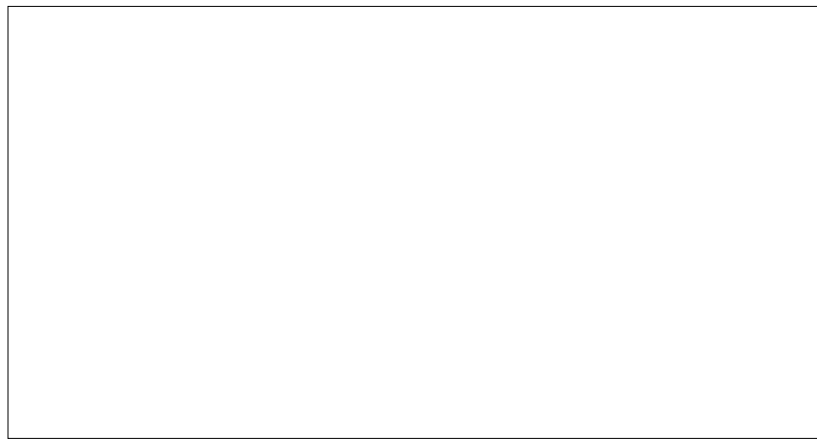


Game Development

What is a game?



Books/Movie vs. Game

Good books have

- Place
- Era
- Plot
- Characters
- Relationships

And so do games?

What is the difference?

Toy/Puzzle vs. Game

- Is a toy a game?
- Is a puzzle a game?

Toy/Puzzle vs. Game

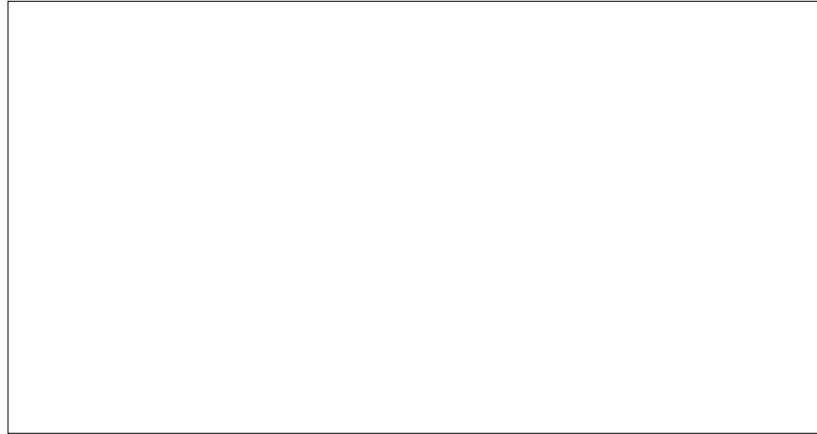
- Is a toy a game?
- Is a puzzle a game?

- Both can be challenging and complex
- However they are not a game!
 - Outcome is predictable and static
 - Outcome does not change

What is a game?

- A game is an **interaction** where a player tries to **achieve** (meet) a **goal/objective** through a **sequence of actions** (plays/moves), which are chosen out of many possible **choices**

What makes a game a good game?



What makes a game a good game?

- “A great game is a **series of interesting and meaningful choices** made by a player in pursuit of a clear and compelling goal”

Sid Meier – game designer

Creating a game

- What is required to create a game?

What is required?

- Idea
- Game objectives
 - What is the purpose of the game (game maker)
 - What is the objectives of the game (player)
- Story
 - Preamble
 - game story
- Tasks
 - What does one have to do to meet the objectives
- Graphics
 - Background
 - Costumes
- Animation
 - What type of animation (realistic, cartoon animation)?

What is required?

- **Music**
 - Game branding
 - Company branding
 - What is the objectives of the game (player)
 - Directing the user (suspense, success, relax)
- **Voice**
 - Narrator - reading game story, filling the missing parts
 - Other non player participants (objects, live objects)
 - Background noises
- **Sounds**
 - Special effects

Who participates in computer game?

