Hacking 4 Health @ UCF

Simulation + Innovation in Healthcare

David Metcalf

Institute for Simulation and Training

UNIVERSITY OF CENTRAL FLORIDA

Overwhelmed?

How do we structure and apply all of these innovations?

Combining Simulation and Innovation Management Techniques Can Produce Exponential Results

The University of Central Florida

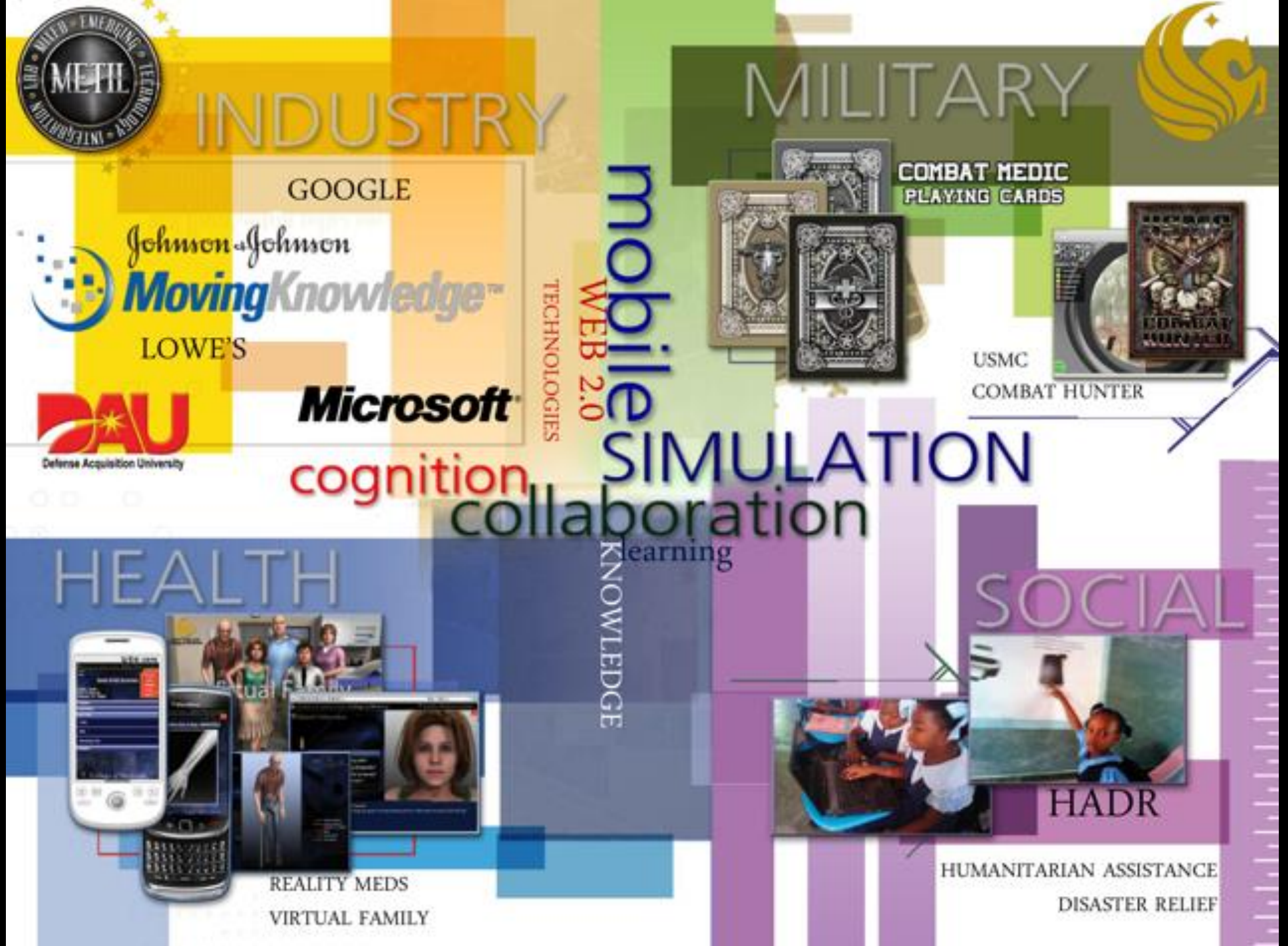
- Orlando, FL
- Largest Undergrad pop in U.S.
- 2nd highest number of CS grads
- Cyberdefense National Champs
- 1st in Game Design (Princeton Review)
- 2015-16 enrollment exceeds 66,000
- 12 Colleges
- 216+ degree programs

New College of Medicine launched in 2009

The Institute for Simulation and Training

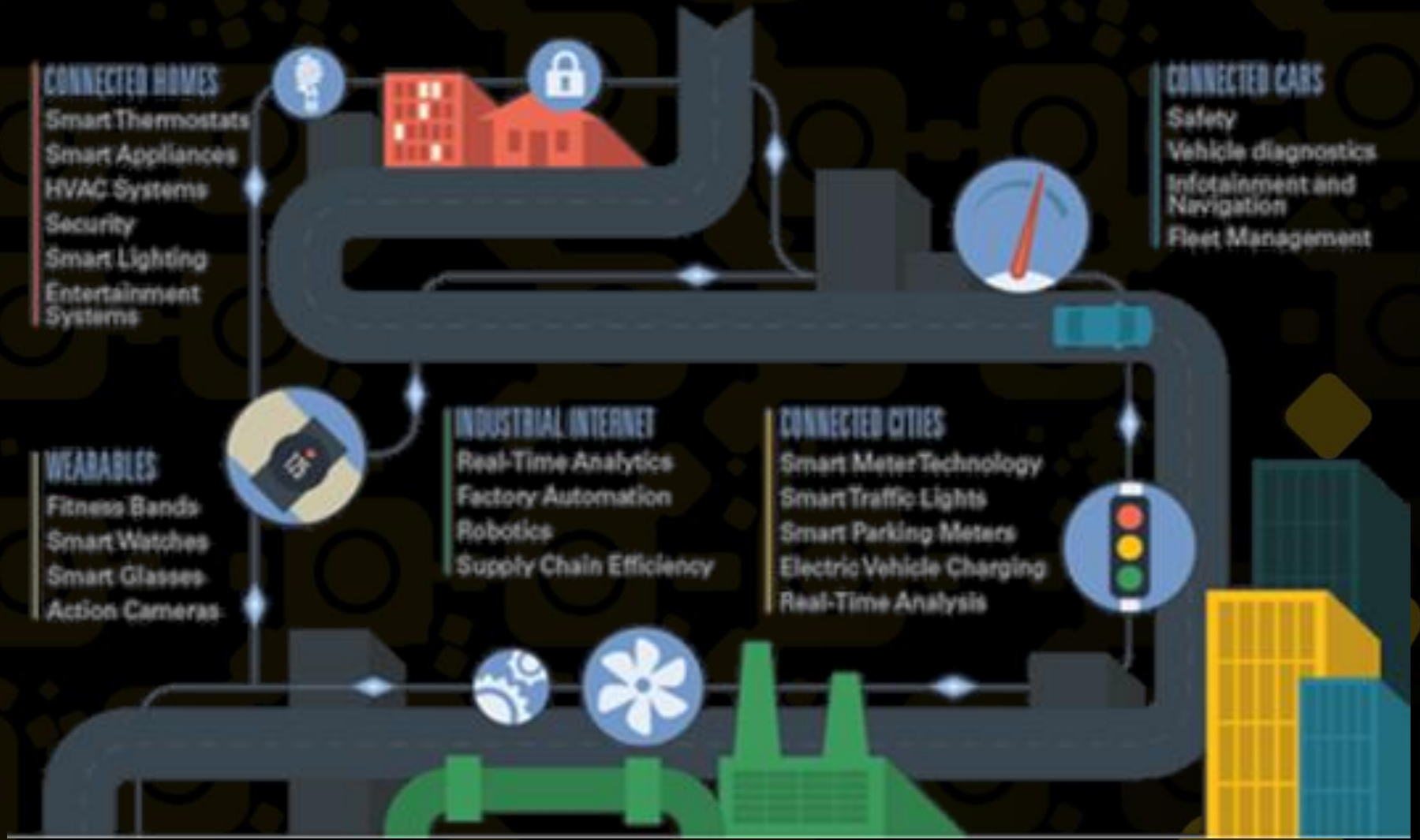
Research Institute, 35 years, $250M, 280 Employees

Large Campus, Interdisciplinary Research, CF Research Park- $5B/yr in Simulation and Training, Lake Nona Medical City


METIL
INDUSTRY
GOOGLE
Johnson & Johnson
MovingKnowledge
LOWE'S
DAU
Defense Acquisition University
Microsoft
MILITARY
COMBAT MEDIC
PLAYING CARDS
USMC
COMBAT HUNTER
mobile
WEB 2.0
TECHNOLOGIES
SIMULATION
cognition
collaboration
learning
KNOWLEDGE
HEALTH
REALITY MEDS
VIRTUAL FAMILY
SOCIAL
HADR
HUMANITARIAN ASSISTANCE
DISASTER RELIEF

WHAT IS THE INTERNET OF THINGS?

The Internet of Things connects devices such as everyday consumer objects and industrial equipment onto the network, enabling information gathering and management of these devices via software to increase efficiency, enable new services, or achieve other health, safety, or environmental benefits.



What Sectors of Society Can Benefit Most?

