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Virtual Worlds in Education: Using Second Life in Health Informatics

THE SCHOOL OF BIOMEDICAL INFORMATICS
THE UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT HOUSTON

Team Members

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- Graduate Certificates
- Master of Science in Biomedical Informatics

  Applied vs. Research Tracks
- Doctor of Philosophy in Biomedical Informatics

Certificates and Masters can be completed entirely online.

5329: Assessment & Evaluation

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- Identify and assess different aspects of healthcare systems and healthcare workflow as well as how to evaluate a health information system.
- Learn skills needed to assess and help improve workflow and the quality of healthcare delivery.
- Learn different methods of evaluation and how they would apply to health information systems.

5329: Assessment & Evaluation

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High Level Course Learning Objectives

- **Analyze** the patient care workflow between departments in an in-patient healthcare setting.
- **Conduct** an assessment to determine problems/gaps in people, process, and technology factors.
- **Model** the patient care workflow process and create diagrams depicting the 'As-Is' and 'To-Be' states.
- **Design** process improvement solutions to workflow addressing people, process, technology based on the gaps identified.
- **Critique** workflow designs using concepts associated with evaluation methods.
- **Justify** workflow design decisions.

Workflow Modeling Activity
Objectives

- Define business process
- Describe the essential components of a process
- Identify processes that can be modeled

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Workflow Modeling Activity
Timeline & Tasks

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Duration of Activity:

- 6 weeks of the course.

Main Tasks for Students:

- Walk through the clinic in Second Life to determine its current blueprint,
- Assess the workflow of a new patient's visit to ambulatory clinics.
- Review the current (as-is) workflow
- Design the future (to-be) workflow as it will be once an Electronic Health Record (EHR) system has been implemented.

Workflow Modeling Activity
Deliverables

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Student groups will turn in:

- Physical Analysis of Clinic Space
- Analysis and Process Flowchart of Patient Visit
- Current State: Workflow, Chart Movement and Responsibilities
- Future State: To-be Process Plan, Physical Analysis of Space, and Blueprint

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Rationale:
Using Second Life in the Assignment

"...the case method involves learning by doing, the development of analytical skills, the internalization of learning, learning how to grapple with messy real-life problems, the development of skills in oral communications, and often teamwork."

Herreid, C. (1994). Case Studies in Science - A Novel Method of Science Education. *Journal of College Science Teaching, 23,* 221-229.

Tips for Writing the Case Scenario

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- Start with the goals and learning objectives of the course.

Course Description

Students in this course will learn how to identify and assess different aspects of healthcare systems and healthcare workflow as well as how to evaluate a health information system. Students will learn the skills needed to assess and help improve workflow and the quality of healthcare delivery. Students will also be introduced to different methods of evaluation and how they would apply to health information systems.

Learning Objectives

Upon successfully completing this course, the student will:

- **Analyze** the patient care workflow between departments in an in-patient healthcare setting.
- **Conduct** an assessment to determine problems/gaps in people, process, and technology factors.
- **Model** the patient care workflow process and create diagrams depicting the 'As-Is' and 'To-Be' states.
- **Design** process improvement solutions to workflow addressing people, process, and technology based on the gaps identified.
- **Critique** workflow designs using concepts associated with evaluation methods.
- **Justify** workflow design decisions.

Tips for Writing the Case Scenario

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- Base the scenario on real-life issues and focus on one event.

Image from: http://www.medicalbillingcodings.org/2014/10/radiation-oncology-cptcodes-billingcoding.html

Tips for Writing the Case Scenario

- List all the chief issues seen in that particular event.

Tips for Writing the Case Scenario

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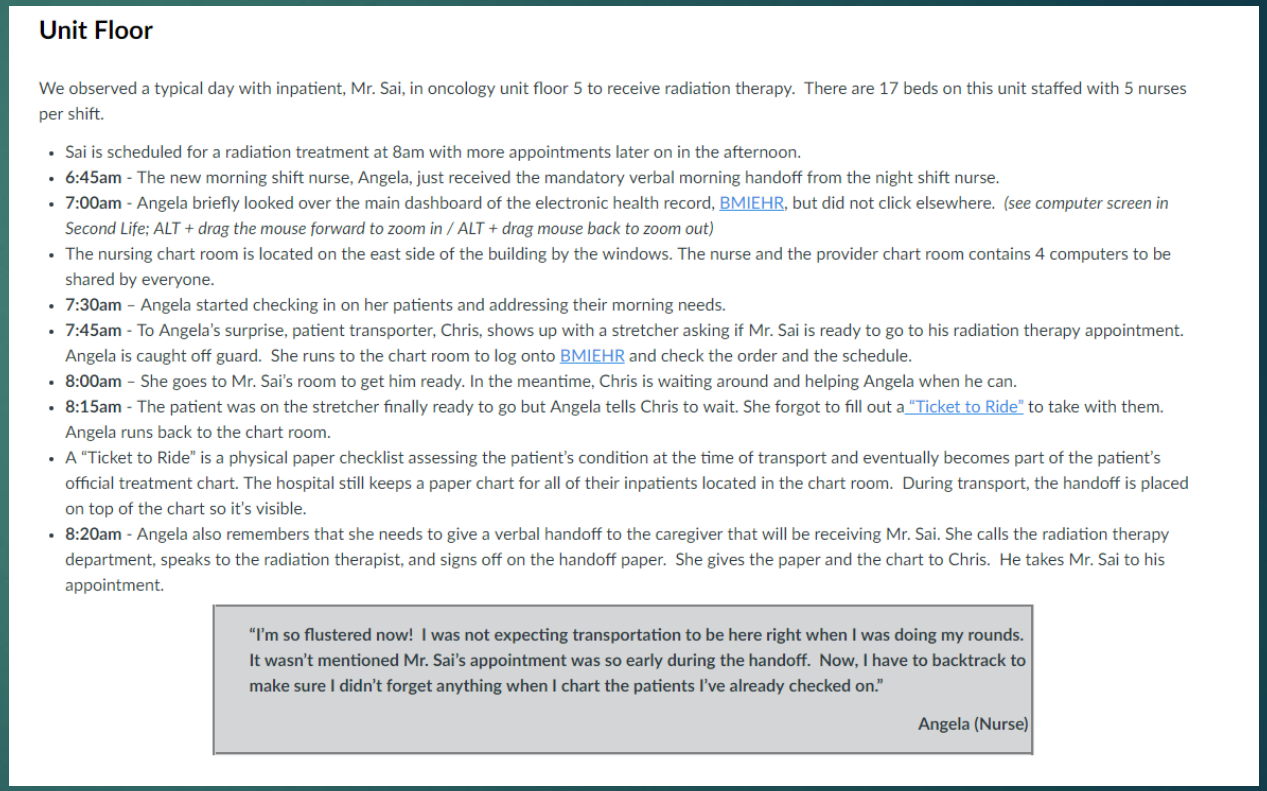
- Write the scenes with the issues identified.
- Break it down by sections to make it consumable.
- Make it engaging by emotional remarks from characters.



Unit Floor

We observed a typical day with inpatient, Mr. Sai, in oncology unit floor 5 to receive radiation therapy. There are 17 beds on this unit staffed with 5 nurses per shift.

- Sai is scheduled for a radiation treatment at 8am with more appointments later on in the afternoon.
- **6:45am** - The new morning shift nurse, Angela, just received the mandatory verbal morning handoff from the night shift nurse.
- **7:00am** - Angela briefly looked over the main dashboard of the electronic health record, BMIEHR, but did not click elsewhere. *(see computer screen in Second Life; ALT + drag the mouse forward to zoom in / ALT + drag mouse back to zoom out)*
- The nursing chart room is located on the east side of the building by the windows. The nurse and the provider chart room contains 4 computers to be shared by everyone.
- **7:30am** – Angela started checking in on her patients and addressing their morning needs.
- **7:45am** - To Angela's surprise, patient transporter, Chris, shows up with a stretcher asking if Mr. Sai is ready to go to his radiation therapy appointment. Angela is caught off guard. She runs to the chart room to log onto BMIEHR and check the order and the schedule.
- **8:00am** – She goes to Mr. Sai's room to get him ready. In the meantime, Chris is waiting around and helping Angela when he can.
- **8:15am** - The patient was on the stretcher finally ready to go but Angela tells Chris to wait. She forgot to fill out a "Ticket to Ride" to take with them. Angela runs back to the chart room.
- A "Ticket to Ride" is a physical paper checklist assessing the patient's condition at the time of transport and eventually becomes part of the patient's official treatment chart. The hospital still keeps a paper chart for all of their inpatients located in the chart room. During transport, the handoff is placed on top of the chart so it's visible.
- **8:20am** - Angela also remembers that she needs to give a verbal handoff to the caregiver that will be receiving Mr. Sai. She calls the radiation therapy department, speaks to the radiation therapist, and signs off on the handoff paper. She gives the paper and the chart to Chris. He takes Mr. Sai to his appointment.