Part	Participants
Game objectives -	Producer, writer, scriptwriter
Story -	Writer, scriptwriter
Tasks -	Script writer
Graphics -	Artists, computer scientists
Animation –	Animator, computer scientist
Music -	Musician, sound engineer
Voice -	Actor, actress,
Sounds	sound engineer

Participants

- Each team member is required to fill a gap

Team Member \equiv An Expert

Musician/Sound Engineer

- Expertise:
 - Create music
 - Mixing sounds
 - Special effects
- Audio design must follow game logic
- Audio must complement the game
- Sound logic drives
 - Music instruments
 - Style
 - Level

Script Playwright

- Expertise:
 - Storytelling
 - Adjustments of existing stories
 - Games,
 - Dialogues
- Sets up
 - goals
 - Story background
 - Story flow

Level Designer

- Expertise:
 - Games
 - Graphics design
 - creativity
- Divides story flow into phases
 - Adjust each phase to a level of difficulty
 - Determines how the level would flow
- Design
 - layout
 - Connectivity to other levels
 - Amount of details and duration at level

Graphics Designer

- Expertise:
 - Gaming
 - Artist
 - Graphic Design
- Creates attractive images
 - Design visualization of level components
 - Design costumes
 - Colour combination
 - Creates a look and feel
- Maintain consistency throughout the game

Animators

- Expertise:
 - Imagination
 - Choreography
 - Artist
 - Domain subject expert
 - Animation
- Design the moves
- Determine which models to use
- Design the control/connection moves
- Determines the type of animations
 - Video moves
 - Key frames

Software Engineers/Programmers

- Expertise:
 - Computer science theory and applied
 - Computer graphics, AI, DB...
 - Programming languages, script languages
- Integrates the game bits and pieces together
 - AI
 - Game logic controls
 - Animation control & playback system
 - Game physics
- Design the graphics engine
- Performance tuning
- Ensure proper resource management

Other Experts

- Voice artists/designers
- Game testers
- Marketing
- Sales
- Technical writers
- Music producers
- Network experts
- Physicist

Participants

Creation

- Artists
- Software Engineers
- Musicians
- Writers/scriptwriters
- Sound engineer
- Animators

Administration

- Producers
- Directors
- Project managers
- Suppliers
- Distributors

Phases of game design

- Conceptualization
- Script writing
- Development
- Distribution
- Feedback analysis
- Sequel / similar game

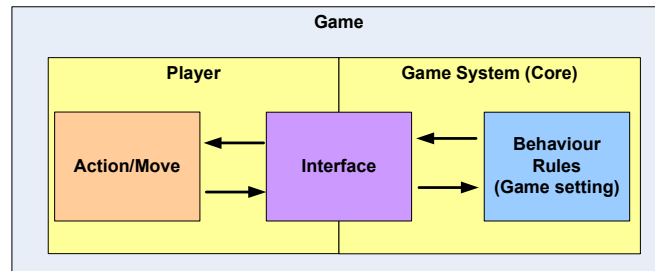
Phases of game design (timeline)

- Conceptualization – 1 - month
- Script writing – 1-3 months
- Development – 6-10 months
- Distribution – 1-3 months
- Feedback analysis – 1-12 months
- Sequel / similar game – start over

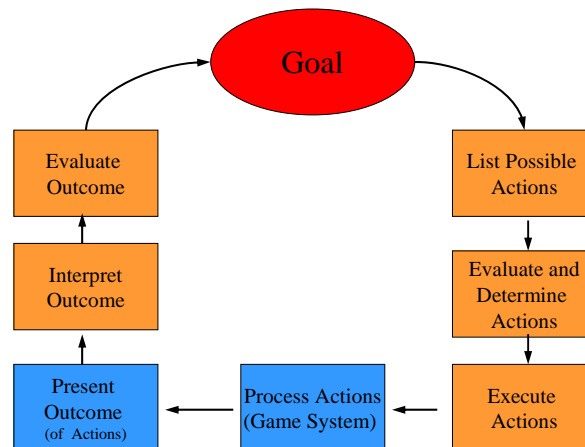
Games and Computer Science

- Virtual reality
 - Computer graphics
 - Artificial intelligence
 - Real-time
 - Networking
 - Graph theory
 - Database
 - Animation
- Sound
 - Input/output
 - Resource management
 - ...

