



**DL-VT416:**  
**A Digital Library Testbed for Research Related to 4/16/2007 at Virginia Tech**

We will research how digital libraries can provide immediate and ongoing support in case of crises, especially on university campuses. We will develop a testbed that will support research related to the events on 4/16/2007 at Virginia Tech (VT416), when 33 members of the university community were killed by a student turned gunman.

In accordance with NSF guidelines regarding Small Grants for Exploratory Research (SGER) Proposals, we are applying, based on discussions held at NSF two days after the terrible massacre at Virginia's largest university. This is a situation "having a severe urgency with regard to availability of, or access to data, facilities or specialized equipment, including quick-response research on natural or anthropogenic disasters and similar unanticipated events". Each day we delay we lose data, hold up social and behavioral science research studies, and diminish the scope of coverage possible with regard to understanding the adjustment of a small town (14,000) and a large university community (26,000 students). Further, we postpone identification of best practices and enhanced integrated solutions combining technology with social and behavioral research findings that might prevent copycat actions, or aid in their management.

The **broader impacts** of this proposal relate to the worldwide interest in VT416, and the desire of researchers, educators, law enforcement personnel, and the general public (including hundreds directly affected, and tens of thousands indirectly affected.) to study, analyze, understand, and learn. By developing a comprehensive digital library, that will collect, organize, and disseminate information about the event, as well as support and record research studies related, we will help serve needs of those who continue to grieve, but will always be remembering. We will facilitate browsing, searching, recommending, analyzing, and reporting of results, as well as receiving all types of submissions of interest. We will have a comprehensive catalog and index, as well as key data; though we cannot hope to store all of the data and news and videos related, we will aim to point to all related sources. While companies like Google and Microsoft quickly launched data collection efforts in response to our requests, long term preservation of such data is not part of their core business; rather, making key information available to the national and international community is a key part of the broader impacts of our effort.

The **intellectual merit** of this proposal includes our inclusion of research results from the Virginia Tech Digital Library Research Laboratory, going back to our first efforts in this field, in 1991. We will integrate our various tools and methods, along with stable software systems like DSpace. We will demonstrate rapid response to crises by deploying a new version of 5Sgen, a digital library generator now also targeting DSpace, building upon our 5S framework for the field. We will integrate research on information visualization and our gigapixel display, techniques of data and information mining and recommending, and investigations regarding communities and social networks. We will liaise with a closely connected effort to convene a workshop and define a research agenda related to VT416. We will demonstrate a new and rapid way to respond to crises with digital library testbeds, enabling unique rapid-response research heretofore impossible, with a systems oriented approach, so that we may quickly cycle through: testing hypotheses, collecting and analyzing related data, visualizing findings, discovering trends and patterns, modeling and simulation, and building improved theories and models.

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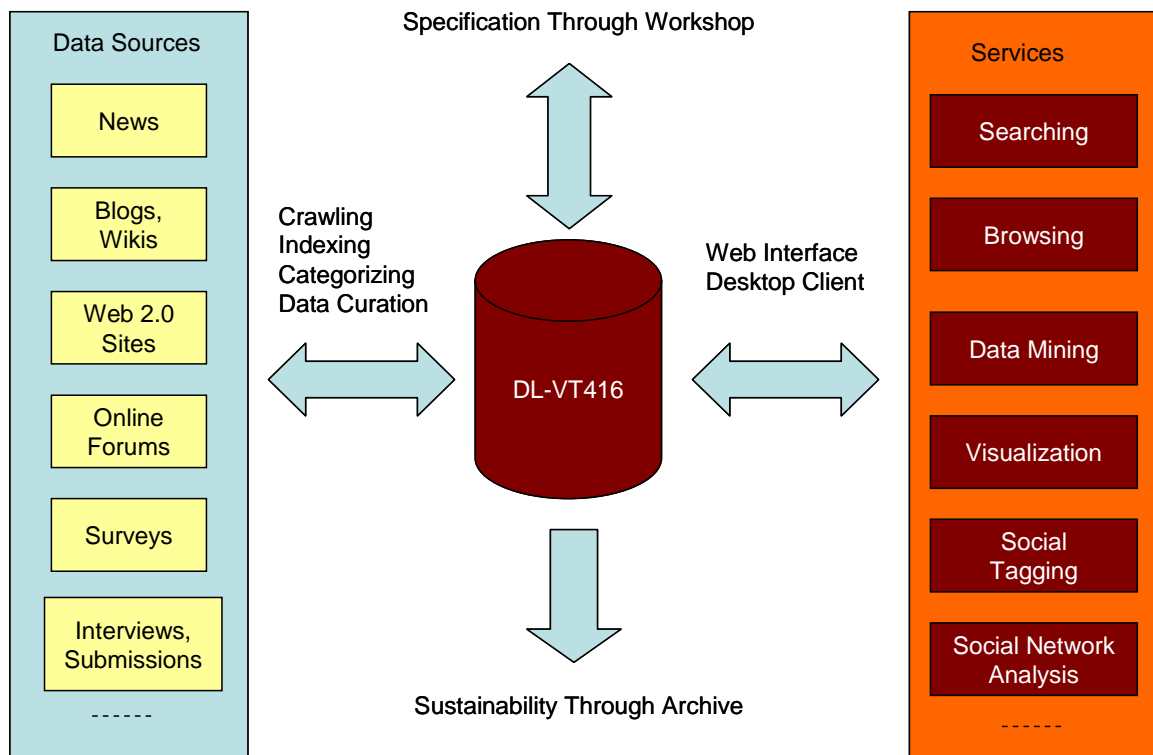
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## Project Description – “DL-VT416: A Digital Library Testbed for Research Related to 4/16/2007 at Virginia Tech”

Our multidisciplinary team will research how digital libraries (DLs) [1, 2] can provide immediate and ongoing support during crises and their aftermath, especially on university campuses. We will develop a testbed supporting a wide range of research studies including those aided by data mining, visualization, and social network analysis. We will validate our approach with data and multimedia information related to the events on 4/16/2007 at Virginia Tech (VT416), when 33 members of the university community were killed by a student turned gunman.

As can be seen from Figure 1, our DL will be at the heart of our research activities and should have significant broader impacts when used by large numbers of scholars, as well as the general public. The specification of the DL will be integrated with the activities of a related VT416 study now being proposed to NSF, for a workshop aimed to develop a research agenda.



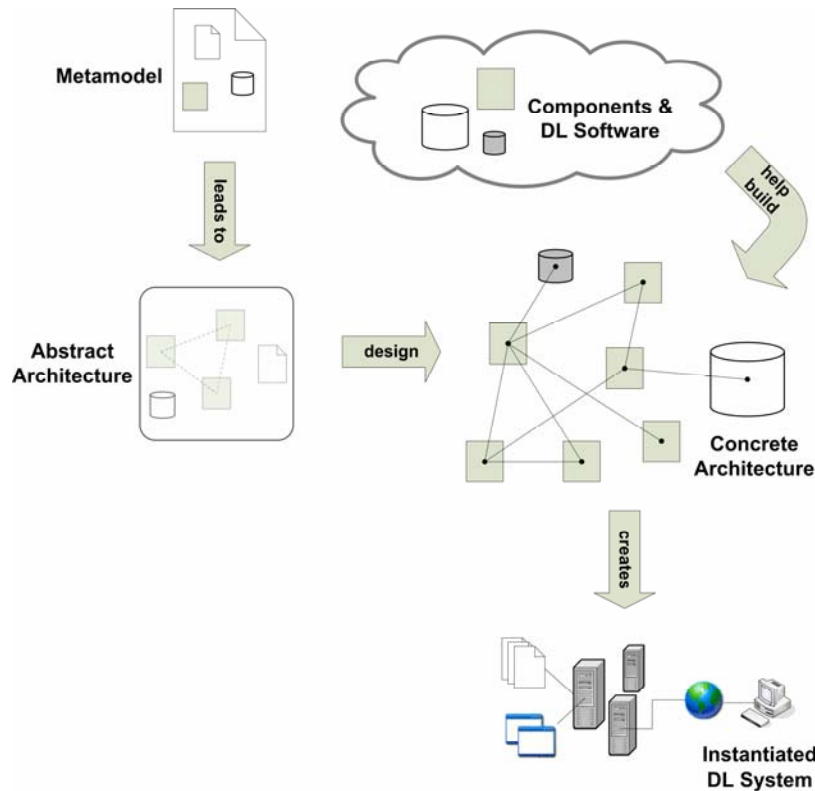
**Figure 1.** Central role of DL-VT416 in our research activities and broader impacts

It is extremely important that our digital library be put into operation as soon as possible, so data now being captured by various parties, to assist in understanding VT416, can be brought together and used to support the research of sociologists, psychologists, and others interested in crises, tragedies, stress, grief, coping, and many related topics. This must be done in a flexible way (see next section), so we can adapt the DL to ever changing needs, including those that will be specified in connection with the abovementioned workshop aimed to devise a research agenda addressing such events (which Dr. Shoemaker will lead).

### DL Generation

DL-VT416 will be built using our semi-automatic approach to rapid development of digital libraries [3, 4] that has been under development by PI Fox and his colleagues for over five years,

in connection with the 5S framework [5]. In addition to a number of doctoral dissertations related [6-8], several Master's theses [9, 10] have facilitated this approach; the most recent is by Gorton [11], who summarized the overall situation as can be seen in Figure 2.



**Figure 2. Overview of DL generation, as into DSpace [11]**

We will generate a DL, and revise it as needed, building initially upon the popular DSpace system [12, 13]. We will connect it with data mining, social network analysis, and visualization capabilities [14], leading to a flexible support infrastructure in which rapid testing of hypotheses will be made possible, as follows.

### Supporting Systems-Level Science

Our goal is to support “systems-level” science on the social dynamics associated with crisis events. Inspired by current research trends in biology and the life sciences, systems-level science seeks to understand the functioning of very large and complex systems and all the interactions therein, in a wholistic fashion. This is in contrast to more traditional reductionist science, which narrows the problem down to focus on specific individual variables. Systems-level science is more exploratory in nature, and encourages the development of new hypotheses. In the life sciences, the “system” of systems-level science refers to the functioning of complex biological organisms. In Virginia Tech’s case, the “system” under study is the complex communities of people and how they respond to crises.

Systems-level science is more challenging to implement than other approaches, but can offer deeper insights into the underlying phenomenon. Systems-level science requires:

- Rapid and continuous collection of massive data: The recent growth of systems-level science in biology was supported by the invention of microarray and similar instrumentation that enables simultaneous collection of data about thousands of genes

and proteins at the cellular level, thereby offering a complete picture that is both detailed and broad. Similarly our digital library will be organized to ingest large collections, such as email logs, that are collected and curated over time.

- Integration of diverse, heterogenous data: Our digital library must be able to bridge diverse data sources, including vast electronic logs such Google searches and email logs, as well as rich personal sources such Facebook pages, surveys, and interviews. We will investigate new kinds of data that could be captured such as through volunteer tracking and deployment of our two Microsoft SenseCam/Memex units.
- Realtime exploratory analysis: To gain deep insight, our digital library must link with analysis tools to support rich exploratory analysis of complex patterns and interrelationships for theory development. Realtime analysis must maintain synchronization with incoming information to enable awareness of breaking hypotheses and quick response. Access, analysis, dissemination, and utilization will be supported by visualizations and data mining tools.

### **Visualization**

For access, analysis, and dissemination of our library contents, we will integrate a set of visualization tools, led by Dr. North. To support heterogeneous and dynamic data collections, flexible visualization tools capabilities are required. We will integrate our Visualization Schemas framework with our 5S digital libraries framework to offer visualization capabilities that users can model and curate in much the same way that they do for the digital library content. We will liaise with other institutions that offer diverse library visualization tools that could plug into this environment, such as Pacific Northwest National Laboratories' InSpire system, and Penn State's Improvise system.

To enable new social science research through realtime analysis of our continuously dynamic library content, we will link the digital library with Virginia Tech's GigaPixel Display. The GigaPixel Display project (<http://infovis.cs.vt.edu/gigapixel/>) offers nearly 200 million pixels of display space for massive data visualization and situational awareness. Recent research results indicate that such large displays significantly expand and enhance human abilities for visualizing large data and maintaining awareness of dynamic data. This can enable a new form of social research that occurs in realtime. Scientists can examine trends as they occur, such as ulterior changes in later crisis reactions by certain population groups, and potentially work to affect outcomes. The GigaPixel Display will give the library a living presence.

