Sustainable Funding and Business Models for Academic Cyberinfrastructure Facilities
Models, challenges and opportunities at advanced computing facilities

Jan E. Odegard

**Executive Director, Ken Kennedy Institute for
Information Technology (K2I)
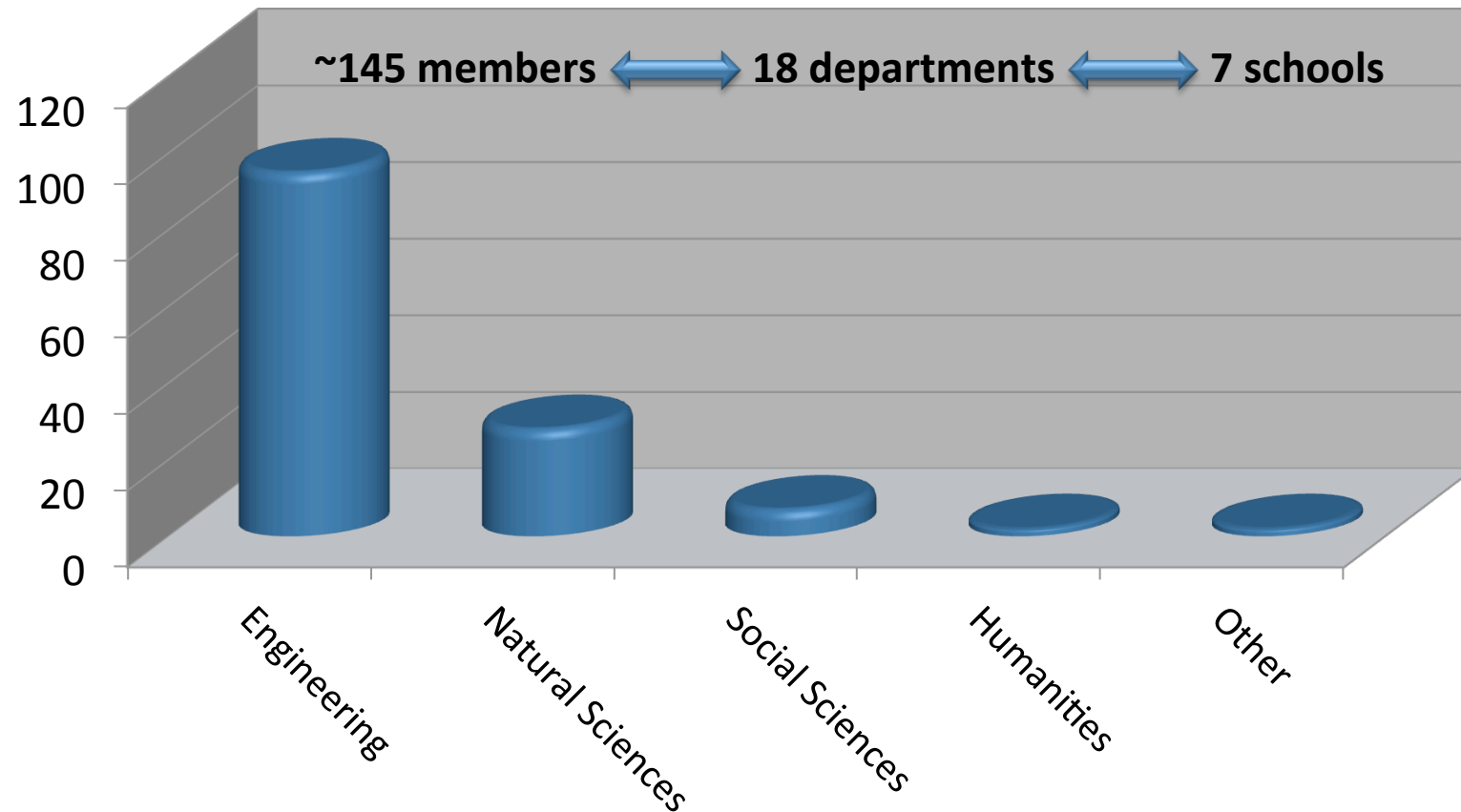Rice University**

October 2, 2013

Rice University

- 3800 undergraduates, 2300 graduate students, & 650 faculty
- More than 50% of students major in science or engineering
  - ~$120M research expenditures (50-70% is computational)
- Tradition of excellence in both education & research
- Long-term focus on computation applied to practical problems
- Renowned groups in HPC, DSP, and computation S&E

Who is K^{2}I?