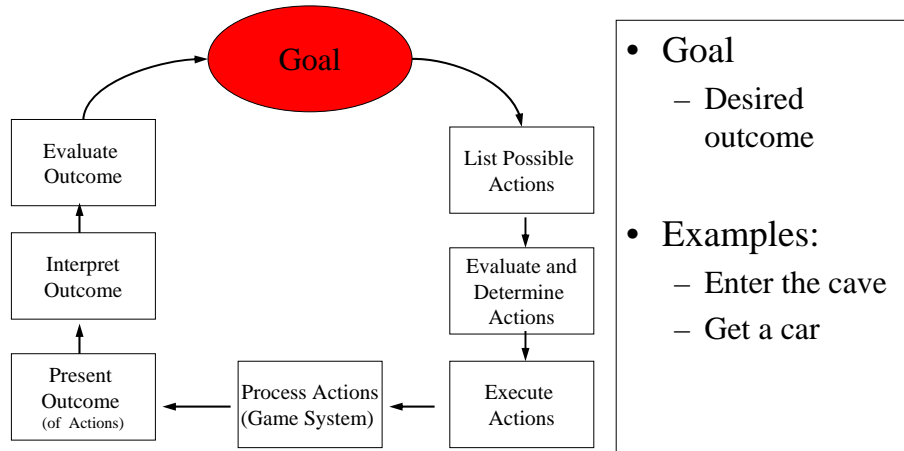
Player-Game Model



Stages of Game Interaction

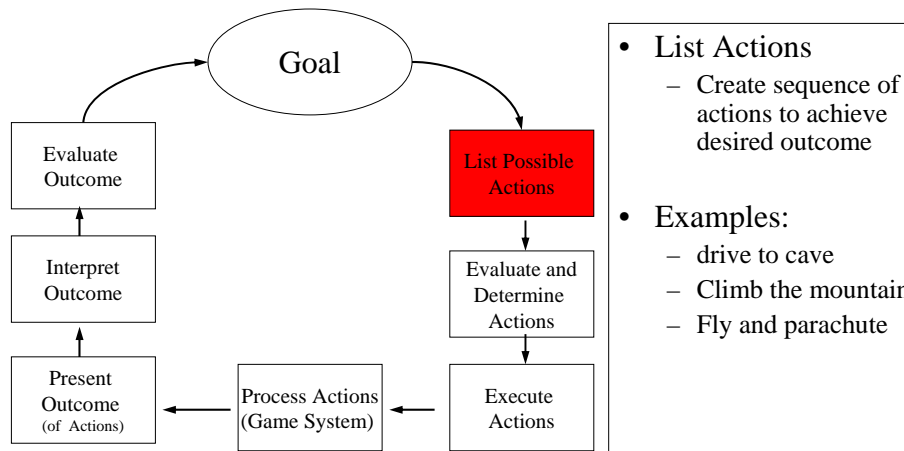


Stages of Game Interaction



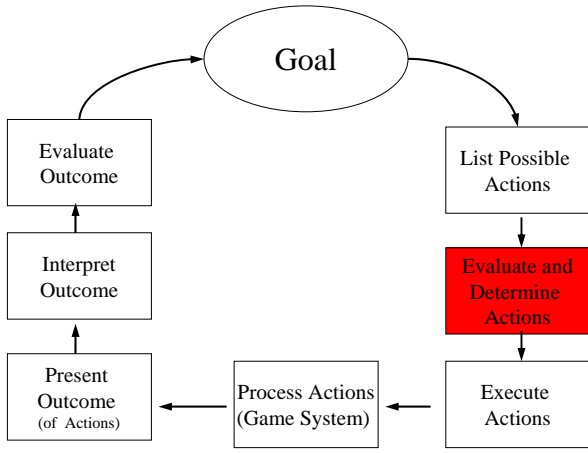
- **Goal**
 - Desired outcome
- **Examples:**
 - Enter the cave
 - Get a car