### **Data Mining**

We will investigate a multi-pronged approach to mining and harnessing the collection of information brought together in DL-VT416. First, led by Dr. Ramakrishnan, we will mine the time-stamped series of documents to uncover the key trends that characterized the tragedy and the ensuing response. Next, we will mine the network of relationships induced by communications as recorded on various social networking sites and characterize this network temporally in light of the trends characterized before. This will aid in understanding if particular forms of communication were especially prevalent during different stages of the unfolding sequence of events. Finally, we can explore different "projections" of the multi-dimensional data space and determine if trends manifesting globally also reflect in the local views. The results of data mining will ideally be parameters of information diffusion that can then be used to drive a system-wide model of human-human communication, which in turn can be used for simulating synthetic scenarios. The algorithms we will explore include Kleinberg's burst detection algorithm, storyline extraction from collections of documents, graph characterizations of networks such as connectedness, average shortest path length, clustering coefficient, and multi-dimensional aggregates and views.

## **Social Network Analysis**

Dr. Fan has extensive expertise on focus crawling, text mining, and social network analysis [15-23]. He will help with crawling data from different sources and with text mining and social network analysis to analyze emerging patterns from the testbed.

Social network analysis is a proven technique widely used in social science to understand properties related to a social system. It will help us understand not only the global properties of a network such as the average betweenness of two nodes, or the average in-degree and out-degree among all nodes in a network, but also help us understand individual node's properties such as its centrality in the network, and in-degree and out-degree. Many data sets from our data collection will have networks of relationships. For example, each email exchange (which we can study with IRB approval if released for research by all parties involved) will set up a link between a sender and a receiver. Similarly, in the popular Facebook discussion forum, every message will include a message originator and a respondent. Analyzing these kinds of social exchange data using social network analysis combined with text mining techniques will help us answer interesting research questions related to the 04/16/2007 VT tragedy such as:

- How do different communication channels (online forums in Facebook, email) help people affected by tragedy cope with the stress and grief, and improve their healing process?
- Who do people respond to when they first hear of a tragedy?
- What types of roles are played by different types of users?
- What are the different sub-communities? How do they evolve over time?

## **Sustainability and Broader Impacts**

Virginia Tech University Libraries, and the various branches concerned with Special Collections and Archives, has been in touch with the Library of Congress and other groups. It will maintain into the future an archive related to VT416. We are coordinating closely with them, as well as the Center for Digital Discourse and Culture (see fuller list of interested parties under Supplemental Documents), and will make sure that sustainability of the DL results. Our focus will be on handling digital information, collecting it as quickly as possible, and supporting the broader impacts of such information through a variety of services aimed at the needs of researchers and the general public (recall Figure 1). Our approach, partially described above, will be refined as we collaborate with those forming a research agenda for this field, those providing data, and those engaged in research and education activities. We will have a web site and widely disseminate our findings through online, conference, and journal venues. We also will build upon work previously supported by NSF, included studies described below.

## **Results from Prior NSF Support**

Drs. Fan and Fox are completing four years of work with NSF (ITR) funding, through grant IIS-0325579, entitled Information Technology Research: Managing complex information applications: An archaeology digital library. This was launched by an archaeologist, Project PI James Flanagan (CWRU), with the IT aspects led by VT PI Fox and co-PI Fan. VT's subcontract was for \$189,500, covering 9/1/03-12/31/05, but a no-cost extension allowed continuation of research into the summer of 2007. The ETANA-DL (digital library – see <http://etana.dlib.vt.edu> for publications, presentations, and a link to the system) provides an integration framework and broad set of services operating on data from sites in Jordan and Israel. Two dissertations, two theses, and a number of papers have been published [4, 24-38]. Tools have been developed for schema mapping and integration, and the system supports search, multi-dimensional browsing, visualization, comparison, data export, and extensibility to more sites and other domains.

Dr. North, serving as PI working with colleagues Doug Bowman, Roger Ehrich, Steve Harrison, is completing work on Towards Boundless Display: Developing a Reconfigurable Research Testbed for Large-scale, High-resolution Visual Displays. NSF #CNS-04-23611

(08/16/04 - 08/15/07) supported the construction of the GigaPixel Display Laboratory (<http://infovis.cs.vt.edu/gigapixel/>), hosted by Virginia Tech's Department of Computer Science and the Center for Human-Computer Interaction (CHCI), and directed by Dr. Chris North. This NSF-funded facility (see Figure 3) contains reconfigurable ultra-high resolution displays, totaling approximately 200 million pixels, one of the highest resolutions in the world. In addition to resolution, a unique aspect of this facility is its diversity of technologies and reconfigurability. Display technologies include rear-projection blocks and LCD panels. Interactive devices include touch panels, 6 DoF trackers, laser trackers, RFID, and various handhelds. Reconfigurability enables the display blocks and panels to be rearranged into arbitrary form factors, with plug-n-play flexibility of input devices. The facility is supported by computational clusters, and software to support rapid reconfiguration. The facility is co-located with the CHCI's AwareLab, providing VICON vision-based tracking for interactive input, and the 3Di Laboratory, providing immersive 3D displays. This facility provides an ideal research testbed for exploring fundamental questions of the design of future human-computer interfaces. It also provides a resource for advanced visualization and analysis of very large data. The massive number of pixels enables analysts to efficiently visualize much larger quantities of data than on traditional desktop displays. A current project resulting from this facility is designing and evaluating visualizations for intelligence data analysis for the National Geospatial-intelligence Agency. Research results have shown significant user performance advantages of such large-scale visualizations over their small-scale counterparts. Initial results are published in [39-45].



**Figure 3.** The specific display shown is a 100-million pixel display composed of 50 tiled 20" LCD monitors. The display is approximately 16'x6'. It is controlled by a networked cluster of 25 computers, with software that connects the 50 monitors as though they were a single large high-resolution display surface.

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**A. Professional Preparation**

MIT Electrical Engineering (Computer Science Option), B.S., 1972

Cornell Computer Science, M.S., 1981

Cornell Computer Science, Ph.D., 1983

**B. Appointments**

- 1/98- Director, Digital Library Research Laboratory, VPI&SU (Virginia Tech)  
4/95- Professor, Dept. of Computer Science, VPI&SU (Virginia Tech), 24061 USA  
6/90-12/02 Associate Director for Research, VPI&SU (Virginia Tech) Computing Center  
5/88-4/95 Associate Professor, Dept. of Computer Science, VPI&SU  
9/83-5/88 Assistant Professor, Dept. of Computer Science, VPI&SU

**C. Publications (over 310, including)****Publications (Selected Related):**

- Seonho Kim, Subodh Lele, Sreeram Ramalingam, Edward A. Fox. Visualizing User Communities and Usage Trends of Digital Libraries Based on User Tracking Information. ICADL 2006, Kyoto, Springer LNCS 4312  
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Nithiwat Kampanya, Rao Shen, Seonho Kim, Chris North, and Edward A. Fox. Citiviz: A Visual User Interface to the CITIDEL System. In Research and Advanced Technology for Digital Libraries: Proceedings 8th European Conference, ECDL 2004, Bath, UK, September 12-17, 2004, Springer LNCS 3232, 122-133  
S. Perugini, K. McDevitt, R. Richardson, M. Perez-Quinones, R. Shen, N. Ramakrishnan, C. Williams, and E. A. Fox. Enhancing Usability in CITIDEL: Multimodal, Multilingual, and Interactive Visualization Interfaces. In Proc. 4th ACM/IEEE Joint Conf. on Digital Libraries: JCDL2004, Tucson, AZ, June 7-11, pp. 315-324  
Marcos Andre Goncalves and Edward A. Fox. 5SL – A Language for Declarative Specification and Generation of Digital Libraries. Long paper in Proc. JCDL'2002, Second Joint ACM / IEEE-CS Joint Conference on Digital Libraries, July 14-18, 2002, Portland, pp. 263-272

**Publications (Selected Other):**

- Marcos Andre Goncalves, Barbara L. Moreira, Edward A. Fox, and Layne T. Watson. "What is a good digital library?" - A quality model for digital libraries. Information Processing and Management (2007), to appear  
Manas Tungare, Xiaoyan Yu, William Cameron, GuoFang Teng, Manuel Perez-Quinones, Lillian Cassel, Weiguo Fan, Edward Fox. Towards a Syllabus Repository for Computer Science Courses, Full paper accepted for ACM SIGCSE 2007, March 7-10, 2007, Covington, KY  
Edward A. Fox, Fernando Das Neves, Xiaoyan Yu, Rao Shen, Seonho Kim, and Weiguo Fan. Exploring the computing literature with visualization and stepping stones & pathways. CACM 49(4): 52-58, April 2006  
Rao Shen, Jun Wang, and Edward A. Fox. A Lightweight Protocol between Digital Libraries and Visualization Systems. In Proceedings of JCDL Workshop on Visual Interfaces to Digital Libraries, July 18, 2002, Portland, eds. Katy Borner & Chaomei Chen, Springer Verlag, LNCS Series, Vol 2539, 2002, pp. 217-225  
Edward A. Fox and Shalini R. Urs. Digital Libraries. Annual Review of Information Science and Technology, ed. Blaise Cronin, Vol. 36, Ch. 12, pp. 503-589, 2002.

**D. Synergistic Activities****Current**

- Chairman, IEEE Technical Committee on Digital Libraries, IEEE Computer Society ([www.ieee-tcdl.org](http://www.ieee-tcdl.org))  
Executive Director, Networked Digital Library of Theses and Dissertations ([www.ndltd.org](http://www.ndltd.org)), the worldwide organization promoting collection and sharing of electronic theses and dissertations  
Director, Computing and Information Technology Interactive Digital Educational Library (CITIDEL, an NSDL collection project launched fall 2001, [www.citidel.org](http://www.citidel.org)), harvesting and sharing roughly .5M educational resources to promote teaching and learning related to computing  
Editorial Board: ACM Trans. Info. Systems, Inf. Proc. Mgmt., Int. J. on Digital Libraries, JEMH, MTAP  
Editor, Morgan Kaufmann Publishers, Inc. Series on Multimedia Information and Systems  
Member, Steering Committee, Joint Conference on Digital Libraries (JCDL)

Member, Steering Committee, International Conference of Asian Digital Libraries (ICADL)  
Member, JISC Advisory Group, Programmes on Digital Repositories, Digital Asset Management & Preservation  
Member, Advisory Board, EU funded DELOS Network of Excellence on Digital Libraries

### **Prior**

Program chair of the Information Retrieval track, ACM CIKM 2006, Arlington, VA, Nov. 6-11, 2006  
Chair, National Science Digital Library (NSDL) Policy Committee (2002-2003, member through 2004)  
Co-Editor-in-Chief, ACM J. of Educational Resources in Computing (JERIC, [www.acm.org/pubs/jeric](http://www.acm.org/pubs/jeric))  
Co-chair, Program Committee, 8th Int'l Con Asian Digital Libraries (ICADL 2005), Bangkok, Thailand  
Chair: First ACM/IEEE-CS Joint Conference on Digital Libraries, JCDL'2001, Hotel Roanoke and Conference Center, Roanoke, VA, June 24-28, 2001, [www.jcdl.org](http://www.jcdl.org)

