

Institute Insider

The Newsletter of the Institute for Ergonomics at The Ohio State University

At the forefront of Human Factors since 1950 Volume 5, No. 2, Spring, 2002



New Multimedia Formats Produced for Electronic Technical Communication

The Cognitive Systems Engineering Lab (C/S/E/L) is innovating new multimedia forms of technical communication. One is called Media-Papers, and this format is illustrated in three CD Products from CSEL R&D (*Design of Telling (Sharing) Stories about the Future; The Role of 2-D and 3-D Task Performance in the Design and Use of Visual Displays; and View Tracks: 3D Virtual Displays are Viewpoint Dependent*).

The materials are the products of David Woods, Magnus Feil, Justin Grossman, Axel Roesler, David Tinapple, and James Tittle.

The media-paper format stretches the capabilities of a common piece of software, Acrobat Reader, to integrate the idea flow of a good talk with the detailed exposition that occurs in a technical paper, while adding animated demonstrations of the concepts, techniques, or procedures in question.

In production terms, the media paper format integrates in the concept of universal publishing. This means that information, once created, can be packaged in various formats of distribution: the same information can be published as printed media, digital publication (such as e-books or media papers), presentation slides, web content, and even as a movie. In contrast to past procedures, the content does not have to be rebuilt every time a different format is attempted. It simply gets re-formatted, since all source material is compiled as vector-based material.

In terms of fidelity, this is a very efficient process, especially when looking at the distribution of printed material in form of digital publication. Documents can easily be shared, even if containing colored illustrations. The

use of full-page color does not challenge ink resources or calls for color copies. Instead, small .pdf files get forwarded as CDs, through e-mail, or can be down-loaded from web sites.

Updates and corrections can be done economically. On the other hand, being burned to CD, the media paper becomes an artifact, to be owned just like the traditional book. The high-capacity of a CD furthermore allows an extension of the static content of the traditional paper. Sound and movie multi-media content can be linked into the document. This means wherever the paper text refers to dynamic visual content, a movie can be accessed, a slideshow can be started, the reader can listen to audio captures, or one can evaluate the dynamic behavior of interface mock-ups.



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Biodynamics Lab Members Win Second Volvo Award

In February, the research study titled, "The Impact of Mental Processing and Pacing on Spinal Loading" won the prestigious 2002 Volvo Award Prize for best paper in the low back pain biomechanics research area.

The study was conducted by former Ph.D. student **Kermit Davis, William Marras, Catherine Heaney** (OSU School of Public Health), Tom Waters (NIOSH), and former OSU orthopaedic surgeon Purnendu Gupta.

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On the Move



Nadine Sarter spoke on “Multimodal Interfaces in the Modern Car Cockpit” at the GM Human Factors Symposium in Detroit (April, 2002). Also in April, Dr. Sarter was a part of the National Research Council–Transportation Research Board Workshop on Human Factors Considerations in the Design of Automatic Identification Systems (New Orleans) and was invited to serve on this board.



The poster *Usability Test of Bar Code Medication Administration (BCMA)* was presented by **Emily Patterson** (along with M. Rogers, A. Eisenlohr, P. Ebright, and M.L. Render) at the VA Health Services Research 2002 Annual Meeting (February 13th-15th, 2002, Washington DC).



Psychology Professor **James Todd** was selected to be a Joan N. Huber Faculty Fellow. This program rewards the strongest scholars on the Social and Behavioral Sciences faculty. Dr. Todd is a world leader in the study of three-dimensional human vision and was among the first cognitive psychologists to study human vision from a computational perspective. He will receive \$5,000 annually, for three years, to further his research program.



Awards for *Best Paper in Session* from the 20th Digital Avionics Systems Conference (DASC) in Daytona Beach (October 2001) were given to:

- **Mark Nikolic**, James Orr and **Nadine Sarter**, “The Effects of Display Context on the Effectiveness of Visual Onset for Attention Capture” and

- **John McGuirl** and **Nadine Sarter**, “Presenting In-flight Icing Information: A Comparison of Visual and Tactile Cues.”



