**Simulation!**

* What do we mean by simulation?
* What is a simulation game?
* These are crucial questions.
* What *IS* a simulation?
  + A representation
  + “This is not a pipe”
    - The treachery of images
    - Rene Marguerite.
  + Invokes something without actually being something
  + Representation is not simulation
  + A procedural (rule-based) representation of aspects of “reality”
    - The require observing or interacting with a process
    - Simulations are representations
    - They are process-based
    - They have a particular relationship to “reality.”
      * Maps meet criteria 1 & 3, but not two.
* It’s only through actually playing a D&D character that the representation of the character on a sheet turns into Simulation
* A character sheet is representation
  + Playing it makes it simulation
* The Game of Life
  + John Conway 1970
  + Explores cellular automata
  + John Conway was a mathematician
  + Interested in problem of trying to find hypothetical machine that can make copies of itself
  + Emerged as Conway’s attempt to actualize these ideas
  + Rules
    - For a cell that is alive
      * Each cell is 1 or 0 neighbors dies - loneliness
      * Each cell with 4 or more dies- overpopulation
      * 2 or 3 survives
    - For a dead cell
      * Each cell with 3 neighbors becomes populated
  + Different patterns
    - Block
    - Beehive
    - Loaf
    - Boat
    - Blinker
    - Toad
    - Beacon
    - Pulsar
    - Penta decathlon
    - Glider (move across screen)
    - Spaceship (move across screen)
    - R-Pentomino
      * An interesting seed creature
        + Takes over 1000 generations to stabilize
  + Emergent Behavior
    - Simple starting conditions and simple rules can form highly complex behaviors
* But what counts as a simulation GAME?
  + We can think of all games as simulations, not all simulations as games.
  + Certain things can deepen our understanding of real world model, and might have some playful interaction, but don’t necessarily invite the player to complete any goal.
  + A simulation goal is a game in which the players ability to accomplish goals depends on the player’s ability to understand and manipulate the simulation.
* Ace of Aces
  + Designed by History teacher in the 1980’s
  + Simulates a dogfight between two aircrafts in WW2.
  + It does all this through books, paper based.
  + Two player game, German and Allies.
  + Each book contains more than 200 pages with an illustration of what the player sees
  + The rules represent the subject matter
  + Through the process of playing it, it shows some of the tensions of a dog-fight
* Every simulation needs to abstract and simplify the situation because real life is so complex
* The difference between what we’re doing and the real world system make it engaging
* What we choose to leave out says more than what we include
* **Key Game: Microsoft Flight Simulator**
  + 1980, Bruce Artwick, subLOGIC, PC, USA
  + FS1 Flight Simulator originally for Apple Computer
  + Loads of sequels
  + An attempt to simulate flying an airplane
  + No quantifiable outcome, no explicit goal
  + At its heart it is just something to play with and get a deeper relationship with
  + It’s VERY hard, lots of controls.
    - You don’t just steer left and right, you have a whole compliment of controls
    - You control EVERYTHING on the plane
  + It requires time and study to really get good at
  + Simulations are abstractions that have to radically simplify their subject
    - Doesn’t mean it can’t be complicated
  + There aren’t traditional game-like mechanics on top of it
  + Later versions of the game added a lot more
    - World maps
    - Airports
    - Level editors
    - You could pilot different planes
    - Weather and wind elements
    - More and more photo-realistic
  + WHY
    - A vertical slice, all versions focus on one pilot flying a plane
    - It gains depth by limiting and abstracting its subject
    - The vehicle sim is a way for these games to go deep and narrow on a subject
    - Simulations are often used as an education strategy
      * You can simulate something fake as well, like piloting a giant robot
    - We can see this interesting and uncomfortable similarities between training real life skills and escapist fantasies
* Goat Simulator
  + 2014
  + Difference between what is being simulated and real-world subject
* Surgeon Simulator
  + 2013
* The gap between reality and the procedural representation of reality leaves room for humor and engagement
* @simGenerator creates random sims
* **Key Game: The Oregon Trail**
  + 1971, Don Rawitsch, Platform, USA
  + Players lead a family across the North American continent to reach a prosperous new life
  + Designed specifically to educate
  + Give players a sense of the trials and tribulations of a famous era in history
  + Rawitsch was hired to create educational software and it was released in most schools
  + The story of Oregon Trail is the story of the Apple II computer
  + WHY
    - A successful educational game
    - The reasons for it had something to do with design
    - Challenging, but wide variety
    - The context it was deployed (Apple II)
    - Unlike many educational games, it doesn’t pull punches. You usually die.
