

Experience of Ph.D. Research in HCI Domain and the Issues Involved

Lecture By

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Abstract:

This lecture primarily focuses on sharing my experience of the doctoral research in the domain of Human-Computer Interaction (HCI) carried out during 2001-2005 at C-DAC. I propose to spend more time on my **'experience' of the process** and not so much on my thesis, as it will be difficult to cover it in short time. The topic of my research was **"Visualization of Interface Metaphor for Software: An Engineering Approach"**. C-DAC fully sponsored and hosted this research as an experiment, after considering its need and relevance for technological development. This example of Ph.D. research can provide **insightful comparisons between on-campus and off-campus/industry sponsored Ph.D. in Human Computer Interaction (HCI) domain**. It will also be interesting to observe the **characteristic differences between pure engineering, scientific, design and multi-disciplinary research**. As HCI research spreads across extreme ends, it can be very scientific or artistic or a mix of both. The spectrum is really very wide. The pervasive nature of design in all human activities compels the **Usability Designer** to deal with multiple disciplines simultaneously. In a developing country like India, there is a **tendency to follow uni-disciplinary approaches**. Very often the design practitioners have to apply **ad hoc techniques** to resolve the issues arising from the unknown disciplines. Ph.D. research provides an opportunity for **scientific and systematic integration of multi-disciplinary approaches** to solve design problems. But getting recognition and **acceptance for multi-disciplinary research** can be very tricky and difficult at times. Ph.D. research can not only produce effective design solutions but also **extend the design-paradigm further to invent new methods, techniques and tools** for designers. It can also help the designers in **creating the wealth of knowledge**.

Brief Profile of Dr. Dinesh S. Katre

Dinesh S. Katre has Ph.D. in Human Computer Interaction (HCI, 2005) from Birla Institute of Technology and Science (BITS), Pilani. He is perhaps the first Ph.D. in HCI in India. He also has M.Des. in Visual Communication (1992) from Indian Institute of Technology, Mumbai and Bachelor of Fine Arts from Sir J. J. Institute of Applied Arts, Mumbai (1990).

He is an evangelist who constantly tries to promote usability and Human-Computer Interaction in the academia, R&D and industry.

Presently, he heads the National Multimedia Resource Centre of C-DAC, Pune; which was established under his leadership and with the sponsorship of Dept. of Information Technology, Govt. of India in 1998. Recently, he has envisioned the charter for Human Computer Interaction Design (HCID) program at C-DAC. This activity has been setup to undertake research, development and projects with strong focus on HCI.

He has traveled all over India and abroad to deliver lectures, seminars and workshops dealing with HCI. Some of the reputed institutes in India where he was invited include Indian Institute of Technology, Mumbai; National Institute of Design, Ahmedabad, SNDT University, Mumbai; Film and Television Institute of India, Pune; Dhirubhai Ambani Institute of ICT, Gandhinagar; Usability Professionals Association (UPA), Pune and several others. He was invited to share his expertise in Human Computer Interaction (HCI) at University of Abertay, Dundee, UK in 1999; University of California, USA in 2001; and Copenhagen Business School, Denmark in 2005. In March 2006, he delivered an introductory seminar 'Pragmatic Approach to HCI Education' for the senior faculty members from 10 engineering colleges from Pune. Vishwakarma Institute of Information Technology (VIIT) had organized it.

He has published around 23 research papers in international conferences and journals. He organized the National Conference on Multimedia Technology for Culture in year 2000. His technical article for 'GUI of the Future' contest won the PC Quest award in 2003. He was a member of international program committee of India-HCI 2004 conference. He was invited to share his experience of Remote Usability at the seminar on User Centred Design (UCD) along with European usability experts at Mumbai in 2003. This seminar was organized by Indo-European Systems Usability Partnership (IESUP) and Computer Society of India (CSI).

During past 14 years at C-DAC, he has conceptualized and implemented many R&D projects that deal with Multimedia Content Creation, Multimedia Authoring, e-Learning, Digital Library for Indian Heritage and 3D Game Development. He is the principle designer of many technology, content and training products. He regularly writes and publishes thought provoking articles related to HCI research in India on www.hceye.org.

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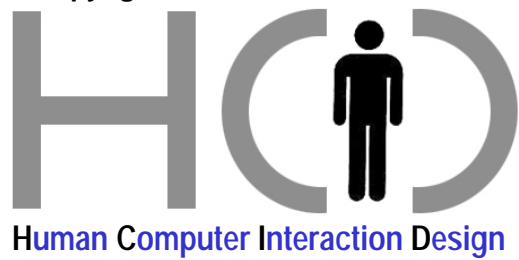
(Abridged Presentation)

The actual lecture is spread over 50 slides.

