**Appendix**

Table A.1 Functionalities and reflection levels supported by apps

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Application** | **Description** | **Category** | **Plan and do work** | **initiate reflection** | **conduct reflection session** | **apply outcome** | **Reflection levels supported by the app** |
| ***CaReflect***:  | CaReflect measures face-to-face interaction between caregivers and residents with proximity sensors. The visualized data provide an objective view on the contact times. This might provoke cognitive discrepancies between the objective contact time documented by the sensors and a caregiver’s own perception and thereby support reflective learning (Müller, Sonnentag, and Heuer 2013). | tracking app | automatic data capturing | data visualisation | data visualisation |  | individual reflection |
| ***KnowSelf***:  | KnowSelf supports reflective learning having to do with time management and self-organisation by logging the activities on a personal computer and providing an “AS IS analysis” of how users spend their time at work. Observations and reflection outcomes can be stored in a reflection diary (Pammer and Bratíc 2013). | tracking app | automatic data capturing | data visualisation | data visualisation, reflection diary - documenting outcomes | reflection diary - documentation of outcomes | individual reflection |
| ***MoodMap App (MMA)***: |  The MMA is a tool for mood tracking, which allows users to capture their moods as well as their related notes and contexts. Different visualizations support the re-evaluation of work experiences (and related emotions) in order to reflect on them and gain new insights (Rivera-Pelayo, Fessl, Müller, and Pammer 2017). | tracking app | manual data capturing, support for data capturing (trigger questions), sharing data | data visualisation, trigger questions, sharing data | data visualisation, reflection diary - documenting outcomes | reflection diary - documentation of outcomes | individual reflection, collaborative reflection, organisational reflection |
| ***WATCHiT:***  | WATCHiT is a wearable computer embedded in a wristband for capturing non-disruptive data (e.g. stress level or time-on-task) in a crisis situation. It can be combined with a smartphone app that aims at promoting reflective learning using the data collected through WATCHiT (Mora and Divitini 2014).  | tracking app | automatic data capturing | data visualisation | data visualisation |  | individual reflection, collaborative reflection |
| ***Medical Quiz:***  | The Medical Quiz aims at connecting theoretical knowledge with practical work experiences. Reflective questions are integrated into the game to serve as reflection amplifiers and to guide the players in their reflective learning process (Fessl, Wesiak, and Pammer 2016). | serious game | simulate work | trigger questions, performance feedback |  |  | individual reflection |
| ***Rescue League***:  | This serious game trains emergency volunteers to face anxiety, medical protocols, and dramatic choices. Several tools (e.g. score, feedback tools, individual reflection session, or a learning diary) provide support, motivation, and guidance for reflective learning. | serious game | simulate work | performance feedback |  reflection diary - documenting outcomes | reflection diary - documentation of outcomes | individual reflection |
| ***Virtual Tutor Serious Games***:  | These 3D games aim to foster reflection upon difficult dialogues and to maximize learners’ ability to self-regulate their training. Main features are a Virtual Tutor inside the game, tools for overall feedback, individual reflection sessions, and a learning diary. There are two games; one is designed for hospitals (CLinIC) and one for care homes (Think better CARE). | serious game | simulate work | performance feedback | reflection diary - documenting outcomes | reflection diary - documentation of outcomes | individual reflection |
| ***Activity Recommendation App (ARA)***:  | ARA serves to document learning and reflection outcomes, goal achievement and – in this use case - the application of time management rules and experiences with the application. ARA was used in combination with activity tracking (KnowSelf) and personal coaching sessions. | journaling / reflection documentation app |  |  | reflection diary - documenting outcomes | reflection diary - documentation of outcomes | individual reflection |
| ***DoWeKnow:***  | The DoWeKnow App allows sales people to document their experiences with presentations to customers. Documentation and reflection can be done both individually and collaboratively through commenting and rating slides. | journaling / reflection documentation app | manual experience capturing, sharing experiences | documentation visible, sharing experiences,  | documentation visible, reflection diary - documenting outcomes | reflection diary - documenting outcomes | individual reflection, collaborative reflection, organisational reflection |
| ***Issue Articulation*** and ***Issue Management App (IAA/IMA)***:  | While IAA is designed to capture reflection outcomes on an employee level, IMA provides visuals of these data for managers, including an automated analysis of relations between business objectives and outcomes.  | journaling / reflection documentation app |  |  | reflection diary - documenting outcomes | reflection diary - documenting outcomes, communication to management | individual reflection, organisational reflection |
| ***Talk Reflect***:  | The Talk Reflection App provides its users with a means of documenting and self-assessing experiences, reflecting on them individually as well as collaboratively, and saving and reviewing reflection outcomes (Prilla and Renner 2014). | journaling / reflection documentation app | manual experience capturing, sharing experiences | documentation visible, sharing experiences,  | documentation visible, reflection diary - documenting outcomes | reflection diary - documentation of outcomes | individual reflection, collaborative reflection |

