IGEM-HERC GRANT PROPOSAL COVER SHEET

State Board of Education

PROPOSAL NUMBER: (to be assigned by HERC)	AMOUNT REQUESTED: $700,000 / year; $2,100,000 over three (3) years

TITLE OF PROPOSED PROJECT: The **Cyberdome** — An Investment in Idaho's Cybersecurity Future

SPECIFIC PROJECT FOCUS:

Cybersecurity is at the forefront of national risk concerns today. If our geographically diverse infrastructure cannot be secured, it can quickly become dangerous, resulting in the loss of critical data, critical physical services, or even lives. In the United States, the demand for professionals with cybersecurity expertise is generally outpacing other occupations[1]. According to the National Initiative for Cybersecurity Education sponsored site, cyberseek.org, there are over 500,000 open, unfilled cybersecurity positions throughout the United States. In a recent study by McKinsey & Company, they state that the increase in remote workers will result in companies investing even more in cybersecurity and awareness training.

To address this market need, and counterbalance the actors causing such needs, Idaho requires "all hands on-deck" to create a "**Cyberdome"** for Idaho. The **Cyberdome** is a Security as a Service (SECaaS) oriented platform meant to leverage force multiplying efforts of our students to secure critical cyber / physical assets of rural and remote clients. Securing these critical cyber / physical assets provides three benefits. First, it **reduces the risk to the state and its citizens**. Second, done correctly, such efforts **create a cybersecurity ready workforce** that makes Idaho a leader across the nation. Third, it **creates techniques, tools, and commercial products** to create economic value. Out of these efforts arise applied research opportunities that will enhance Idaho's universities as industry innovators.

Our goal is to cooperatively secure client community assets using fiscally responsible methods by **engaging the best and brightest within the industry across the state**, including cybersecurity leaders at the **INL, the State of Idaho, Idaho's Universities and Colleges, and private industry.** We can simultaneously reduce critical cyber / physical risks for state, local, tribal, territorial (SLTT) clients while creating competency-based learning platforms for Idaho cybersecurity learners; making Idaho "Cyber Workforce Ready" for employers.

This proposal outlines the development of the **Cyberdome**, a platform providing three key benefits to the state and its citizens. First, it creates a cybersecurity ready workforce that elevates Idaho as a leader across the nation. Second, it creates a platform which reduces the risk to the state and its citizens. Third, it creates techniques, tools, and product commercialization opportunities which produce long-term economic value. Out of these efforts further arise applied research opportunities that will enhance Boise State and Idaho as industry innovators.

The Project objectives are:
Objective 1: Create competency-based learning platforms for Idaho cybersecurity learners which provide a differentiated cyber workforce to employers
Objective 2: Reduce critical cybersecurity risks for State, Local, Tribal, and Territorial (SLTT) clients
Objective 3: Produce innovative research, tools, techniques to transfer to commercial efforts

PROJECT START DATE: 7/1/2021	PROJECT END DATE: 6/30/2024
NAME OF INSTITUTION: Boise State University	DEPARTMENT: Office of Sponsored Programs

ADDRESS: 1910 University Drive, Boise, Idaho 83725-1135

[1] https://www.darkreading.com/careers-and-people/demand-for-cybersecurity-jobs-declines-but-still-outperforms-other-sectors/d/d-id/1337634

E-MAIL ADDRESS: osp@boisestate.edu	PHONE NUMBER: 208-426-4420

	NAME:	TITLE:	SIGNATURE:
PROJECT DIRECTOR/PRINCIPAL INVESTIGATOR	Edward Vasko, CISSP	Director, Institute for Pervasive Cybersecurity	
CO-PRINCIPAL INVESTIGATORS	Dr. Amit Jain Dr. Sin Ming Loo Dr. Francesca Spezzano Dr. Edoardo Serra Dr. Jidong Xiao	Department Chair, Computer Science Professor Assistant Professor Assistant Professor Assistant Professor	See below

NAME OF PARTNERING COMPANY:	COMPANY REPRESENTATIVE NAME:

	NAME:	SIGNATURE:
Authorized Organizational Representative	Karen Henry, AVP for Sponsored Programs	Digitally signed by Karen R. Henry Date: 2021.03.30 12:29:41 -06'00'

Amit Jain

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Edoardo Serra

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Francesca Spezzano

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1. **Name of Public Institution:** Boise State University
2. **Name of Principal Investigator Directing the Project:** Edward Vasko, CISSP, Director, Institute for Pervasive Cybersecurity (IPC)
3. **Project Objective and Total Amount Requested:** There are three objectives to this project:

1. Create competency-based learning platforms for Idaho cybersecurity learners which provide a differentiated cyber workforce to employers: The **Cyberdome** - a Security as a Service (SECaaS) oriented platform meant to leverage the force multiplying efforts of our students to secure critical cyber / physical assets of rural and remote clients - will enable students to obtain and grow skills that provide employers a more effective worker. The IPC recognizes that students today view their education through the lens of stackable knowledge development[2]. However, employers often receive workers in need of further skill development in order to achieve maximum effectiveness. The Cyberdome provides competency-based development to students, and in doing so creates a differentiated workforce for employers. Requested funds enable hiring the necessary student workers and staff to work in the Cyberdome. Doing so will provide various competency-based learning initiatives for cybersecurity learners to gain knowledge as Cybersecurity Analysts or Engineers, just as they would if they were hired by industry employers. This important differentiator will enable Idaho learners to more effectively activate in their new roles at employers and obtain a premium salary.

The Cyberdome will not only produce a pipeline of knowledgeable and competent workers to fill current needs of Idaho employers, but also can be used as a business attraction tool for outreach to cybersecurity / cyber physical employers. As shown in the letters of support section, wide support exists inside and outside Idaho to hire / retain students taught via the Cyberdome model.

[2] https://www.wired.com/story/students-stacking-credentials-route-degree/

2. Reduce critical cybersecurity risks for State, Local, Tribal, and Territorial (SLTT) clients:

Rural and remote communities across the country are under attack from cyber criminals and nation states looking to capture critical data, influence citizens, or disrupt critical infrastructure[3]. These communities have limited staff to provide appropriate monitoring, prevention, and response services to thwart cyber or cyber physical attacks. Funding of the Cyberdome enables the creation of a "live-fire" SECaaS platform to provide "force multiplying" efforts utilizing student workers to monitor cyber risks for our SLTT clients. A tangential benefit to our SLTT clients is a better use of constrained technology budgets as there are not enough dollars for each SLTT entity to hire and retain the necessary trained cybersecurity staff to be effective in the on-going fight against cyber-criminal activity or nation state efforts. The Cyberdome is a cost-efficient solution as a result, while also achieving the other benefits outlined in this proposal.

3. Produce innovative research, tools, techniques to transfer to commercial efforts: This proposal touches on a number of research opportunities. It will not only directly benefit commercial entities, but will also enable the resident expertise growth at Boise State University, making our faculty more competitive for external grants and contracts. Examples include:

Data Resiliency Research -The goal of this applied research is to determine how operational data obtained from industrial control systems and cyber-physical components can be successfully integrated with security data using an existing intrusion detection/protection systems software to determine if the integrated data can be successfully measured for accuracy and efficiency.

Malicious Behavior, Misinformation, and Attack Detection - Using AI / ML modeling, the intent is to examine the data collected and analyze this data to process and organize large flows of alerts and feeds from threat intelligence sharing systems. Further, threat actors using social

[3] https://www.govtech.com/security/Massachusetts-Communities-Fight-Back-Against-Cyberattacks.html

media and dark web information feeds, including Wikipedia vandals and spammers, trolls, and opinion spammers, and protecting the Web from misinformation (fake news detection and identifying undisclosed paid editing) can be identified, prevented or and alerted against.

Cloud Security Analysis and Enhancement - Analyzing, identifying, and mitigating potential threats in cloud environments, especially the virtualization layer through discovering side channels and covert channels will enable more effective and secure cloud environments.

Total amount requested for this project is $700,000 / year; $2,100,000 in total.

4. Resource commitment

The objectives of this proposal are consistent with the five-year Strategic Research Plan for Higher Education developed by the Vice Presidents for Research at the three Idaho Universities. The plan identifies strategic research areas that have great potential to drive future economic growth within the state. One of these five high-impact areas is Systems Engineering and Cybersecurity. Boise State has responded to this challenge by creating the IPC and proposing the Cyberdome as a transformational component for research and workforce development needs of industry as one of its top institutional priorities. Over the last three years, the University has identified emerging areas of strength around cybersecurity / cyber physical and Boise State continues to invest in this effort.

Collectively, Boise State provides several labs and platforms for use by the IPC and the Cyberdome platform. These labs host an assortment of cyberoperations, AI/ML analysis, and cyber-physical relevant laboratory equipment, and systems as teaching tools. The labs include Boise State's Cyber Lab for Industrial Control Systems (CLICS), Software Defined Data Center (SDDC), the Manticore Cyber Range, and the Artificial Intelligence based Security (AIbS) Lab.

5. Specific project plan and timeline (1-3 years)

Initial effort consists of hiring staff and students to initiate the building of the platform and recruiting the first SLTT clients will take the first six (6) months of effort. Student participants will receive significant engineering and security architecture skill development while working on the initial setup, configuration, and service activation of the Cyberdome platform. All components, configuration and first client activations are scheduled for completion by the end of the first quarter Calendar Year (CY) 2022. Rollout of the service architecture to other colleges, universities, and SLTT partners will occur over a phased timeframe in CY 2022. By following a phased implementation approach, the Cyberdome will "field test" the architecture and technologies so that extended support of the Cyberdome to other Idaho Colleges, Universities, and SLTT clients can occur after Phase 1 activation within our initial pilot client community.

6. Potential economic impact

This proposal produces a wide range of economic benefits for Idaho. Examples, include:

1. Proposed funding includes the hiring of up to 28 part-time students across Idaho community colleges and universities over each 12-month period of funding. These 28 students, post-graduation, would normally expect to earn a current minimum average salary of approximately $60,000.00 as cybersecurity analysts in the Boise area[4]. We currently estimate the "Cyberdome advantage" to be a 15% increase to the local area base salary due to the improved real-world skill development provided through the work / learning efforts of the platform. This provides a premium starting salary of $69,000.00. This premium salary impact is used to calculate the economic impact of the Cyberdome for this section over a short 36-month window:

$69,000.00/student x planned 28 students/year = $1,932,000.00 / year.

$1,932,000.00/year x 3-year simple compounding model = **$11,592,000.00 (5.52x ROI)**.

[4] https://www.salary.com/tools/salary-calculator/information-security-analyst-i/boise-id

2. Based on the near constant reporting of the latest breaches and impacts, it is clear that SLTT governmental organizations are under attack. Further, average breach cleanup costs are well above $1M across all industries[5]. As far back as 2015, research efforts conducted by the Ponemon Institute (sponsored by HP) clearly outlined the impacts to Federal and SLTT organizations. In their final report,[6] the surveyed IT and IT security practitioners in state and local government each reported an impactful incident a little less than every 12 weeks. Further, 11 percent of respondents believe some incidents were nation state attacks. Even more impactful, only 32 percent of state and local agencies are confident they would detect an attack at all.

The Cyberdome platform provides a portfolio of tools and services that rural SLTT clients are traditionally unable to afford. Assuming tools were available, attracting and retaining cybersecurity staff is difficult considering the high demand for such jobs across the nation[7]. For modeling purposes, we assume the early detection / prevention of only one impactful incident within the SLTT clients yields a savings / economic impact of at least $1M to the state.

3. The Cyberdome will facilitate and accelerate the development of new knowledge and the transfer of technology out of our research facilities and into the private sector to increase industry competitiveness. Such dynamic partnerships will expand on Boise State's current successes and will create new ideas, new products and new companies that will lead to higher-paying jobs and a stronger economic foundation. Examples of such opportunities include:

3.a. Research into data resilience and systems resilience, and how low-level voltages, current, and feedback signals can be integrated into intrusion detection and intrusion protection systems to better protect systems and networks.

[5] https://dynasis.com/2019/03/price-security-how-much-cybersecurity-attack-actually-cost/

[6] https://www.ponemon.org/research/ponemon-library/security/the-state-of-cybersecurity-in-local-state-and-federal-government.html

[7] https://www.tripwire.com/state-of-security/security-data-protection/cyber-security/government-cybersecurity-federal-state/

3.b. Detecting cyber intrusions is a crucial task to protect enterprise / operational networks. The continuous sophistication of malware, the evolution of targeted attacks, and zero-day exploits make current intrusion detection systems and antivirus often obsolete. Our team will investigate advanced intrusion detection systems able to self-adapt to new emergent threats by leveraging the multimodal and multi-source data collected by the current project. Such systems will incorporate new machine learning models that will not just identify complex malicious patterns but are also paired with procedures for the interpretation of the results. Such results could be transferred and licensed to current cyber security vendors.

3.c. Textual analysis of social media posts and measuring the trustworthiness of social media users to ensure the trustworthiness of the source of information in social media. Such analysis could then be transferred to commercial application or licensed to social media network vendors.

3.d. Building secure cloud environments. Cloud computing is now prevalent in our society and consumers oftentimes have to blindly trust the security of cloud environments, as that is not something they can control. Yet many research efforts have shown that cloud environments are not secure. Investigating the cloud security, identifying and mitigating potential threats, will help to make clouds more secure. Results from such research could be transferred and licensed to commercial cloud service providers.

7. Criteria for measuring success

The Cyberdome's success depends on three major factors. First, effective competency development that includes conducting successful recruitment & training of student workers. Second, the quality of service provided by the student workers to the SLTT clients and the level of partnership created between the Cyberdome staff and SLTT clients. Third, the ability to follow best practices while conducting effective applied research in the pursuit of stated economic

development objectives. Our measurements will take a comprehensive mixed-methods approach to obtain data about: (1) student recruitment and enablement, (2) the quality of service provided by students and staff to SLTT clients, (3) adherence to research best practices in the pursuit of applied research (4) the level of adherence by personnel to the activities outlined in this funding proposal. We will establish baseline models for each area upon activation and utilize those models to show improvements or contractions over time. Semi-annual reports for HERC will be created and reviewed outlining the successes, challenges, and (as needed) remediation plans.

