Microsoft EDUCATION Puerto Rico Forum

# The History, Evolution, and Future of Information Technology in Advancing Research in Higher Education


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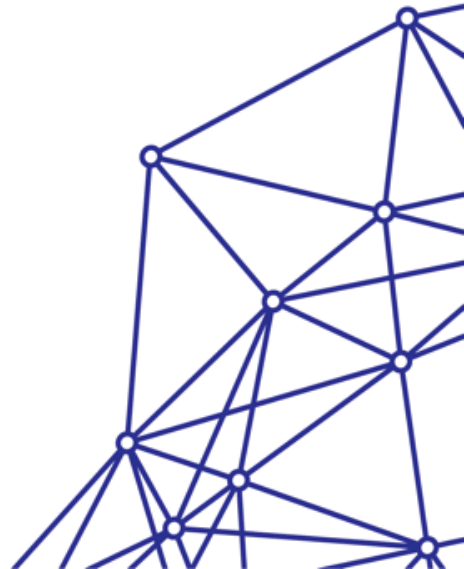
*A long time ago, on a campus far, far away …*



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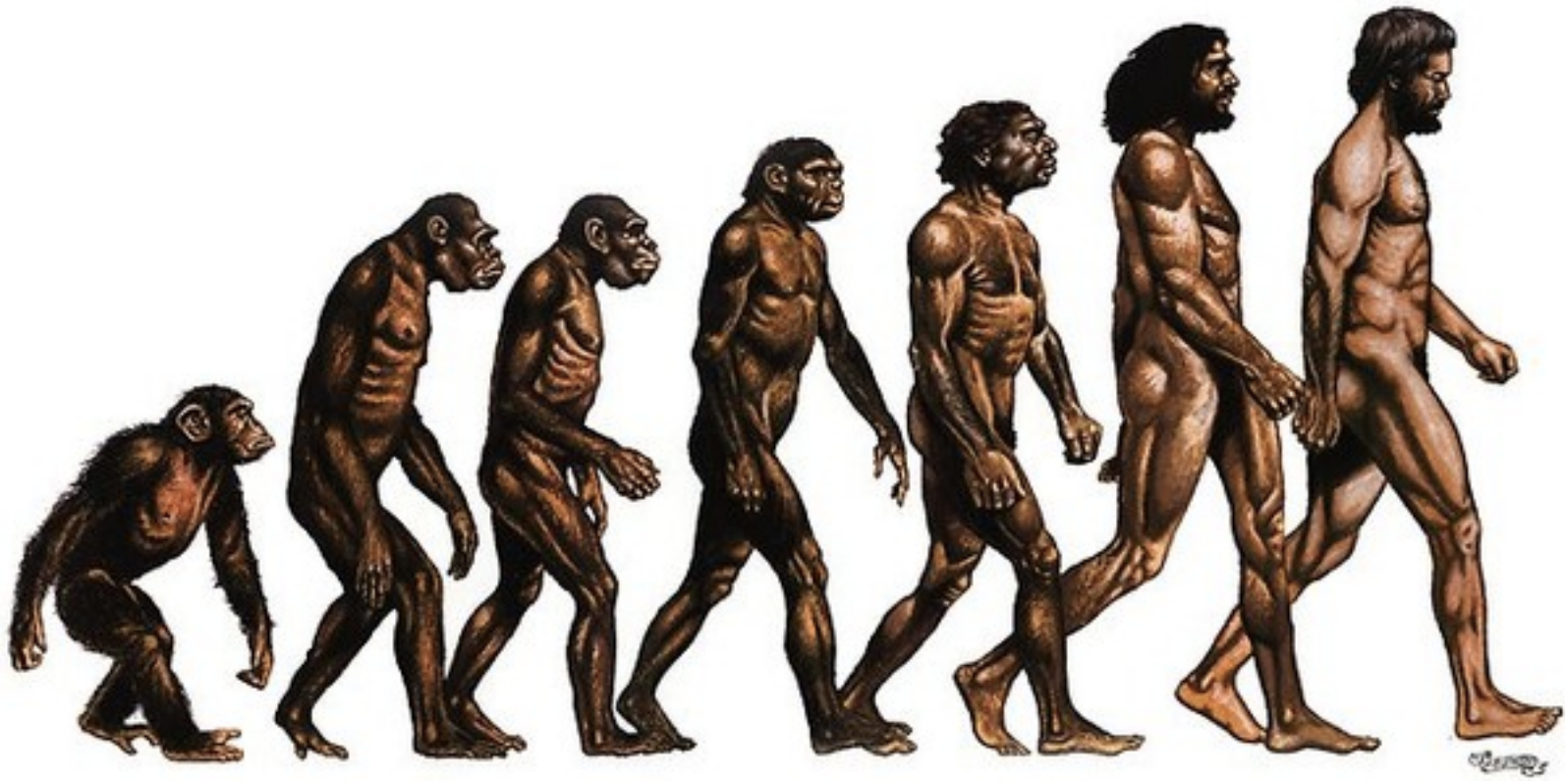

