

institute for Cyber- Enabled Research

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April 17, 2009

Wolfgang Bauer, MSU

Step 1

- **Visioning Committee for Cyber-Enabled Discovery**
 - Feb. 2008
 - Task: Investigate future needs in high performance computing at Michigan State University
 - Jointly charged by Provost Wilcox and Vice President Gray

Committee Charge (1)

- Identify the high priority cyber-enabled research areas where MSU has a near-term competitive advantage.
- Identify the needed resources (including infrastructure and personnel) that are critical for advancing these areas.
- Indicate policy changes that might improve computational support in these areas.
- Consider new (or changes in existing) administrative structures that would enhance, or better coordinate cyber-enabled research.

Committee Charge (2)

- Identify critical research areas that will require terascale to petascale computing within the next five years. Consider how MSU should fit into the Great Lakes Consortium for Petascale Computation.
- Consider the types of programmatic activities (including academic programs, workshops, and seminar series) important to develop as part of this initiative.
- Propose an implementation plan – How can units (including Departments and Colleges) support and implement the plan, what types of support is best provided centrally, and what types of resources should be sought from funding agencies.
- Propose a timeline for implementation

Shanker Balasubramanian, Department of Electrical and Computer Engineering

Wolfgang Bauer, Department of Physics and Astronomy (**Committee Chair**)

Ravi Bhavnan, Department of Physiology

Robin Buell, Department of Plant Biology

Kris Chan, Department of Chemical Engineering

Jim Cole, Department of Crops and Soil Science

Bob Cukier, Department of Chemistry

Tom Dietz, Environmental Science and Policy Program

Phil Duxbury, Department of Physics and Astronomy

Michael Feig, Department of Biochemistry and Molecular Biology & Chemistry

Mark Kornbluh, Department of History

Rob Last, Department of Biochemistry and Molecular Biology & Plant Biology

Filomena Nunes, National Superconducting Cyclotron Laboratory

Charles Ofria, Department of Computer Science and Engineering

Piotr Piecuch, Department of Chemistry

Bill Punch, Department of Computer Science and Engineering

Jiaguo Qi, Department of Geography

Phil Reed, Department of Epidemiology

Shin-Han Shiu, Department of Plant Biology

Curtis Wilkerson, Department of Plant Biology

Committee Composition (2)

The following Associate Deans provided administrative input:

Dave Dewitt, College of Natural Science

John Goddeeris, College of Social Science

Leo Kempel, College of Engineering

Special assistance to the committee was provided by:

Estelle McGroarty, Assistant Vice President for Research and Grad Studies

Anthony Wojcik, Consultant to the OVPRGS

Administrative support:

Stacey Pabis

Leadership Team

Jiaguo Qi,	Geography and Center for Global Change and Earth Observations
Shanker Balasubramaniam,	Electrical and Computer Engineering
Michael Feig,	Chemistry and Biochemistry and Molecular Biology
Piotr Piecuch,	Chemistry