> **"I'm so flustered now! I was not expecting transportation to be here right when I was doing my rounds. It wasn't mentioned Mr. Sai's appointment was so early during the handoff. Now, I have to backtrack to make sure I didn't forget anything when I chart the patients I've already checked on."**
>
> **Angela (Nurse)**

Tips for Writing the Case Scenario

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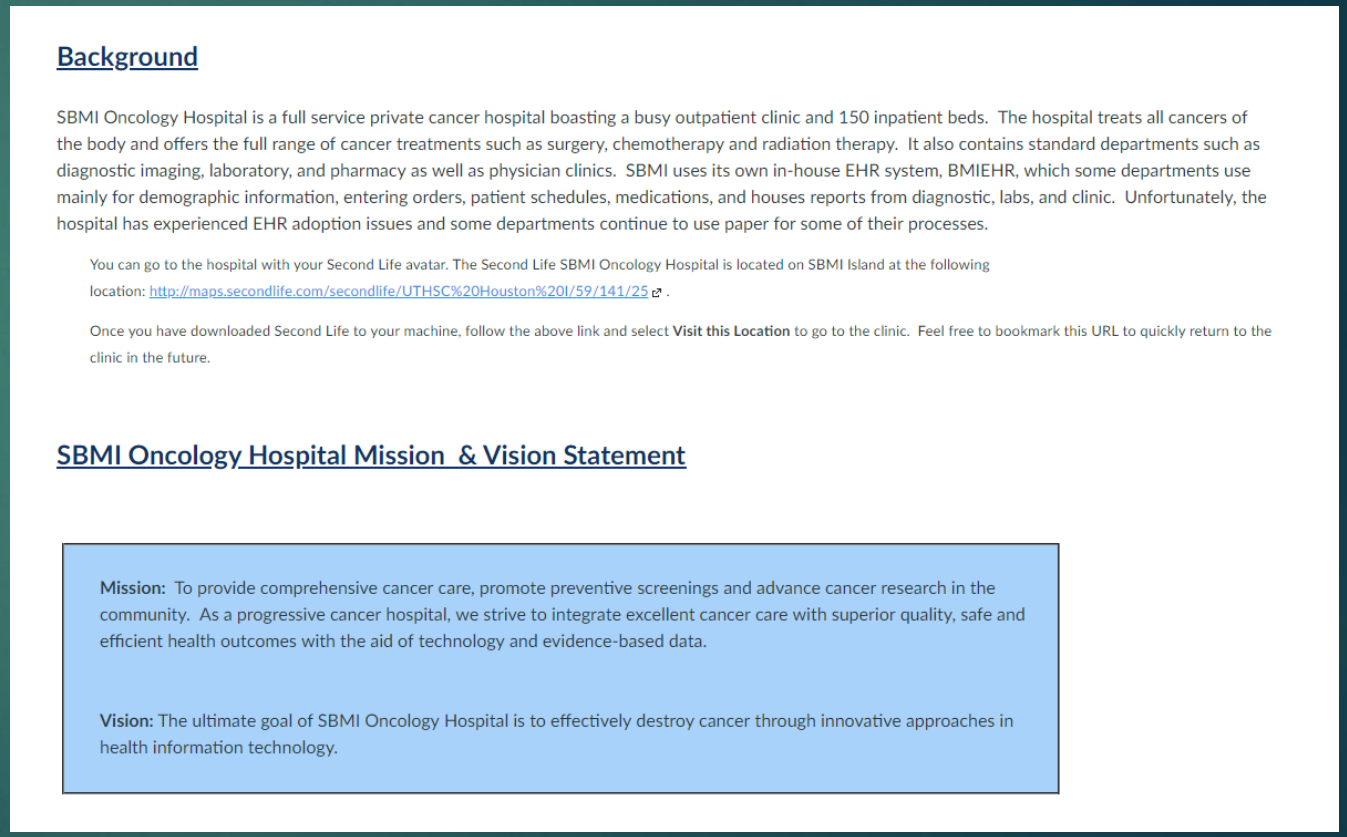
- Provide context and background.
  - Mission & Vision



Background

SBMI Oncology Hospital is a full service private cancer hospital boasting a busy outpatient clinic and 150 inpatient beds. The hospital treats all cancers of the body and offers the full range of cancer treatments such as surgery, chemotherapy and radiation therapy. It also contains standard departments such as diagnostic imaging, laboratory, and pharmacy as well as physician clinics. SBMI uses its own in-house EHR system, BMIEHR, which some departments use mainly for demographic information, entering orders, patient schedules, medications, and houses reports from diagnostic, labs, and clinic. Unfortunately, the hospital has experienced EHR adoption issues and some departments continue to use paper for some of their processes.

You can go to the hospital with your Second Life avatar. The Second Life SBMI Oncology Hospital is located on SBMI Island at the following location: http://maps.secondlife.com/secondlife/UTHSC%20Houston%20I/59/141/25 .

Once you have downloaded Second Life to your machine, follow the above link and select **Visit this Location** to go to the clinic. Feel free to bookmark this URL to quickly return to the clinic in the future.

SBMI Oncology Hospital Mission & Vision Statement

Mission: To provide comprehensive cancer care, promote preventive screenings and advance cancer research in the community. As a progressive cancer hospital, we strive to integrate excellent cancer care with superior quality, safe and efficient health outcomes with the aid of technology and evidence-based data.

Vision: The ultimate goal of SBMI Oncology Hospital is to effectively destroy cancer through innovative approaches in health information technology.

Tips for Writing the Case Scenario

- Get student buy-in by establishing a role for them in the story.

Assignment

Our Health Informatics Consulting firm was tasked to look into some workflow issues between nursing units, transportation, and the radiation oncology department. Among the chief complaints are lack of communication between the unit and the department, conflict of schedules with different appointments, patient wait times in the hallway, patient satisfaction and backflow of the radiation therapy schedule.

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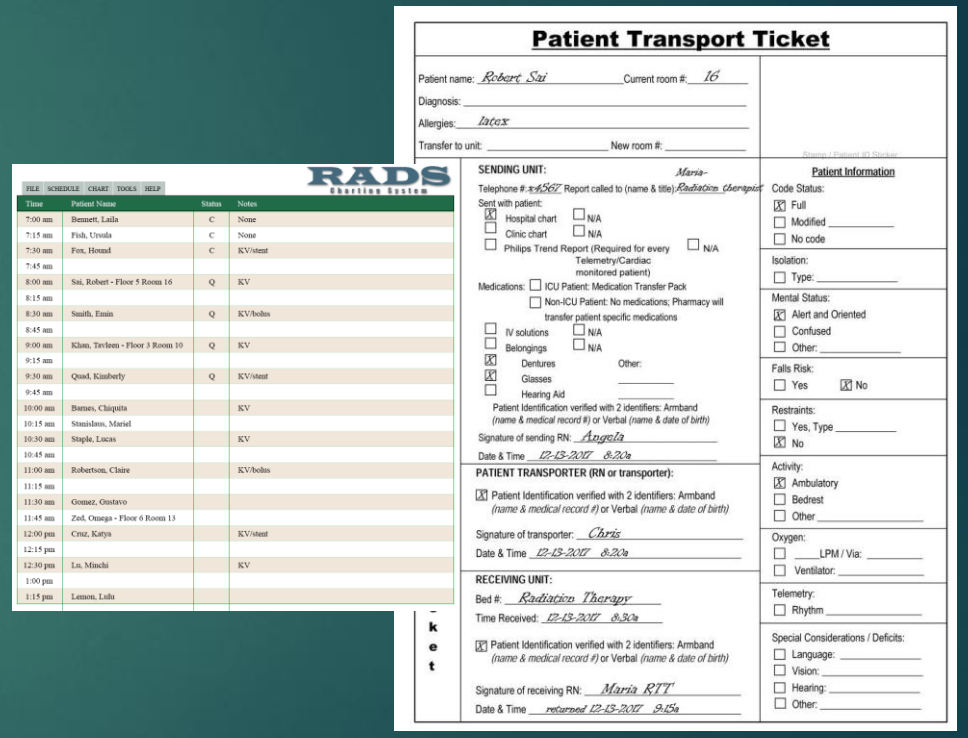
Tips for Writing the Case Scenario

- Provide visuals to make it as immersive as possible.



