state chart diagram in which states are activities (“aggregated functions”)
- These are related to use cases!

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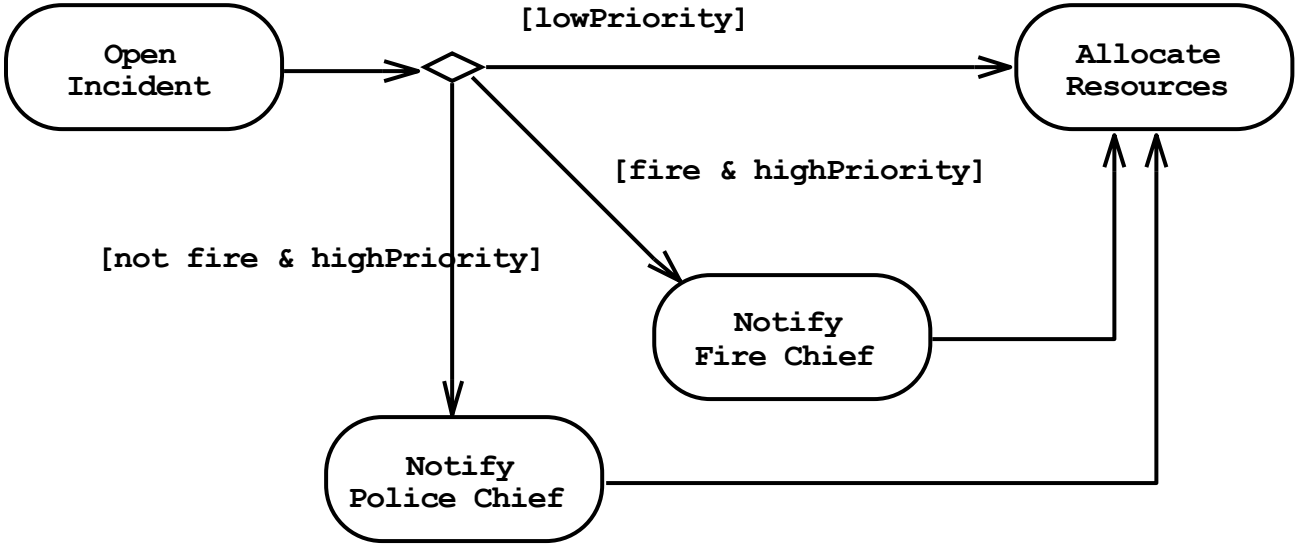
Activity Diagram: Modeling Decisions



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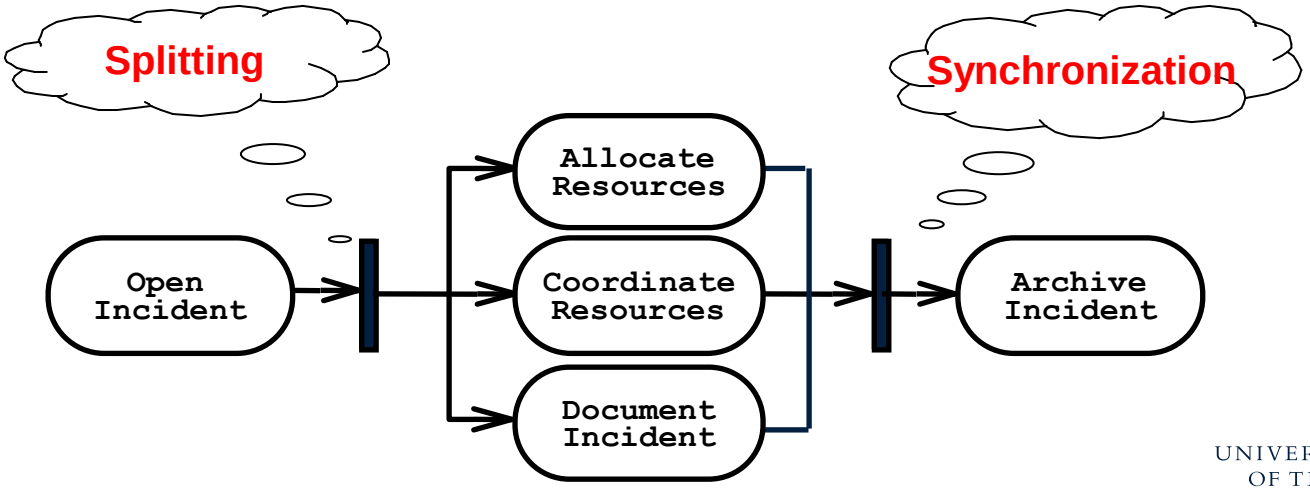
Activity Diagrams: Modeling Concurrency