### **E. Collaborators & Other Affiliations**

#### **Collaborators and Co-Editors (other than those listed below)**

L. S. Abiteboul (INRIA), G. Adel (VT), F. Agblevor (VT), A. Agrawal (VT), K. Ahuja (VT), M. Ali (VT), H. Anan (ODU), S. Angle (VT), L. Arnold (VT), A. Atkins (VT), N. Balakrishnan (Indian Inst. Sci.), N.D. Barnette (VT), A. Bazaz (VT), P. Buneman (U. Edinburgh), P. Calado (UFMG, Brazil), W. Cameron (Villanova), L. Cantara (CWRU), J. Carroll (Penn St.), L. Cassel (Villanova U.), M. Chang (VT), H. Chen (U. Arizona), I.R. Chen (VT), S.-S. Chen (U. Florida), Z. Chen (Microsoft), C. Coleman (SAS), B. Congleton (VT), J. Connor (VT), M. Cristo (UFMG), J. Cundiff (VT), L. Delcambre (Portland State U.), R. Dividino (U. Campinas), S. Davidson (U. Penn.), N. Davis (VT), M. Drutar (SAS), D. Duong (VT), J. Eaton (VT), J. Eustis (CWRU), A. Falcão (UNICAMP), W. Fan (VT), M. Figueiredo (U. Campinas), J. Flanagan (CWRU), J. French (U. Virginia), J. Futrelle (NCSA), K. Garach (VT), D. Garza-Salazar (Monterrey Tech., Mexico), C.L. Giles (Penn St.), B. Goertzel (VT), R. Goff (VT), M. Gordon (U. Mich.), M. Gregg (VT), H. Griffin (VT), M. Halbert (Emory U.), A. Halevy (U. Wash.), H. Han (Penn State), E. Hilf (U. Oldenburg), J. Impagliazzo (Hofstra U.), Y. Ioannidis (U. Athens), F. Jagodzinski (Villanova), E. Hoffman (Eastern Michigan U.), L. Kalinichenko (UNESCO), N. Kampanya (VT), A. Kanade (VT), S. Kim (Sookmyung Women's U.), C. Knoblock (U. S. Ca.), T. Knott (VT), D. Knox (College of NJ), M. Kothapalli (VT), A. Laender (UFMG, Brazil), J. Lage (UFMG), A. Lally (U. Arizona), R. Larsen (U. Pitt.), JAN Lee (VT), S. Lele (VT), X. Liu (ODU), J. Lo (VT), E. Logan (Fl. State U.), G. Loganathan (VT), V. Lohani (VT), Y. Lu (Peking U.), G. Luc (VT), W. Ma (Microsoft), D. Maier (Portland State U.), K. Mallikarjunan (VT), E. Manavogly (Penn State), B. Marshall (Oregon St. U.), D. Masiello (U. Tampa), K. McDevitt (VT), K. Maly (ODU), G. McMillan (VT), C.B. Medeiros (UNICAMP, Brazil), R. Moore (SDSS), B. Moreira (UFMG), S. Mostaghimi (VT), J. Moxley (U. S. Florida), J. Muffo (VT), S. Murthy (PSU), S. Myaeng (Chungnam National U.), M. Nelson (ODU), E. Neuhold (Tech. U. Vienna), C. North (VT), S. Oh (UNC-CH), G. Panchanathan (VT), A. Pande (VT), P. Pathak (U. Fl.), M. Perez (VT), S. Perugini (U. Dayton), J. Pomerantz (UNC-CH), A. Prabhune (VT), P. Premssmit (Chulalongkorn U.), F. Rabitti (ISTI-CNR), A. Raghavan (VT), N. Ramakrishnan (VT), S. Ramalingam (VT), D. Rangarajan (VT), D. Reis (UFMG), B. Ribeiro-Neto (UFMG), C. Ribbens (VT), P. Roberto (UFMG), J.A. Sánchez (UDLA, Mexico), K. Santhanagopalan (VT), M. Scarborough (VT), H. Schek (UMIT), P. Shires (VT), P. Shivakumar (VT), J. Shu (VT), A.S. da Silva (Fed. U. Amazon), M. Suthers-McCabe (VT), R. Tan (VT), G. Teng (Villanova), M. Tungare (VT), S. Tupe (VT), S. Vatile (VT), D. Vaughan (VT), J. Venuto (VT), M. Vieira (UFMG), L. Wang (U. Mich.), L. Watson (VT), G. Weikum (Max-Planck Inst.), C. Weisser (Fl. Atlantic U.), T. Wildman (VT), B. Wildemuth (UNC-CH), C. Williams (VT), M. Wolfe (VT), H. Wu (U. Mich.), V. Wuwongse (AIT, Bangkok), L. Xu (VT), J. Yan (Beijing U.), S. Yan (Peking U.), R. Yang (VT), W. Xi (VT), H. Zha (Penn State), B. Zhang (Microsoft), Y. Zhang (U. Arizona), Z. Zhang (Zhejiang U.), D. Zhuang (Beijing Inst. Tech.), R. Zia (VT), M. Zubair (ODU)

**Graduate Advisor:** G. Salton (deceased 1995)

**Thesis Advisor (over 28):** G. Abdulla, Y. Chen, F. Das Neves, S. Feizbadi, R. France, M. Goncalves, D. Gorton, R. Kelapure, S. Kim, N. Kipp, A. Krowne, B. Liu, M. Luo, P. Mather, U. Murthy, A. Raghavan, U. Ravindranathan, R. Richardson, R. Shen, O. Sornil, H. Suleman, L. Tinoco, N. Vemuri, J. Wang, S. Yang, X. Yu, B. Zhang, J. Zhao, Y. Zhou, Q. Zhu

**Postgraduate-Scholar Sponsor (over 12):** J.-M. Bae (Gyeongsang Natl. U.), L. Cassel (Villanova U.), B. Chauhan (Thapar Inst.), P. Cheemalavagupalli (U. Hyderabad), R. da S. Torres (UNICAMP), P. de la Fuente (U. Valladolid), R. Gaur (MDI, Gurgaon), B. Kim (Acad. Korean Studies), M.H. Lee (Chungnam Natl. U.), D. Madali (Indian Stat. Inst.), A. Maeda (Ritsumeikan U.), S. Urs (U. Mysore)

## Weiguo (Patrick) Fan

### Education

University of Michigan, Ann Arbor (1998-2002)  
Ph. D., Computer and Information Systems (2002)  
National University of Singapore, Singapore (1996-1998)  
M. Sc, Computer Science (1998).  
Xi'an Jiaotong University, Xi'an, P. R. China (1991-1995)  
Bachelor of Eng., Information Science and Engineering (1995)

### Academic and Professional Appointments

|                        |  |
|------------------------|--|
| July, 2006 – present   | <b>Associate Professor</b> of Information Systems<br><b>Associate Professor</b> of Computer Science<br>Virginia Polytechnic Institute and State University, Blacksburg, VA |
| July 2002 – June, 2006 | <b>Assistant Professor</b> of Information Systems<br><b>Assistant Professor</b> of Computer Science<br>Virginia Polytechnic Institute and State University, Blacksburg, VA |
| May – June 2001        | Instructor<br>Dept. of CIS<br>University of Michigan, Ann Arbor  |

### Five publications related to the proposal (i)

- “An empirical study of knowledge community success,” with H. Lin, L. Wallace, Z. Zhang, in *the Proceedings of the 40th Hawaii International Conference on System Sciences (HICSS)*, January 3-6, Big Islands, HI, 2007.
- “Tapping the power of text mining,” with L. Wallace, S. Rich and Z. Zhang, *Communications of the ACM*, 49(9), 76-82, 2006.
- “Mining navigations for intelligence,” with H. Wu, M. D. Gordon, *Decision Support Systems*, 41(3), 574-591, 2006.
- “The architecture of CommKnowledge: combining link structure and user actions to support an online community,” with M. D. Gordon, S. Rafaeli, H. Wu, N. Farag, *International Journal of Electronic Business*, 1(1), 69-82, 2003.
- “Website success metrics: addressing the duality of goals”, with F. Belanger, C. Schaupp, J. Everhart, D. Poteet, A. Krishen, K. Nakamoto, in press, *Communications of ACM*, 2006.

### Five other significant publications (ii)

- “Effective and efficient dimensionality reduction for large scale and streaming data preprocessing,” with J. Yan, B. Zhang, N. Liu, S. Yan, Q. Cheng, Q. Yang, W. Xi, Z. Chen, *IEEE Transactions on Knowledge and Data Engineering*, 18(3), 320-333, 2006.
- “Effective profiling of consumer information retrieval needs: a unified framework and empirical comparison”, with M. D. Gordon, P. Pathak, *Decision Support Systems (DSS)*, 40(2), 213-233, 2005.
- “The effects of fitness functions on genetic programming-based ranking discovery for web search”, with E. Fox and P. Pathak, H. Wu, *Journal of the American Society for Information Science and Technology (JASIST)*, 55(7), 628-636, 2004.
- “Discovery of context-specific ranking functions for effective information retrieval by genetic programming”, with M. D. Gordon, P. Pathak, *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, 16(4), 523-527, 2004.

- “A generic ranking function discovery framework by genetic programming for information retrieval”, with M. D. Gordon, P. Pathak, *Information Processing and Management (IP&M)*, 40(4), 587-602, 2004.

### **Synergistic Activities**

- Executive member of the IEEE-CS Technical Committee for Digital Library.
- NSF Panel member, 2004, 2005, 2007.
- Program committee for 2006 ICTAI, 2004, 2005, 2006 WITS, 2006 CIKM, ICADL, 2005 ICADL, 2005, 2006 ICIS
- Memberships in the Association for Computing Machinery (ACM), the Institute for Operations Research and the Management Sciences (INFORMS), and the Association for Information Systems (AIS).
- Reviewer for *Management Science*, *MISQ*, *Information Systems Research*, *Information Processing and Management*, *ACM Transactions on Information Systems*, *Information Systems*, *Communications of ACM*, *Journal of the American Society for Information Science and Technology*, *Information Systems*, *Information Systems Research*, *Decision Support Systems*, *IEEE Transactions on Knowledge and Data Engineering*, *IEEE Transactions on Systems, Man, and Cybernetics*, *IEEE Transactions on Evolutionary Computation*, *International Conference on Information Systems*
- As a **jointly appointed Associate Professor** in both the Information Systems and Computer Science at Virginia Tech, Dr. Fan acts as a bridge between the technical and behavioral aspects of computer and information systems research and education. In addition to offering unique, multidisciplinary input into research projects, he uses his joint appointment to disseminate his knowledge to multiple audiences.

### **Collaborators and Other Affiliations**

#### ***i. Collaborators***

F. Belanger (Virginia Tech), D.W. Cheung (Univ. of Hong Kong), N. Farag (Univ. of Michigan), E. Fox (Virginia Tech), C. Goh (National Univ. of Singapore), S.B. Goldensohn (Columbia Univ.), M.D. Gordon (Univ. of Michigan), K. Libner (Univ. of Michigan), H. Lu (Hong Kong Univ. of Science and Technology), R. Lindsay (Univ. of Michigan), S. Madnick (Massachusetts Institute of Technology), D.H. Ming (National Univ. of Singapore), P. Pathak (Univ. of Florida), K. Phua (National Univ. of Singapore), J. Prager (IBM), H. Qi (Univ. of Michigan), D.R. Radev (Univ. of Michigan), S. Rafaeli (Univ. of Michigan), L. Wallace (Virginia Tech), H. Wu (Univ. of Michigan), W. Xi (Virginia Tech), Y. Zeng (National Univ. of Singapore), Y. Zhang (National Univ. of Singapore), Z. Zhang (Univ. of Michigan), Z. Zhang (Univ. of Conn.).

#### ***ii. Graduate and Post Doctoral Advisors***

M.S. Advisor: Kang Hoh Phua, National University of Singapore

Ph.D. Advisor: Michael D. Gordon, University of Michigan

#### ***iii. Graduate Students***

Li Wang, Wensi Xi, Ye Zhou, Baoping Zhang, Rao Shen, Ming Luo, Rui Yang, Christian Schaupp, Marcos André Gonçalves, Hui Lin

# Christopher L. North

Associate Professor  
Department of Computer Science  
Virginia Polytechnic Institute and State University  
660 McBryde Hall, Blacksburg, VA 24061-0106  
(540) 231-2458      fax: (540) 231-6075  
north@cs.vt.edu      http://www.cs.vt.edu/~north/

## Education:

B.S., University Honors, Computer Science / Mathematics, Carnegie Mellon University, 1992  
M.S., Computer Science, University of Maryland, College Park, 1995  
Ph.D., Computer Science, University of Maryland, College Park, 2000

## Current Appointment:

Associate Professor, Department of Computer Science, Virginia Tech  
(since 2000, including Assistant Professorship)  
Head, Laboratory for Information Visualization and Evaluation (LIVE), Virginia Tech  
Director, GigaPixel Display Laboratory, Virginia Tech  
Member, Center for Human-Computer Interaction, Virginia Tech

## Research Interests:

Human-computer interaction, information visualization, user interface evaluation, high-resolution displays, digital libraries, collaborative systems, end-user programming.  
Applications of HCI and visualization to intelligence information, bioinformatics, geographic information systems, network intrusion detection, information-rich virtual environments.