Table A.2 Questionnaire items from the MIRROR Toolbox

|  |  |  |
| --- | --- | --- |
| **Evaluation level** | **Topic** | **Item text** |
| Reaction | Usage Barriers | I did not have the time to use the app.I did not have the place to use the app.I do not see an advantage in using the app.I was not motivated to use the app.I could find out how the app worked.aI need more formal training with the app. |
| Satisfaction, professional training | I am satisfied with the app.I think the app is useful for professional training.I think the app can be used to complement professional training. |
| Long-term usage | I see the long-term advantage of using the app in my work-life.I would like to use the app continuously as part of my work-life.It is practical for me to continue using the app in my work-life. |
| Learning | Short-Reflection-Scale (SRS)Examples | I often reflect on my work in order to improve it.Reflecting on [specific work task] helps me to improve [the task].We as a team often reflect on our work in order to improve it.Conversations with colleagues help me to improve [specific work task]. |
| App-specific reflection questions (AR)Examples | [The app] helped me by providing accurate information about my work.[The app] helped me to reconstruct a work experience.[The app] guided me in deciding whether/when to reflect.[The app] helped me by supporting sharing of experiences.[The app] guided me in re-evaluating an experience.[The app] guided me in reaching a resolution.[The app] helped me by simulating the work process. |
| Learning Outcome Core Questions | LO1: I made a conscious decision about how to behave in the future. LO2: I gained a deeper understanding of my work life. |
| General App Effects | GAE: [The app] helped me to find situations on which we should reflect. |
| Knowledge and Skills | KS: I improved my understanding in the area that I wanted to improve in. |
| Behaviour | Behaviour Core Qu. | CB: [The app] helped me improve my [work performance].b  |
| Work behaviour (WK)Examples | I used my learning on the job [The app] increased my work satisfaction.Using the app made me more confident that I can succeed in my work tasks. |
| Result | KPIs ExamplesLoyality metric  | How satisfied are you with your coaching sessions? cI feel my ideas to improve a process are addressed by my manager/coach.I plan my tasks in written form and control them.How likely is it that you would recommend the app to a friend or a colleague?\*\*\*d |

*Note: Answer formats: 5-pt rating scale (1-strongly disagree to 5-strongly agree). aItem was recoded as barrier for analyses; breplaced in each evaluation by a specific relevant working behaviour; c5-pt rating scale (1- very dissatisfied to 5-very satisfied), d11-pt scale (0-not at all to 10-verly likely).*

Table A.3 Organisations and job descriptions of participants evaluating MIRROR apps

|  |  |
| --- | --- |
| **Test-bed (Sector)** | **Job Description** |
| BT | Advisors, coaches, and managers from two call centers of the telecommunication company British Telecom in Great Britain participated. Their main task is incoming product support or handling information inquiries from customers. Advisors take the calls, coaches support and train the advisors (partly in coaching sessions), and managers monitor advisors' performance and supervise the coaching. |
| IMC | The 'information multimedia communication' company, located in Germany, provides (technology) solutions for business processes, content design, and consulting in training and education. Participants were knowledge workers, half of them on a management level, with a broad range of project-related tasks. |
| INFOMAN | Infoman AG is a consulting company that consults, sells, and personalizes Microsoft Customer Relationship Management (CRM) Software. The company has about 60 employees, who mainly work in small teams of two to three people. Daily work is heavily focused on customers’ needs, including meetings at the customers’ site which require internal preparation and post-processing.  |
| NBN | From the Stroke Unit at the 'Neurological Clinic Bad Neustadt' nurses and physicians participated in MIRROR evaluations. They work in three shifts with the main task to care for stroke patients.  |
| RNHA | Several care homes under the umbrella of the 'Registered Nursing Home Association' (UK) took part in MIRROR evaluation studies. The involved carers work in shifts and are often inexperienced due to a high turn-over. One of the main challenges is the high number of patients with dementia.  |
| REGOLA | This Italian company develops software-technology and cloud services in the emergency domain, including ICT systems for emergency centres and volunteering associations. Participants were either employees at Regola itself (office workers) or volunteers for emergencies. |
| Uni Bergamo | Students from nursing bachelor degree course at the University of Bergamo. |
| RBKC | Royal Boroughs of Kensington and Chelsea (RBKC) in London is the public administration unit for the districts (“Boroughs”) of Kensington and Chelsea in London. Participants were either interns who needed support in challenges they were facing in their new work in order to learn for future jobs or office workers from two departments with similar duties that were about to be merge.  |
| Emergency Milan | SOS Novate Milanese is a public voluntary association that lends their vehicles and personnel (volunteers) to public safety to respond to different activities: civil protection, emergency medical services, planned/unplanned health care services (non-emergency), etc. Therefore the voluntary associations have to provide professional and high quality services to the community and to Public Authorities;  |

Table A.4 Overview over the evaluations

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **App/ Testbed** | Duration\*4 | BT | RNHA | NBN | IMC | Info-man | Regola | Uni Berga-mo | RBKC | Emerg Milan |
| MMA | LT | **39**\*1 (58) |  |  |  |  | **34** (35) |  |  |  |
| CaReflect | ST |  | **40** (44) |  |  |  |  |  |  |  |
| Medical Quiz | LT |  |  | **21** (24) |  |  |  |  |  |  |
| KnowSelf | LT |  |  |  | **10** (10) | **10** (12) |  |  |  |  |
| ARA | LT |  |  |  | **10** (10)\*2 |  |  |  |  |  |
| Virtual Tutor SG (CLiniC, CARE) | ST |  | **5** |  |  |  |  | **16** (16) |  |  |
| Rescue League | ST |  |  |  |  |  | **19** (19) |  |  | **14** (14) |
| Talk Reflect | LT |  | **5** (9) | **10**\*3 (9) |  |  |  |  | **7** (12) |  |
| Watchit | ST |  |  |  |  |  | **35** (35) |  |  |  |
| IAA | LT | **24**\*1 |  | **11** |  |  |  |  |  |  |
| DoWeKnow | LT |  |  |  |  | **10** (10) |  |  |  |  |
|  | Note. Bold numbers denote participants who used the app and answered the post–questionnaires, numbers in brackets denote all participants who used the app at least once (with or without answering questionnaires). \*1 3(MMA) and 6 (IAA) participants answered the questionnaire without using the app \*2 Same participants as KnowSelf at IMC, \*3 Evaluation of 2 years, partly same participants \*4 LT = long-term, ST = short-term |