Nadine Sarter has been selected for the 2002 OSU College of Engineering Lumley Research Award.



Wayne Carlson (ACCAD) is a recipient of one of 21 Incentive Fund grants from the Ohio Board of Regents to study “Human Figure Motion Synthesis, Analysis, and Animation.” Most of these awards are for \$175,000 each.



Institute Welcomes New Faculty, Staff

The Institute is pleased to announce that **Carolyn Sommerich** will be joining the Department of Industrial, Welding & Systems Engineering as an Associate Professor.

Dr. Sommerich's research focus is ergonomics and occupational biomechanics, with special interest in the upper extremity and office ergonomics. She has received funding for research addressing computer monitor placement, ergonomic aspects of portable computer use, and the study of risk factors for upper extremity musculoskeletal disorders in the furniture manufacturing industry and in agricultural work.

She is the author of papers on a diverse range of ergonomics issues, including work-related MSDs of the shoulder, assessment of carpal tunnel pressure during keyboarding, and changes in patterns of trunk muscle activity in response to lifting task requirements.

Dr. Sommerich is a member of the editorial board of the *Journal of Applied Biomechanics* and a reviewer for several journals, including *Human Factors*, *Applied Ergonomics*, and the *American Journal of Industrial Medicine*. She is the past chair of the Ergonomics Committee of the American Industrial Hygiene Association and an active member of the Human Factors & Ergonomics Society.



Sommerich

Carolyn graduated summa cum laude from the University of Cincinnati, with a BSME, and earned her MS and PhD from The Ohio State University. Currently, she is an Associate Professor in the Department of Industrial Engineering at North Carolina State University.

Dr. Sommerich will begin in Autumn, 2002.

The Institute also welcomes **Jodi Heintz Obradovich**, who was hired as a Research Specialist in the IWSE Department in March, 2002. She earned her M.S. and Ph.D. degrees in Cognitive Systems Engineering at OSU.

Dr. Obradovich and Dr. Phil Smith are currently lead investigators on an Army Distributed Continuous Planning project. This is a 5(+3) year project funded by the Army Research Laboratory's Advanced Decision Architecture Collaborative Technology Alliance.

Other research Jodi conducted has taken place in the aviation context. She explored the difficult problem of surface movement at national airports. She also was involved in the design and analysis of the Post-Operations Evaluation Tool (POET), which enables the FAA and airline operations centers to examine trends of inefficiency occurring in the National Airspace System.

Dr. Obradovich also is currently focusing on distributed collaborative work and distributed continuous planning. She has studied the interactions of pairs of FAA Enroute Traffic Managers and Airline Dispatchers as they collaborated using a shared virtual display, to address inefficiencies in the airspace between selected city-pairs.

Dr. Obradovich has authored numerous papers and in 1999 won the Jerome H. Ely Award for outstanding article in *Human Factors*.

Jodi can be reached at 614-292-9497 or obradovich.2@osu.edu.



Obradovich

Lab Hosts Visiting Scholar

Since January 2002, **Hong-Ki Kim** has been studying and working in OSU's Biodynamics Lab. During his year-long sojourn, Dr. Kim will be pursuing his research interests, which include the effects of manual materials handling, work physiology, muscle fatigue, biomechanical modeling, and EMG analyses.

Dr. Kim is an Associate Professor in the Dept. of Industrial Engineering at Kyonggi University, in Suwon-si, Kyonggi-do, Korea. He earned his doctorate from Texas Tech in 1990.

During his visit, Dr. Kim can be contacted in the Biodynamics Lab (614-292-2016) or reached, via e-mail, at kim.1545@osu.edu.



Kim

Volvo Award...

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This research was the result of a multi-disciplinary effort, involving experts from several departments across campus, as well as off-campus colleagues.

This study is among the first to show how different types of mental stress affect the body in physical ways, particularly with regard to loading of the lumbar spine.

