Getting the most out of our time today …

I can give you my perspectives on:

- What's happening at many research universities in the US
  - The challenges with establishing and sustaining campus-based cyberinfrastruture (CI)
- Directions from funding agencies (NSF in particular)
- The movement by cloud providers (Amazon, Google, Microsoft, etc.) to reach out to researchers … but the impediments to making use of their services
- How using the cloud shares one common – and often overlooked – thing with traditional CI to make it successful: *Humanware*
- Why trying to grasp the *'ROI'* of cyberinfrastructure to research is both critical to success and a challenge to moving to the cloud
- What we're doing at Indiana University (supported by Microsoft, but not beholden to Microsoft) – Humanware – Advancing Research in the Cloud (H-ARC)

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What's happening at Research Universities *

- Pressure in trying to establish and/or sustain investments in CI
  - Funding drying up from external sources and budget pressures from other priorities across institutions
  - Lack of a good understanding of the Return on Investment (ROI) of CI expenditures makes it largely a 'matter of faith' to make those investments
- Many priorities for central IT making it very hard to focus on research enablement
- Lack of good research-savvy CIO candidates (CIO pipeline issues)
- Lack of understanding/appreciation for IT/CI among institutional executive leadership (presidents, provosts, CBOs, Boards)

My opinion based upon my observations

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Directions from funding agencies (e.g., NSF) *

- Overall funding reductions due to politics in the US government
- A sense that investing in campus infrastructure is something institutions should be funding rather than asking for federal grants
- A sense that the 25-year effort to establish, expand, and maintain 'National Centers' (NCSA, SDSC, PSC, TACC, Teragrid/XSEDE) is not sustainable
- Various funding programs establishing a 'toe in the water' for cloud credits as a replacement for capital infrastructure
  - Some awareness of the need for humanware

My opinion based upon my observations

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Cloud Providers reaching out to researchers

- Past efforts by Amazon in this community have given them a 'leg-up' on competition

- Google looking to increase their presence

- Microsoft Azure looking to increase their presence (hence programs like the one at IU)

- However, all is not glittering gold …
  - Tools, documentation, and support are not good
  - Lack of product-trained technical support (humanware)
  - Key challenges with overcoming the 'ka-ching!' element of cost per use

* *My opinion based upon my observations*

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Humanware is more critical with the cloud *
… And just as absent from strategies

- Cloud requires even more support for adoption and ongoing use

- Especially true if researchers eventually hope to see the various providers as 'commodity' … being able to move from one to another based upon pricing and performance

- People are still a 'base-budget' resource

- Skill levels with cloud environments are lacking and the vendors don't have good programs for education and certification
  - *Real challenges in getting these same vendors engage in pedagogy on campus*
  - *Revisit the story of Microsoft Certification Programs in the 1990s*

* My opinion based upon my observations

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ROI remains hard to grasp *
… no Buck$, no Buck Rogers

- Metrics for the benefits of CI-enablement of research are hard to quantify and qualify

- Costs are more difficult to control in the cloud
  - Campus allocation and consumption versus $/cycle or $/TB costing

- Scientific data and analysis is illuminating the 'woods dark and deep' but we have miles to go before we sleep.

- In many cases, there is an intuitive feeling that CI investments advance research, but it is largely an act of faith on the part of administrators

* My opinion based upon my observations

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What we're doing at Indiana
... With support from Microsoft

People – not just technology! #humanware

Humanware describes the critical importance of people in the provision of CI—as opposed to just hardware, software, and advanced networks—supporting research in the 21st century. This concept is based on decades of experience and success in broad areas of leveraging IT support resources, as use of technology became decentralized and distributed starting in the 1990s.