## Related Publications:

Ball, R., North, C., and Bowman, D. "Move to Improve: Promoting Physical Navigation to Increase user Performance with Large Displays", *ACM Conference on Human Factors in Computing Systems (CHI)*, April 2007. [Honorable Mention Award Paper]

Ball, R. and North, C. "Realizing Embodied Interaction for Visual Analytics through Large Displays", *Computers & Graphics (C&G)*, Volume 31, issue 3, 2007.

Purvi Saraiya, Chris North, Vy Lam, and Karen Duca, "An Insight-based Longitudinal Study of Visual Analytics", *IEEE Transactions on Visualization and Computer Graphics*, 12(6): 1511-1522, Nov 2006.

Beth Yost, Chris North, "The Perceptual Scalability of Visualization", *IEEE Transactions on Visualization and Computer Graphics*, 12(5): 837-844, Sept. 2006.

Chris North, "Towards Measuring Visualization Insight", *IEEE Computer Graphics & Applications*, 26(3): 6-9, May/June 2006.

Chris North, "Information Visualization", chapter in *Handbook of Human Factors and Ergonomics, 3rd Edition*, G. Salvendy (editor), New York: John Wiley & Sons, 2005.

Purvi Saraiya, Chris North, Karen Duca, "An Insight-based Methodology for Evaluating Bioinformatics Visualizations", *IEEE Trans. on Visualization and Computer Graphics*, 11(4):443-456, (July 2005).

Doug Bowman, Chris North, Jian Chen, Nicholas Polys, Pardha Pyla, and Umur Yilmaz, "Towards Usable and Effective Information-Rich Virtual Environments", *ACM Virtual Reality Software and Technology 2003*, (Sept 2003).

C. North, N. Conklin, K. Idukuri, V. Saini. "Visualization Schemas and a Web-based Architecture for Custom Multiple-View Visualization of Multiple-Table Databases", *Information Visualization*, 1(3-4): 211-228, Palgrave-Macmillan, December 2002.

C. North, B. Shneiderman. "Snap-Together Visualization: Can Users Construct and Operate Coordinated Views?", *Intl. Journal of Human-Computer Studies*, 53(5): 715-739, Nov. 2000.

#### **Related Funded Research:**

Chris North, "Design and Evaluation of Scalable Information Visualizations with High-Resolution Displays", National Science Foundation, HCC.

Chris North, Bill Carstensen, "Ultra-High Resolution Interactive Information Visualization", ARDA and National Geospatial-intelligence Agency (NGA), Geo-Spatial Intelligence Information Visualization Program (GI2Vis).

Chris North, Doug Bowman, Steve Harrison, Roger Ehrich, "Towards Boundless Display: Developing a Reconfigurable Research Testbed for Large-scale, High-resolution Visual Displays", NSF, CISE Research Resources.

Scott McCrickard, Chris North, "Flexible and Extensible Multivariate Data Visualization: Toward a Collaboratory for Sharing Data Findings", National Institute of Standards and Technology (NIST).

Chris North, "Geographic Information Visualization", U.S. Bureau of the Census.

#### **Related Teaching Activities:**

*Display Wall User Interfaces*, special topics seminar on user interfaces for high-resolution displays.

*Information Visualization*, research-oriented graduate course taught yearly on visualization design and evaluation.

*Human-Computer Interaction*, undergraduate course taught yearly on user interface design, development, and evaluation.

#### **Related Synergistic Activities and Technology Transfer:**

DataMaps: U.S. Bureau of the Census, *Counties USA* cd-rom (2005).

Director's Award for Innovation, U.S. Bureau of the Census, May 2000.

Conference Organizing Committee: *IEEE Symposium on Information Visualization*, 2004 – 2007.

Organizer: Workshop on Using Large, High-Resolution Displays for Information Visualization, *IEEE Visualization 2005*.

Guest editor: *Information Visualization* special issue on Bioinformatics Visualization (July 2005).

#### **Recent Collaborators:**

*Virginia Tech*: Doug Bowman, Roger Ehrich, Ed Fox, Steve Harrison, Rex Hartson, Lenny Heath, Scott McCrickard, Francis Quek, Naren Ramakrishnan, Cliff Shaffer (CS), Karen Duca, Reinhard Laubenbacher (VBI), Anthony Songer (CEE), Bill Carstensen (Geo).

*External*: Catherine Plaisant (University of Maryland), Eser Kandogan (IBM Almaden), Phillip Korn (AT&T Labs), David Desjardins, Kent Marquis (U.S. Census Bureau), Allan Kuchinsky (Agilent Labs), Theresa-Marie Rhyne (NCSU), George Robertson (Microsoft), Theresa-Marie Rhyne (NC State).

*Graduated students*: Nathan Conklin, John Costigan, Sanjini Jayaraman, Varun Saini, Kiran Indukuri, Chris Catanzaro, Sujatha Krishnamoorthy, Nicholas Polys, Lauren Shupp, Purvi Saraiya, Glenn Fink, Robert Ball.

*Graduate advisor*: Ben Shneiderman (University of Maryland, College Park).

# Naren Ramakrishnan

Associate Professor of Computer Science  
Virginia Tech, Blacksburg, VA 24061, USA  
Email: naren@cs.vt.edu, Web: <http://www.cs.vt.edu/~ramakris>

## Research Interests

Computational science, mining scientific data, problem solving environments, bioinformatics, and information personalization.

## Education

Jan 1995 – July 1997 Ph.D. in Computer Sciences, Purdue University, IN 47907  
Aug 1992 – Dec 1993 Master of Eng. in Computer Science & Eng., Anna University, India

## Professional Appointments

Jan 2005 – July 2005 Visiting Professor, Dept. of CSA, IISc, Bangalore, India  
Sep 2004 – Dec 2004 Visiting Scientist, Courant Institute, New York University  
Jun 2004 – Aug 2004 Visiting Faculty, IBAB, Bangalore, India  
Jun 2003 – Associate Professor of Computer Science, Virginia Tech  
Aug 1998 – May 2003 Assistant Professor of Computer Science, Virginia Tech  
Aug 1997 – July 1998 Visiting Assistant Professor of Computer Sciences, Purdue University  
Jan 1994 – Dec 1994 Assistant Systems Analyst, Tata Consultancy Services, India

## Adjunct Appointments

July 2005 – Adjunct Professor, IBAB, Bangalore, India  
Aug 2003 – Associate Faculty, Genetics, Bioinformatics, and Computational Biology (GBCB), Virginia Tech  
Aug 2001 – Affiliate Investigator, Virginia Tech Center for Genomics (VIGEN)  
Aug 2001 – Core Faculty, Virginia Tech Lab for Advanced Scientific Computing & Applications (LASCA)

## Academic Honors and Professional Recognition

- ‘Best of SIAM Data Mining 2005.’
- Faculty Fellow, Virginia Tech College of Engineering, 2005.
- Dean’s award for Excellence in Teaching, Virginia Tech, 2005 (one of only four awarded).
- Top 10 teachers in the College of Engineering, Virginia Tech, 2004 (from  $\approx$  300 faculty).
- DARPA BioSPICE Early Contributor Appreciation Award, June 2002.  
(with J.J. Tyson, C.A. Shaffer, and L.T. Watson)
- New Century Technology Council (NCTC) Innovation Award, May 2001.
- U.S. National Science Foundation CAREER Grant, Aug 2000.

## Professional Service

- Program Chair, Seventh IEEE International Conference on Data Mining (ICDM’07), Omaha, NE (with O. Zaïane).
- Co-chair, ACM SIGKDD 2006 Workshop on ‘Temporal Data Mining: Network Reconstruction from Dynamic Data,’ Philadelphia, PA, Aug 2006 (with K.P. Unnikrishnan, P.S. Sastry, and R. Uthurusamy).
- Area Editor, *IEEE Computer*, June 2004–.
- Guest Editor, Special Issues of *IEEE Computer* on ‘Bioinformatics Software Systems’ (with L.S. Heath), July 2002; on ‘Data Mining’ (with A.Y. Grama), Aug 1999.

## Five Selected Publications

1. D. Kumar, N. Ramakrishnan, M. Potts, and R.F. Helm, Algorithms for Storytelling, in *Proceedings of the Twelfth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD'06)*, Philadelphia, PA, pages 604–610, Aug 2006.
2. L. Zhao, M.J. Zaki, and N. Ramakrishnan, BLOSUM: A Framework for Mining Boolean Expressions, in *Proceedings of the Twelfth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD'06)*, Philadelphia, PA, pages 827–832, Aug 2006.
3. M.J. Zaki and N. Ramakrishnan, Reasoning about Sets using Redescription Mining, in *Proceedings of the Eleventh ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD'05)*, Chicago, IL, pages 364–373, Aug 2005.
4. N. Ramakrishnan, D. Kumar, B. Mishra, M. Potts, and R.F. Helm, Turning CARTwheels: An Alternating Algorithm for Mining Redescriptions, in *Proceedings of the Tenth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD'04)*, Seattle, WA, pages 266–275, Aug 2004.
5. C. Bailey-Kellogg, N. Ramakrishnan, and M.V. Marathe, Spatial Data Mining to Support Pandemic Preparedness, *ACM SIGKDD Explorations*, Vol. 8, No. 1, pages 80–82, June 2006.

## Five Other Publications

1. S. Perugini and N. Ramakrishnan, Mining Web Functional Dependencies for Flexible Information Access, *Journal of the American Society for Information Science and Technology* (Special Issue on 'Mining Web Resources for Enhancing Information Retrieval'), 2007, to appear.
2. M.B. Kumar, B.J. Keller, and N. Ramakrishnan, Scouts, Promoters, and Connectors: The Roles of Ratings in Nearest Neighbor Collaborative Filtering, *ACM Transactions on the Web* (Special Issue of selected expanded papers from *ACM EC'06*), 2007, to appear.
3. S. Perugini and N. Ramakrishnan, Interacting with Web Hierarchies, *IEEE IT Professional*, Vol. 8, No. 4, pages 19–28, July/Aug 2006.
4. M. Koyutürk, A.Y. Grama, and N. Ramakrishnan, Non-Orthogonal Decomposition of Binary Matrices for Bounded-Error Data Compression and Analysis, *ACM Transactions on Mathematical Software*, Vol. 32, No. 1, pages 33–69, March 2006.
5. M. Koyutürk, A.Y. Grama, and N. Ramakrishnan, Compression, Clustering, and Pattern Discovery in Very High Dimensional Discrete-Attributed Datasets, *IEEE Transactions on Knowledge and Data Engineering*, Vol. 17, No. 4, pages 447–461, Apr 2005.

## Synergistic Activities

- Established record of interdisciplinary collaboration with science and engineering departments at Virginia Tech to develop domain specific problem solving environments. Examples of software developed include WBCSim (wood-based composites design), L2W (watershed assessment), Espresso (microarray experiment management), S<sup>4</sup>W (wireless communication system design), and JigCell (cell cycle modeling).
- Computer science representative to the interdisciplinary genetics, bioinformatics, and computational biology (GBCB) program at Virginia Tech. Committee roles have included course design and development, curriculum integration, admissions processing, and faculty recruiting. GBCB has been highlighted prominently in a *Nature Biotechnology* April 2004 article as one of 11 selected programs in North America and 18 around the world offering novel courses in systems biology.

## Recent Collaborators (not at Virginia Tech)

L. Parida (IBM TJ Watson), B. Mishra (NYU), T.S. Rappaport (UT Austin), A.Y. Grama (Purdue), C. Bailey-Kellogg (Dartmouth), S. Perugini (University of Dayton), J.C. Browne (UT Austin), M.J. Zaki (RPI), M. Antoniotti (NYU).

## Thesis Advisor

Elias N. Houstis (formerly at Purdue; now at University of Thessaly, Greece).

