

# Multimodal Interaction for Ambient Assisted Living (AAL)

Max Mühlhäuser

Telekooperation, FB Informatik, Technische Universität Darmstadt, Hochschulstr. 10  
64289 Darmstadt, Germany  
[max@informatik.tu-darmstadt.de](mailto:max@informatik.tu-darmstadt.de)

**Extended Abstract.** Over fifteen years of research on multimodal interaction at Telecooperation have led to the compilation of a list of important issues for HCI and UI concepts, appropriate for the ‘post PC’ era of computing:

(1) *Integration of HCI & SW engineering*: the two research disciplines HCI and software engineering, and in particular their models, notations, and methods, must be more tightly integrated. Human factors and task analysis results must lead to human-computer models that drive and accompany the entire software lifecycle up to and beyond the point where automatic user testing is ‘automatically’ inserted into code in order to measure UI quality and feed it back to the beginning of the integrated HCI/SWE life cycle.

(2) *Efficient Development*: Model driven software development and other means must be furthered in order to foster the necessary ‘quantum leap’ in user interaction that would want users to *like* the vision of being surrounded by hundreds of computers – with todays GUIs, they have to *fear* it!

(3) *Modality abstraction*: for the first time in its history, software engineering *cannot* assume a dominating interaction paradigm (after two decades each of punch cards, character cell terminals, and windows-based GUIs); rather, software must be developed with a large and unpredictable number of devices and device federations in mind: devices range from mobile phones, headsets, and the like to multitouch wall displays – and federations of all these. This requires a layered approach, with developers relying on a ‘modality independent’ interaction layer plus sophisticated means for mapping onto physical interaction.

(4) *Context & user awareness, proactivity*: context-aware interaction was emphasized in research lately, but both human learning and machine learning must be added. As to the first one, more elaborate *user models* must be emphasized, which adapt to changing user knowledge. As to the second one, the ‘intelligence’ of user interfaces must (in contrast to former AI visions) *gradually* approach the vision of ‘software acting in the user’s stead’, by *proactively* proposing ready-to-launch operations ‘learnt’ from user data and social networks.

(5) *Better support for natural modalities*: voice based and tangible user interfaces as well as natural-language interaction made progress with respect to the underlying technology (voice recognition, NLP etc.) – which is not yet complemented by appropriate HCI concepts. Holistic concepts for the development of user friendly UIs based on such natural modalities is key for interaction beyond the desktop i.e. on the move, while executing a primary task, etc.

*Reflection on AAL*: user friendliness is even more important for AAL than for the ‘post PC’ era as a whole; hence, the points above require intensified efforts. As to point (5), particular methods and tools must be established that reflect the particularities of different disabilities / diseases and patient / helper needs.