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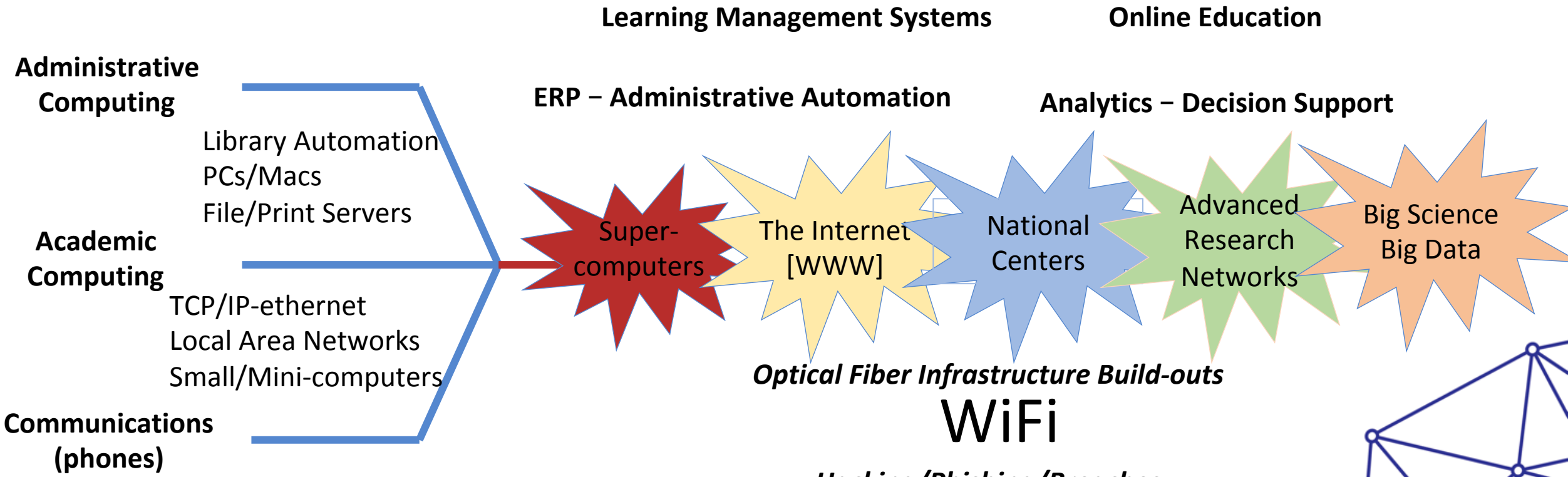
# Key events in the evolution of IT in higher ed

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# What role does the IT (and the CIO) play?

