Preface

MIT Project Oxygen is in its second full year of operation. A large number of faculty from the Laboratory for Computer Science and the Artificial Intelligence Laboratory have brought their work together to realize the dream of pervasive human centered computing. With our partners in the Oxygen Alliance we are inventing a new computational environment that we hope will revolutionize the way in which humans interact with computation.

The impetus for the Oxygen effort came from a number of different perspectives:

- that we should be able to do more by doing less,
- that speech and vision interfaces are the key to ease of use,
- that the computer should be brought out into the human world rather than vice-versa,
- and that computation and communication will continue its exponential drop in price.

With these assumptions in mind we constructed a framework for Oxygen around three sorts of artifacts (morphable hand-held units: the Handy-21; environmental intelligent spaces: the Enviro-21; and new layers of network capabilities; the Network-21), around the hardware and software infrastructures for these, and around four user technologies (speech and vision, automation, collaboration, and individual knowledge access). We did not expect to devote precisely equal resources across all nine of these subdivisions, nor within each of the categories. However, we have worked in all of these areas, and will continue to work in them all. As we have proceeded, the boundaries between these areas of work have become fuzzier and fuzzier as we are building bigger and more integrated prototype systems.

This book captures the first stages of work across all the areas of Oxygen. These are research papers recently published, or about to be published by faculty and students at LCS and AI who are working on Oxygen. The papers naturally fit into six rather than nine sections:

- **Handy 21:** technologies for the current generations of Handy's which are based on commercial off the shelf technologies with some custom glue, and low-power high-performance computation technologies for the future custom built generations.

- **Network 21:** new technologies for intentional naming, organization of ad-hoc networks, location tracking, vertical handoff, and network security.
- **Systems:** both hardware and software technologies to support the Oxygen vision, with a good number of technologies that straddle the hardware/software boundary.
- **Perceptual interfaces:** speech based systems, vision based trackers, microphone arrays, visual disambiguation of speech signals and sketching interfaces.
- **Knowledge access:** natural language and semantic bases for access to the vast amounts of knowledge that are available on the network.
- **Collaboration:** tools for helping people to be more productive in meetings or giving presentations.

While written papers give the technical details of the work, it is often hard to convey in them the way in which the work changes the way it feels to be in a human centric pervasive computing environment. For that one needs to experience it. Some of our technologies are already in our partners' hands. Others can be seen in movies on the Oxygen web site at http://oxygen.lcs.mit.edu/.

Onward, with the revolution!

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