Elizabeth Leake

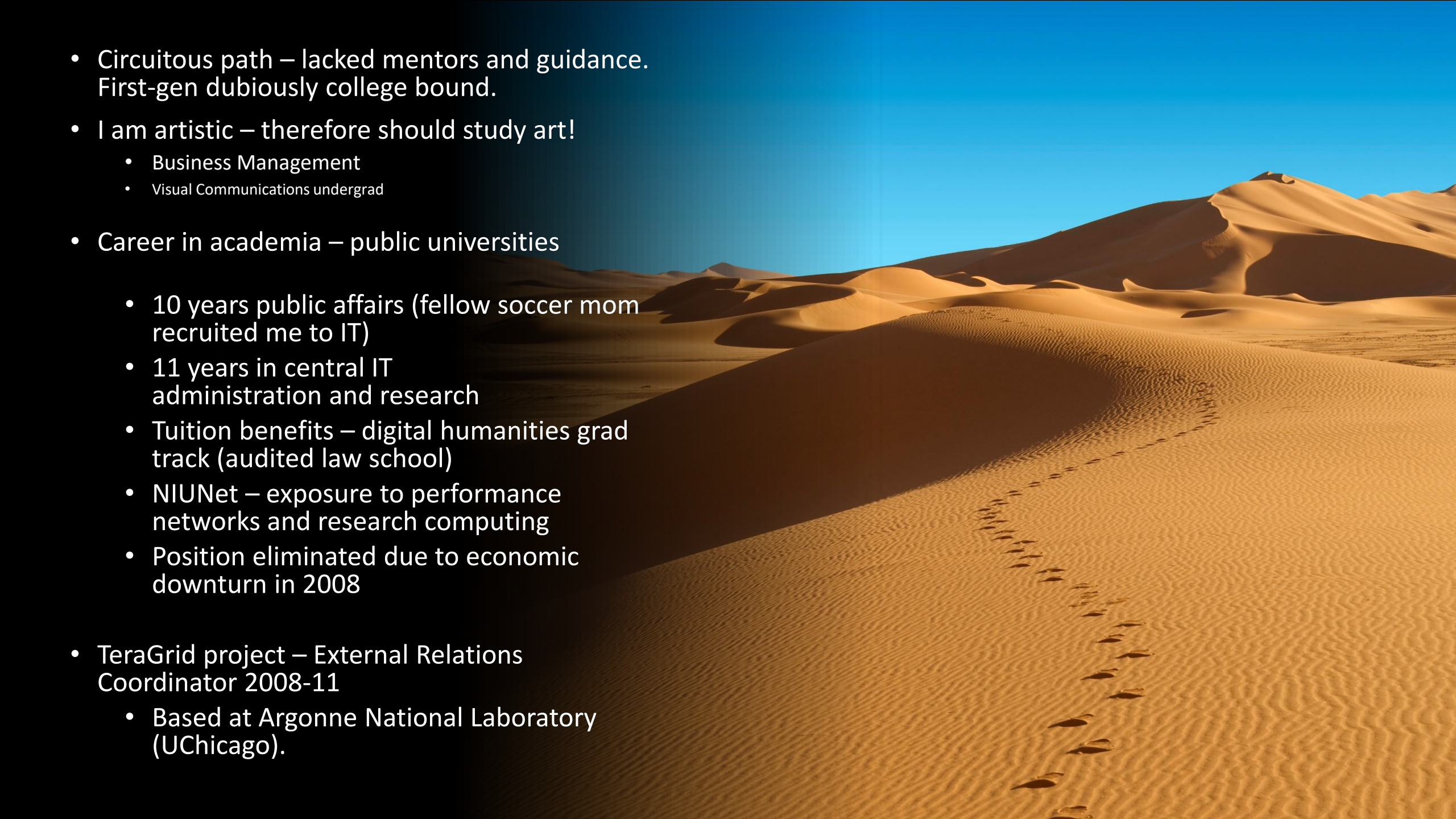
STEM-Trek Nonprofit

Founder and Director

Director, Research Computing
Boise State University

BOISE STATE UNIVERSITY


BARNUM'S ANIMALS



- Circuitous path – lacked mentors and guidance. First-gen dubiously college bound.
- I am artistic – therefore should study art!
  - Business Management
  - Visual Communications undergrad
- Career in academia – public universities
  - 10 years public affairs (fellow soccer mom recruited me to IT)
  - 11 years in central IT administration and research
  - Tuition benefits – digital humanities grad track (audited law school)
  - NIUNet – exposure to performance networks and research computing
  - Position eliminated due to economic downturn in 2008
- TeraGrid project – External Relations Coordinator 2008-11
  - Based at Argonne National Laboratory (UChicago).

