Cyber, Intelligence & Information Operations

CENTER OF ACADEMIC EXCELLENCE – CYBER OPERATIONS

INTELLIGENCE COMMUNITY - CENTER OF ACADEMIC EXCELLENCE

UNIVERSITY OF ARIZONA
2019

Cyber, Intel & Information Ops Program

CENTER OF ACADEMIC EXCELLENCE
Cyber Operations

- National Center of Academic Excellence – Cyber Operations (CAE-CO)
- Intelligence Community – Center of Academic Excellence (IC-CAE)
- College of Applied Science & Technology (Sierra Vista)
- Program Advisory Board
  - DoD, IC, Commercial & Industrial Representatives
- DoD Partnerships
  - NSA & CYBERCOM
  - ODNI & DIA
  - ARCYBER, USAF, USN, USMC, NETCOM
  - Arizona National Guard Cyber Joint Task Force
  - Department of Justice
- Industrial and Commercial Partnerships
  - CISO & HR Managers

Cyber Intel Convergence

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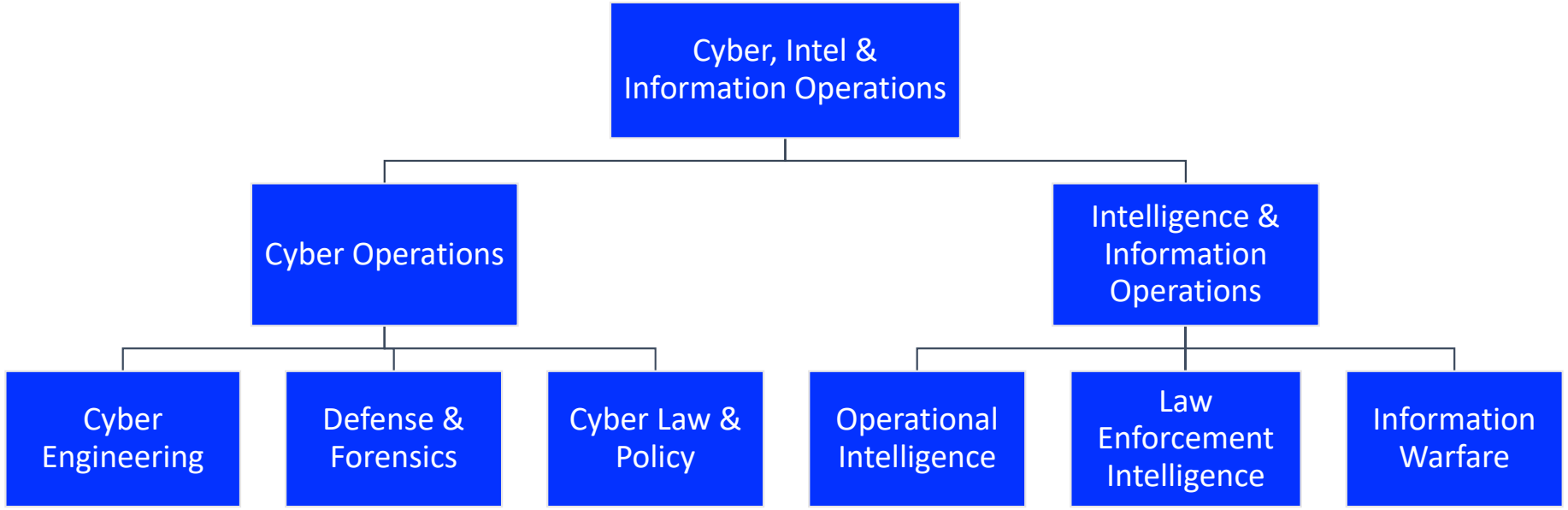
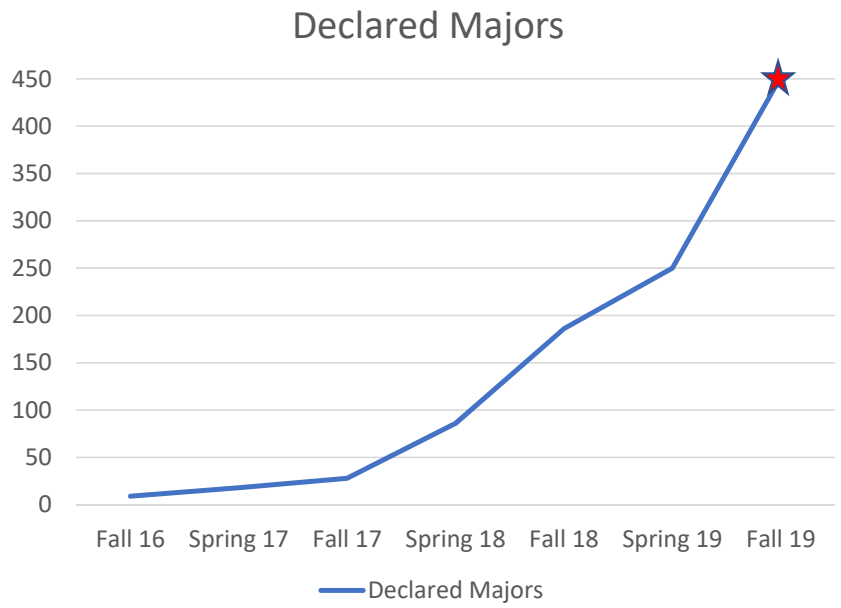
Cyber Operations