- A virtual organization focused on research in information technology and computing engaging all of Rice and acting as a catalyst for accelerated innovation and discovery

~145 members ⟷ **18 departments** ⟷ **7 schools**

Who am I?

- <u>Executive Director</u>, Ken Kennedy Institute for Information Technology (K2I), Rice University
  - Institute reports to Office of Research (VPR)
- What is my role?
  - Dictionary: "having the power to put plans, actions, or laws into effect"
  - Reality: It means I am there to make **stuff** happen
  - Need to be confortable with providing "leadership from behind"
- What kind of stuff?
  - Build research partnerships in C and IT
  - Support/incubate co
  - Facilitate c utions
  - Enco nal strength
  - Devel ernal collaborations (also industry)
  - Develop search infrastructure (aka CyberInfrastructure)
  - Expand c oration beyond traditional boundaries
- What do I do for fun?
  - I love building other stuff with my hands

Facilitate Collaboration
Build Partnerships
Develop Cyberinfrastructure

RICE

Here is some stuff I did this summer
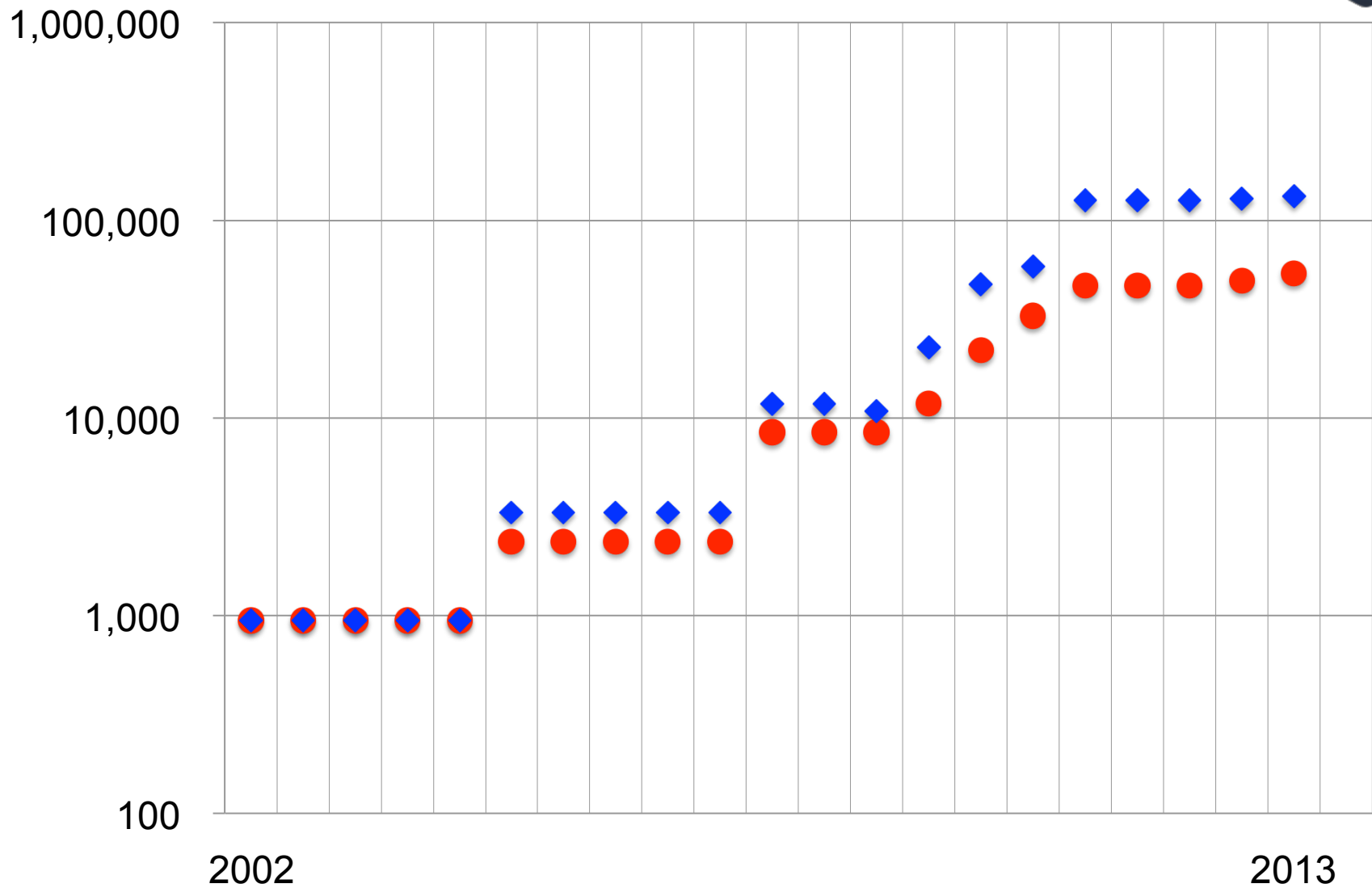
Before After

