Visible Display of Automated Observation of Collaborative Workspaces

John Counsell[1] and Marie-Cecile Puybaraud[2]

[1] University of the West of England, Bristol, Frenchay Campus, Coldharbour Lane, Bristol, BS16 1QY United Kingdom
John.Counsell@uwe.ac.uk
[2] Johnson Controls, Park West 1, Aerospace Centre, Farnborough, GU14 6XR, United Kingdom
Marie.C.Puybaraud@jci.com

Abstract. Through the Facilities Innovation Research Programme, (www.facilitiesinnovation.co.uk) staff at the University of the West of England, Bristol and at Johnson Controls have been investigating systems that have the potential to track collaborative activities in the workplace, capture them, and in real time respond to them. The longer term goal is to develop embedded technologies that provide intelligent feedback in predictable office environments but also address the unpredictable working environments of nomadic knowledge workers and of remote workers engaged in virtual collaboration with those physically present. Some of these systems are relatively close to market and others are less immediately applicable. It is suggested that a heterogeneous mix of such systems is likely to be necessary for some time to come. A prototype real time location system for workers has been developed and is being tested to determine the extent to which it assists in better management of space and support of collaborative activity.

1 Introduction

Because of increased mobility in their day-to-day work, collaborative workers today interact in a wide variety of working environments, yet there is no basis yet for a fully effective working environment which responds to demands and needs in a proactive manner. Through the Facilities Innovation Research Programme (FI) Johnson Controls and their research partners have launched an investigation into such 'smart space management'[1]. Within this initiative the 'Visible' project has the overall goal of mapping and utilising users' behaviour while collaborating, to monitor, record and store contextual knowledge in order to automatically provide a working environment adapted to the needs of each user or group of users. This paper examines the scope for that first stage of mapping user behaviour, in order to understand better how space affords or disables collaborative knowledge work, and how that environment can be optimised. Some of the systems to enable this mapping are relatively close to market and others are less immediately applicable. It is suggested that a heterogeneous mix of such systems is likely to be necessary for some time to come. A prototype real time location system for workers has been developed and is being tested to determine the

Y. Luo (Ed.): CDVE 2006, LNCS 4101, pp. 192 – 199, 2006.

extent to which it assists in the better management of space and in support of collaborative activity.

"The concept of Ambient Intelligence (AmI) provides a vision of the Information Society where the emphasis is on greater user-friendliness, more efficient services support, user-empowerment including respect for privacy, and support for human interactions. People are surrounded by intelligent intuitive interfaces that are embedded in all kinds of objects and an environment that is capable of recognising and responding to the presence of different individuals in a seamless, unobtrusive and often invisible way"[2]. For this it is held that there will need to be substantial integration of three converging technologies: (1) Personal Digital Assistants (Palm or Windows CE); (2) Wearables / objects and people (includes RFID); and (3) microelectronic controlled equipment. "Most of these systems are currently stand-alone. Integrating these devices in an integrated communication environment using existing or easy-to-install networks (e.g. powerlined, wireless systems) will allow major enhancements to existing and the creation of completely new applications and services"[3].

Furthermore it has been suggested that employees need different types of ambient intelligence applications than citizens in general, because work organisation, business process redesign, change management, motivation, reward systems, etc. are involved [4]. "The discipline of work design faces a fundamental dilemma: Increased productivity involves specialisation, standardisation and an increased degree of routine, i.e. a reduction of complexity. On the other hand, the innovative ability of knowledge-intensive enterprises and the competence development of knowledge workers require an increased complexity of tasks. It is necessary to consider the complete working system (competence, staff, work, technology, organisation)"[5]. More research is needed into the inter-relations between knowledge workers and their organisations with regard to the constraints and affordances of their working environments. This paper examines the scope for currently equipping the working environment with sensors that 'perceive users', suggesting this is a prerequisite before such research leading to forms of context based communication can become effective.

2 Longer Term Research Goals

Ambient Intelligence is the now increasingly widely used term that embraces: ubiquitous computing; pervasive computing; 'smart' technologies; and the convergence of devices, communications and networks. It is in use by the EC and most major mobile phone companies. Its development is in theory based on continuous user evaluation and feedback, not waiting to discover customer demand, and so based on forward gazing scenarios and 'living labs'. The WWRF 'book of visions' in 2001 [3] stated that "In the mobility and location-related category sensory input will play a major role in providing the information. Sensor technologies are embedded in the mobile equipment and networks and services will sense who the user is, where he is, what he is doing, what the environmental conditions are, etc. The environment itself will also be equipped with sensors that perceive users and communicate with their devices." However it is not clear that much has changed since 1999, when it was stated that "Understanding human activity is held to be one of the most difficult open problems in the area of automated video surveillance"[6].