

Break the habit!

Designing e-health interventions
with a virtual health coach,
the smoking cessation example

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Outline

- Virtual Agents (ECA's)
- Design process
- The smoking cessation example
- Analysis of a coach in practice
- Global design
- Conclusions
- Future work

Research on a virtual coach

- Main objective was to formulate a requirements specification for a virtual coach in aid of smoking cessation
- Research was conducted with cooperation of STIVORO organisation for a smokefree future.
- The protocol Personal Coaching of STIVORO was used as a blueprint for the virtual coach

Interaction with Virtual Entities

- Interaction in virtual environments is getting more and more common use:
 - MMORPG
 - Second Life (and other virtual worlds)
- Virtual Reality
 - Use for mental health purposes grows (phobia, autism)
- Field of Research: Embodied Conversational Agents



Embodied Conversational Agents

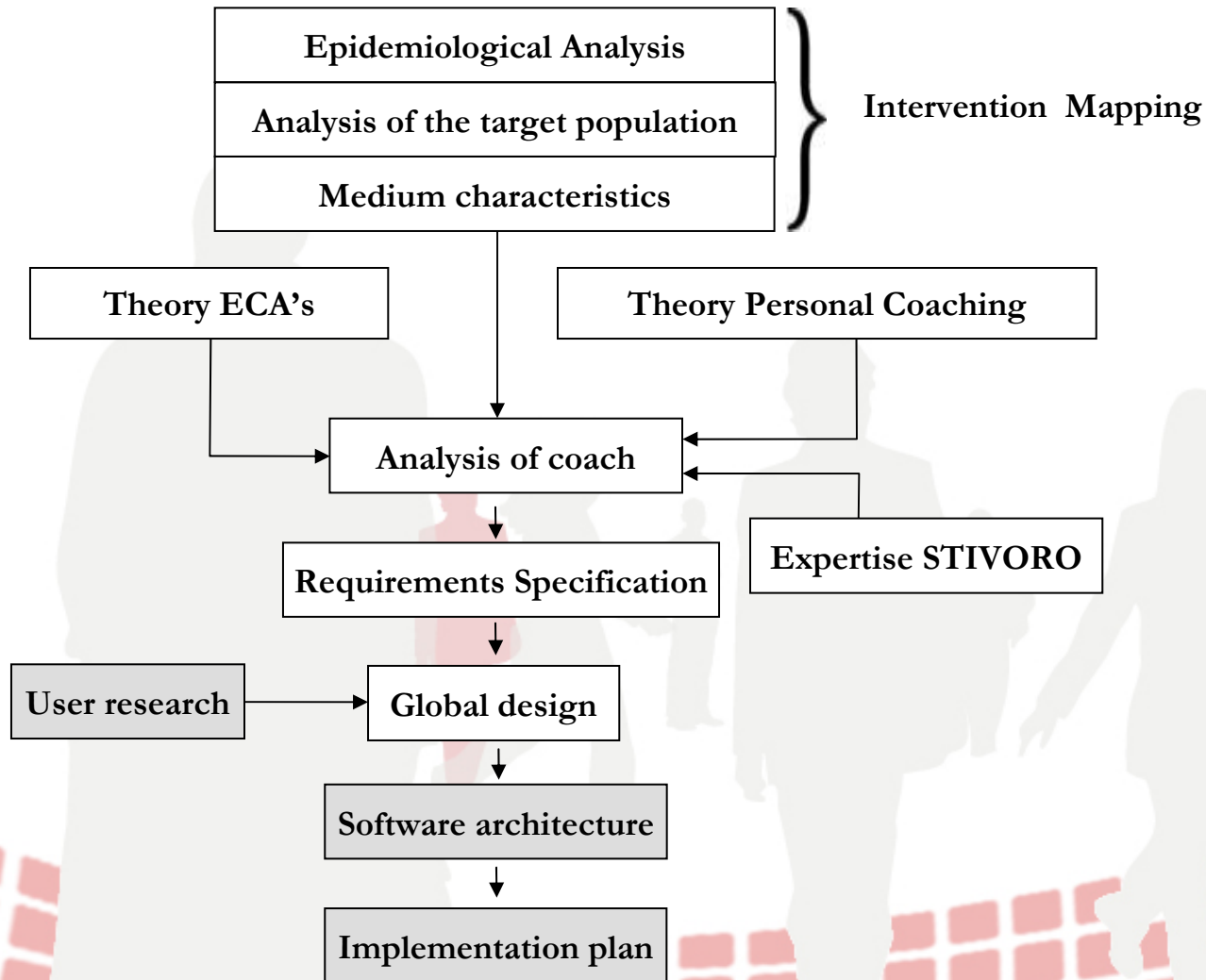
- An Embodied Conversational Agent (ECA) is a software agent with a visual representation that emulates many of the properties of humans and is capable of communicating with a user.
- An ECA
 - Produces and responds to verbal and nonverbal communication
 - Facial tracking
 - Emotion abstraction
 - Dialogue systems
 - Uses multimodal communication (speech, gestures, facial expressions, etc.)