RADS Charting System

Time	Patient Name	Status	Notes
7:00 am	Bennett, Laila	C	None
7:15 am	Fish, Ursula	C	None
7:30 am	Fox, Hound	C	KV/stent
7:45 am			
8:00 am	Sai, Robert - Floor 5 Room 16	Q	KV
8:15 am			
8:30 am	Smith, Emin	Q	KV/bolus
8:45 am			
9:00 am	Khan, Tavleen - Floor 3 Room 10	Q	KV
9:15 am			
9:30 am	Quad, Kimberly	Q	KV/stent
9:45 am			
10:00 am	Barnes, Chiquita		KV
10:15 am	Stanislaus, Mariel		
10:30 am	Staple, Lucas		KV
10:45 am			
11:00 am	Robertson, Claire		KV/bolus
11:15 am			
11:30 am	Gomez, Gustavo		
11:45 am	Zed, Omega - Floor 6 Room 13		
12:00 pm	Cruz, Katya		KV/stent
12:15 pm			
12:30 pm	Lu, Minchi		KV
1:00 pm			
1:15 pm	Lemon, Luhi		

Patient Transport Ticket

Patient name: Robert Sai Current room #: 16

Diagnosis:

Allergies: latex

Transfer to unit: New room #:

SENDING UNIT: Maria-

Telephone #: x4567 Report called to (name & title): Radiation therapist

Sent with patient:

- [X] Hospital chart ☐ N/A
- ☐ Clinic chart ☐ N/A
- ☐ Philips Trend Report (Required for every Telemetry/Cardiac monitored patient) ☐ N/A

Medications: ☐ ICU Patient: Medication Transfer Pack

☐ Non-ICU Patient: No medications; Pharmacy will transfer patient specific medications

- ☐ IV solutions ☐ N/A
- ☐ Belongings ☐ N/A
- [X] Dentures Other:
- [X] Glasses
- ☐ Hearing Aid

Patient Identification verified with 2 identifiers: Armband *(name & medical record #)* or Verbal *(name & date of birth)*

Signature of sending RN: Angela

Date & Time 12-13-2017 8:20a

PATIENT TRANSPORTER (RN or transporter):

[X] Patient Identification verified with 2 identifiers: Armband *(name & medical record #)* or Verbal *(name & date of birth)*

Signature of transporter: Chris

Date & Time 12-13-2017 8:20a

RECEIVING UNIT:

Bed #: Radiation Therapy

Time Received: 12-13-2017 8:30a

[X] Patient Identification verified with 2 identifiers: Armband *(name & medical record #)* or Verbal *(name & date of birth)*

Signature of receiving RN: Maria RTT

Date & Time returned 12-13-2017 9:15a

Patient Information

Code Status:
- [X] Full
- ☐ Modified
- ☐ No code

Isolation:
- ☐ Type:

Mental Status:
- [X] Alert and Oriented
- ☐ Confused
- ☐ Other:

Falls Risk:
- ☐ Yes [X] No

Restraints:
- ☐ Yes, Type
- [X] No

Activity:
- [X] Ambulatory
- ☐ Bedrest
- ☐ Other

Oxygen:
- ☐ LPM / Via:
- ☐ Ventilator:

Telemetry:
- ☐ Rhythm

Special Considerations / Deficits:
- ☐ Language:
- ☐ Vision:
- ☐ Hearing:
- ☐ Other:

Tips for Writing the Case Scenario
Summary

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- Start with the goals and learning objectives.
- Base the scenario on real-life issues and focus on one event.
- List all the chief issues seen in that particular event.
- Write the scenes with the issues identified.
- Break it down by sections to make it consumable.
- Make it engaging by emotional remarks from characters.
- Provide context and background.
- Get student buy-in by establishing a role for them in the story.
- Provide visuals to make it as immersive as possible.

Oncology Hospital Build Process

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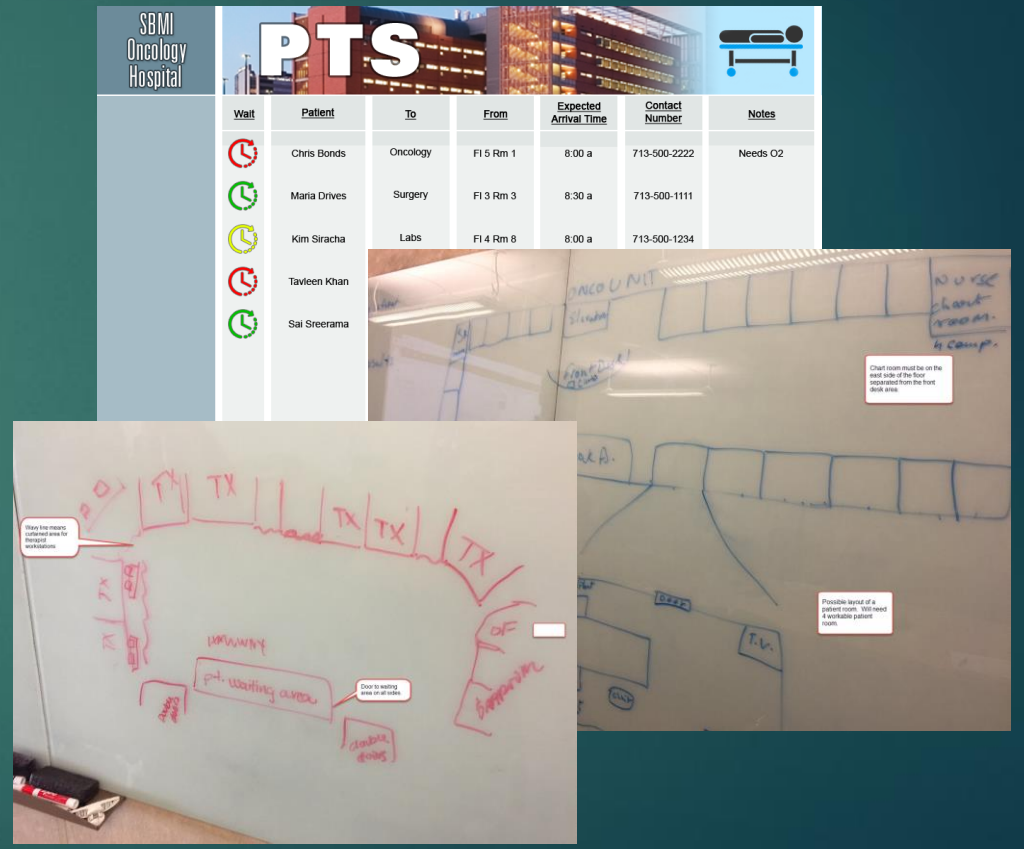
- Completed case scenario with developer notes.
- Rough sketches of unit floor and radiation department layout.
- Finalized visuals of computer screens and documents.



Oncology Hospital Build Process
Best Practice

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- Storyboard
- Set timelines
- Meet frequently
- Clear communication

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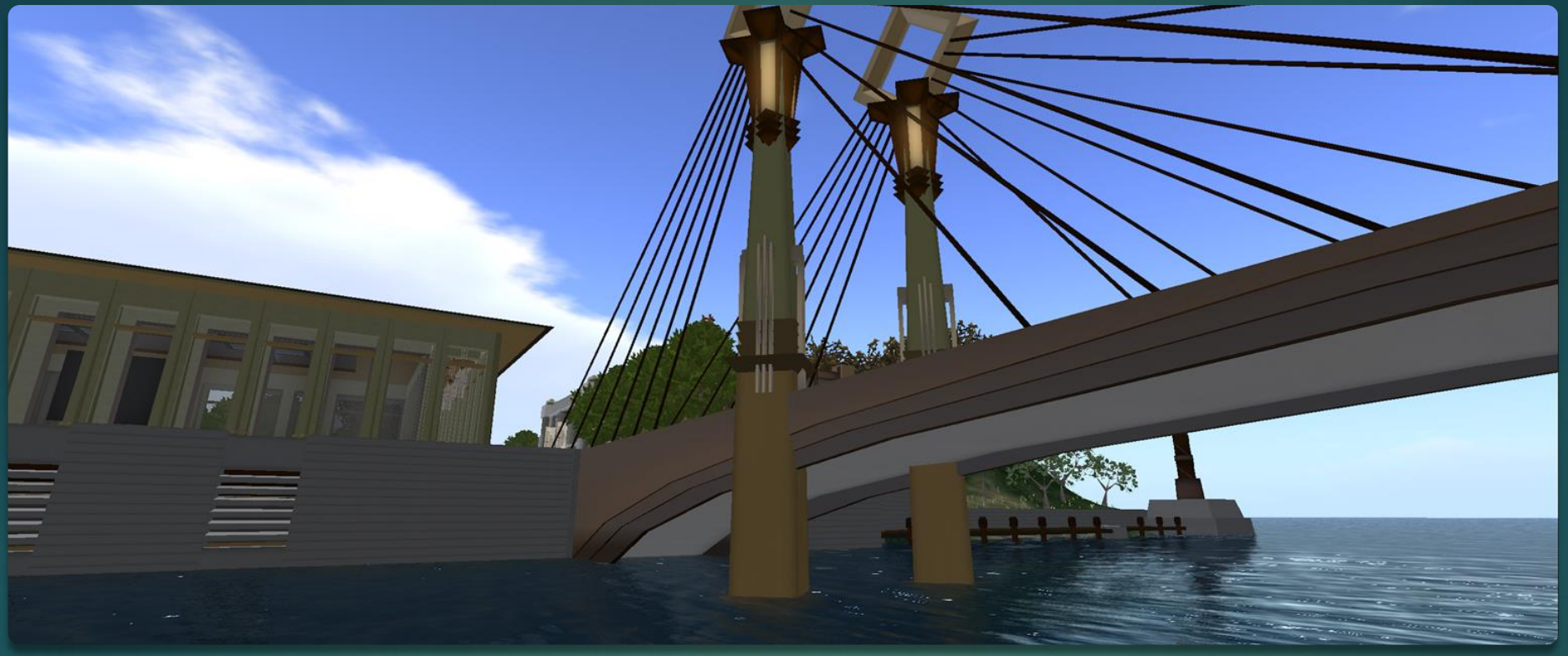

What is Second Life?

