CyberInfrastructure Specialists
Draft of White Paper

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Introduction

The computing-enabled infrastructure of the 21st century, required to support a knowledge economy in today's information age, has been termed **cyberinfrastructure**. The term refers to the networked digital communications and storage technologies, and advanced software for distributed and parallel computations and visualization. (An analogy has been drawn with the traditional notion of infrastructure, a term coined in the 1920s to refer collectively to the roads, power grids, telephone systems and similar public works required for an industrial economy).

This group of experts, representing cyberinfrastructure, as well as user interface and video technologies, will offer a perspective on the state of cyberinfrastructure as it applies to the delivery of remote interpreting and captioning systems within a postsecondary educational environment.

Of particular importance for this summit and for this group, would be discussions on the creation of cybertools to facilitate communication between deaf and hard of hearing (DHH) faculty and students and hearing faculty and students in an higher educational setting with a focus on STEM disciplines. The development of cybertools would require a well-defined and organized community of practice (CoP) to define standards and mechanisms for sharing information as well as applications. They are very critical to achieve the stated goals of wide dissemination and effective usage of cybertools.

Overview of Cyberinfrastructure

Cyberinfrastructure has been defined as "*a layer between fundamental [computing] components and applications – as illustrated in Figure 1 [FRE 03]; a thick layer that empowers the federation of distributed resources - such as people, expertise, computational tools and services, data, information sensors and actuators - to create virtual organizations or teams that reduce constraints of distance and time. Distance in this context could be measured geographically, organizationally, or in a disciplinary sense. Cyberinfrastructure … [is] a means to an end, involve finding and supporting commonality of use, encapsulating best practice, enabling interoperability, making it easier, more cost-effective for a wide range of applications with specific requirements and participants.*" [HLS 04]

Cyberinfrastructure is more than just hardware and software and bigger computer boxes and wider pipes connecting them. In addition to more powerful processing and communications technology, cyberinfrastructure requires **shared development software tools and also shared, community-specific applications and data**. The focus is thus on the creation of much more powerful computing environments driven by the requirements from the practitioners in a given domain. In this work we are focusing on the domain of providing support for the DHH community in a university setting.
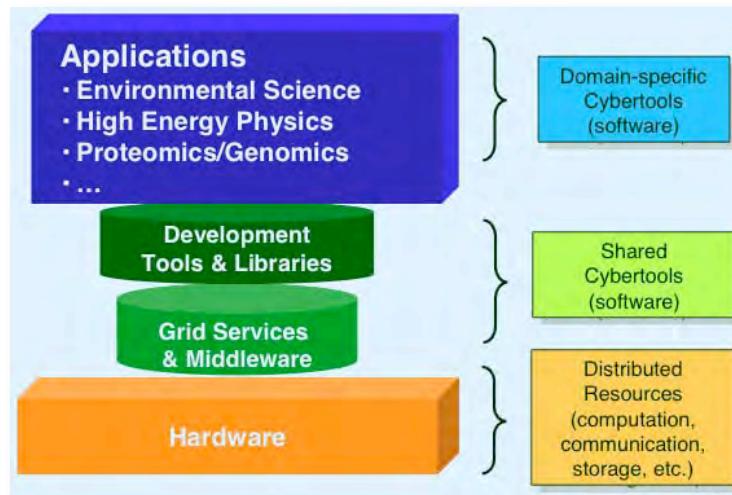
Figure 1: Cyberinfrastructure Components

## Cyberinfrastructure support for the Deaf and Hard of Hearing

Services within the cyberinfrastructure framework to support DHH would include among others the following:

- Develop approaches, methods, and techniques for enabling information to be exchanged among sets of users, for discovering sets of users who could benefit from the exchange of information, and for studying how such exchanges affect those involved
- Support workshops with particular user communities to test different methods and technologies to analyze the effectiveness of the cybertools
- Provide system (and inter-system) integration, operation, and administration
- Supplement existing national or regional facilities to enable optimal and productive use of them
- Ensure effective design of the environments through participation in their development

Figure 2 illustrates an approach to support DHH Communities of practice. The elements of core computing and information sciences are put to work together to create computing environments especially designed to enable effective communication with DHH communities. Feedback from use advances both cyberinfrastructure itself and the community's "maturity," by answering newer questions, and by allowing quick problem reformulation. Activities associated with CoP include:

- Develop and make accessible Cybertools based on domain-specific vocabularies, ontology, and data schema for the specific solutions
- Integrate multimedia solutions to facilitate interoperability across platforms