8. Budget: Total Budget provided below. Years 1 thru 3 are provided in Appendix E

IGEM-HERC SUMMARY PROPOSAL BUDGET				
Name of Institution: Boise State University				
Name of Project Director: Edward Vasko, CISSP				
A. PERSONNEL COST (Faculty, Staff, Visiting Professors, Post-Doctoral Associates, Graduate/Undergraduate Students, Other) Name/ Title		Salary/Rate of Pay	Fringe	Dollar Amount Requested
PI: Edward Vasko, CISSP (35 hours / month; 20% of annual time; 3% increase in years 2 and 3)		$11,589 / month	30%	$111,756.00
Faculty Co-PI: Dr. Amit Jain (62 hours / year; 3% increase in years 2 and 3)		$14,677 / month	28%	$27,873.00
Faculty Co-PI: Dr. Sin Ming Loo (100 hours / year; 3% increase in years 2 and 3)		$13,504 / month	31%	$31,988.00
Faculty Co-PI: Dr. Francesca Spezzano (100 hours / year; 3% increase in years 2 and 3)		$11,607 / month	33%	$27,913.00
Faculty Co-PI: Dr. Edoardo Serra (100 hours / year; 3% increase in years 2 and 3)		$11,607 / month	33%	$27,913.00
Faculty Co-PI: Dr. Jidong Xiao (100 hours / year; 3% increase in years 2 and 3)		$11,224 / month	34%	$27,195.00
Ph.D. student, Graduate Assistants, 3 students, calendar year. Fringe benefits include $3,372 for health insurance in year 1 with a 5% estimated increase in years 2 and 3; includes Graduate Student Fee Remission; academic year and six summer credits.		$41,000 / student	7% plus health insurance	$376,064.00
Staff: TBH / Cyberdome Manager (Full-time resource)		$6,583.00 / month	35%	$336,970.00
Staff: TBH / Cyberdome Lead (Full-time resource)		$5,750.00 / month	37%	$298,581.00
Undergraduate Students (Two cohorts of 14 students / 6-month period for 28 total students / year @ 20 hours / week. This equates to 7 full-time staff / year; 3% increase in years 2 and 3)		$12.50 / hour	7%	$580,967.00
% OF TOTAL BUDGET: Annual Budget / Total Budget	87% / 88%		SUBTOTAL:	$1,847,240.00
B. EQUIPMENT: (List each item with a cost in excess of $1000.00.) Item/Description				Dollar Amount Requested
Hardware (log collection server) (Assumption: 5 clients; annual cost per client = $4,000.00; 20% support cost in years 2 and 3); Estimated hardware: Dell PowerEdge R640 Rack Server; 32GB RAM; 1TB RAID 5				$28,000.00
Software tools (forensic tools) (Assumption: 5 clients; annual cost per client = $900.00; 20% support cost in years 2 and 3)				$6,300.00
AWS Cloud Subscription (Assumption: 5 clients; annual cost per client = $8,400.00; 10% annual increase / year)				$139,020.00
AWS Cloud Storage (Assumption: 5 clients; annual cost per client = $3,000.00; 10% annual increase / year)				$49,650.00

Ticketing Software Subscriptions (Assumption: 5 clients; annual cost per client = $1,800.00; 10% annual increase / year)						$29,790.00
					SUBTOTAL:	$252,760.00
C. TRAVEL: Dates of Travel (from/to)	No. of Persons	Total Days	Transportation	Lodging	Per Diem	Dollar Amount Requested
					SUBTOTAL:	$0.00
D. Participant Support Costs:						Dollar Amount Requested
					SUBTOTAL:	$0.00
E. Other Direct Costs: Requested						Dollar Amount
					SUBTOTAL:	$0.00
F. Total Costs: (Add subtotals, sections A through E)					TOTAL:	$2,100,000.00
G. Amount Requested (Year 1):					TOTAL:	$2,100,000.00
Project Director's Signature:					Date: March 31, 2021	

9. Budget justification

The proposed budget is broken into the following categories (ranked by % of consumed budget):

Student Workers: The primary budget item is to hire up to 14 students per 6-month period for training and enablement in supporting SLTT clients. This aligns to our core objective. Students will be background checked as part of the hiring process.

Management Team: The Student Workers require mentors to ensure proper service quality and levels are maintained for SLTT clients. Two (2) full time staff hired through this proposal will provide on-going management and portfolio alignment for SLTT clients.

PI / Co-PI / Research Staff: Conducting applied research is a critical objective. The PI, Edward Vasko, commits 20% of his full-time role for overall platform management, outreach to SLTT clients and industry partners, and providing industry knowledge to applied research. The faculty Co-PIs and other research staff include faculty members in electrical and computer engineering, and computer science. Three (3) graduate students are included in this proposal in order to assist with furthering applied research efforts around faculty research.

Cloud Subscription Services: We intend to leverage a cloud service provider for secure public cloud subscriptions in order to provide the core cybersecurity platform. Technologies proposed include those outlined in Figure-1 below. The budget for cloud services will pay for virtual instances of servers, databases, and Infrastructure as Code platforms.

Figure 1 - Cyberdome Service Architecture

Hardware / Software: Proposed hardware will be utilized at SLTT clients for on-premise data collection and aggregation of network, system and application log traffic before securely transferring this data to the cloud-based analysis engine. Software costs in this proposal are for digital forensic toolkits to enable incident response for SLTT clients.

10. Institutional commitment

Boise State's institutional commitment to advancing cybersecurity and cyberoperations is shown through a number of areas:

1. The creation of the IPC and the hiring of its Director, Edward Vasko, CISSP, to execute the vision and direction of the IPC. (Edward's CV is provided in Appendix B.);

2. The faculty, staff, and equipment commitment to the Idaho Cybersecurity Education Initiative (ICEI), including: one 32-node HPC cluster for cyber simulations, workspace for 15 servers for a Training SOC, and 18 workstations for use in the cyber ranges / Cyberdome platform;

3. The advancement of undergraduate and graduate degrees in CyberOperations and Resilience (which align directly with the Cyberdome effort), an MS in Cybersecurity, plus three graduate and 6 undergraduate certificates; and

4. Prior year expansions of Boise State's Computer Science program, and the creation of multiple avenues of applied research including blockchain, cyber physical integration, voting system security, and cloud security. This expansion also created an opportunity to build a PhD in Computing with Cybersecurity emphasis.

The Cyberdome will reside in the IPC, which reports to the Vice President of Research and Economic Development. The IPC and Cyberdome will be managed by Edward Vasko, CISSP, Director of the IPC with the creation of a board of advisors from industry and SLTT clients.

11. Additional institutional and other sector support

As presented via the wide array of support letters in Appendix E, the Cyberdome has institutional support from the leadership of Boise State as it creates high-paying, clean energy career opportunities for students. Other sector support includes: (1) industrial perspective and project guidance from the leadership of local and national cybersecurity / cyber physical companies like Kount/Equifax, PlexTrac, Blue Ridge Networks, and Avertium, (2) cybersecurity leadership and support from critical Idaho employers and providers such as the INL, Micron, ITC, Intuit, and St. Luke's, and (3) a cross membership of the SLTT community, including local chambers of commerce, all strongly supporting this project. Leaders in these categories have offered support, guidance, and willingness to create employment pathways for workers and funding in the future. Long-term sustainable funding will be pursued through other funding models, industry partnerships and low-cost subscription models.

Appendix A: Facilities and Equipment

The combined and integrated facilities for the Cyberdome include ~2,000 square feet of workspace within the College of Engineering. The space is equipped with workstations and other equipment to mirror a commercial Security Operations Center. This environment is equipped to support up to 18 student workers and management staff.

In addition to this physical space, the research team has access to other labs and facilities throughout the computer science / computer engineering departments. These include the following.

Cyber Lab for Industrial Control Systems (CLICS)

CLICS serves as a test bed for Industrial Power Protection systems. The lab consists of a wide variety of SEL protective devices as well as a real time digital simulator (RTDS). The RTDS allows students to simulate power systems and perform hardware in loop testing (HIL) of protective devices. The lab's capabilities enable the testing of power system simulations, protective device settings, and multiple communication protocols. Equipment includes: SEL-3355 Rack Mount Computer, SEL 3530 Real-Time Automation Controller, SEL-3355 Flow Control, SEL-2730M Managed 24-port Ethernet Switch, SEL-2740S Software-Defined Network Switch, SEL-3031 Serial Radio Transceiver, SEL-3620 Ethernet Security Gateway, SEL-700G Generator Protection Relay, SEL-787 Transformer Protection Relay, SEL-411L Advanced Line Differential Protection, Automation, and Control System, SEL-487E Transformer Protection Relay, SEL-3530 Real-Time Automation Controller, SEL-751/751A Feeder Protection Relay, SEL-700G Generator Protection Relay, SEL-351S Protection System

Boise State University Data Mining Laboratory:

This lab has the following shared equipment:

- The CSHadoop cluster is a 12 node cluster for the study of big data:
    - Connected via 56Gb/s Infiniband, Uses Apache Ambari to manage the Hadoop functions., Has 41 terabytes of HDFS storage, 1 TB of total memory, 208 cores
- GPU cluster machine Titan:
    - 128GB of memory, 2 Xeon E5-2620v4 8-core processors @ 2.10GHz, 3 TB hard drive, 4 NVidia Titan X Pascal 12GB cards
- GPU cluster machine Mars:
    - 96 GB of memory, 2 Xeon E5-2620 8-core processors @ 2.00 GHz, 3.5 TB hard drive, 2 NVidia 1080Ti Pascal 11GB cards
- GPU cluster machine (DLA server):

o 64 GB of memory, 2 Xeon E5-2620v3 6-core processors @ 2.40 GHz, 800 GB hard drive, 2 Nvidia Tesla K20 5GB cards

Science DMZ and SDN for a Software Defined Data Center

Boise State was awarded the NSF-funded "CC*DNI: Networking Infrastructure: Science DMZ and SDN" proposal. The Science DMZ and SDN allows Boise State to expand the capabilities of a research network using the Idaho Regional Optical Network (IRON) to support a statewide collaboration among Boise State, INL, the University of Idaho (UI), and Idaho State University (ISU). The project lays the groundwork for a statewide Software Defined Data Center (SDDC) design to facilitate shared network, data, and compute resources. Software Defined Networks

(SDN) provide the foundation of the infrastructure and Software Defined Compute (SDC) and Software Defined Storage (SDS) integrate to create the Software Defined Data Center (SDDC). Leveraging this network and extending a dedicated software defined science network into our Idaho peer institutions enables collaboration among researchers to accelerate scientific discovery.

Manticore Open-Stack Based Cyber Range and Training Security Operations Center (SOC)

As part of the statewide Idaho Cybersecurity Education Initiative (ICEI), Boise State has undertaken the development of a series of support platforms for student learning and graduation into the Cyberdome platform. These platforms are based on the Open-Stack private cloud project and enable both public / cross-institutional collaboration as well as simulation training prior to advancement into the Cyberdome platform.

The public-facing cyber range, named Manticore, is made up of a 32-node high performance computing cluster, enabling over 1.8TB of RAM and 960 virtual CPUs of simulation and training space. This platform is intended for the following uses:

- CompTIA Sec+
- Sandbox Simulation Environment for Students / Partners
- Offensive / Defensive Skill Development (early stage learning)
- Connecting to other state universities, colleges
- Enabling local cyber-emergency simulations with local partners
- Enabling sharing of resources and scenarios

The Training SOC is a 16-node cluster with .75TB of memory and 168 computing cores. While smaller in size than Manticore, the uses of this computing cluster are very focused on providing early-stage simulation training for 3rd / 4th year students in Computer Science, Cybersecurity, CyberOperations, and other ancillary degree programs. This environment is meant to be a launchpad to the Cyberdome live-fire environment.

Appendix B: Biographical Sketches

Listed below are the biographical sketches for:

Edward Vasko

Amit Jain

Sin Ming Loo

Francesca Spezzano

Edoardo Serra

Jidong Xiao

NAME: Edward Vasko, CISSP

POSITION TITLE & INSTITUTION: Director, Institute for Pervasive Cybersecurity at Boise State University

A. PROFESSIONAL PREPARATION
(see PAPPG Chapter II.C.2.f.(i)(a))

INSTITUTION	LOCATION	MAJOR/AREA OF STUDY	DEGREE (if applicable)	YEAR (YYYY)
Arizona State University	Tempe, AZ	History	BA	1995

B. APPOINTMENTS
(see PAPPG Chapter II.C.2.f.(i)(b))

From - To	Position Title, Organization and Location
2020 - Present	Director, Institute for Pervasive Cybersecurity at Boise State University, Boise, ID
2019 – 2020	Senior Vice President, Avertium LLC, Phoenix, AZ
2015 - 2019	Commissioner, Arizona Commission for Post-Secondary Education, Phoenix, AZ
2019	Industry co-Chair, National Institute Standards & Technology, National Initiative for Cybersecurity Education (NIST NICE) Annual Conference
2017 - 2018	co-Chair, Arizona Cyber Team, Workforce Development sub-committee, Phoenix, AZ
2008 - 2019	CEO, Terra Verde, LLC, Phoenix, AZ
2007 - 2008	CEO, CEV Acquisitions, LLC, Phoenix, AZ
2002 - 2007	Director, Technology Risk Management, Jefferson Wells, Inc, Phoenix, AZ

C. PRODUCTS

(see PAPPG Chapter II.C.2.f.(i)(c))

Products Most Closely Related to the Proposed Project

Other Significant Products, Whether or Not Related to the Proposed Project

Built two commercial platforms similar to the Cyberdome project that are relevant (but not academic in nature). These were:
1. Breach Radar (www.breachradar.com), a fully cloud based small business focused Managed Detection & Response (MDR) platform providing enterprise grade security at small business prices. This solution is deployed and monitoring over 2,000 sites around the world.

2. TruSOC, a mid-market focused, fully cloud enabled, MSSP platform offering 24x7x365 operation centers, along with necessary core security operational elements.
See https://www.avertium.com/managed-security-services-provider-xdr/ for resulting details on either platform.

D. SYNERGISTIC ACTIVITIES

(see PAPPG Chapter II.C.2.f.(i)(d))

1. Provided industry input to CyberOperations and Resilience asynchronous curriculum resulting in the launch of two degree programs and three graduate certificates.
2. Conducted cybersecurity curriculum reviews for various Maricopa County Community College District (Greater Phoenix Metropolitan area) campuses with provided input resulting in pathway improvements of over 100% increase in student enrollements.
3. As an industry leader, led the team that facilitated multiple cyber challenges over a 5-year period with various Arizona universities and community colleges and career to assist with the development of a workforce pipeline to fulfill industry needs.

Amit Jain, Ph.D.

Professional Preparation

Institution	Location	Major	Degree & Year
Indian Institute of Technology	New Delhi, India	Computer Science & Engg	B. Tech., 1987
University of Central Florida	Orlando, Florida	Computer Science	Ph.D., 1994

Appointments

Period	Appointment	Institution & Location
2018-present	Chair and Professor, Computer Science Department	Boise State University, Boise, Idaho
2000-present	Associate Professor, Computer Science	Boise State University, Boise, Idaho
2014-2018	Associate Chair, CS Department	Boise State University, Boise, Idaho
2007-2008	Chief Scientist	Balihoo, Inc, Boise, Idaho
2007-2007	Interim Chair, CS Department	Boise State University, Boise, Idaho
1994-1999	Assistant Professor, Computer Science	Boise State University, Boise, Idaho
1987-1988	Software Engineer	Fermin National Accelerator Lab, Illinois

Products

Project-Related

1. *The Hatchery: An Agile and Effective Curricular Innovation for Transforming Undergraduate Education*. Tim Andersen, Amit Jain, Noah Salzman, Don Winiecki, Carl Seibert. HICCS-52 Hawaii International Conference on System Sciences, Maui, HI. 2019.

2. *Reflecting on the Impact of a Course on Inclusive Strategies for Teaching Computer Science.* Alark Joshi, Amit Jain. 48th IEEE Annual Frontiers in Education Conference. San Jose, CA. 2018.

3. *The Computer Science Professionals' Hatchery at Boise State University: Incorporating Inclusion, Diversity and Social Justice into the Computer Science Curriculum.* Don Winiecki, Noah Salzman, Tim Andersen, Amit Jain, Dianxiang Xu. 2018 The Collaborative Network for Engineering and Computing Diversity (CoNECD). Arlington, Virginia. 2018.

4. *Panel: Influencing Culture and Curriculum Via Revolution.* Kelly Cross, Marina Miletic, Tiago Forin, Mani Mina, Amit Jain, Elsa Villa, Lisa McNair, Ella L. Ingram. 2017 IEEE Frontiers in Education Conference (FIE). Indianapolis, Indiana. 2017.

