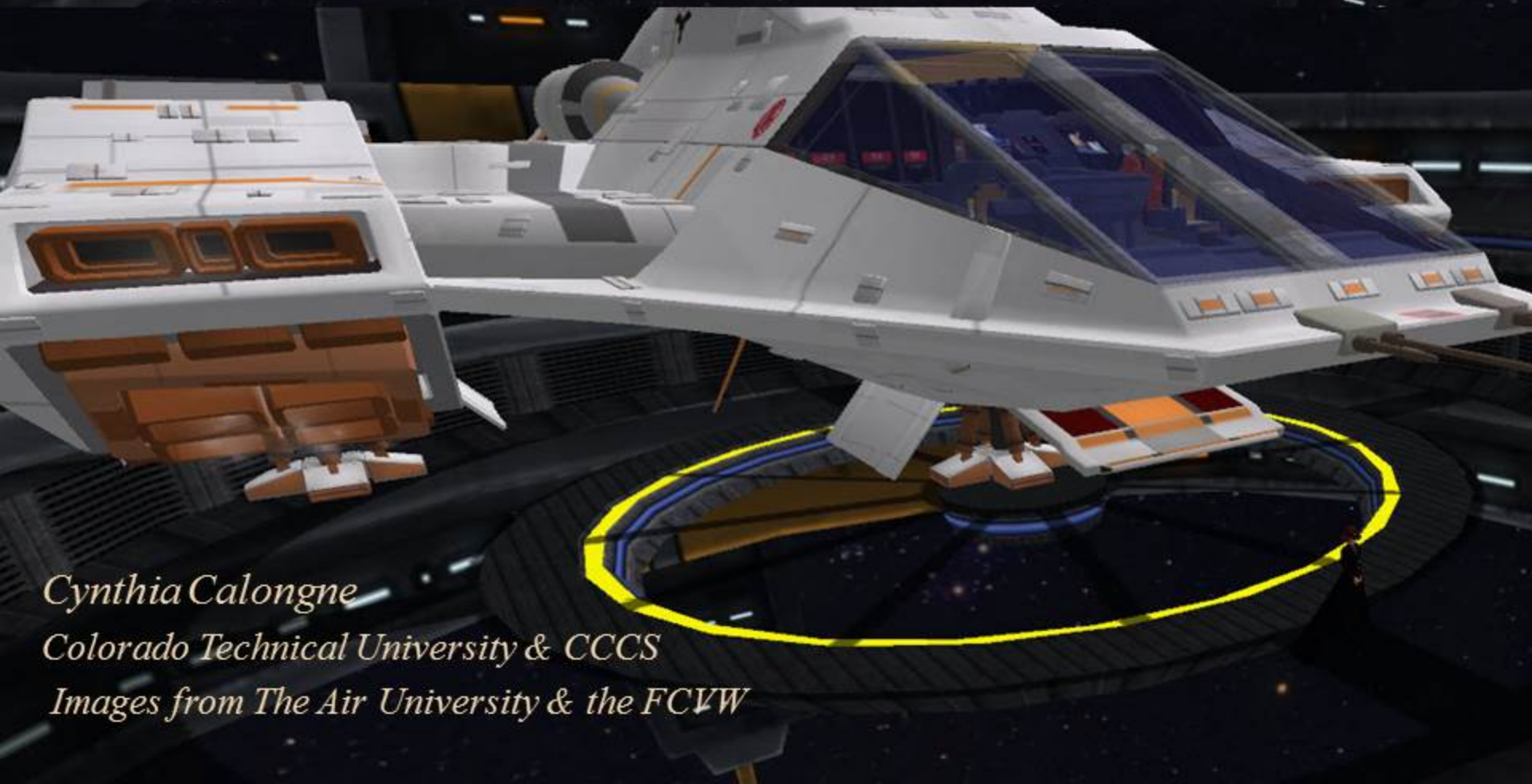


*Bridging Games & Raspberry Pi2 Learning Simulations
with Data Analytics & the Internet of Things*