The Volvo Award recognizes those who have contributed a significant body of work to a research area pertaining to the study of the lumbar spine.

It is the second time that Dr. Marras has co-authored a Volvo Award winning paper with one of his Ph.D. students. He first received this award in 1993, with Gary Mirka, who is now an Associate Professor at North Carolina State University.

The paper will be presented at the Annual Meeting of the International Society for the Study of the Lumbar Spine, in Cleveland, on May 17th.



Davis



Marras



Heaney



In December and January, recent research led by **William Marras** was covered by several news organizations around the country. These included United Press International, the *New York Times*, Reuters News Service, the *Dallas Morning News*, *Investor's Business Daily*, *CBS Saturday Early Show*, and the *Seattle Times*. This research suggested that low-back injured individuals compensate for their injury by using their muscles differently than uninjured persons when lifting, which places them more at risk of re-injury.



Gary Allread's article, "Essential Elements for Creating a Successful Ergonomics Program" was featured in the Ohio Chamber of Commerce's *2002 Environmental & Safety Directory*.



New software for the aviation industry, developed by **Phil Smith** and colleagues, was profiled in the Spring 2002 issue of *News in Engineering*, OSU College of Engineering's magazine. Called the Reroute Advisory Tool (RAT), the software will support communication and information-sharing between airline dispatchers and FAA traffic managers, who together work to reroute flights when weather or other airline traffic disruptions occur. The software will perform some of the more-routine cognitive tasks involved in this process and, thus, lighten the heavy workloads of these dispatchers and traffic managers.

Speaker to Discuss Ergonomics in Agriculture

As part of its continuing Guest Lecture Series, the Institute is pleased to announce that Dr. Fadi Fathallah (University of California, Davis) will speak on "Agricultural Ergonomics Research in California."

This talk will held on **Friday, May 31st**, at 1:00 p.m., in 263 Dreese Labs, 2015 Neil Ave., on the OSU main campus.



Fathallah

Dr. Fathallah will summarize the research efforts of the UC Agricultural Ergonomics Research Center in helping California growers cope with the challenges of musculoskeletal disorders. The focus will be on field intervention research activities, and on the development of engineering and design controls especially for the wine-grape industry in the Napa and Sonoma Valleys.

2002 HFES Conference: Change in Date, Location

The 46th Annual Meeting of the Human Factors and Ergonomics Society will *not* be held in Pittsburgh this year, as originally scheduled.

Instead, this conference will take place September 30th - October 4th, 2002, at the Baltimore Waterfront Marriott. For more details, visit the HFES web site, www.hfes.org.



Computer Eye Clinic Opens

Dr. James Sheedy will direct the Computer Eye Clinic, which he and the College of Optometry opened April 1st on the OSU main campus.

The clinic will provide advanced care for computer-using patients. Nearly one in six optometric patients cite computer-related eye problems (collectively named Computer Vision Syndrome by the American Optometric Association) as the reason for scheduling eye appointments.



Sheedy

Clinical management of patients with symptoms related to computer use can involve procedures that are not typically provided in traditional primary care eye examinations. The problems often require secondary care

testing of vision function, dry eyes, and/or prescription of computer glasses. Also, many of the problems are related to workplace factors. This facility allows Sheedy and his colleagues to analyze and recommend workplace changes that will improve visual comfort as well as musculoskeletal problems.

Dr. Sheedy said that those suffering from CVS can be helped by wearing special computer glasses (that have a different prescription than one's regular corrective lenses), blinking more (which moistens the eyeball), shielding the glare from overhead lighting, and adjusting monitor height.

More information about Computer Vision Syndrome can be found at Dr. Sheedy's website, www.doctorego.com. To schedule an appointment at the Computer Eye Clinic, call 614-292-2020.

OSHA Announces “Comprehensive” Ergonomics Plan to Reduce Injuries

On April 5th, the Occupational Safety and Health Administration unveiled a plan designed to reduce injuries using a combination of guidelines, enforcement measures, workplace outreach, and research efforts.

