Transcending Disciplinary Boundaries in Interaction Design

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As an interaction designer or researcher, chances are you've collaborated in a team of contributors with different disciplinary backgrounds. You may remember such collaborations warmly, painfully, or anywhere in between. Communications between collaborators in working teams may be effective or fraught with misunderstandings. People may have differing ideas about the value of their contributions. Some may think their skills are more valuable than the skills of others. Some may think their tools are better than the tools of others. Some may think their knowledge is more important than the knowledge of others. Some may think their way of thinking about what is important trumps everyone else.

Despite the problems associated with working in teams comprising differing disciplinary backgrounds, the need to form such teams endures. Working this way raises issues of and distinctions between notions of disciplinarity, multidisciplinarity, and interdisciplinarity [1].

Disciplinarity

Disciplinarity is an approach to a particular problem space using a single, identifiable collection of methods informed by or in the service of a single body of knowledge. We have elsewhere characterized notions of disciplines in terms of philosophical norms and practical norms [2].

Under philosophical norms, what unifies a single disciplinary perspective is the belief in common notions of values, methods, and reasoning (VMR), where value is how you perceive your discipline, method is how you engage in your discipline, and reasoning is how you represent your discipline. Table 1 shows characterizations of some disciplinary perspectives germane to HCI in terms of values, methods, and reasoning.

Under practical norms, what unifies a single disciplinary perspective is the belief in common notions of mind-set, knowledge set, skill set, and tool set, where mind-set is what you think is important to you and to your discipline, knowledge set is what you think everyone in your discipline ought to know, skill set is what you think everyone in your discipline needs to know how to do, and tool set is what you think everyone in your discipline should use to practice the discipline [3]. Table 2 shows characterizations of some disciplinary perspectives germane to HCI in terms of mind-set, knowledge set, skill set, and tool set.

Given these differences when it comes to disciplinarity, it is not a surprise that these varied disciplinary perspectives can lead to issues in collaborative teams.

Multidisciplinarity and Interdisciplinarity

Multidisciplinarity is an approach to a particular problem space using coordinated outputs from distinct collections of methods informed by or in the service of respective distinct bodies of knowledge. Interdisciplinarity is an approach to a particular problem space using integrated outputs from combined collections of methods informed by or in the service of combined bodies of knowledge. Both approaches—multidisciplinarity and interdisciplinarity—answer the need for teams to work across disciplinary boundaries in the service of certain kinds of problems or goals.

As a means of overcoming the potential effects of disciplinary parochialism, interdisciplinarity and multidisciplinarity have both promises and issues of their own. For example, Rogers, Scaife, and Rizzo critically distinguish interdisciplinarity from multidisciplinarity:

"There is a widespread view that interdisciplinary research is a

[1] We have elsewhere described the potential shift in interaction design from disciplinary to transdisciplinary perspectives: Blevis, E. & Stolterman, E. (2008). The Confluence of Interaction Design and Design: from Disciplinary to Transdisciplinary Perspectives. In *Proc. 2008 Design Research Society Conference.* Sheffield, UK: Design Research Society. 344/1-12.

Some of this article owes to this prior publication. Yvonne Rogers is also advancing the idea of the transdisciplinary perspective as a trend in interaction design and HCI: Rogers, Y. "A New Framework for HCI." (2010, in preparation).

[2] Blevis, E., Lim, Y.K., and Stolterman, E. "Regarding Software as a Material of Design." In *Proceedings of Wonderground* (2006).

[3] The notion of disambiguating mind-sets, knowledge sets, skill sets, and tool sets owes to Harold Nelson [private communication].

good thing. By 'interdisciplinarity' is usually meant something like: the emergence of insight and understanding of a problem domain through the integration or derivation of different concepts, methods, and epistemologies from different disciplines in a novel way. However, it is also widely believed that 'true' interdisciplinarity is very difficult to achieve and, more often than not, remains an elusive goal. In practice, many self-styled interdisciplinary enterprises actually work at the level of being multidisciplinary (or pluridisciplinary): where a group of researchers from different disciplines cooperate by working together on the same problem towards a common goal, but continue to do so using theories, tools, and methods from their own discipline, and occasionally using the output from each other's work. They remain, however, essentially within the boundaries of their own disciplines both in terms of their working practices and with respect to the outcomes of the work" [4].

Transdisciplinarity

Transdisciplinarity is an approach that focuses neither on particular collections of methods nor on particular bodies of knowledge, but rather focuses on a broader goal: transcending disciplinarity and using collections of methods and their associated bodies of knowledge on an as needed basis as required by the pursuit of this target broader goal.