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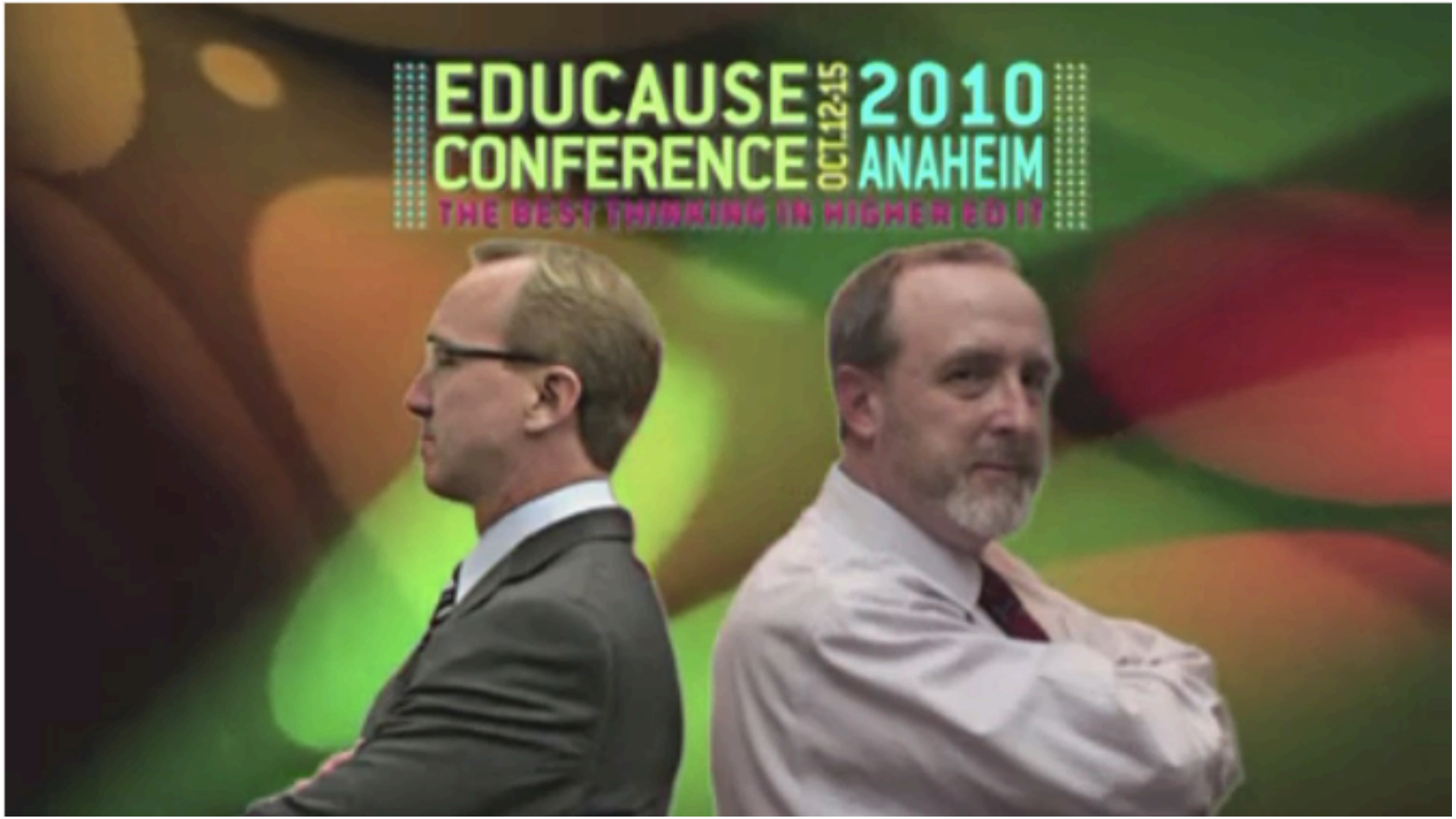
# Is IT (and the CIO) strategic? Or Plumbing?

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# Strategic? Or Plumbing?

**Strategic**

- Funded as a ‘greater good’ item
- CIO part of campus leadership
- IT is recognized as a fundamental component of all areas of the institution
- IT is ‘appropriately’ centralized and decisions are made holistically
- IT is an active collaborator with members of the academy

**Plumbing**

- Funded by ‘charge-back’
- CIO reports ‘down the line’
- IT is viewed as a ‘luxury’ or a ‘necessary evil.’
- IT is widely distributed and decisions are made locally, not holistically
- IT is not seen as an beneficial collaborator

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# A 21st Century IT Organization