Stages of Game Interaction



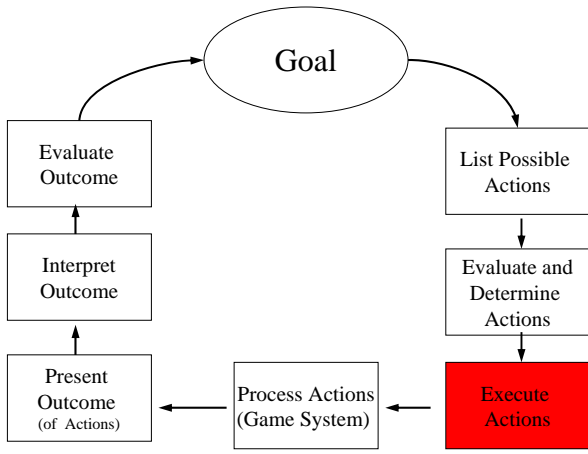
- **List Actions**
 - Create sequence of actions to achieve desired outcome
- **Examples:**
 - drive to cave
 - Climb the mountain
 - Fly and parachute

Stages of Game Interaction



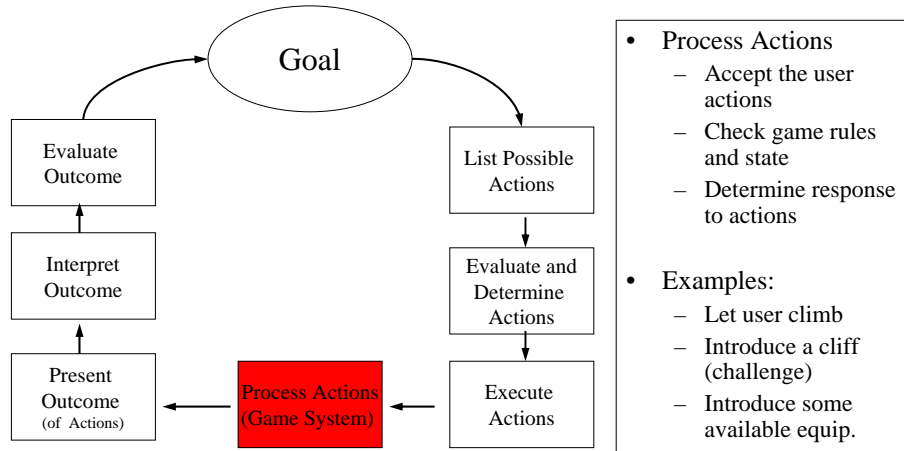
- Evaluate
 - Determine which action sequence is best
 - Determine order of smaller steps
- Examples:
 - Drive to cave
 - Lots of obstacles,
 - Slow road
 - Carry larger equipment
 - Climb the mountain
 - Cheap
 - Slow
 - Small equipment
 - Fly and parachute
 - Expensive
 - May miss the target
 - Small equipment