Credits

- What we are able to accomplish at Rice would not be possible if it was not for the close collaboration between the Ken Kennedy Institute and the Office of the VPIT

- We early (in 2002) made the strategic decision that IT support staff for research computing needed to be part of central IT and not part of K2I

- While hard resources such a funding and staff lines are not fungible credit is very flexible and what we have accomplished is a result of these partnerships and learning lessons along the way
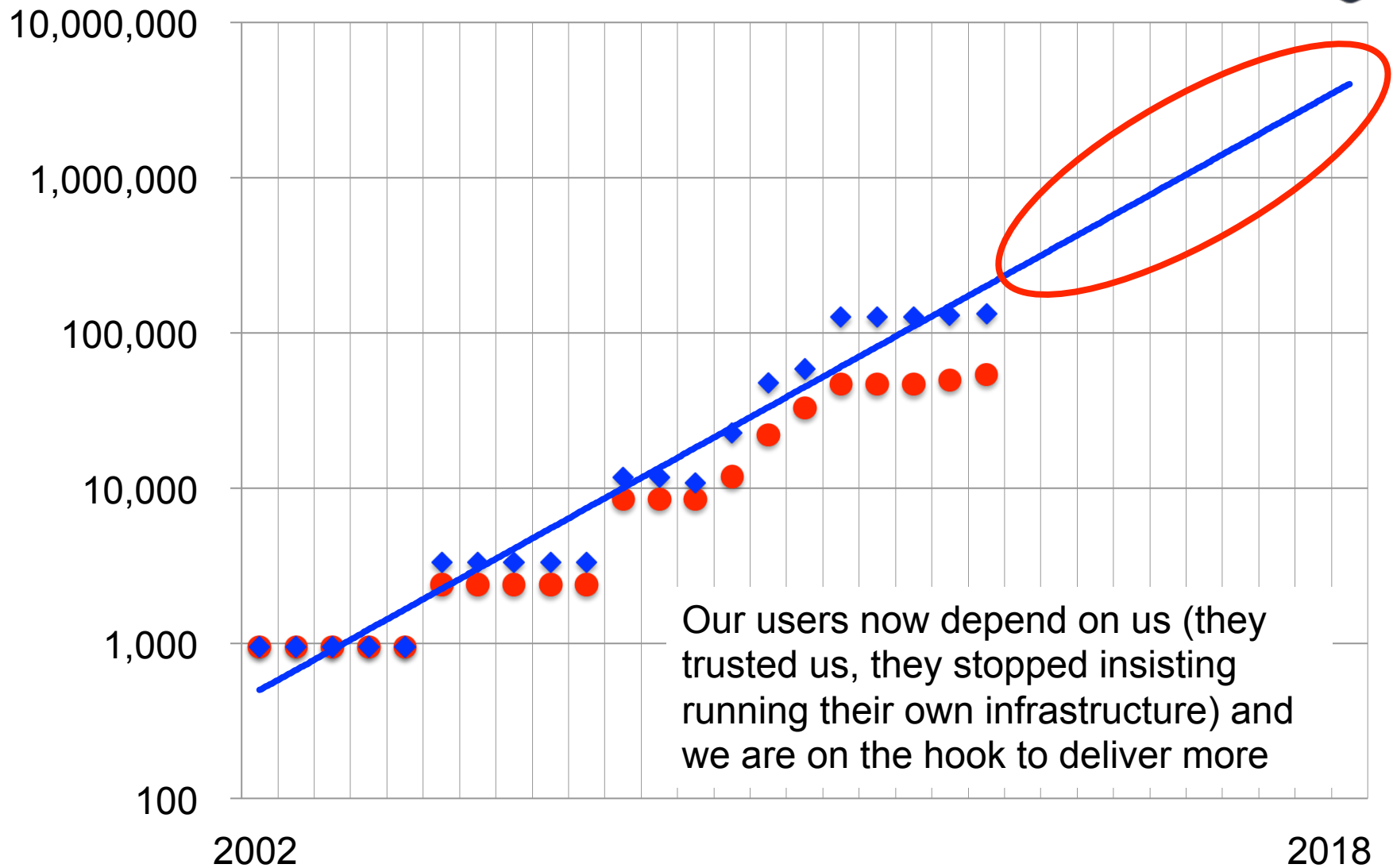
1. Moving to sustainable research CI