- Synchronization of multiple activities
- Splitting the flow of control into multiple threads



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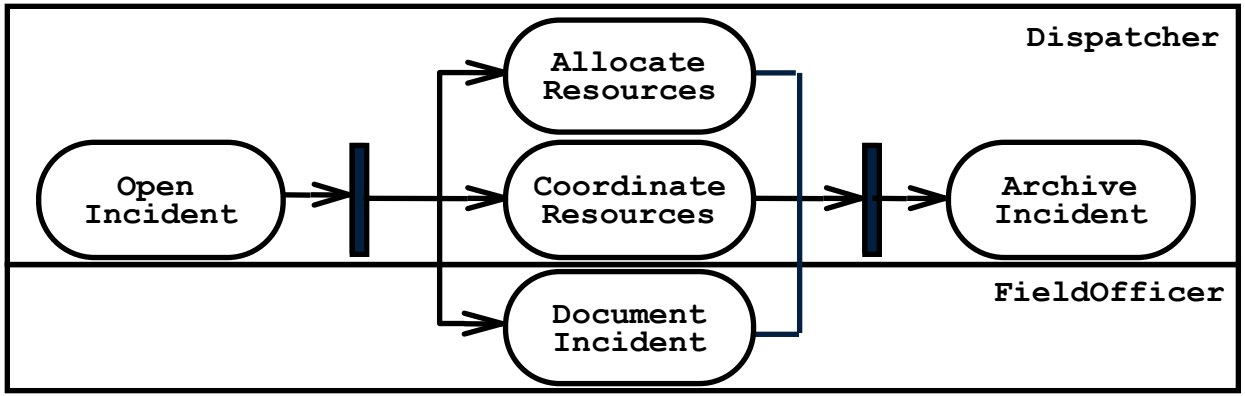
Activity Diagrams: Swimlanes

- Actions may be grouped into “swimlanes” to denote the object or subsystem that implements the actions.



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Storyboarding

- Storyboarding is an excellent technique to visualize interaction!
  - Make at least one per major use case

- ”A step by step visualization of the users actions”

- The primary tools: pen and paper!

  (CASE-tools…=…Carbon Assisted Software Engineering ☺)

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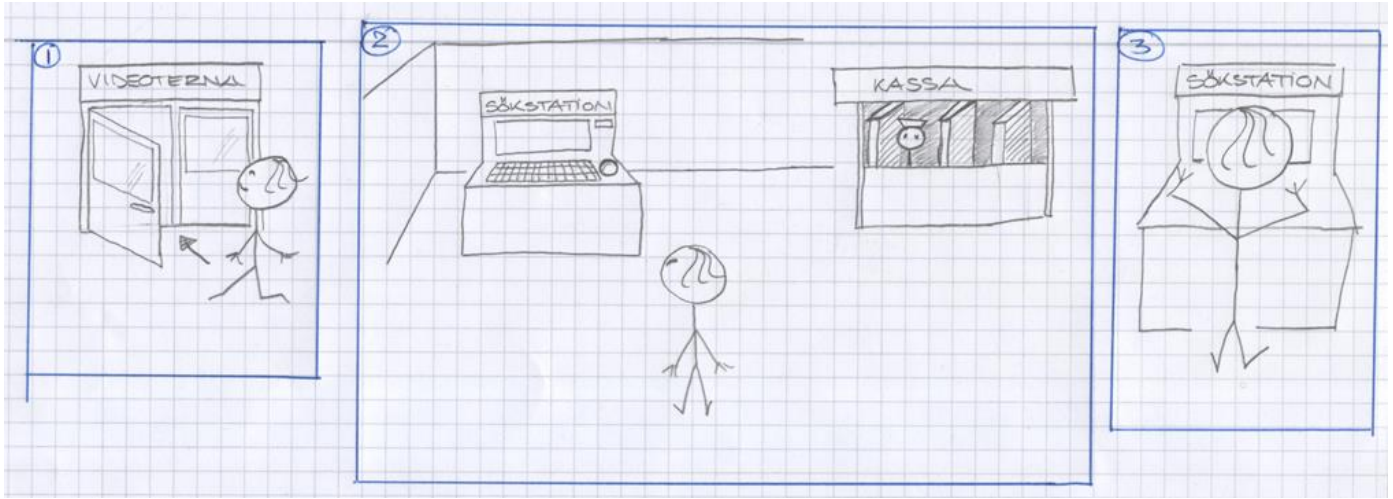
Storyboard example