Cynthia Calongne

Colorado Technical University & CCCS

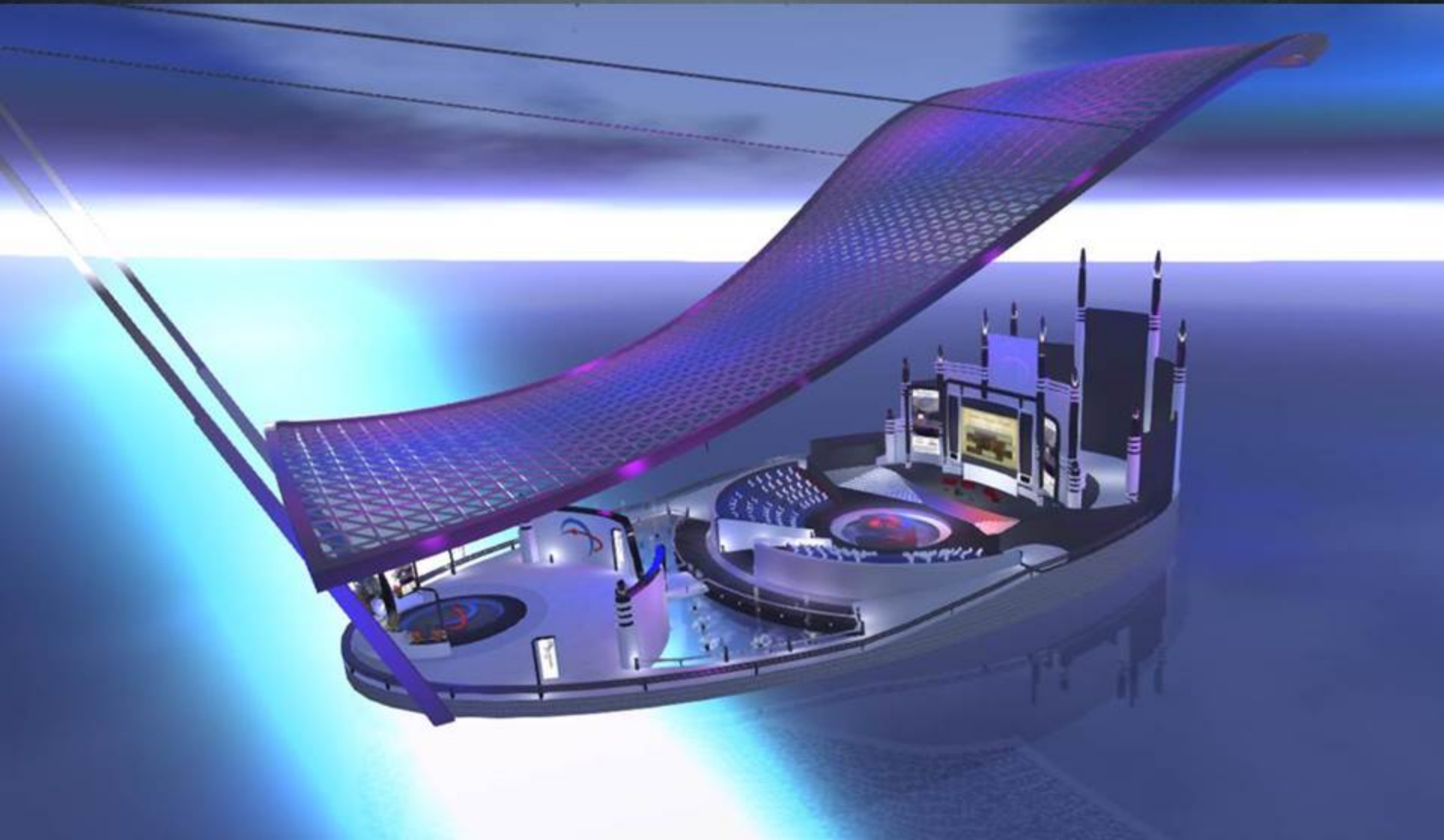
Images from The Air University & the FCVW

Military Use of Open Source Tools

Federal Consortium of Virtual Worlds (FCVW)



Metacognition Track in OpenSim MOSES Project Sponsored FCVW 2015



FCVW Modeling & Simulation Track

Education

Military

Research

Hypergrid

Bridges worlds



Integrated Learning Environment

An Integrated Learning Environment (ILE) spans **physical** and **virtual** spaces to better enable learning, instruction, and discovery **whenever** and **wherever**. Instructional design of ILE places emphasis on **learner-centered** environments offering **positive choices** for how people can learn using a variety of **interactive** contexts, tools, and media in **authentic** ways that are **engaging** and **meaningful**.