- *The concept of humanware—called out in the 2011 NSF Advisory Committee for Cyberinfrastructure Task Force on Campus Bridging—has a 25-year track record in successfully enabling the effective use of information technology in higher education environments.*

Humanware – Advancing Research in the Cloud (H-ARC)

https://humanware.iu.edu/

- A project at Indiana University (Pervasive Technology Institute)
  - Funded by Microsoft (~$1-mil) through June 2020, part of a global initiative
  - Platform (vendor) agnostic – looking at how human resources impact adoption of cloud CI
  - Dual focus – illuminating the Return on Investment (ROI) of cyberinfrastructure-enhanced research
- Progress to date
- Plans for next phases (Partners in Advancing Research in the Cloud)

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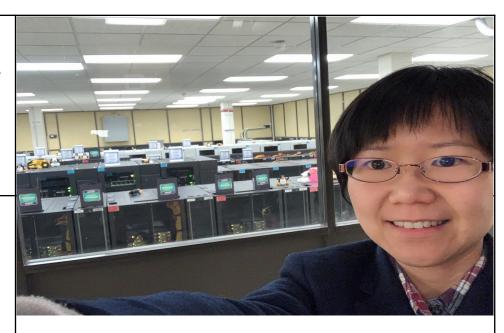# Humanware Advancing Research in the Cloud (H-ARC)

http://humanware.iu.edu

Objective: To study and improve the understanding within the higher education community of how people in support roles – *Humanware* – advance the use of cloud-based cyberinfrastructure (CI) in the advancement of research at universities. To provide detail in the form of 'return on investment' (ROI) of the use of cloud-based CI by offering case studies on its use as compared to campus-based or existing national CI resources

Status of Effort: Project launched in January 2019 with funding from Microsoft. First cohort (8) of Cloud Research Support Engineers (CRSEs) brought onboard for 7 months, covering a variety of endeavors across multiple academic disciplines, with use cases across the two objectives.

Personnel Supported: Approx. ten currently, ultimately between 20-30 depending upon project evolution.

Publications and Meetings: PEARC19 Workshop Accepted for July 2019 in Chicago; workshop will include invitation to other presenters with ideas aligned with the project objective, to further broaden impact of the project.

Funding: $1,001,000 in a MOU-based award from Microsoft Corporation. While the award includes adequate MS Azure cloud credit resources to be provided to project participants, the project entails examination and use examples of all cloud CI vendors.

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Humanware Advancing Research in the Cloud (H-ARC)

http://humanware.iu.edu

Project Description: To fulfill the objectives of the project, we have established a program that engages and supports appropriate personnel (Post-Doctorate Fellows, Research Associates, etc.) in the conduct of their research or service missions to their institutions. CRSEs are provided stipends to support their activities, access to Azure credits, access to support resources at IU and Microsoft, and encouraged to collaborate with their cohort CRSEs. We require regular reports on progress and submission of papers and participation in project workshops; activities and outcomes will be communicated more broadly across the CI-enabled research community.	**Project Timeline/Duration**: Funding is sufficient, given the initial plan, for the project to continue and advance through June 2020. The project is in its initial start-up and delivery phase through July 2019, and a second phase will commence in June 2019. **Key Elements**: A 'Research Engagement Manager' with recognized accomplishment across higher education IT and particularly in the use of humanware to support research was brought onboard within the structure of the Pervasive Technology Institute to leverage its broader capabilities to advance this initiative.
Approach and Project Background: Upon learning of the relation of Microsoft's emerging vision of how to increase use of cloud-CI aligned with long-standing philosophies and endeavors related to the value of the successful use of humanware to impact many IT-related challenges, the PTI was chosen as a partner to advance the effort. Our initial approach involved soliciting project proposals from the research community and engaging an initial cohort in developing and advancing the endeavor.	**Opportunities for Broader Collaboration:** • Potential to partner with other Cloud platform providers to expand offerings • Seeking opportunities for an assigned CRSE to work with an industrial partner on a project that expands use beyond higher education research • Evolve the program to serve far more humanware-engaged individuals, by examining successes in other areas related to our objective

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Humanware – Advancing Research in the Cloud (H-ARC)

- Continued but limited investments in 'CRSEs' (TBD)

- Plans for next phases (**P**artners in **A**dvancing **R**esearch in the **C**loud)
  - Build a broader community
  - Provide support, tools, and case-based knowledgebase of solutions
  - Provide input back to vendors (Microsoft) on advancing training and certification efforts
  - Do some 'demonstration projects' – may be linked to CRSEs

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- Writings/Musings on the role of the CIO
  - https://www.linkedin.com/in/briandvoss/detail/recent-activity/posts/
  - https://er.educause.edu/columns/got-a-minute