The field of participatory design (PD) spans a rich diversity of theories, practices, analyses, and actions, with the goal of working directly with users (and other stakeholders) in the

design of social systems including computer systems that are part of human work. In this issue of *Communications*, we offer a diversity of views into this rapidly growing field.

PD questions major assumptions about technologies in workplaces, communities, homes, and social institutions. It is not coincidental that PD offers these challenges at a time when many businesses are discarding the conventional wisdom and struggling to remake themselves in the face of heightened international competition, and dramatic political change is taking place around the globe.

• Is it inevitable that technology be applied in ways that constrain, deskill, and devalue human work?
• Must we always analyze the impact of *technology on people*, or is there just as strong an impact of *people on technology?*
• Is improving peoples' working conditions less important than having cutting edge technology?
• Are there ways of designing jobs (and technologies to support jobs) to combine heightened productivity with human growth, challenge, and a high quality of work life for the people who hold those jobs?
• Is democracy valuable only *outside* the workplace?
• Can software professionals recognize and affirm the validity of perspectives other than their own, and value the expertise that comes from experience, not just the knowledge that is attested by academic credentials?

PD first took root in Europe, especially in the Scandinavian workplace democracy movement and, in modified form, in England. Strong labor unions, acting as advocates for workers, and a history of socio-technical approaches which argued for the importance of the social dimension of work with technology, provided fertile soil for those raising concerns about the workplace and social effects of new technologies.

The value of PD was demonstrated in projects such as DEMOS, FLORENCE, and UTOPIA and in international conferences such as the Information Systems Research Seminar (IRIS) series, and the IFIP Working Group on Computers and Work series (WG 9.1) with titles such as *Systems Design For, With, and By the Users* [3] and *System Design for Human Development and Productivity: Participation and Beyond* [4]. Bjerknes, Ehn and

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Taxonomy of PD Practices: A Brief Practitioner's Guide

Michael J. Muller
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As noted in the introduction, the area of PD has been growing rapidly—in terms of numbers of practices, extent of theoretical development, numbers of practitioners, and geographical and institutional diversity of practice. This has led to two problems:
• Practitioners may need some guidance in finding techniques that are appropriate for their particular circumstances.
• Practitioners, software development management, and other stakeholders may believe incorrectly that PD has not been used in commercial products, or that it has not been successful outside of Scandinavia.

Here, we attempt to resolve both of these problems: first by attempting to provide a brief guide to PD practices for current or potential practitioners. We have organized practices into a taxonomic space with two visual dimensions (Figure 1), and a third dimension given by the following notations:
• **Time during the development life cycle:** Some practices appear to be more appropriate at certain points within the development life cycle or iteration. The horizontal axis of the figure provides a *very* approximate guide to points within the life cycle at which each practice may be useful.
• **Who participates with whom in what?** The concept of *participation* is open to multiple interpretations. The vertical axis of the figure spans one way of organizing the various approaches, asking: do the software professionals participate in the users' world (lower on the axis), or do the users participate in the software professionals' world (higher on the axis)? We believe there is value in both extremes of participation, as well as the mixtures between those two forms of participation that occupy the middle of the vertical axis.
• **Appropriate group size for the practice:** Different practices are designed to work with groups of different sizes. Appropriate group sizes are indicated by superscripted letters

for each category of practice: T (tiny, 2-4 participants), S (small, 6-8 participants), M (moderate, up to 40 participants), and B (big, up to 200 participants). The group size recommendations are in some cases approximate, and we urge the reader to consult the source descriptions for each practice before making firm decisions regarding group size.

Our second purpose is to dispel certain misunderstandings regarding PD. A number of practitioners, theorists, and critics have stated that PD is inappropriate or infeasible outside of the specialized legal environment provided by Scandinavia's codetermination laws. There is also a belief that PD has not been applied outside of research laboratories or research-funded projects.

In Figure 1, we note in *italics* those practices that have been developed or used outside of Scandinavia (19 out 22); these may *also* have been developed or used within Scandinavia. We also note in **bold** those practices that have been used on commercial projects (without research funding); these may *also* have been developed or used within a research environment. In doing this, we do not intend to deny or minimize the importance of the Scandinavian work or the research projects. Both were fundamental and essential for the later successes in more diverse domains. We focus on non-Scandinavian and nonresearch work to show the successful transfer of PD practices from their cultural and institutional roots to increasingly diverse domains.

For many *Communications* readers, PD is a relatively new field. We hope this brief taxonomy will help new or established practitioners to find techniques that can be used (or improved!) to fit their circumstances. We would appreciate learning about techniques that we have failed to mention, or enhancements of any of the techniques listed.