Design Thinking & Collaboration



Multiplayer Educational Roleplay Game



24 Character Strengths

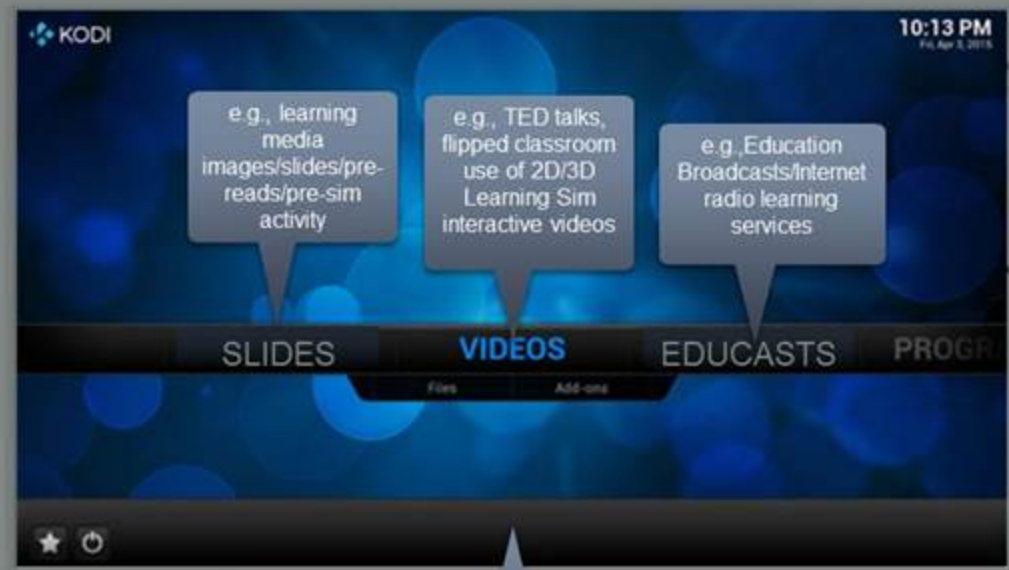
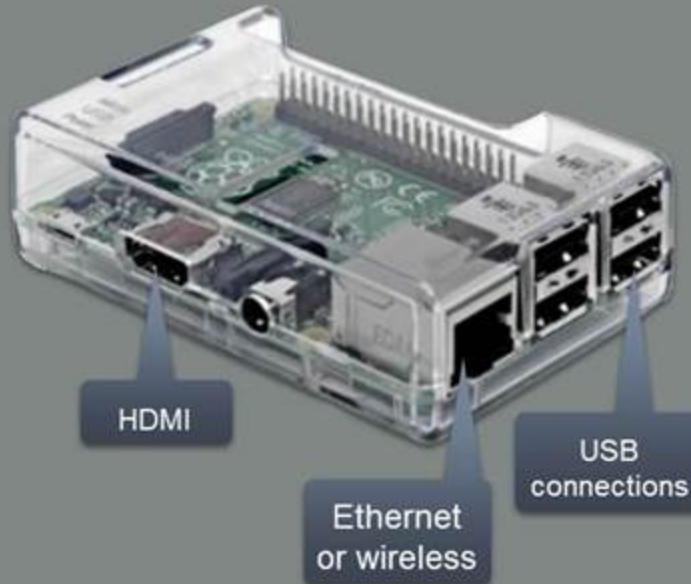