- TeraGrid ended in July 2011 –
  - My mother passed away in August
  - The year prior to her death required 24x7 constant care – I was traveling about 50 percent for work and at her house every available weekend.
    - Caregiver problems – drug-seekers
- Designated daughter – siblings had to work.
  - Prepared her 100+ year old house for sale; Fixed foundation/cleared outbuilding and basement
  - Delayed job search/stalled career trajectory

What to do with myself?

- My children were grown & married; parents were gone.
- I wanted to stay engaged with CI, but I didn’t want to risk unemployment every five years – grant lifecycle = duration of hardware warranty.
- By then, the NSF federated follow-on project was awarded (UChicago lost the bid), and the external relations effort was reassigned to a new team.

My assets…

- I didn’t inherit much money.
  - I fixed my garage roof and bought a new bicycle.
- Intellectual curiosity, creativity and resourcefulness.
- Social capital; 20k of the world’s smartest people.
  - As TeraGrid’s US agency and international liaison, I gathered a lot of moss.
  - Corresponded for several global CI projects.
  - Contributing editor for HPCwire, InsideHPC, ScienceNode (iSGTW), and CERN’s GridCast.

What brings me joy?

- People, science and technology
- Helping others
  - Mentoring
  - Training
  - Scholarly Travel
  - Broader engagement
- Breaking cultural barriers to find talent

STEM∞TREK

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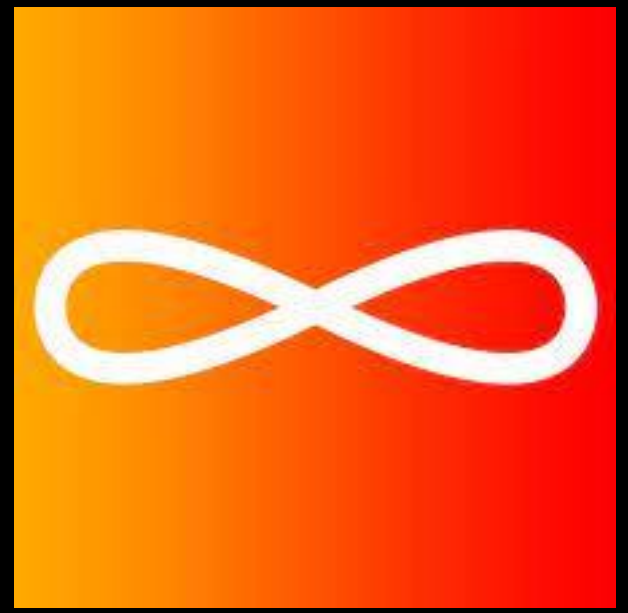
Global, grassroots and going places!

Travel and professional development for science, technology, engineering and mathematics scholars.

Communities Served



- Veterans
- People with disabilities
- Workforce displaced by automation
- People in resource constrained regions
- HPC-curious domain scientists and engineers
- Demographics that are under-represented in RCD academics and careers

- Infinity sign – we encourage beneficiaries to pay-it-forward

PureButtons.com; Standoutstickers.com

My son designed the website and logo!

Organizational framework

501.c.3 nonprofit organization (tax exempt; donations are deductible).