## **BioSketch: Donald J. Shoemaker, Ph.D.**

### **Educational Background**

University of Georgia: Athens, Georgia; M.A. Sociology, 1968; Ph.D. Sociology, 1970; NDEA Title IV Fellow, 1966-1969  
Millsaps College: Jackson, Mississippi; B.A. Sociology, 1966  
University of Mississippi: Oxford, Mississippi; Undergraduate Study, 1962-63

### **Appointments**

Professor, Virginia Polytechnic Institute and State University, Department of Sociology, 1997;  
Director, Center for the Study of Violence in Society, 2003-present  
Visiting Exchange Professor, Department of Sociology, University of the Philippines, Diliman, Spring Semester, 1997; June-August, 1998; Spring Semester, 2001  
Associate Professor, Virginia Polytechnic Institute and State University, Department of Sociology, 1977-1997. Assistant Professor, 1974-1976. One-third time with the Community Resource Development Office at Virginia Tech, Winter, 1983  
Visiting Exchange Professor, Department of Sociology, Xavier University in Cagayan de Oro City, Philippines, January-March, 1987  
Adjunct Professor, Roanoke College, Fall, 1986 (taught a course on juvenile delinquency)  
Assistant Professor, University of Southern Mississippi, 1970-1974

### **Synergistic Activities**

#### Editorial and Advisory Experience

Proposal reviewer for NSF, March, 2007  
Member, Editorial Board, Journal of Research in Crime and Delinquency, 2002-present  
Member, Editorial Board, Philippine Journal of Law and Justice, 2000-2005  
International Advisor, Child Abuse Research in South Africa On Line, 1998-2000  
Member, Editorial Advisory Board, Youth and Society, 1985-1995  
Proposal reviewer for SEA Grant program, 1990  
Member, Editorial Advisory Board, Sociological Spectrum, 1984-87, 1987-1990  
Guest Editor, "Special Issue on Theoretical Approaches to the Study of Deviant Behavior: Issues and Prospects," Deviant Behavior, Vol. 9, No. 1, 1988  
Member, Editorial Advisory Board, Sociological Inquiry, 1986-87  
Book Review Editor, Deviant Behavior, 1979-1985  
Associate Editor, Deviant Behavior, 1978-79

#### Consultantships

Member, Advisory Committee for Attorney General's Anti-Gang Task Force, July, 2003-January, 2006  
Expert Consultant and Member, Infrastructure Expert Team (IET) for the Department of Homeland Security, administered by Oak Ridge Associated Universities, Oak Ridge, TN, March, 2004-present

### **Publications Related to Related to the Proposed Project**

Wolfe, T.W. and D. J. Shoemaker, "Actor, Situation, and Context: A Framework for Theory Integration." American Journal of Criminal Justice, Vol. 24, 1999: 117-138.  
Zarco, R.M. and D.J. Shoemaker, "Student Organizations as Conflict Gangs, University of the Philippines, Diliman." Philippine Sociological Review, Vol. 43, 1995: 69- 84.

- Bryant, C. D. and D. J. Shoemaker, "Gun Ownership and Carrying: A Comparison of Protective and Subcultural Correlates," Psychological Reports, Vol. 62, 1988: 61-62.
- Shoemaker, D. J. and J. S. Williams, "The Subculture of Violence and Ethnicity," Journal of Criminal Justice, Vol. 15, Number 6, 1987: 461-472.
- Shoemaker, D. J. and G. A. Hillery, Jr., "Violence and Commitment in Custodial Settings," Criminology, Vol. 18, May, 1980: 94-102.

### **Other Publications**

- Shoemaker, D.J. and D. McDonald, "An Evaluation of the Drug Court of the Twenty-third Judicial Circuit Court of Virginia: A Response to the War on Drugs." Criminal Law Bulletin, Vol. 39, Number 5, 2003: 569-583.
- Shoemaker, D.J. and T. W. Wolfe, Juvenile Justice: A Reference Handbook (Santa Barbara, California:ABC-CLIO, 2005), pp. 223.
- Shoemaker, D.J., Theories of Delinquency: An Examination of Explanations of Delinquent Behavior. New York: Oxford University Press, 1984), pp. 281. Second edition, 1990, p. 329. Third edition, 1996, pp. 284. Fourth edition, 2000, pp.294. Fifth edition,2005.
- Shoemaker, D.J., "Juvenile Corrections in the Philippines." Journal of Offender Rehabilitation, Vol. 24, Number 12, 1996: 29-52.
- Shoemaker, D.J., Ethnic Identity and Delinquency Among Filipino-American Youth: A Theoretical View. Philippine Sociological Review, Vol. 43, 1995: 95-114.

### **Collaborators**

W. Timothy Austin, Indiana University of , Pennsylvania, Paul Friday, University of North Carolina-Charlotte, Filomin Gutierrez, University of the Philippines, Diliman, Danielle McDonald, University of New Hampshire, ZinRen, California, State University, Sacramento, Timothy W. Wolfe, Mount Saint Mary College, Ricardo Zarco, University of the Philippines, Diliman.

### **Advisor**

Raymond Payne (deceased)

### **Thesis and Dissertation Advisees**

Sinan Demarik, Danielle McDonald, John McMullen, Andrea Nash, Roderick Neal, Virginia Rothwell, Jamie Spradlin, Elizabeth Ward

Total number of graduate advisees, 20

## Francis Quek

### i. Professional Preparation

|                        |                        |             |
|------------------------|------------------------|-------------|
| University of Michigan | Electrical Engineering | B.S.E. 1984 |
| University of Michigan | Electrical Engineering | M.S.E. 1984 |
| University of Michigan | C.S.E.                 | Ph.D. 1990  |

### ii. Appointments

|              |   |
|--------------|---|
| 2004-Present | Professor – Dept. of Computer Science<br>Director – Center for Human Computer Interaction<br>Director – Vision Interfaces and Systems Laboratory (VISLab)<br>Virginia Polytechnic and State University, Blacksburg VA |
| 1999-2004    | Associate Professor – Dept. of Computer Science & Engineering<br>Director – Vision Interfaces and Systems Laboratory (VISLab)<br>Wright State University, Dayton, OH  |
| 1993-1999    | Assistant Professor – Dept. of Electrical Engineering & Computer Science, Director -<br>Vision Interfaces and Systems Laboratory (VISLab),<br>University of Illinois, Chicago   |
| 1990-1993    | Assistant Research Scientist, Visiting Research Investigator (June 1989 – May 1990)<br>Dept. of Electrical Engineering & Computer Science, University of Michigan   |
| 1985-1989    | Research Assistant - Dept. of Electrical Engineering & Computer Science, University<br>of Michigan  |
| 1984-1985    | Research & Development Engineer - Hewlett-Packard   |

### iii. Publications

#### a. Five publications most closely related to the project

1. Quek, F., McNeill, D., Bryll, B., Duncan, S., Ma, X., Kirbas, C., McCullough, K-E, and Ansari, R., "Multimodal Human Discourse: Gesture and Speech," *ACM Transactions on Computer-Human Interaction*, 2002.
2. Quek, F., McNeill, D., Bryll, R., Kirbas, C., Arslan, H., McCullough, K-E., Furuyama, N., and Ansari, R., "Gesture, Speech, and Gaze Cues for Discourse Segmentation," *IEEE Conference on Computer Vision and Pattern Recognition (CVPR'2000)*. Hilton Head Island, South Carolina, Vol. 2, pp. 247–254, June 13-15, 2000,
3. Zhao, M., Quek, F., and Wu, X., "RIEVL: Recursive induction learning in hand gesture recognition," *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 20, pp. 1174-1185, 1998.
4. Quek, F., "Unencumbered gestural interaction," *IEEE Multimedia*, vol. 4, pp. 36-47, 1996.
5. Quek, F., Bryll, R., Arslan, H., Kirbas, C., and McNeill, D., "A multimedia database system for temporally situated perceptual psycholinguistic analysis," *Multimedia Tools and Applications*, Kluwer Academic Publishers. Vol. 18, No. 2, pp. 91-113, August 2002.

#### b. Five significant other publications

1. McNeill, D., Quek, F., McCullough, K-E, Duncan, S., Furuyama, N., Bryll, R., Ma, X.-F., and Ansari, R., "Catchments, Prosody and Discourse," *Gesture*. Vol. 1, No. 1, 2002, pp. 9-33, Also as Vision Interfaces and Systems Lab, VISLab Report: VISLab-01-06
2. Quek, F., "Eyes in the interface," *International Journal of Image and Vision Computing*, vol. 13, pp. 511-525, Aug. 1995.
3. Quek, F., McNeill, D., Bryll, B., Duncan, S., Ma, X., Kirbas, C., McCullough, K-E, and Ansari, R., "Multimodal Human Discourse: Gesture and Speech," In Press, *ACM Transactions on Computer-Human Interaction*. Also as Vision Interfaces and Systems Lab, VISLab Report: VISLab-01-01.
4. Quek, F., McNeill, D., Ansari, R., Ma, X., Bryll, R., Duncan, S., and McCullough, K-E., "Gesture cues for conversational interaction in monocular video," in *ICCV'99 Wksp on Rec., Anal. & Tracking of Faces & Gestures in R.T. Sys*, pp. 64–69, Corfu, Greece, Sep. 26–27 1999

5. Quek, F., "The Catchment Feature Model: A Device for Multimodal Fusion and a Bridge Between Signal and Sense," In Press, EURASIP Journal of Applied Signal Processing, 2002. Also as Vision Interfaces and Systems Lab, VISLab Report: VISLab-02-19

#### **iv. Synergistic Activities**

1. Directs a interdisciplinary team in psycholinguistics/anthropological linguistics, vision, signal, speech, and natural language processing.
2. Participated in projects for eye tracking of automobile drivers, interfaces and video analysis for multi-media database access, and robot navigation.
3. Projects as an R&D engineer included keyboards, digitizing tablets, graphic cursor control devices and optical character input/recognition.
4. Associate editor on the board of Gesture Magazine.
5. Program committee on IMCI Multimodality Workshop.

#### **v. Collaborators and Other Affiliations**

##### *a. List of Collaborators:*

1. Rashid Ansari (U. of Illinois, Chicago)
2. Mary Ellen Bargerhuff (Wright State University)
3. Melanie Brandabur (U. of Illinois Hospitals)
4. Fady Charbel (U. of Illinois Hospitals)
5. Susan Duncan (U. of Chicago)
6. Mary Harper (Purdue)
7. John Haviland (Reed College)
8. Thomas Huang (U. of Illinois at Urbana-Champaign)
9. Leah Jamieson (Purdue)
10. David McNeill (U of Chicago)
11. Susan McRoy (University of Wisconsin, Milwaukee)
12. Lorraine Ramig (University of Colorado)
13. Ronald Tuttle (Air Force Institute of Technology)
14. Jeffrey Vernooy (Wright State University)
15. Miede Zhao (U. of Illinois Hospitals)

##### *b. List of Ph.D. Students Graduated:*

1. Robert Bryll

##### *c. List of Graduate Students currently advising:*

1. Yonca Haciahmetoglu
2. Cemil Kirbas
3. Richard Travis Rose
4. Yang Shi
5. Wen Lin

# Budget Justification

## Senior Personnel:

- The PI will be supported for 3 weeks, and the 4 co-PIs will each be supported for 2 weeks during the summer, over the course of this year-long project.
- PI Fox will manage the effort, and lead the digital library activities.
- Co-PI Fan will assist with the DL activities, and lead the social network analysis activities.
- Co-PI North will lead the information visualization work, including the research with the gigapixel display unit.
- Co-PI Ramakrishnan will lead the work on data and information mining.
- Co-PI Shoemaker will connect with the workshop proposal, and with his colleagues in Sociology, but also with those in Psychology, etc.
- Senior investigator Quek, director of the Center for Human-Computer Interaction, will ensure connections are developed between the project and the HCI community.

Graduate research assistants will work with the senior personnel. There will be 2 GRAs all year. A third GRA will be available in the summer. In the following AY, however, the third person can only be funded ½ time with the funds available. Thus, the project will have a bit more than 2.5 GRAs over the year of the grant.

Fringes are computed according to a standard rate schedule for regular faculty, summer faculty, and GRAs.

## Equipment:

We will purchase 3 small computers, one for each GRA, costing 3 \* \$2233. We also will buy a server for the DL, since DSpace performance will depend strongly on the computer's capabilities. We have quotes from Dell indicating that for \$17K we can have 6 terabytes of reliable storage, and a PowerEdge system with 2 processors, each quad core. The Virginia Tech Computing Center will support, monitor, backup, and provide network assistance for the server.

## Tuition:

Under Other we show \$19,278 that covers the GRA's tuition.

## Travel:

Travel of \$5000 will allow the PI and 4 co-PIs each to have \$1000 to cover their travel to related conferences and to work with data sources as well as users. Presentations will be given at JCDL and at a number of other conferences that relate to this grant.