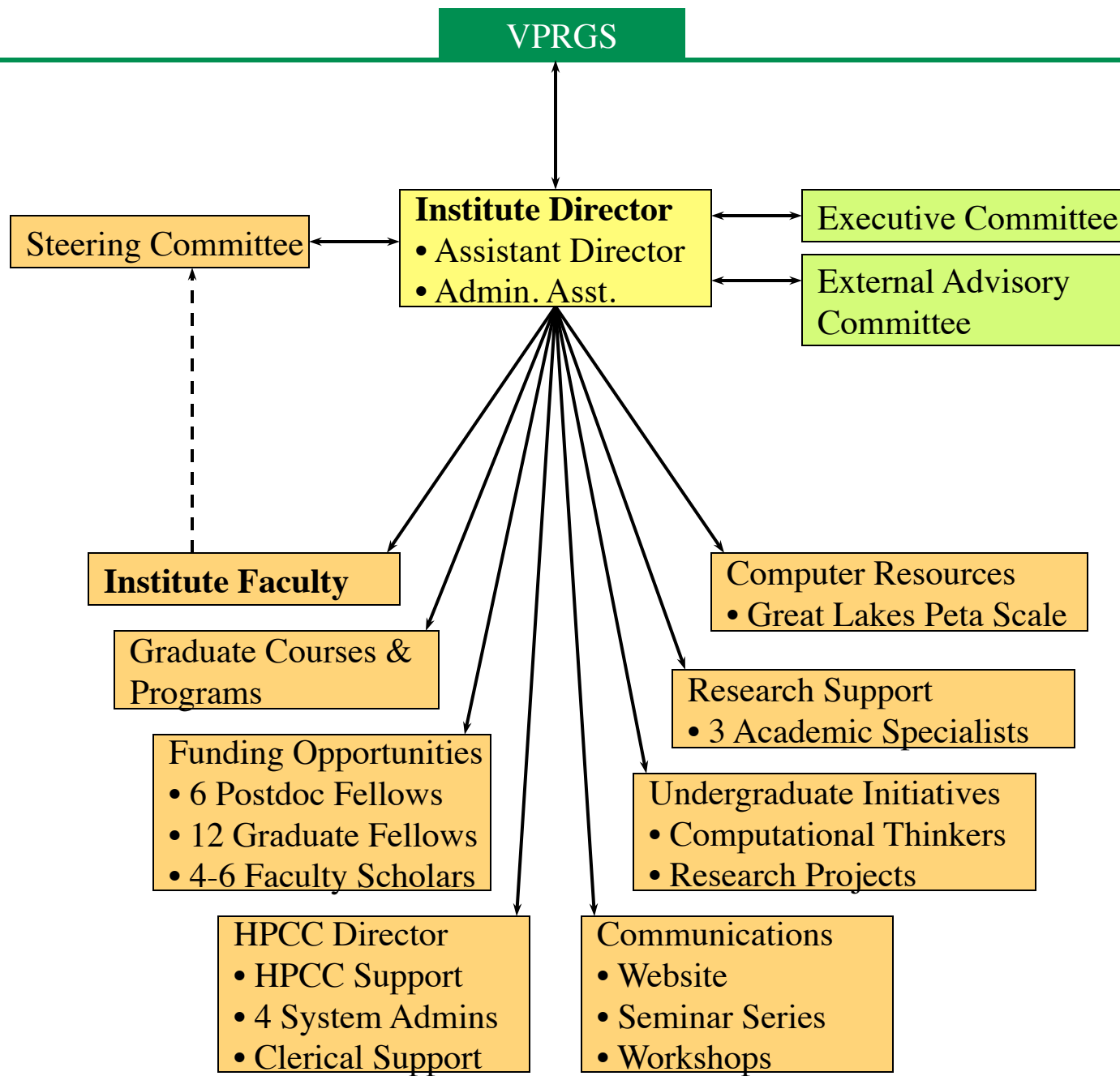
Timeline

- 2008-02: Committee charged
- 2008-03: Campus-wide questionnaire
- 2008-04: Workshop at Henry Center
- 2008-07: Finished committee report
- 2008-08: Presentation to deans
- 2008-09: Leadership team presents to provost & VPRGS
- 2008-10: Leadership team develops “Next Steps” paper
- 2008-12: Preliminary budget approved
- 2009-03: First director appointed