    - It gets across the conditions of travel
    - While it’s a historical simulation, it’s only representing a SINGLE slice of history
      * This American west is mostly empty. The violence and displacement of indigenous people is left out of the game.
        + It says it’s a simulation of reality, but it’s never without simplification or reduction. Whose reality are we simulating?
* **Key Game: Lemonade Stand**
  + 1973, Bob Jamison, Apple II, USA
  + Preinstalled on most apple computers
  + Just enough variables to make it interesting
  + WHY
    - Capitalism for everybody
    - It’s not trying to simulate something objective
    - Instead it’s simulating a human made system
    - It’s not really simulating capitalism, but the principles by which it operates
      * Supply, demand, risk, market, etc.
* **Key Game: Sim City**
  + 1989, Will Wright/Maxis, PC, USA
  + Iconic game among simulation games
  + Lots of expansions
  + Designed by Will Wright
    - He created this string of important games
    - Pinball Construction Set (1983) inspired him
    - Also inspired by Christopher Alexander (architect)
    - First game, Raid on Bungeling Bay (1984) helped shape sims
      * Working on map creator was more fun than playing the game
    - Sim City (1989) for Mac was originally made for Commodore 64
    - It could neither be won nor lost
    - Publishers were hesitant to publish it
    - Jeff Brown from Maxis agreed to publish it
  + Came out for Mac and Amiga
  + Player takes the role of omnipotent mayor and lay down plans for the city
  + Sometimes Disasters hit and you have to do things
  + Massive hit, universally acclaimed
  + Sim City 2000 (1994)
    - Improved visual fidelity
    - Upped complexity
    - You could add real buildings, and your city could grow much more sprawling
    - You didn’t just connect each building with electricity, but you also needed water sources
    - The complexity eclipsed the fun for some players
  + Subsequent games increased the scope
  + Sim Copter (1996) and Streets of Sim City (1997) were made and neither were successful
  + These Sim games produced interesting games
    - Sim Earth (1990)
    - Sim Ant (1991)
  + In all these games there is a love of complexity, as well as the attempt to figure out, where the game is.
  + WHY
    - Mayor for life
    - A very extreme example
    - Magnasanti
      * Emergence through creativity
      * Beautiful evil conceptual art work
* Chris Crawford
  + Interesting if flawed game designer
  + Founder of the Game Developers Conference
  + Writer of first ever book on Game Design
    - The Art of Computer Game Design
  + He keeps a bead for every day of his life.
    - He has one jar for the beads that are left, and one that goes into another jar
  + Interested in social simulations.
    - Wants to solve the dream of interactive narratives
    - Tells meaningful stories
    - “People, not things!”
      * A quote from 1992 Game Developers Conference
      * Games about the human condition
      * He would slay this dream and prove he could do it
      * Pursuing that dream meant conquering the issues of interactive storytelling.
      * Started trying to make games about people and not things
      * PEOPLE GAMES
      * Made Gossip (1982, Atari)
        + A game about how much people liked each other or not
        + Wanted to simulate the dynamics of gossip
        + Tried to tackle subset of people interaction
        + Unfortunately, many people didn’t have a chance to play because the market crashed.
        + The “Pong” of People Games
* Social interactions often have a lot of complex things going on, so simulating people will ALWAYS be simplified.
* Simulations of people are always reductionist—it’s important to be conscientiously reductionist.
* The Sims
  + 2000, Will Wright, Maxis, PC, USA
  + Sims precedent
    - The Turing Test
      * Named after Alan Turing
      * Helped invent computer science
      * Invented the Turing Test
        + This idea of “can you fool someone into thinking an AI is a real person”
        + Inspired by a parlor game in which a man and a woman answer questions on paper in a separate room. Players have to figure out what the gender of each writer is.
    - ELIZA
      * The Rogerian simulator
    - The ELIZA Effect
      * The tendency that people have to ascribe intelligence to computers without much prompting
        + Joseph Weizenbaum (1976)
    - Little Computer People
      * A life simulation game for the commodore 64 in 1995
      * Like a little dollhouse
  + THE SIMS
    - It’s had many expansions and newer versions
    - At the center of the sim are people
    - You can design their look, personality
      * Assign points to different attributes
    - You also design their homes
      * Like dollhouse construction
    - The houses are all located in a neighborhood and the player could have several houses and groups of people at once
    - Emergent interactions between each of your Sims is what makes the game fun.