Persistent Real time Online 3D Virtual World

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What is Second Life?

It's not a Game, or Is It?

All Content is created by the User Base.

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What is Second Life?

Users Represented by Avatars

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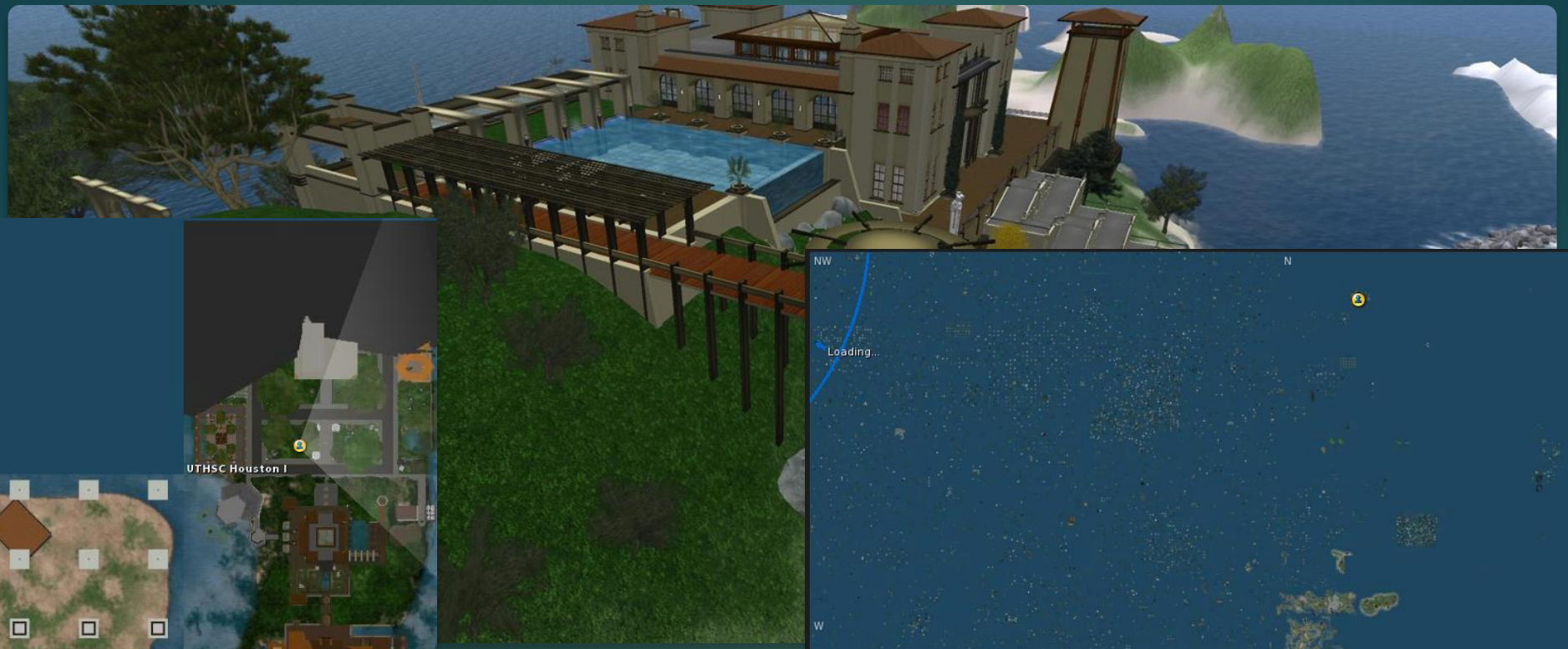

What is Second Life?

Virtual Land Ownership

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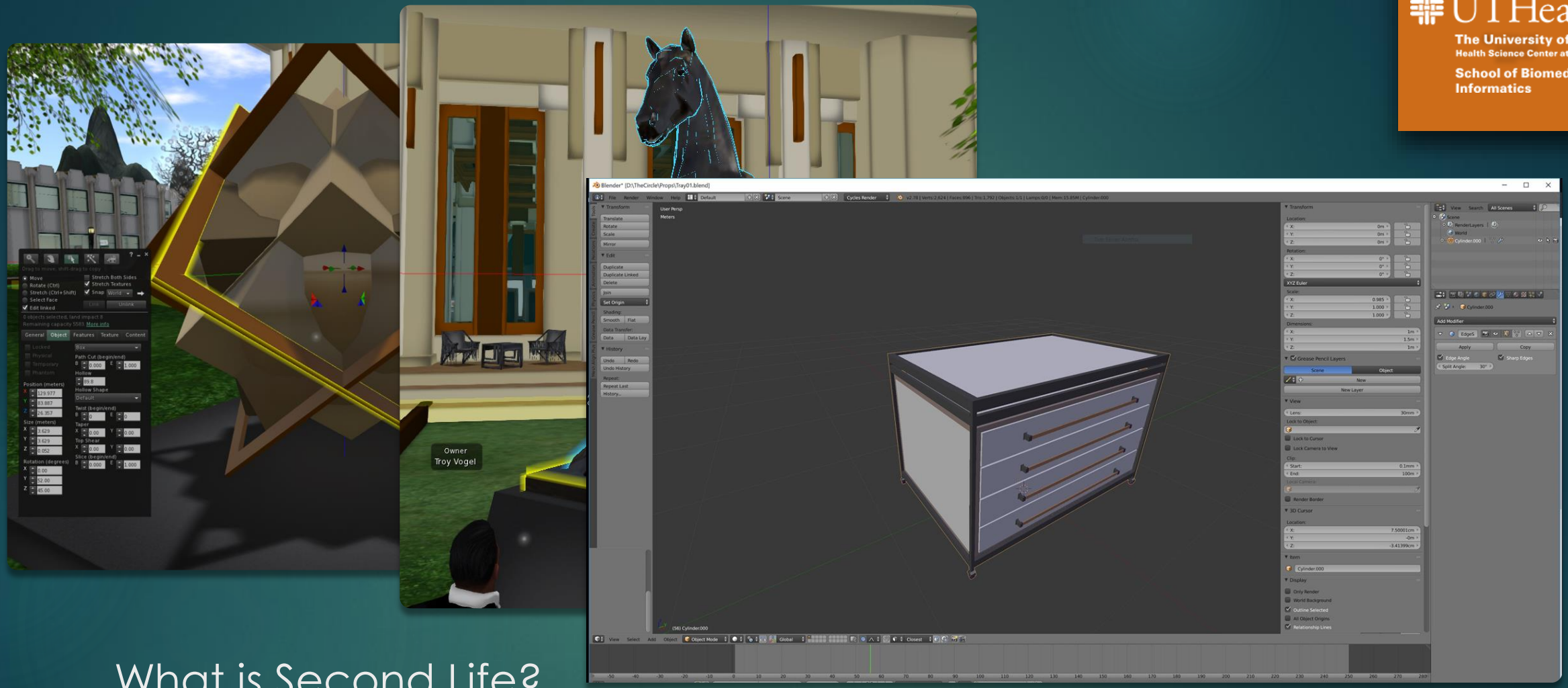

What is Second Life?