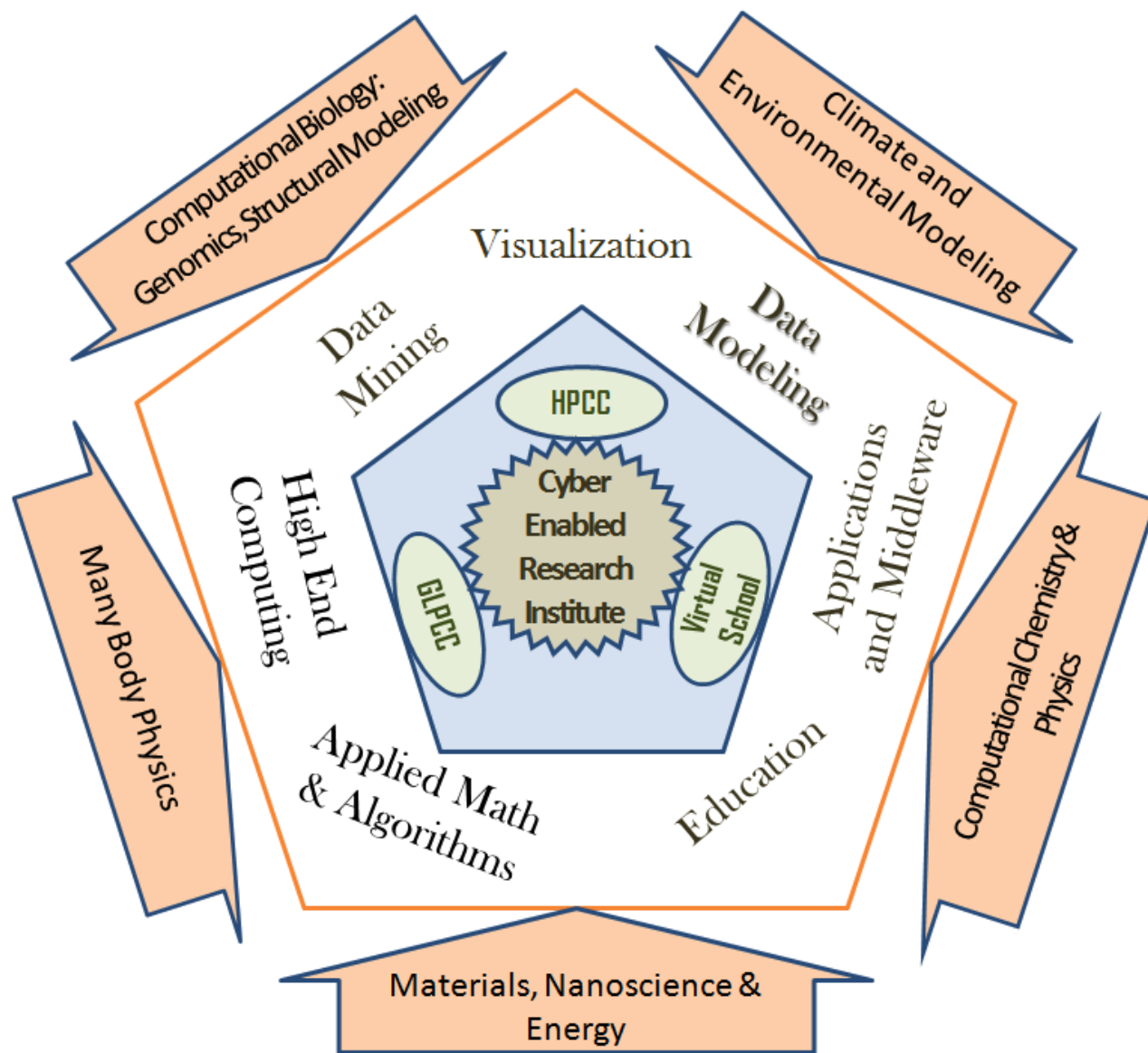
iCER Mission

- Mission – to coordinate and support multidisciplinary cyber-enabled research at Michigan State University. The Center is to enhance MSU's national and international presence and competitive edge in disciplines and research thrusts that rely on advanced computing.