- Cross-sector technology integration strategy-
  - Mil/GovTech, HealthTech, EdTech, FinTech, TransTech, Global/CharityTech
- Military research benefiting other sectors of society through commercialization and licensing (Dual use)
- Each sector benefits from the others in a neutral academic setting- creating public/private benefit to society

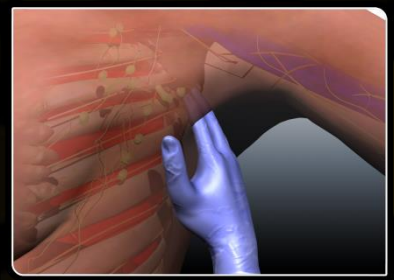
Advanced Simulation and Mobile Learning

Cognotion, CNA eLearning/Sim

Juan Cendan, MD, UCF

The Clinical Breast Exam: Self-learning Module

- Visual medial developed to support clinical breast exam education
- Includes 3D animation of axillary exam and additional imagery to enhance interactive self-learning module
- Developed in collaboration with Drs. Juan and Judith Cendan from the UCF College of Medicine
- Published to MedEDPORTAL



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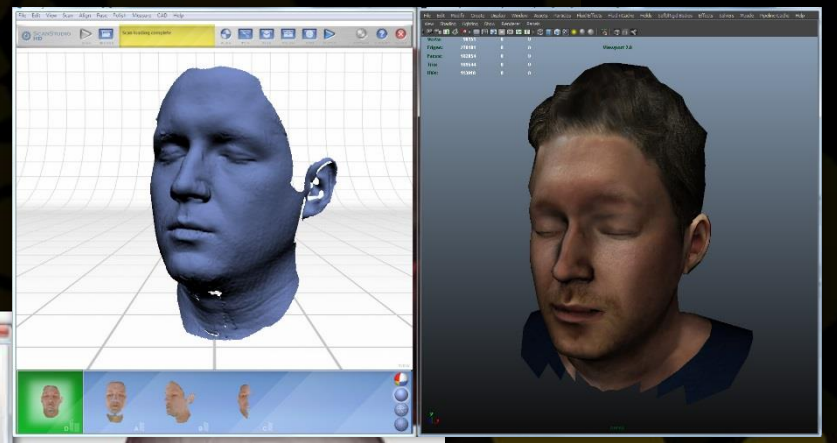
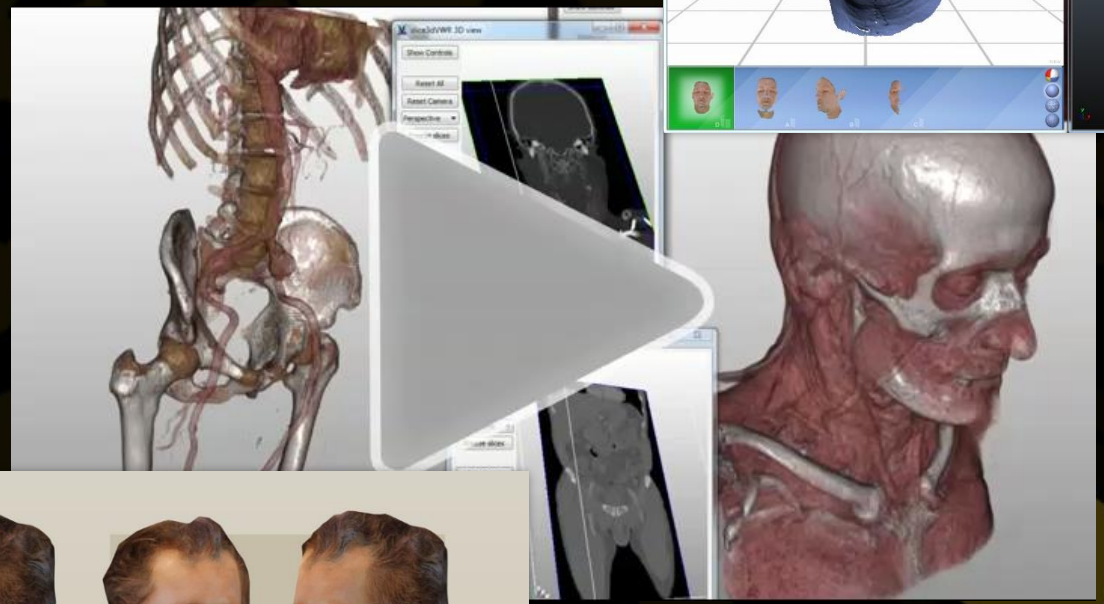
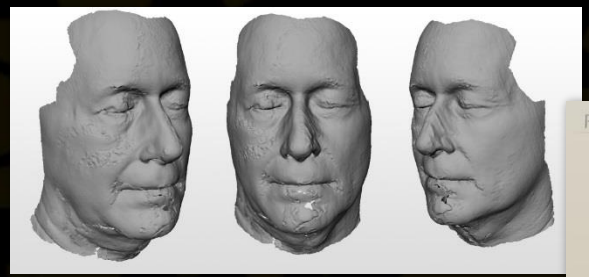
mHealth: Anatomical Models

Scientifically Accurate Anatomical Models

- Generated from DICOM images
- New medical visualization tools from European universities
- Diagnosis
- Medical Illustration
- Interactive eBooks
- Mobile-ready







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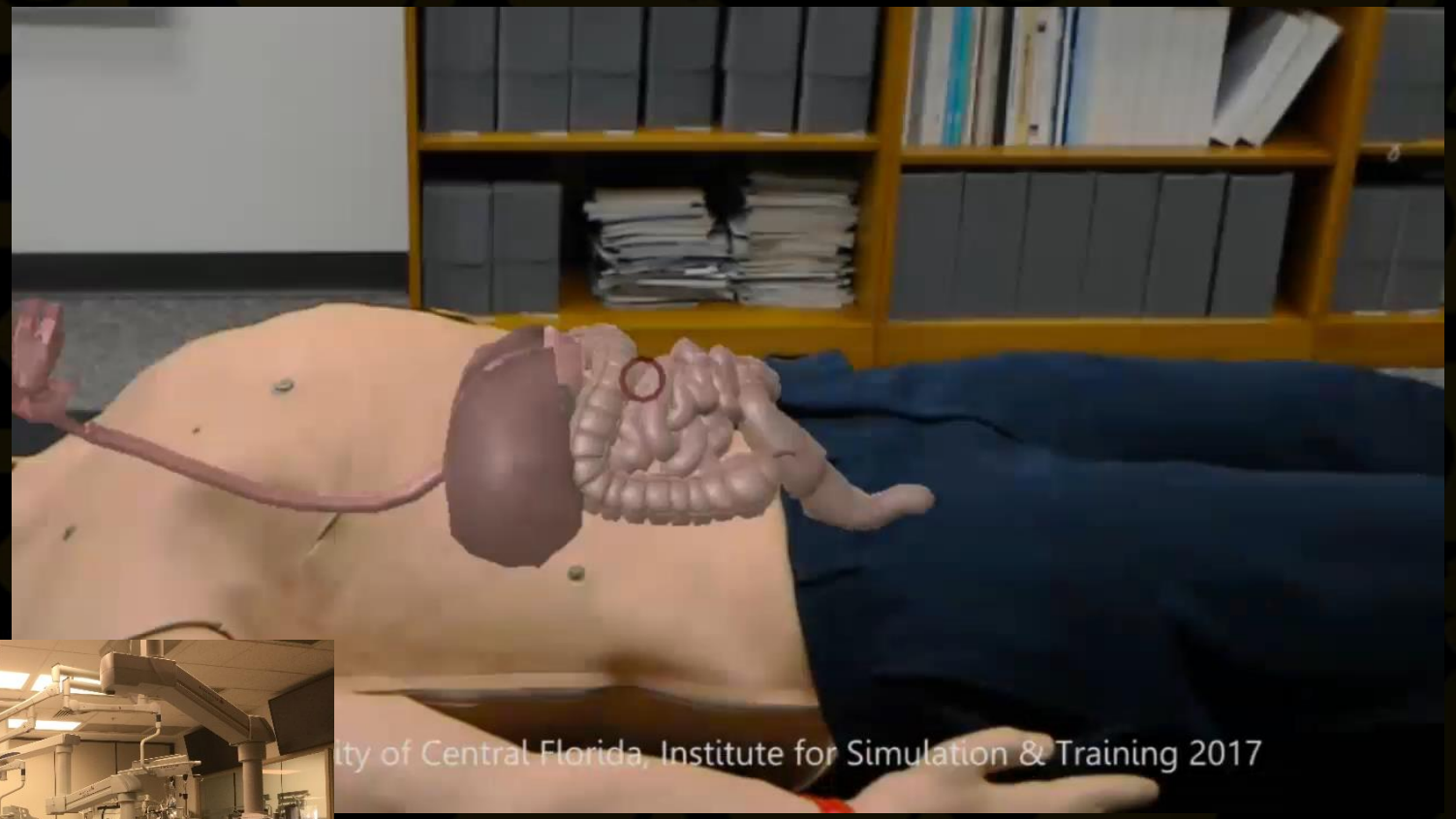
VA SimLEARN- AR Training Sim and mHealth VA-VMC PPE App



PPE

DONNING + DOFFING

Betty Social Companion Robot/Hologram

Drs Julio Hajdenberg, Tomas Dvorak, Diane Robinson
Orlando Health UF Cancer Center

Lake Nona Institute: WHIT

Partnership with Cisco, J&J, GE, Guidewell, Nemours, Amwell, UCF and many others

“Living Laboratory”

Simulated Home

Mobile Tour App

- Rapid development, interactive, AR, VR, and GPS across mobile and web.

Actions

RELAX
REDUCE STRESS AND IMPROVE YOUR WELL-BEING WITH AROMATHERAPY, BIOPHILIC SOUNDS, AND MINDFUL MEDITATION

BREATHE
A SIX-STAGE AIR FILTRATION SYSTEM, LOW VOC PAINT, AND CORK FLOORING TACKLE EVERY MAJOR POLLUTANT CATEGORY HELPING YOU BREATHE EASIER.

CARE
A VARIETY OF TECHNOLOGIES ENABLE YOUR HOME TO BECOME YOUR OWN PERSONAL CARE CENTER CAPABLE OF MONITORING HEALTH ISSUES AND CONNECTING WITH HEALTH PROFESSIONALS IN REAL TIME.

MOVE
A COLLECTION OF EQUIPMENT, MOBILE APPS, AND GAMES THAT INSPIRE YOUR ENTIRE FAMILY TO REACH EXERCISE GOALS IN THE COMFORT OF THE HOME

SLEEP
IMPROVE THE QUALITY AND QUANTITY OF SLEEP WITH CIRCADIAN LIGHTING, LONG WAVE NIGHT LIGHTING, BLACK OUT SHADES AND MUCH MORE

HYDRATE
WATER FILTRATION SYSTEMS THAT REDUCE IMPURITIES AND CONSUMPTION TRACKING DEVICES WORK TOGETHER TO PROMOTE OPTIMAL HYDRATION

meet

WHIT

WELLNESS + HOME : INNOVATION + TECHNOLOGY

Spaces

LEARN
A REAL-LIFE CONSTRUCT AND INCUBATION LAB THAT GATHERS FEEDBACK ON INNOVATIVE SOLUTIONS DESIGNED TO IMPROVE HEALTH OUTCOMES

BUILT ENVIRONMENT
FROM THE SOUND-PROOF INSULATION, LOW VOC PAINT, TO THE HUE LIGHTING- ALL MATERIALS ARE PURPOSEFULLY DESIGNED TO ENHANCE YOUR HEALTH AND WELLNESS

