



Artificial Intelligence techniques to enhance mobile therapy

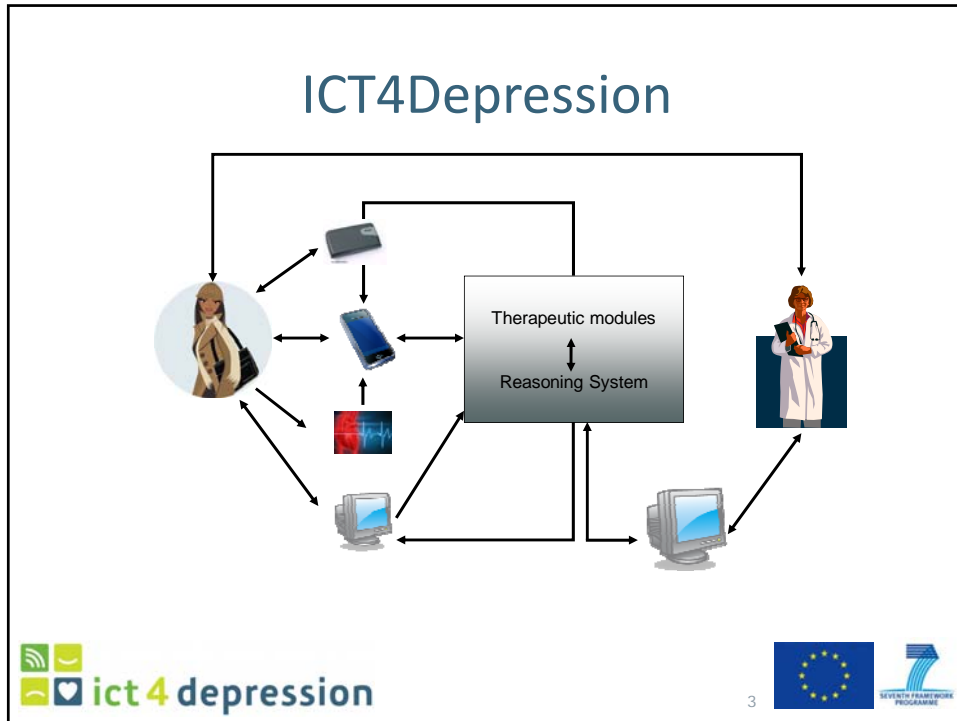
ISRII symposium



Outline talk

- The need for Artificial Intelligence
- AI techniques in ICT4depression
- Virtual patient
- Using the virtual patient



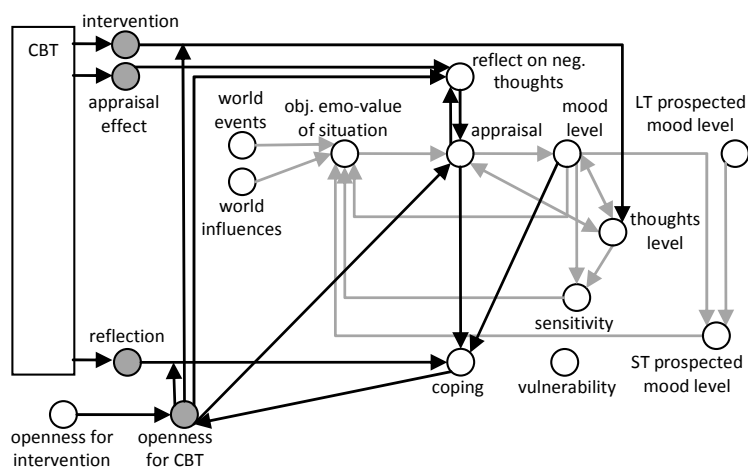


- ## Why Artificial Intelligence?
- Advantages of therapy via mobile phone:
 - Real-time monitoring of patients
 - Sensor data
 - Self-reported mood
 - Feedback at right moment
 - Interpretation of data and *right* feedback important (personalization):
 - How is the patient doing?
 - What does he need?
 - What will be the effect of specific advices?
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AI techniques used

- Model-based simulation of mood and behavior of patient (“virtual patient”)
 - For assessing status
 - For predicting effects of advices / changes in therapy
- Rule-based specification of feedback
 - Combines different criteria to determine messages to patient
 - e.g. progress, current mood, development of mood over time

Virtual patient



Measurements in ICT4depression

- Progress of patient
 - Activities being conducted
 - Self-reported mood
 - Adherence to schedule for modules
- Sensor data:
 - Mobile phone
 - Sensors (accelerometer / GPS)
 - Answers to questions (e.g. mood rating)
 - Physiological sensors
 - ECG
 - GSR
 - Respiration
 - Medication adherence monitor