Virtual - No bricks or mortar

No salaries – 100 percent volunteer effort

- I drive it in my spare time

$50k cap on currency donations

The house charges 20 percent (post office box, web hosting, legal and software costs – orphan requests)

- Most donations are in-kind, products or services

Interim gigs increased social capital in new and exciting directions (20k+)

U-Wisconsin at Milwaukee – UITS/Research Computing Comms

Gates Foundation HarvestChoice Project (food security)

CGIAR Platform for Big Data in Agriculture

University of Iowa – Research Support Specialist, Iowa Informatics Initiative; Center for Global and Regional Environmental Research

Tabor Communications (managed awards for HPCwire and Datanami)

International engagement

- European Grid Infrastructure (EGEE/EGI) 2008-12
- Partnership for Advanced Computing in Europe (EU/US activities) 2008-2011
- South African Centre for High Performance Computing 2012-2019 (hopeful to return post covid)
- Southern African Development Community (SADC) HPC Forum 2012-2019 (hopeful to return post covid)
- International Data Week (IDW18) Gaborone, Botswana
- ISC Frankfurt, Germany 2015-19
- SADC Women in STEM, Mbabane, Eswatini (2017 and 2019)
- HPCKM Barcelona 2018
- M3HPC Ghaziabad, India 2020
- Judge – ISC Student Cluster Competition 2019 to present
- Judge – Winter Classic SCC 2020
- IndySCC@SC21 and 22 Adviser

Conference planning

- SC 2008-present – committee work or pre-conference workshops. SC14 Broader Engagement co-chair. Doctoral Showcase committee.
- TeraGrid, XEDE and PEARC since 2008 – Communications, student program committee co-chair, more.
- ISC12-19 – international correspondent

Developing a “Diversity Directory” – scraping LinkedIn network to help conference planners find speakers (gender, race, geography, domain, years of service).

STEM-Trek - Financial Flexibility

Lessons learned from working 20+ years in higher education and US agency-funded projects – processes are fraught with economic biases and social inhibitors.

- People from marginalized communities often lack credit, or are unbanked.

STEM-Trek can:

- Purchase flights on their behalf.
- Provide our credit card hold for incidentals.
- Pre-award funds for travel.
- Cover lost wages and dependent care costs.
- Offer ‘pocket money’ cash for social activities after hours.
- Purchase alcohol.

2012 wrote to Happy Sithole, Director of the South African Centre for HPC…

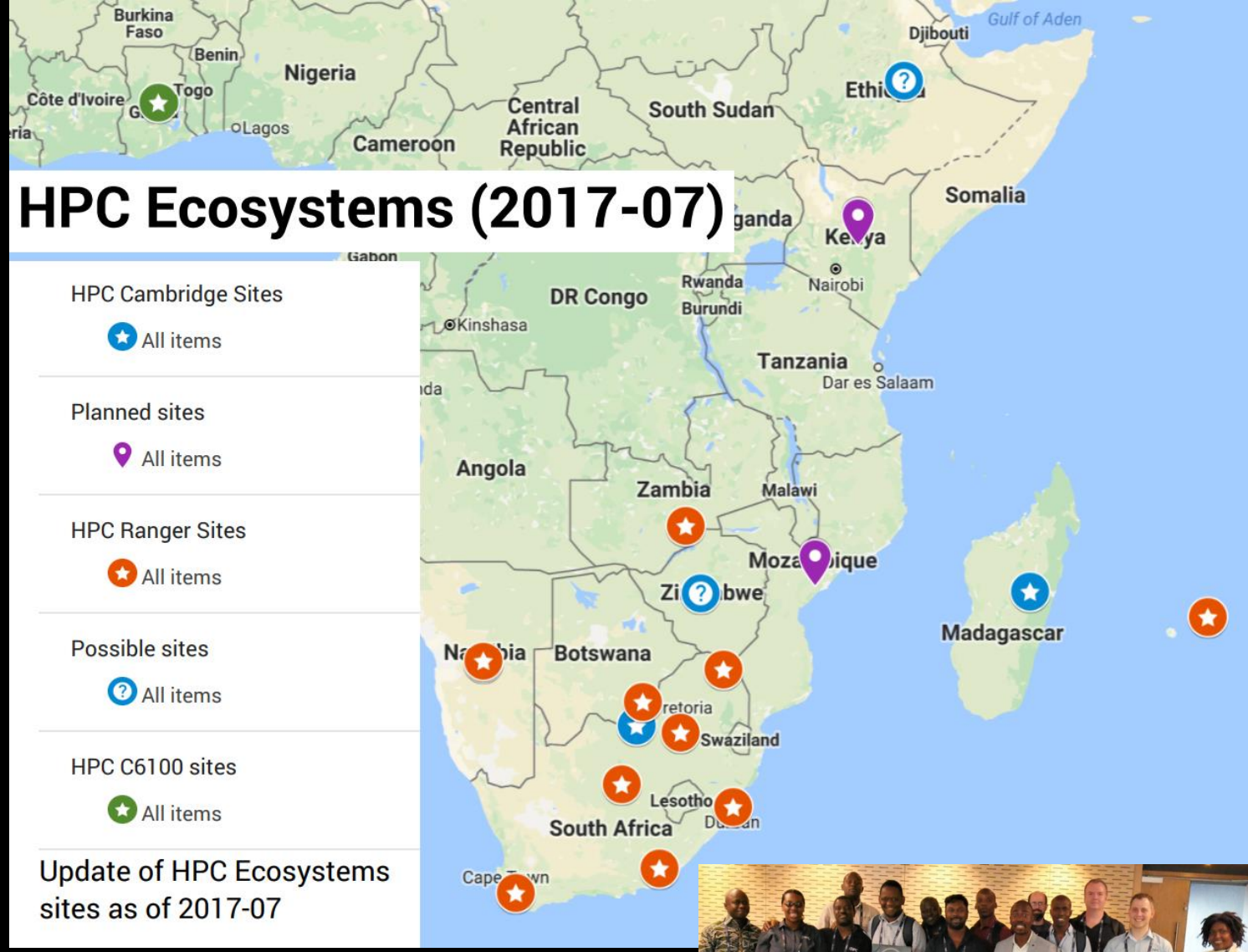
- Events that led me to South Africa:
  - Noted network growth to support Square Kilometer Array – sad that the US wasn't among 13 participating countries.
  - US-NSF investment/global instrumentation and network infrastructure valuable to the global astro community (but it wouldn't hurt to have a US correspondent chronicle SKA outcomes on behalf of CHPC).
  - CHPC National Meeting in December
  - Happy Sithole invitation – have been corresponding each year since, except 2020/21 due to covid.