Actor: Customer
Use Case: Rent Movie



Enter shop.

Locate terminal.

Use terminal.

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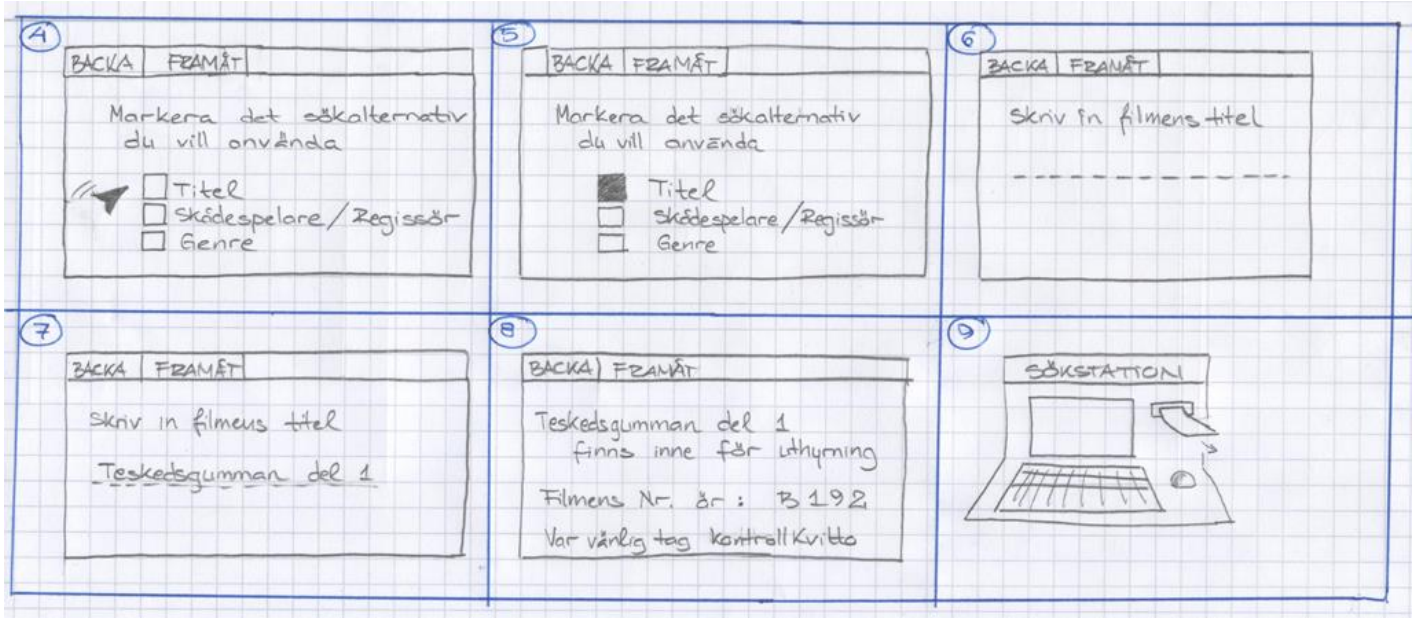
Storyboard example

Select criteria.

Select criteria.

Enter title.



Enter title.

Verify selection.

Print selection.