BAS Cyber Operations

CENTER OF ACADEMIC EXCELLENCE
Cyber Operations

- BAS Cyber Operations Formalized in Fall 2016
- 463 Declared Majors & 600+ Students Taking Classes
- Bachelors of Applied Science – Cyber Operations
  - NSA CAE-CO Designated
  - 2 + 2 Degree Program (Juniors & Seniors Only)
  - ABOR Approved New Academic Program 2019
    - Cyber Engineering
    - Defense & Forensics
    - Cyber Law & Policy



- ***Program Offered Fully Online*** – Delivered via Cyber Virtual Learning Environment & CyberApolis
- Face to Face Courses at Sierra Vista, Fort Huachuca, and UA Distance Campuses
- University of Arizona Undergraduate Cybersecurity Certificate Program for Non-Degree Seeking Students

Cyber Operations Degree

CENTER OF ACADEMIC EXCELLENCE
Cyber Operations

Cyber Engineering Emphasis

PREREQUISITE COURSES
Calculus I & II
Discrete Math I
Algorithms
C Data Structures
Assembly Language Programming
C Programming

BAS CORE COURSES
CYBV301 – Fundamentals of Cybersecurity
ENGV306 – Advanced Composition
CYBV326 – Network Analysis
CYBV329 – Cyber Law, Ethics & Policy
BASV376 – Mathematics for Applied Technology
INFV 320 – Computational Thinking & Doing

CYBER OPERATIONS SPECIFIC COURSES
CYBV385 - Introduction to Cyber Operations
CYBV388 – Cyber Investigations & Forensics
NETV379 – Cloud Computing
CSCV452 - Operating System Theory
CYBV400 - Active Cyber Defense
CYBV454 – Malware Threats & Analysis
CYBV470 – C Programming for Security Professionals
CYBV471 – Assembly Programming
CYBV472 - Secure Software Development & Analysis
CYBV479 – Wireless Networking & Security
CYBV480 – Cyber Warfare
CYBV498 – Cyber Operations Senior Capstone

Conforms to the NSA Centers of Academic Excellence in Cyber Operations (CAE-CO) requirements
Exceeds Office of Personnel Management's (OPM) 1550 job series (Computer Scientist) requirements

Cyber Operations Degree

CENTER OF ACADEMIC EXCELLENCE
Cyber Operations

Defense & Forensics Emphasis

PREREQUISITE COURSES
College Algebra
Networking Principles
Python Programming
Security Principles

BAS CORE COURSES
CYBV301 – Fundamentals of Cybersecurity
ENGV306 – Advanced Composition
BASV314 – Mathematics for Applied Sciences
CYBV326 – Network Analysis
CYBV329 – Cyber Law, Ethics & Policy
INFV320 – Computational Thinking & Doing

CYBER OPERATIONS SPECIFIC COURSES
CYBV385 - Introduction to Cyber Operations
CYBV388 – Cyber Investigations & Forensics
CYBV400 - Active Cyber Defense
CYBV435 - Cyber Threat Intelligence
CYBV436 – Counter Cyber Threat Intelligence
CYBV454 – Malware Threats & Analysis
CYBV473 – Violent Python
CYBV 474 – Advanced Analytics for SECOPS
NETV477 - Advanced Cyber Forensics
CYBV479 – Wireless Networking & Security
CYBV480 – Cyber Warfare
CYBV481 – Social Engineering Attacks
CYBV498 – Cyber Operations Senior Capstone

Conforms to the NSA Centers of Academic Excellence in Cyber Operations/Defense (CAE-CO/CD) requirements
Exceeds Office of Personnel Management's (OPM) 2210 job series (Information Technology Manager) requirements

Cyber Operations Degree

CENTER OF ACADEMIC EXCELLENCE
Cyber Operations

Cyber Law & Policy Emphasis

PREREQUISITE COURSES
College Algebra
Networking Principles
Python Programming
Security Principles