Smoking facts

- In The Netherlands 28% of the population is a smoker
- Lifestyle factor putting a burden on public health
 - 20.000 deaths a year in The Netherlands (2002)
 - Public health costs: 500 million euro a year
 - Negative influence on quality of life (e.g. COPD)
- Quit smoking trough the internet:
 - Informative websites
 - Newsgroup, chatbox, forum
 - E-mail services
 - Quit programs (step by step)
 - Online tailored advice
 - Chat session with an expert or buddy
- Effectiveness of a 'cold turkey' quit smoking attempt is only 4%
- Most effective aid is personal coaching in combination with nicotine replacement (15 – 20 %)
- Using an Embodied Conversational Agent as a virtual coach is not known

Design process



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An ECA in favor of well being and health

- Carmen's Bright IDEAS



An ECA in favor of well being and health

- FearNot! Demonstrator (VICTEC)



Quit smoking using a virtual coach

Why use an ECA as virtual coach?

- Traditional advantages of the internet (wide reach, 24h availability, small barriers, cost-effective)
- An ECA evokes more commitment, trust and arousal than a regular text interface
- Individual coaching proves to be effective
- Less dropout expected compared to regular internet interventions because of antropomorphic character
- User friendly
- Entertaining

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Embodied conversational agents

The components of an ECA

- **Appearance**
 - Human, 2D or 3D, male or female
- **Emotion and personality**
 - Consistent personality is important
- **Expressions**
 - Posture, gaze behavior, facial expressions, head movement and gestures
- **Conversation**
 - Turn-taking, feedback mechanisms
 - Speech

Analysis coach in practice

- Four components of an ECA analysed in practice using the instruction-DVD of the protocol Personal Coaching
- **Appearance**
 - Most coaches are women
- **Personality**
 - Neutral/quiet attitude
 - Friendly non dominant personality
 - Not especially introvert or extrovert

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Analysis coach in practice

Conversation

- Conversation is fully determined by motivational interviewing
 - Counseling method to elicit self-motivating statements (change talk)
 - Reflection of content, emotion and conflict
 - Active listening ('humming')
 - Techniques to decrease resistance
 - Posing open-ended questions
 - Summarizing
 - Provoking
- **Emotions (facial expressions)**
 - Fits the clients reaction (empathy)
 - Moderate display of emotions

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Analysis coach in practice



Serious/empathic expression



Amused expression

Analysis coach in practice

- Gaze behavior
 - A lot of direct eye contact (more than regular 30%)
- Analysis based on Alphabet and Lexicon of Eyes (Poggi & Pelachaud)
 - Gaze contains eyebrow, eyes and eyelids
 - Determine frequency of 9 types of gaze
 - Implement only most frequent types
 - FACS could be used for description

Analysis coach in practice

Meta-discursive



Performative



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Meta-cognitive



Affirmative



Affective

Global Design

Rationale

- Only implement nonverbal channels that are frequently used to reduce complexity.

Appearance

- Instant messenger metaphor
- Lifelike and human
- 2D-animation
- First prototype
 - Only a woman
 - Only visible from shoulders upwards



Source: Verbot player 4.0
(www.verbots.com)

Global Design

Input

- Verbal
 - Free text input
 - Questions and answers are sequential
 - Text input could be replaced with speech recognition in the future
- Nonverbal
 - Gaze direction detection
 - Emotion detection

Global Design

Conversation

- Contemporary chatbots (ELIZA-type) are not of sufficient quality
- Extensions
 - Clear structure of conversation(topic parsing)
 - Techniques motivational interviewing
 - Domain knowledge
 - Profile of user (smoke profile)
 - History of the conversation
 - Affection parsing

Expressions

- Most important are head movements and gaze behavior
- Use of toolkits, by example
 - BEAT
 - EMOTE

