Can IT Enhance Creativity?

Can Creativity Enhance IT?

Mary Lou Maher

CreativeIT Program Director, NSF

University of Colorado August 2007
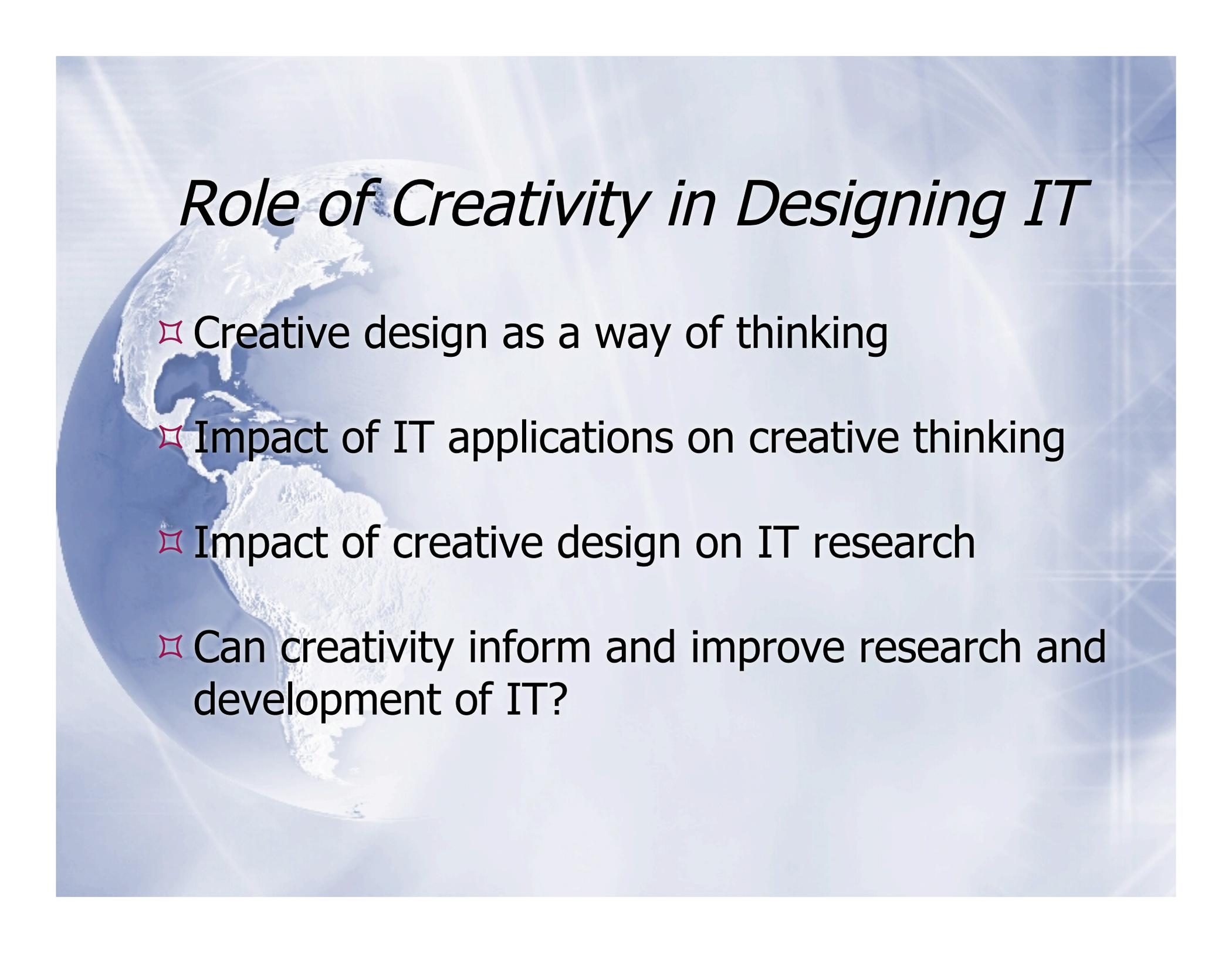
Role of Creativity in Designing IT

- Creative design as a way of thinking

- Impact of IT applications on creative thinking

- Impact of creative design on IT research

- Can creativity inform and improve research and development of IT?

A computational model of curiosity coupled with a reinforcement learning algorithm is motivated to learn to change the display to attract people to read the information display.