Dr. Dinesh S. Katre

**Lecture for Usability Matters Organization
(UMO), Cordys Technologies, High-tech
City, Hyderabad**

June 15th, 2006



Motivation

High Performance Computing Centric
Focus of C-DAC

Electronic lamp in 1993-1994



C-DAC's Corporate Image (1994-95)



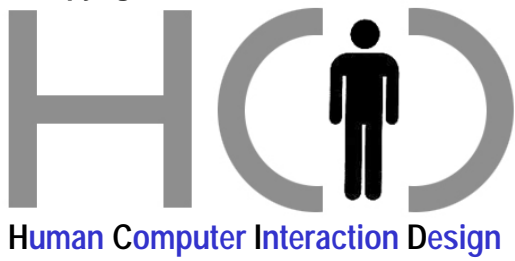
Advanced Computing for Human Advancement

Conceived the Multimedia Resource Centre Project 1996-97 funded by DIT



1998 onwards-

Diversified into many spheres of technology development like Multimedia Authoring, Digital Library for Indian Heritage, Digital Archeology, e-Learning, Game Design, Tools for Usability Evaluation, HCI as the underlying theme for every technical project



What is research?

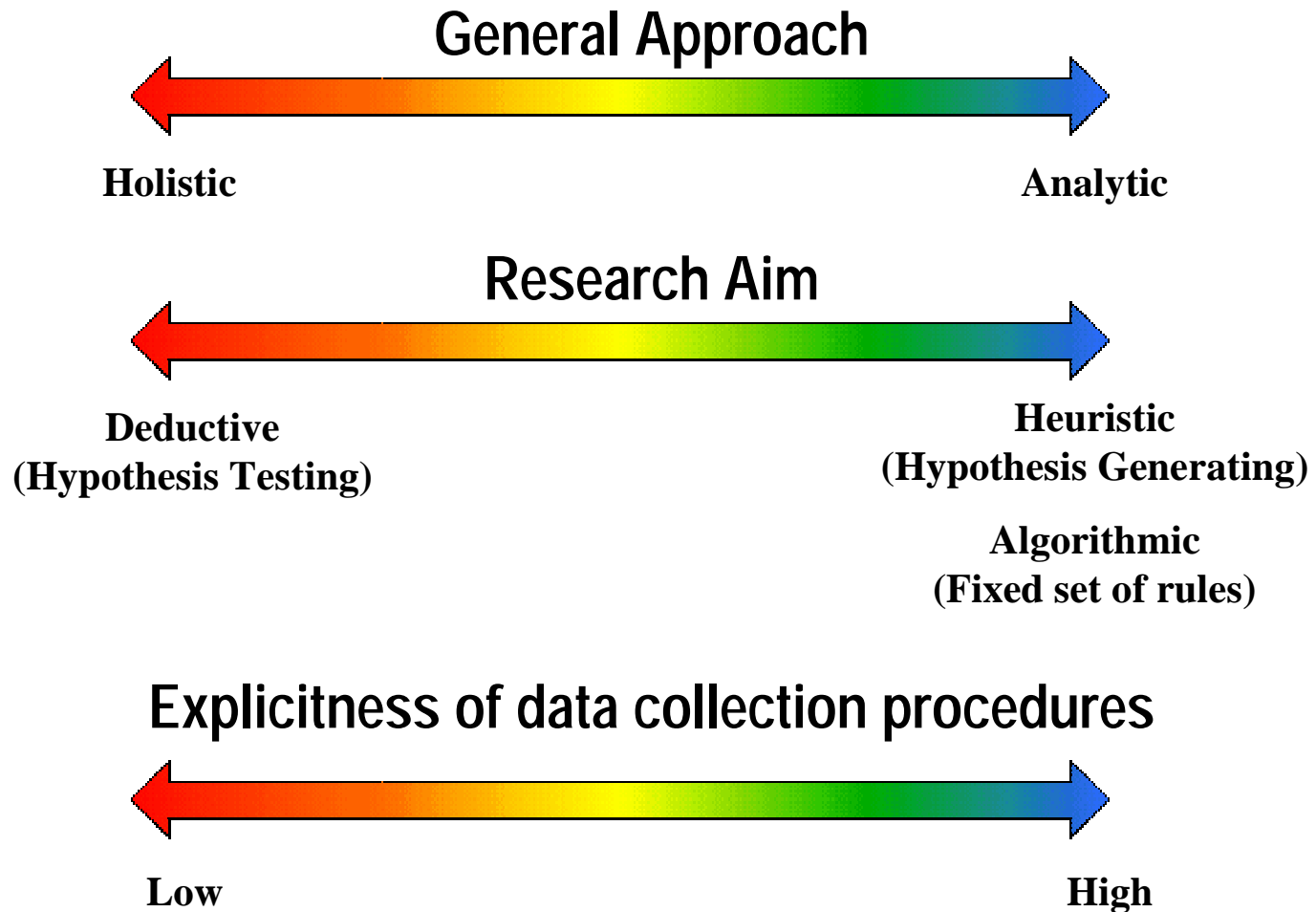
Research is an **ORGANIZED** and
SYSTEMATIC way of **FINDING ANSWERS**
to **QUESTIONS**.