BAS CORE COURSES
CYBV301 – Fundamentals of Cybersecurity
ENGV306 – Advanced Composition
BASV314 – Mathematics for Applied Sciences
CYBV326 – Network Analysis
CYBV329 – Cyber Law, Ethics & Policy
INFV320 – Computational Thinking & Doing
CYBV385 – Introduction to Cyber Operations
CYBV400 – Active Cyber Defense

CYBER LAW & POLICY SPECIFIC COURSES
CYBV435 – Cyber Threat Intelligence
GPSV314 – National Security Policy
GPSV461 – Civil Liberties & the US Constitution
CYBV498 – Cyber Operations Senior Capstone

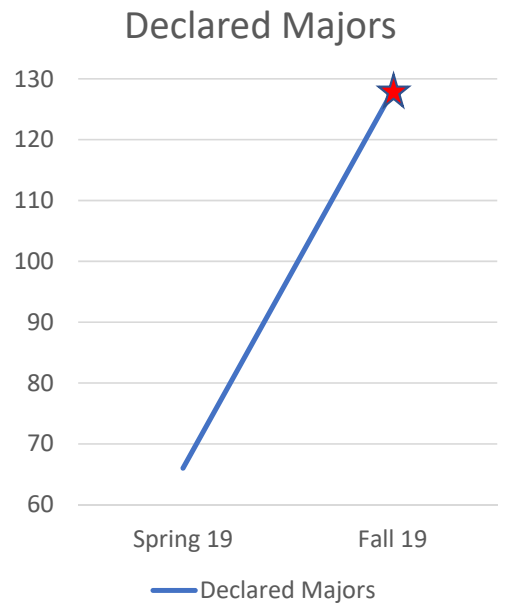
TWO ELECTIVE COURSES
CYBV436 – Counter Cyber Threat Intelligence
CYBV473 – Violent Python
CYBV496 – Special Topics in Digital Espionage
CYBV496 – Special Topics in Cyber War, Terror & Crime
GPSV441 – American Foreign Policy
GPSV442 – International Law
GPSV471 – National Security & Intelligence
GPSV473 – National Security Operations & Issues
GPSV474 – Politics of Terrorism

Technical Content Conforms to the NSA Centers of Academic Excellence in Cyber Operations/Defense (CAE-CO/CD) requirements
Exceeds Office of Personnel Management's (OPM) 2210 job series (Information Technology Manager) requirements

BAS Intel & Information Operations

CENTER OF ACADEMIC EXCELLENCE
Cyber Operations

- BAS Intelligence Studies
  - 2 + 2 Degree Program (Juniors & Seniors Only)
- IC-CAE Designated - Summer 2019
- After Designation - Grew from 66 to 131 Declared Majors
- New Academic Program Application – Submitted Fall 2019
  - Bachelors of Applied Science – Intelligence & Information Operations
    - Operational Intelligence
    - Information Warfare
    - Law Enforcement Intelligence
- Program Offered Fully Online – Delivered via Virtual Learning Environment & CyberApolis
- Face to Face Courses on UA South, Fort Huachuca, and UA Distance Campuses
- Minor/Undergraduate Certificate Program in 2020



Student Distribution

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Cyber Operations

Other Countries

Afghanistan
Canada
Chile
Djibouti
England
Germany
Israel
Japan
Mauritius
Mexico
Philippines