5. *Improving Retention & Engagement in CS1 using Team-Based Learning.* Marissa Schmidt, Amit Jain, Mason Vail. American Society of Engineering Education (ASEE) PNW Section Conference. Boise, Idaho. 2016.

Other Significant Products

1. *A New Software and Social Network Analysis: Tools for Gaining an Understanding of Cooperation with a Broader Public.* Susan Mason, Don Holley, Aaron Wells, Amit Jain, Thomas Wuerzer, Alark Joshi. Socio-Economic Planning Sciences: Intl. Journal of Public Sector Decision Making. Vol. 56, pp. 14-26. 2016.
2. *Computer Science Vision*. Tim Andersen, Amit Jain. Co-author of a 10-year vision statement for the department at the request of the University. Presented to industry leaders at the Software Talent Initiative Workshop on 19th December, 2012. http://cs.boisestate.edu/~amit/Computer Science Vision_fall-2012.pdf
3. *Hadoop and Hive as Scalable Alternatives to RDBMS: A Case Study*. Marissa Hollingsworth. Masters project, Boise State University. 2012. https://scholarworks.boisestate.edu/cs_gradproj/2/

[In collaboration with a local startup software company. The industrial *Datanami* magazine that focuses on big-data selected the work with my graduate student Marissa Hollingsworth as one of four top noteworthy works from academia on the topic of Big Data in 2012. The masters project has been downloaded over 3000 times from Scholarworks.]

4. *An Interactive Simulation Tool for Complex Multilayer Dielectric Devices*. Rick Southwick III, Aaron Sup, Amit Jain and William B. Knowlton, *IEEE Transactions on Device and Materials Reliability*, 2011. [*Band Diagram Modeling software based on this work:* joint work with Bill Knowlton from MSE department and several graduate students. Over 5000 downloads by 250+ universities and research institutes and by 50+ companies from nearly 60 countries. Active from 2011-current]

SYNERGISTIC ACTIVITIES

INSURE - Idaho electioN cyberSecURity cEnter (2020-2024): This **c**enter is funded by a 3-year $500K grant from the Idaho Secretary of State. The goals of the center are (1) collaborate with election officials to improve election cybersecurity, (2) recommend tools and technologies, (3) provide training and awareness, (4) design solutions for e-voting, and (5)explore emerging technologies such as *blockchain* and *AI* to improve integrity and auditing of elections. Idaho Secretary of State is a partner in the enter that includes computer science and political science faculty.

Cybersecurity TTX Project (2018, 2019): Designed and ran a cybersecurity TableTop eXercise for the Idaho Secretary of State and election officials from around the state. Five graduate students and 25 undergraduate students were part of the team. Funded by a grant from Department of Homeland Security. *PI: Hoda Mehrpouyan. Co-PI: Amit Jain*.

CS Professionals Hatchery (2016-now): The Computer Science Professionals Hatchery seeks to transform undergraduate education by replicating the best elements of a software company environment, layering in moral, ethical, and social threads with entrepreneurship and professional skills, to produce graduates who are not only technically adept and effective team members, but also empowered as agents of positive cultural change in their workplaces. The project has introduced the idea of short, agile 1-credit courses to introduce professional skills alongside regular courses. These were co-designed with industry. The project involves twelve companies and over forty industry professionals along with the faculty. The project has implemented major curriculum reform in the first three years (out of a five-year project). From F'17 through S'19, 1584 students have taken 57 sections of the Hatchery courses, which includes 776 unique students. Fourteen publications and other presentations have been made to disseminate the results of the research. Funded by a $2M NSF IUSE/PFE:RED award. Role: PI.

IDoCode project (2014-2018): Lead for NSF CS 10K award to promote Computer Science in Idaho high schools. The IDoCode project has created three new programs for in-service and pre-service teachers, enrolled 50+ high school teachers, and created working groups with industry, school districts, State Department of Education and Idaho Technology Council. Member of statewide Governor's task force for promoting computer science. *Role: PI.*

Department growth grants*: Computer Science at Boise State: An Investment in Idaho's Future*, a $2.1 million grant to jumpstart the growth of the CS department. 2012-2015. PI: Amit Jain, Co-PI: Robert Kustra (President, Boise State University). Grant was renewed for another $2.1 million for 2015-2018 with Co-PIs Tim Andersen (CS Chair) and Jim Conrad (CS Clinical Faculty). Sample activities: Mentor new faculty/staff, curriculum reform, design tutoring center, manage industry connections, etc. Major highlight: lead the improvement in retention from 50% to 85% for the introductory CS courses.

NAME: Sin Ming Loo

POSITION TITLE & INSTITUTION: Professor, Boise State University

A. PROFESSIONAL PREPARATION
(see PAPPG Chapter II.C.2.f.(i)(a))

INSTITUTION	LOCATION	MAJOR/AREA OF STUDY	DEGREE (if applicable)	YEAR (YYYY)
University Alabama	Huntsville, AL	Electrical Engineering	BS	1997
University Alabama	Huntsville, AL	Computer Engineering	MS	2000
University Alabama	Birmingham, AL Huntsville, AL	Computer Engineering	PhD	2003

B. APPOINTMENTS
(see PAPPG Chapter II.C.2.f.(i)(b))

From - To	Position Title, Organization and Location
2019 – Present	Joint Appointment with Idaho National Laboratory, Idaho Falls, ID
2012 - Present	Professor, Department of Electrical and Computer Engineering, Boise State University, Boise, ID
2018 - Present	Director, Cyber-Physical Systems Security / Control Lab Industry Controls Systems, Boise State University, Boise, ID
2011 - 2013	Chair, Department of Electrical and Computer Engineering, Boise State University, Boise, ID
2008 - 2011	Associate Professor, Department of Electrical and Computer Engineering, Boise State University, Boise, ID
2003 - 2008	Assistant Professor, Department of Electrical and Computer Engineering, Boise State University, Boise, ID

C. PRODUCTS

(see PAPPG Chapter II.C.2.f.(i)(c))

Products Most Closely Related to the Proposed Project

1. Esther A. Enright, Connie Justice, Sin Ming Loo, Eleanor Taylor, Char Sample, D. Cragin Shelton, "Building Capacity for Systems Thinking in Higher Education Cybersecurity Programs," 24th Colloquium for Information Systems Security Education, November 4-5, 2020.
2. Char Sample, Sin Ming Loo, Matt Smith, "Resilient Data: An Interdisciplinary Approach," 2020 Resilient Week Virtual Symposium, October 19-23, 2020.
3. Char Sample, Sin Ming Loo, Connie Justice, Eleanor Taylor, Clay Hampton, "Cyber-informed: Bridging Cybersecurity and Other Disciplines," 20th European Conference on Cyber Warfare and Security, June 24-25 2020, Chester, UK.
4. Sin Ming Loo, Liljana Babinkostova, "Cyber-physical Systems Security Introductory Course for STEM Students," 2020 ASEE Annual Conference," June 22-26 2020.
5. Noah Salzman, Sin Ming Loo, "Connecting Hardware and Software in a Middle School Engineering Outreach Effort," ASEE 123rd Annual Conference & Exposition, June 26-29, 2016, New Orleans, LA, USA.

Other Significant Products, Whether or Not Related to the Proposed Project

1. Sin Ming Loo, HP Marshall, Austin Davis, Mark Laverty, Grady Anderson, Ashton Durrant, Chris Larsen, Jeff B. Johnson, Jake F. Anderson, Bill Nalli, Mark Saurer, "Avalanche Monitoring Using Portable Low-Cost Infrasound Systems," 2018 International Snow Science Workshop, Innsbruck, Austria, October 07-12, 2018.
2. Christopher D. Zevitas, John D. Spengler, Byron Jones, Eileen McNeely, Brent Coull, Xiaodong Cao, Sin Ming Loo, Anna-Kate Hard & Joseph G. Allen, "Assessment of noise in the airplane cabin environment," Journal of Exposure Science & Environmental Epidemiology, March 15, 2018.
3. Michael L. Pook, Sin Ming Loo, "A Small Acoustic Goniometer for General Purpose Research," Sensors 2016, 16(5), 622; doi:10.3390/s16050622

D. SYNERGISTIC ACTIVITIES

(see PAPPG Chapter II.C.2.f.(i)(d))

1. Cyber Operations Curriculum—Developing online asynchronous courses with industry certification for workforce development
2. Developing Undergraduate (BS) and Graduate (MS) Cyber Operations and Resilience degrees —Developing online asynchronous graduate certificates and Master's degree curriculum for, all students, early to mid-career - working professionals, returning US military veterans and career changing professionals
3. Cyber-Physical Systems Security for All Curriculum—Developing undergraduate online asynchronous certifications for all students
4. Tech Transfer and Commercialization—Developed monitoring system for commercial vehicle, funded by Idaho IGEM
5. Embedded Systems Summer Camp—Developed and conducted an embedded systems summer camp for junior high and high school students (Summer 2012 and Summer 2013).

FRANCESCA SPEZZANO, PH.D.

PROFESSIONAL PREPARATION

INSTITUTION	LOCATION	MAJOR	DEGREE & YEAR
University of Calabria	Rende, Italy	Computer Science Engineering	B.Sc., 2006
University of Calabria	Rende, Italy	Computer Science Engineering	M.Sc., 2008
University of Calabria	Rende, Italy	Computer Science Engineering	Ph.D., 2012

APPOINTMENTS

PERIOD	APPOINTMENT	INSTITUTION & LOCATION
Fall 2015– Present	Assistant Professor	Boise State University, Boise, ID
August 2013 – August 2015	Postdoctoral Research Associate	University of Maryland Institute for Advanced Computer Studies, College Park, MD
April 2012 – July 2013	Postdoctoral Research Associate	University of Calabria, Rende, Italy
October 2010 – July 2011	Visiting Scholar, Computer Science Dep.	University of California, Santa Cruz, CA

PUBLICATIONS

PROJECT-RELATED

1. Kumar S., **Spezzano F.**, Subrahmanian V., *VEWS: A Wikipedia Vandal Early Warning System*. In Proceedings of the 21st ACM SIGKDD International Conference of Knowledge Discovery and Data Mining (KDD 2015), pp. 607-616, 2015. https://doi.org/10.1145/2783258.2783367 https://doi.org/10.1109/ASONAM.2014.6921581
2. Suyehira K., **Spezzano F.**, Gundala L.A., *Detecting pages to protect in Wikipedia across multiple languages*. Social Network Analysis and Mining 9(1), pp. 10:1-10:16, 2019. https://doi.org/10.1007/s13278-019-0555-0
3. Green T., **Spezzano F.**, *Spam Users Identification in Wikipedia via Editing Behavior*. In Proceedings of the Eleventh International Conference on Web and Social Media (ICWSM), pp. 532-535, 2017. https://aaai.org/ocs/index.php/ICWSM/ICWSM17/paper/view/15678
4. **Spezzano F.**, Subrahmanian V., Mannes A., *STONE: Shaping terrorist organizational network efficiency*. In Proceedings of the 2013 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM), pp. 348-355, 2013. https://doi.org/10.1145/2492517.2492626
5. **Spezzano F.**, Subrahmanian V., Mannes A., *Reshaping Terrorist Networks*. Communications of the ACM (CACM) 57(8): 60-69, 2014. https://doi.org/10.1145/2632661.2632664

OTHER SIGNIFICANT PUBLICATIONS

1. Kumar S., **Spezzano F.**, Subrahmanian V., Faloutsos C., Edge Weight Prediction in Weighted Signed Networks. In Proceedings of IEEE International Conference on Data Mining (ICDM), pp. 221-230, 2016. https://doi.org/10.1109/ICDM.2016.0033
2. Kansal A., **Spezzano F.**, *A Scalable Graph-Coarsening Based Index for Dynamic Graph Databases*. Proceedings of the 26th ACM International Conference on Information and Knowledge Management (CIKM 2017), 2017. https://doi.org/10.1145/3132847.3133003

3. Andrews I., Kumar S., **Spezzano F.**, Subrahmanian V., *SPINN: Suspicion Prediction in Nuclear Networks*. In Proceedings of the 2015 IEEE International Conference on Intelligence and Security Informatics (IEEE ISI 2015), pp. 19-24, 2015. https://doi.org/10.1109/ISI.2015.7165933
4. Kumar S., **Spezzano F.**, Subrahmanian V., *Accurately Detecting Trolls in Slashdot Zoo via Decluttering*. In Proceedings of the 2014 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM), pp. 188-195, 2014. https://doi.org/10.1109/ASONAM.2014.6921581
5. Kang C., Kraus S., Molinaro C., **Spezzano F.**, Subrahmanian V., *Diffusion Centrality: A Paradigm to Maximize Spread in Social Networks*. Artificial Intelligence Journal (AIJ), 239:70-96, 2016. https://doi.org/10.1016/j.artint.2016.06.008

SYNERGISTIC ACTIVITIES

Conference Organization Committee—Program Committee Co-Chair of the 2019 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2019). Proceedings Chair of the 13th ACM International Conference on Web Search and Data Mining (WSDM 2020).

Conference Program Committee Member—Poster track of the International World Wide Web (WWW) Conference 2015-2016. International Joint Conference on Artificial Intelligence (IJCAI) 2015-2019. International Symposium on Foundations of Open Source Intelligence and Security Informatics @ASONAM 2015- 2019. The International Workshop on Computational Methods for CyberSafety @The Web Conference 2017-2019. The First Workshop on Women in Data Science @SDM 2017. ACM SIGKDD International Conference of Knowledge Discovery and Data Mining 2017-2019. ACM/SIGAPP Symposium On Applied Computing 2017-2019: SONAMA Track. MIS2: Misinformation and Misbehavior Mining on the Web Workshop @ WSDM 2018. IEEE/WIC/ACM International Conference on Web Intelligence (WI) 2019. SIAM International Conference on Data Mining (SDM) 2019.

Talks—Kumar S., Spezzano F., Subrahmanian V., *Identifying Malicious Actors on Social Media.* Tutorial at IEEE-ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2016), San Francisco, USA, August 18-21, 2016. Spezzano F., *Bad Actors in Social Media*. Keynote Speech at First International Workshop on Computational Methods for CyberSafety (co-located with CIKM 2016), Indianapolis, USA, October 28, 2016. Spezzano F., *Multilingual Page Protection in Wikipedia.* Invited keynote at MIS2: Misinformation and Misbehavior Mining on the Web, workshop co-located with WSDM 2018, Los Angeles, USA, February 9, 2018.

Course Development—*Internal Grant:* CS310HU: Intro to database systems usage. PIs: F. Spezzano and S. Pera. Source of Support: Internal award part of NSF's IUSE/PFE:RED: Software Hatchery: An Ecosystem for Nurturing the Next Generation of Computer Science Professionals. Total Award Amount: $14,000. Total Award Period Covered: Spring 2017.
Ph.D. Computing Colloquium: Weekly interdisciplinary seminars from speakers in academia, government labs, and industry involved in the computing sciences.

Broadening Participation in Computer Science—Co-chair of *"The 2nd & 3rd Workshop on Women in Data Science"* (co-located with The Web Conference 2018-2019). Co-organizer and moderator of the panel on *"Broadening Participation in Data Science"* at SIAM International Conference on Data Mining (SDM) 2018.