BEDROOMS
LUXURY AND TECHNOLOGY INTERSECT IN UNIQUE WAYS TO PROVIDE A RESTORATIVE AND SOOTHING OASIS

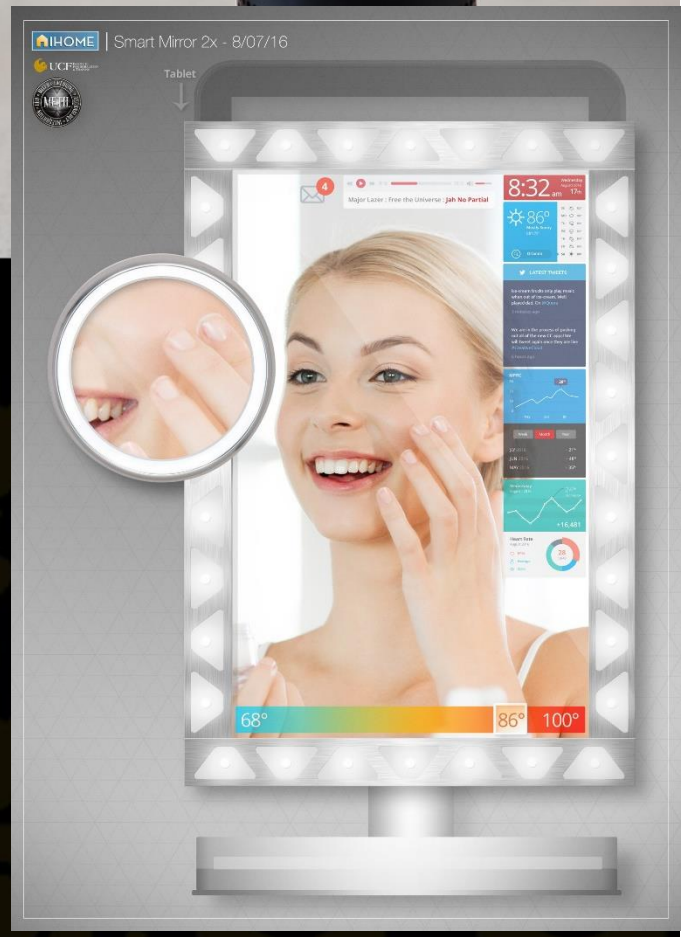
BATHROOMS
AN INTIMATE YET CONNECTED SPACE WITH TECHNOLOGIES THAT EDUCATE, MONITOR, TRACK AND SHARE HEALTH METRICS

KITCHEN
THE WELLNESS HUB OF THE HOME WITH SOLUTIONS THAT CONNECT, EDUCATE AND INSPIRE FAMILY MEMBERS TO DEVELOP HEALTHY EATING HABITS

GARDEN
THE HEALTHFOOD STORE IN YOUR KITCHEN AND BACKYARD DELIVERING HYPER-LOCAL, SUSTAINABLE AND BEYOND ORGANIC FOODS FOR YOUR ENTIRE FAMILY

FAMILY ROOM
THE SOCIAL GATHERING SPACE OUTFITTED WITH INTERACTIVE DEVICES THAT CREATE PERSONALIZED ENVIRONMENTS TO SET THE MOOD FOR EVERY OCCASION

How can technologies such as the Amazon Echo be used in the home to inspire healthy habits?



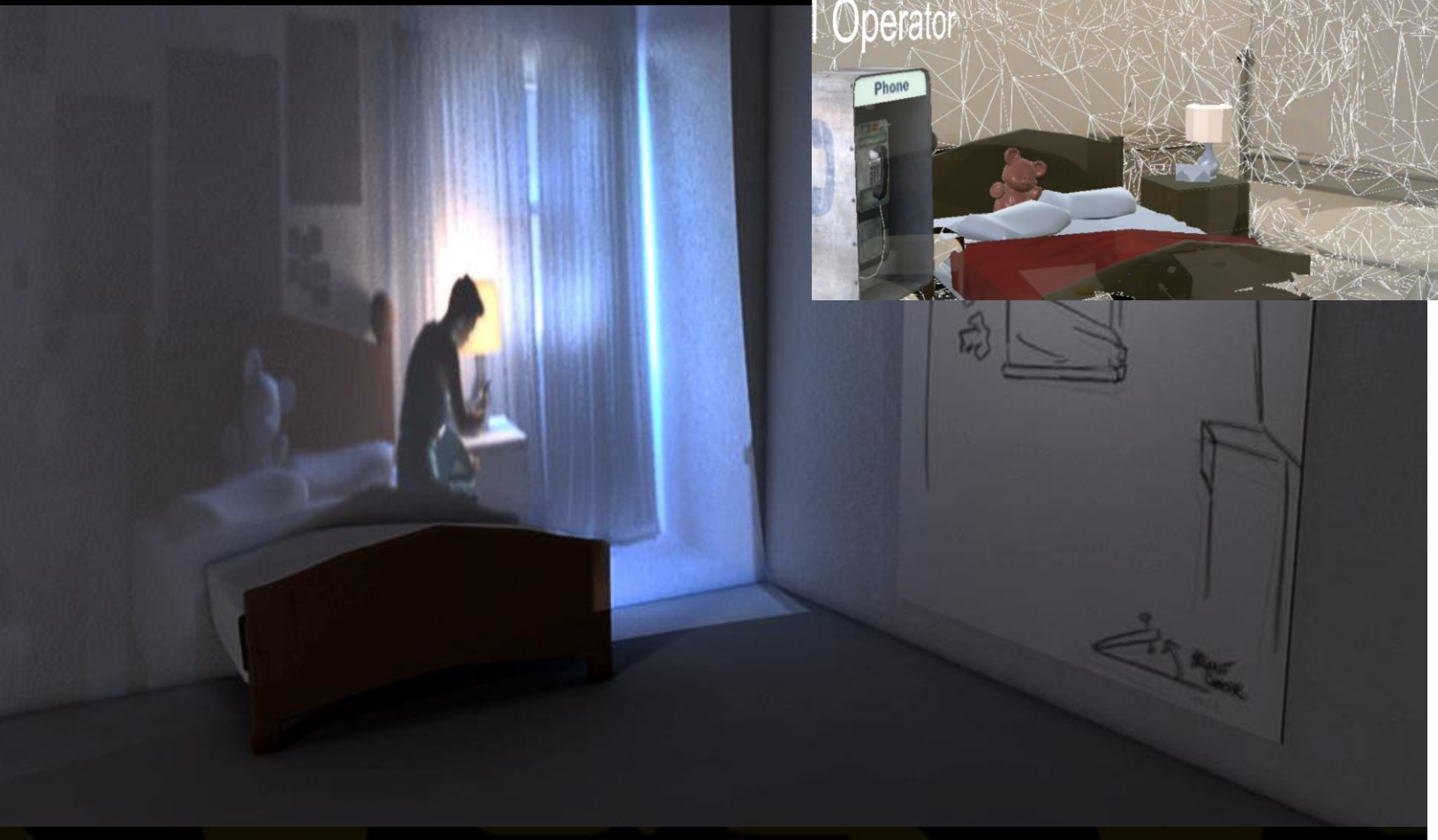
Follow Our Family

Demonstrate Use Cases through Storytelling
Integrate a Range of Health Profiles
Establish Emotional Touchpoint

Interactive Mirror

Interdisciplinary Dashboard
Track & Monitor Each Family Member's Well-Being
Touchscreen Capabilities
Florida Blue Nurse

- Intelligent VR/AR Garage



Institute for Simulation and Training
UNIVERSITY OF CENTRAL FLORIDA

METIL
MIXED · EMERGING · TECHNOLOGY · INTEGRATION · LAB

UCF Construct at WHIT Intelligent Garage
Studio for 3D virtual reality, augmented reality and holographic visualizations

Ideation
Creation
Evaluation

3D Visulatization
Wellness
Health
Performance
Living Laboratory
Mixed Reality
Weable Evaluation

Health, Safety & Training in Transportation

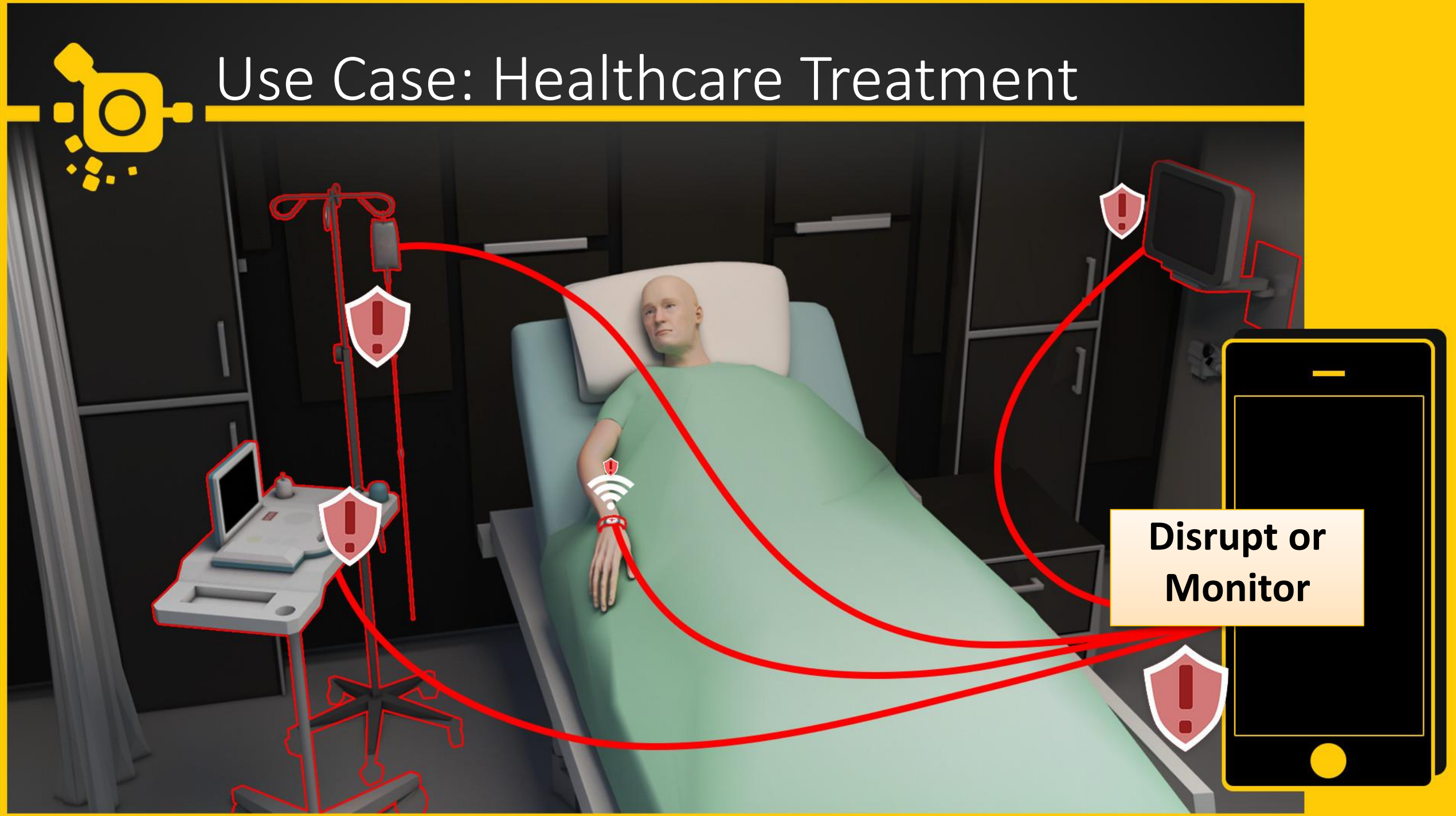
FDOT Self driving car simulator and
Boeing Holographic Avatar