This is what success look like

This is what the "**dark side**" of success look like

Our users now depend on us (they trusted us, they stopped insisting running their own infrastructure) and we are on the hook to deliver more

1. Moving to sustainable research CI

2. Complete understanding of TCO

Total Cost of Ownership

- Staff
  - Hardware support focus (sys-admins)
  - Research support focus (application support)
- Space
- Power & Cooling (it is all just power)
- Networking/Connectivity
- Storage infrastructure
- Computing infrastructure
- Visualization infrastructure
- Hardware & Software support contracts

- What is missing on the list?

1. Moving to sustainable research CI

2. Complete understanding of TCO

3. Managing across technology inflection points

Managing across technology changes

- Infrastructure decisions
  - more/new/disruptive
  - local versus external

- TCO impact
  - Without understanding your TCO you can not perform an honest assessment of more/new/disruptive technology
  - Cloud may seem cheap but there is more to it and what other cost will you incur to support not 1 or 2 users but 100s of users?
    - XSEDE cloud survey great start!

- Staff impact
  - The staff we depend on for understanding and experimenting with "the next new thing" is often the same staff that will be "out of a job" if the experiment points to rebalancing the CI portfolio.
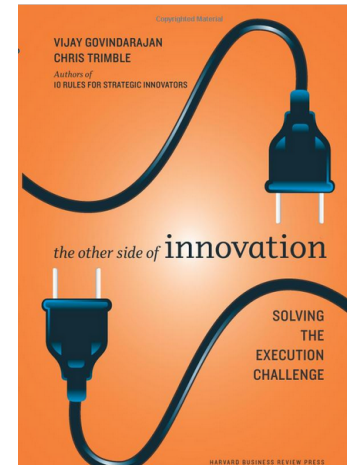
Where are we today?

- We always operated FULL cost recovery on all allowable expenses

- Only change over time is formula by which we charge

  – metered to "membership" to metered to …

What are we doing moving forward?

- University open to front infrastructure investments
  - we need to develop needs-based infrastructure projections
  - how much can reasonably be recovered is part of the conversation
- University expect 'full cost recovery'
- Conversation shifted to
  - how much infrastructure should be
    - local
    - regional/national
    - cloud (utility)
  - and discussing what the institution consider
    - Sunk cost?
    - Fixed cost?
    - Variable cost?

CI sustainability: Why is it hard?

- A research culture that wants research CI to be "free"

- Universities want "someone else" to pay for it

  - Funding agencies have shrinking resources

  - Universities resist opening the door to "subsidize federally funded research"

  - Direct cost for computing on project-budgets are sometimes disallowed

    - not explicitly by programs but effectively by reviewers

      - "We have met the enemy and he is us." Pogo author, Walt Kelly, 1970

    - this limits ability to implement cost recovery to fund computing and storage

  - "We are not structurally equipped to support infrastructure, in particular IT infrastructure"

    - OMB-A21 is a stumbling block because university recovered F&A does not cover total cost of research

Total Cost of Ownership

- What are the components and which component matters when?
  - Staff
    - Hardware support focus (sys-admins)
    - Research support focus (application support)
  - Space
  - Power & Cooling (it is all really just power)
  - Networking/Connectivity
  - Storage infrastructure
  - Computing infrastructure
  - Visualization infrastructure
  - Hardware & Software support contracts

LOCAL
REGIONAL/NATIONAL
CLOUD (UTILITY)

- Under what research "CI portfolio mix" are these costs:
  - Sunk cost?
  - Fixed cost?
  - Variable cost?

Doing this does not mean

Doing this does not mean

we are ready to do this

Doing this does not mean

we are ready to do this

or even this