Kinds of Research Kinds of Research

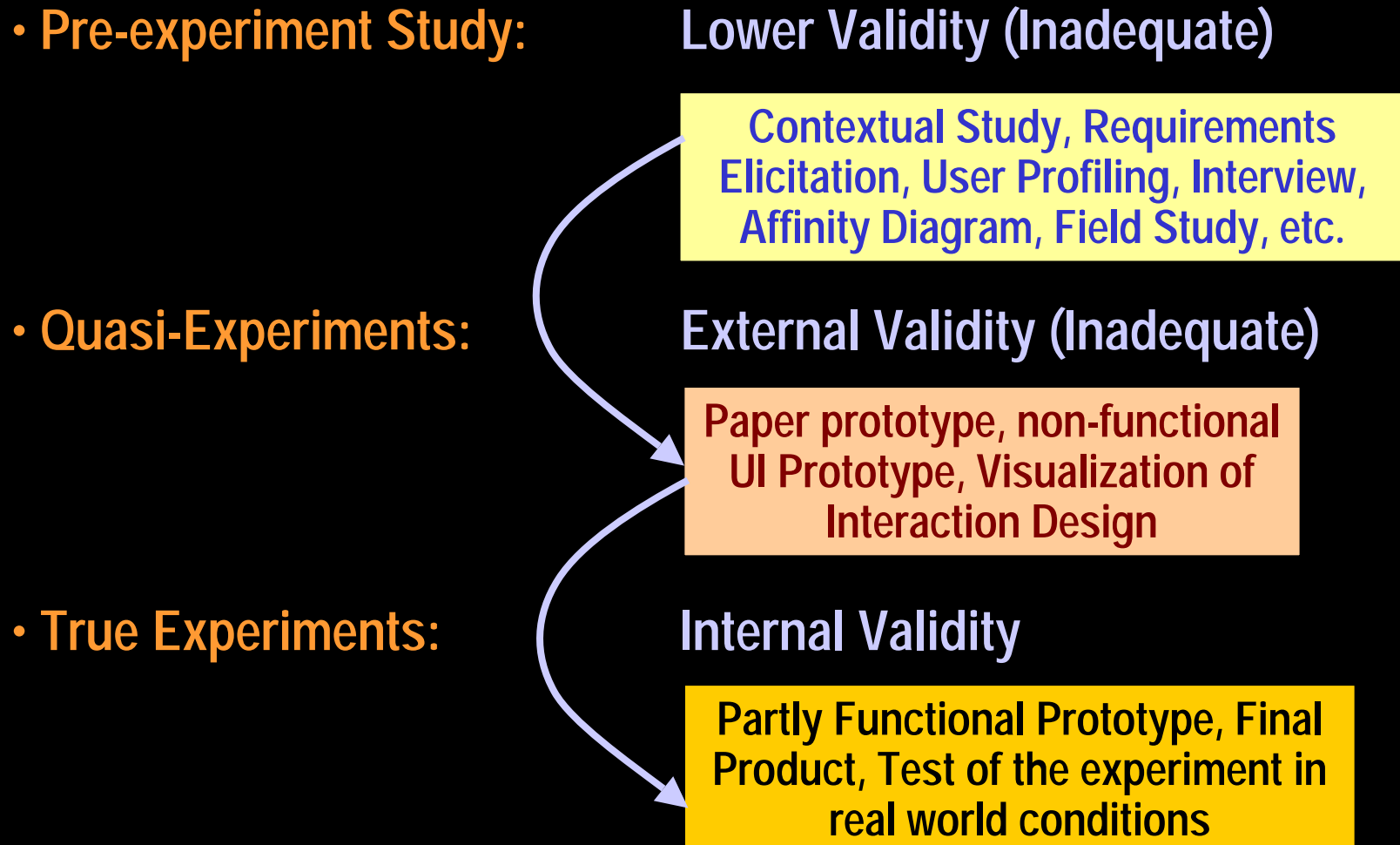
- **Basic:**
Knowledge for the sake of theory
- **Applied:**
Showing how the finding could be applied
- **Exploratory:**
Lacking the clarity of objective
- **Confirmatory:**
Confirming that the theory is supported by the facts
- **Quantitative:**
Measuring
- **Qualitative:**
Observations
- **Literature Survey:**
Books, Research Papers