Online and Offline Building Tools for Content Creation

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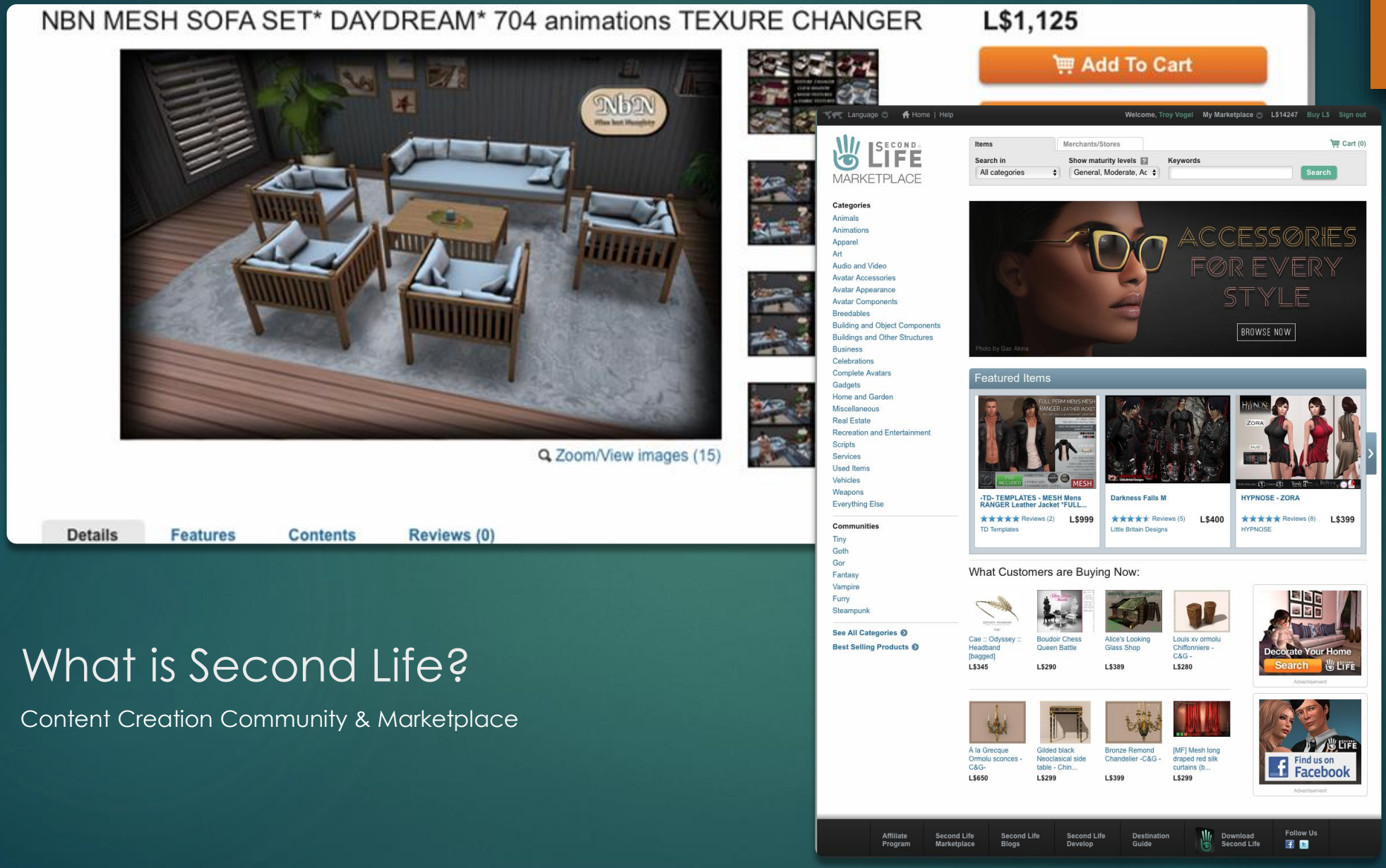

What is Second Life?

Content Creation Community & Marketplace

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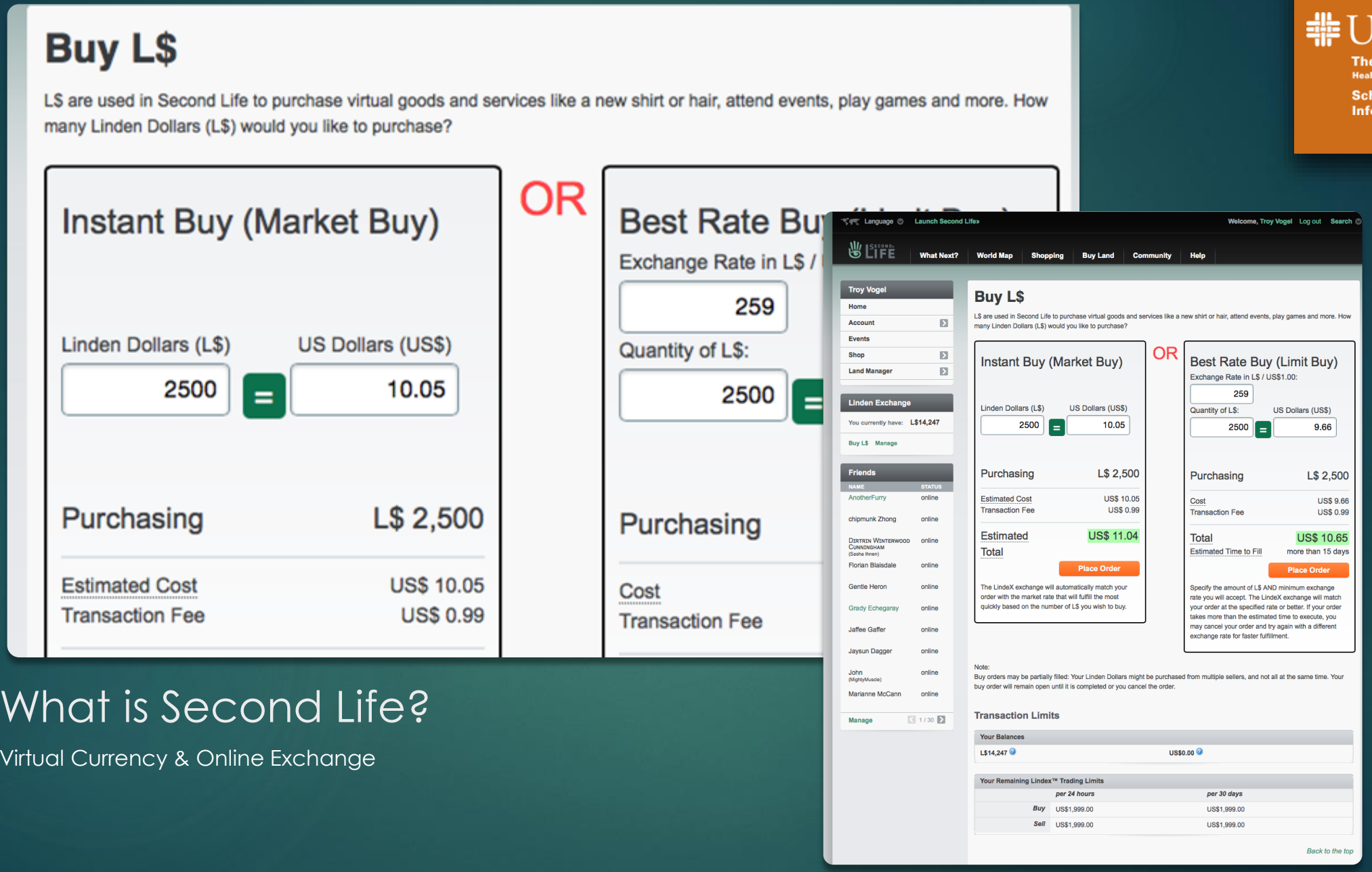

What is Second Life?

Virtual Currency & Online Exchange

Second Life
Two Minute History

- 2002 Second Life grid goes live
- 2005 Lindex Exchange Open
- 2007 Educators Rush In
- 2009 Marketplace Acquired
- 2009-2010 Educators Rush Out
- 2011 Mesh Imports

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Second Life
Use in Education

- Visually engaging
- Low risk high availability environment
- Non-proprietary platform
- Free membership
- Relatively low learning curve for end user
  - Provided you are willing to do a quick orientation
- Comparatively affordable
- Marketplace provides prefabbed goods

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SBMI Virtual Campus & Previous Use in Education

- 2010: SBMI Virtual Campus built.
  - Outsourced the campus construction.
  - Used for the Applied Program
- 2014: Campus Redesign
- 2014: SBMI Clinic Version #2
- 2015: Nursing Informatics Class
- 2016-2017: Classes / Group Meetings
- 2017: SBMI Oncology Hospital