Teaching & Learning IT

**Research Enablement**

Enterprise Systems

Support Services

Campus IT Infrastructure

IT Security & Policy

Governance, Risk, Compliance

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# The Role of IT in Advancing Research - Today

- **Providing Infrastructure – Cyberinfrastructure**
  - MAXIMIZED Computational platforms (HPC)
  - Networks – robust campus and border connections
  - Software – common (and uncommon!) products
  - Visualization and other rendering tools/resources
  - Compliance and Security
- **Facilitating Collaboration – on campus and broadly**
- **Grant Support – PI or co-PI**
- **Strategic Partner (within campus leadership)**
- **Humanware**

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# Challenges to the Status Quo

- **Funding – *No Buck$ No Buck Rogers***
  - Reduction/ending of grant funding (NSF, NIH, etc.) for infrastructure
  - Continued challenges to institutional funding/revenue
- **Emphasis on teaching/learning** *(de-emphasis on research/discover)*
  - Degrees that lead to jobs
- **Sustainability of campus HPC infrastructure (the 'arms-race')**
  - Growing viability of Cloud for Research
    - But … Cloud providers still don't "get research"
- **Continued lack of grasp/understanding/appreciation for IT by university leadership (presidents, provosts, CBOs, Boards)**
  - Inability to communicate 'ROI' of Cyberinfrastructure to Research

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# The Role of IT in Advancing Research - Coming

- **Providing Infrastructure – Cyberinfrastructure**
  - ➢ **MINIMAL Computational platforms (HPC) for local test & development**
  - Networks – robust campus and border connections
  - *Software – common (and uncommon!) products*
  - Visualization and other rendering tools/resources
  - Compliance and Security
- ➢ **Facilitating a move to the Cloud**
  - **Shift away from dependence on campus/institutional infrastructure**
- **Facilitating Collaboration – on campus and broadly**
- **Grant Support – PI or co-PI**
- **Strategic Partner (VPR and in Cabinet)**
- ➢ **Humanware**

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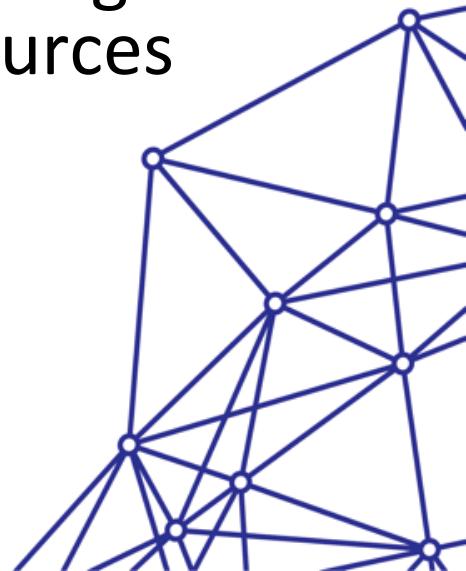
# The Cloud is Advancing

- Google, Amazon, Microsoft, IBM, and others are moving to make their platforms available for Research
  - Already made significant advances into HE for enterprise/administrative
  - Some are better than others at advancing pedagogical efforts (training)

- Funding agencies (e.g., NSF) are moving away from providing hardware resources to build campus and national CI resources and moving toward use of cloud credits/funding



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# Challenges to Providing Campus CI

- Institutions not able to ‘keep up’ with the cycle/storage ‘arms race.’
- Institutions not yet ‘in the game’ finding it harder to establish local CI of consequence.
- Lack of grant funding makes it harder to leverage local investments.
- Lack of ability to express “ROI” of investments in CI
  - *“An act of faith?”*

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# A Possible Way Forward

- Minimal investment in local compute/storage resources – consider them ‘development and test’ platforms
- Grasp how moving to the cloud (in essence IaaS) impacts campus/ institutional funding/spending (capital vs. expense)
- Continue to look for ways to express ROI beyond ‘faith-based initiatives’
- Now more than ever FOCUS ON HUMANWARE!

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# 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.*

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# 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
  - Platform (vendor) agnostic – looking at how human resources impact adoption of cloud CI
  - Dual focus – illuminating the Return on Investment (ROI) of cyber-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.

# 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

# 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/
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