NSF BIOGRAPHICAL SKETCH

NAME: Serra, Edoardo

NSF ID: 000716889@nsf.gov
ORCID: 0000-0003-0689-5063

POSITION TITLE & INSTITUTION: Assistant Professor, Boise State University

(a) PROFESSIONAL PREPARATION

INSTITUTION	LOCATION	MAJOR / AREA OF STUDY	DEGREE (if applicable)	YEAR YYYY
University of Calbria	Rende (CS), Italy	Computer Science	BENG	2006
University of Calbria	Rende (CS), Italy	Computer Science	MIS	2008
University of Calabria	Rende (CS), Italy	Computer Science	PHD	2012

(b) APPOINTMENTS

2015 - present Assistant Professor, Boise State University, Boise, ID
2013 - 2015 Postdoctoral Research Associate , University of Maryland, College Park, MD
2012 - 2012 Postdoctoral Research Associate , University of Calabria
2010 - 2011 Visiting Researcher, Unversity of California, Los Angeles

(c) PRODUCTS

Products Most Closely Related to the Proposed Project

1. Serra E, Shrestha A, Spezzano F, Squicciarini A. DeepTrust. Proceedings of the Tenth ACM Conference on Data and Application Security and Privacy. CODASPY '20: Tenth ACM Conference on Data and Application Security and Privacy; 16 0 20; New Orleans LA USA. New York, NY, USA: ACM; c2020. Available from: https://dl.acm.org/doi/10.1145/3374664.3375744 DOI: 10.1145/3374664.3375744
2. Rullo A, Midi D, Serra E, Bertino E. Strategic Security Resource Allocation for Internet of Things. 2016 IEEE 36th International Conference on Distributed Computing Systems (ICDCS). 2016 IEEE 36th International Conference on Distributed Computing Systems (ICDCS); ; Nara, Japan. IEEE; c2016. Available from: http://ieeexplore.ieee.org/document/7536578/ DOI: 10.1109/ICDCS.2016.48
3. Rullo A, Serra E, Bertino E, Lobo J. Shortfall-Based Optimal Security Provisioning for Internet of Things. 2017 IEEE 37th International Conference on Distributed Computing Systems (ICDCS). 2017 IEEE 37th International Conference on Distributed Computing Systems (ICDCS); ; Atlanta, GA, USA. IEEE; c2017. Available from: http://ieeexplore.ieee.org/document/7980243/ DOI: 10.1109/ICDCS.2017.12
4. Jajodia S, Park N, Pierazzi F, Pugliese A, Serra E, Simari G, Subrahmanian V. A Probabilistic Logic of Cyber Deception. IEEE Transactions on Information Forensics and Security. 2017 November; 12(11):2532-2544. Available from: http://ieeexplore.ieee.org/document/7937934/ DOI: 10.1109/TIFS.2017.2710945
5. Samer Khamaiseh, Edoardo Serra, Zhiyuan Li, Dianxiang Xu. Detecting Saturation Attacks in SDN via Machine Learning. 2019 4th International Conference on Computing, Communications and Security (ICCCS), Rome, Italy, October 10-12, 2019; 2019; IEEE; c2019. Available from: https://doi.org/10.1109/CCCS.2019.8888049 DOI: 10.1109/CCCS.2019.8888049

Other Significant Products, Whether or Not Related to the Proposed Project

1. Rullo A, Midi D, Serra E, Bertino E. Pareto Optimal Security Resource Allocation for Internet of Things. ACM Transactions on Privacy and Security. 2017 October 26; 20(4):1-30. Available from: https://dl.acm.org/doi/10.1145/3139293 DOI: 10.1145/3139293
2. Jajodia S, Park N, Serra E, Subrahmanian V. Using temporal probabilistic logic for optimal monitoring of security events with limited resources. Journal of Computer Security. 2016 December 01; 24(6):735-791. Available from: https://www.medra.org/servlet/aliasResolver?alias=iospress&doi=10.3233/JCS-160555 DOI: 10.3233/JCS-160555
3. Farhad Rasapour, Edoardo Serra, Hoda Mehrpouyan. Framework for Detecting Control Command Injection Attacks on Industrial Control Systems (ICS). 2019 Seventh International Symposium on Computing and Networking, CANDAR 2019, Nagasaki, Japan, November 25-28, 2019; 2019; IEEE; c2019. Available from: https://doi.org/10.1109/CANDAR.2019.00035 DOI: 10.1109/CANDAR.2019.00035
4. Antonino Rullo, Edoardo Serra, Elisa Bertino, Jorge Lobo. Optimal Placement of Security Resources for the Internet of Things. In: Franco Cicirelli, Antonio Guerrieri, Carlo Mastroianni, Giandomenico Spezzano, Andrea Vinci, editors. The Internet of Things for Smart Urban Ecosystems [Internet] Springer; 2019. 95--124p. Available from: https://doi.org/10.1007/978-3-319-96550-5_5 DOI: 10.1007/978-3-319-96550-5_5
5. Tanmoy Chakraborty, Sushil Jajodia, Noseong Park, Andrea Pugliese, Edoardo Serra, V. S. Subrahmanian. Hybrid adversarial defense: Merging honeypots and traditional security methods. J. Comput. Secur.. 2018; 26(5):615--645. Available from: https://doi.org/10.3233/JCS-171094 DOI: 10.3233/JCS-171094

(d) SYNERGISTIC ACTIVITIES

1. Journal Reviewer—ACM Transactions on Computational Logic (TOCL), Social Network Analysis and Mining (SNAM), Journal of Intelligent Information Systems (JIIS), Information Processing Letters (IPL), Theoretical Computer Science (TCS), Scientific World Journal, Journal of Computer and Security (COSE), Embedded Systems Letters, Transactions on Dependable and Secure Computing (TDSC). Transactions on Computational Social Systems, Neural Computing and Applications.
2. Program Committee Member—European Conference on Artificial Intelligence International Joint Conference on Artificial Intelligence (IJCAI); IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM), International Conference on Information Systems Security (ICISS), International Symposium on Security and Privacy in Social Networks and Big Data (SocialSec)
3. Co-PI Boise State REU Site in Data-driven Security: Data-driven security is an emerging interdisciplinary area that focuses on researching and applying data science and artificial intelligence methods to solve national security problems. National security protects the country against substantial physical and psychological threats to our government; public safety; environment; or energy, food, and fiscal infrastructures. Terrorism, misinformation, and cyberattacks are common examples which are among the top 26 national security threats America is currently facing. Data-driven security is an emerging interdisciplinary area that focuses on researching and applying data science and artificial intelligence methods to solve national security

problems. For instance, it deals with applying social network analysis and game theory for bad actor detection and counter-attack in crime and terrorist networks; using artificial intelligence to reduce the spread of misinformation which is responsible for manipulating opinions and public response; integrating data science and analytics into cybersecurity for meeting the cybersecurity challenges of processing large data sets in order to gain valuable insights and reduce cybersecurity risks.

4. PI of NSF Capacity Building: Integrating Data Science into Cybersecurity Curriculum (1820685) - Boise State University proposes to develop innovative curriculum materials on security data science by integrating data science workflow, security problems, the adversary's perspective of security, and inquiry-based learning into hands-on practices. The success of this project will increase the capacity of the United States higher education enterprise to produce security data scientists or cybersecurity professionals with analytic skills. It will not only produce much-needed workforce at Boise State University, but also help faculty from other institutions to integrate data science topics into their cybersecurity curriculum. This will alleviate the desperate shortage of people who have integrated skills in data science and cybersecurity. The curriculum materials will help students develop critical-thinking skills in security data science. In addition, this project will advance the knowledge base of security data science education by transforming research results into reusable educational materials. The broader impacts include: (1) The curriculum materials can be used for not only cybersecurity courses, but also data science and computer science courses. (2) The project will have an impact on a number of universities across the nation, including minority-serving institutions. (3) The project results will be disseminated through the open collaborative repository, faculty development workshops and webinars, presentations and tutorials at professional conferences. This project will create four self-contained course modules on data science for software vulnerability prediction, malicious user detection in social networks, malware detection, and intrusion detection. They can be used in the existing cybersecurity courses or combined into a standalone course on security data analytics. The project will also develop an open collaborative repository to host the proposed curriculum materials (e.g., lecture notes, data sets, tools, and lab exercises), and serve the community as a collaborative environment for educators to exchange ideas, contribute new contents, and share resources. In addition, the project team will hold national faculty development workshops on security data science. The workshops will bring together various stakeholders, such as researchers, educators, industry practitioners, and policymakers, to discuss most recent progress and needs in security data science and how to integrate data science into specific security courses.

JIDONG XIAO, PHD

PROFESSIONAL PREPARATION

INSTITUTION	LOCATION	MAJOR	DEGREE & YEAR
Fudan University	Shanghai, China	Microelectronics	B.S., 2005
College of William and Mary	Williamsburg, Virginia	Computer Science	Ph.D., 2016

APPOINTMENTS

PERIOD	APPOINTMENT	INSTITUTION & LOCATION
2016–Present	Assistant Professor	Boise State University, Boise, ID
2015 - 2015	Software Engineer Intern	Juniper Networks, Sunnyvale, CA
2014 - 2015	Research Intern	Nokia Corporation, Mountain View, CA
2010 - 2014	Research Assistant	College of William and Mary, Williamsburg, VA
2006 - 2010	Software Engineer	Symantec, Beijing, China
2005 - 2006	Product Engineer	Intel, Shanghai, China

PRODUCTS

PROJECT-RELATED

I. Publications Most Relevant to this Proposal:

1. Lei Zhou, Fengwei Zhang, Jinghui Liao, Zhenyu Ning, **Jidong Xiao**, Kevin Leach, Westley Weimer, and Guojun Wang, "KShot: Live Kernel Patching with SMM and SGX", The 50th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN), Valencia, Spain, June, 2020. **Best Paper Award Nomination** (3 out of 291 submissions)
2. Xing Gao, **Jidong Xiao**, Haining Wang, and Angelos Stavrou, "Understanding the Security Implication of Aborting Live Migration", IEEE Transactions on Cloud Computing (TCC), 2020.
3. Kai Huang, Xing Gao, Fengwei Zhang, **Jidong Xiao**, "COMS: Customer Oriented Migration Service", The 2017 IEEE 10th International Conference on Cloud Computing (CLOUD), Honolulu, HI, June, 2017. (Kai Huang was the undergraduate student under my supervision.)
4. Lei Lu, Xing Gao, **Jidong Xiao**, "Poster: TwinHype: A Novel Approach to Reduce Cloud Downtime," The 2016 Network and Distributed System Security Symposium (NDSS), San Diego, CA, February 2016. **Distinguished Poster Award**.

OTHER SIGNIFICANT PRODUCTS

1. Joseph Connelly, Taylor Roberts, Xing Gao, Jidong Xiao, Haining Wang, Angelos Stavrou, "CloudSkulk: A Nested Virtual Machine Based Rootkit and Its Detection", The 51st Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN), Taipei, Taiwan, June, 2021.
2. Marwan Albahar, Xing Gao, Gaby Dagher, Daiping Liu, Fengwei Zhang, and **Jidong Xiao**, "A Study of the Multiple Sign-in Feature in Web Applications",

The 15th EAI International Conference on Security and Privacy in Communication Networks (SecureComm), Orlando, Florida, 2019.

3. **Jidong Xiao**, Lei Lu, Hai Huang, Haining Wang, "Hyperprobe: Towards Virtual Machine Extrospection", The 29th USENIX Large Installation System Administration Conference (LISA), Washington DC, Nov, 2015. **Best Paper Award**.
4. **Jidong Xiao**, Hai Huang, Haining Wang, "Kernel Data Attack is A Realistic Threat", In Proceedings of the 11th EAI International Conference on Security and Privacy in Communication Networks (SecureComm), Dallas, TX, October, 2015.

SYNERGISTIC ACTIVITIES

GenCyber Cybersecurity Summer Camps. PI: Gaby Dagher. Co-PI: Jidong Xiao. $99,990 in Summer 2018, $97,766 in Summer 2019, and $100,000 in summer 2020 (postponed due to COVID-19) resulting from three separate proposals with joint funding from the National Security Agency and the National Science Foundation. Dr. Xiao served as the lead instructor. *Intellectual Merit:* The projects advance research knowledge by incorporating current cybersecurity technology into two one-week summer camps at Boise State University. Students learn basic knowledge of and techniques for cyber-attack and defense as per current standards. *Broader Impact*: The GenCyber programs strive to reduce the shortfall in skilled cybersecurity professionals, by offering no-cost camps for either K–12 students or their teachers (we focused on students). The camps raise awareness of cybersecurity and offer practical skills.

Workshop on The State of High School Cybersecurity Education for Preparing a Cybersecurity Workforce: PI: Gaby Dagher. Co-PI: Jidong Xiao. $100,000. 09/01/2020 - 08/31/2021. Funded by the NSF. This project aims to implement a workshop to analyze the state of the art of cybersecurity education in the U.S. high schools. Approximately 30 participants (educators, policymakers, and industry leaders) from six states — which have made good progress in implementing cybersecurity education standards and creating career pathways in high schools — will attend the workshop and produce a report on the state of high school cybersecurity education for preparing a cybersecurity workforce.

Information Retrieval in Clouds: A collaborated project with University of Delaware. PI at University of Delaware: Haining Wang, PI at Boise State: Jidong Xiao, 01/01/2019 – 12/31/2021, $480,021. Funded by the Army Research Office (ARO). This project aims to identify vulnerabilities in cloud environments which allow attackers to collect sensitive information, and then from defenders' perspective, we investigate how to thwart potential attacks and detect possible intrusions.

Service: Program Session Chair of SecureComm 2019, Program Committee Member of SecureComm 2018, ICPADS 2016, National Science Foundation (NSF) Graduate Research Fellowship Program (GRFP) review panelist 2021, National Science Foundation (NSF) proposal review panelist 2016, 2018; Workshop Reviewer of ACM Special Interest Group on Computer Science Education (SIGCSE) (2019, 2020, 2021); Shadow Program Committee Member of EuroSys 2016, External Reviewer of DSN 2014. Journal reviewer: IEEE's Transactions on Cloud Computing (TCC); IEEE Transactions on Dependable and Secure Computing (TDSC); International Journal of Security and Networks (IJSN);

Supervisor, Student Research: Supervises 1 Ph.D. graduate student, 1 master student, and 5 undergraduate students in the Computer Science department at Boise State University.

