Nomination for the Design Science Award of the INFORMS Information Systems Society (ISS), 2008

I. **Cover Statement**

A. **Name of nominee and affiliation:** Dr. Hsinchun Chen, McClelland Professor, Director, Artificial Intelligence Lab, Management Information Systems Department, University of Arizona, Tucson, Arizona, USA, hchen@eller.arizona.edu, 520-621-4153

B. **Name of nominator and affiliation:** Dr. Daniel Zeng, Management Information Systems Department, University of Arizona, Tucson, Arizona, USA, zeng@eller.arizona.edu, 520-621-2748

C. **Nominating project:** COPLINK (Artificial Intelligence Lab, MIS Department, University of Arizona)

D. **Goals, Accomplishments and Contributions:** Funded by the National Institute of Justice and the NSF Digital Government Program, the COPLINK project aims to develop information sharing, data mining, and knowledge management technologies for law enforcement community and to understand the associated social and organizational impacts. Based on a ten-year partnership between the UA MIS Artificial Intelligence Lab and various US law enforcement agencies, the project developed an award-winning XML-based (GJXDM, Global Justice XML Data Model) data warehousing logical mapping approach for linking diverse public safety legacy databases and information sources, resulting in efficient information sharing within and across agencies. The project also developed significant data mining and knowledge management research for criminal relationship identification, criminal network analysis and visualization, criminal deception detection, crime spatial-temporal pattern analysis and visualization, public safety workflow and ontology modeling, and law enforcement technology acceptance assessment. Much of the research has been published in major conferences and top-tier MIS and CS publications, including: Communications of the ACM, ACM Transactions on Information Systems, Journal of the American Society for Information Science and Technology, Decision Support Systems, etc. The COPLINK research has generated unique contributions in Information Systems design science related data models, computational algorithms, visualization methods, and web-based system design, especially for digital government information sharing, adversarial data mining, and dark network analysis. The COPLINK system, which has been quoted as a national model for public safety information sharing and analysis, has been adopted in more than 1600 law enforcement and intelligence agencies in 20 states in the US. It has become the largest public safety information sharing system in US (as reported recently by the Washington Post in 2008), revolutionizing law enforcement IT. Dr. Chen is also the founder of the Knowledge Computing Corporation, a university spin-off company and a market leader in law enforcement and intelligence information sharing and data mining. The COPLINK research had been featured in the New York Times, Newsweek, Los Angeles Times, Washington Post, Boston Globe, and ABC News, among others. The COPLINK project was selected as a finalist by the prestigious International Association of Chiefs of Police (IACP)/Motorola 2003 Weaver Seavey Award for Quality in Law Enforcement in 2003. Due to the success of the COPLINK research many public safety agencies have reported significantly improved information sharing and collaboration, more effective crime analysis and case closure, and more timely response to crime incidents, resulting in significant reduction in crime rate and improved citizen safety. Many other countries in Asia and Europe are also in the process of adopting similar COPLINK technologies for their communities.
E. **Design Science Relevance:** The COPLINK system is an end-to-end Information System for the public safety community. Related research began with two years of careful user studies and focus groups with the Tucson and Phoenix police departments and detailed data mapping and logical design based on the (then) new Global Justice XML Data Model (GJXDM). New mathematical models, data mining algorithms, and visualization methods were subsequently developed by the AI Lab researchers and refined based on real-life law enforcement data, crime cases, and continuous feedback from the law enforcement personnel (Tucson Police Department had provided in-kind support of one full-time veteran officer to the COPLINK project for over a decade). Significant algorithm evaluations, user experiments (with police officers and detectives), and technology acceptance studies (with several large agencies) were conducted. The COPLINK research has generated unique contributions in Information Systems design science related data models, computational algorithms, visualization methods, and web-based system design, especially for digital government information sharing, adversarial data mining, and dark network analysis.

F. **University-based Research:** The COPLINK project was conceived in 1997 and developed at the University of Arizona’s Artificial Intelligence Lab (headed by Dr. Hsinchun Chen) with the research funding support from the National Institute of Justice and the National Science Foundation (1997-2008). More than 50 research staff and Ph.D., MS, and BS students contributed to the project, from database design and algorithm development, to user study and system evaluation. Subsequently, the COPLINK technologies were licensed to the university spin-off company Knowledge Computing Corporation for additional commercial development. Many of the former AI Lab students became key employees and engineers at KCC, including: Chief Technology Officer, Director of Engineering, System Manager, etc.


II. **Supporting Documentation**

A. **Peer-Reviewed COPLINK Related Papers:** The COPLINK project has generated more than 15 journal papers and 30 conference publications. Some of the most relevant journal publications are listed below. Selected papers are included in the nomination packet.


B. Project Web Site and Funding:

• Project web site: [http://ai.arizona.edu/research/coplink/index.htm](http://ai.arizona.edu/research/coplink/index.htm)

• “Spiral Up, and other management secrets behind widely successful initiatives,” by Jane C. Linder, American Management Association Book, 2008, Chapter 10 “Coplink: An Unconventional Collaboration Revolutionizes Law Enforcement” (a detailed case study about the COPLINK project conducted by the author).

The COPLINK related research has received more than $6M in government research funding for over a decade and $4.6M in venture funding.


• NSF, Information Technology Research (ITR) Program, “COPLINK Center for Intelligence and Security Informatics – A Crime Data Mining Approach to Developing Border Safe Research,” $700,000 (EIA-0326348), September 2003-August 2007. (UA matching: $175,000)


• Knowledge Computing Corporation (venture funding, 2000-, $4.6M): KCC received exclusive licensing from the University of Arizona for the Artificial Intelligence Lab COPLINK technologies. The company received more than $4.6M in VC funding and currently has 80 employees with $14M revenues in 2007.
C. Awards and COPLINK in the Press

- Tucson Police Department (TPD) COPLINK project received the PTI Technology Solutions Award in the mid-size, public-safety category, January 27, 2003.


- COLINK project recognized as a finalist (among a field of 144 nominations) by the prestigious International Association of Chiefs of Police (IACP)/Motorola 2003 Weaver Seavey Award for Quality in Law Enforcement, IACP Conference, Philadelphia, PA, October 23, 2003.

- “National Dragnet Is a Click Away,” COPLINK system featured in cover page as the largest information sharing system for the US public safety agencies. The Washington Post, March 6, 2008.

- “LAPD hopes to Add High-Tech Partner to Force,” The COPLINK computer program can mesh data in minutes, a task that can take a detective weeks. Los Angeles Times, January 2, 2004.


- “Google For Cops: Software Helps Police Search for Cyber Clues to Bust Criminals,” ABC News, April 15, 2003. Also appeared on TechTV.

- “A Google for Cops,” COPLINK was considered as the Google search engine for cops, featured in NEWSWEEK, March 3, 2003.


- “An Electronic Cop that Plays Hunches,” COPLINK system was used to assist in DC sniper investigation and the project was featured in New York Times, November 2, 2002.