Stages of Game Interaction



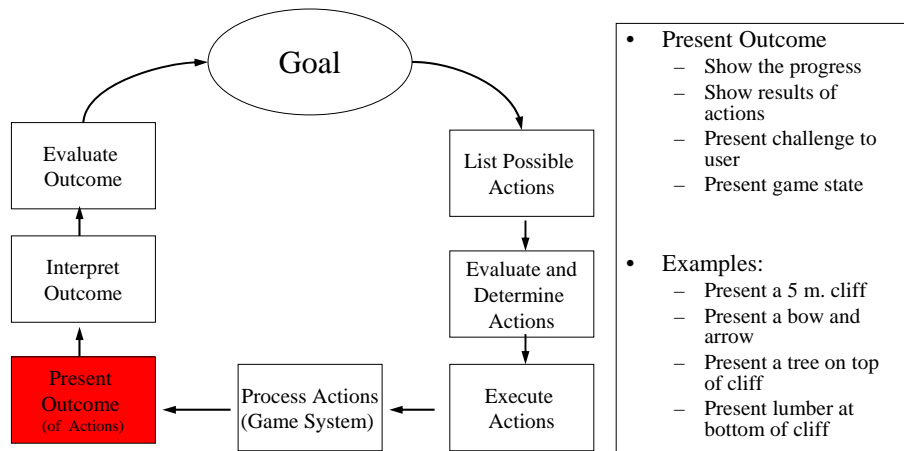
- Execute Actions
 - Start manipulating the game to perform desired actions
- Examples:
 - Organize equipment
 - Climb the mountain

Stages of Game Interaction



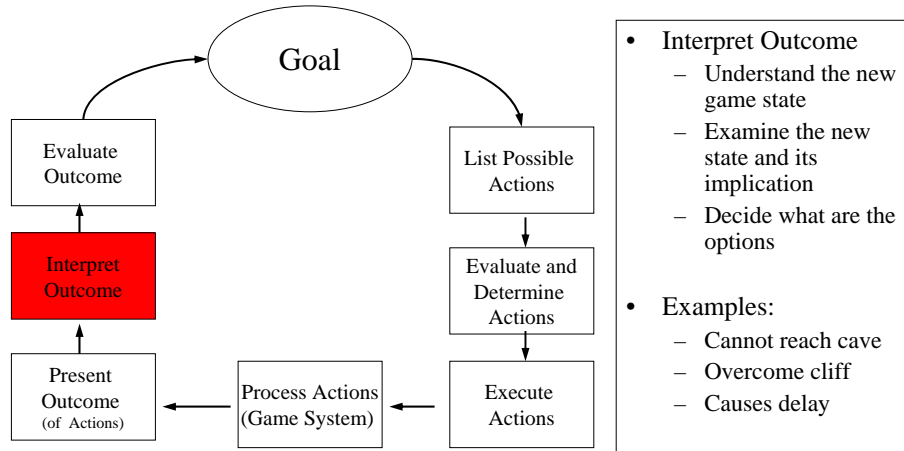
- **Process Actions**
 - Accept the user actions
 - Check game rules and state
 - Determine response to actions
- **Examples:**
 - Let user climb
 - Introduce a cliff (challenge)
 - Introduce some available equip.

Stages of Game Interaction



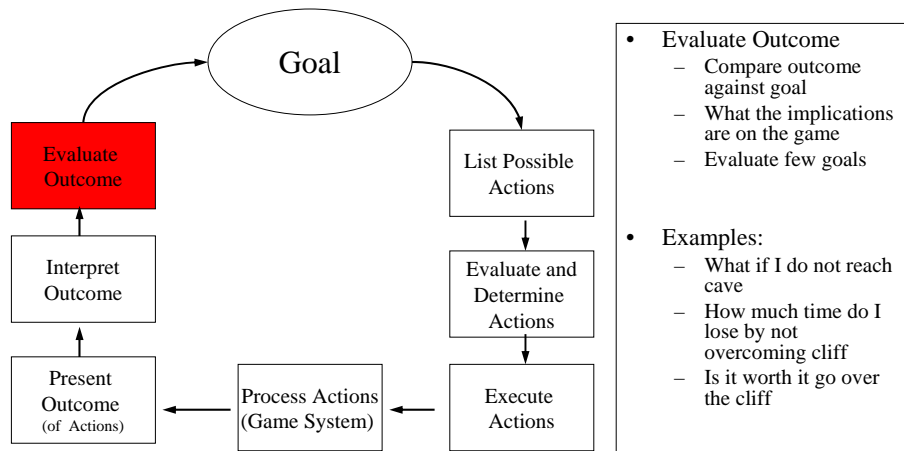
- **Present Outcome**
 - Show the progress
 - Show results of actions
 - Present challenge to user
 - Present game state
- **Examples:**
 - Present a 5 m. cliff
 - Present a bow and arrow
 - Present a tree on top of cliff
 - Present lumber at bottom of cliff