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SBMI Virtual Campus

http://maps.secondlife.com/secondlife/UTHSC%20Houston%20I/142/86/25

SBMI Virtual Campus

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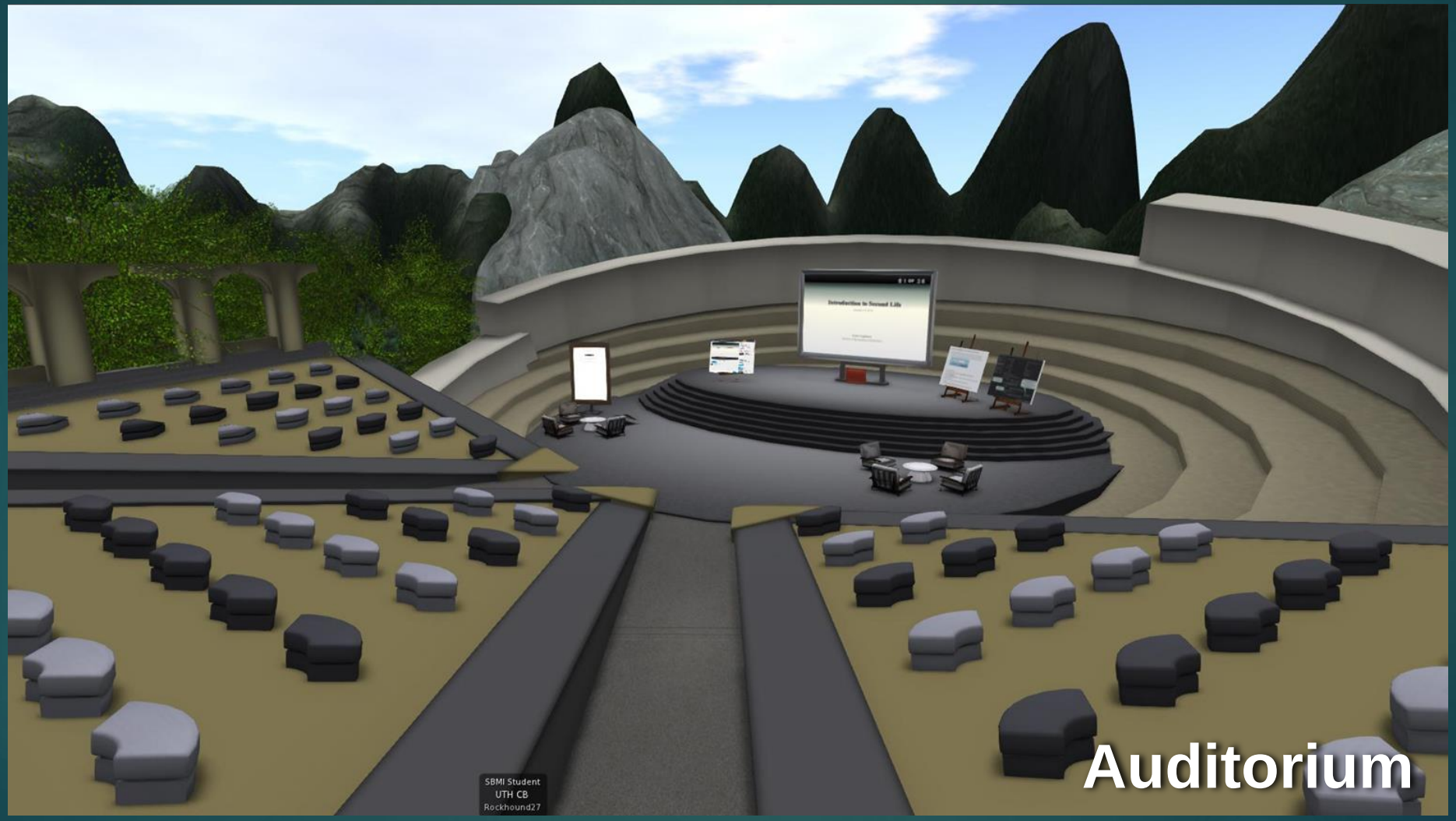

SBMI Virtual Campus

Break Out Classrooms

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SBMI Oncology Hospital in Second Life

http://maps.secondlife.com/secondlife/UTHSC%20Houston%20I/70/145/25

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Iterative Design Approach

1. Plans & Storyboard Reviewed
    a. All team members
2. Plans & Storyboard Implemented
    a. Partial reviews as we built.
3. Final Review Meeting
    a. Minor adjustments to SL build and to storyboards.
4. Final Adjustments Made to SL build.

Oncology Hospital Build Process

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Architecture

- Interpreted from Instructional Design Drawings.
- Artistic Liberties were Taken During Building Process.
- Built with SL Building Tools -- Minimal Mesh.

Furniture & Equipment

- SL Marketplace Purchases
- Mission Home Store Donations for furniture
- Repurposing of Linear Accelerator from Previous Projects

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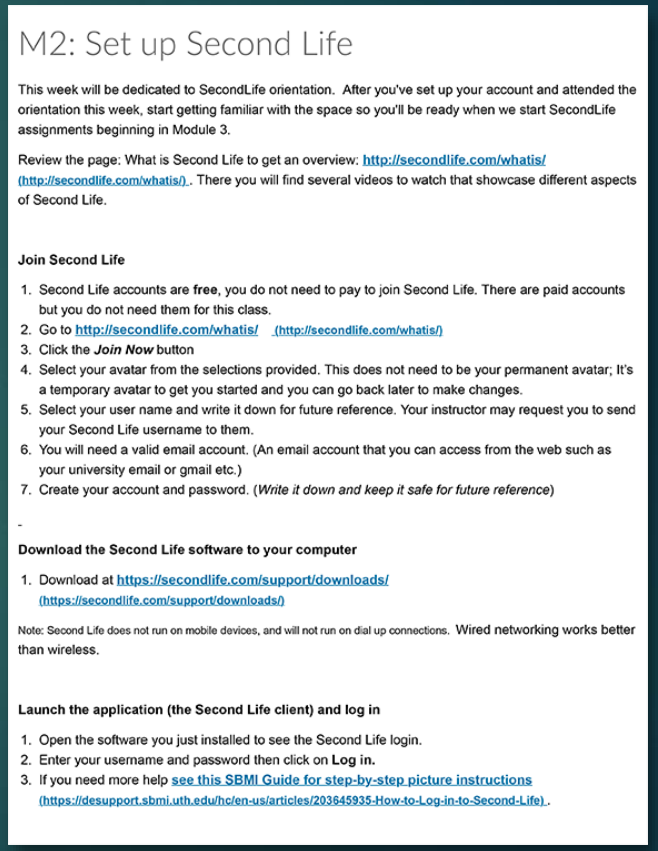
Best Practices
Account Creation Instructions

Before sending the class to attend an orientation session in SL share with your class document with the following information:

1. Where to go to sign up for a new account
2. What type of account name, shape, appearance you expect.
3. Where to go to attend the orientation
4. SLURL link to the campus / educational space.
5. Where to report problems / get help.

Keep this document in your LMS course along with other materials for the simulation module so students can refer to it before, during and after the activity.



M2: Set up Second Life

This week will be dedicated to SecondLife orientation. After you've set up your account and attended the orientation this week, start getting familiar with the space so you'll be ready when we start SecondLife assignments beginning in Module 3.

Review the page: What is Second Life to get an overview: http://secondlife.com/whatis/ (http://secondlife.com/whatis/) . There you will find several videos to watch that showcase different aspects of Second Life.

Join Second Life

1. Second Life accounts are **free**, you do not need to pay to join Second Life. There are paid accounts but you do not need them for this class.
2. Go to http://secondlife.com/whatis/ (http://secondlife.com/whatis/)
3. Click the ***Join Now*** button
4. Select your avatar from the selections provided. This does not need to be your permanent avatar; It's a temporary avatar to get you started and you can go back later to make changes.
5. Select your user name and write it down for future reference. Your instructor may request you to send your Second Life username to them.
6. You will need a valid email account. (An email account that you can access from the web such as your university email or gmail etc.)
7. Create your account and password. (*Write it down and keep it safe for future reference*)

-

Download the Second Life software to your computer

1. Download at https://secondlife.com/support/downloads/ (https://secondlife.com/support/downloads/)

Note: Second Life does not run on mobile devices, and will not run on dial up connections. Wired networking works better than wireless.

Launch the application (the Second Life client) and log in

1. Open the software you just installed to see the Second Life login.
2. Enter your username and password then click on **Log in.**
3. If you need more help see this SBMI Guide for step-by-step picture instructions (https://desupport.sbmi.uth.edu/hc/en-us/articles/203645935-How-to-Log-in-to-Second-Life) .

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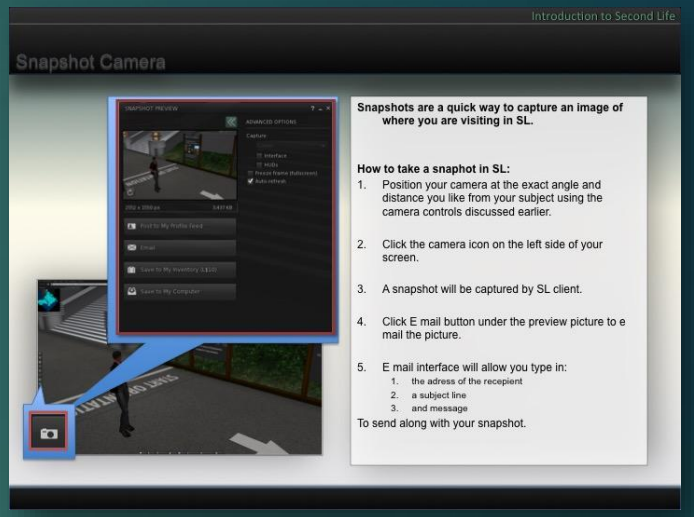
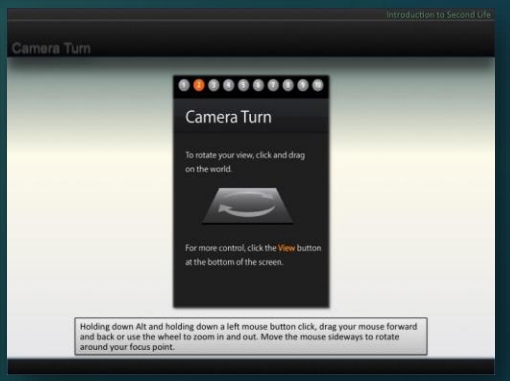
Best Practices
Synchronous Orientation Session

- Synchronous Orientation Session
  - Keep it short and simple (1 hour max)
  - Introduce Second Life as a platform
  - Basic Skills needed to navigate SL
    - Walk, fly, and navigation
    - Camera controls and taking snapshots,
    - chat / IM controls,
    - Searching and finding other content
  - Q&A

- Provide slides and recording of the session for review in the LMS course.