Labor Secretary Elaine Chao stated, “Our goal is to help workers by reducing ergonomic injuries in the shortest possible time frame. This plan is a major improvement over the rejected old rule because it will prevent ergonomics injuries before they occur and reach a much larger number of at-risk workers,” she said.

This new plan was announced a year after Congress rejected the Clinton Administration’s rule, which was developed over a period of eight years and was denounced as being burdensome and complicated. Over the last year, DOL conducted three major public forums around the country and met with scores of stakeholders, collecting hundreds of sets of written comments and taking testimony from 100 speakers, including organized labor, workers, medical experts, and businesses.

The plan comprises a four-pronged approach:

1. Guidelines. OSHA Assistant Secretary John Henshaw said the agency will immediately begin work on developing industry and task-specific guidelines to reduce and prevent musculoskeletal disorders that occur in the workplace. OSHA expects to begin releasing these guidelines this year. OSHA also will encourage other businesses and industries to immediately develop additional guidelines of their own.

2. Enforcement. The Department’s enforcement plan intends to focus on companies having a poor record dealing with ergonomics, by coordinating inspections with a legal strategy designed for successful prosecution. OSHA will have an enforcement plan designed to target prosecutable ergonomic violations, and inspections will be coordinated with a legal strategy developed by DOL attorneys based on prior successful ergonomics cases, also designed to maximize successful prosecutions. OSHA also will have special ergonomics inspection teams that will work closely with DOL attorneys and experts to successfully bring prosecutions under the General Duty clause.

3. Outreach and Assistance. The new ergonomics plan also calls for compliance assistance tools to help employers reduce and prevent injuries. OSHA will provide specialized training and information on guidelines and the implementation of successful ergonomics programs. It will administer targeted training grants, develop compliance assistance tools, forge partnerships, and create a recognition program to highlight successful injury reduction efforts.

4. Research. The plan also includes the announcement of a national advisory committee; part of their task will be to advise OSHA on research gaps. In concert with the National Institute for Occupational Safety and Health, OSHA will stimulate and encourage needed research in this area.

“Bureau of Labor Statistics’ data show that musculoskeletal disorders are already on the decline. This plan is designed to accelerate that decline as quickly as possible,” said Henshaw. “Thousands of employers are already working to reduce ergonomic risks without government mandates. We want to work with them to continuously improve workplace safety and health. We will go after the bad actors who refuse to take care of their workers.”

Response to Plan. Reactions to this announcement have been mixed. The plan has received praise from the U.S. Chamber of Commerce, and the National Association of Manufacturers stated that the approach will be “less disruptive” in the workplace than last year’s rejected standard. However, AFL-CIO President John Sweeney believes the plan “caters to corporate special interests” and Senator Edward Kennedy (D-Ma) believes the plan “rejects substantive protections for America’s workers in favor of small symbolic gestures.”

Newly Introduced Ergonomics Bill. On April 17th, John Breaux (D-La), Arlen Specter (R-Pa), and 25 other Senators introduced Senate Bill 2184. If passed, this bill will provide a reissuance of an ergonomics rule within two years. As with the previous standard, this bill is intended to address serious workplace safety and health issues, while correcting problems in the previous standard that led to it being rescinded.

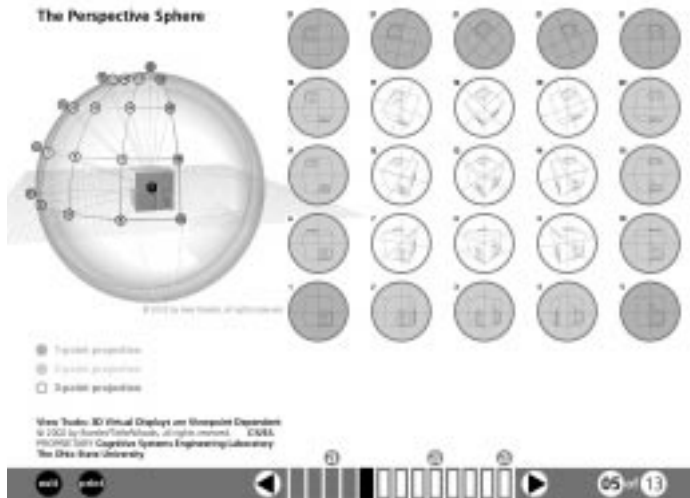
For more details of OSHA’s plan, visit their web site, www.osha.gov.