iCER-Organization



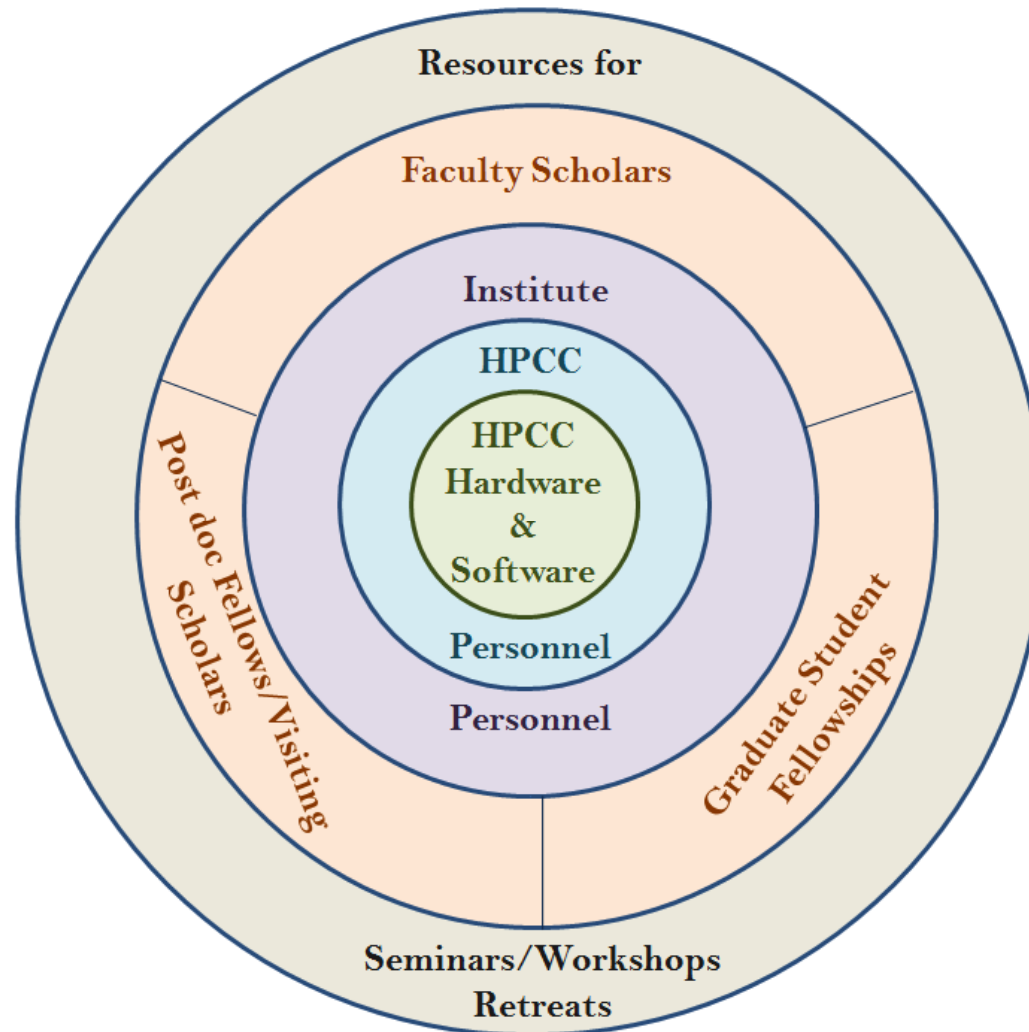
(initial ! ...) Research Thrusts



Programmatic Components

- Faculty Scholars Program (visitors, buy-outs)
- Post-Doctoral Program (50/50 funding)
- Graduate Student Fellowships (supplemental)
- Graduate Curriculum
- Undergraduate Engagement
- Seminars
- HPCC
- Support Personnel

Resource Layers



Support (1)

- At the lowest level of support, MSU should provide assistance with the programming of certain time-limited projects for faculty and research groups who cannot accomplish this task on their own.
- Many scholars on campus realize that cyber-based research could dramatically increase their own scope and productivity, but they currently lack the resources to acquire the necessary tools and expertise. Annual workshops, a set of defined courses/modules, as well as individual training (in person, via pre-produced modules on the Internet, or by participating in GLCPC programs) could address this need. This support would also include help with cutting-edge approaches to data analysis, simulation and modeling such as the use of scientific visualization.
- Another group of researchers on campus already have computer programming skills, but lack expertise and experience to port their code to run efficiently on massively parallel computer clusters. Support for this group would include one-on-one work with support personnel trained in this field.

Support (2)

- Preparation of proposals for petascale and CDI projects is expected to be highly competitive on a national level. MSU should provide support for research groups, which already have working codes running on our HPCC, but need assistance to make the transition to the largest scale of cyber-based research.
- To increase the effectiveness of support personnel and to "bootstrap" researchers, MSU must become more involved in the GLCPC Virtual School. By providing "virtual" personnel, MSU can take advantage of other schools expertise, as well as providing expertise to other schools. Such sharing will make MSU's efforts more effective.

HPCC - 3 classes of users

1. Buy-in contributors
 - Guaranteed access to “own” nodes, priority access to all nodes, preemption rights
2. Federally funded computational researchers
 - With grants submitted through iCER
3. General academic community

Everybody gets CPU cycles and support
... but not all at the same rate.

Space



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Evaluation

- Annual report (iCER & HPCC)
- Productivity reports
- Review by Faculty Steering Committee, Executive Committee, VPRGS, & Provost
- Procedures for addition and/or discontinuation of thrust areas
- Annual re-evaluation of resource allocation

Future

- MSU recognizes that a continued investment in computing hardware is unavoidable
 - Support needs to be included
- iCER funding (initially...) limited to 5 year
 - Long-term funding needs to come from external grants
 - **New model for IDC sharing**

Final Remarks

- Website: <http://icer.msu.edu/>
 - Phone: 517-884-5060
 - **Everybody is invited
to participate**
- ... really!**