UCF Cybersecurity Cluster

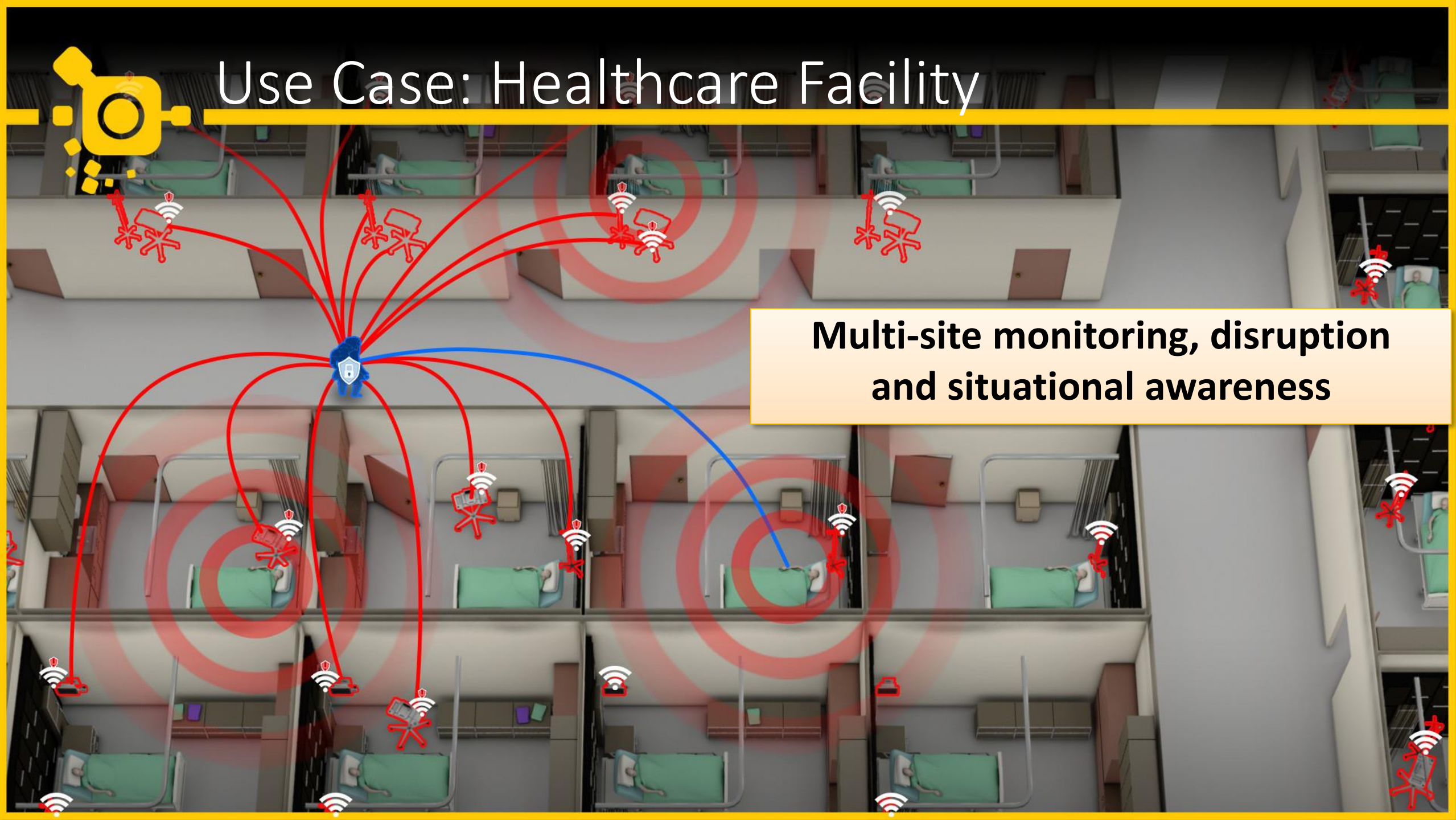
- NSA CAE-CD/R
- Institute for Simulation and Training
  - IoT Test Ranges
  - IARPA Insider Threat Program
  - Partnership with Army Cyber School/PEO STRI/ARL
- Orlando designated as USDOT CAV Test Range and "Smart City" pilot
- 3X National Cyber Defense Champions
- Over 2000 Computer Science and IT Students
- MIST
- Silicon Security Lab (SSL) Research and Database

Proprietary to UCF 2016-17

Use Case: Healthcare Treatment



Use Case: Healthcare Facility



Multi-site monitoring, disruption and situational awareness

Student-led, Community Service and Social Entrepreneurship

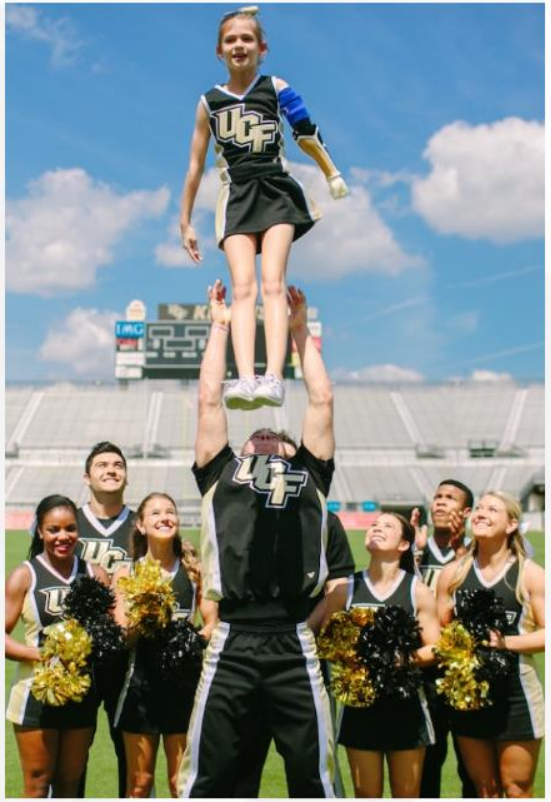
Interdisciplinary Innovation for Social Good Can Produce Exponential Results

●○○○○ T-Mobile 10:11 AM 90%
limbitless-solutions.org

limbitless SOLUTIONS

Tap on a picture to learn more about each of our stories!

Alex



Julianna

Wyatt

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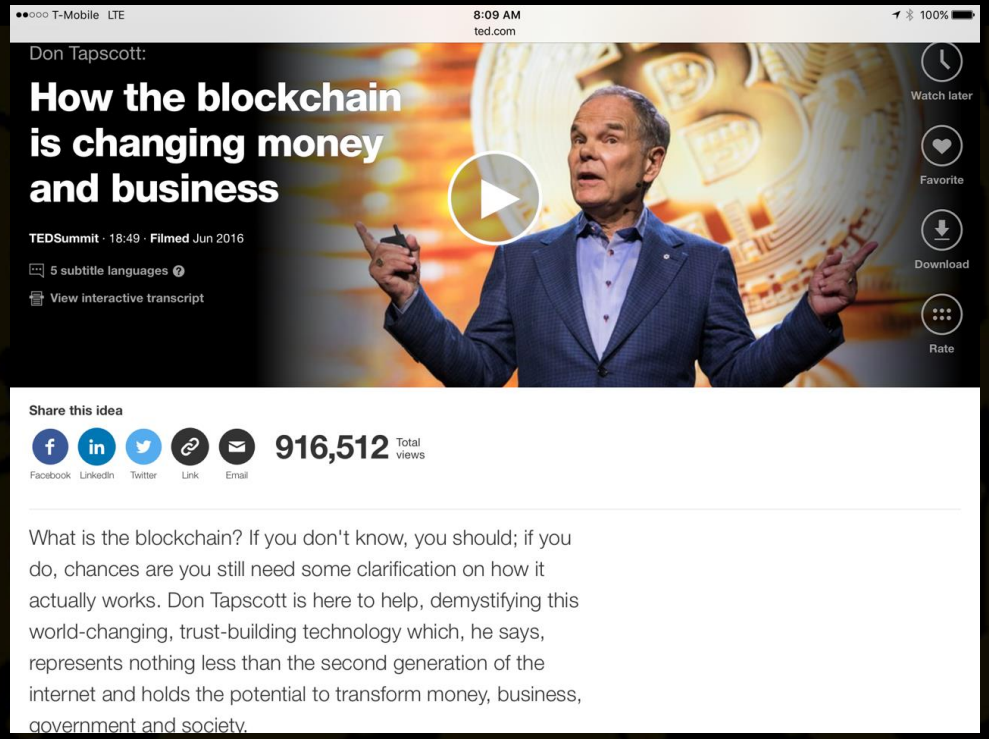
10:14 AM
89%
limbitless-solutions.org