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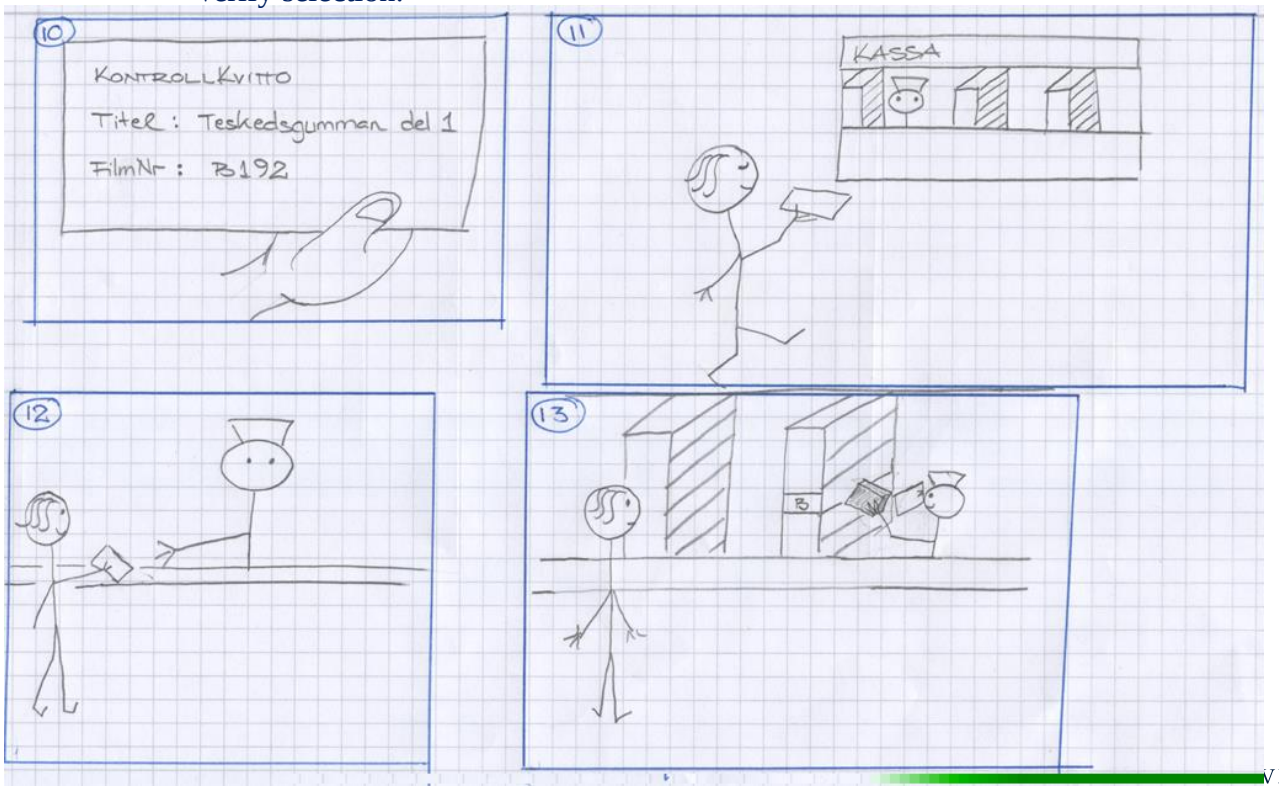
Storyboard example

Verify selection.

Locate counter.