IoT-enabled Blended

LEARNING MEDIA CENTER

Supporting Integrated Learning Environments

Raspberry Pi2

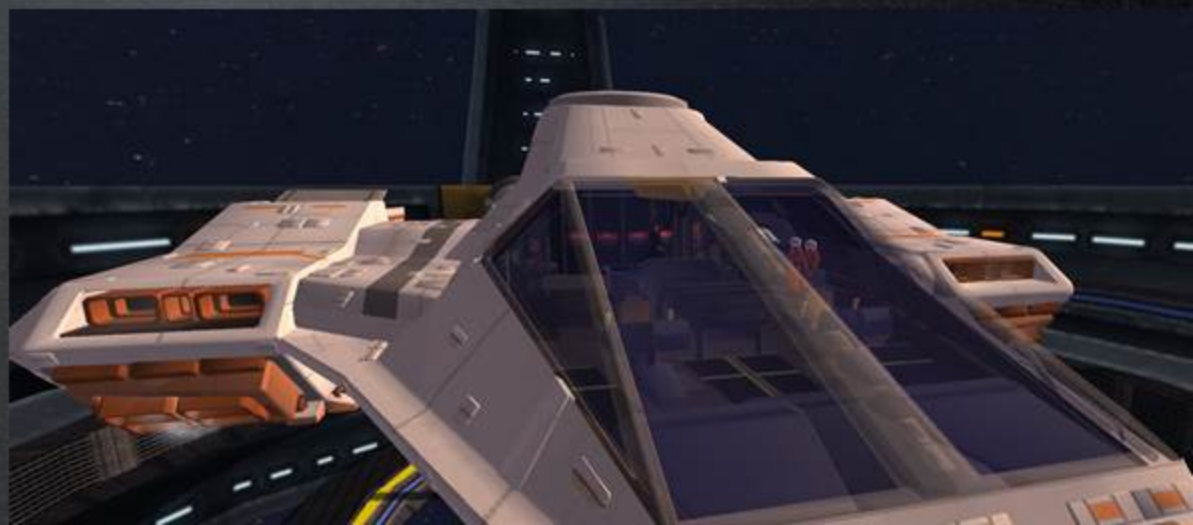


Learning Media Center Interface

Providing for classroom accessibility to enriched learning media with connections to 3D learning spaces and micro-learning simulations

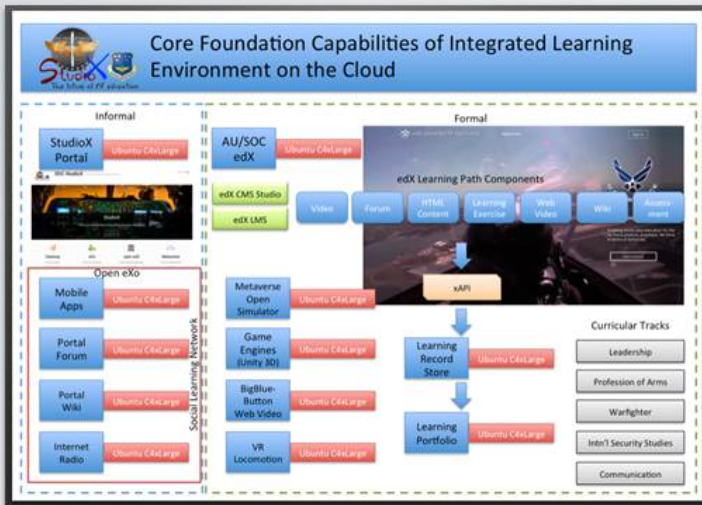


The Space Port



AU/SOC

Micro Learning Sim Framework using ILE Capabilities

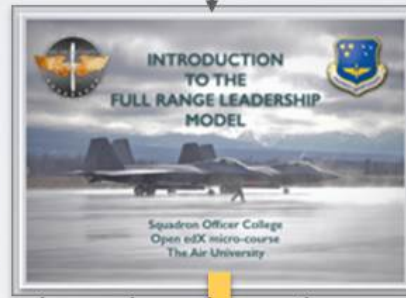


Support access to Mobile and Immersive Learning Resources for Exercise (e.g., EduCasts using Open edX App, access to additional readings, resources (e.g., Virtual FRLM Center, AU Metaverse, Raspberry Pi, 2D comic-design App))



Student Name, Date/Time Stamp, Exercise Name, Device, Completion Status

Micro-Open edX course (e.g., Full Range Leadership)



Learning sim pathway (flow)