Mary Lou Maher
Kathryn Merrick
Curious Information Display 2006

Computational Creativity
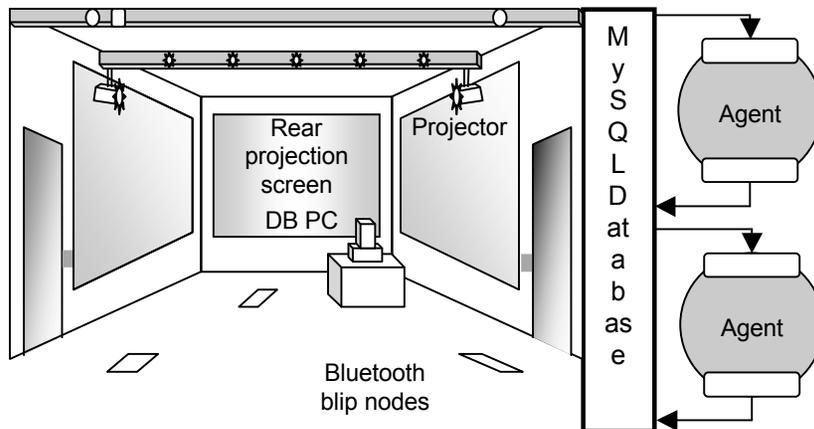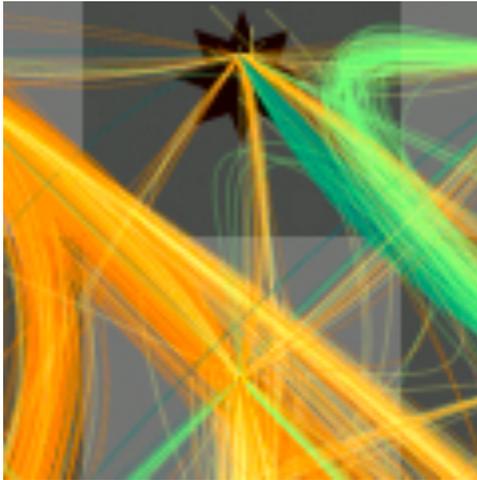
Martin Wattenberg
Thinking Machine 03-04
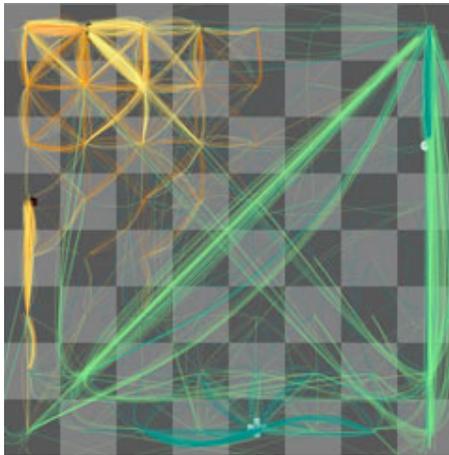
Thinking Machine 4 explores the invisible, elusive nature of thought. Play chess against a transparent intelligence, its evolving thought process visible on the board before you.The artwork is an artificial intelligence program, ready to play chess with the viewer. If the viewer confronts the program, the computer's thought process is sketched on screen as it plays. A map is created from the traces of literally thousands of possible futures as the program tries to decide its best move. Those traces become a key to the invisible lines of force in the game as well as a window into the spirit of a thinking machine.
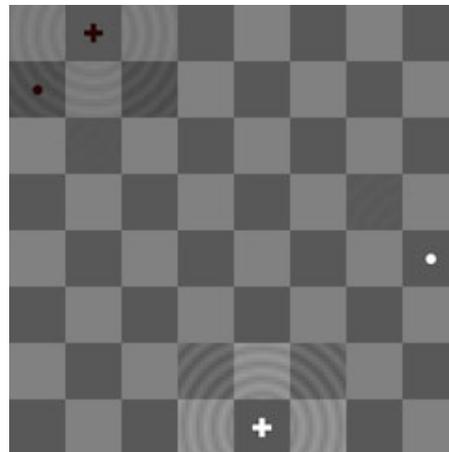
Visualizing Thinking

A study of the impact of tangible Interfaces to 3D digital models shows that people produce more exploratory modifications to the design model and experience more unexpected discoveries.