Conclusions

- A virtual coach is a potential effective intervention
- Further research is needed to improve the quality of interaction
- First basic prototype is important to evaluate effectiveness and usability

Future work

Future research

- Ongoing research needed to improve Natural Language algorithms
- Better integration of nonverbal and verbal channels
- Adaptation of expressiveness of ECA to the personality of the user

Future developments

- ECA development tools (reduce fragmentation)
- Virtual coach on smartphone and PDA



Analysis coach in practice

- **Non verbal expressions**

- Gestures

- Metaforic and beat gestures

- Posture

- Open posture, upper body straight slightly tilted backwards

- Head movements

- During speech

- Rhythmic movements supporting the metrum
- Short rhythmic nods to emphasize important words
- When asking a question the head is tilted towards the client

- During listening

- Empathy/encouragement: downward nod, big amplitude with a small bounce
- Desire to take the floor: cyclic, quick nods with a small amplitude

Analysis coach in practice

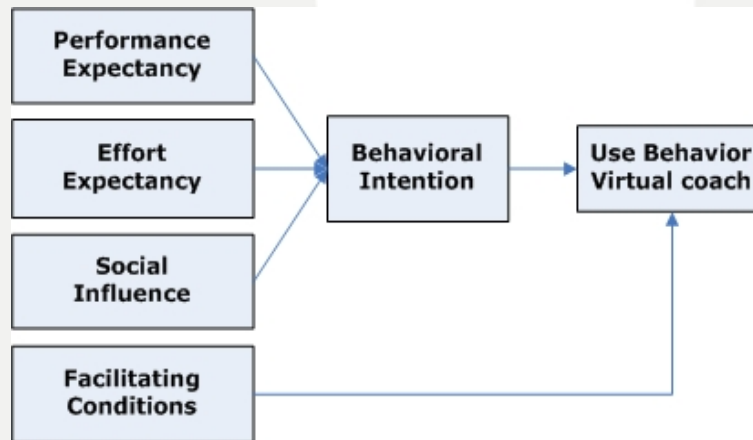
Protocol Personal Coaching:

- 6 face-to-face sessions of 45 minutes
- Workbook with assignments
- Instruction-DVD for coaches
- **Different phases based on stage of change**
 - Contemplation
 - Decision and preparation
 - Action
 - Maintenance
- **Three cornerstones**
 - Motivational Interviewing
 - Self control
 - Relapse prevention

User acceptance

- Research on technology acceptance in favor of adoption and implementation planning

Unified Theory of Acceptance and Use of Technology (Venkatesh)



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Analysis coach in practice

- **Conversational techniques**

- Reflection of content, emotion and conflict
- Active listening ('humming')
- Techniques to decrease resistance
- Posing open-ended questions
- Summarizing
- Provoking

Prosody

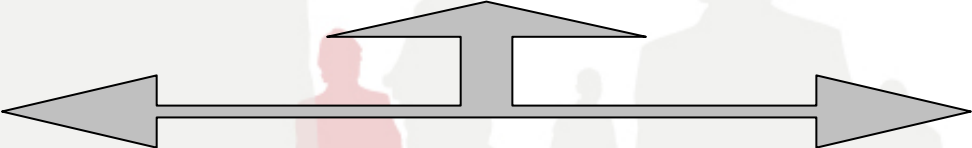
- Low speed and volume of speech to create possibility to take the floor
- Empathy with lots of intonation and lowering of pitch
- During resistance higher speed and lowering of pitch

Global Design

Program window



The virtual coach



Interaction



The user

E-health intervention

User acceptance

- Survey conducted with smoking students measuring UTAUT-factors
- Sample
 - Respondents want to quit within the next 6 months
 - 35 people (18 - 27 year)
 - Little experience using the internet as aid (11%)
 - Experienced internet and computer users

Analysis coach in practice

Conversation

- Conversation is fully determined by motivational interviewing
 - Counseling method to elicit self-motivating statements (change talk)

Basic principles

- Acceptance of the problem
- Constructive confrontation

Strategies

- Express empathy
- Develop discrepancy
- Avoid discussion
- Support self-efficacy

User research

Results

- 49% wants to give the coach a try
 - 37% is not planning to try the coach
 - 14% is in doubt
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- Expectations of user friendliness
 - People think they have time, skills and facilities to use the coach
 - Social influence is not important
 - People are doubting the effectiveness of the coach
 - More sceptical attitude among computer experts

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