A scholar or practitioner can be transdisciplinary in terms of broad perspective and still be disciplinary, multidisciplinary, or interdisciplinary in terms of approaches to more specific problems or tasks. You can be at once transdisciplinary and disciplinary, interdisciplinary, or multidisciplinary.

In our opinion, the present-day foundations of transdisciplini-

[4] Rogers, Y., Scaife, M., and Rizzo, A. "Interdisciplinarity: an Emergent or Engineered Process?" In *Interdisciplinary Collaboration*, edited by Derry, S.J., Schunn, C.D., Gernsbacher, M.A. Mahwah, New Jersey: LEA, 2005.

	VISUAL DESIGNERS	INTERACTION DESIGNERS	CONTENT DESIGNERS	SOFTWARE DESIGNERS
values (what design is about as a value system)	aesthetics affect culture	interactivity experience transparency	message credibility	performance correctness function
methods (what design is as activity)	creating form and image	designing for usability and user experience	understanding discourse and culture	programming, specification, testing, capability maturity model (CMM), object-oriented programming (OOP)
reasoning (what designs are as plans or explanations or representations)	sketches, look and feel, visual artifacts, appearance prototypes	prototypes, demonstrations, task models	text, images, narratives	programs, specifications, requirements, unified modeling language (UML)

▸ Table 1. Characterizations of some disciplinary perspectives in terms of values, methods, and reasoning.

	VISUAL DESIGNERS	INTERACTION DESIGNERS	CONTENT DESIGNERS	SOFTWARE DESIGNERS
mind-set	appearance	interactivity	message	performance
knowledge set	visual form	cognition	narrative	algorithms and data structures
skill set	drawing, sketching, brainstorming, illustrating	processes: contextual design, interaction design process, formative evaluation, iterative design, participatory design	secondary research, analysis, précis, narrative, indexing, tagging	processes: star, spiral, waterfall, joint application development (JAD), rapid application development (RAD)
tool set	image and illustration tools, photography, video, cultural artifacts	usability labs, rapid ethnography, low- and high-fidelity prototypes	classification, reportage, secondary research	software development kits, open source

▸ Table 2. Characterizations of some disciplinary perspectives in terms of mind-sets, knowledge set, skill set, and tool set.

narity are Basarab Nicolescu's *Manifesto of Transdisciplinarity* and Manfred Max-Neef's *Foundations of Transdisciplinarity*. The notion of transdisciplinarity enjoys a present-day renaissance, having first appeared 30 to 40 years ago in writings by Erich Jantsch, Thomas Kuhn, and others, according to Nicolescu. Nicolescu and Max-Neef's account of transdisciplinarity calls for a radical, values-rich interpretation of what it means to transcend disciplinarity. A number of recent books and anthologies attempt to distinguish transdisciplinarity from more familiar notions of disciplinarity, multidisciplinarity, and interdisciplinarity. (Please see the sidebar for further information.)

Teamwork is necessary in order to address the difficult issues of our times—like sustainability, poverty and homelessness, health care, food supply, and so forth. Apropos of such broad concerns, the danger of multidisciplinarity is that individual team members may never gain a holistic understanding of the problem at hand. The danger of interdisciplinarity is that it is hard enough to be good at one discipline, let alone two or more. Being interdisciplinary puts an individual at risk of being spread too thin or sacrificing rigor to breadth.

The trick and challenge of the transdisciplinary perspective is to break down barriers to working together without loss of rigor, by focusing on issues first rather than disciplinary notions of methods and bodies of knowledge. Nicolescu puts this best in his emphasis on the relationship of taking a broad perspective and vision to notions of rigor, tolerance, and openness:

Further Reading

Basarab Nicolescu, *Manifesto of Transdisciplinarity*, translated by K. Voss, SUNY Press, 2002.

Manfred Max-Neef, "Foundations of Transdisciplinarity." *Ecological Economics*, volume 53.

Erich Jantsch "Towards Interdisciplinarity and Transdisciplinarity in Education and Innovation." In CERI (Ed.), *Interdisciplinarity: Problems of Teaching and Research in Universities*. Paris: OECD, 1972.

Thomas Kuhn, *The Structure of Scientific Revolutions,* 1962.

A number of recent books and anthologies attempt to distinguish transdisciplinarity from more familiar notions of disciplinarity, multidisciplinarity, and interdisciplinarity. We classify them as follows:

Case Studies and Perspectives
Some of these sources describe case studies and individual perspectives on the nature and definition of transdisciplinarity, including:

Hadorn, G., Hoffmann-Riem, H., Biber-Klemm, S., Grossenbacher-Mansuy, W., Joye, D., Pohl, C., Wiesmann, U., and Zemp, E., ed. *Handbook of Transdisciplinary Research*. New York: Springer, 2008.