Stages of Game Interaction



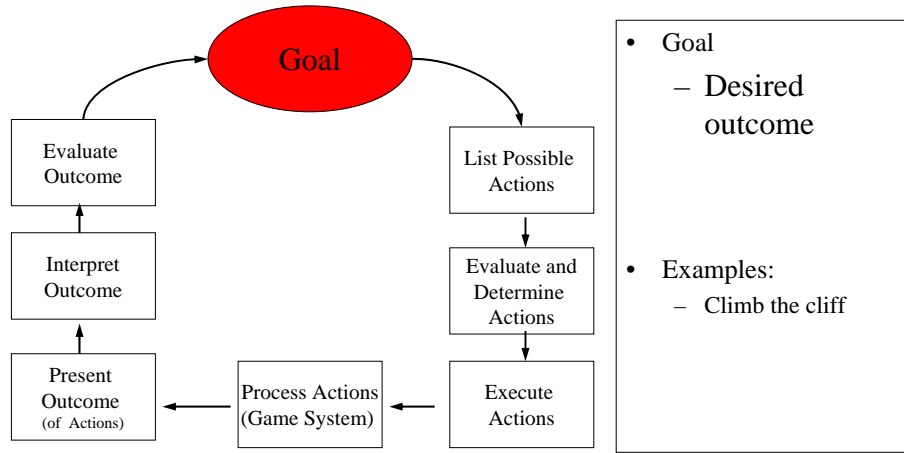
- Interpret Outcome
 - Understand the new game state
 - Examine the new state and its implication
 - Decide what are the options
- Examples:
 - Cannot reach cave
 - Overcome cliff
 - Causes delay

Stages of Game Interaction



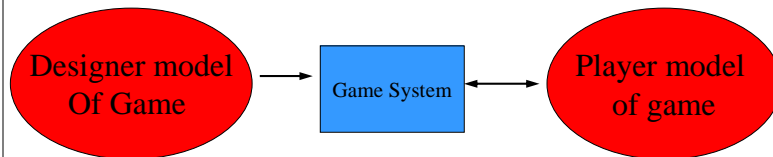
- Evaluate Outcome
 - Compare outcome against goal
 - What the implications are on the game
 - Evaluate few goals
- Examples:
 - What if I do not reach cave
 - How much time do I lose by not overcoming cliff
 - Is it worth it go over the cliff