- Identify key building blocks into a framework for the DHH computing environment
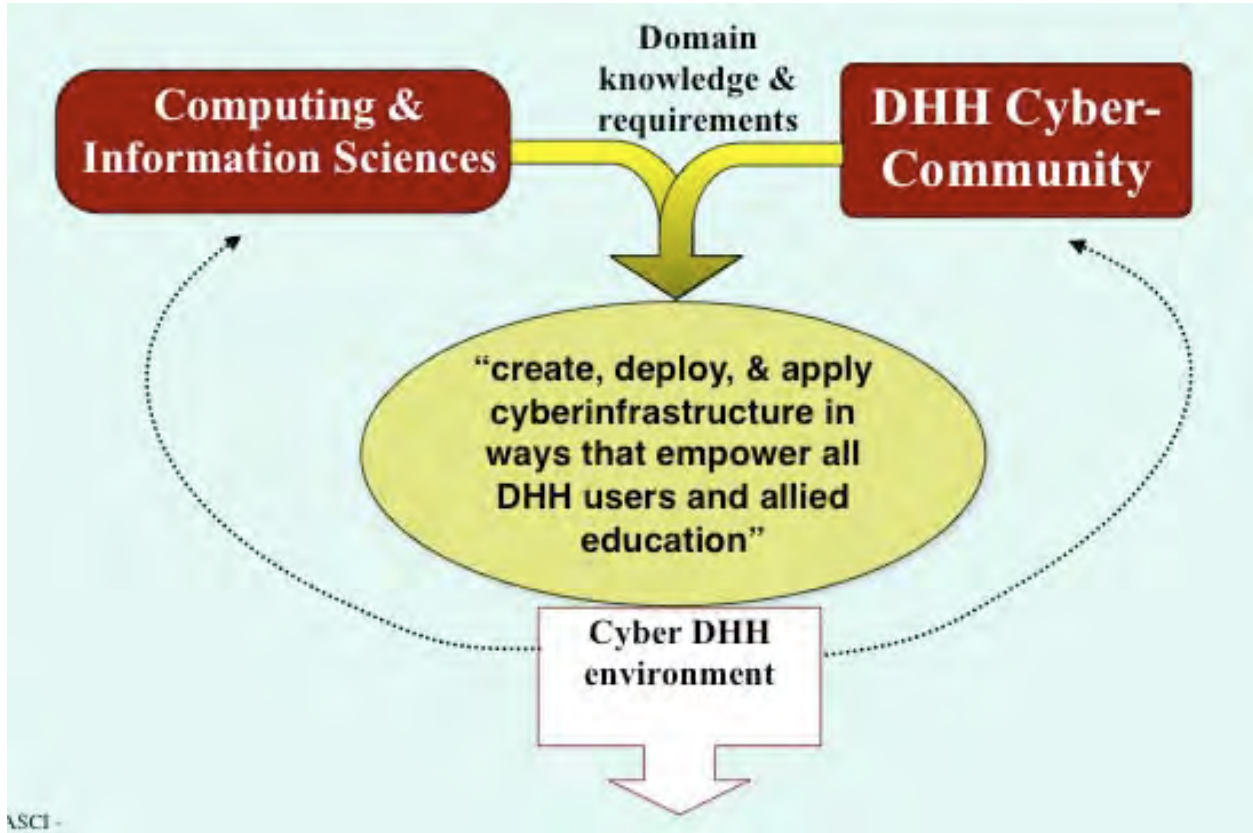
Figure 2: Cyberinfrastructure Working Model

Collaboration Tools and Environments

It is fundamental for the cyberinfrastructure framework to be effective that it explicitly incorporates the notion of domain-specific problem areas from DHH community. An important motivation for this approach is a desire to modularize systems in a domain in such a way that solutions to new problems can be built from standard parts. This would allow, for example, the development of communicating systems to help DHH persons in their core competencies quickly and effectively.

-- Microsoft NetMeeting and the Role of Internet Conferencing for Deaf and Hard-of-Hearing Users

-- Adobe Acrobat Connect Captioning Extension and Adobe Connect.

-- IBM **IBM ViaScribe**: Creates a written transcript of existing audio or video content or provides an instant transcript of live audio content
    * Automatically captions audio content as it occurs
    * Offers an intuitive interface for speakers to learn and use

  * Facilitates searching and indexing of content

Setting up a Cyberinfrastructure-supported Communication System

<<TBD>>

Conclusions and Future Directions

<<TBD>>

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