Mary Lou Maher, Yohann Daruwala, Mi Jeong Kim
Digital Workbench 2006

Tangible Interfaces for Creative Thinking
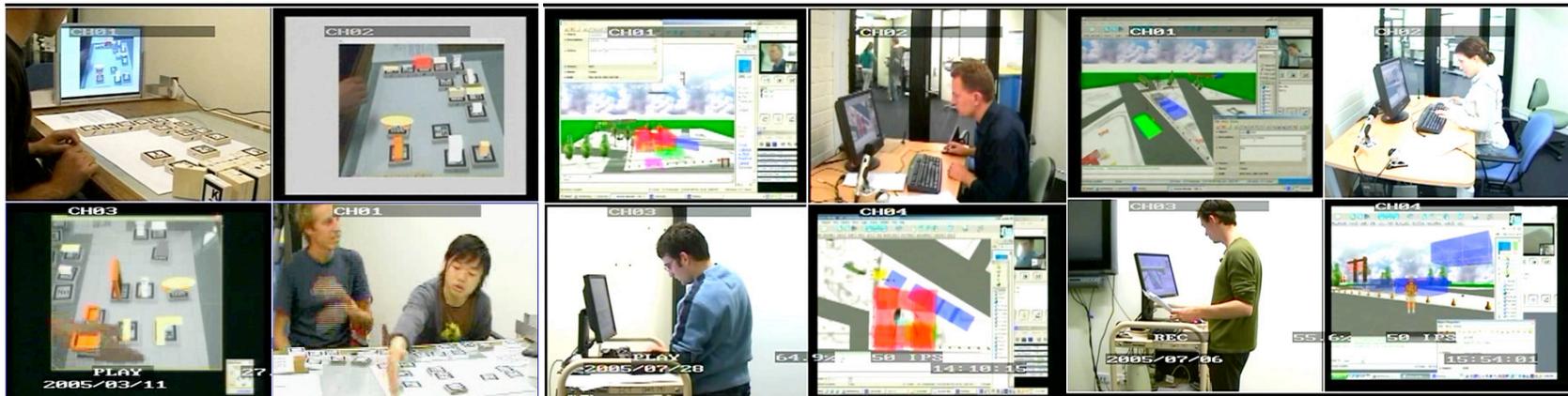
In The Legible City the visitor is able to ride a stationary bicycle through a simulated representation of a city that is constituted by computer-generated three-dimensional letters that form words and sentences along the sides of the streets.

Jeffrey Shaw
Legible City 89
The Distributed Legible City 98

New Interaction Techniques

The increasingly ubiquitous nature of the Internet and the maturing of 3D interaction techniques is encouraging the technological development of new social interaction and interface paradigms for content rich, inter-connected, shared virtual environments.

Christa Sommerer
Laurent Mignonneau
Life Writer 2006

An interaction and communication environment where remotely located visitors on the Internet and the on-site visitors to the installation at the NTT-ICC Museum in Tokyo can interact with each other through artificial creatures. Artificial creatures are created by on-line participants through writing email messages to the *Life Spacies* web page. Each text message is encoded into the genetic code for a creature, our in-house text-to-form editor allows us to translate text into 3D shapes. When a text is written into the *Life Spacies* web site GUI an email message is generated and an artificial creature starts to live in the interaction environment at the NTT-ICC Museum.

Representing Text as Creatures

whisper[s] is a collaborative project involving artists (dance, sculpture, music), designers (of visuals, objects & textiles), computer scientists and hardware/ software engineers. We are developing technology and communications metaphors that enable networked wearable devices to communicate affective states in a continuous manner.

Techla Schiphorst
Susan Kozel
Whisper current

Augment Verbal and Visual Modes of Communication

Jonah Brucker-Cohen
Umbrella.Net current

UMBRELLA.net is an experimental platform for developing ad-hoc networks based around coincidence or chance occurrences. The project utilizes the haphazard and unpredictable patterns of weather and crowd formation as a catalyst for network formation. This approach is meant to challenge traditional conceptions of how networks form and function by correlating their existence to circumstances beyond people's direct control. The system consists of a set of umbrellas as nodes that can spontaneously form based on weather conditions. UMBRELLA.net establishes a visual footprint of a network in public space and creates a framework for sharing localized information among connected nodes.

Ad Hoc Network Formation

Rafael Lozano-Hemmer
Amodal 2003

"Amodal Suspension" was a hybrid work that transformed public space by visualizing electronic messages that people sent to each other. This project is not about communication, it is about relationships. We want to slow-down communication to an urban level, to make it tangible.