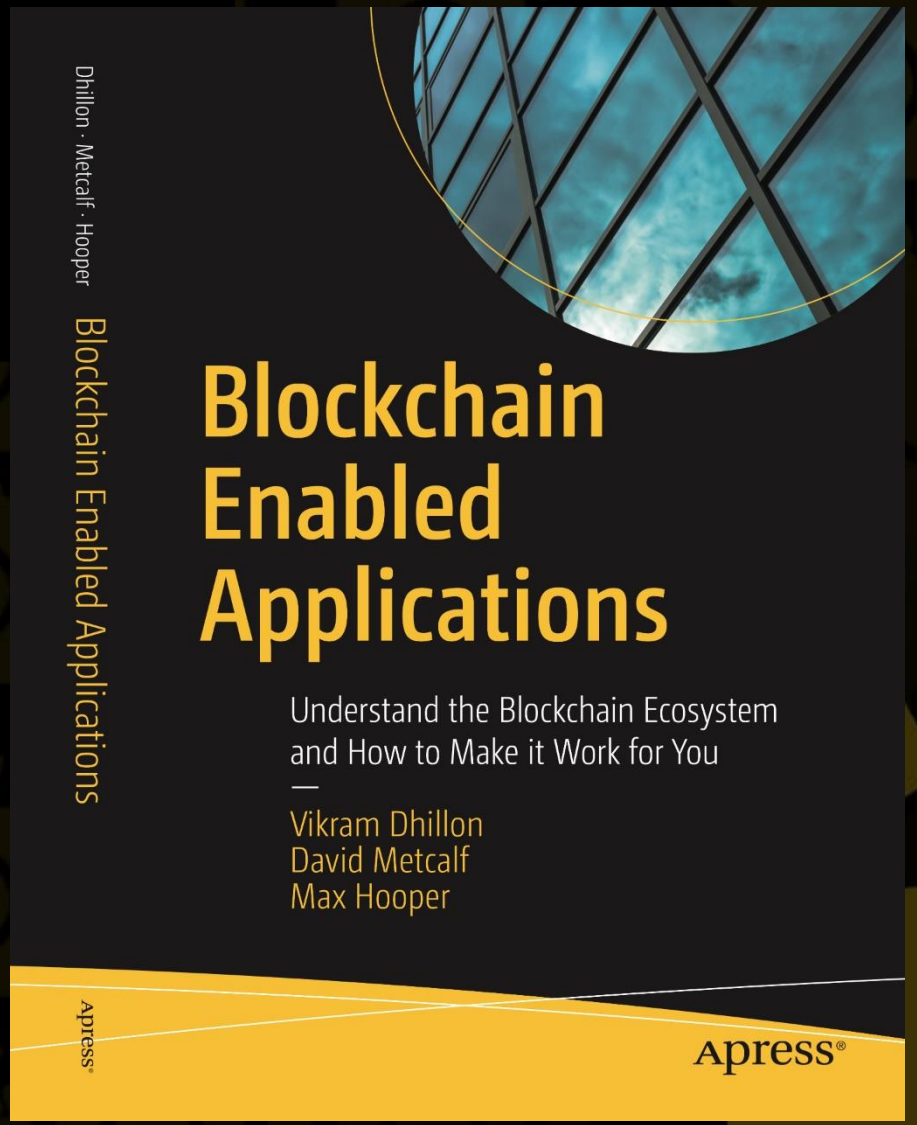
IRON MAN ARM

HealthShares- Blockchain for Health

Student-Led NSF I-Corps Award

Don Tapscott, TED Talk





Emergency Manager Portal for Harvey, Irma and Maria

KCG, NEMA, IAEM, FEMA

SitScape

Public Private Partnership Portal

Hi Harvey3 | See Demo | Inbox [3] | Logout

I'm looking for...

Pages | PPP Landing | Hurricane Irma SitRep | More

Share

NEMA

UNIFIED INFORMATION | PORTAL

PUBLIC PRIVATE PARTNERSHIP

IAEM

Introduction

This is a working product of the NEMA Private Sector Information Sharing Task Force in partnership with IAEM in support of Hurricane's Harvey and Irma. This dashboard is intended to facilitate a baseline level of shared consciousness for public and private sector partners. Scroll for more

This dashboard has the ability to include information that your organization would need to obtain situational awareness and support operational coordination.

You may also submit requests for information or assistance on the "Requests for Assistance" tab, and those requests will be directly routed to FEMA NBEOC on a daily basis. If you have additional ideas of information, content or resources to share, please submit.

This dashboard is currently open and does not require username and password. Use at your own risk. If you

Join the National PPP Contact List !

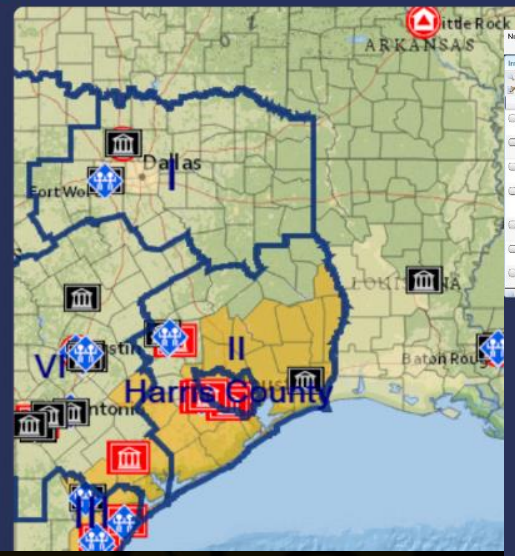
Email *

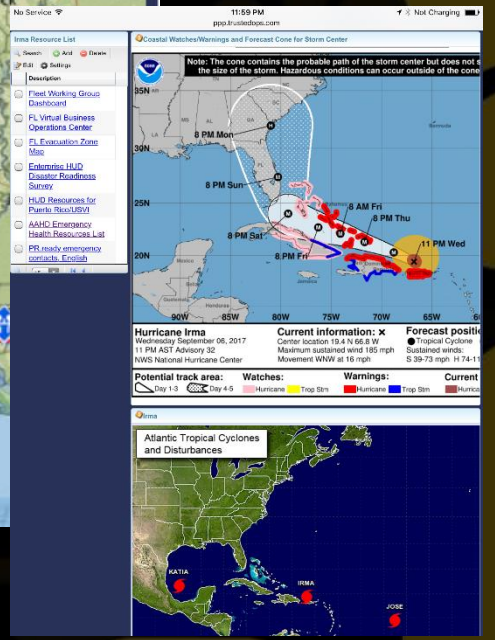
Irma Situation Reports

Harvey Situation Reports

Irma Remote Sensing & GIS Data

Harvey Remote Sensing & GIS Data





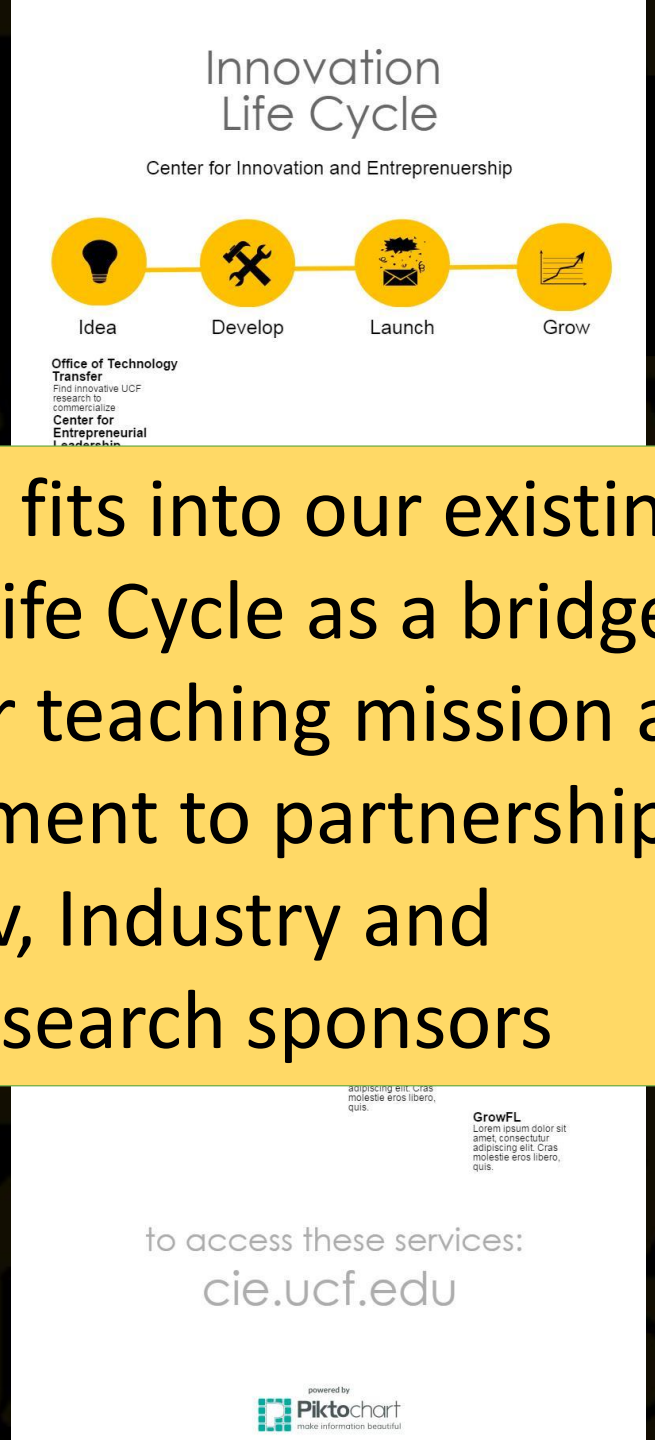
Overwhelmed?

How I-Corps, Hacking 4 Defense/Health, and other Design Thinking and Lean Startup Methods Can Help

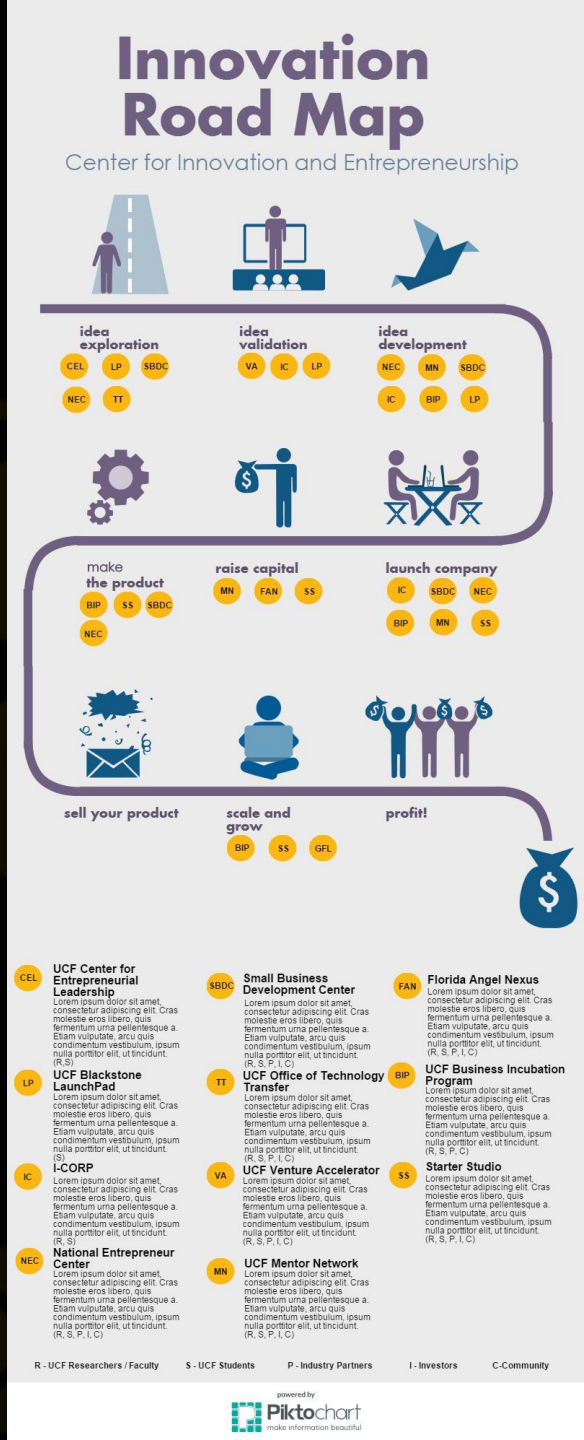
Innovation Management Techniques
Can Produce Exponential Results

I-Corps- Evidence-based Entrepreneurship/Intrapreneurship

Proven Silicon Valley principles for Lean Startup, Customer Discovery and Business Model Canvas adopted by NSF, NIH, DoD and other agencies for grantmaking, translation/tech transfer, and prediction of broad impact/adoption.