Washington State to Implement Ergonomics Rule With Delayed Penalties

On March 5th, Washington Governor Gary Locke directed the state’s Department of Labor and Industries to implement the state’s ergonomics rule, but he asked that enforcement actions be delayed until July 2004. This activity was to have begun July 1st, 2002, for the highest risk employers. The Department will continue to support employers by completing demonstration projects, providing educational workshops for employers, distributing awareness education kits and videos, and continuing to offer ergonomics consultations. More information can be found at the Department’s web site, www.lni.wa.gov/wisha/ergo/.

New Multimedia Formats...

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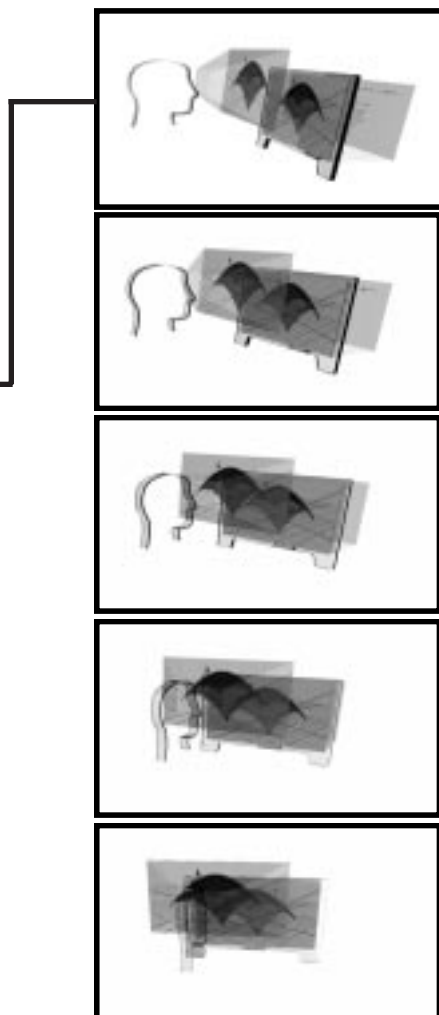
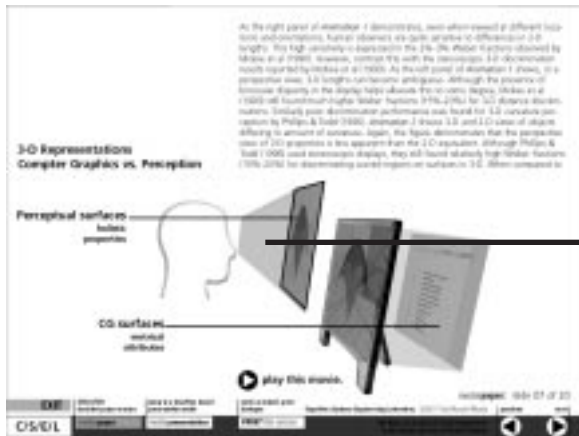


High Resolution Graphics, Scaleable (left)

Despite the graphics limitations in web publishing and standard authoring software, media paper supports postscript graphics features. Documents can be printed enlarged, and window views on the screen can be zoomed. Media papers can even be prepared for pre-press quality.

Navigation Bar (below)

Media papers provide their own navigation while the host application, Acrobat Reader, stays invisible. Taking advantage of .pdf embedded hyperlinks, user access can be directed to only the essential features.



Embedded Movies

Through clicking on buttons in the media paper surface movies or soundclips can be called up that play within the document, just as if an illustration gets suddenly animated. Media papers are cross-platform compatible even in their multimedia features.