Appendix C: Current and Pending Support

Listed below are the current and pending support needs for:

Edward Vasko

Amit Jain

Sin Ming Loo

Francesca Spezzano

Edoardo Serra

Jidong Xiao

NSF CURRENT AND PENDING SUPPORT

PI/co-PI/Senior Personnel: Vasko, Edward

PROJECT/PROPOSAL PENDING SUPPORT

1. Project/Proposal Title: Competency Based Cybersecurity Collaborative Workforce Development Initiative

   Proposal/Award Number (if available):

   Source of Support: Federal

   Primary Place of Performance: Boise, ID

   Project/Proposal Support Start Date (if available):

   Project/Proposal Support End Date (if available):

   Total Award Amount (including Indirect Costs): $2,512,567

   Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project:

Year	Person-months per year committed
2021	1.7
2022	1.7
2023	1.7
2024	1.7

2. Project/Proposal Title: Office of Naval Research - ROTC Cadet Cybersecurity Research Techniques

   Proposal/Award Number (if available):

   Source of Support: Federal

   Primary Place of Performance: Boise, ID

   Project/Proposal Support Start Date (if available):

   Project/Proposal Support End Date (if available):

   Total Award Amount (including Indirect Costs): $249,446

   Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project:

Year	Person-months per year committed
2021	2.4

3. Project/Proposal Title: The Cyberdome, a Collaborative Education and Workforce Development Initiative

   Proposal/Award Number (if available):

   Source of Support: State Board of Education

   Primary Place of Performance: Boise, ID

   Project/Proposal Support Start Date (if available):

   Project/Proposal Support End Date (if available):

   Total Award Amount (including Indirect Costs): $2,100,000

   Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project:

Year	Person-months per year committed
2021	2.4
2022	2.4
2023	2.4
2024	2.4

NSF CURRENT AND PENDING SUPPORT

PI/co-PI/Senior Personnel: Jain, Amit

PROJECT/PROPOSAL CURRENT SUPPORT

1. Project/Proposal Title: INSURE: Idaho electioN cyberSecURity cEnter

   Proposal/Award Number (if available):

   Source of Support: Idaho Secretary of State

   Primary Place of Performance: Boise State University

   Project/Proposal Support Start Date (if available): 2020/10

   Project/Proposal Support End Date (if available): 2023/09

   Total Award Amount (including Indirect Costs): $499,709

   Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project:

Year	Person-months per year committed
2021	1
2022	1
2023	0.5

2. Project/Proposal Title: IDoCode Extension: Sustaining CS Teacher Endorsement

   Proposal/Award Number (if available): 18BSU-iSTEM

   Source of Support: Idaho STEM Action Center - Office of the Governor

   Primary Place of Performance: Boise State University

   Project/Proposal Support Start Date (if available): 2018/03

   Project/Proposal Support End Date (if available): 2021/06

   Total Award Amount (including Indirect Costs): $98,531

   Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project:

Year	Person-months per year committed
2018	0.5

Year	Person-months per year committed
2019	0.5

3. Project/Proposal Title: IUSE/PFE:RED: Software Hatchery; An Ecosystem for Nurturing the Next Generation of Computer Science Professionals

   Proposal/Award Number (if available): 1623189

   Source of Support: National Science Foundation

   Primary Place of Performance: Boise State University

   Project/Proposal Support Start Date (if available): 2016/07

   Project/Proposal Support End Date (if available): 2021/06

   Total Award Amount (including Indirect Costs): $2,000,000

   Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project:

Year	Person-months per year committed
2021	1
2020	1
2019	1
2018	1
2017	1

PROJECT/PROPOSAL PENDING SUPPORT

1. Project/Proposal Title: SaTC: EDU: BEACON: Vertically-Aligned Hands-on Cybersecurity Curriculum Based on Adversarial Thinking

   Proposal/Award Number (if available):

   Source of Support: National Science Foundation

   Primary Place of Performance: Boise State University

   Project/Proposal Support Start Date (if available): 2020/09

   Project/Proposal Support End Date (if available): 2023/08

   Total Award Amount (including Indirect Costs): $399,999

Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project:

Year	Person-months per year committed
2021	0.25
2022	0.25
2023	0.25

Current and Pending Support	
The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal	
Investigator: Sin Ming Loo	Other agencies to which this proposal has been/will be submitted:

Support: ☒Current ☐Pending ☐Submission Planned in Near Future ☐Transfer of Support
Project/Proposal Title: Infrasound Avalanche Monitoring: Enhanced monitoring in Little Cottonwood Canyon, Utah
Source of Support: Colorado Department of Transportation
Total Award Amount: $99,509.00 Total Award Period Covered: 11/20/2018 - 12/30/2022
Location of Project: Boise State University, Boise, ID
Person-Months Per Year Committed Cal: Acad: Sumr: 0.5

Support: ☒Current ☐Pending ☐Submission Planned in Near Future ☐Transfer of Support
Project/Proposal Title: Cyber-Physical Systems Security Workforce Capacity Building
Source of Support: Idaho Workforce Development Council
Total Award Amount: $833,957.00 Total Award Period Covered: 7/1/2019 - 6/30/2022
Location of Project: Boise State University, Boise, ID
Person-Months Per Year Committed Cal: Acad: 2.0 Sumr: 1.0

Support: ☒Current ☐Pending ☐Submission Planned in Near Future ☐Transfer of Support
Project/Proposal Title: Joint-Appointment
Source of Support: Idaho National Lab
Total Award Amount: $41,214.00 Total Award Period Covered: 10/1/20 – 9/31/21
Location of Project: Boise State University, Boise, ID
Person-Months Per Year Committed Cal: Acad: 1 Sumr: 1

Support: ☒Current ☐Pending ☐Submission Planned in Near Future ☐Transfer of Support
Project/Proposal Title: Cabin Air Quality and Bleed Air Contamination
Source of Support: Kansas State University / FAA
Total Award Amount: $69,626.00 Total Award Period Covered: 7/1/20 – 6/31/21
Location of Project: Boise State University, Boise, ID
Person-Months Per Year Committed Cal: Acad: 0 Sumr: 0.5

NSF CURRENT AND PENDING SUPPORT

PI/co-PI/Senior Personnel: Spezzano, Francesca

PROJECT/PROPOSAL CURRENT SUPPORT

1. Project/Proposal Title: CAREER: Enhanced Analysis & Algorithms to Minimize Social Network Misinformation Spread

   Proposal/Award Number (if available): 1943370

   Source of Support: National Science Foundation

   Primary Place of Performance: Boise State University - Computer Science Department

   Project/Proposal Support Start Date (if available):

   Project/Proposal Support End Date (if available):

   Total Award Amount (including Indirect Costs): $487,469

   Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project:

Year	Person-months per year committed
2020	1
2021	1

2. Project/Proposal Title: Capacity Building: Integrating Data Science into Cybersecurity Curriculum

   Proposal/Award Number (if available): 1820685

   Source of Support: National Science Foundation

   Primary Place of Performance: Boise State University - Computer Science Department

   Project/Proposal Support Start Date (if available):

   Project/Proposal Support End Date (if available):

   Total Award Amount (including Indirect Costs): $499,963

   Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project:

Year	Person-months per year committed
2021	0.6

Year	Person-months per year committed
2020	0.6
2019	0.6

3. Project/Proposal Title: REU Site: Data Driven Security

   Proposal/Award Number (if available): 1950599

   Source of Support: National Science Foundation

   Primary Place of Performance: Boise State University - Computer Science Department

   Project/Proposal Support Start Date (if available):

   Project/Proposal Support End Date (if available):

   Total Award Amount (including Indirect Costs): $363,656

   Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project:

Year	Person-months per year committed
2021	0.4

NSF CURRENT AND PENDING SUPPORT

PI/co-PI/Senior Personnel: Serra, Edoardo

PROJECT/PROPOSAL CURRENT SUPPORT

1. Project/Proposal Title: Capacity Building: Integrating Data Science into Cybersecurity Curriculum

   Proposal/Award Number (if available):

   Source of Support: National Science Foundation

   Primary Place of Performance: Boise State University

   Project/Proposal Support Start Date (if available):

   Project/Proposal Support End Date (if available):

   Total Award Amount (including Indirect Costs): $499,963

   Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project:

Year	Person-months per year committed
2018	1
2019	1
2020	1

2. Project/Proposal Title: REU Site: Data Driven Security

   Proposal/Award Number (if available):

   Source of Support: National Science Foundation

   Primary Place of Performance: Boise State Ubniversity

   Project/Proposal Support Start Date (if available):

   Project/Proposal Support End Date (if available):

   Total Award Amount (including Indirect Costs): $364,500

   Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project:

Year	Person-months per year committed
2021	0.4

3. Project/Proposal Title: STEM Education Material in the Field of Cyber-physical System Security

   Proposal/Award Number (if available):

   Source of Support: Idaho STEM Action Center - Office of the Governor

   Primary Place of Performance: Boise State University

   Project/Proposal Support Start Date (if available):

   Project/Proposal Support End Date (if available):

   Total Award Amount (including Indirect Costs): $25,000

   Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project:

Year	Person-months per year committed
2020	1

NSF CURRENT AND PENDING SUPPORT

PI/co-PI/Senior Personnel: Xiao, Jidong

PROJECT/PROPOSAL CURRENT SUPPORT

1. Project/Proposal Title: Gencyber Non-Residential Summer Camps for Underrepresented High School Students in Idaho

   Proposal/Award Number (if available):

   Source of Support: National Security Agency

   Primary Place of Performance: Boise State University - Computer Science Department

   Project/Proposal Support Start Date (if available):

   Project/Proposal Support End Date (if available):

   Total Award Amount (including Indirect Costs): $100,000

   Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project:

Year	Person-months per year committed
2021	1

2. Project/Proposal Title: Information Retrieval in Clouds

   Proposal/Award Number (if available): 53520

   Source of Support: University of Delaware

   Primary Place of Performance: Boise State University - Computer Science Department

   Project/Proposal Support Start Date (if available):

   Project/Proposal Support End Date (if available):

   Total Award Amount (including Indirect Costs): $300,000

   Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project:

Year	Person-months per year committed
2021	1
2020	1
2019	1

3. Project/Proposal Title: The State of High School Cybersecurity Education for Preparing a Cybersecurity Workforce: A Workshop Proposal

   Proposal/Award Number (if available): 2010614

   Source of Support: National Science Foundation

   Primary Place of Performance: Boise State University - Computer Science Department

   Project/Proposal Support Start Date (if available):

   Project/Proposal Support End Date (if available):

   Total Award Amount (including Indirect Costs): $100,000

   Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project:

Year	Person-months per year committed
2021	1

PROJECT/PROPOSAL PENDING SUPPORT

1. Project/Proposal Title: SaTC: EDU: BEACON: Vertically-Aligned Hands-on Cybersecurity Curriculum Based on Adversarial Thinking

   Proposal/Award Number (if available):

   Source of Support: National Science Foundation

   Primary Place of Performance: Boise State University - Computer Science Department

   Project/Proposal Support Start Date (if available):

   Project/Proposal Support End Date (if available):

   Total Award Amount (including Indirect Costs): $399,999

   Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project:

Year	Person-months per year committed
2021	0.5
2022	0.5
2023	0.5

Appendix D: Senior Personnel

Funding of this project enables the hiring of two (2) key people to manage the day-to-day service levels and overall platform for our SLTT clients. The Cyberdome Manager will provide overall staff management and mentoring of the hired undergraduate workers. The manager will also coordinate with Co-PIs and graduate assistants on research needs. The Cyberdome Lead will be the key platform engineer and architect to ensure core technologies are kept up to date and appropriately serving client needs. The lead will also provide analyst / threat hunting mentoring and skill development with the undergraduate workers. Finally, the lead, alongside the manager, will act as coordinators of research requests of the Co-PIs and graduate assistants.

The Cyberdome concept is fresh in its application of workforce development to the cybersecurity industry. Therefore, while other proposals request senior personnel from inside / outside the proposing institution for support, the Cyberdome leadership team intends to align with key industry partners to obtain on-going sustainable funding.

Appendix E: Other

The following letters of support or partnership are provided as clear evidence of wide community support inside and outside of Idaho. This support shows alignment with our proposed objectives and advances the notion that the Cyberdome can be a truly impactful platform for workforce, economic, and research development. NOTE: Budget plans for years 2 and 3 are presented at the end of the support letters.

BOISE STATE UNIVERSITY
OFFICE OF THE PRESIDENT

March 29, 2021

Idaho State Board of Education
Higher Education Research Council
Idaho Global Entrepreneurial Mission Initiative

To Whom it May Concern,

The Administration of Boise State University enthusiastically supports the IGEM Higher Education Research Council (IGEM-HERC) grant proposal submitted by the Institute for Pervasive Cybersecurity. "The Cyberdome — An Investment in Idaho's Cybersecurity Future" proposal aligns with our university's goals as outlined in our strategic plan, cutting across all pillars of this plan. The platform fulfills strategic needs in producing a highly paid, cyber-ready labor pool as it also enables the reduction of risk to our State, Local, Tribal and Territorial (SLTT) community partners, while also enabling applied research in critical cybersecurity and cyber-physical areas.

Further the long-term economic development opportunities arising from this proposal align to the state's targeted plans to grow/expand its commercial industry base. The ability to fulfill open positions across the state, while also attracting new cyber employers to the state, is critically important to establishing Idaho as a key national cyber workforce hub. From healthcare, to all aspects of our economy, to local and federal government, to the individual holding a cell phone, there is no facet of our world and our lives that isn't impacted by cybersecurity. The Cyberdome serves as a premier driver for Idaho and regional cybersecurity.

An appropriately trained cybersecurity workforce is vital to the protection of our critical data and infrastructure across the state, and around the nation. With over 1,500 open positions in the State of Idaho, and over 500,000 open positions nationally, Idaho has an opportunity to help create a workforce ready to tackle the challenges of the 21st Century. This proposal, wth its efforts to enable cybersecurity career seekers with real world experience, accelerates Idaho's ability to provide the best workforce to the State, region and Nation.

Cybersecurity is now fundamental across all our scientific, engineering, business, critical infrastructure, and operational environments. The need for efforts such as the Cyberdome and the objectives it will fulfill, add significant force multiplying efforts where they are needed most while also enabling applied research, technical innovation, and enhancements to tactics, techniques and procedures.

I am pleased to lend my strongest support for this proposal and to affirm the alignment of the cyberdome with the goals of Boise State University. I am excited about the potential outcomes of developing a needed workforce, the reduction of risk to our SLTT partners, and the applied research proposed for Idaho at large.

Sincerely,

Dr. Marlene Tromp
President

1910 University Drive Boise, Idaho 83725-1000
Phone (208) 426-1491 Fax (208) 426-3779 www.boisestate.edu

Kount®
An Equifax Company

1005 West Main Street
Boise, Idaho 83702
www.kount.com

Addressed to:
Higher Education Research Council
Idaho Global Entrepreneurial Mission Initiative

Kount, An Equifax Company enthusiastically supports the IGEM Higher Education Research Council (IGEM-HERC) grant proposal submitted by the Institute for Pervasive Cybersecurity entitled “The Cyberdome — An Investment in Idaho’s Cybersecurity Future.” Kount, An Equifax Company is very excited to see an effort put forward that will reduce risk to State, Local, Tribal, and Territorial (SLTT) organizations, while also producing a “cyber ready” labor pool able to enter the workforce and more efficiently add value to their employers. The proposal is a credit to the vision of the team at Boise State University, and we look forward to strong collaboration between Kount, Boise State, and the other Idaho Universities and Colleges in the fulfillment of the Cyberdome.

Kount, An Equifax Company has been a leader in Cybersecurity for the past 15 years. We have pioneered and patented core technology around Device Fingerprinting, Proxy Piercing and AI. We own more then 40 patents in the cybersecurity space. Equifax is looking to make Boise a center of excellence for Identity, Fraud and Cybersecurity. This would significantly grow our footprint and make Boise a cybersecurity hub. The Cyberdome is critical to making this happen.

Cybersecurity is now fundamental across all our scientific, engineering, business, critical infrastructure, and operational environments. The need for efforts such as the Cyberdome, and the objectives it will fulfill add critical force multiplying efforts where they are needed most while also enabling applied research, technical innovation, and enhancements to tactics, techniques, and procedures.

Kount is committed to our partnership with Boise State and looks forward to continued collaborative efforts around innovative platforms such as the Cyberdome.