Kyng made a major contribution in *Computers and Democracy: A Scandinavian Challenge* [1]. Individual views within the diverse Scandinavian and English traditions were provided by [2, 5, 9, 10]. Aspects of the Scandinavian work were reported in North America at ACM conferences such as CSCW '88, '92 and CHI '90. These meetings, in turn, gave rise to non-Scandinavian work that was reported at CHI '90, '91, '92, and CSCW '92.
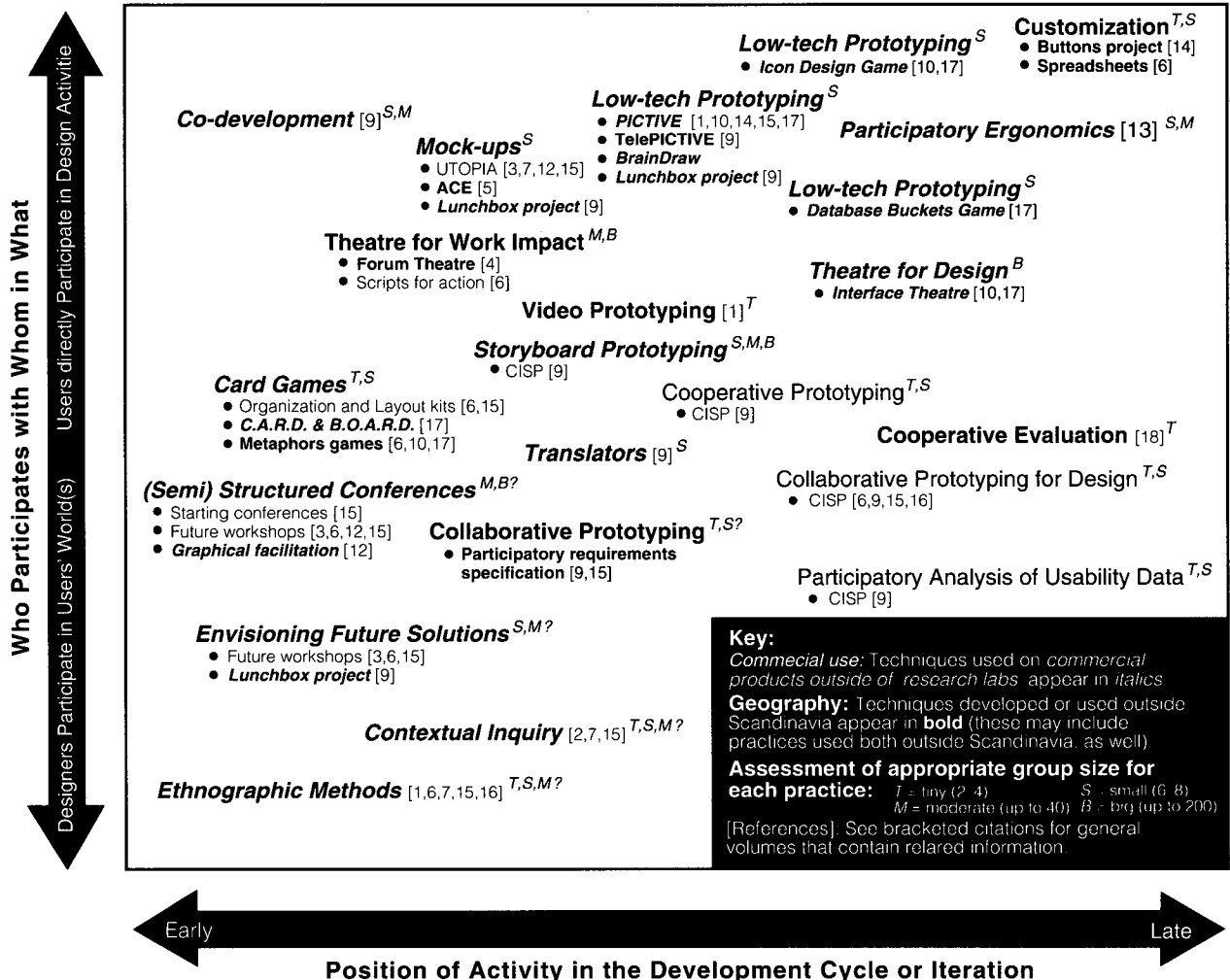
Important North American books on the topic are *Design at Work: Cooperative Design of Computer Systems* [7] and *Participatory Design: Principles and Practices* [11]. Other major references are provided in the taxonomy that follows. (A more detailed PD bibliography will appear in [8].)