Stages of Game Interaction

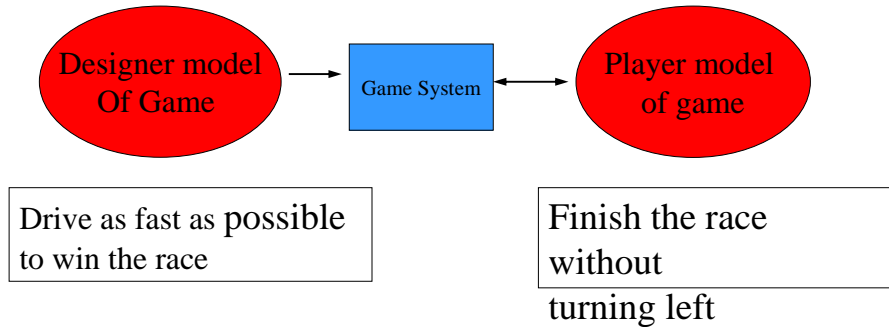


Game Goals/Objectives

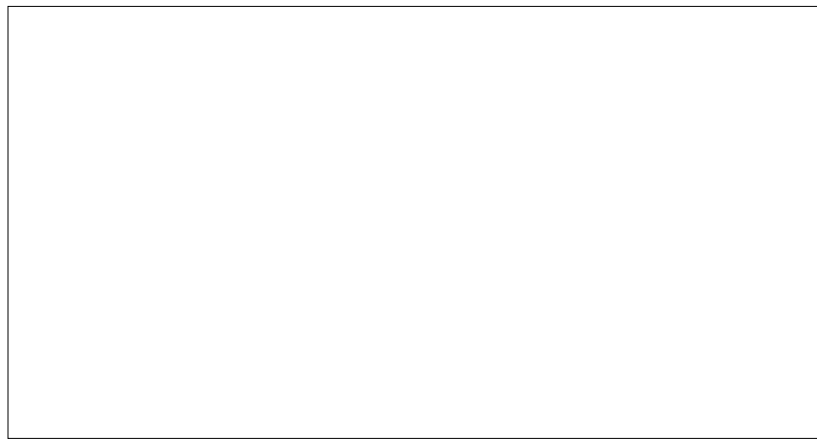
- Two people who do not interact –
 - Player
 - Game designer



Car Racing Game



Choices



Choices

- Players have choices
 - Each choice create a new situation that must be addressed (big or small)
- Outcome
 - Outcome depends on the player's choice(s)
 - Not only the end result

What makes a game a good game?

It is all about choices!!

- “A great game is a series of **interesting** and **meaningful choices** made by a player in pursuit of a **clear** and **compelling goal**”

Sid Meier – game designer

Choices and Consequences

Choices

- A question that is presented to the user
 - What vehicle do you want?
- A set of options that are presented to the user
 - A road junction
- Outcome
- Results of user's choice
 - A 4x4 vehicle consumes more gas (limiting range)
 - A left turn in the junction (a steep hill or longer road)

Well designed choices

- Require a user to make a decision (think)
- Are related to user's objectives
- Motivate the user to make a decision
- Have some good and some bad effects
- Are different from other choices

Types of Choices

- Obvious \Rightarrow no choice is to be made
- Uninformed \Rightarrow arbitrary decision
- Calculated (weighted) \Rightarrow good and bad results
- Real-time \Rightarrow little time to think
- Unrelated \Rightarrow choices do not affect the game
- Reversible \Rightarrow choices can be changed
- Irreversible \Rightarrow choices cannot be changed

Impact of Choices

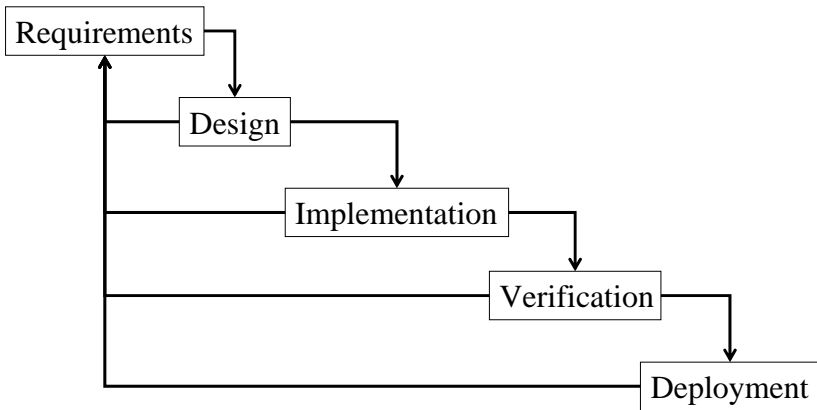
- Short term \Rightarrow only local impact
- Immediate \Rightarrow new decisions must be taken
- Long term \Rightarrow usually strategic effect
- No impact \Rightarrow choices are not related to game
- Reversible \Rightarrow user can learn from mistakes
- Irreversible \Rightarrow user must start over

SW Development

Software Engineering

- Most team members are not CS
 - Graphics designers
 - Audio engineers
- Some have limited CS knowledge
 - Project managers
 - Marketing personnel
- Education phase must occur when working in a cross disciplinary environment

SE Waterfall Model



Waterfall Validation Model