Hybrid Active Learning Model

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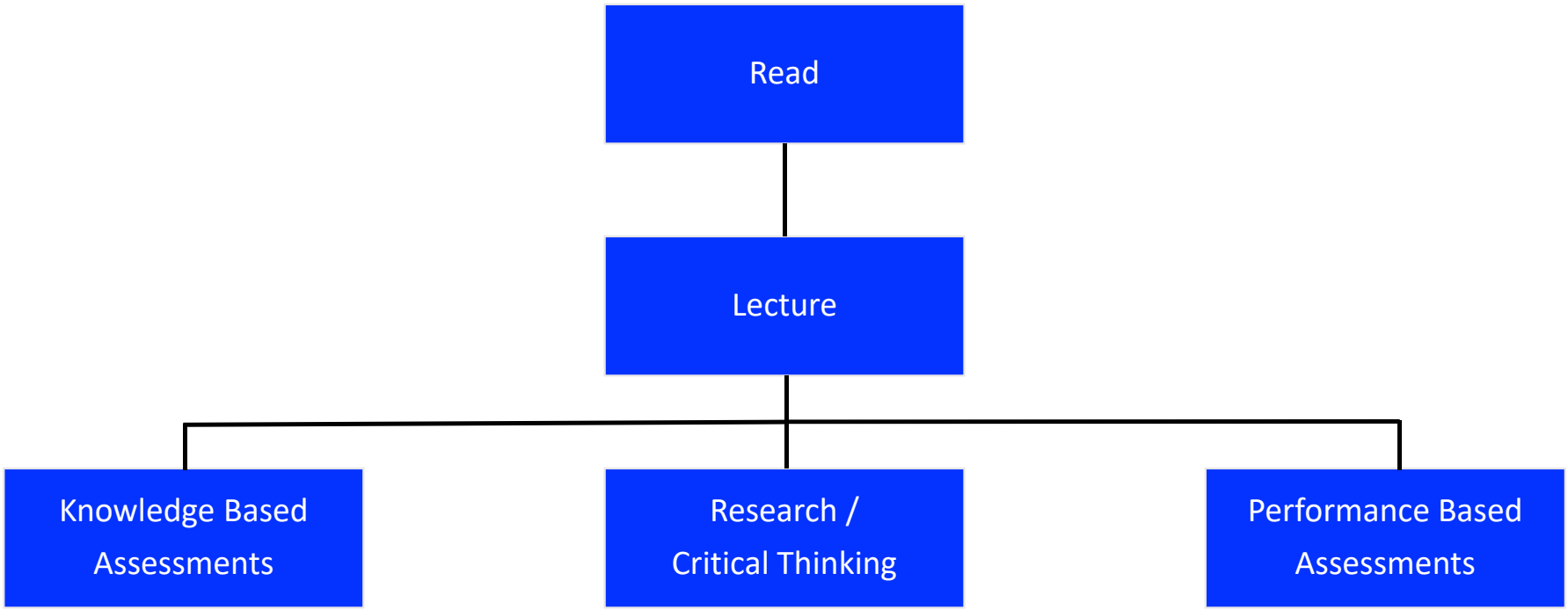
Cyber Operations



Program Development

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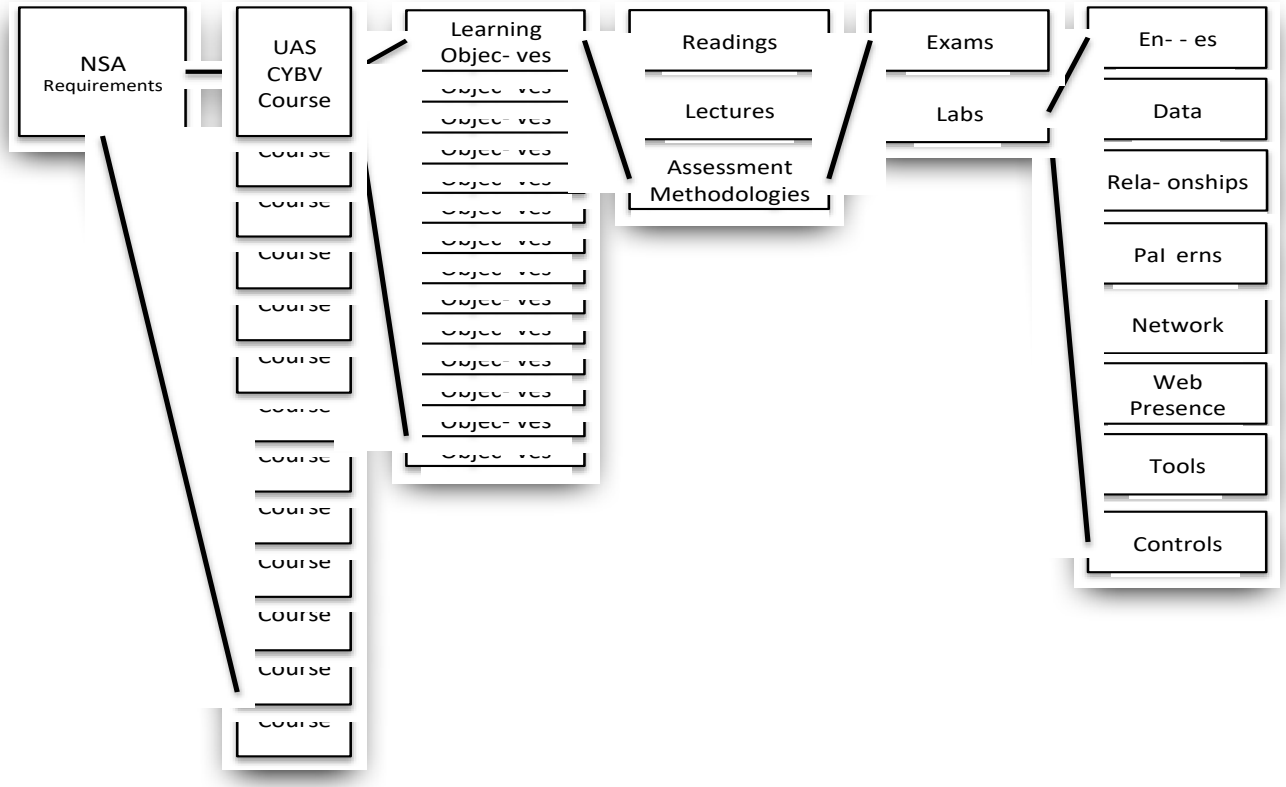
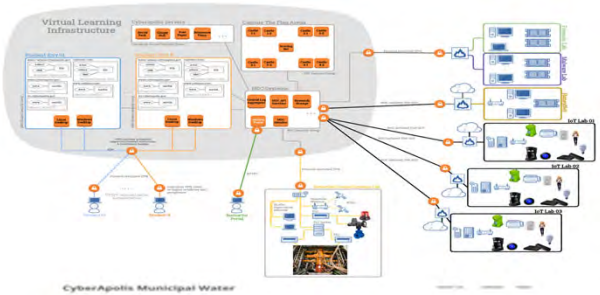
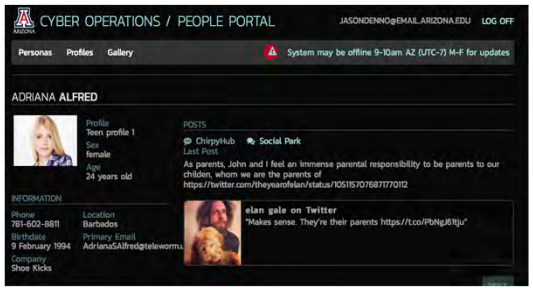
Cyber Operations

