Workshop 4 Summary:

The goal of Workshop 4 was to determine whether and how we should move forward as a consortium with respect to providing high performance computing capabilities to faculty at our institutions. The participants were key consortium members from Colgate, Hamilton, Skidmore and Union.

General points and issues raised during discussion:

- At all of our schools we need to make better use of all our existing computing resources, and then it is likely expansion will come naturally.
- There is no “one size fits all” – teaching needs are different than research needs, because you don’t need as much computing power for teaching.
- Are our students “missing out” because they don’t have access to HPC? Are they ill-equipped to go on to graduate work, compared to undergraduates from Research 1 institutions? Probably not but …..
- It’s important to make it easy for faculty to take the next step. Have to be able to show people how to make the next step, to get their projects onto HPC platforms.
- There’s an important HPC-instructional technology connection that has to be made in order to address: what resource should be used? how do you get there? the “interpreter” who will provide the support piece for faculty.
- Faculty will go a lot further (even with less computing power) if they have support.
- Can HPC access make our institutions more attractive to new faculty?
- How important is (facilitated) access to outside computing resources?
- Can we as a group provide better service than we can provide individually?
- What should drive our decisions about how to proceed?
  - institutional imperatives?
  - faculty research needs and directions?
  - Have to have the need – and then have to determine that we can meet the need better as a group than individually.
- What about faculty who want their own dedicated resource, who don’t want to use an outside resource and don’t want to share because they can keep a machine busy 100% of the time themselves?
- What about bringing people to the campuses to work with a group of faculty? Have to optimize the use of faculty time.
- How much should or can administration or IT evangelize about use of HPC by other faculty? Not likely a successful approach.
- Have to remove the sense of “we can’t do that here because”. Don’t want faculty to think they can’t do certain things because they anticipate that the institution won’t support it.

Hardware possibilities:
1. use outside resources
2. individual school choices (cluster, on the fly hooking together of campus computers)
3. common hardware purchased by each consortium school
4. one big hardware resource, shared by the consortium schools
5. combination of the above (using both centralized and decentralized computing resources)
6. Suggestion was made that if we are to share hardware across the consortium, we should locate it at NYSERNET rather than on any single campus. Then we don't have to deal with issues of space, A/C, power, etc. Makes the hardware costs very clear and NYSERNET can administer it.

Outside hardware resources:
• State resources, such as the RPI, SUNY Albany, SUNY Buffalo, SUNY Stonybrook, Albany Nanotech computers
• Teragrid, cloud computing resources, NCSA

Support is critical:
• Another possible “shared resource” is that of a human resource in the form of someone who can provide some form of support for moving applications onto supercomputers.
• continually returned to the importance of support, even more important than the actual hardware
• Even if we have a consortium resource, still need good local people at each school. If we have a computational scientist type employed by the consortium, that person will have to be able to work with both the instructional technology specialists and the faculty on each campus.
• Grants may provide equipment, but it's unlikely that they will fund support people.
• Survey report: We sent out a survey to all who attended the first 3 workshops. The general feedback is that there is interest in using high performance computing, but lack of access to proper support and lack of faculty time.

Hamilton’s experience scaling up HPC use over a 7 year period – can give a sense of the experience that other schools may have that are just starting out with HPC now:
• gradual growth in use over time – started with one scientist, then a few more, then started developing interest from social scientists. Some faculty have time on Teragrid.
• said there was value of having something local, particularly for students, before putting them out onto national resources.
• It makes a big difference that they have a dedicated systems administrator.
• But they also need someone who can help faculty translate their research onto high performance computing platforms.
• they are likely to be purchasing a second cluster soon with a new NSF grant.

Discussion of options and issues for the consortium

Common small cluster at each institution and access to larger external resources for when people outgrow the cluster. This is a low cost entry approach, but a way to demonstrate the value of HPC. Need one or two people who can do training locally and across the consortium for faculty and students in non-CS departments. Training and support across the consortium could be made accessible via Skype or videoconferencing. Possibility of some initial funding through grants. Leverage Hamilton's experience which shows that growth can happen over time.
Systems administration responsibilities – could be developed within existing IT organizations. However, some schools expressed that they do not want to do that, that it is not worth the expenditure of resources to learn how to do it, especially since it will be a “part time” sort of thing and won't be supporting a large number of faculty members.