Klein, J.T., Grossenbacher-Mansuy, W., Häberli, R., Bill, A., Scholz, R.W. and Welti, M., ed. *Transdisciplinarity: Joint Problem Solving Among Science, Technology: An Effective Way for Managing Complexity*. Berlin: Birkhäuser Verlag, 2001.

Somerville, M. and Rapport, D., ed. *Transdisciplinarity: reCreating Integrated Knowledge*. Oxford: EOLSS, 2000.

Sustainability and Transdisciplinarity
Somerville and Rapport's anthology is part of a series on sustainable development, and the issue of sustainability and transdisciplinarity is taken up as a distinguished topic in Hadorn, G.H., Bradley, D., Pohl, C., Rist, S., and Wiesmann, U. "Implications of Transdisciplinarity for Sustainability Research." *Ecological Economics* 60 (2006): 119–128.

Pohl's treatment in particular describes observed individual disciplinary-focused impediments of attitude toward collaborative transdisciplinary research. Pohl, C. "Transdisciplinary Collaboration in Environmental Research." *Futures* 37 (2005): 1159–1178.

Other Sources
An online article that presents an engaging discussion about current views of transdisciplinarity. Nowotny, H. "The Potential of Transdisciplinarity." *Interdisciplines*. http://www.interdisciplines.org/interdisciplinarity/papers/5

"Rigor, openness, and tolerance are the fundamental characteristics of the transdisciplinary attitude and vision. Rigor in argument, taking into account all existing data, is the best defense against possible distortions. Openness involves an acceptance of the unknown, the unexpected, and the unforeseeable. Tolerance implies acknowledging the right to ideas and truths opposed to our own."

Nicolescu's and Max-Neef's accounts of transdisciplinarity distinguish notions of weak and strong transdisciplinarity. Moreover, they account for how transdisciplinarity may be a more rigorous stance than more conventional states, even from a strictly scientific point of view.

Why HCI and Interaction Design are a Transdiscipline

We'll argue that HCI and interaction design are particularly suited to adopt the transdisciplinary perspective. Looking over the range of contributions to the annual SIGCHI conferences, for example, one can see the enormous breadth of HCI and the wide range of contributor backgrounds. This is a very good thing. We in HCI can and should begin to think of ourselves as a transdiscipline. We can do so by focusing on the important issues of our day, and with openness and tolerance, without loss of rigor.

Openness—we're already good at this. There probably isn't a field that is more open to new ideas and approaches than HCI and interaction design.

Tolerance—we're pretty good at this, too. There are already a wide range of disciplines represented in HCI, including design, computer science, cognitive science, education, psychology, ethnography, and critical theory. We need to hone our skills in working together to expose our predispositions about what we take as values, methods, and reasoning and how we relate them to what we take as mind-sets, knowledge sets, skill sets, and tool sets. In addition, we must seek to enhance our understandings of how our work can fit together in the service of significant goals.

Rigor—here's where our field is most ripe for debate. If you were lucky enough to attend CHI'09 in Boston, you may have been witness to the controversy surrounding Andy Crabtree, Tom Rodden, Peter Tolmie, and Graham Button's paper "Ethnography Considered Harmful" [5]. At the heart of the controversy were differing notions of the connections between rigor and particular methods and knowledge. We don't want to engage this controversy here *per se*; rather, we wish to point out to our community that in emphasizing larger societal goals first and individual methods and bodies of knowledge as servants of these larger goals, transdisciplinarity may be—indeed, we believe is—the alternative notion of rigor that serves us best.

While advocating a transdisciplinary approach and also recognizing its potential in our field, we do not want to underestimate the work and effort needed to make transdisciplinarity a well-understood and developed approach. The values of openness, tolerance, and rigor are not just out there in "ready to use" form. It will require an intentional effort from the field to put the goals of our work before our individual and narrow disciplinary norms. HCI and interaction design are in a unique position to make a real change and to address some of the most urgent issues of our time. We can't let issues of collaboration and disciplinary complications stand in the way of our attempts to serve these societal goals.

Acknowledgements

Many thanks to Yvonne Rogers for her discussions with us about transdisciplinarity, to Youn Kyung Lim for her earlier work with us on collaborative profiles, and to Harold Nelson for the notion of disambiguating mind-sets, knowledge sets, skill sets and tool sets.

ABOUT THE AUTHORS

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[5] Crabtree, A., Rodden, T., Tolmie, P., and Button, G. "Ethnography Considered Harmful." In *Proceedings of the 27th International Conference on Human Factors in Computing Systems* (2009): 879–888.

DOI: 10.1145/1572626.1572636