## Current and Pending Support

See GPG Section II.D.8 for guidance on information to include on this form.

|  |   |
|--|---|
| The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.   |   |
| Investigator: Edward A. Fox  | Other agencies (including NSF) to which this proposal has been/will be submitted: |
| Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support  |   |
| Project/Proposal Title: <b>HCC: Collaborative Research: Assessing the Success, Quality, Innovation, and Value of Knowledge Communities</b>   |   |
| Source of Support: <b>NSF</b>  |   |
| Total Award Amount: <b>\$690,361 (VT)</b>  | Total Award Period Covered: <b>09/01/07-8/31/10</b>                               |
| Location of Project: <b>Virginia Tech</b>  |   |
| Person-months committed to project: Cal: <b>0.50</b> Acad: <b>0.00</b> Sumr: <b>0.00</b>   |   |
| Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support  |   |
| Project/Proposal Title: <b>Storytelling in the National Nuclear Archive: Development of an Information Extraction Module for the Nuclear Domain</b>  |   |
| Source of Support: <b>Idaho National Laboratory</b>  |   |
| Total Award Amount: <b>\$10,866</b>  | Total Award Period Covered: <b>4/20/2007-9/30/2007</b>                            |
| Location of Project: <b>Virginia Tech</b>  |   |
| Person-months committed to project: Cal: <b>0.00</b> Acad: <b>0.00</b> Sumr: <b>0.00</b>   |   |
| Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support  |   |
| Project/Proposal Title: <b>Incorporating Superimposed Information into UIMA, Using UIMA to Help Develop Tools and Web Services for Enhanced Syllabi Collections, Integrating the Resulting Syllabus Analyzer into UIMA, and Developing Educational Modules that are Based on that Work with UIMA</b> |   |
| Source of Support: <b>IBM</b>  |   |
| Total Award Amount: <b>\$16,740</b>  | Total Award Period Covered: <b>8/16/2006-8/15/2007</b>                            |
| Location of Project: <b>Virginia Tech</b>  |   |
| Person-months committed to project: Cal: <b>0.00</b> Acad: <b>0.00</b> Sumr: <b>0.00</b>   |   |
| Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support  |   |
| Project/Proposal Title: <b>Collaborative Research: CPATH CB: Living In the KnowlEdge Society (LIKES)</b>   |   |
| Source of Support: <b>NSF</b>  |   |
| Total Award Amount: <b>\$289,999</b>   | Total Award Period Covered: <b>5/16/07-5/15/09</b>                                |
| Location of Project: <b>Virginia Tech</b>  |   |
| Person-months committed to project: Cal: <b>1.00</b> Acad: <b>0.00</b> Sumr: <b>0.00</b>   |   |
| Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support  |   |
| Project/Proposal Title: <b>Reformulating General Engineering and Biological Systems Engineering at Virginia Tech</b>   |   |
| Source of Support: <b>NSF</b>  |   |
| Total Award Amount: <b>\$996,238</b>   | Total Award Period Covered: <b>01/01/05-12/31/07</b>                              |
| Location of Project: <b>Virginia Tech</b>  |   |
| Person-months committed to project: Cal: <b>0.00</b> Acad: <b>0.00</b> Sumr: <b>0.00</b>   |   |
| Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support  |   |
| Project/Proposal Title: <b>Concept Maps for Discovering/Using Multilingual Electronic Theses and Dissertations</b>   |   |
| Source of Support: <b>Google</b>   |   |
| Total Award Amount: <b>\$105,000</b>   | Total Award Period Covered: <b>1/1/07-12/31/07</b>                                |
| Location of Project: <b>Virginia Tech</b>  |   |
| Person-months committed to project: Cal: <b>1.00</b> Acad: <b>0.00</b> Sumr: <b>0.00</b>   |   |
| Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support  |   |
| Project/Proposal Title: <b>Personalization of content: Bridging the gap between the NSDL and its users</b>   |   |
| Source of Support: <b>NSF-NSDL</b>   |   |
| Total Award Amount: <b>\$450,000</b>   | Total Award Period Covered: <b>01/01/06-12/31/08</b>                              |
| Location of Project: <b>Virginia Tech</b>  |   |
| Person-months committed to project: Cal: <b>0.50</b> Acad: <b>0.00</b> Sumr: <b>0.00</b>   |   |
| <b>*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.</b>  |   |

## Current and Pending Support

See GPG Section II.D.8 for guidance on information to include on this form.

|   |   |
|---|---|
| The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.                  |   |
| Investigator: Edward A. Fox   | Other agencies (including NSF) to which this proposal has been/will be submitted: |
| Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support |   |
| Project/Proposal Title: <b>Collaborative Research: Curriculum Development: Digital Libraries</b>  |   |
| Source of Support: <b>NSF</b>   |   |
| Total Award Amount: <b>\$272,187</b>  | Total Award Period Covered: <b>01/01/06-12/31/08</b>                              |
| Location of Project: <b>Virginia Tech</b>   |   |
| Person-months committed to project: Cal: <b>1.00</b> Acad: <b>0.00</b> Sumr: <b>0.00</b>  |   |
| Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support |   |
| Project/Proposal Title: <b>Deployment and Assessment of an Image Annotation and Retrieval Tool, Including for Biodiversity</b>  |   |
| Source of Support: <b>Microsoft Research</b>  |   |
| Total Award Amount: <b>\$50,000</b>   | Total Award Period Covered: <b>5/16/2007-5/15/2008</b>                            |
| Location of Project: <b>Virginia Tech</b>   |   |
| Person-months committed to project: Cal: <b>0.50</b> Acad: <b>0.00</b> Sumr: <b>0.00</b>  |   |
| Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support |   |
| Project/Proposal Title: <b>Mining and Interpretation of GP Solutions to Improve Information Retrieval</b>   |   |
| Source of Support: <b>NSF</b>   |   |
| Total Award Amount: <b>\$382,926</b>  | Total Award Period Covered: <b>5/16/07-5/15/09</b>                                |
| Location of Project: <b>Virginia Tech</b>   |   |
| Person-months committed to project: Cal: <b>1.04</b> Acad: Sumr:  |   |
| Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support |   |
| Project/Proposal Title: <b>Ensemble: Enriching Communities and Collections to Support Computing Education</b>   |   |
| Source of Support: <b>NSF</b>   |   |
| Total Award Amount: <b>\$800,483</b>  | Total Award Period Covered: <b>1/1/2008 – 12/31/2011</b>                          |
| Location of Project: <b>Virginia Tech</b>   |   |
| Person-months committed to project: Cal: <b>0.3</b> Acad: Sumr:   |   |
| Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support |   |
| Project/Proposal Title: <b>CI-TEAM Implementation Project: Collaborative Research - A National Engineering Dissection Cyber-Collaboratory</b>   |   |
| Source of Support: <b>NSF</b>   |   |
| Total Award Amount: <b>\$104,378</b>  | Total Award Period Covered: <b>1/1/2007 - 12/31/2008</b>                          |
| Location of Project: <b>Virginia Tech</b>   |   |
| Person-months committed to project: Cal: <b>0.0</b> Acad: Sumr:   |   |
| Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support |   |
| Project/Proposal Title: <b>DL-VT416: A Digital Library Testbed for Research Related to 4/16/2007 at Virginia Tech</b>   |   |
| Source of Support: <b>NSF</b>   |   |
| Total Award Amount: <b>\$199,993</b>  | Total Award Period Covered: <b>5/1/2007 – 4/30/2008</b>                           |
| Location of Project: <b>Virginia Tech</b>   |   |
| Person-months committed to project: Cal: <b>0.69</b> Acad: Sumr:  |   |
| Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support |   |
| Project/Proposal Title: <b>DL-VT416: Setting a technology-based research agenda of stress and coping after 4/16/2007 at VT</b>  |   |
| Source of Support: <b>NSF</b>   |   |
| Total Award Amount: <b>\$199,976</b>  | Total Award Period Covered: <b>5/15/2007 – 5/14/2008</b>                          |
| Location of Project: <b>Virginia Tech</b>   |   |
| Person-months committed to project: Cal: <b>0.24</b> Acad: Sumr:  |   |

### Current and Pending Support

**See GPG Section II.D.8 for guidance on information to include on this form.**

|   |   |  |  |
|---|---|--|--|
| The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.                  |   |  |  |
| Investigator: <b>Weiguo (Patrick) Fan</b>   | Other agencies (including NSF) to which this proposal has been/will be submitted: n/a |  |  |
| Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support |   |  |  |
| Project/Proposal Title: <b>Personalization of Content and Interaction: Bridging the Gap Between NSDL and its Users</b>  |   |  |  |
| Source of Support: <b>NSF</b>   |   |  |  |
| Total Award Amount: <b>\$450,000</b>  |   | Total Award Period Covered: <b>01/01/06-12/31/08</b> |  |
| Location of Project <b>Virginia Tech</b>  |   |  |  |
| Person-months committed to project:    Cal: <b>0.00</b> Acad: <b>0.00</b> Sumr: <b>0.2</b>  |   |  |  |
| Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support |   |  |  |
| Project/Proposal Title: <b>Assessing the Success, Quality, Innovation and Value of Knowledge Communities</b>  |   |  |  |
| Source of Support: <b>NSF</b>   |   |  |  |
| Total Award Amount: <b>\$690,361</b>  |   | Total Award Period Covered: <b>09/01/07-08/31/10</b> |  |
| Location of Project <b>Virginia Tech</b>  |   |  |  |
| Person-months committed to project:    Cal: <b>0.00</b> Acad: <b>0.00</b> Sumr: <b>0.7</b>  |   |  |  |
| Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support |   |  |  |
| Project/Proposal Title: <b>Mining and Interpretation of GP Solutions to Improve Information Retrieval</b>   |   |  |  |
| Source of Support: <b>NSF</b>   |   |  |  |
| Total Award Amount: <b>\$382,926</b>  |   | Total Award Period Covered: <b>5/16/07-5/15/09</b>   |  |
| Location of Project <b>Virginia Tech</b>  |   |  |  |
| Person-months committed to project:    Cal:       Acad: <b>0.00</b> Sumr: <b>1.0</b>  |   |  |  |
| Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support |   |  |  |
| Project/Proposal Title: <b>Collaborative Research: CPATH CB: Living In the KnowlEdge Society (LIKES)</b>  |   |  |  |
| Source of Support: <b>NSF</b>   |   |  |  |
| Total Award Amount: <b>\$440,000</b>  |   | Total Award Period Covered: <b>5/16/07-5/15/09</b>   |  |
| Location of Project <b>Virginia Tech</b>  |   |  |  |
| Person-months committed to project:    Cal:       Acad:       Sumr: <b>0.2</b>  |   |  |  |
| Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support |   |  |  |
| Project/Proposal Title: <b>Ensemble: Enriching Communities and Collections to Support Computing Education</b>   |   |  |  |
| Source of Support: <b>NSF</b>   |   |  |  |
| Total Award Amount: <b>\$800,483</b>  |   | Total Award Period Covered: <b>1/1/08-12/31/2011</b> |  |
| Location of Project <b>Virginia Tech</b>  |   |  |  |
| Person-months committed to project:    Cal:       Acad:       Sumr: <b>0.6</b>  |   |  |  |
| Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support |   |  |  |
| Project/Proposal Title: <b>DL-VT416: A Digital Library Testbed for Research Related to 4/16/2007 at Virginia Tech (this proposal)</b>   |   |  |  |
| Source of Support: <b>NSF</b>   |   |  |  |
| Total Award Amount: <b>\$199,993</b>  |   | Total Award Period Covered: <b>05/01/07-04/30/08</b> |  |
| Location of Project <b>Virginia Tech</b>  |   |  |  |
| Person-months committed to project:    Cal:       Acad:       Sumr: <b>0.48</b>   |   |  |  |

## Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

|   |   |
|---|---|
| The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.  |   |
| Investigator: <b>Christopher North</b>  | Other agencies (including NSF) to which this proposal has been/will be submitted. |
| Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support<br>Project/Proposal Title: <b>SGER: Design and Evaluation of Scalable Information Visualizations with High-Resolution Displays</b>                         |   |
| Source of Support: <b>NSF</b><br>Total Award Amount: \$ <b>99,000</b> Total Award Period Covered: <b>04/01/06 - 09/30/07</b><br>Location of Project: <b>Virginia Tech</b><br>Person-Months Per Year Committed to the Project.   Cal: <b>0.00</b> Acad: <b>0.00</b> Sumr: <b>1.00</b>  |   |
| Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support<br>Project/Proposal Title: <b>Ultra-High Resolution Interactive Information Visualization</b>  |   |
| Source of Support: <b>DTO</b><br>Total Award Amount: \$ <b>497,933</b> Total Award Period Covered: <b>06/01/05 - 05/31/07</b><br>Location of Project: <b>Virginia Tech</b><br>Person-Months Per Year Committed to the Project.   Cal: <b>0.00</b> Acad: <b>0.00</b> Sumr: <b>0.00</b>   |   |
| Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support<br>Project/Proposal Title: <b>Towards Boundless Display: Developing a Reconfigurable Research Testbed for Large-scale, High-resolution Visual Displays</b> |   |
| Source of Support: <b>NSF</b><br>Total Award Amount: \$ <b>230,067</b> Total Award Period Covered: <b>08/16/04 - 06/15/07</b><br>Location of Project: <b>Virginia Tech</b><br>Person-Months Per Year Committed to the Project.   Cal: <b>0.00</b> Acad: <b>0.00</b> Sumr: <b>0.00</b>   |   |
| Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support<br>Project/Proposal Title: <b>HCC: Realizing Embodiment ? Affording Embodied Interaction for Insight Formation with Expansive Displays</b>                 |   |
| Source of Support: <b>NSF</b><br>Total Award Amount: \$ <b>899,267</b> Total Award Period Covered: <b>06/01/07 - 05/31/10</b><br>Location of Project: <b>Virginia Tech</b><br>Person-Months Per Year Committed to the Project.   Cal: <b>0.00</b> Acad: <b>0.00</b> Sumr: <b>1.00</b>   |   |
| Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support<br>Project/Proposal Title:  |   |
| Source of Support:  |   |
| Total Award Amount: \$   _____ Total Award Period Covered:  |   |
| Location of Project:  |   |
| Person-Months Per Year Committed to the Project.   Cal:   _____   Acad:   _____   Summ:   _____   |   |
| *If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.  |   |

## Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

|  |   |
|--|---|
| The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.   |   |
| Investigator: <b>Naren Ramakrishnan</b>  | Other agencies (including NSF) to which this proposal has been/will be submitted. |
| Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support<br>Project/Proposal Title: <b>III-COR: Deep Personalized Searching: Modeling and Finding Elusive Information on the Internet</b>    |   |
| Source of Support: <b>NSF</b><br>Total Award Amount: \$ <b>499,053</b> Total Award Period Covered: <b>05/16/07 - 05/15/10</b><br>Location of Project: <b>Blacksburg, VA</b><br>Person-Months Per Year Committed to the Project.    Cal: <b>0.00</b> Acad: <b>0.00</b> Sumr: <b>0.50</b>  |   |
| Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support<br>Project/Proposal Title: <b>Compositional Mining of Biological Data</b>   |   |
| Source of Support: <b>NSF</b><br>Total Award Amount: \$ <b>654,077</b> Total Award Period Covered: <b>01/01/07 - 12/31/09</b><br>Location of Project: <b>Blacksburg, VA</b><br>Person-Months Per Year Committed to the Project.    Cal: <b>0.00</b> Acad: <b>0.00</b> Sumr: <b>1.00</b>  |   |
| Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support<br>Project/Proposal Title: <b>III-CXT: Storytelling across the Biological Literature: Algorithms and Applications</b>               |   |
| Source of Support: <b>NSF</b><br>Total Award Amount: \$ <b>779,847</b> Total Award Period Covered: <b>06/01/07 - 05/31/10</b><br>Location of Project: <b>Blacksburg, VA</b><br>Person-Months Per Year Committed to the Project.    Cal: <b>0.00</b> Acad: <b>0.00</b> Sumr: <b>1.00</b>  |   |
| Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support<br>Project/Proposal Title: <b>ITR-(NHS)-Sim: Computational Models of Gene Silencing: Elucidating a Pervasive Biological Defense</b> |   |
| Source of Support: <b>NSF</b><br>Total Award Amount: \$ <b>1,100,000</b> Total Award Period Covered: <b>09/01/04 - 08/31/09</b><br>Location of Project: <b>Blacksburg, VA and New York, NY</b><br>Person-Months Per Year Committed to the Project.    Cal: <b>0.00</b> Acad: <b>0.00</b> Sumr: <b>1.00</b>                         |   |
| Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support<br>Project/Proposal Title: <b>CSE-AES: The Adaptive Code Kitchen: Flexible Tools for Dynamic Application Composition</b>            |   |
| Source of Support: <b>NSF</b><br>Total Award Amount: \$ <b>642,736</b> Total Award Period Covered: <b>08/15/06 - 08/14/09</b><br>Location of Project: <b>Blacksburg, VA</b><br>Person-Months Per Year Committed to the Project.    Cal: <b>0.00</b> Acad: <b>0.00</b> Summ: <b>1.00</b>  |   |
| *If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.   |   |

## Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

|   |   |
|---|---|
| The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.  |   |
| Investigator: <b>Naren Ramakrishnan</b>   | Other agencies (including NSF) to which this proposal has been/will be submitted. |
| Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support<br>Project/Proposal Title: <b>DL-VT416: A Digital Library Testbed for Research Related to 4/16/2007 at Virginia Tech (this proposal)</b> |   |
| Source of Support: <b>NSF</b><br>Total Award Amount: \$ <b>199,993</b> Total Award Period Covered: <b>05/01/07 - 04/30/08</b><br>Location of Project: <b>Blacksburg, VA</b><br>Person-Months Per Year Committed to the Project.    Cal: <b>0.00</b> Acad: <b>0.00</b> Sumr: <b>0.48</b>   |   |
| Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support<br>Project/Proposal Title:  |   |
| Source of Support:<br>Total Award Amount: \$                      Total Award Period Covered:<br>Location of Project:<br>Person-Months Per Year Committed to the Project.    Cal:                      Acad:                      Sumr:   |   |
| Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support<br>Project/Proposal Title:  |   |
| Source of Support:<br>Total Award Amount: \$                      Total Award Period Covered:<br>Location of Project:<br>Person-Months Per Year Committed to the Project.    Cal:                      Acad:                      Sumr:   |   |
| Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support<br>Project/Proposal Title:  |   |
| Source of Support:<br>Total Award Amount: \$                      Total Award Period Covered:<br>Location of Project:<br>Person-Months Per Year Committed to the Project.    Cal:                      Acad:                      Sumr:   |   |
| Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support<br>Project/Proposal Title:  |   |
| Source of Support:<br>Total Award Amount: \$                      Total Award Period Covered:<br>Location of Project:<br>Person-Months Per Year Committed to the Project.    Cal:                      Acad:                      Summ:   |   |

\*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

### Current and Pending Support

**See GPG Section II.C.2.h for guidance on information to include on this form.**

|   |   |  |  |
|---|---|--|--|
| The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.                  |   |  |  |
| Investigator: <b>Donald J. Shoemaker</b>  | Other agencies (including NSF) to which this proposal has been/will be submitted: n/a |  |  |
| Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support |   |  |  |
| Project/Proposal Title: <b>DL-VT416: Setting a technology-based research agenda of stress and coping after 4/16/2007 at VT</b>  |   |  |  |
| Source of Support: <b>NSF</b>   |   |  |  |
| Total Award Amount: <b>199,976</b>  |   | Total Award Period Covered: <b>05/15/07-05/14/08</b> |  |
| Location of Project <b>Virginia Tech</b>  |   |  |  |
| Person-months committed to project: Cal:                      Acad:                      Sumr: <b>.48</b>   |   |  |  |
| Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support |   |  |  |
| Project/Proposal Title: <b>DL-VT416:A Digital Library Testbed for Research Related to 4/16/2007 at Virginia Tech</b>  |   |  |  |
| Source of Support: <b>NSF</b>   |   |  |  |
| Total Award Amount: <b>199,993</b>  |   | Total Award Period Covered: <b>05/1/07-04/30/08</b>  |  |
| Location of Project <b>Virginia Tech</b>  |   |  |  |
| Person-months committed to project: Cal:                      Acad:                      Sumr: <b>.48</b>   |   |  |  |
| Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support            |   |  |  |
| Project/Proposal Title:   |   |  |  |
| Source of Support:  |   |  |  |
| Total Award Amount:   |   | Total Award Period Covered:                          |  |
| Location of Project   |   |  |  |
| Person-months committed to project: Cal:                      Acad:                      Sumr:  |   |  |  |
| Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support            |   |  |  |
| Project/Proposal Title:   |   |  |  |
| Source of Support:  |   |  |  |
| Total Award Amount:   |   | Total Award Period Covered:                          |  |
| Location of Project   |   |  |  |
| Person-months committed to project: Cal:                      Acad:                      Sumr:  |   |  |  |
| Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission planned in near future <input type="checkbox"/> Transfer of support            |   |  |  |
| Project/Proposal Title:   |   |  |  |
| Source of Support:  |   |  |  |
| Total Award Amount:   |   | Total Award Period Covered:                          |  |
| Location of Project   |   |  |  |
| Person-months committed to project: Cal:                      Acad:                      Sumr:  |   |  |  |

### Current and Pending Support

#### See GPG Section II.D.8 for guidance on information to include on this form.

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Quek, Francis

Other agencies (including NSF) to which this proposal has been/will be submitted:

Support: Awarded

Project/Proposal Title: NSA from Wright State University

Source of Support: Wright State University

Total Award Amount: \$ 476,448

Total Award Period Covered: 01-AUG-2004 - 29-SEP-2007

Location of Project: Blacksburg, VA

Person-months committed to project: Cal: Acad: Sumr: 0.00

Investigator: Quek, Francis

Other agencies (including NSF) to which this proposal has been/will be submitted:

Support: Awarded

Project/Proposal Title: Embodiment awareness, mathematics discourse, and the blind

Source of Support: National Science Foundation

Total Award Amount: \$ 749,839

Total Award Period Covered: 01-OCT-2004 - 30-SEP-2007

Location of Project: Blacksburg, VA

Person-months committed to project: Cal: Acad: Sumr: 0.00

Investigator: Quek, Francis

Other agencies (including NSF) to which this proposal has been/will be submitted:

Support: Awarded

Project/Proposal Title: Beyond the talking head and animated icons: behaviorally situated avatars for tutoring

Source of Support: National Science Foundation

Total Award Amount: \$ 273,504

Total Award Period Covered: 01-SEP-2004 - 31-AUG-2007

Location of Project: Blacksburg, VA

Person-months committed to project: Cal: Acad: Sumr: 2.00

Investigator: Quek, Francis

Other agencies (including NSF) to which this proposal has been/will be submitted:

Support: Awarded

Project/Proposal Title: Interfaces for the embodied mind

Source of Support: National Science Foundation

Total Award Amount: \$ 399,999

Total Award Period Covered: 15-MAR-2006 - 28-FEB-2010

Location of Project: Blacksburg, VA

Person-months committed to project: Cal: Acad: Sumr: 0.00

Investigator: Quek, Francis

Other agencies (including NSF) to which this proposal has been/will be submitted:

Support: Awarded

Project/Proposal Title: Multimodal human communicative behavior analysis

Source of Support: Advanced Technical Intelligence Cen

Total Award Amount: \$ 19,251

Total Award Period Covered: 16-OCT-2006 - 29-DEC-2006

Location of Project: Blacksburg, VA

Person-months committed to project: Cal: Acad: Sumr: 0.00

Investigator: Quek, Francis Other agencies (including NSF) to which this proposal has been/will be submitted:

Support: Awarded

Project/Proposal Title: Embodied communication: vivid interaction with history and literature

Source of Support: National Science Foundation

Total Award Amount: \$ 103,839

Total Award Period Covered: 30-MAR-2006 - 31-MAR-2008

Location of Project: Blacksburg, VA

Person-months committed to project: Cal: Acad: Sumr: 0.00

Investigator: Quek, Francis Other agencies (including NSF) to which this proposal has been/will be submitted:

Support: Pending

Project/Proposal Title: I/UCRC: evolving environment for high-performance reconfigurable computing in the CHREC

Source of Support: National Science Foundation

Total Award Amount: \$ 10,000

Total Award Period Covered: 01-JAN-2007 - 31-DEC-2007

Location of Project: Blacksburg, VA

Person-months committed to project: Cal: Acad: Sumr: 0.00

Investigator: Quek, Francis Other agencies (including NSF) to which this proposal has been/will be submitted:

Support: Pending

Project/Proposal Title: Realizing Embodiment – Affording Embodied Interaction for Insight Formation with Expansive Displays

Source of Support: National Science Foundation

Total Award Amount: \$899,267

Total Award Period Covered: 16-MAY-2007 – 15-MAY-2010

Location of Project: Blacksburg, VA

Person-months committed to project: Cal: Acad: Sumr: 1.00

Investigator: Quek, Francis Other agencies (including NSF) to which this proposal has been/will be submitted:

Support: Pending

Project/Proposal Title: Non-Intrusive Zone of Attention Estimation From Stances

Source of Support: National Science Foundation

Total Award Amount: \$899,917

Total Award Period Covered: 16-MAY-2007 – 15-MAY-2010

Location of Project: Blacksburg, VA

Person-months committed to project:                      Cal:                      Acad:                      Sumr: 1.00

Investigator: Quek, Francis                      Other agencies (including NSF) to which this proposal has  
been/will be submitted:

Support: Pending

Project/Proposal Title: DL-VT416: A Digital Library Testbed for Research Related to 4/16/2007 at Virginia  
Tech

Source of Support: National Science Foundation

Total Award Amount: \$199,993

Total Award Period Covered: 1-MAY-2007 – 30-APR-2008

Location of Project: Virginia Tech, Blacksburg, VA

Person-months committed to project:                      Cal:                      Acad:                      Sumr:

# Facilities, Equipment and Other Resources

The work for this project will be carried out using the facilities available to the Center for Human-Computer Interaction and the Computer Science Department. The statement below describes the facilities available for our research.