Much of the Scandinavian work retains an explicit commitment to workplace democracy in the context of technological growth and business development—that is, direct and effective worker participation (not mere "involvement") in design activities and decisions, within a trade union context. Outside of Scandinavia, the field is more varied, with some theorists and practitioners pursuing a locally adapted form of democratic decision-making, and others emphasizing effective knowledge acquisition and product quality.

As part of its Workplace Project, Computer Professionals for Social Responsibility has sponsored two Participatory Design Conferences—PDC '90 in Seattle, and PDC '92 in Cam-

bridge. The 1992 conference was held at MIT and involved a program committee from eight nations and participation by 175 people from 12 nations. Some 55% of the attendees were from industry; the rest were from academia, government, and nonprofit organizations. Most of the articles presented in this issue are drawn from that conference.

It is simplistic to describe any of the contributions to this issue as addressing only a single theme because there is such a variety of issues within the scope of PD. Historical and intercultural analyses are presented in articles by Bjerknes, Carmel, Whitaker, and George; and Clement and Van den Besselaar. The complex

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Who Participates with Whom in What (vertical axis)
- Users directly Participate in Design Activities
- Users Participate in Design Activities
- Designers Participate in Users' World(s)
- Users Participate in Users' World(s)

Low-tech Prototyping [S]
- *Icon Design Game* [10,17]

Customization [T,S]
- **Buttons project** [14]
- **Spreadsheets** [6]

Co-development [9] [S,M]

Low-tech Prototyping [S]
- *PICTIVE* [1,10,14,15,17]
- *TelePICTIVE* [9]
- *BrainDraw*
- *Lunchbox project* [9]

Participatory Ergonomics [13] [S,M]

Mock-ups [S]
- UTOPIA [3,7,12,15]
- ACE [5]
- *Lunchbox project* [9]

Low-tech Prototyping [S]
- *Database Buckets Game* [17]

Theatre for Work Impact [M,B]
- Forum Theatre [4]
- Scripts for action [6]

Theatre for Design [B]
- *Interface Theatre* [10,17]

Video Prototyping [1] [T]

Storyboard Prototyping [S,M,B]
- CISP [9]

Card Games [T,S]
- Organization and Layout kits [6,15]
- *C.A.R.D. & B.O.A.R.D.* [17]
- **Metaphors games** [6,10,17]

Cooperative Prototyping [T,S]
- CISP [9]

Translators [9] [S]

Cooperative Evaluation [18] [T]

(Semi) Structured Conferences [M,B?]
- Starting conferences [15]
- Future workshops [3,6,12,15]
- *Graphical facilitation* [12]

Collaborative Prototyping for Design [T,S]
- CISP [6,9,15,16]

Collaborative Prototyping [T,S?]
- Participatory requirements specification [9,15]

Participatory Analysis of Usability Data [T,S]
- CISP [9]

Envisioning Future Solutions [S,M?]
- Future workshops [3,6,15]
- *Lunchbox project* [9]

Key:
Commecial use: Techniques used on *commercial products outside of research labs* appear in *italics*.
Geography: Techniques developed or used outside Scandinavia appear in **bold** (these may include practices used both outside Scandinavia, as well).
Assessment of appropriate group size for each practice: T = tiny (2-4)   S = small (6-8)   M = moderate (up to 40)   B = big (up to 200)
[References]: See bracketed citations for general volumes that contain related information.

Contextual Inquiry [2,7,15] [T,S,M?]

Ethnographic Methods [1,6,7,15,16] [T,S,M?]

Early ←————————————→ Late

Position of Activity in the Development Cycle or Iteration

interrelations of design, development, ethics and politics that arise during participatory practices are explored by Greenbaum and Halskov Madsen; Miller; and Wagner. The importance of *process* in working collaboratively across the boundaries of expertise, ownership and organization is clarified by Anderson and Crocca; Blomberg, McLaughlin and Suchman; Euchner, Sachs, and the NYNEX panel; Gronbaek, Kyng and Mogensen; Muller, Wildman and White; and Williams and Begg.

Other issues of communication—through language or through artifacts—are discussed by Crane; Katzenberg and Piela; and Novick and Wynn. In a related article, Kensing and Munk-Madsen develop a theory of practice based on participatory practices and artifacts. Finally, there are reports on important programs offered by Floyd; Halskov Madsen and Aiken; Harker; and Mumford.

We encourage *Communications* readers to look for commonalities among these articles, and for commonalities between the work reported here and your own practices, ethics and actions. ◪

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Recommended Reading
A full set of taxonomy references includes over 100 citations. Inclusion of all of them would be inappropriate for this magazine, and especially for introductory material. We have therefore trimmed this version of the taxonomy to list only named practices and/or relatively well-known practices. We have also limited the citations, for

the most part, to general volumes that contain multiple papers or chapters on PD.

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