Micro Learning Sim Architecture Using Unity

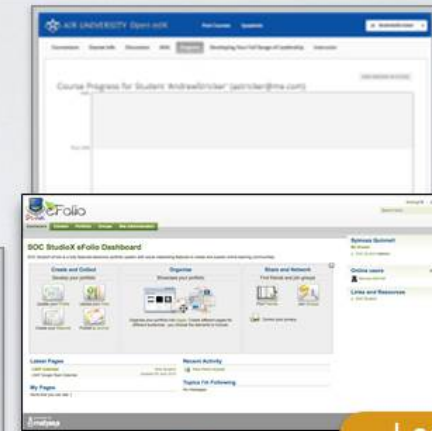


Student Registration Data

Game Play Data

Student Feedback Data

Data storage on Cloud databases



Learning Record Store (LRS) database

(Student Name, Course ID, Date/Time Stamp, Completion Status)

Data retrieval from LRS for display in student and instructor dashboards

Data collection for storage in LRS database

StudioX Raspberry Pi Capability for stand-alone or LAN access options to Micro-Learning Simulations running on Micro SD cards



Raspberry Pi2 computer (for @\$30.00)

900 MHz quad-core ARM Cortex-A7 CPU
1GB LPDDR2 SDRAM (2x memory)

Runs the full range of ARM GNU/Linux distributions



Pre-imaged
OpenSim delivered
micro-learning sims

Name or Username: Password: Grid: Start Location: Log In

Jane Air Force [password] AU Metaverse My Last Location

Remember name Remember password Grid Manager



Core Foundation Capabilities of Integrated Learning Environment on the Cloud

Informal

StudioX Portal Ubuntu C4xLarge

SOC StudioX

Gateway | eXo | open edX | Metaverse

Open eXo

Mobile Apps Ubuntu C4xLarge

Portal Forum Ubuntu C4xLarge

Portal Wiki Ubuntu C4xLarge

Internet Radio Ubuntu C4xLarge

Social Learning Network

Formal

AU/SOC edX Ubuntu C4xLarge

edX CMS Studio

edX LMS

AIR UNIVERSITY Open edX

edX Learning Path Components

Video | Forum | HTML Content | Learning Exercise | Web Video | Wiki | Assessment

xAPI

Micro-Learning Sims

Metaverse Open Simulator Ubuntu C4xLarge

Game Engines (Unity 3D) Ubuntu C4xLarge

BigBlue-Button Web Video Ubuntu C4xLarge

VR Locomotion Ubuntu C4xLarge

Learning Record Store Ubuntu C4xLarge

Learning Analytics Dashboard

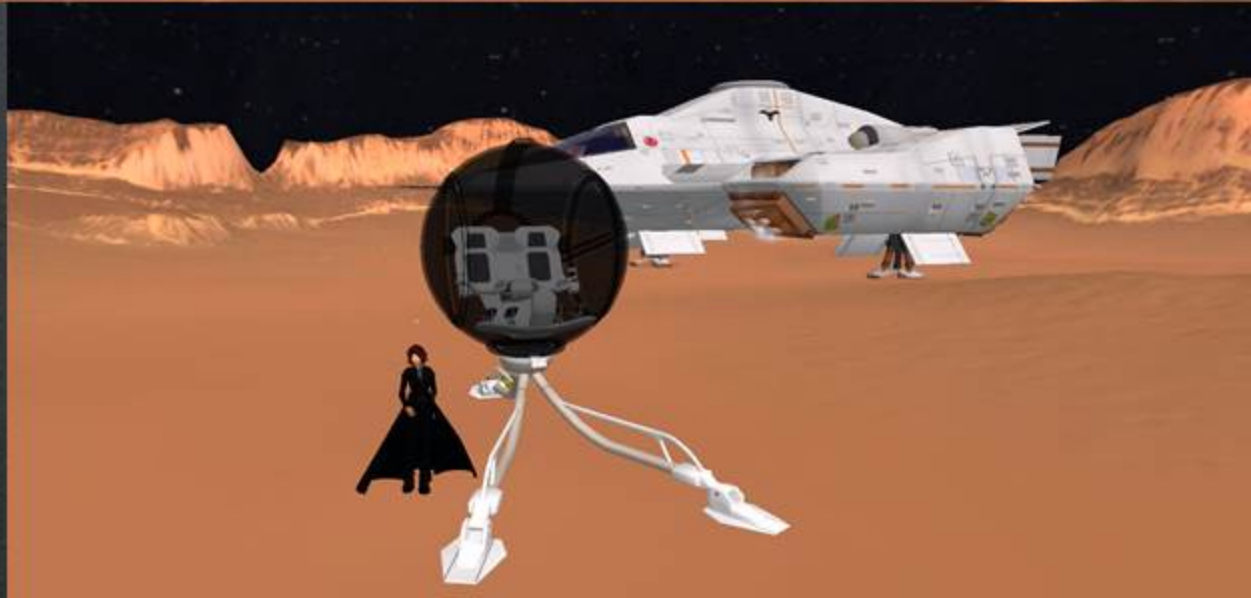
Learning Portfolio Ubuntu C4xLarge

Curricular Tracks

- Leadership
- Profession of Arms
- Warfighter
- Intn'l Security Studies
- Communication