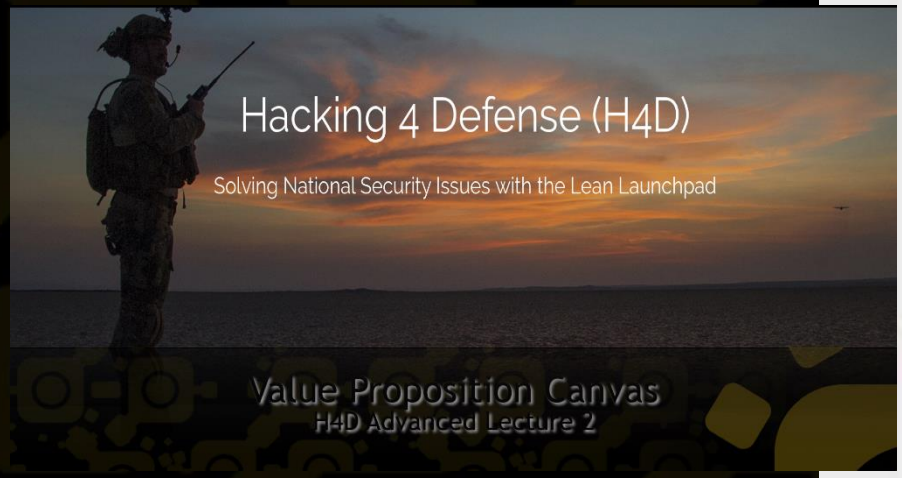
I-Corps/H4H fits into our existing Innovation Life Cycle as a bridge between our teaching mission and our commitment to partnership with our Gov, Industry and Nonprofit research sponsors