Sincerely,
Jim Gasaway | Vice President & Senior Techonlogy Leader at Kount, an Equifax Company
1005 W. Main Street | Boise, Idaho 83702
P 208 489 3384 | m 208 340-2551
jim.gasaway@kount.com

State of Idaho

Information Technology Services
Office of the Governor

BRAD LITTLE
Governor
JEFF WEAK
Administrator
GREG ZICKAU
Deputy Administrator
Chief Information Officer

11331 W. Chinden Blvd, Suite B201
P.O. Box 83720
Boise, ID 83720-0042
Telephone (208) 605-4000 or FAX (208) 605-4093
http://its.idaho.gov

March 26, 2021

Idaho State Board of Education
650 West State Street, 3rd Floor
Boise, ID 83702

Dear Higher Education Research Council Board Members,

I am writing this letter in support of Boise State University's Cyberdome Program.

It is a known fact that state and county governments, local municipalities, and the K-12 education sector struggle to attract and retain trained and competent cybersecurity staff to identify, protect, detect, respond and recovery from cyber-attacks. This leaves our critical infrastructure, computer systems and data open to attack from bad actors including nation states and organized crime entities.

Idaho employers need multiple universities inside our state to offer programs that specialize in all aspects of cybersecurity to satisfy the demand and need for trained cybersecurity professionals. The proposed Institute for Pervasive Cybersecurity Cyberdome program will help build a pathway to build a collaborative, competency-based learning environment for cybersecurity learners across Idaho. In turn, this program will also help protect Idaho's most critical information and physical assets, enable a competency-based workforce, and provide Idaho employers a better trained and more effective cybersecurity workforce.

I have been working in the cybersecurity area of concentration for over 15 years and teaching Information technology and Cybersecurity curriculum for almost 20 years, and I sincerely believe the proposed Cyberdome program will help Idaho take a giant step in filling the cybersecurity workforce gaps and become a national leader in cybersecurity education!

In closing, I would like to add that as a cybersecurity professional with over 25 years of information technology and cybersecurity operational experience, I feel the Cyberdome program can and will dramatically increase the available number of trained cybersecurity professionals within Idaho and nationwide. I wholeheartedly support the Cyberdome program and concept!

If you have questions or need more information, please feel free to contact me at (208) 605-4054 or keith.tresh@its.idaho.gov.

Sincerely,

Keith Tresh
Chief Information Security Officer
Office of Information Technology Services
Office of the Governor
Keith.Tresh@its.idaho.gov
Office: (208) 605-4054
Cell: (208) 407-8509

IDAHO COMMERCE

Brad Little, Governor
Tom Kealey, Director

March 18, 2021

State Board of Education
Higher Education Research Council (HERC)
650 West State Street, 3rd Floor
Boise, ID 83702

Dear Dr. Bliss,

The Idaho Department of Commerce (Commerce) supports the IGEM Higher Education Research Council (IGEM-HERC) grant proposal submitted by Boise State University's Institute for Pervasive Cybersecurity entitled "The Cyberdome — An Investment in Idaho's Cybersecurity Future." Commerce recognizes the growing need by businesses across different industries to have a "cyber ready" labor pool able to enter the workforce.

As the State's lead economic development agency, Commerce has a responsibility to support initiatives that can address urgent economic challenges. An appropriately trained cybersecurity workforce is critical to the protection of critical data and infrastructure. With over 1,500 open jobs across the state and over 500,000 open jobs nationally, Idaho has an opportunity to create a workforce ready to tackle the challenges of the 21st Century.

The Cyberdome proposal, with its efforts to enable cybersecurity career seekers with real world experience, accelerates Idaho's ability to provide the best workforce to the state, region, and nation, and can assist Commerce in attracting new cyber employers to the state as well. We enthusiastically support Boise State University's proposal.

Respectfully,

Thomas "Tom" Kealey

Tom Kealey
Director

IDAHO ARMY NATIONAL GUARD
JOINT FORCE HEADQUARTERS
3882 W Ellsworth St, Bldg. 440
Boise, Idaho 83705

MARCH 29, 2021

Edward Vasko, CISSP
Director, Institute for Pervasive Cybersecurity
Boise State University

Dear Mr. Vasko:

I write to you to express the Idaho National Guard's interested in providing support to Boise State University's collaborative effort to establish the Cyber-Security Workforce Development Initiative through the Idaho Global Entrepreneurial Mission and State Board of Education Higher Education Research Council. The Department of Defense has recognized that the National Guard is a key element in addressing the cybersecurity challenges facing our nation. The Idaho National Guard is ideally positioned as a resource for expertise and to foster creative solutions to cybersecurity problems facing our nation, state, and local communities.

One of the primary responsibilities of the National Guard in cybersecurity is to provide defense support to our state and civil authorities via a coordinate, train, advise and assist role. The Idaho National Guard can fulfill this responsibility through collaborative efforts with State and local governments, non-governmental organizations, and the private sector. This support can be provided through engagement in training activities with mission partners or by observing for the purpose of sharing best practices and enhancing DoD defensive cyber operations-related knowledge, skills, and capabilities. Additional support can be provided in an advisory role on development of potential strategies, plans, and solutions for identifying, protecting, detecting, responding to and recovering from cyber-security breaches. This collaboration will enhance and develop abilities to mitigate and defend to prevent cyber-security incidents.

The Idaho National Guard feels that our mission objectives in defensive cybersecurity align well with the proposed objectives relating to workforce development and sustainability. We have members that are highly trained and equipped to share and advice on best practices and strategies that can be used to enhance the workforce development efforts of Boise State University. Our expertise could be leveraged to advise in the development of curriculum and training exercises that would align with industry and Department of Defense standards.

We are pleased to provide our support towards Boise State University's effort to establish the Cyberdome initiative and look forward to further engagement on this project.

Sincerely,

LISTER.DANIAL.1159094142 Digitally signed by LISTER.DANIAL.1159094142 Date: 2021.03.29 12:27:35 -06'00'

Danial Lister
COL, SC, IDARNG
CIO/G6

March 24, 2021

Edward Vasko
Director, Institute for Pervasive Cybersecurity
Boise State University
Dept of Research & Economic Development
1910 University Drive
Boise, ID 83725

Mr. Vasko,

Thank you for your time on Friday, March 12, 2021, to discuss the Boise State University Cyberdome initiative.

Cybersecurity is core to Micron's business operations and protecting our intellectual property is of utmost concern for our organization. Finding talent within the Boise valley as well as across the industry has been an increasing challenge for Micron, so we are extremely excited to hear about and are supportive of the program which Boise State has put together.

We believe that the students who complete this program will be equipped with the security skillsets, knowledge and fundamentals that will prepare them to enter into the workforce as successful Security professionals.

Please let us know how we can help with your Cybersecurity program initiatives.

Thank you,

Samuel Evans
Director, Cyber Security Operations
Micron Technology, Inc.
8000 S. Federal Way
Boise, Idaho 83707

March 23, 2021

Edward Vasko, CISSP
Director, Institute for Pervasive Cybersecurity
Boise State University

Mr. Vasko,

Please accept this letter of support for Idaho's Cybersecurity Future Initiative. The Workforce Development Council desires a future where Idaho's diverse and prepared workforce meets the needs of our unique communities and employers. The opportunities within the Cyberdome to provide work-based learning are critical for Idaho's, and the nation's, frontline defenders of our infrastructure. Employers have shared that need individuals with both theoretical knowledge and technical skills in cybersecurity before they begin their employment. It is upon us to integrate the theoretical and practical and the Cyberdome does just that.

Information Technology, including computer programming, cybersecurity, networking, and help desk jobs (Computer and Mathematical Occupations, Occupation Codes 15-1211 through 15-1257) in the state of Idaho are expected to increase by 11.2% from 2018 to 2028. Idaho will continue to have a need for approximately 480 developer positions in computer programming, applications, systems, and web development annually. Idaho expects 170 positions in computer and security analysis, and another 512 positions will open annually in administration and support roles (Bureau of Labor Statistics). In the United States, the demand for professionals with cybersecurity expertise is outpacing all other occupations. There are over 500,000 open, unfilled cybersecurity positions throughout the United States according to CompTIA. In a recent study by McKinsey & Company, they state that the increase in remote workers will result in companies investing even more in cybersecurity and awareness training. These information technology occupations maintain over $75,000 annual median pay on average which is well above the median income in Idaho. Simply said, these are the career opportunities that we need to develop a pipeline for.

The Workforce Development Council will continue offer its support for Idaho's Cybersecurity Future Initiative in any way it can. We look forward to working with you, state entities and our federal delegation to ensure that this project comes to fruition.

Sincerely,

Wendi Secrist
Executive Director

Edward Vasko, CISSP
Director, Institute for Pervasive Cybersecurity
Boise State University

St. Luke's Health System excitedly supports the IGEM Higher Education Research Council (IGEM-HERC) grant proposal submitted by the Institute for Pervasive Cybersecurity entitled "The Cyberdome — An Investment in Idaho's Cybersecurity Future." St. Luke's Health System is eager to see an effort put forward that will reduce risk to State, Local, Tribal, and Territorial (SLTT) organizations, while also producing a "cyber ready" labor pool able to enter the workforce and more efficiently add value to their employers. The proposal is a credit to the vision of the team at Boise State University, and we look forward to strong collaboration between St. Luke's Health System, Boise State, and the other Idaho Universities and Colleges in the fulfillment of the Cyberdome.

St. Luke's is Idaho's largest private employer with nine inpatient facilities and hundreds of clinics primarily located throughout Southwest Idaho. As a not-for-profit health system, St. Luke's is dedicated to improving the health of people in the communities we serve. Cybersecurity is critical to ensure the safe and uninterrupted quality care we are committed to provide.

Cybersecurity is fundamental across scientific, engineering, business, critical infrastructure, and operational environments. The need for efforts such as the Cyberdome, and the objectives it will fulfill, add critical force multiplying efforts where they are needed most while also enabling applied research, technical innovation, and enhancements to tactics, techniques, and procedures.

St. Luke's is committed to our partnership with Boise State and looks forward to continued collaborative efforts around innovative platforms such as the Cyberdome.

Sincerely,

DocuSigned by:
Shawna Hofer
5EBFBDADD2A741F...

Shawna Hofer
Director, Cyber Security
St. Luke's Health System
☎ 208-706-8454
hofersh@slhs.org

ADA COUNTY INFORMATION TECHNOLOGY

TRUST • EMPOWER • COLLABORATE

March 25, 2021

Mr. Edward Vasko
Director, Institute for Pervasive Cybersecurity
Boise State University

Re: Support and Partnership for the Idaho Cyberdome

Mr. Vasko,

Please consider this correspondence Ada County's formal pledge of support and partnership in the creation of the Idaho Cyberdome project, currently being led by yourself through the Institute for Pervasive Cybersecurity at Boise State University.

We have conversed numerous times in the past about how finding and hiring cyber security professionals in Idaho is a very expensive and arduous task for a governmental entity. The pool of local candidates is very shallow in options, while deep in experience; that makes for very expensive hiring and equally difficult retention. When one takes a step and back and looks at the massive threat that cyber is for any governmental entity, it quickly becomes overwhelming as to how to prepare, fund and hire for appropriate defense. The State is in the same boat as the cities and counties in Idaho are, and as a result the State is unable to help beyond a superficial level. When you consider the deeper pockets a place like Ada County has, if we cannot figure out how to prepare, fund and hire appropriately, what of our peer counties or cities across the state with far less money yet same threat landscape? What is missing is actually in two parts: we need someone that can help Idaho government in general learn how to manage, plan and employ cyber defense; in addition, the creation of a feeder system of trained professionals to help fill that employee need we all have is equally essential. Why not attract, educate and create top level cyber professionals right here in Idaho, and then have those folks stay and have great careers in either government or the private sector – again, right here in Idaho? Deepening the pool of candidates will also make it far more affordable for all. And with the Cyberdome, local governments can have a chance of partnering and leveraging each other in what would be a group effort for cyber security. BSU and your efforts I believe are the very beginnings of building something great for students, cyber security as an industry and even Idaho itself. At the same time, you will be helping governments in the state learn how to properly protect themselves from a cyber hygiene point of view, as well as creating a feeder system of professionals who can do that work. I have no idea how else this incredible

possibility could come to fruition, other than to let the local governments in Idaho continue to scrape together what they can and create their own individual cyber security efforts, alone and fragmented. Status quo is not sustainable nor is it safe.

As part of this effort, Ada County plans to participate with you and BSU in the education of new cyber security professionals by not only utilizing your intern programs but by also data sharing our real time, real network data with the Cyberdome. This would give your students actual live network information to learn and study. The added benefit of doing this would be the aggregation of governmental network data to review, find and react to potential threat intelligence across the state, in a near real time basis. A number of peer governments, all sharing threat intelligence into the Cyberdome would be an incredible way to track and counteract attacks that right now only happen to each government alone. A response to a truly bad attack detected through the Cyberdome could be stopped across multiple governments and could also bring resources from peer governments together quickly to help someone recover from an incident.

It is my belief that through your leadership alone and the vision of BSU can Idaho achieve anything like this. Ada County stands ready as a core partner in these efforts. Please reach out to me directly should I be able to do anything to assist getting this all-important concept off the ground.

Sincerely,

Stephen O'Meara

CIO, Ada County Government
Director of Technologies, Ada County Sheriff's Office

March 17, 2021
Higher Education Research Council
Idaho Global Entrepreneurial Mission Initiative
RE: IGEM Higher Education Research Council Grant for the Institute for Pervasive Cybersecurity- "The Cyberdome"

The Idaho Technology Council is the voice from industry to grow innovation and technology in Idaho. We represent approximately 100,000 employees who work for innovative companies across the Gem State. We enthusiastically support the IGEM Higher Education Research Council (IGEM-HERC) grant proposal submitted by the Institute for Pervasive Cybersecurity entitled "The Cyberdome — An Investment in Idaho's Cybersecurity Future." One of the major shifts over the past year with the pandemic, is the increased optimization of data and intellectual and proprietary property. With this increase is the added need for The Cyberdome to help reduce the cyber risks to Idaho organizations and produce a strong cyber labor pool.

The economic development opportunities arising from this proposal certainly align to the state's targeted plans to grow and expand our commercial industry base. The Cyberdome can be used to create opportunities to fulfill open positions across the state while also attracting new cyber employers to the state. The Idaho Technology Council looks forward to strong collaboration between the Institute for Pervasive Cybersecurity, and the other Idaho Universities and Colleges in the fulfillment of the Cyberdome.

Cybersecurity is now fundamental across all our scientific, engineering, business, critical infrastructure, and operational environments. With over 1,500 open positions in the State of Idaho, and over 500,000 open positions nationally, Idaho has an opportunity to do its part in creating a workforce ready to tackle the challenges of the 21st Century. The Cyberdome proposal, with its efforts to enable cybersecurity career seekers with real world experience, accelerates Idaho's ability to provide the best workforce to the State, region, and Nation.

The Idaho Technology Council is committed to our partnership with Boise State University and the other Idaho universities and look forward to continuing essential collaborative efforts around innovative platforms such as the Cyberdome.

Sincerely,

Jay Larsen
Founder and CEO, Idaho Technology Council
jlarsen@idahotechcouncil.org
208-608-0211
877 W. Main Street, Suite 503
Boise, ID 83702

intuit turbotax quickbooks mint

March 20, 2021

Higher Education Research Council
Idaho Global Entrepreneurial Mission Initiative

Dear Committee Members:

This memorandum is written to express – in the strongest possible terms – my support for Boise State University's Cyberdome initiative.