Mars



18 Regions of Learning Activities Hosted in the Amazon Cloud



STUDIOX 3D LEARNING METAVERSE ON THE CLOUD

High-level Goals

- Support persistent 3D Single- and Multi-Player Education Role-Playing Games (SPERPGs and MPERPGs) for improving levels of engagement, meaningfulness, and interaction among learners, with augmented content, and instructors whenever and wherever
- Support continuous use of learning analytics to discern and make visible levels of understanding and skill performance for improvements across a global Integrated Learning Environment (ILE)
- Support persistent collaboration with partners from across higher education, industry and federal agencies to continuously explore and leverage blended 2D and 3D learning environments

512x512 var grids

Each AU/SOC squadron is supported via a Universal Campus grid



Dragons



Knights



Bulls



Centurions



Tigers



Blackhawks

Additional Grids in AU Metaverse



SOC Main



IoT



Shangri-la



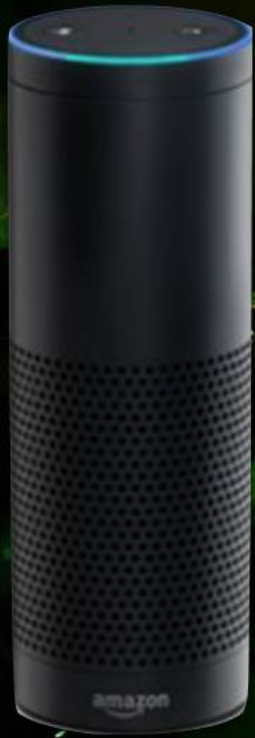
xBase

Note: xBase is a 1024x1024 grid

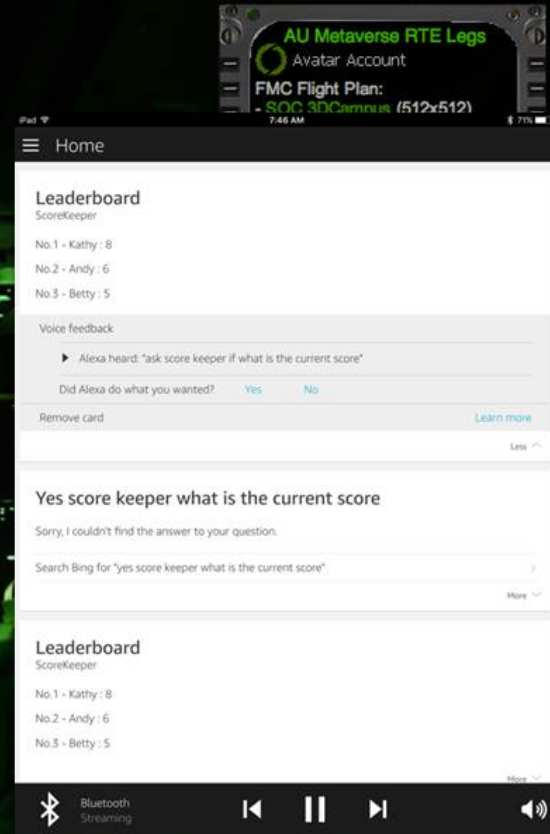


<http://soc.austudiox.com>

StudioX IoT Capability Using A Lambda-Delivered Alexa Skill Set For Connecting With Micro-Learning Simulations