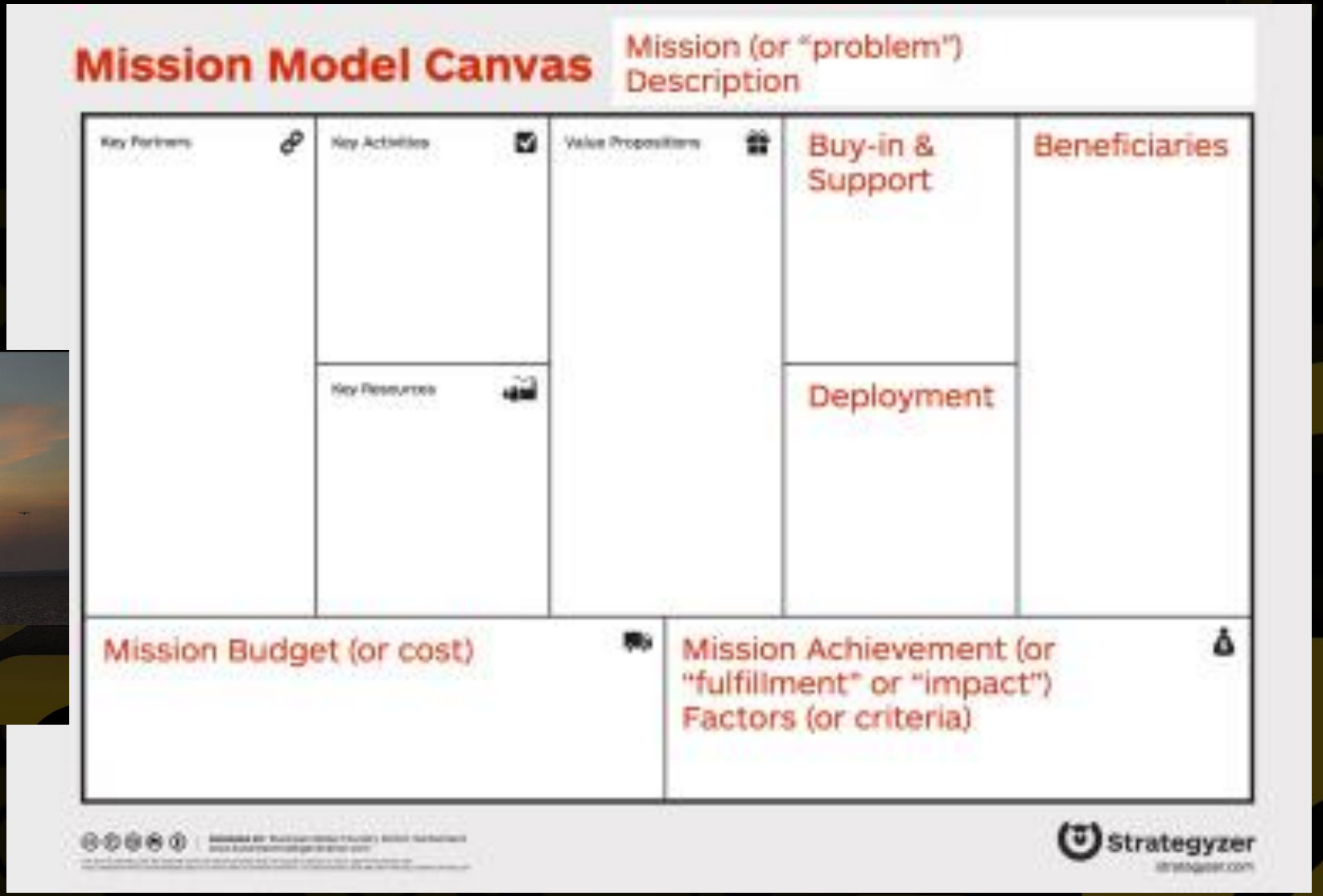


Key Analysis Tool: Mission Model Canvas

Hacking 4 x

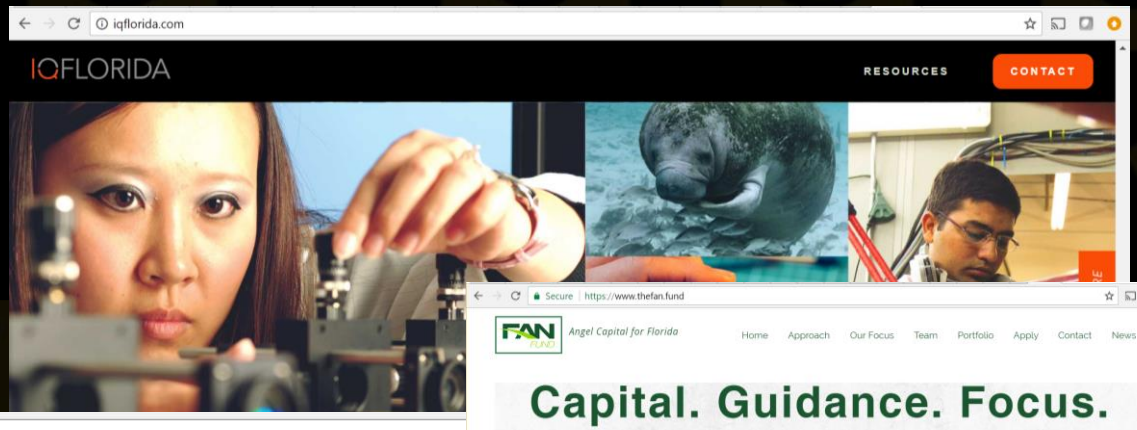
Steve Blank, Stanford

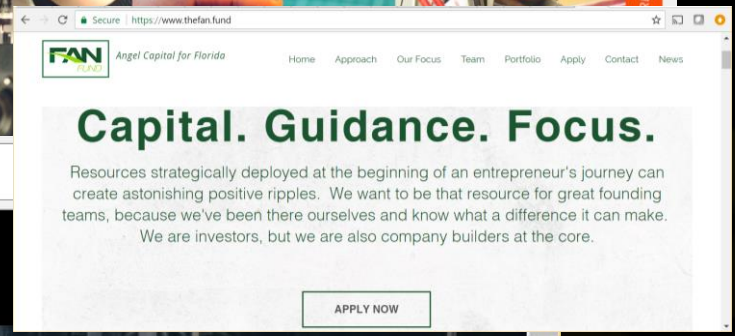


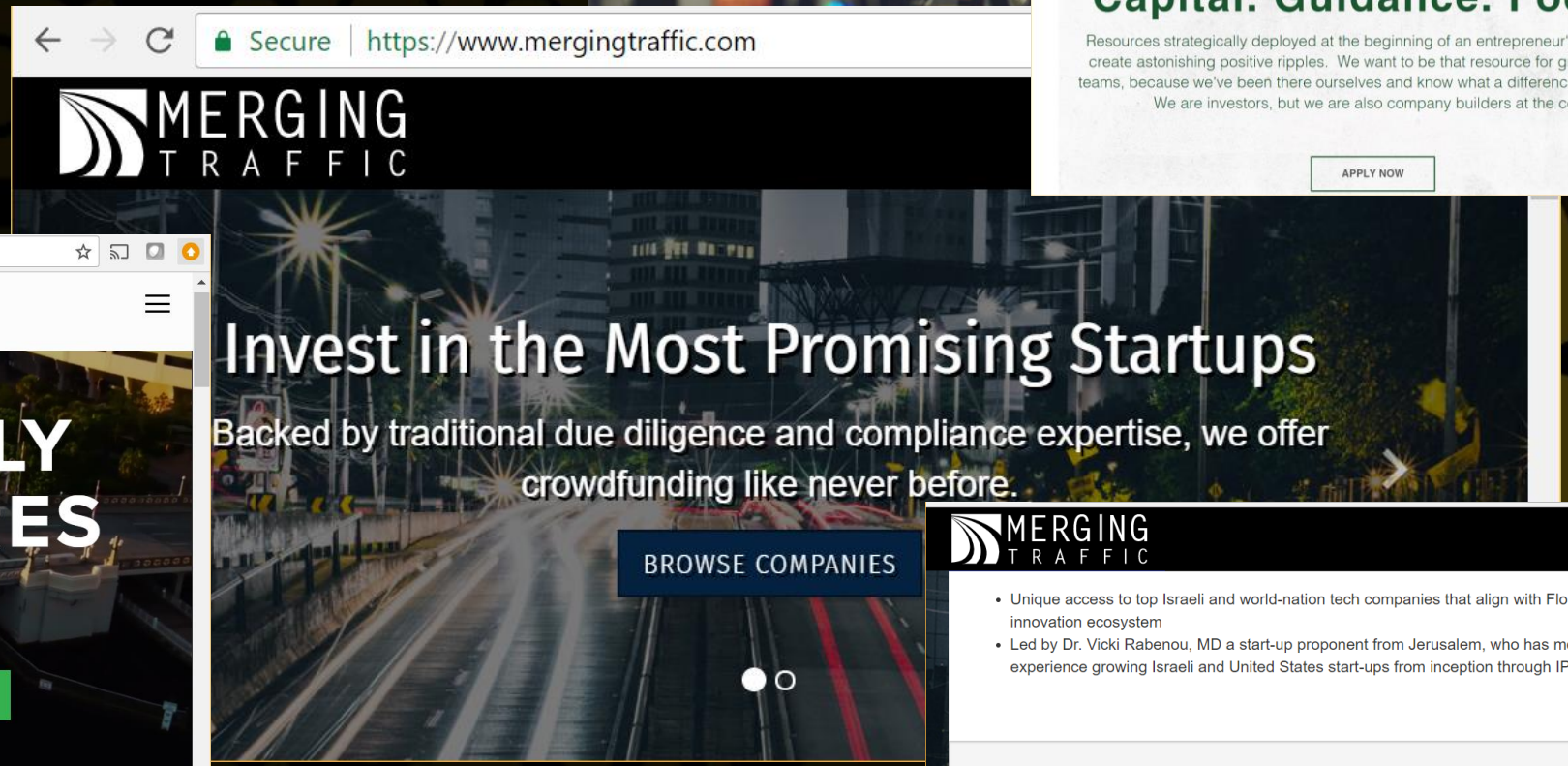


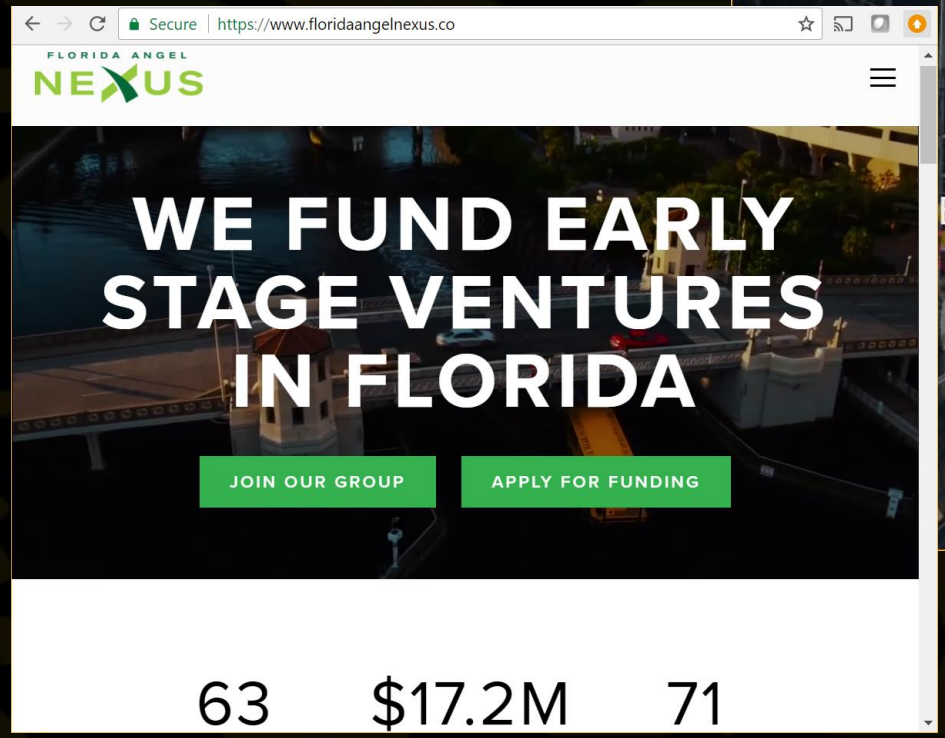
Investors and Programs

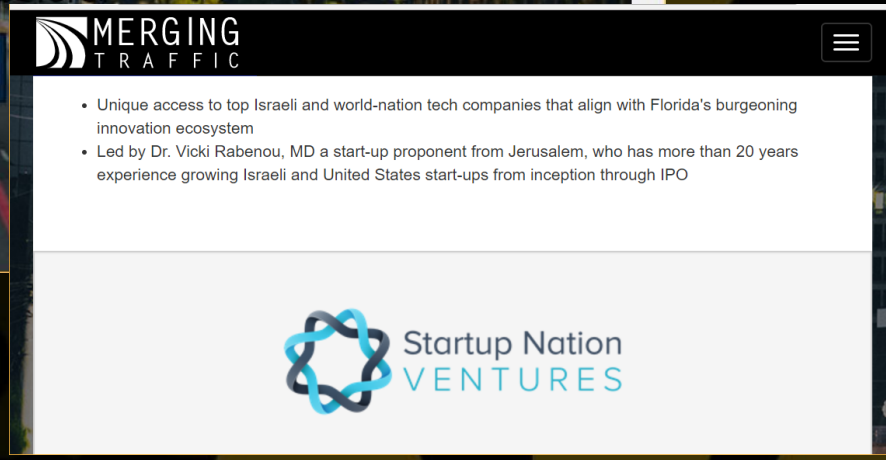
Fund your dreams





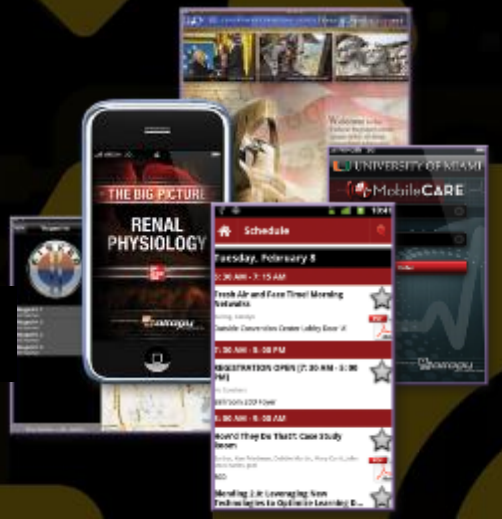




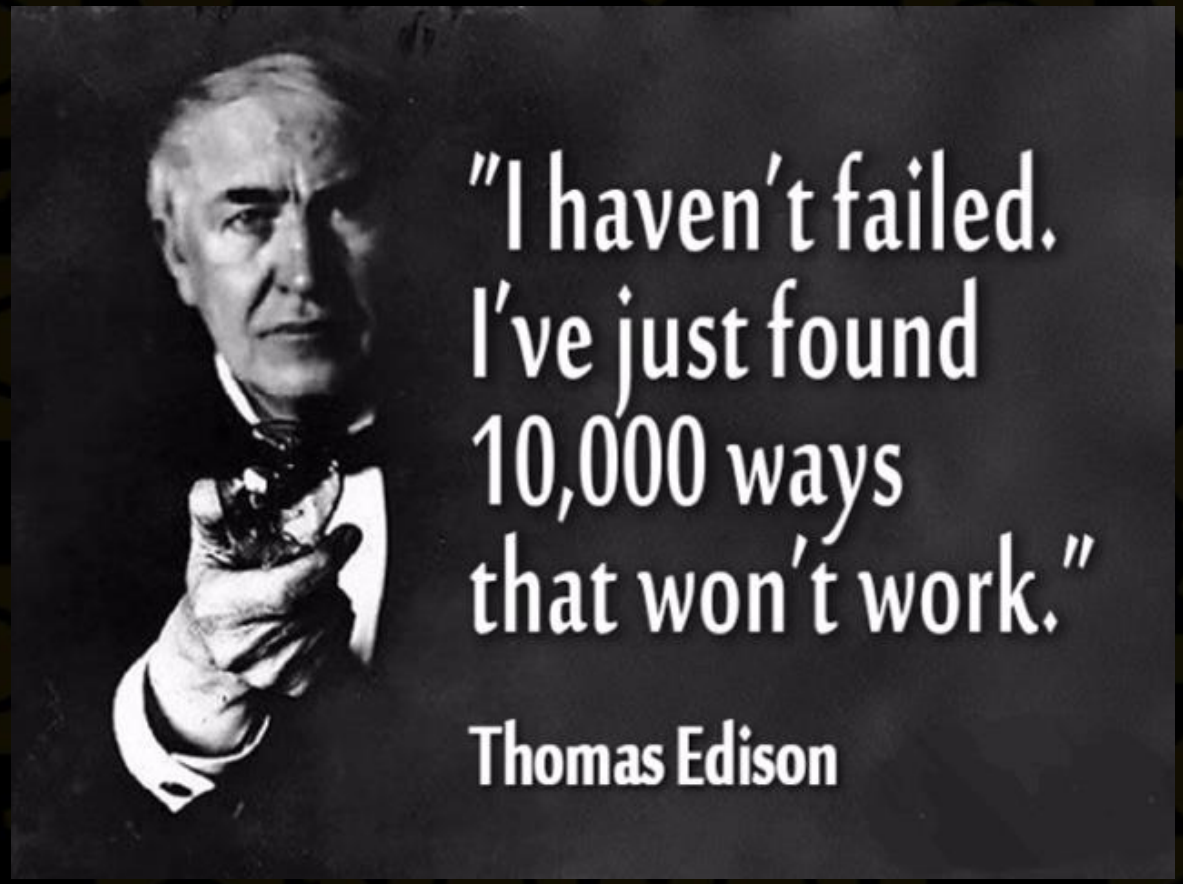


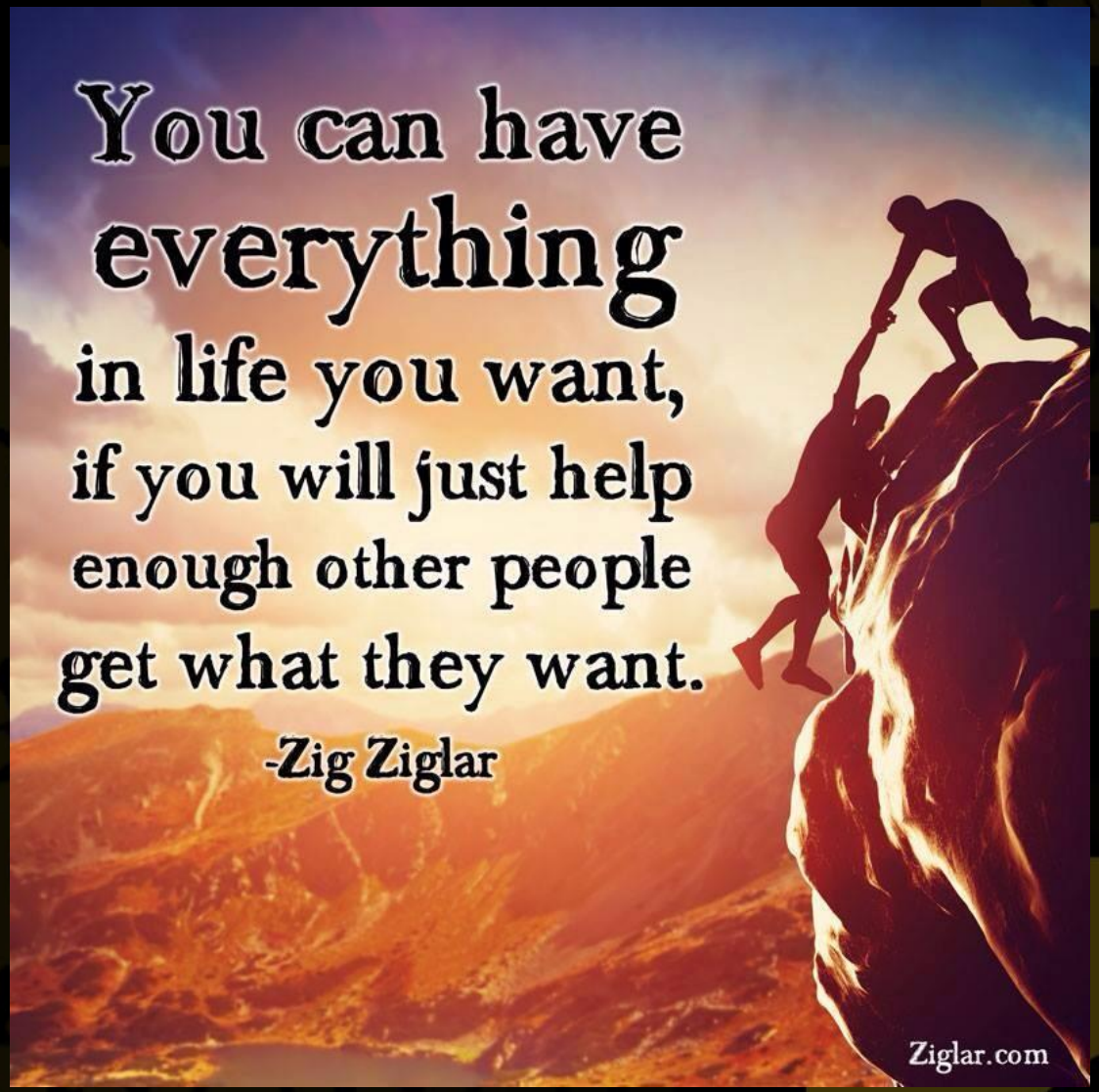
Partnership Approach at Univ of Central Florida Institute for Simulation and Training

- Partners with similar vision
  - Public, nonprofit university
  - Compelling projects with the potential for global impact
  - International partnerships that meet the broad goals of UCF, and the Institute
  - We can be an academic partner that understands how to interact with NGOs, Government and Industry partners
  - Joint pursuit of grants
- Resource strategies for people, funding, and tools that create sustainable innovation
  - Spin-off multiple commercial entities and help launch/fund startup activities for students, faculty and our staff
  - Develop next generation leaders and technologists



Exponential Legacy





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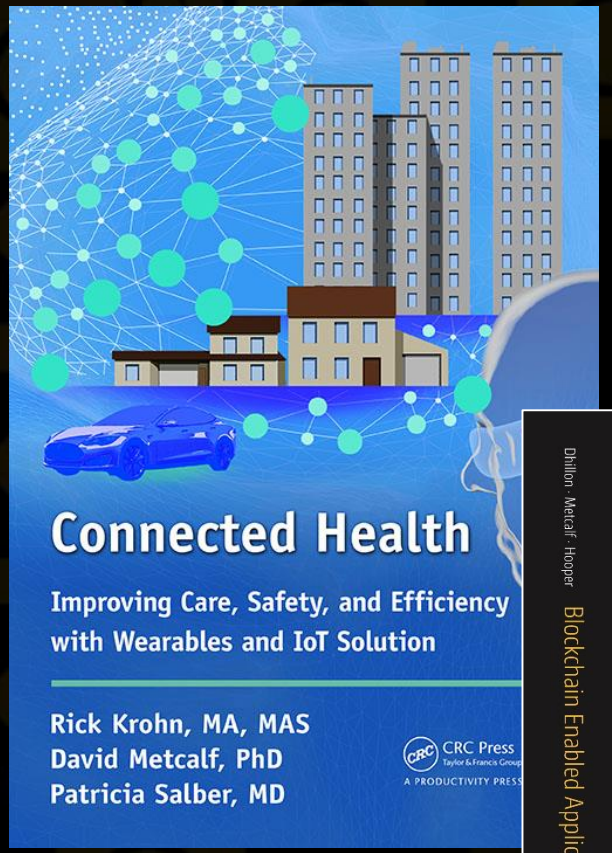
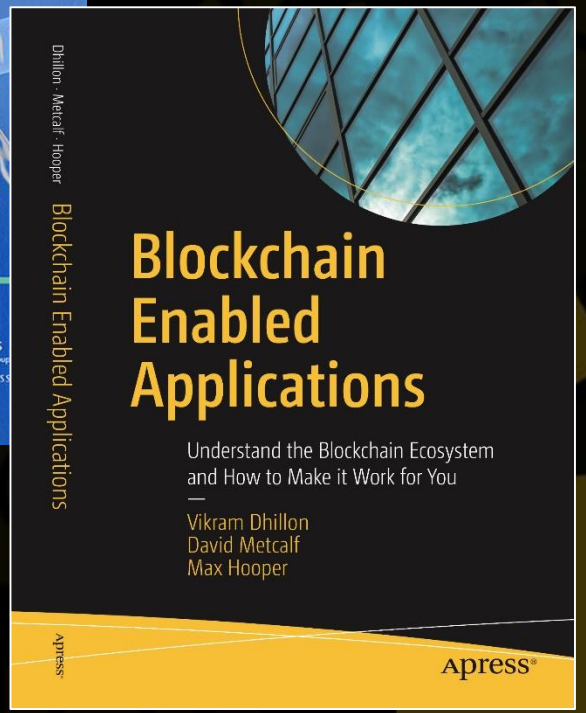