Course Content Mapped from NSA Requirements to Specific Virtual Learning Environment Requirements







Virtual Learning Environment (VLE)

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Cyber Operations

Why we Built and Use our VLE

- Consistently Deliver all 26 Courses across the Cyber Operations Program
- Focus all Course Time on Achieving the Learning Objectives – Not Fighting Their Systems
- Avoid Distributing USB Drives or Requiring Students to Download & Install 100s of Security Tools and Files
- Simplify and Minimize Student Environment Maintenance & Support Requirements
- Create an Environment to Deliver Offensive Cyber Operations (OCO) Education – Not on the Open Internet!
- No Weaponization of Students

How we Achieve This

- Provide a Hybrid Cloud-based Solution that includes Student Desktops
- Baseline all Students and Prevent Installation, Versioning, and Configuration Management Issues
- Preconfigure and Test all Desktops, Tools, Data, and Networking
- Centrally Manage all Updates, Data Distribution, Software Versioning and Patching, etc.

CyberApolis

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Cyber Operations

15,000 Detailed Virtual Residents

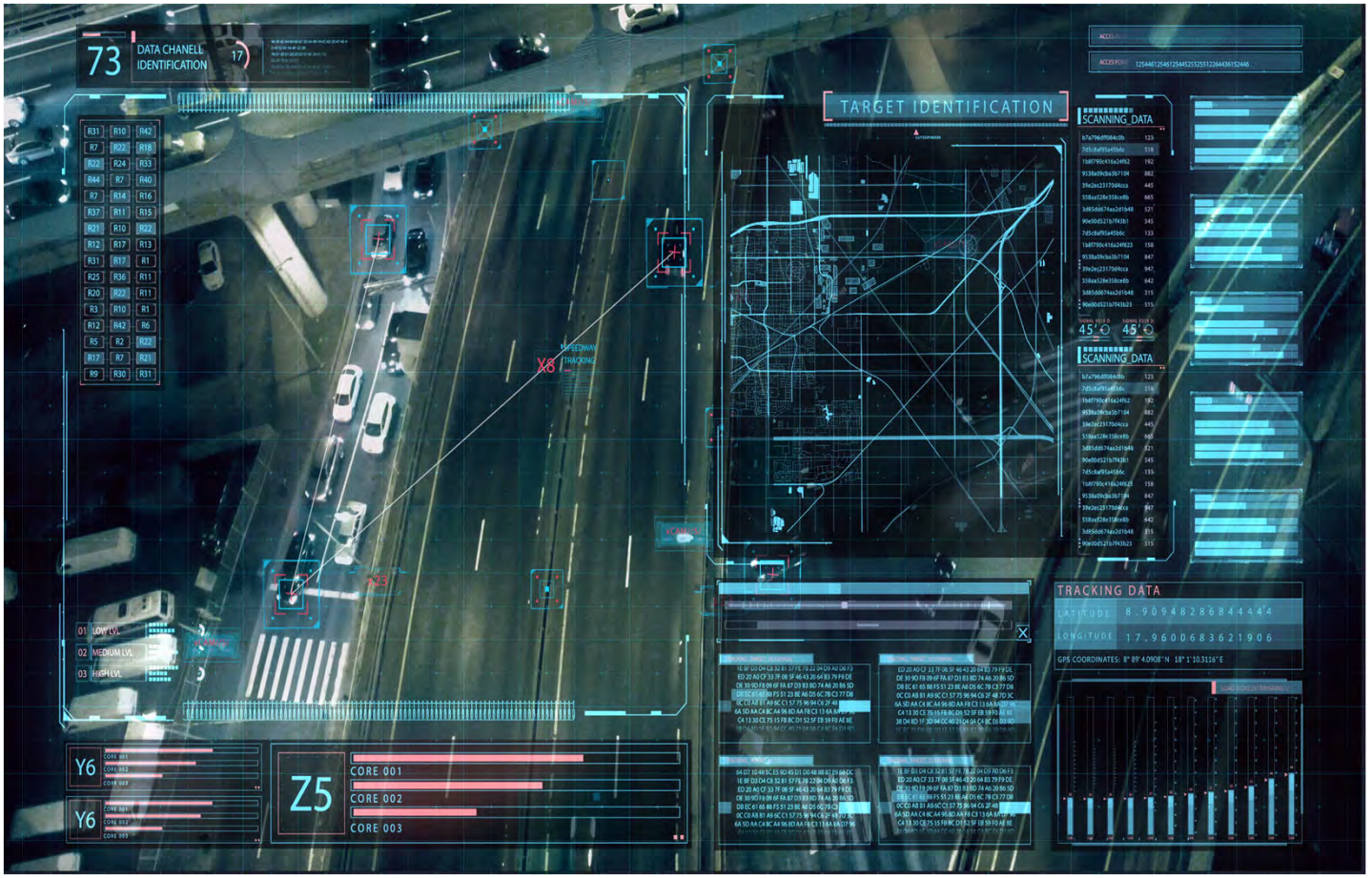
- 100+ Highly Detail Virtual Persona
- Underground Hacker Community
- Organized Crime Element
- Drug Cartels
- Entity & Data Relational Linkages
- Patterns of Life
- Web Browsing, Emailing, Social Media Posts

Web and Network Infrastructure

- City Infrastructure with IRC Servers
- Water Company
- Power Company
- 2 Online News Agencies
- Bank
- Hospital
- Shipping Company
- Large Retailer
- 20 Small Retailers/Service Providers

Social Media Sites

- Social Park
- ChirpyHub



Virtual Personas

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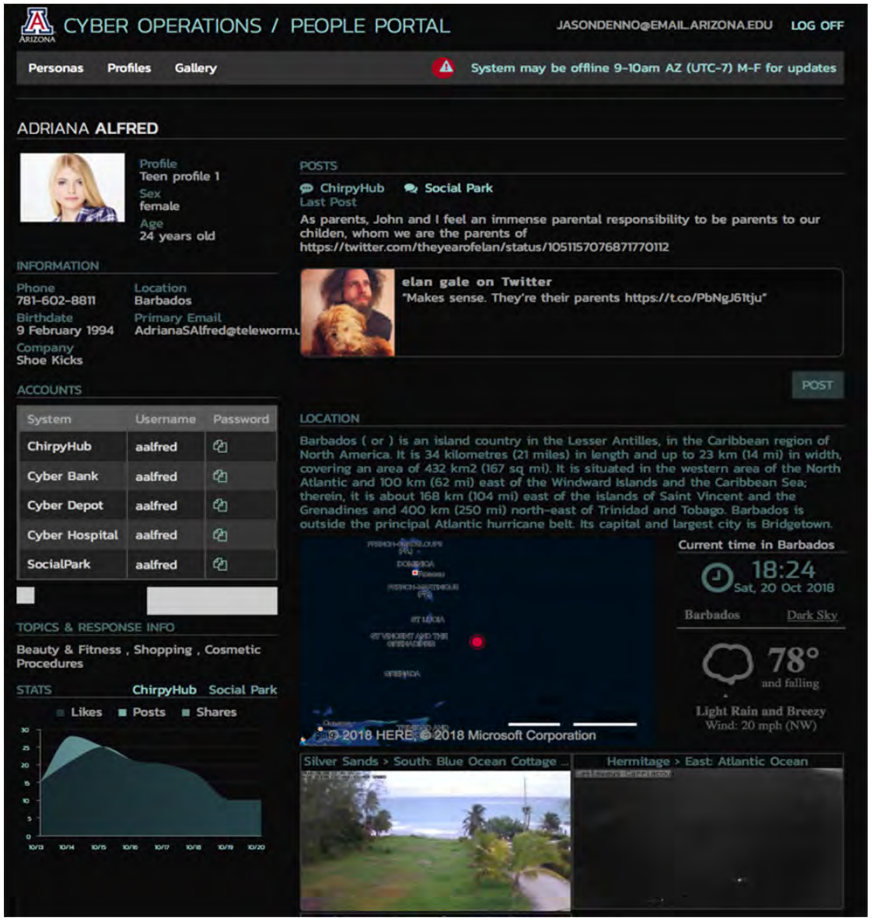
Cyber Operations