African HPC Ecosystems Project started in 2012 with a donation from the Texas Advanced Computing Center. Their (NSF) decommissioned “Ranger” system was split into several small clusters that were placed in centers throughout southern Africa.

The systems have been useful in training RCD skills and the inter-federated CI has been an important diplomatic effort that supports research of importance to global stakeholders (food insecurity; climate change; drought and extreme weather – food, water and energy nexus).

Training program is led by the SA Centre for HPC in Cape Town. Online training model was put in place long before COVID, but fewer have internet access at home.

Square Kilometre Array project in the Karoo region of South Africa has been a driver.



SADC Advising led to other opportunities

- Southern African Development Community – 17 member states
- Botswana IDA18
- Botswana ICICIS 2019
- Eswatini 2018-19 (Nursing and K-12 Education)

Right top: Eswatini Women in STEM meeting 2019.

Right bottom: U-Iowa Nursing Study Abroad program in Eswatini led by Anita Nicholson (Associate Dean). Creating a culture of access to care (uiowa.edu)

CODATA

WORLD DATA SYSTEM

UNIVERSITY of BOTSWANA

RDA RESEARCH DATA ALLIANCE

ASSAf

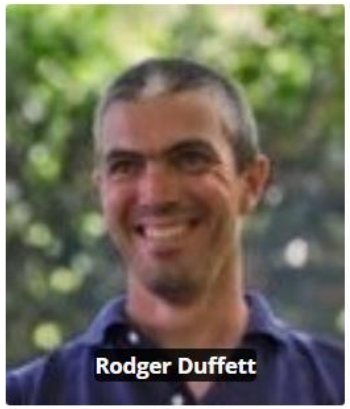
INTERNATIONAL DATA WEEK – IDW 2018

Time: 8:30am
Date: 05th to 08th November 2018
Venue: Gaborone International Conference Centre (GICC)

KEYNOTE ADDRESS AND OFFICIAL OPENING by His Excellency, the President of the Republic of Botswana, Dr. Mokgweetsi Eric Keabetswe Masisi.