Broad Approaches to Research





Kinds of Experimental Research





Levels of Research & Development

**Techniques, Methods, Processes,
Underlying Theories, Principles,
Knowledge Creation**

**New Product / System / Tools/
Process Design, Technology
Innovation, Invention**

**GUI Design / Interaction Design,
Practicing well-known methods**

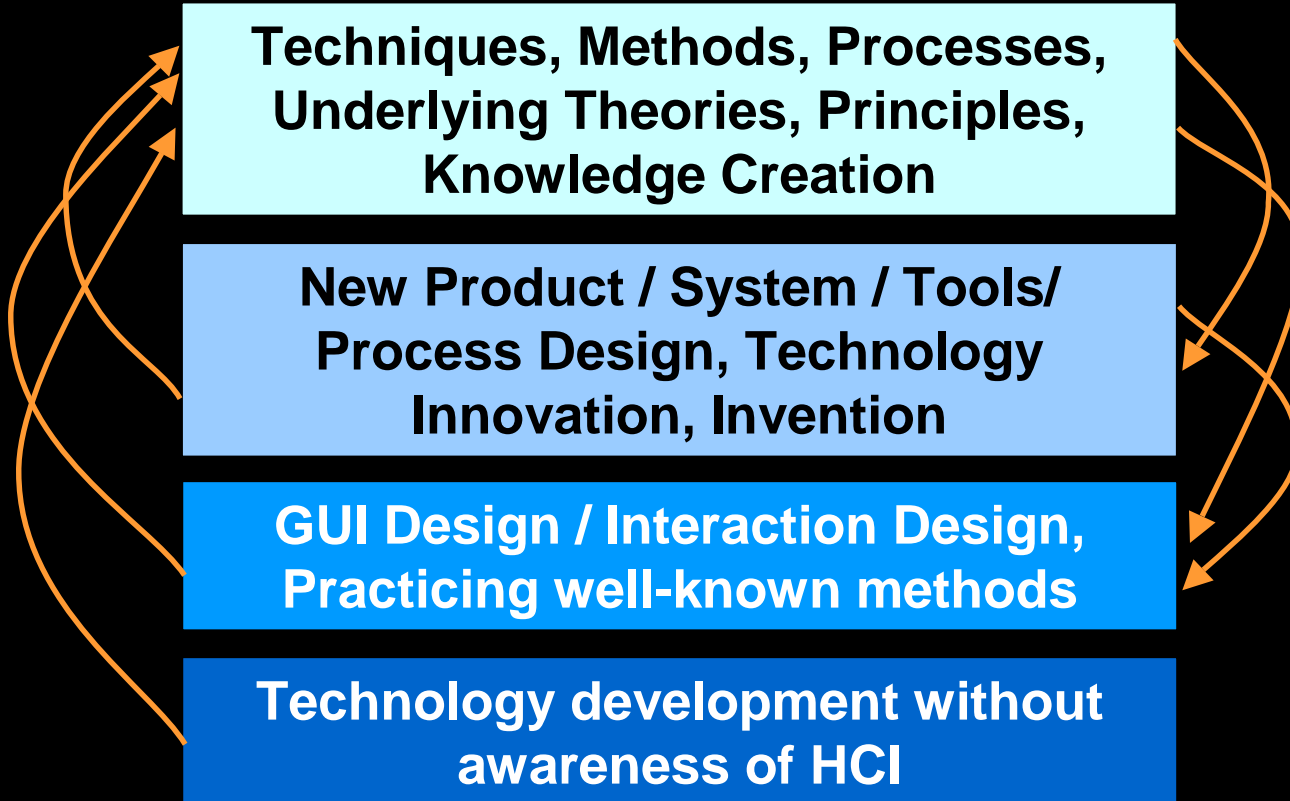
**Technology development without
awareness of HCI**

**Knowledge
Creation**

**Disruptive /
Incremental R & D**

Aware

Unaware





Human Computer Interaction Design

**Multi-disciplinary
domain**

Multi-disciplinary Research

Research in which a problem is analyzed using the perspective and methodology of more than one discipline.