Tangible Access to Digital Communication

Synergy Between Creativity and IT
Developing New Research Areas

Artists and Scientists – Similarities

- – Exploration of the unknown
- – Experimentation
- – Observation
- – Openness
- – Analysis
- – Process of discovery

Artists and Scientists – Differences

Methodology

CreativeIT

Synergies Between Creativity and IT

Focus on research that improves our understanding of creativity while producing simultaneous advances in computer science and information technologies with digital arts, cognitive science, engineering design, and physical and life science.

Goals of CreativeIT
Synergies Between Creativity and IT

- Understand creativity as cognitive and computational processes

- Understand information technology as a means for enhancing human creative thinking and vice versa

- Understand how design (creative) thinking develops new products, methods, organizations in computer science in the context of a perceived need or problem

Transforming Research

Synergies Between Creativity and IT

- Establish creativity-based research as rigorous research.

- Examine how new value and reward systems can be implemented to extend and complement research objectives in traditional research domains.

- Identify and create shared semantics between new and traditional forms of research.

- Identify and sustain collaboration between new forms of research, such as creative design, and traditional forms of research.

- Identify and recognize value and reward systems that govern each domain. What are the accepted deliverables? How are they evaluated? How are they used as seeds for further research inquiries?

CreativeIT Research Advances

Synergies Between Creativity and IT

New theoretical models: computational and cognitive models of creativity in the context of problems and solutions.

New modes of research: focus on understanding the roles of creative processes or creative professionals in research in computer science and information systems, for example, including artists in research groups.

Innovative educational approaches: learning environments in computer science that reward creative thinking.

Creativity enhancing tools: information technology tools and infrastructure that support and enhance creativity in problem finding as well as problem solving.

Links with other NSF Programs

Synergies Between Creativity and IT

- International Office

- SBIR/SBTT - Errol Arkilic

- CPATH - Anita La Salle

- Science of Design - Alan Hevner

- Engineering Design - Judy Vance

- Cyberinfrastructure - Diana Rhoten

- Behavior and Cognitive Science - Chris Kello

Workshops

Synergies Between Creativity and IT

- Developing Computational Tools that Facilitate Individual and Group Creativity in the Early Stages of Design, June 2007

- NAE Exhibition: Speculative Data and the Creative Imagery, June-August 2007

- Creativity and Rationale in Design, January 2008

- Success Factors in Fostering Creativity in IT Research and Education, January 2008

- AAAI Symposium: Creativity and Intelligent Systems, April 2008

- Studying Design Creativity, March 2008

Exploratory Projects

Synergies Between Creativity and IT

- Similarities between poetry and coding

- Simulations of creativity and conflict in open source software development

- Artists working with scientists in visualizing and representing complex data

- Role of creative performance in defining specifications for collaborative immersive environments

- Designing technologies to encourage creative collaboration in public spaces

- Designing the next generation wiki for creative community building

- Computational models of creativity in search algorithms

CreativeIT Research Areas

Synergies Between Creativity and IT

Understanding Creative Cognition and Computation. The development of new models of cognition and computation that explain or simulate creativity.

Creativity to Stimulate Breakthroughs in Science and Engineering. Understanding the role and performance of artists in developing new technologies, discovering new patterns in information, and in finding new ways of seeing, knowing, and doing computer and information science and engineering.

Educational Approaches that Encourage Creativity. Approaches to teaching that encourage creativity: multi-disciplinary teaching and learning, design studio teaching, and open-ended problem-based learning.

Supporting Creativity with Information Technology. Develops new software and user interfaces to support users in being more creative and evaluates their performance.

Solicitation: Two Kinds of Projects

Synergies Between Creativity and IT

Pilot Projects identify a synergistic group of people or ideas that have the potential to lead to innovative and creative advances in one or more disciplines. These projects will start with a set of objectives that are consistent with the CreativeIT program and will pursue a methodology for achieving those objectives recognizing that the objectives may change as the specific context of the problem being addressed is better understood. The outcomes of a Pilot Project may be an innovative solution or area of research that will benefit from further development. Up to $200,000

Major Projects bring together a significant group of people to focus on specific synergies that can transform our understanding of models, tools, or education relevant to CreativeIT. While the research may use a design approach in which the specifics of the problem and solution may change during the life of the project, the overall objectives and methods are well defined. This type of project is well founded on previous research in the individual or combined disciplines involved in the project. Up to $800,000

NSF Contacts for CreativeIT
Synergies Between Creativity and IT

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