THEME: "DIGITAL FRONTIERS OF GLOBAL SCIENCE"

Planning Committee



Committee: Chair: Jane Wyngaard (Notre Dame/RDA), Lindsay Barbieri (University of Vermont), Rodger Duffett (Climate System Analysis Group-CSAG, South Africa), Elizabeth Leake (STEM-Trek), Tshiamo Motshegwa (U-Botswana), Kagiso Sematho (DataLabs), Lillian Okui (DataLabs), and Don Sullivan (NASA Airborne Science Program).

#DRONES 4GOOD @IDW18 - Botswana

Photo: African Fish Eagle from Owen Deutsch Photography: [African Fish Eagle | Bird Call | Owen Deutsch Photography]

Watch STEM-Trek.org for an invitation to apply for EarthSci@SC22 in Dallas, November 10-18

Tale of two scholars

Privileged

- Has a campus job that offers paid release time to attend workshops and conferences.
  - More likely to get a full-time job at the U once they graduate.
- Has a credit card and can purchase flight/can wait to be reimbursed later up to 30 days without going hungry or failing to pay rent.
- Has a savings account that can be tapped if necessary.
- Less likely to have dependents.
- Progress quicker through degree programs – start earning quicker and realize an exponentially greater lifetime of benefits for this reason.
- Because privileged youths see few non-privileged in leadership positions, they grow up believing that they aren't as capable – and the cycle continues.

Marginalized

- Few opportunities – conference attendance offered to privileged counterparts. They're bypassed.
- Will lose two weeks' wages in order to attend a conference. They live paycheck to paycheck.
- More likely to care for family – lacks dependent care coverage.
- No credit, or bad credit. May not have bank where they can apply for a loan.
- Stuck in the grad track for years and years – indentured servitude to the university while they pay off student debt
  - (SADC; not South Africa though – many positive female role models in academic research and leadership positions in SA).

GPA is not an indication of aptitude

- Some travel for hours to get to school
- Fewer marginalized communities have access to the internet at home
- Common practice of ‘load-shedding’ where the power is cut for hours at a time on a regular basis – difficult to study after chores.
  - They may have to haul water from a creek to serve their household needs.
- More likely to be care for family (AIDS/HIV 1/3 of adults in some places – more than half of children are orphaned or at risk – they must care for adults and tend the farms; typically girls are tasked with this burden.
- Transactional sex – girls sell themselves for SIM cards to buy agricultural inputs, healthcare, education, etc. Poorest communities. Trafficking is common.

Lessons learned from Zooming…

- PEARC20, 21 and 22 (Co-Chair 20-21) –
  - Majority of students were completely checked out by PEARC21 – didn’t show up, didn’t engage, etc.
  - SC21 was a full hybrid. This was extremely costly and complex to execute. Much of the effort was transferred to students who did a great job but missed out on the conference because they were working. Kudos to Jay Lofstead (Sandia National Labs), Jenett Tillotson (NCAR), Alana Romanella (UC-Boulder), the rest of our committee and all students for managing what will likely go on record as the most complex to manage.
  - PEARC22 was better – less demanding for students and they were engaged. Boston was fun, but EXPENSIVE! Providers are trying to make up for lost time – they charge for everything ($80 for electrical outlets to be turned on).

More lessons learned…

- More came out – some pursued gender reassignment surgery.
  - We're now more mindful of preferred pronouns.
- One PEARC20-21 student attendee was especially attentive (when others checked out).
  - I investigated why this might be by connecting with her on social media.
  - Virtual formats make it possible for those who are ill or mobility impaired to participate. Those who are immunocompromised should not travel.
    - Conferences resist making recorded content available after the conference. SC21 was only available through January, and then only high-level talks.
    - It would be useful to create a registration category for those who can't travel and that would benefit from having access to the recorded content long after the event is over.
    - Synchronous streaming is difficult to manage, costly and limiting for those in disparate time zones.

A Man Cannoli Hope…

- We are not meant to be isolated –
  even those who self-identify as introverts!
  - People we meet at conferences are more important than tech skills - obsolete in five years; human relationships can last a lifetime.
    - John Gustafson - Isango
- PEARC22 – Samuel and Lucille's story…
  - The importance of risk-taking in love and life.