**Multi-disciplinary
domain**

Human-Computer Interaction (HCI)

- Computer Science
- Cognitive Science
- Behavioral Psychology
- Social Science
- Semiotics
- Linguistics
(Speech, Natural language, Cognitive)
- Aesthetics
- Visual Design / Visual Literacy
- Industrial Design
- Multimedia Communication (Multi-sensory)
- Ergonomics
(Physiological, Cognitive)
- Instructional Design and Learning
- Library and Information Science
- Phenomenology
- Anthropometry
- Anthropomorphy
- Anthropology
- Statistics



Barriers in Interdisciplinary Research

- Insecurity due to unknown disciplines
- Strong influence of candidate's primary background
- Adaptability to other disciplines
- Lack of access to relevant literature
- Unavailability of guidance
- Inability to translate the interdisciplinary findings into the solution

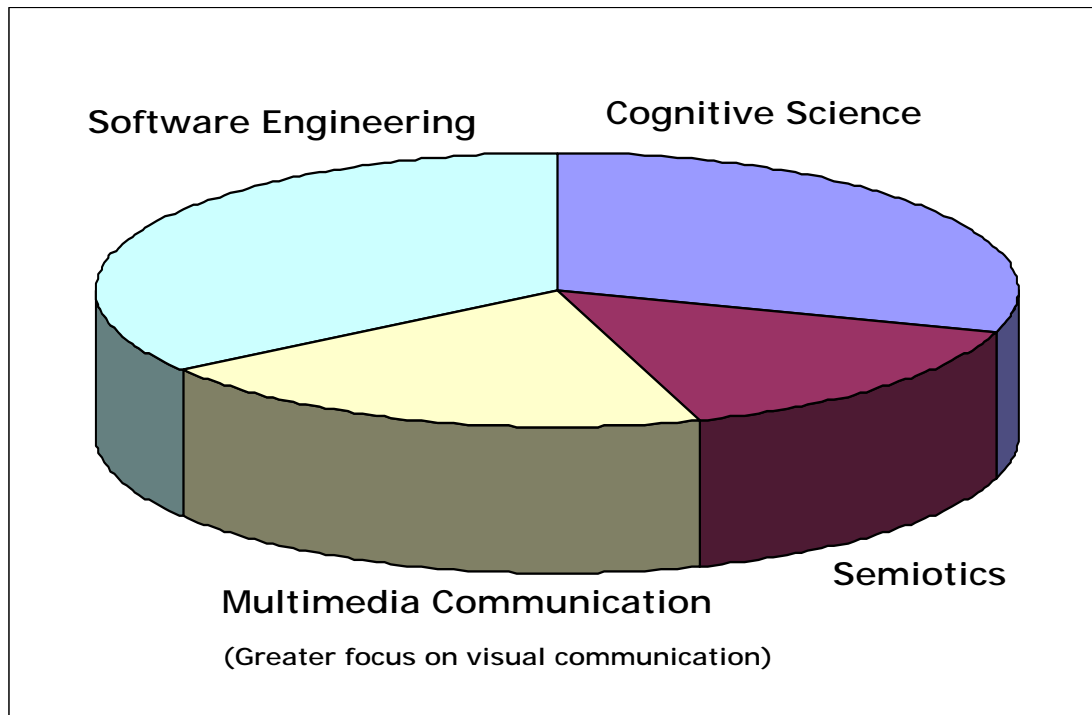


Issues in Multidisciplinary Research

- Ownership
- Trade-offs between the disciplines
- Terminological conflicts
- Deciding the weight and focus for each discipline
- Prejudices against other discipline
- Difference in goals, expectations and methodologies
- Integration and representation of multidisciplinary knowledge
- Acceptance / Recognition



My Doctoral Research in HCI: Visualization of Interface Metaphor for Software: An Engineering Approach



- Core Discipline
Computer Science
Software Engineering
- Complementing Disciplines
Cognitive Science
Semiotics
Linguistics
Visual Communication
Multimedia



Benefits of Interdisciplinary Research

- Knowledge expansion
- Knowledge redefinition
- Knowledge creation
- New processes, approaches
- Innovative technology, products
- New user groups, professions
- Identification of challenges, problems, opportunities