- Reverse Engineered to Support Learning Objectives
- Relationships & Patterns of Life
  - Web Surfing, Email, Social Media, Purchasing, Shipping, Work & School
- Functional CyberApolis Accounts
  - Bank, Credit Cards, Customer Accounts, Digital Health Records
- Metadata Embedded in Documents & Pictures
- Proteus AI Driven and/or Manually Crafted Activities



CyberApolis Organizations

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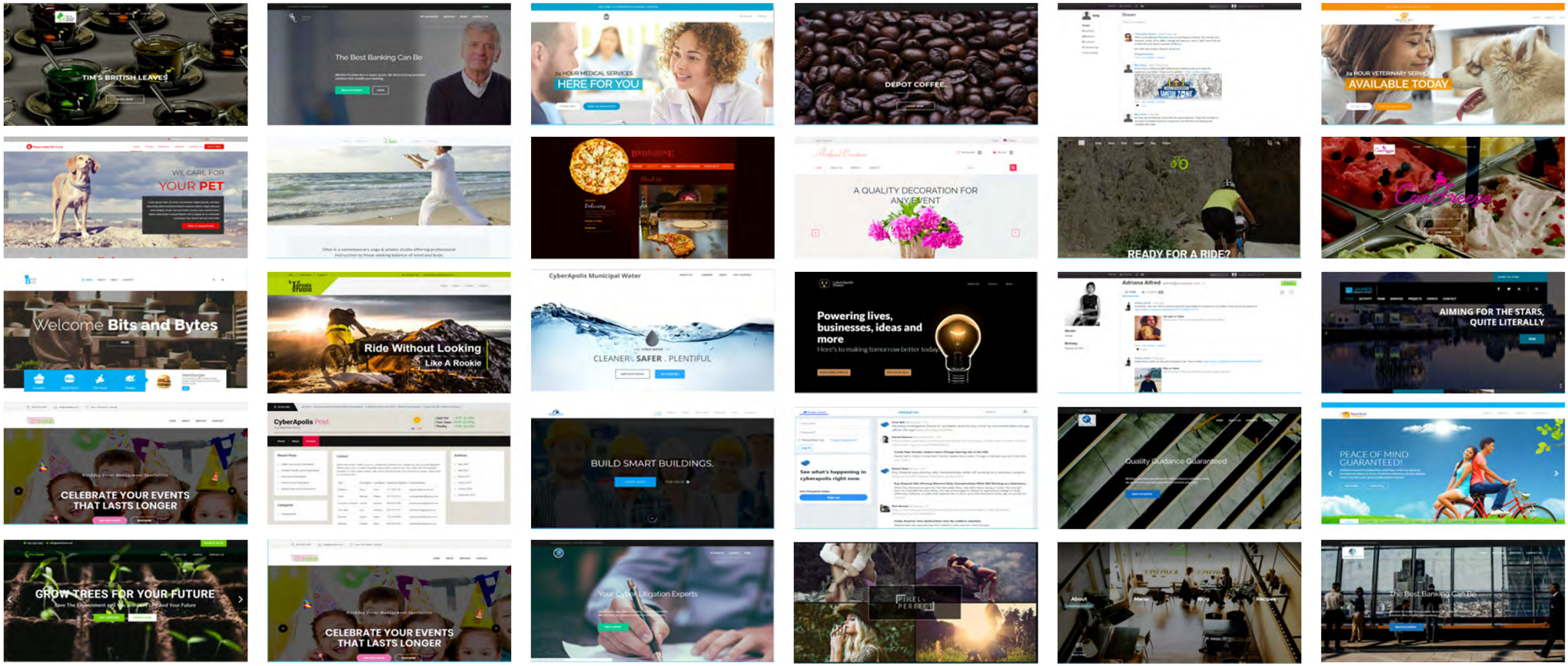
Cyber Operations