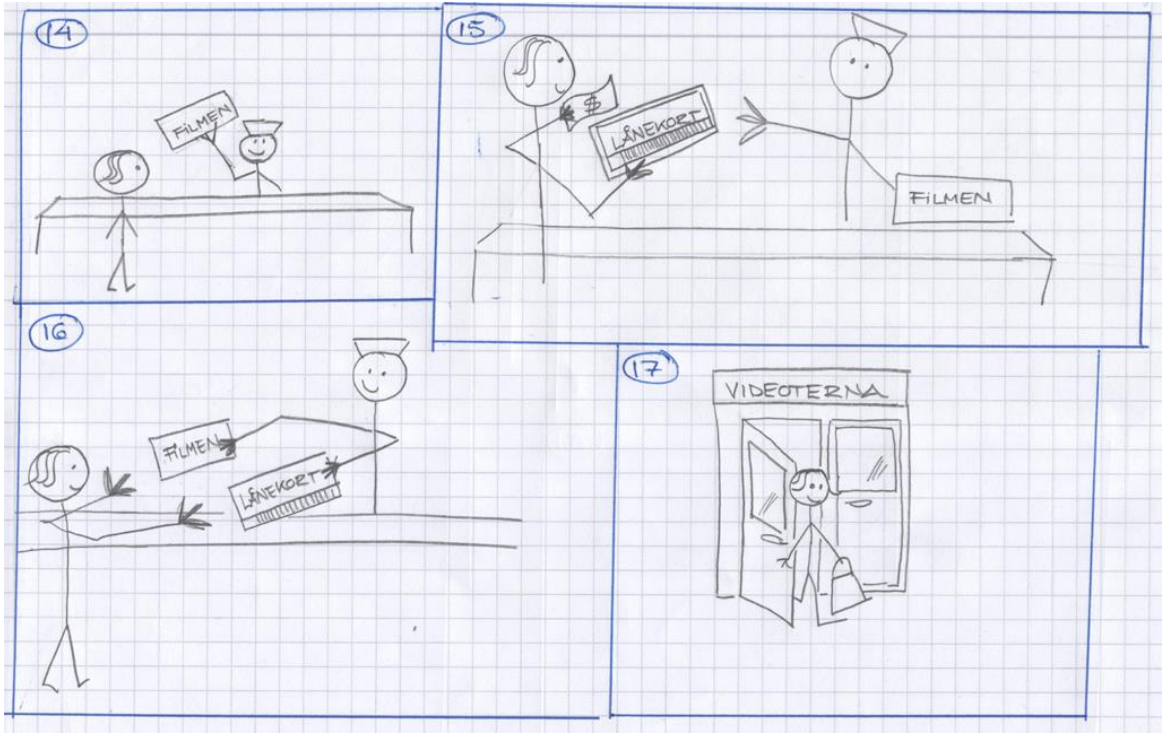
Show selection.

Wait for film.

Storyboard example

Verify film.

Pay and show ID.



Get film and ID.

Exit shop.

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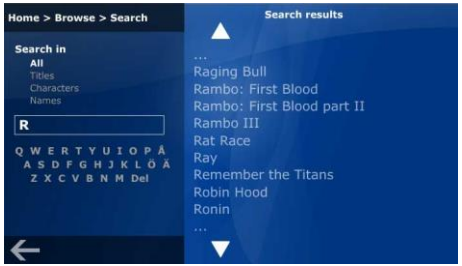
Graphichal storyboards, example 1

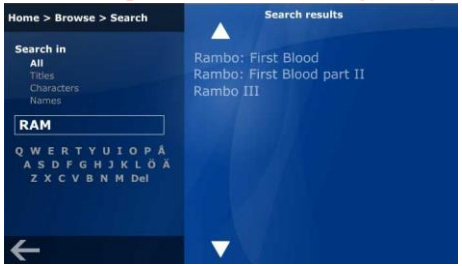
1. Select Movies

2. Select personal movie (King Kong)

3. Select to search

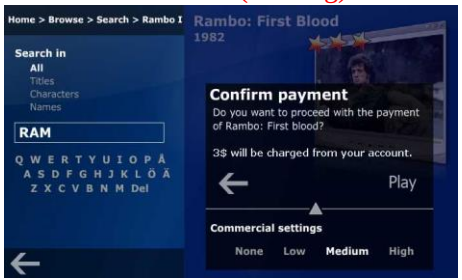


4. Enter characters (filtering)



5. Select found movie (Rambo FB)

6. Select to Play movie (Rambo FB)



7. Confirm payment to play

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Storyboards

- Write which actor and use case is described by the storyboard!
- Name and number each picture so that you can refer to them easily!
- Always start with the **entry condition**, where the user starts interacting with the system (just like with the use case).
- Always end with the **exit condition**, where the user stops interacting with the system (just like with the use case).
- Only do one step at a time! It should be easy to understand!
- Show the activity! What happens? Describe what happens between each picture.