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Best Practices
Keep Your Finger on the Pulse

- **Give your students multiple venues to reach you to ask for support.**
  - Discussion Forum in the LMS
  - E mail support tickets
  - Additional synchronous SL sessions as office hours.

- **Give your students opportunity to reflect on how the simulation worked for them:**
  - Was SL simulation transparent?
  - What were the major sticking points?
  - How can the simulation / assignment be improved?

Best Practices
Make it Fun

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Try to add elements that put a smile on the learner's face without distracting them too much.

- Goal: Increase buy-in and engagement in the learning environment.

Examples:

- Each TV in each patient room has a different still from a zeitgeist movie / tv show or mini series.
- Little Teddy bears appear in various parts of the hospital as props.
- Extra spaces like the cafe, waiting room, entrance hall give a sense of realism although they are not a part of the scenario.

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Best Practices
Track Student Access & Usage

Why track student activity in SL?

- Similar to supporting student success in the LMS by looking at analytics.

There are many traffic scanner / access list tools available in SL Market.
We chose to use:

- CTS Presence by By Carlyle Theas Solutions

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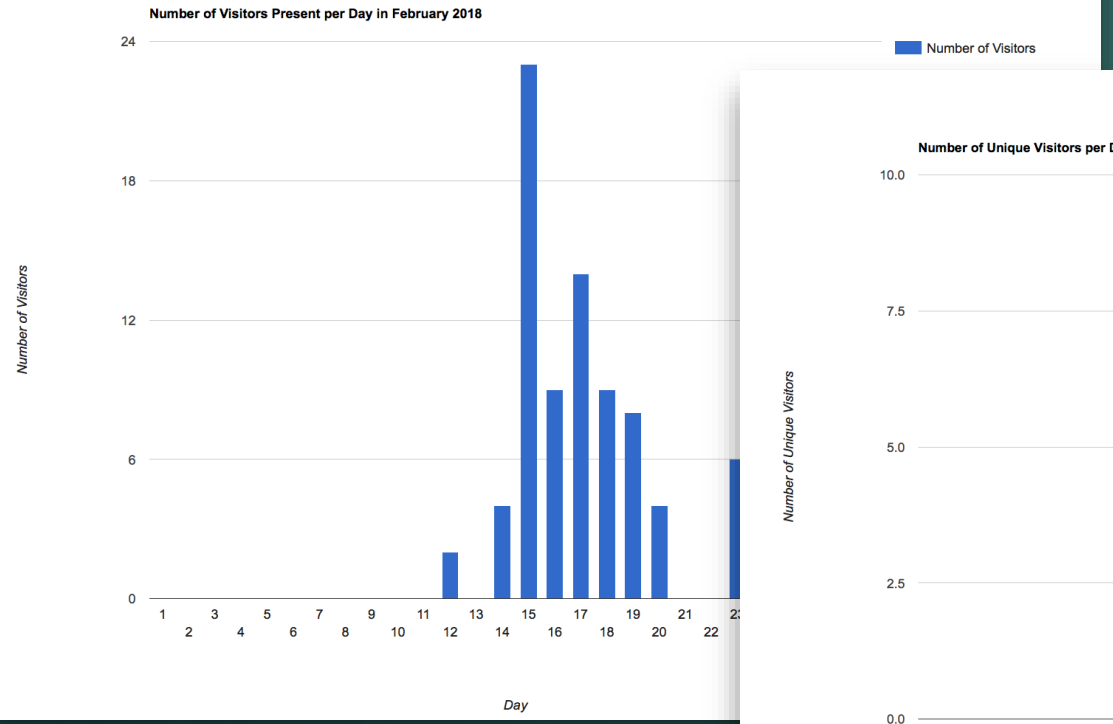
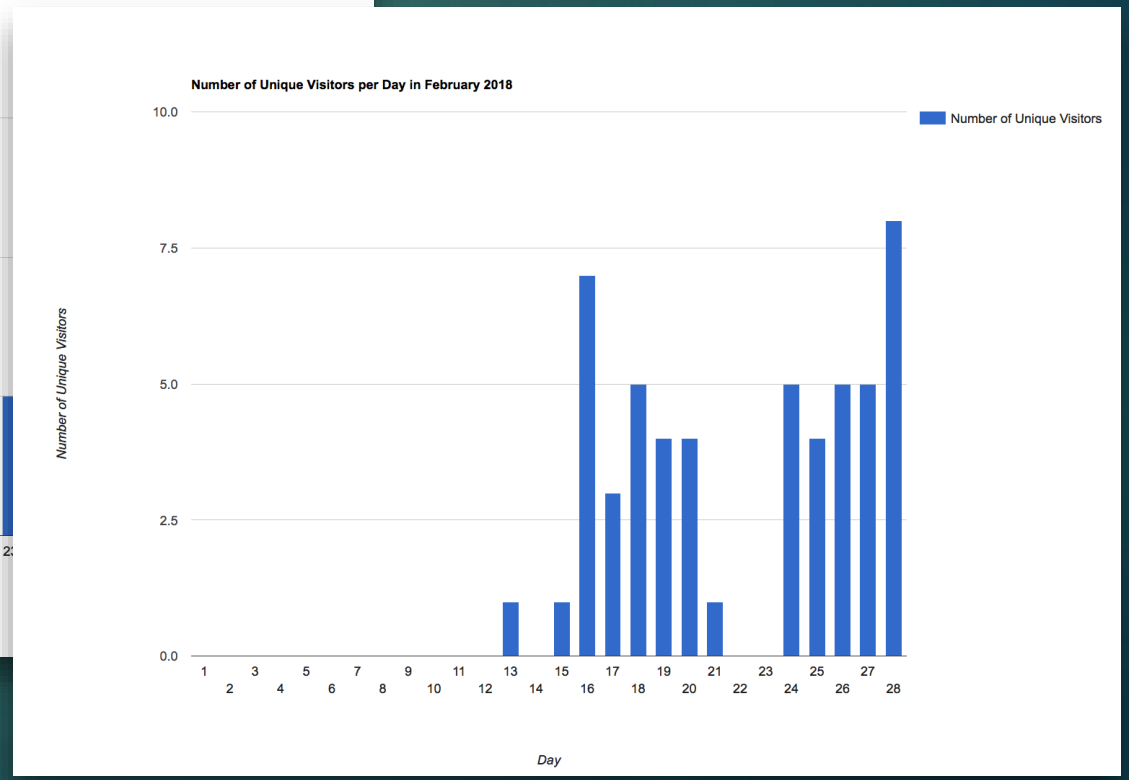
Best Practices
Track Student Access & Usage

Unique Visitors in February 2018

	Sensor	Visitor Name	Visitor UUID	Number of Visits
1	SBMI Oncology Visitor Tracker	1k3l9d4	fb05cce5-47d6-4326-93dd-7ddf4650ad78	1
2	SBMI Oncology Visitor Tracker	aabay		
3	SBMI Oncology Visitor Tracker	ariavicious		
4	SBMI Oncology Visitor Tracker	belledejour101		
5	SBMI Oncology Visitor Tracker	betsythomas		
6	SBMI Oncology Visitor Tracker	casherah		
7	SBMI Oncology Visitor Tracker	cjaseminole		
8	SBMI Oncology Visitor Tracker	daria.lionheart		
9	SBMI Oncology Visitor Tracker	ehalbrook		
10	SBMI Oncology Visitor Tracker	entdeus		
11	SBMI Oncology Visitor Tracker	fenshi		
12	SBMI Oncology Visitor Tracker	fernvillarreal		
13	SBMI Oncology Visitor Tracker	grundignikki		
14	SBMI Oncology Visitor Tracker	jamal.greymoon		
15	SBMI Oncology Visitor Tracker	jjamon		
16	SBMI Oncology Visitor Tracker	krisenchatarpal		
17	SBMI Oncology Visitor Tracker	leyla.rosea		
18	SBMI Oncology Visitor Tracker	lisaboo46		
19	SBMI Oncology Visitor Tracker	marcelo1986		
20	SBMI Oncology Visitor Tracker	naicheapache		
21	SBMI Oncology Visitor Tracker	o0kate0o		
22	SBMI Oncology Visitor Tracker	poupette00		
23	SBMI Oncology Visitor Tracker	sahneschnitte22.pinklad		
24	SBMI Oncology Visitor Tracker	spcastel		
25	SBMI Oncology Visitor Tracker	troy.vogel		
26	SBMI Oncology Visitor Tracker	vanessa.remex		
27	SBMI Oncology Visitor Tracker	vikki.veeper		





Best Practices – Overview

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- Give the activity plenty of time in your syllabus.
- Provide account registration instructions and brief help document.
- Schedule a synchronous orientation session in SL.
- Provide a recording of the session afterwards.
- Give students a week after the orientation to absorb new skills.
- Encourage students to use their time effectively.
- Give students a platform to share experiences.
- Keep track of student progress.