My new chapter…

- As I mentioned, I keep a day job.
- I have been searching for one that is supportive of my research interests and appreciates my extracurricular pursuits (STEM-Trek, conference planning, speaking, etc.).
  - I authored several awesome projects at U-Iowa that stalled when the UI3 program (Iowa Informatics Initiative) was cancelled.
  - Tired of the gig culture – I need stability and WFH flexibility.

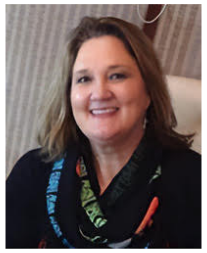
Director of Research Computing?

- I told the person who posted the ad for Boise State University, “I wish I were qualified!” He encouraged me to apply, and voila! I began working at BSU (remotely until August) on January 23.

RESEARCH COMPUTING

OIT welcomes new research computing director Elizabeth Leake

January 27, 2022



The Office of Information Technology is pleased to welcome Elizabeth Leake as the new director of Research Computing Services.

Leake is a high performance computing (HPC) consultant, correspondent, and advocate with more than 15 years of experience serving the global HPC and data science industries. Leake holds a BFA in graphic design from the University of Illinois. In 2012, she founded **STEM-Trek**, a global, grassroots nonprofit organization that supports scholarly travel and workforce development opportunities for HPC-curious science, technology, engineering, and mathematics (STEM) scholars from underserved and underrepresented regions.

As a program director, Leake has mentored hundreds of early-career professionals who are breaking cultural barriers in an effort to accelerate scientific and engineering discoveries. Her multinational programs have specific themes that resonate with global stakeholders, such as food security data science, blockchain for social good, cybersecurity/risk mitigation, and more. Her efforts drew recognition when STEM-Trek received the 2016 and 2017 HPCwire Editors’ Choice and 2020 Readers’ Choice Awards for Workforce Diversity and Inclusion Leadership.

As the director of Research Computing Services, Leake will provide strategic oversight for **Boise State’s research computing team** in supporting high performance computing clusters and research cyber

Elizabeth Leake, Director Research Computing Services
Directs day-to-day operations, personnel, policies, programs and infrastructure; assists with proposal development and external relations.

Steve Cutchin, Faculty Director RCS, and Assoc. Professor
Faculty liaison; architect for campus and regional research CI; PoC for WestNet and NSF West Big Data Innovation Hub; Scientific Viz expertise.

Jason Watt, Senior Cyberinfrastructure Engineer
Provides expertise in parallel software development; developing solutions for big data transfer, storage and retrieval; and community engagement.

Kyle Shannon, Senior Scientific Software Engineer
Assists researchers with programming - optimization, debugging, and creating software for specific applications; provides training, and much more.

James Nelson, HPC Engineer III
Designs and supports a wide range of compute and data storage solutions; serves as an XSEDE Campus Champion; Geosciences domain expertise.

Frank Willmore, HPC Engineer III
Primary sysadmin for the Falcon HPC system at Idaho National Lab; serves as an XSEDE Campus Champion; Chemical Engineering domain expertise.

Jenny Fothergill, HPC Engineer II
Master Software Carpentry trainer; provides support for R2 and Borah users; XSEDE Campus Champion; Chemistry and Scientific Viz expertise.

Eli Woodard, Student Intern Summer 2022
Assists with workflow optimization, account provisioning, systems support and documentation.

Projects begun at U-Iowa reimagined at BSU

- Isango – composable, portable and affordable platform for RCD workforce development.
  - With engineers at Stillwater Supercomputing, MIT and NCSA.
  - Lessons learned from SCC judging over the years.
  - Globally-distributed teams will use the platform for training, competitions and development.
  - Second life as a custom compute environment for startups (edge applications); AI workflows, in particular.