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From measurements to advice

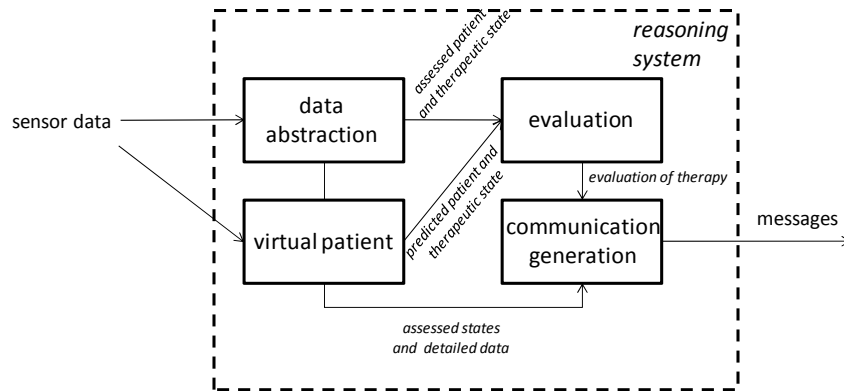
- Abstraction of sensor data
 - e.g. average mood per day
- Trend detection
 - e.g. increasing level of activities during week
- Input to “virtual patient model”
- Compare predictions of model
- Send tailored messages



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In a picture

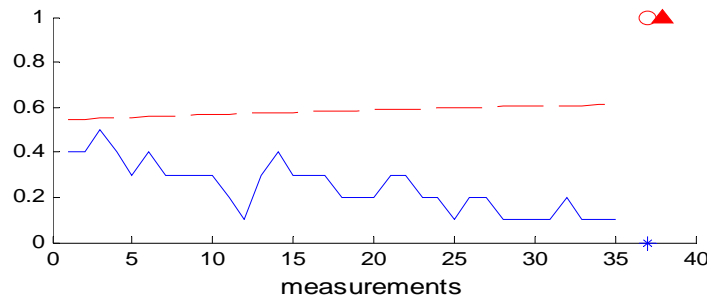


Two roles of the virtual patient

- Determine which advice should be given *within* current therapy
 - Model predicts progress which is compared with actual progress
 - Messages are sent to motivate / remind patients
- Determine whether alternative therapy would give better results
 - Model is used to compare predicted progress with predicted progress in alternative therapy

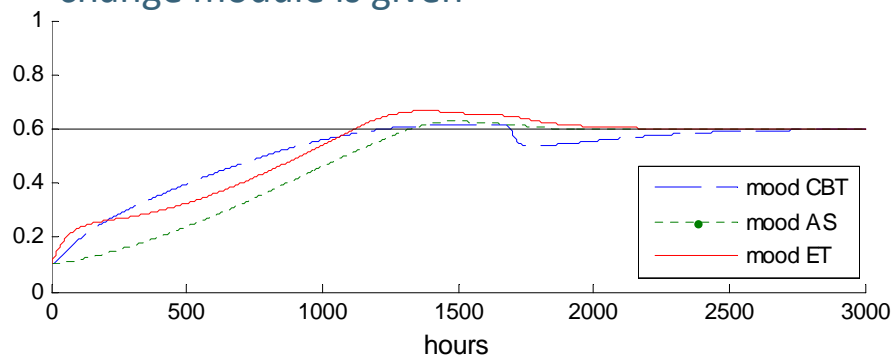
Comparison of predicted progress with actual progress

- Too much difference triggers an advice module



Comparison of effect of alternative therapies

- If other therapy seems better, advice to change module is given

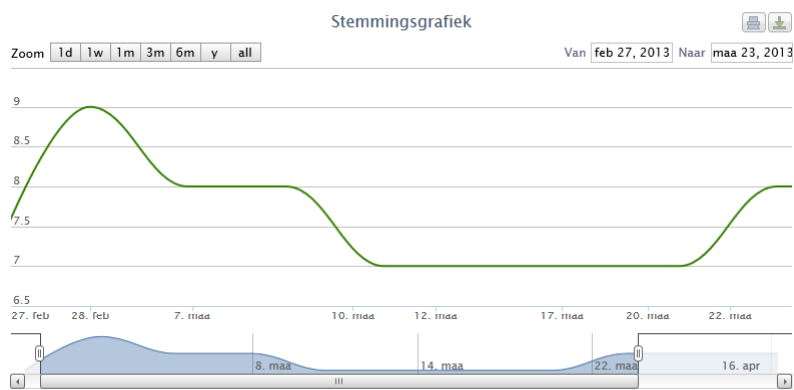


Messages

- Feedback to the patient via phone and web
 - Reminders for activities
 - Motivational messages
 - Percentage of completion of current therapeutic module
 - Weekly feedback about progress
 - Therapeutic advice
- Information on the website
 - Graphical representation of history of mood ratings
 - Graphical representation of history of other ratings



Graphical mood ratings



Logic behind messages

- Rules are defined that determine which messages are appropriate
- Priority-based mechanism is used to limit number of messages per day
 - Criteria are expressed per message:
 - Importance
 - Up to date (previous message sent concerning this topic), etc.
 - Result in a number per message and the one with the highest message is sent



Questions?