Student Feedback

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School of Biomedical Informatics

“ I have never worked in a hospital before and the experience of working in Second Life has improved my understanding of hospital layouts and design issues. Understanding the hospital has made it easier to imagine employee workflows.

Additionally, Second Life has made completing group work in an online course much simpler. When we are all working in the same space, our work is more cohesive and is completed faster. ”

Student Feedback

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"At first, Second Life was not easy to use for me. I am not on any form of social media and have not played very many video games in my entire life, so moving around the site was difficult in the beginning. As I spent more time there, I found the correct location and then could move more smoothly from the Radiation Treatment Department to the patient floor. It became easier to maneuver my avatar after I had more experience with the site.

As I used Second Life for the assignments, I was very impressed with the amount of detail that existed in both locations and even the outside areas. Being able to see the entire patient floor and radiation department facilitated making observations about the layout and issues that are involved in the patient flow….Reading the scenario gave a certain amount of detail but actually seeing the floors provided more information which assisted us in analyzing the workflow."

Next Steps

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- Gather more data (future cohorts)
- Formative Evaluation
- Reaction Survey (assignment improvement)
- Embed more interactivity within Second Life

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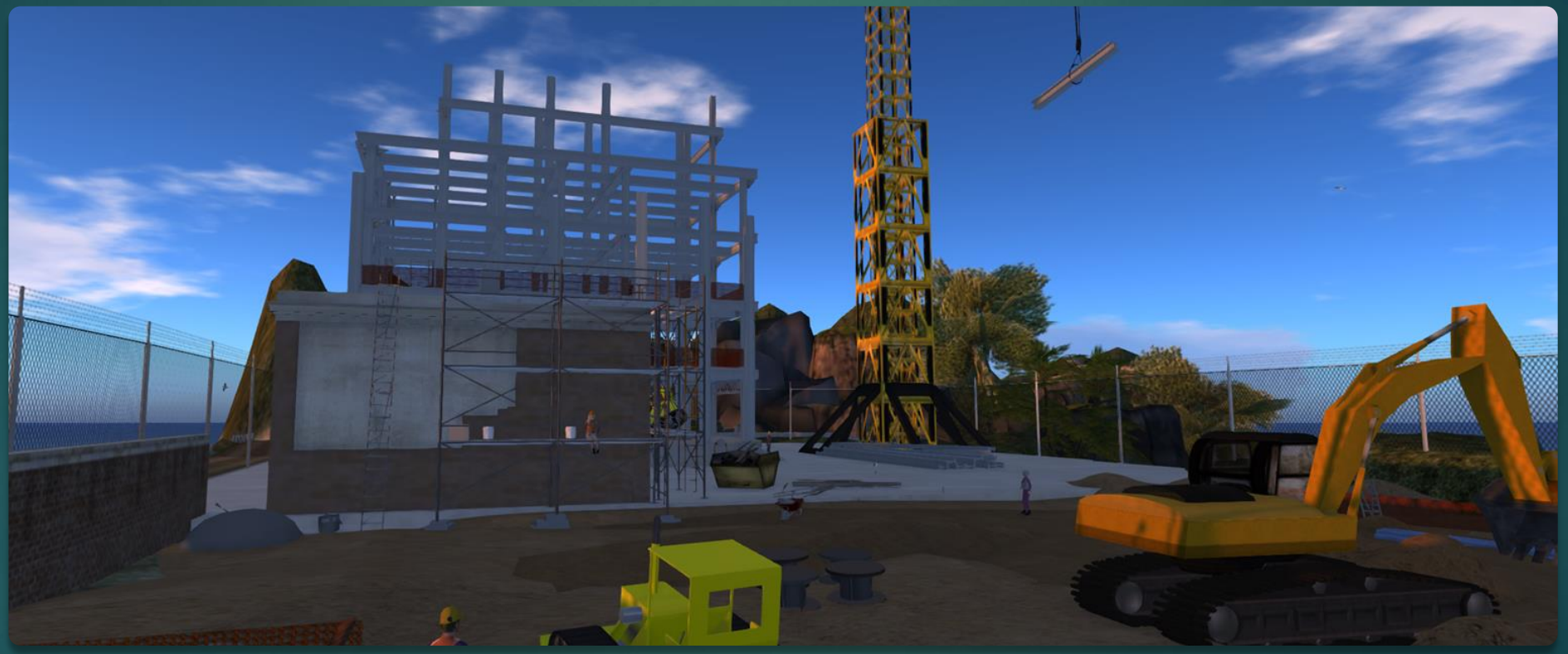
Other Simulations in Second Life

UT El Paso Construction Safety Training



http://maps.secondlife.com/secondlife/UTEP%20Miners%203/75/31/36

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Other Simulations in Second Life

TXSTATE El Cerrito Project

https://vimeo.com/39429424

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Other Simulations in Second Life

TXSTATE Classroom Management

https://vimeo.com/65086785

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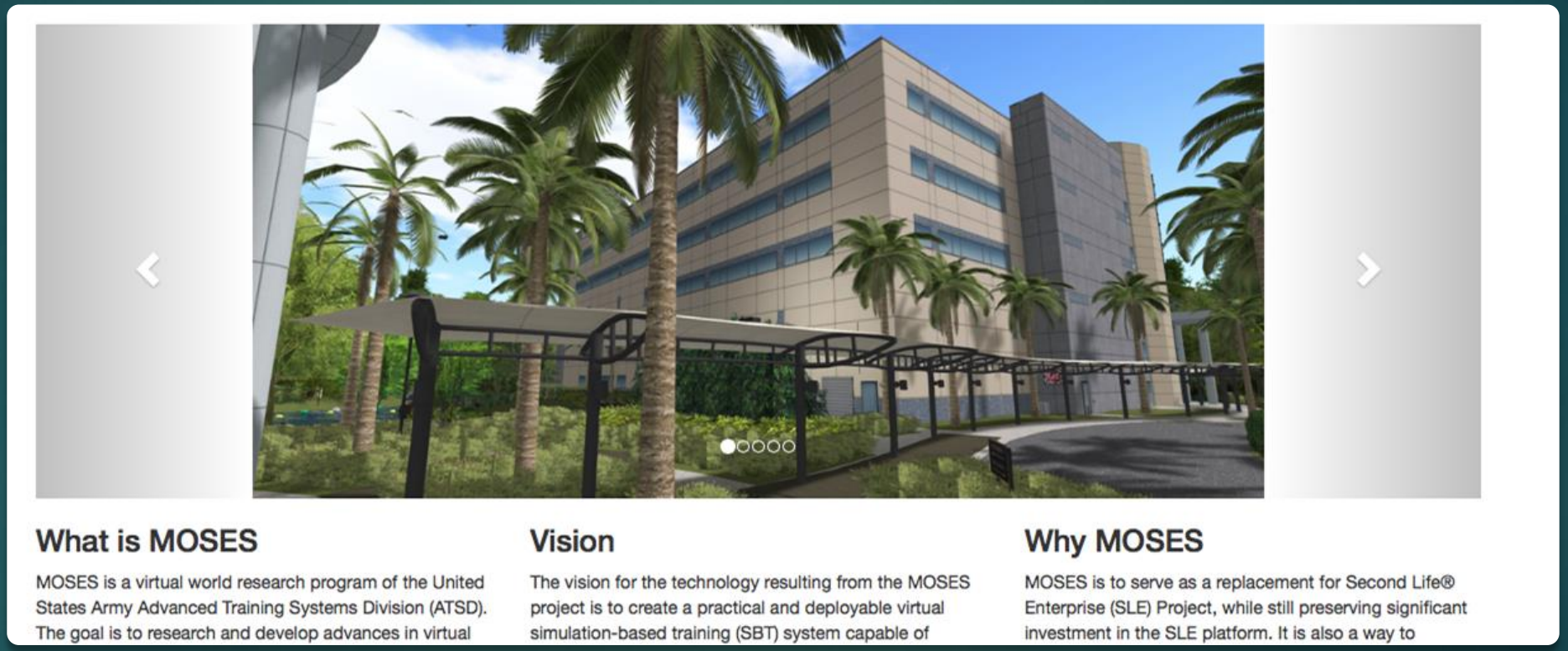
Other Simulations in Second Life

MOSES



https://militarymetaverse.org

Q&A

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