As a senior security professional[1] and former chief information security officer (CISO) too often have I have seen supposedly innovative cybersecurity education initiatives fall well short of expectations. In most cases these failures have occurred due to a lack of (a) realistic foci; (b) truly engaged industry expertise; and/or (c) community focus. Boise State's Cyberdome initiative easily and effectively addresses these pitfalls. Cyberdome's competency-based training focus eschews the typical certificate- or degree-based approach in favor of a hands-on experience which arms participants with the practical needed skills to address today's most vexing cyber challenges. Boise State's continued commitment to engage with industry leaders – to include the creation of its Center for Pervasive Cybersecurity and the hiring of an industry expert to head the organization – ensures that Cyberdome will remain current and relevant with its teachings and offerings.

Of particular note for me is Boise State's focus on all aspects (state, local, tribal, and territorial) of its community. Not only will this holistic focus increase cyber opportunities across the state, but it will also serve to draw underserved/underrepresented populations to the cybersecurity arena – something which we must do if we are to succeed against the plethora of bad actors who would do use harm.

Cyberdome's balanced and collaborative approach resonates deeply with me; I believe it will succeed where like efforts have failed. It has my full support.

Please feel free to contact me if you have questions.

Sincerely

Kim L. Jones CISM, CISSP, M.Sc.
Director, Security Operations
Intuit
(619) 993-9521
Kim_Jones@Intuit.com

[1] See https://www.linkedin.com/in/kimjones-cism/ for my career details.

BOISE METRO CHAMBER

To Whom It May Concern,

The Boise Metro Chamber proudly serves as the region's advocate for a vibrant, prosperous economy and for an outstanding quality of life for our community. With over 1,700 member businesses, we represent 120,000+ employees in the metro area.

The Boise Metro Chamber **supports** Boise State University's efforts to create The Cyberdome and believe it is imperative to making Idaho "Cyberworkforce Ready."

The economic benefits that flow from the worldwide internet include greater access to knowledge, information, goods, and services; yet the internet is safe and secure for users. As the use of technology increases in our businesses and educational system, the concurrent cyberthreats increase proportionally and the need for cybersecurity is increasingly evident.

A collaborative hub that is created for competency-based training, with a mission to reduce risk and produce a cybersecurity workforce, will create techniques and tools to better prepare Idaho's business, technology, and government sectors. This awareness will protect employers and their employees and offer economic value.

We appreciate your consideration of this opportunity, which will help Idaho safely enjoy the benefits of a global and open internet.

Sincerely,

Mat Erpelding
VP, Government and Community Relations
Boise Metro Chamber of Commerce
(208) 472-5237 | merpelding@boisechamber.org

Idaho National Laboratory

March 22, 2021 CCN 249015

Higher Education Research Council
Idaho State Board of Education
Idaho State University
650 West State Street, 3rd Floor
Boise, ID 83702

SUBJECT: Letter of Support for BSU's IGEM Higher Education Research Council Grant Proposal

Dear Members of the Higher Education Research Council:

Idaho National Laboratory (INL) strongly supports the IGEM Higher Education Research Council (IGEM-HERC) grant proposal submitted by the Institute for Pervasive Cybersecurity entitled "The Cyberdome — An Investment in Idaho's Cybersecurity Future."

Located in Idaho Falls, Idaho, and managed by Battelle Energy Alliance, INL is one of the national laboratories of the United States Department of Energy (DOE). The laboratory performs basic and applied research in DOE strategic areas of energy, national security, science and environment, and serve as the nation's leading center for nuclear energy research and development.

INL champions efforts designed to reduce risk to State, Local, Tribal, and Territorial (SLTT) organizations, while also producing a "cyber ready" workforce capable of creating efficiencies and adding value to industry.

Cybersecurity is fundamental across all our scientific, engineering, business, critical infrastructure, and operational environments. The need for efforts such as the Cyberdome, and the objectives it will fulfill, add critical force multiplying efforts where they are needed most while also enabling applied research, technical innovation, and enhancements to tactics, techniques, and procedures.

The proposal and vision put forth by Boise State University, provides opportunities for strong collaboration between INL, Boise State, and the other Idaho Universities and Colleges and the advancement of competency-based learning models and workforce development efforts.

INL is committed to our partnership with Boise State and looks forward to continued collaborative efforts around innovative platforms such as the Cyberdome.

Sincerely,

Zachary D. Tudor, Associate Laboratory Director
National and Homeland Security

EJT:JCR

cc: W. E. Austad, INL
M. T. Bingham, INL
E. J. Taylor, INL

bcc: INL Correspondence Control, email: BEACC@inl.gov
INL Prime Contracts, email: PRIME@inl.gov
Z. D. Tudor Letter File (ZDT-08-21)

Uniform File Code: 0201
Disposition Authority: A16-1.4-a
Retention Schedule: Cut off file annually. Destroy 10 years after cut off

NOTE: Original disposition authority, retention schedule, and Uniform Filing Code applied by the sender may not be appropriate for all recipients. Make adjustments as needed.

PlexTrac

PlexTrac, Inc.
110 Main St.
Boise, ID 83702

www.plextrac.com
(405) 924-7085
linkedin.com/company/plextrac/

MARCH 29, 2021 –PlexTrac enthusiastically supports the IGEM Higher Education Research Council (IGEM-HERC) grant proposal submitted by the Institute for Pervasive Cybersecurity entitled "The Cyberdome — An Investment in Idaho's Cybersecurity Future." PlexTrac is very excited to see an effort put forward that will reduce risk to State, Local, Tribal, and Territorial (SLTT) organizations, while also producing a "cyber ready" labor pool able to enter the workforce and more efficiently add value to their employers. The proposal is a credit to the vision of the team at Boise State University, and we look forward to strong collaboration between PlexTrac, Boise State, and the other Idaho Universities and Colleges in the fulfillment of the Cyberdome.

PlexTrac, Inc. is a fast-growing cybersecurity company driven by a mission to improve the security posture of organizations and security teams of all sizes. The PlexTrac solution is a software platform focused on streamlining the reporting and remediation of cybersecurity risks and aiding efficient collaboration within security teams. Supporting organizations using a purple teaming paradigm, PlexTrac serves as the central communication hub to aggregate all of the components of an organization's cybersecurity program.

Cybersecurity is now fundamental across all our scientific, engineering, business, critical infrastructure, and operational environments. The need for efforts such as the Cyberdome, and the objectives it will fulfill add critical force multiplying efforts where they are needed most while also enabling applied research, technical innovation, and enhancements to tactics, techniques, and procedures

PlexTrac is committed to our partnership with Boise State and looks forward to continued collaborative efforts around innovative platforms such as the Cyberdome.

Sincerely,

Daniel DeCloss
Founder / CEO
PlexTrac, Inc.

1431 Centerpoint Blvd., Suite 150
Knoxville, TN 37932-1984
P: +1 (800) 810-1885
F: (865) 244-3599
www.avertium.com

March 18, 2021

IGEM Higher Education Research Council
C/O Edward Vasko
1910 W University Dr.
Boise, ID 83725

Edward Vasko and The IGEM HERC Team:

Today, we face one of the greatest challenges in the 21st century as we see the fourth industrial revolution taking hold of an always on – always connected society, and the advancement of machines to better our lives. The fundamental gap in cybersecurity skills is at a crisis level with over 1.5 million vacant positions globally and more than 1/3 of these in the United States. This gap is expected to continue to widen, unless we find ways to entice the human element by developing programs that encourage the next generation of cybersecurity professionals. It is essential to the evolution of the world we live in. From protecting our public systems, like utilities, education, and government, to support and protection of the booming and always-on connected world, we know that "connected" cannot evolve without assurance that its protected against the adversary. Specifically, this program's focus will produce a "cyber ready" labor pool able to enter the workforce and more efficiently add value to their employers. Further, this directly helps Boise in leading the charge to reduce cybersecurity risk to State, Local, Tribal, and Territorial (SLTT) organizations.

Avertium enthusiastically supports the IGEM Higher Education Research Council (IGEM-HERC) grant proposal, submitted by the Institute for Pervasive Cybersecurity, entitled "The Cyberdome — An Investment in Idaho's Cybersecurity Future." The proposal is a credit to the vision of the team at Boise State University, and we look forward to strong collaboration between Avertium, Boise State, and the other Idaho Universities and Colleges in the fulfillment of the Cyberdome.

Avertium is the managed security and consulting provider that companies turn to when they want more than check-the-box cybersecurity. In today's threat landscape, your not-so-standard processes, workflows, and vulnerabilities require more than just a standard approach to cybersecurity. You need a smarter, stronger, show-no-weakness approach based on more rigor, more relevance, and more responsiveness. That's why more than 2,500 organizations in every sector from manufacturing to financial services, healthcare to technology and business services to hospitality rely on Avertium's 200+ professionals for their cybersecurity needs.

AVERTIUM

1431 Centerpoint Blvd., Suite 150
Knoxville, TN 37932-1984
P: +1 (800) 810-1885
F: (865) 244-3599
www.avertium.com

Cybersecurity is now fundamental across all our scientific, engineering, business, critical infrastructure, and operational environments. The need for efforts such as the Cyberdome, and the objectives it will fulfill, add critical force multiplying efforts where they are needed most, while also enabling applied research, technical innovation, and enhancements to tactics, techniques, and procedures.

Avertium is committed to our partnership with Boise State and looks forward to continuing collaborative efforts around innovative platforms, such as the Cyberdome.

Sincerely,

Jeff Schmidt

24 March 2021

Edward Vasko, CISSP
Director, Institute for Pervasive Cybersecurity
Boise State University

Dear Mr. Vasko,

The purpose of this letter is to express Blue Ridge Networks' support of the Boise State University Institute for Pervasive Cybersecurity and it's Cyberdome initiative. At Blue Ridge Networks, our cybersecurity solutions have been trusted by numerous US agencies and top companies to prevent exploits of operations that simply cannot tolerate exposure to cybersecurity breaches. With over 20 years of faithful service protecting our customers' critical operations, Blue Ridge Networks is acutely aware of the needs of state/local entities and of the cybersecurity challenges they face. Education, validation, and documented architectures are critical to your communities' abilities to survive today's cyber threat landscape.

Blue Ridge Networks, Inc. enthusiastically supports the IGEM Higher Education Research Council (IGEM-HERC) grant proposal submitted by the Institute for Pervasive Cybersecurity entitled "The Cyberdome — An Investment in Idaho's Cybersecurity Future." Blue Ridge Networks is very excited to see an effort put forward that will reduce risk to State, Local, Tribal, and Territorial (SLTT) organizations, while also producing a "cyber ready" labor pool able to enter the workforce and more efficiently add value to their employers. The economic development opportunities arising from this proposal unquestionably align to the state's targeted plans to grow/expand your commercial industry base. Further, the Cyberdome can be used to create opportunities to fulfill open positions across the state while also attracting new cyber employers to the state. We look forward to strong collaboration between Blue Ridge Networks, the Institute for Pervasive Cybersecurity, and the other Idaho Universities and Colleges in the fulfillment and lifecycle of the Cyberdome.

An appropriately trained cybersecurity workforce is critical to the protection of our critical data and infrastructure across the state, and around the nation. With over 1,500 open positions in the State of Idaho alone, and over 500,000 open positions nationally, Idaho has an opportunity to do its part in creating a workforce ready to tackle the challenges of the 21st Century. The Cyberdome proposal, with its efforts to enable cybersecurity career seekers with real world experience, accelerates Idaho's ability to provide the best workforce to the State, region, and Nation.

Cybersecurity is now fundamental across all scientific, engineering, business, critical infrastructure, and operational environments. The need for efforts such as the Cyberdome, and the objectives it will fulfill add critical force multiplying efforts where they are needed most while also enabling applied research, technical innovation, and enhancements to tactics, techniques, and procedures

Blue Ridge Networks is committed to a successful partnership with Boise State and we look forward to continuing collaborative efforts around innovative platforms such as the Cyberdome and beyond.

Sincerely,

Mark B Webber

Mark B Webber
VP of Sales
Blue Ridge Networks, Inc.

March 15, 2021

IGEM Higher Education Research Council Recipient

RE: Institute for Pervasive Cybersecurity IGEM Higher Education Research Council (IGEM-HERC) grant proposal

IGEM Higher Education Research Council Recipient:

The North American Cyber Range Alliance (NACRA) enthusiastically supports the IGEM Higher Education Research Council (IGEM-HERC) grant proposal submitted by the Institute for Pervasive Cybersecurity entitled "The Cyberdome — An Investment in Idaho's Cybersecurity Future." NACRA is very excited to see an effort put forward that will reduce risk to State, Local, Tribal, and Territorial (SLTT) organizations, while also producing a "cyber ready" labor pool able to enter the workforce and more efficiently add value to their employers. The proposal is a credit to the vision of the team at Boise State University and Edward Vasko (the proposal's PI), and we look forward to strong collaboration between NACRA, Boise State, and the other Idaho Universities and Colleges in the fulfillment of the Cyberdome.

An Arizona Cyber Threat Response Alliance (ACTRA) initiative developed in collaboration with the NACRA Alliance Participants aims to strengthen US cyber defenses by answering the growing number of cyber threats by increasing the number of trusted and well-trained cyber operatives in the US. NACRA does this by developing an alliance of like-minded cyber ranges which adopt a uniform code of conduct and commit to collaboration for the common good. The Alliance promotes cyber range autonomy at the local level foster individual creativity, ensure unique workforce- and economic development needs are met, and it promotes close collaboration between NACRA ranges to defend US interests in cyberspace, and neutralize adversarial threats responsibly.

Cybersecurity is now fundamental across all our scientific, engineering, business, critical infrastructure, and operational environments. The need for efforts such as the Cyberdome, and the objectives it will fulfill add critical force multiplying efforts where they are needed most while also enabling applied research, technical innovation, and enhancements to tactics, techniques, and procedures.

NACRA is committed to our partnership with Boise State and looks forward to continuing collaborative efforts around innovative platforms such as the Cyberdome.

Sincerely,

Frank J. Grimmelmann
President & CEO
Arizona Cyber Threat Response Alliance, Inc. (ACTRA)

Wholly-independent but conceived with FBI InfraGard Program
Co-Chair Governor Ducey's Arizona Cybersecurity Team
Co-Chair Greater Phoenix Chamber Cybersecurity Workforce Collaborative
Board Member, National Council of Registered ISAO (NCRI)

To:

State Board of Education
Higher Education Research Council
Idaho Global Entrepreneurial Mission Initiative

To whom it may concern:

If the proposal submitted by **Edward Vasko** entitled, "Idaho's Cybersecurity Future: A Collaborative Education & Workforce Development Initiative" is selected for funding by IGEM-HERC, it is my intent to collaborate as detailed in the proposal.

On behalf of the Boise State Hazard and Climate Resilience Institute (HCRI), I also commit to offering presentations and/or a 1 credit classes to students in the Cybersecurity and Resilience degree program that provides a holistic perspective on community resilience, emphasizing how cybersecurity is essential to strengthening institutions and critical infrastructure.