ISANGO *Gateway to diversity, inclusion and discovery!*

Training the global Research Computing and Data (RCD) workforce

Academic, industrial and commercial employers agree – there is a high-tech labor shortage. Hackathons, data, cybersecurity and student cluster competitions (SCCs) are great ways to prepare scholars for RCD academics and careers, but advanced skills aren't always taught in schools, and few universities can afford to provide hands-on experience with locally hosted high-performance computing (HPC) systems, let alone offer a diverse array of accelerator and platform options that are increasingly found in the workplace. The tech landscape is rapidly changing, and the evolution is driven by artificial intelligence (AI) workflows. Industrial applications are becoming more customized, and energy efficiency is a big driver. RCD training initiatives would benefit from having access to a menu of computational platforms, accelerators and cloud combinations so that learners are prepared to produce the fastest and most energy-efficient outcomes needed to solve global AI grand challenges associated with climate change, pandemic response, autonomous transit, space exploration, biomedical innovation, and more.

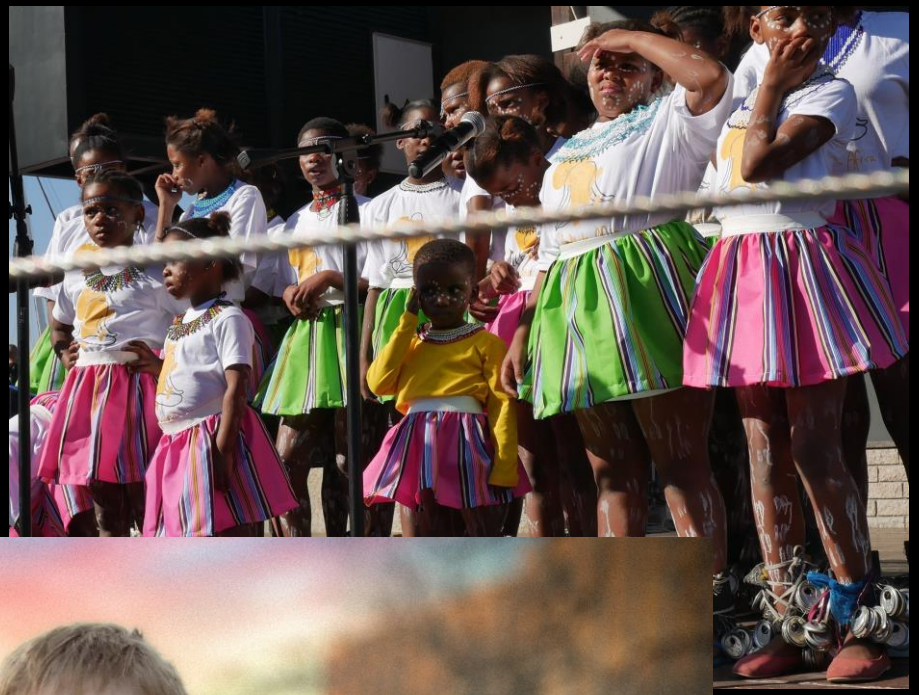
Introducing the "Isango" training platform.

The Sterkfontein Valley in the South African Gauteng Province, with the oldest evidence of hominid culture, is known as the cradle of civilization. In the Zulu language commonly spoken there, the word "Isango" (pronounced e-sun-go) means gateway.

Isango is a ***composable, affordable, and portable*** platform, or gateway, for training, competitions and research discovery. With its own pre-packaged training sessions and advanced user support, it will help prepare future generations of RCD professionals, while establishing a global community of practice. A variety of commercially-available processors and accelerators – some programmable – are featured. Using containers, it integrates with all flavors of commercial and private cloud options on the back end so that trainers can stage unique challenges using open-source software. The project team will pre-optimize training builds for each competition according to a selected operating system, for a menu of accelerators - central processing units (CPU X-86), graphics processing units (GPU) and Field Programmable Gate Array technology that for training purposes will be pre-configured with vector or data flow engines bearing their own instruction set to run as posits-based knowledge processing units (KPU), Google's Cloud Tensor Processing Units, (TPU), or others that haven't been invented yet.

Projects begun at U-Iowa cont'd…

- CI-Pro – RCD certification program (five specializations for starters)
- Ogallala DMZ – A CI that will foster industry/academic engagement in food, feed, fiber, fuel and water security science. Inspired by my work for the Gates Foundation HarvestChoice project.
- Nimbus – Geomodification (with Disaster Engineering, Inc., University of Iowa, and others).



Elizabeth Leake

Thank you!

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www.stem-trek.org

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