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New Multimedia Formats...

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C/S/E/L has also developed another new format,

Topic Landscapes, that uses the capabilities web browsers and concepts in Cognitive Engineering to provide a coherent map and route through a set of resources on inter-related topics. Users can easily browse across topics and dig deeper into resources on particular sub-topics. A description and a mature example of the format are available at url:

<http://csel.eng.ohio-state.edu/woodscta/>

A demo of the first version of a Topic Landscape is on the topic of Seeding design concepts for intelligence analyst overload and is available at url:

<http://csel.eng.ohio-state.edu/analystoverload/>

The Topic Landscapes format has the potential to become a collaborative work tool that integrates diverse contributions across multi-organizational teams within the consortium. Topic Landscapes can become a living artifact where collaborators integrate their contributions in a way that captures the growth of results and the interconnections across results from different groups. Work will focus on distributed Topic Landscapes and on making the tools to implement the format more accessible to other groups.

A Topic Landscape Structure Consists of:

Part 1: A diagnosis that defines the difficulties and opportunities

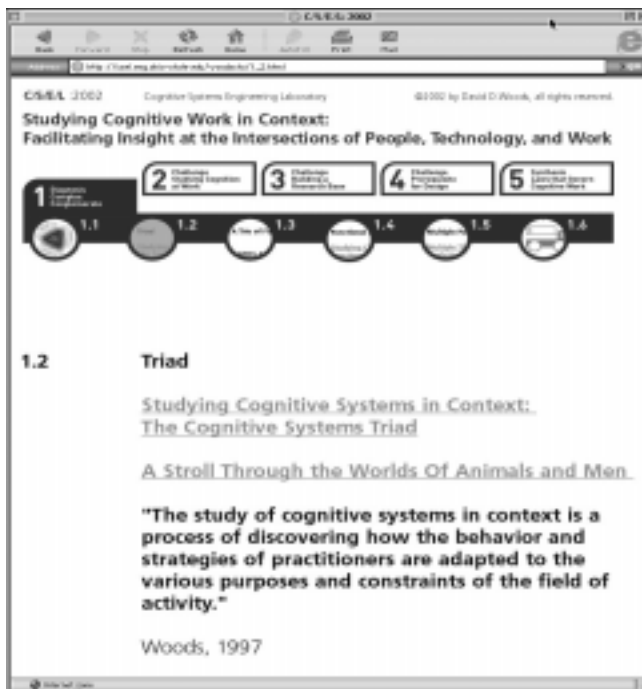
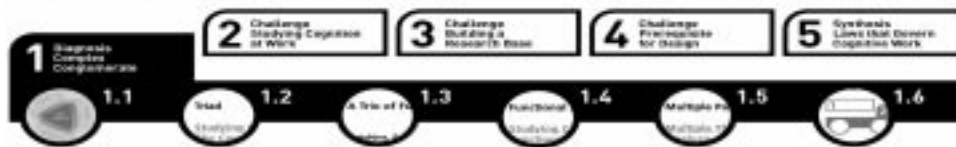
Parts 2-N: A series of challenge and response units.

Part N+1 (the last part): Provides a synthesis and transition

Each part has a sub-structure of an idea flow as series of points / graphics / animations and supporting resources (papers, demonstrations, mediapapers).

This generic landscape structure triples then as a navigation mechanism, as a structuring heuristic, and as a model of the topic:

Studying Cognitive Work in Context: Facilitating Insight at the Intersections of People, Technology, and Work



This is the map for the topic landscape, *Studying Cognitive Work in Context*:

Diagnosis: 1. Uncoupling Complex Conglomerates.

Challenge and Response: 2. Studying Cognition at Work.

Challenge and Response: 3. Building a Research Base on Cognitive and Collaborative Work.

Challenge and Response: 4. Prerequisite for Design

Navigation bar of the 'facilitating insight' topic landscape (above left)

Screenshot of the same web site (left)