URL: http://icorps.cie.ucf.edu
http://www.metil.org





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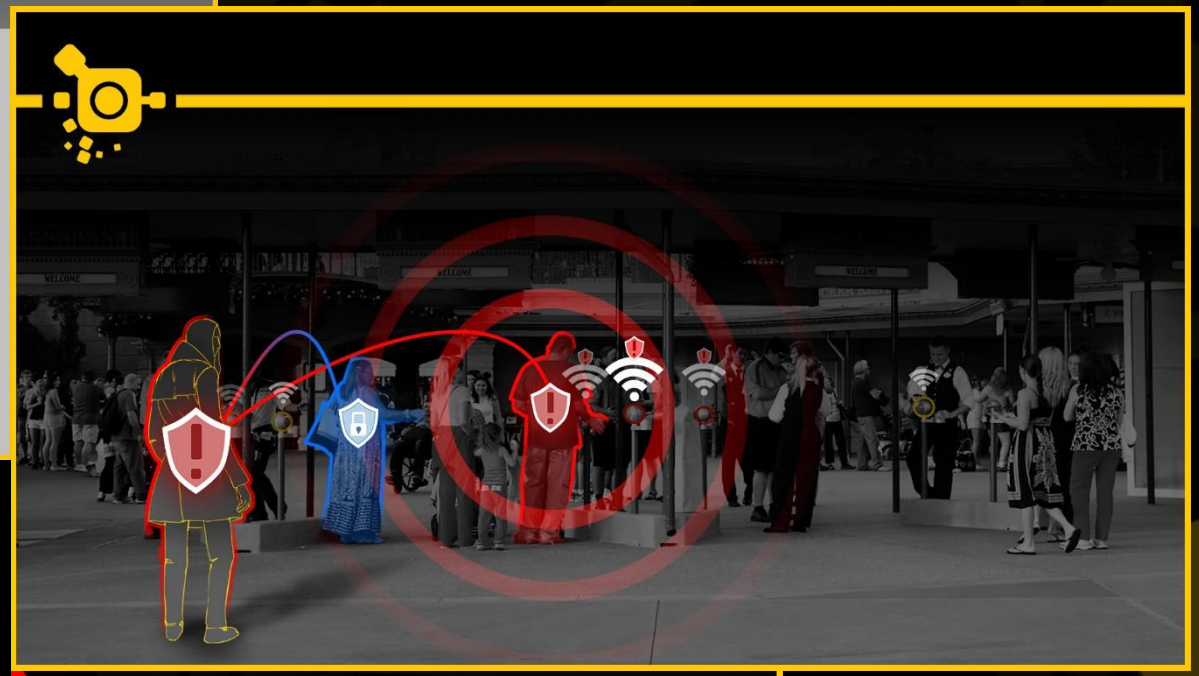
What is Blockchain?

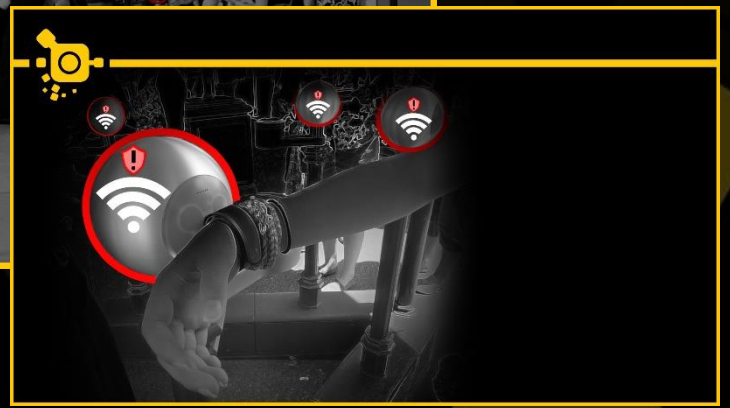
- Blockchain is the underlying cryptocurrency behind Bitcoin. Think about it as money in the internet age, but it can also be used to share any type of trusted information (such as health data and payments) and verify accuracy
- Smart Contracts are used to insure privacy, data transparency and interoperability between system like EHRs

What other technologies are disrupting healthcare?

- Mobile
  - mHealth
  - Mobile payments
    - M-PESA Leapfrogging from Africa
- Wearables
  - Automated tracking of health data
- IoT
  - Internet of Things is turning everything into a sensor and data manager

Cybersecurity for Tourism Consortium

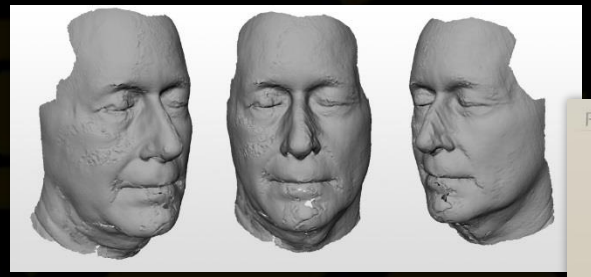




mHealth: Virtual Patient Pipeline

Benefits

- **23x cost reduction** in the creation of virtual patients
- **6x cost reduction** in the cost of motion capture equipment and process
- Minimal studio space requirements and reduced setup time
- No suits or markers
- **2 – 3 weeks** of production reduced to **1 – 2 days**
- Assets are applied to motion capture data
- Optimized for mobile platforms



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