Cyberspace & The Information Environment

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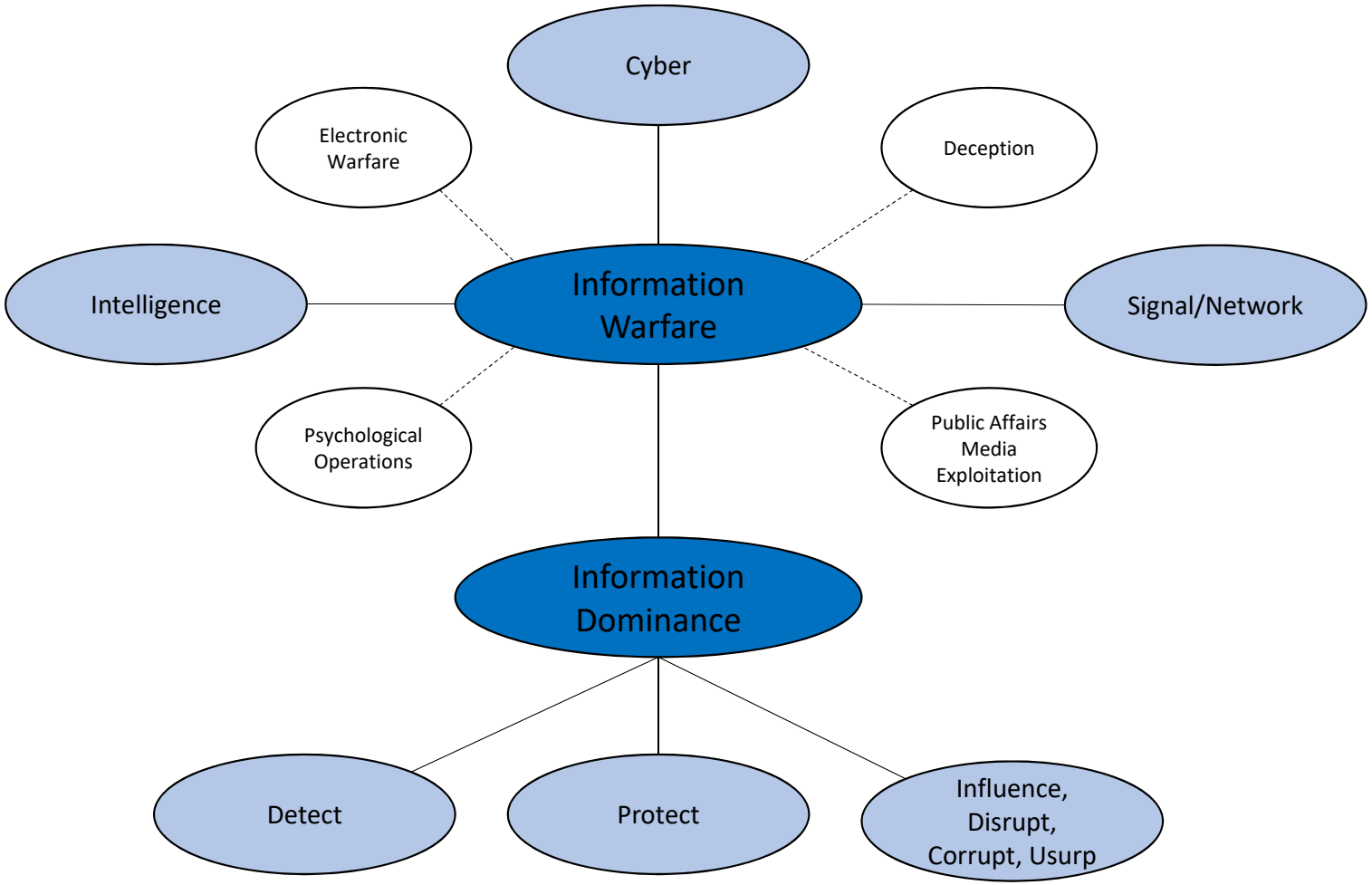
Cyber Operations

- Everyone Lives In or Transits Through Cyberspace
- Not all Zeros and Ones are Equal
  - Physical
  - Logical
  - Persona
- The Information Environment is the New Front

Conflict in the Information Environment



Arizona's Future Initiatives

CENTER OF ACADEMIC EXCELLENCE
Cyber Operations

- Cyber–Intelligence Convergence
  - Adapting to the Changing Environment
  - Integrate Capabilities from Across the College of Applied Science & Technology
  - Develop the Future Workforce for both Government & Industry

- Evolve the VLE into Multi-Disciplinary/Multi-Domain Learning Platform
  - New Highly Detailed Threat Actors Driven by our Advanced Proteus AI
  - Advanced Hardware-In-The-Loop Labs Delivered to Online Students
  - New Interactive Applications Supporting All Programs ranging from Cyber to Regional Commerce
  - Infuse Augmented & Virtual Reality Environments to Enrich the Learning Experience

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THANK YOU