1. Encyclopedic/Spatial/Procedural/Participatory affordances
   1. These are four defining representation affordances in digital medium. Encyclopedic affordances are the vast numbers of bits of information, the extensive range of legacy and computational media formats and genres, and its ability to represent any process through logical symbolic representation. Participatory affordances allow an interactor to manipulate, contribute to and influence digital content and computer processing. Procedural affordances are the most important because it handles the processing power of the computer which allows us to specify conditional, executable instructions. Spatial affordances can represent space using all the strategies of traditional media such as maps, images, video tracking in a digital environment.
   2. Encyclopedic affordances can range from text, photographs, animation, audio recording, live image, databases, search engines and able to represent logical symbolisms such as simulations of highly complex systems. A participatory example is any software you can interact with such as Google Docs. Procedural affordances can create a new representational strategy such as spoken language or recorded moving images. Spatial affordances can navigate digital media artifacts unlike real world situation. We get a better sense of immersion with familiar metaphors such as a maps app on your phone. We know that an arrow pointing north is a compass to show our sense of direction according to our position on earth.
2. Simulations/Emergent behavior
   1. Simulations is a system with behaviors. This can be achieved by human-performed games, computer program or a combination of both. It abstracts and imitates key components of an imaginary or real system. Emergent behavior is the phenomenon characteristic of complex systems where unknown behaviors arise as the result of individual actions of multiple agents.
   2. Simulations examples can be a simulation of a planet’s surface, where the user can understand what it’s like to be in another planet’s surface by interacting, smelling, touching, seeing, etc. In a simulator, we can run multiple test to find emergent behaviors in a system before it is released such as a simulator to test if someone’s weight in another planet will affect the physical actions of a person and how they will react to this new environment.
3. Robustness/Scalability
   1. Scalability is a desired quality in systems because we can accommodate more users and larger data sets without having to reengineer a process or system. Robustness is another desired quality because it indicates reliability and flexibility.
   2. We can think about a small database that can have less than a hundred records but because the software is scalable, we can scale up to a bigger database that can accommodate one million records. If the system is robust, we can comfortable transition to the new system or program and not have conflicting issues with reliability or errors.
4. Synchronous vs. Asynchronous
   1. To be synchronous, it must happen at the same time and asynchronous is something that is not happing at the same time.
   2. Synchronous is useful for live chatting such as voice chat or video chat. Asynchronous is like email or Instagram posts so that people can view them at different times.
5. Mental model/Machine model/Think-aloud protocols
   1. A machine is any manufactured device that augments human effort, performing its automated task with minimal human intervention. A mental model is the mental representation of someone’s though process about how something works in the real world. Think aloud protocol is a method for studying the responses of users to interactive artifacts and development.
   2. We can think about a machine model example such as the Amazon Alexa. You ask it a question and it does the computational requirements to answer your questions. We can think of the supply and demand mental model to help understand how the economy works. Think aloud protocols can find solutions, problems by having the participants say whatever comes to mind as they complete a task to see how they are feeling, doing, or thinking which gives an observer an insight into the participant’s cognitive process.
6. Visibility/Feedback
   1. Visibility is the process of making a computing machine clear to the interactor before, during and after an action. Feedback is required to monitor or change behavior.
   2. An example of visibility is an editing program with an Apple Pencil that has an icon of an eraser which makes it clear that this tool is meant to be used to erase something from an image. We can get feedback from users and see if they understood what that icon meant.
7. Direct Manipulation
   1. A design in which features are a natural representation of actions which promote the notion of performing a task.
   2. In our previous example, we said the icon of an eraser promotes direct manipulation by erasing as if you would with a physical pencil.
8. Usability/Accessibility
   1. When a product is said to be useable, it means we have measured the products potential to accomplish goals desired by the user. Accessibility can discriminate user experience for people who have disabilities.
   2. The usability of an Apple Pencil to write on an iPad is always an option since they were designed to be used together, however if you do not have hands to write, this accessibility is not useable to you.
9. Situated Action Theory
   1. A designer’s job is to enhance communication, predict the users state and making a machines assumption visible which can give a user control over a sequence instead of expecting user to conform to roles. Nothing can be understood until first understanding its context.
   2. An example is like the project we are doing. We need to go through a process to make sure the designs we have implemented are usable such as cognitive walkthroughs.