      * Getting to know their personalities and watch their little stories play out.
    - The underlying system is controlled by objects with affordances. Every object has a list of things Sims can do with them.
      * The Sims themselves are also objects with affordances
    - Sims have different needs and things they need fulfilled
      * They choose what to do based on their needs.
    - Cultural representation
      * If you think about the idea of acquiring different objects and you’re just fulfilling needs with objects
        + There’s an ideology of consumer capitalism in the game
        + Common critique of the game, reducing someone’s life to their things
    - Even though it has this weird hyper-capitalist message it was also kind of progressive
      * Wasn’t entirely heteronormative
* Shadow of Mordor (2014)
  + Nemesis System
  + Orcs in the game are randomly generated and every orc has its own personality and vying among themselves for social goals
  + You see the social vying of the orcs in the game
  + There’s a synchronicity between the wrapping, the representation, and the simulation (since orcs are pretty simple already)
* Simulation as building on (and augmenting) our existing mental models
  + We all have this mental model of how people work
  + Simulations build on these existing models
  + They can also augment those models
* Performance as Simulation
  + Performative music games
  + History of games about performing music
    - Following prompts in time to music
    - Karaoke Revolution
* Guitar Hero (Harmonix 2005)
  + Very performative
  + Plastic guitar which convincingly recreates playing a guitar
  + Songs were well designed so that it felt like you were playing real music
* Rock Band
  + 2007, Harmonix, Xbox 360/PS3, USA
  + Full spread of instruments
  + Points to the peak of the music game trend
  + Digital layer to the game gave you a distance to the traditional social barriers that come along with normal karaoke
  + Because Rock Band is a kind of performative simulation, it’s very accessible
    - It builds on existing mental models
  + Party game
    - Accommodates different levels of difficulty.
    - The drums have the greatest fidelity of doing that thing in real life
  + WHY
    - Games-As-Performance
    - Socially Aware and manipulates social dynamics
    - Apex of musical games and plastic instrument genre
    - Wide appeal to both hard-core and casual players
    - Pioneering in micro-transactions
* FIFA (series)
  + 1993-present, EA Sports (Originally EA Canada), Sega Genesis, Canada (for release in Europe)
  + Inspired by the success of Madden
  + Originally called EA Soccer
  + During development they signed a 5 year deal with FIFA
  + Original version used dev names as player names
  + Originally going to be called Team USA Soccer, and then called FIFA
  + Sold over 500k in first month and became best selling game of 1993
  + Isometric viewpoint
  + The player controlled one of the 11 footballers on the pitch
  + You can flip between different players
  + Up to 4 players could play, or single player
  + All the FIFA games have remained largely the same
    - Notable for the iterative features and tweaks
  + FIFA is massively important because of these tweaks
  + Each title seeks to get closer to realistic fidelity of simulation
  + Bestselling sports franchise in the world
    - FIFA 2012 holds record for fastest selling sports game ever
* Gran Turismo (series)
  + 1997-present, Polyphony Digital, Playstation, Japan
  + Focus on Gran Turismo 3
  + First game (1997) took 5 years to develop
  + Gran Turismo 3 (PS2)
    - The difference between each iteration are not revolutionary, they are evolutionary.
    - GT3 has a wide selection of cars and tracks
    - All of them are based closely on real world cars and tracks
    - Best known for single player experience
    - Has very detailed physics simulation, so tiny changes in car accessories and shape make for big differences
  + WHY
    - Game or Simulation?
      * Blurs the line
* Elite
  + 1984, David Braben and Ian Bell, PC (BBC Micro), UK
  + First, genre defining, space trading game
  + You could become a space pirate
  + 3D Wireframe perspective
  + Spore was an evolution of this and Sim Earth
  + POWERS OF 10
    - You start with life, individual organisms, and then you keep zooming out to powers of 10.
    - This was the promise of Spore, an ambitious game.
    - Pushed the limits and ambitions of what the sim game could uncover
    - Looks at BREADTH VERSUS DEPTH
* THINGS WE LEAVE OUT OF PROCEDURAL REPRESENTATION ARE JUST AS IMPORTANT AS THE THINGS WE LEAVE IN.
* Simulations help us build tiny representational models