Echo device



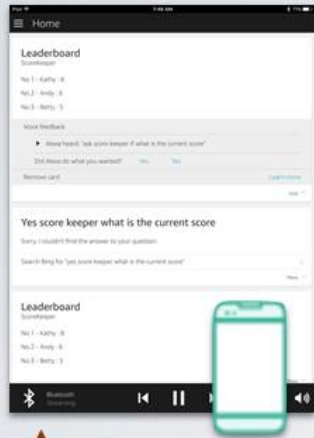
App interface for learning sim scores

Name or Username: Password: Grid: Start Location: Log In

Jane Air Force AU Metaverse My Last Location Log In

Remember name Remember password Grid Manager

HOW IT WORKS



Alexa Voice
Activated/Controlled
by Instructor for
Leadership
Game Scorekeeper
Updates

AWS AU StudioX
Lambda on the Cloud is
triggered

Leadership game
data stored
in DynamoDB on
the Cloud



Echo bluetooth
paired with
mobile
device for using AU
StudioX
Leadership Skill Set
wherever, whenever

API Gateway
(option to use AU StudioX
DreamFactory on the Cloud for
RESTful API calls
to endpoint or AWS login application
management services)

Lambda runs
Leadership
game code and
returns stored
DynamoDB
data back
using node js

AWS
DynamoDB



Echo
Device
(for blended
connections
between physical
and virtual
learning spaces)



Learning Simulations
on the Cloud
with option to use
classroom stand-alone
micro-learning sims
via Raspberry Pi2...

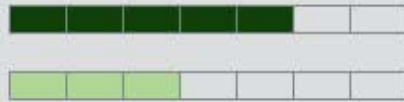
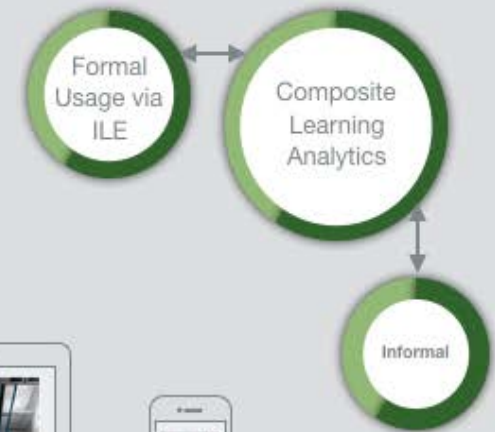


...using pre-imaged

Micro SD card configured for OpenSim running on Raspberry Pi



Supporting Modularity Across Formal and Informal Learning Pathways on the Cloud



Parallel Gamification and Learning Analytics Data
Bridging informal and formal learning environments

User Options

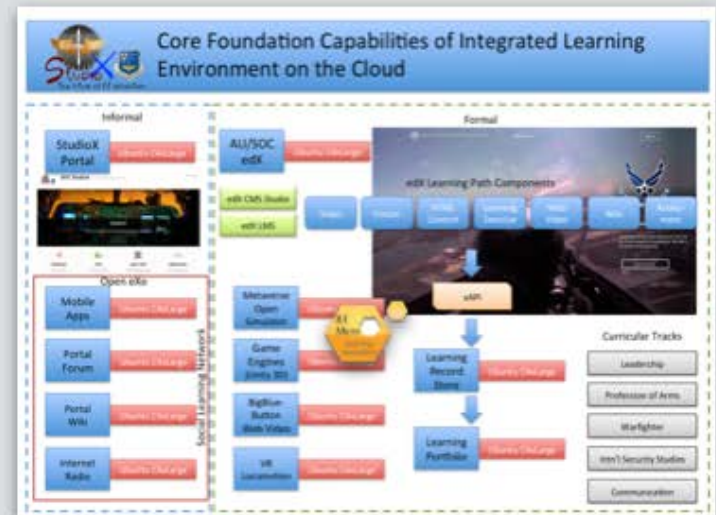
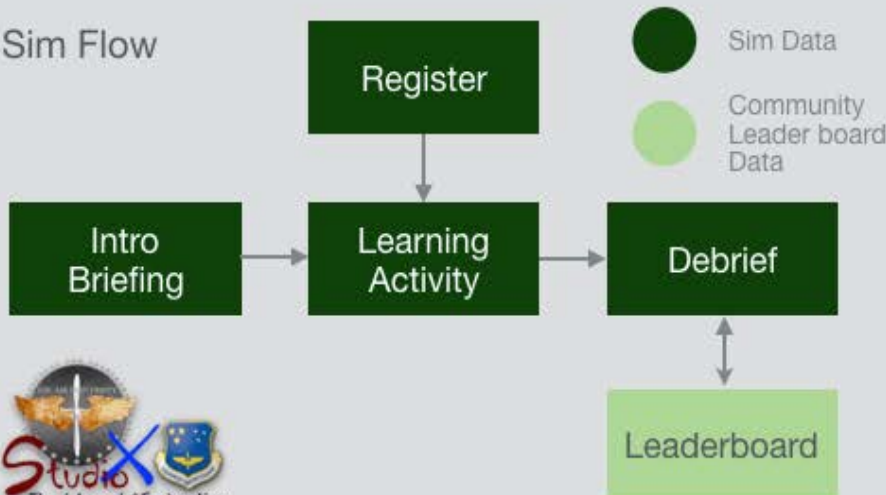