Sincerely,

Brittany D Brand

Brittany D Brand, Ph.D. 3/24/2021
Associate Professor
Director for the Boise State Hazard and Climate Resilience Institute
Department of Geosciences

Budget Model: Year 1

IGEM-HERC SUMMARY PROPOSAL BUDGET				
Name of Institution: Boise State University				
Name of Project Director: Edward Vasko, CISSP				
A. PERSONNEL COST (Faculty, Staff, Visiting Professors, Post-Doctoral Associates, Graduate/Undergraduate Students, Other) Name/ Title		Salary/Rate of Pay	Fringe	Dollar Amount Requested
PI: Edward Vasko, CISSP (35 hours / month; 20% of annual time; 3% increase in years 2 and 3)		$11,589 / month	30%	$36,156.00
Faculty Co-PI: Dr. Amit Jain (62 hours / year; 3% increase in years 2 and 3)		$14,677 / month	28%	$9,018.00
Faculty Co-PI: Dr. Sin Ming Loo (100 hours / year; 3% increase in years 2 and 3)		$13,504 / month	31%	$10,349.00
Faculty Co-PI: Dr. Francesca Spezzano (100 hours / year; 3% increase in years 2 and 3)		$11,607 / month	33%	$9,031.00
Faculty Co-PI: Dr. Edoardo Serra (100 hours / year; 3% increase in years 2 and 3)		$11,607 / month	33%	$9,031.00
Faculty Co-PI: Dr. Jidong Xiao (100 hours / year; 3% increase in years 2 and 3)		$11,224 / month	34%	$8,798.00
Ph.D. student, Graduate Assistants, 3 students, calendar year. Fringe benefits include $3,372 for health insurance in year 1 with a 5% estimated increase in years 2 and 3; includes Graduate Student Fee Remission; academic year and six summer credits.		$41,000 / student	7% plus health insurance	$123,272.00
Staff: TBH / Cyberdome Manager (Full-time resource)		$6,583.00 / month	35%	$109,020.00
Staff: TBH / Cyberdome Lead (Full-time resource)		$5,750.00 / month	37%	$96,600.00
Undergraduate Students (Two cohorts of 14 students / 6-month period for 28 total students / year @ 20 hours / week. This equates to 7 full-time staff / year; increases in years 2 and 3)		$12.50 / hour	7%	$198,225.00
% OF TOTAL BUDGET: Annual Budget / Total Budget	87% / 88%		SUBTOTAL:	$609,500.00

B. EQUIPMENT: (List each item with a cost in excess of $1000.00.) Item/Description	Dollar Amount Requested
Hardware (log collection server) (Assumption: 5 clients; annual cost per client = $4,000.00; 20% support cost in years 2 and 3); Estimated hardware: Dell PowerEdge R640 Rack Server; 32GB RAM; 1TB RAID 5	$20,000.00
Software tools (forensic tools) (Assumption: 5 clients; annual cost per client = $900.00; 20% support cost in years 2 and 3)	$4,500.00
AWS Cloud Subscription (Assumption: 5 clients; annual cost per client = $8,400.00; 10% annual increase / year)	$42,000.00
AWS Cloud Storage (Assumption: 5 clients; annual cost per client = $3,000.00; 10% annual increase / year)	$15,000.00
Ticketing Software Subscriptions (Assumption: 5 clients; annual cost per client = $1,800.00; 10% annual increase / year)	$9,000.00
SUBTOTAL:	$90,500.00

C. TRAVEL: Dates of Travel (from/to)	No. of Persons	Total Days	Transportation	Lodging	Per Diem	Dollar Amount Requested
					SUBTOTAL:	$0.00

D. Participant Support Costs:	Dollar Amount Requested
SUBTOTAL:	$0.00

E. Other Direct Costs: Requested	Dollar Amount
SUBTOTAL:	$0.00
F. Total Costs: (Add subtotals, sections A through E) TOTAL:	$700,000.00

G. Amount Requested (Year 1):	TOTAL:	$700,000.00
Project Director's Signature: 	Date: March 31, 2021	

Budget Model: Year 2

IGEM-HERC SUMMARY PROPOSAL BUDGET (YEAR 2)

Name of Institution: Boise State University

Name of Project Director: Edward Vasko, CISSP

A. PERSONNEL COST (Faculty, Staff, Visiting Professors, Post-Doctoral Associates, Graduate/Undergraduate Students, Other)

Name/ Title	Salary/Rate of Pay	Fringe	Dollar Amount Requested
PI: Edward Vasko, CISSP (35 hours / month; 20% of annual time; 3% increase in years 2 and 3)	$11,936.26 / month	30%	$37,241.00
Faculty Co-PI: Dr. Amit Jain (62 hours / year; 3% increase in years 2 and 3)	$15,117.54 / month	28%	$9,288.00
Faculty Co-PI: Dr. Sin Ming Loo (100 hours / year; 3% increase in years 2 and 3)	$13,909.39 / month	31%	$10,659.00
Faculty Co-PI: Dr. Francesca Spezzano (100 hours / year; 3% increase in years 2 and 3)	$11,955.26 / month	33%	$9,302.00
Faculty Co-PI: Dr. Edoardo Serra (100 hours / year; 3% increase in years 2 and 3)	$11,955.26 / month	33%	$9,302.00
Faculty Co-PI: Dr. Jidong Xiao (100 hours / year; 3% increase in years 2 and 3)	$11,560.51 / month	34%	$9,062.00
Graduate Assistants, 3 students, calendar year. Fringe benefits include $3,372 for health insurance in year 1 with a 5% estimated increase in years 2 and 3)	$41,773.53 / student	7% plus health insurance	$125,321.00
Staff: TBH / Cyberdome Manager (Full-time resource; 3% increase in years 2 and 3)	$6,780.83 / month	35%	$112,291.00
Staff: TBH / Cyberdome Lead (Full-time resource; 3% increase in years 2 and 3)	$5,922.50 / month	37%	$99,498.00
Undergraduate Students (Two cohorts of 14 students / 6-month period for 28 total students / year @ 20 hours / week. This equates to 7 full-time staff / year; increases in years 2 and 3)	$12.88 / hour	7%	$200,536.00

% OF TOTAL BUDGET: Annual Budget / Total Budget	89% / 88%	SUBTOTAL:	$622,500.00

B. EQUIPMENT: (List each item with a cost in excess of $1000.00.) Item/Description

	Dollar Amount Requested
Hardware (log collection server) (Assumption: 5 clients; annual cost per client = $4,000.00; 20% support cost in years 2 and 3)	$4,000.00
Software tools (forensic tools) (Assumption: 5 clients; annual cost per client = $900.00; 20% support cost in years 2 and 3)	$900.00
AWS Cloud Subscription (Assumption: 5 clients; annual cost per client = $8,400.00; 10% annual increase / year)	$46,200.00
AWS Cloud Storage (Assumption: 5 clients; annual cost per client = $3,000.00; 10% annual increase / year)	$16,500.00
Ticketing Software Subscriptions (Assumption: 5 clients; annual cost per client = $1,800.00; 10% annual increase / year)	$9,900.00
SUBTOTAL:	$77,500.00

C. TRAVEL: Dates of Travel (from/to) | No. of Persons | Total Days | Transportation | Lodging | Per Diem | Dollar Amount Requested

					SUBTOTAL:	$0.00

D. Participant Support Costs:	Dollar Amount Requested
SUBTOTAL:	$0.00

E. Other Direct Costs:	Dollar Amount Requested
SUBTOTAL:	$0.00

F. Total Costs: (Add subtotals, sections A through E) TOTAL:	$700,000.00

G. Amount Requested: TOTAL:	$700,000.00

Project Director's Signature:	Date: March 31, 2021

Budget Model: Year 3

IGEM-HERC SUMMARY PROPOSAL BUDGET (YEAR 3)

Name of Institution: Boise State University

Name of Project Director: Edward Vasko, CISSP

A. PERSONNEL COST (Faculty, Staff, Visiting Professors, Post-Doctoral Associates, Graduate/Undergraduate Students, Other)

Name/ Title	Salary/Rate of Pay	Fringe	Dollar Amount Requested
PI: Edward Vasko, CISSP (35 hours / month; 20% of annual time; 3% increase in years 2 and 3)	$12,294.34 / month	30%	$38,358.00
Faculty Co-PI: Dr. Amit Jain (62 hours / year; 3% increase in years 2 and 3)	$15,571.07 / month	28%	$9,567.00
Faculty Co-PI: Dr. Sin Ming Loo (100 hours / year; 3% increase in years 2 and 3)	$14,326.67 / month	31%	$10,979.00
Faculty Co-PI: Dr. Francesca Spezzano (100 hours / year; 3% increase in years 2 and 3)	$12,313.92 / month	33%	$9,581.00
Faculty Co-PI: Dr. Edoardo Serra (100 hours / year; 3% increase in years 2 and 3)	$12,313.92 / month	33%	$9,581.00
Faculty Co-PI: Dr. Jidong Xiao (100 hours / year; 3% increase in years 2 and 3)	$11,907.32 / month	34%	$9,334.00
Ph.D. student, Graduate Assistants, 3 students, calendar year. Fringe benefits include $3,372 for health insurance in year 1 with a 5% estimated increase in years 2 and 3	$42,490.70 / student	7% plus health insurance	$127,472.00
Staff: TBH / Cyberdome Manager (Full-time resource)	$6,984.26 / month	35%	$115,659.00
Staff: TBH / Cyberdome Lead (Full-time resource)	$6,100.18 / month	37%	$102,483.00
Undergraduate Students (Two cohorts of 14 students / 6-month period for 28 total students / year @ 20 hours / week. This equates to 7 full-time staff / year; increase in years 2 and 3)	$13.26 / hour	7%	$182,225.00
% OF TOTAL BUDGET: 28.85%		SUBTOTAL:	$615,240.00

B. EQUIPMENT: (List each item with a cost in excess of $1000.00.) Item/Description	Dollar Amount Requested
Hardware (log collection server) (Assumption: 5 clients; annual cost per client = $4,000.00; 20% support cost in years 2 and 3)	$4,000.00
Software tools (forensic tools) (Assumption: 5 clients; annual cost per client = $900.00; 20% support cost in years 2 and 3)	$900.00
AWS Cloud Subscription (Assumption: 5 clients; annual cost per client = $8,400.00)	$50,820.00
AWS Cloud Storage (Assumption: 5 clients; annual cost per client = $3,000.00)	$18,150.00
Ticketing Software Subscriptions (Assumption: 5 clients; annual cost per client = $1,800.00)	$10,890.00
SUBTOTAL:	$84,760.00

C. TRAVEL: Dates of Travel (from/to)	No. of Persons	Total Days	Transportation	Lodging	Per Diem	Dollar Amount Requested
SUBTOTAL:						$0.00

D. Participant Support Costs:	Dollar Amount Requested
SUBTOTAL:	$0.00

E. Other Direct Costs:	Dollar Amount Requested
SUBTOTAL:	$0.00

F. Total Costs: (Add subtotals, sections A through E)	TOTAL:	$700,000.00

G. Amount Requested:	TOTAL:	$700,000.00

Project Director's Signature:	Date: March 31, 2021

Certificate Of Completion

Envelope Id: EA61731B80E340E6BA3330919B0D2F0C
Status: Completed
Subject: Urgent Please DocuSign: 9922 Cyberdome IGEM-HERC Proposal
Source Envelope:
Document Pages: 72
Signatures: 5
Certificate Pages: 5
Initials: 0
AutoNav: Enabled
EnvelopeId Stamping: Enabled
Time Zone: (UTC-07:00) Mountain Time (US & Canada)

Envelope Originator:
Cara Greenlee
1910 University Dr.
Boise, ID 83725
caragreenlee@boisestate.edu
IP Address: 132.178.207.22

Record Tracking

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caragreenlee@boisestate.edu
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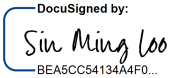
Signer Events	Signature	Timestamp
Amit Jain ajain@boisestate.edu Security Level: Email, Account Authentication (None)	DocuSigned by: Amit Jain 5105A7B3E83049B... Signature Adoption: Pre-selected Style Using IP Address: 65.129.66.222	Sent: 3/31/2021 10:12:24 AM Viewed: 3/31/2021 10:29:47 AM Signed: 3/31/2021 10:30:02 AM
Electronic Record and Signature Disclosure: Accepted: 3/31/2021 10:29:47 AM ID: 343ed0b8-ef71-4387-a24f-4e35917f0c75		
Edoardo Serra edoardoserra@boisestate.edu Security Level: Email, Account Authentication (None)	DocuSigned by: 3292AFFF57924D5... Signature Adoption: Drawn on Device Using IP Address: 174.27.80.186 Signed using mobile	Sent: 3/31/2021 10:12:25 AM Viewed: 3/31/2021 10:23:06 AM Signed: 3/31/2021 10:24:02 AM
Electronic Record and Signature Disclosure: Accepted: 3/31/2021 10:23:06 AM ID: fbaf5257-cb3f-484e-a993-06910c74b89f		
Francesca Spezzano francescaspezzano@boisestate.edu Security Level: Email, Account Authentication (None)	DocuSigned by: Francesca Spezzano D6957F53CD9B47D... Signature Adoption: Pre-selected Style Using IP Address: 174.27.80.186	Sent: 3/31/2021 10:12:24 AM Viewed: 3/31/2021 10:44:39 AM Signed: 3/31/2021 10:45:20 AM
Electronic Record and Signature Disclosure: Accepted: 3/31/2021 10:44:39 AM ID: 9367f0e8-e80e-4aac-8edf-a7cbb827928c		
Jidong Xiao jidongxiao@boisestate.edu Security Level: Email, Account Authentication (None)	DocuSigned by: Jidong Xiao B99E22BEC8A74C3... Signature Adoption: Pre-selected Style Using IP Address: 174.204.22.210	Sent: 3/31/2021 10:12:25 AM Viewed: 3/31/2021 11:16:42 AM Signed: 3/31/2021 11:17:16 AM
Electronic Record and Signature Disclosure: Accepted: 3/31/2021 11:16:42 AM ID: 39d32956-8976-43ed-8b9d-44d85a6f4f6f		

Signer Events	Signature	Timestamp
Sin Ming Loo smloo@boisestate.edu Security Level: Email, Account Authentication (None)	DocuSigned by:  BEA5CC54134A4F0... Signature Adoption: Pre-selected Style Using IP Address: 132.178.207.19	Sent: 3/31/2021 10:12:24 AM Viewed: 3/31/2021 10:20:28 AM Signed: 3/31/2021 10:21:28 AM
Electronic Record and Signature Disclosure: Accepted: 3/31/2021 10:20:28 AM ID: 01d7b89a-6f6b-43ae-8b58-6bfeb477413f		

In Person Signer Events	Signature	Timestamp

Editor Delivery Events	Status	Timestamp

Agent Delivery Events	Status	Timestamp

Intermediary Delivery Events	Status	Timestamp

Certified Delivery Events	Status	Timestamp

Carbon Copy Events	Status	Timestamp
Cruz Gallegos cruzgallegos@boisestate.edu Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign	COPIED	Sent: 3/31/2021 10:12:26 AM Viewed: 3/31/2021 11:28:48 AM
Edward Vasko edwardvasko@boisestate.edu Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign	COPIED	Sent: 3/31/2021 10:12:26 AM Viewed: 3/31/2021 10:25:24 AM

Witness Events	Signature	Timestamp

Notary Events	Signature	Timestamp

Envelope Summary Events	Status	Timestamps
Envelope Sent	Hashed/Encrypted	3/31/2021 10:12:26 AM
Certified Delivered	Security Checked	3/31/2021 10:20:28 AM
Signing Complete	Security Checked	3/31/2021 10:21:28 AM
Completed	Security Checked	3/31/2021 11:17:16 AM

Payment Events	Status	Timestamps

Electronic Record and Signature Disclosure

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