Discussion kept returning to the idea of a shared human resource who could work with faculty on getting their work up on a local cluster (if there is one) and then on some form of external resource. This person will have to be able to help identify the correct resource, be familiar with the available external resources and what it takes to transfer an application and get it up and running.

Look at the campus champion and cyberinfrastructure facilitator programs – how do we arrive at those sorts of resources across the consortium? Might be possible if we are a formal consortium that can hire someone

Partnerships between CS faculty and others work well if there is an interesting CS problem. But need IT support for situations in which the CS folks are not interested. What about issues across the consortium, interdisciplinarity connections across fields across the consortium? What about opportunities for utilizing specializations across the schools. For example, what if Skidmore needs a computational chemist for a project, and Hamilton's got one. Is there a way to hook Hamilton's faculty member into Skidmore's project?

Do we need some sort of project that unites us across the consortium? Should each school have a big unifying project? Do we want to have faculty and students working on projects across the consortium? If so, what would it take to get this sort of thing off the ground?

What elements of common infrastructure do the consortium institutions have to have, and at what cost? Likely need Internet 2 at all schools, as well as videoconferencing facility.

**Need an approach that will cover all our schools**

Since we are all in different places vis a vis how much we already utilize HPC, we discussed approaches that would work for everyone. For schools that have no/few clusters now and are doing little with HPC, how do they get started? In these cases having a small local cluster makes sense. But for school that already have a number of faculty doing cluster work, there is greater interest in external resources. In both cases human expertise is critical.

Have to be careful that the decisions of the consortium don't create problems on any of the member campuses. For example, at Colgate all use of HPC is currently decentralized and faculty driven. If we move forward as a consortium with a centralized shared computing resource, might not generate much interest at Colgate.

**Incentives institutions should consider providing to faculty** in order to promote HPC work. There has to be a clear message from the administration of each institution that they want to move in this direction, and then encourage faculty:

- money or release time for course development work that incorporates HPC
- perhaps the designation of faculty fellows who would get release time to do their own HPC related work and be advocates for HPC on their campuses, and would also get money to attend conferences and travel to the other campuses
• summer research money
• money for faculty to attend relevant conferences (digital humanities, digital social sciences, other computational science related conferences)

**Cost comparisons:**
We are currently gathering data about costs of a cluster located at NYSERNet, costs for using external resources, cost to be on Internet 2 (critical if we are going to be availing ourselves of external resources).

**Recommendations:**
These will be expanded on in the white paper.

1. Create formal consortium of 5-8 schools (at this time we are uncertain of Bard College's interest in participating; will approach Hobart William Smith and St. Lawrence about joining).
2. Consortium schools will invest in a shared machine that will be housed at NYSERNet. Will also avail themselves, as appropriate, of external resources such as RPI, Teragrid, etc.
3. The consortium will invest in a facilitator who will work with faculty to move projects onto HPC (or move projects that are already using HPC to the next level of HPC resource, where appropriate).
4. The consortium will pay a consultant for systems administration, to be carried out at the NYSERNet facility as needed.
5. Each year the consortium will try to identify a person who could serve as a visiting professor with HPC expertise. This will be someone whose research involves using HPC, but they will also be able to work with existing faculty to identify projects that are ripe for HPC.
6. Each consortium school will each year identify an HPC fellow. The group of fellows will work with the facilitator and the visiting professor to get their own projects running on an HPC resource, they will hold seminars on each campus where they discuss with other faculty what they are doing, and they will screen proposals and make decisions about allocating summer research support money. The fellows will receive course release and will have a budget for the seminars and for travel between the campuses.
7. The consortium will participate in organizations such as iCHASS, MATRIX, HASTAC and make a concerted effort to send key faculty (the fellows, or others as appropriate) to relevant conferences and workshops. The goal is to create an ever larger presence on each campus of faculty who are committed to using HPC and are developing experience using HPC in their research and teaching.