Cloud hosted



Global Access and Usage Analytics

Sim Flow



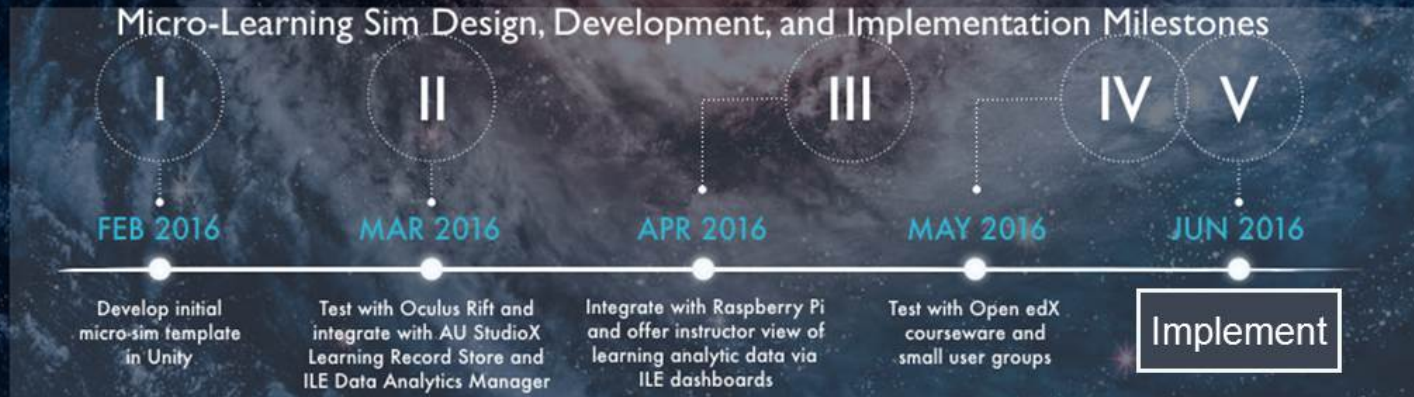
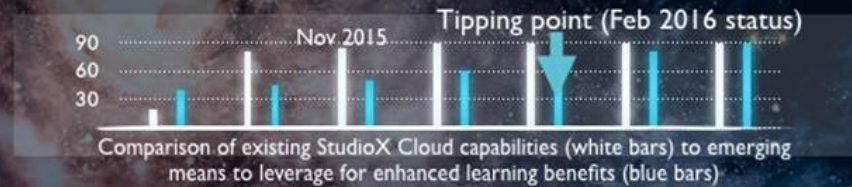
STATUS

Rapid Time to Fielding AU StudioX Micro-Learning Simulations for ILE



Delivery Options

- Apple Mobile** (Apple logo)
- Cloud** (AWS S3 Download for desktop/labs)
- APP Space Doc** (Star icon)
Enterprise license distribution (Android and iOS mobile apps)
- Raspberry Pi** (Checkmark icon)
IoT connectivity via classroom learning media centers



MICRO-LEARNING SIM FLOW OF DATA IN CLOUD STREAM



Micro-learning simulations

Cloud Delivery & User Data Storage-Retrieval



Unity3D
SPERPGs



OpenSim
SPERPGs &
MPERPGs



Tomcat
xAPI servlet



Learning
Locker



Kyougi
Dashboard



QUESTIONS?



Andy Stricker astricker@me.com
Cynthia Calongne calongne@pcisys.net