## Center for Human-Computer Interaction

The rapid growth of HCI research at Virginia Tech (stimulated by an earlier NSF RI award) has necessitated the recent move of the Center for Human-Computer Interaction (CHCI) to new and expanded facilities in the Corporate Research Center. This building houses the Center in a new complex of almost 16,000 square feet. Included in the CHCI complex, in addition to student and faculty space, are:

- Ten 145 square foot project rooms, some with two-way observation windows
- a 280 square foot general HCI laboratory
- a 2,330 square foot shared laboratory space incorporating:
  - the Aware Laboratory (directed by co-PI Quek) containing extensive instrumentation for meeting participant tracking and gesture, voice and video analysis
  - the Gigapixel Display Laboratory (directed by co-PI North) containing several large, high-resolution displays
  - the Virtual and Augmented Reality Laboratory (directed by co-PIs Gracanic and Gabbard) containing immersive displays and tracking systems
  - the 3D Interaction Laboratory (directed by PI Bowman) containing a wide variety of 3D and advanced input devices, as well as virtual environment display technology
- extensive conference and meeting facilities

The CHCI core laboratories are co-located so that equipment from any laboratory is readily available for use in another laboratory. The new space brings together facilities that previously could not be spatially co-located due to the rapid expansion of HCI research at Virginia Tech.

**Aware Laboratory:** The Aware Laboratory provides space and infrastructure for research in human multimodal interaction, computer vision, and multimedia data access. The space features a 1,100 sq ft aware meeting room. A suite of 10 genlocked and pair-wise calibrated cameras (recording into digital disks) and a Vicon near-infrared motion capture system featuring 8 high-speed, high-resolution cameras capture the visual behavior of meeting participants. A set of eight close-talking Countryman microphones with wireless transmitter/receivers and a pair of desktop microphones capture synchronized audio into a digital audio recorder. All video, motion-capture, and audio devices are genlocked to a single black-burst generator. A suite of Macintosh G5 computers provide the computation and video handling.

**Gigapixel Display Laboratory:** The Gigapixel Display Laboratory provides infrastructure for research using large-scale, high-resolution, and reconfigurable displays. Currently two display technologies are being utilized: tiled LCD panels and stackable rear-projection blocks. The largest tiled LCD display features fifty 20-inch touch-sensitive panels with thin bezels, each capable of displaying 1600x1200 pixels, for a total of about 100 million pixels. The panels are attached to columns, and each column can be moved or rotated, allowing the display to be reconfigured in various form factors (flat, curved, angled, etc.). A cluster of twenty-five PCs drive two displays each, with a head node coordinating rendering. The facility also includes various smaller tiled LCD prototypes, including several that are used routinely for individuals' daily work. The rear-projected display is based on VisBlocks, a stackable modular system from Visbox, Inc. Each block has a rigid frame and screen and an LCD projector, and blocks can be moved and stacked in a variety of

configurations, including vertical walls and horizontal tabletops. The main advantage to this technology is seamlessness; there are no bezels between adjacent blocks. The facility contains 18 VisBlocks, each capable of displaying 1280x720 pixels; these are driven by nine PCs.

**Virtual and Augmented Reality Laboratory:** The VR/AR laboratory provides space for students and faculty working on immersive virtual environments and augmented reality research. A key feature of the lab is the open tracked space allowing unencumbered use of head-mounted displays (HMDs). This 12x12-foot space is tracked with an Intersense IS-900 position tracking system. Other equipment in the lab includes Virtual Research and Sony HMDs, a Fakespace Immersive Workbench™ stereoscopic display, a Polhemus Fastrak position tracking system with three receivers, Fakespace pinch glove input devices, and a variety of graphics workstations.

**3D Interaction Laboratory:** The 3DI laboratory supports research in 3D user interfaces and interaction techniques, as well as immersive virtual environments. Position tracking is provided in this laboratory by an Intersense IS-900 VET system and a Polhemus Fastrak system. In addition to the tracked input devices provided by these systems, the laboratory also provides advanced input devices such as Pinch Gloves, 5DT data gloves, a chord keyboard, Measurand ShapeTape, 3D Connexion SpaceBall, and various handheld mice. Display systems include a Virtual Research V8 HMD, and a two-wall rear-projected VisWall system capable of displaying stereoscopic imagery at 2800x1050 pixels. These walls are also reconfigurable and expandable.

**Computer and networking support:** Project staff will have access to networked workstations and servers running Windows, Mac OSX, Linux, and Solaris. Both wired and wireless connectivity is available in the Center's lab facilities. Infrastructure software includes database, file, proxy, and web server systems, as well as server software for custom collaboration tools developed by the Center. Custom and off-the-shelf tools for audio and video capture, processing and transcription support data collection activities. Analysis tools include custom session log processing software, as well as qualitative and quantitative data analysis packages. Development tools are also available for a variety of platforms and languages.

## Department of Computer Science

In addition to the Laboratories already described, Virginia Tech's Department of Computer Science (the largest CS program, in terms of majors, in Virginia) is well equipped to support research in the areas described in the proposal. In addition to office space for faculty, students, and visitors (located on the same floor as the CHCI facilities), it hosts two general computer labs.

## Virginia Tech

**Major Equipment – VT System X:** Virginia Tech's System X ("System Ten"), was initially ranked 3rd on the 22nd TOP500 List released November 16, 2003. Virginia Tech, teaming with Apple Computer, Cisco, Liebert, and Mellanox Technologies, has introduced a new, turnkey solution for creating supercomputing clusters. The university designed a large 64-bit InfiniBand cluster using existing, off-the-shelf industry components. There are 1100 nodes, each with dual 2.3GHz G5 processors. Details can be found at <http://www.eng.vt.edu/tcf/index.html>. This facility is used for scalable solutions, as well as for research.

**VT Campus Information Technology:** The Computing Center provides information processing services for the campus, as well as administering computer labs for student use. The Computing Center houses servers - from PC to mainframe - for various tasks. These servers include systems by IBM, DEC, Sun, and SGI. Also available for research use are varied systems including a Sun Enterprise 6500 with 17 processors. IBM has donated a substantial amount of IBM hardware for research use at Virginia Tech, including a Digital Linear Tape based hierarchical storage facility.

Virginia Tech boasts a rich network infrastructure. The campus backbone serves over 15,000 desktops in campus building LANs.

Virginia Tech plays a key role in Network Virginia (<http://www.networkvirginia.net/>), a mature statewide network. This provides high-bandwidth connectivity to Virginia Tech's geographically scattered campus. It is able to support multimedia-intense activities such as video teleconferencing.

Virginia Tech also manages the Virginia gigaPOP providing access for Research I institutions throughout the mid-Atlantic region to next generation networks including Internet2's Project Abilene Network, the Department of Energy's ESnet, and the National Science Foundation's vBNS network. Campus network users all have access to these resources currently. Virginia Tech is a charter member of the Internet2 (<http://www.internet2.edu>) initiative and provided leadership in the MidAtlantic Crossroads (MAX) initiative (see <http://www.networkvirginia.net/MAX>). Current focus is on the National Lambda-Rail (NLR, <http://www.nationallambdarail.org/>).


Virginia Tech is also an active participant in wireless networking technologies. Its Center for Wireless Telecommunications (<http://www.cwt.vt.edu>) obtained licenses to operate in the 1150 MHz wireless spectrum in the Greater Roanoke, Danville, Martinsville and Kingsport-Johnson City market areas, as part of the FCC's first Local Multipoint Distribution Service (LMDS) auction. This allows Virginia Tech to forge ahead in its LMDS research efforts (<http://www.cwt.vt.edu/lmdf/>).



DATE: April 26, 2007

MEMORANDUM

TO: Edward A. Fox

FROM: David M. Moore 

SUBJECT: **IRB Interim Approval:** "A Digital Library Testbed for Research Related to 4/16/2007 at Virginia Tech", IRB # 07-251

Information related to the above referenced study was forwarded to the IRB Chair for review. The information package provided a description of the scope of the proposed activities, and an assurance that research activities involving human subjects would not be initiated without prior review and approval by the Virginia Tech IRB. Additionally, as a required component of the IRB review of proposed human subjects activities involved in each specific element/study included in the Contract or Task Order, an approved Informed Consent document, valid for the specified period (usually for 1 year) following approval of the individual study, will be required. As you are aware, research studies involving human subjects may not commence without appropriate IRB approval, and failure to adhere to federal laws and regulations and Virginia Tech policies related to human subjects protection may result in suspension of permission to conduct the study or revocation of the authorization to conduct future human subjects research at this University.

Having received the above referenced assurances from you, I, on behalf of the IRB, am granting permission to begin the initial planning required to develop individual study protocols under this Contract or Task Order as of April 26, 2007. Please forward this memo to the Office of Sponsored Programs at Virginia Tech as verification of initial IRB review and to state the process by which individual studies will ultimately be individually reviewed and approved by the IRB.

Please note that an email query will be sent to you every six months to assess this project's status until you supply a subsequent IRB application which notes this interim approval number.

cc: File

## People at Virginia Tech who we Plan to Engage in this Project

| Name                   | Affiliation   |
|------------------------|---|
|                        |   |
| Axsom, Danny           | Psychology  |
| Blythe, Erv            | VP Information Technology   |
| Bohner, Shawn          | Computer Science  |
| Clum, George           | Psychology  |
| Crowder, Jeff          | Project Director, Telecommunications<br>Auxiliary   |
| Evans, Michael         | Instructional Design & Technology   |
| Goldstein, Bruce       | Department of Urban Affairs and Planning  |
| Hitchingham, Eileen    | Dean, University Libraries  |
| Jesiek, Brent          | Manager, Center for Digital Discourse and<br>Culture  |
| Kafura, Dennis         | Head, Dept. of Computer Science   |
| Kennelly, Tamara       | University Archivist  |
| Lilly, Judy            | Associate VP Network Infrastructure &<br>Services   |
| Luke, Timothy          | University Distinguished Professor,<br>Political Science                                      |
| McMillan, Gail         | Director of Digital Library & Archives<br>Library   |
| Puckett, Anita         | Director, Appalachian Studies Program   |
| Scarpa, Angela         | Psychology  |
| Scarpa-Friedman, Bruce | Psychology  |
| Sheetz, Steve          | Accounting & Information Systems  |
| Shoemaker, Donald      | Sociology   |
| Tretola, Betsy         | Associate Director, Research &<br>Assessment Institute for Distance &<br>Distributed Learning |
| van Gelder, Brenda     | Program Director, eCorridors  |
| Zobel, Christopher     | Business Information Technology   |