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Storyboards, but what next?

- Use the storyboards to get feedback on your use cases from the user group and the system expert (product owner)
  - Fewer unknowns - fewer risks!
  - The **storyboards** are your **first prototypes**!
    - Paper is cheap and quick to use!
    - Feedback from users almost immediately!
    - Show picture after picture and ask the user to **complete a task**, **study**, and **learn**! Find faults early!

- Note that everything is linked together:
  - Use case
  - Storyboard
  - Activity diagram
  - Sequence diagram
  - Test case

Faults in how a system should be used leads to very expensive corrections – If they are even possible to correct!

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Example table of Use Cases

Use Case (#. Name)	Cost (1=low 10=high)	Value (1=high 10=low)	Risk (1=low 10=high)	Dependency (#)
...	...	...	...	...
15. Create report	2	2	6 To be developed	14, 11, 5
16. Edit report	4	7	2 Integrate inhouse tool	15
17. Store report	5	2	7 Database by subcontractor	16
18. Send report	3	5	5	15, 17
19. Search report	4	4	7 Database by subcontractor	15, 17
20. Print report	1	5	4	15
...	...	...	...	...

CVR	Development order
=2*2*6=24	1
=4*7*2=56	3
=5*2*7=70	4
=3*5*5=75	5
=4*4*7=112	6
=1*5*4=20	2

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”Failing gracefully”

- Experience is won through an equal amount of
- successes and failures.

- One way to become truly successful is to know how to ”fail gracefully”!

- Start small and simple, then evolve in small steps!
  - A failure does not mean that too much is lost. It’s small!

- Manage risks by:
  - Identifying risks early, then weigh value against risk to prioritize work.
  - Doing the parts of the system with least value/risks ratio last!
  - Starting with studying critical risks! (The hardest parts)

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How to do a design...IMHO!

- Develop the text description of your system.
- Identify the actors of the system.
- Try to find the actors uses of the system and express them as use cases.
- Attach values to the use cases:
  - Cost (Time/Resources)
  - Value (Customer)
  - Risk (Unknown/Complexity)
  - Dependencies on other use cases
  - Priority
  - Metrics (How to measure)
- Start with a minimal set of use cases – then evolve!!!
- Make use case diagrams to view how use cases relates to actors.
- Draw activity diagrams where activities (use cases) are related!
- Make simple storyboards on paper for the use cases – it will make these simpler to understand.
- Make paper prototypes! (rapid prototyping)
- Make prototypes! Throw away! Start small! Evolve!

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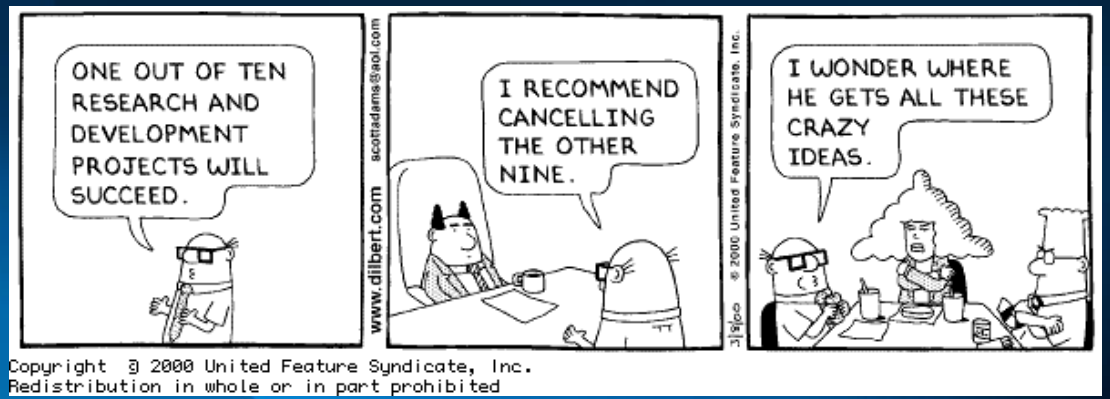

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