An architectural design for self-reporting e-health systems

IEEE/ACM 1st International workshop on Software Engineering for Healthcare (SEH 2019)
Presented by: Professor Liam Peyton

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Høgskulen på Vestlandet

Project partners

ÍNTROMAT

ATTENSI

MODUMBAD
- en kilde til liv

Youwell

telenor

HELSE VEST IKT

IBM

EXPLORABLE
Think Outside The Box

CheckWare

BTO

BRYGGEN RESEARCH

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BRYGGEN RESEARCH

Høgskulen på Vestlandet

HELSE BERGEN
Haukeland universitetssjukehus

UNIVERSITAS BERGENSIS

UNIVERSITAS OSLOENSIS
MDCCCXI

INTROMAT worldview ☺

Citizen side

Patient

Private person

INTROMAT

Therapist

ClinTech specialist

Data analyst

Researcher

Provider side

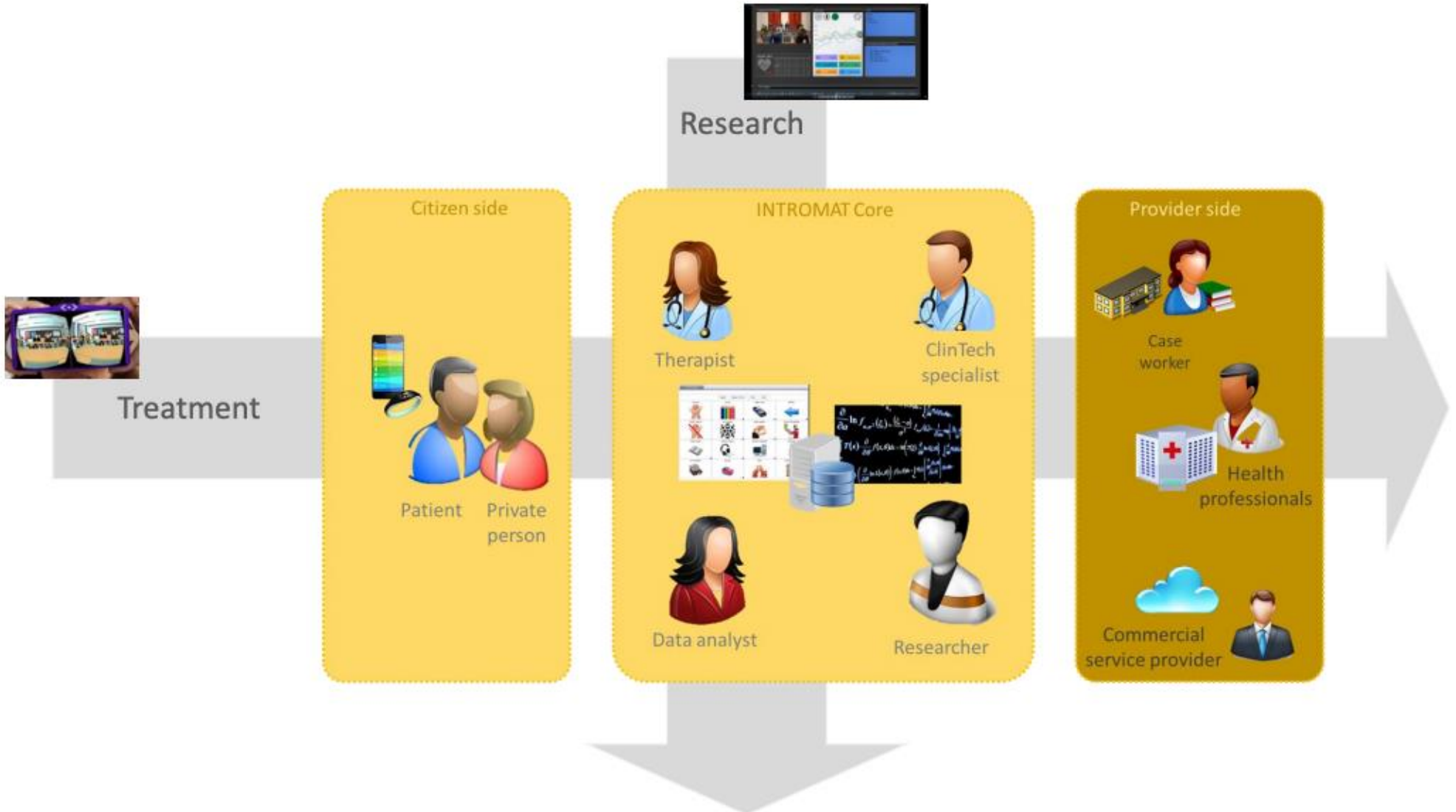
Case worker

Health professionals

Commercial service provider

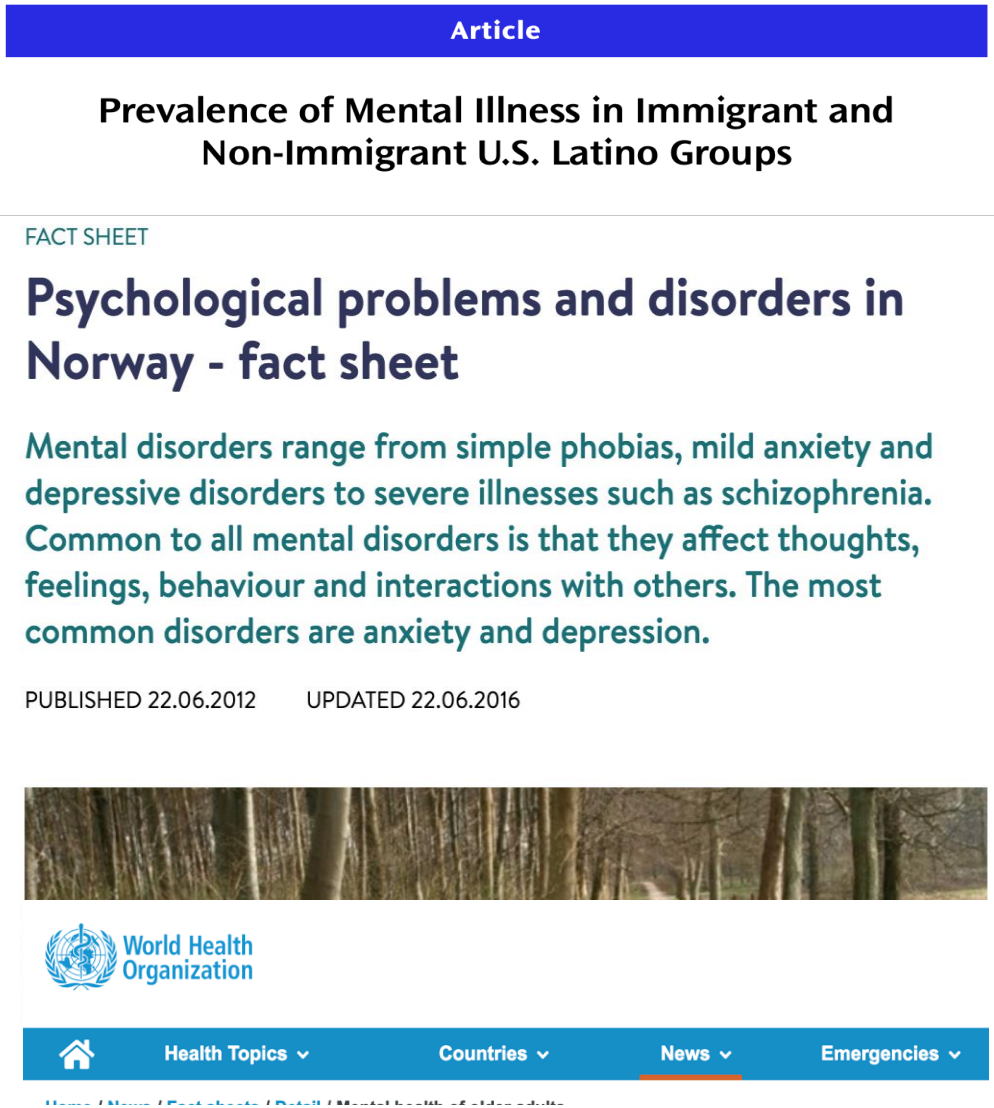
Høgskulen på Vestlandet

Two perspectives on information and functionality



Høgskulen på Vestlandet

Motivation



Article

Prevalence of Mental Illness in Immigrant and Non-Immigrant U.S. Latino Groups

FACT SHEET

Psychological problems and disorders in Norway - fact sheet

Mental disorders range from simple phobias, mild anxiety and depressive disorders to severe illnesses such as schizophrenia. Common to all mental disorders is that they affect thoughts, feelings, behaviour and interactions with others. The most common disorders are anxiety and depression.

PUBLISHED 22.06.2012 UPDATED 22.06.2016

World Health Organization

Health Topics Countries News Emergencies

- **Prevalence of Mental Health**
- **Self-stigma Issue**
- **Interoperability**
- **Lack of available and accessible system**
- **Data collection tool**

Høgskulen på Vestlandet

Prevalence of Mental health

- WHO 25% of people will be affected at some point in their lives
- 450 million people currently suffering

Article

Margar
Glorisa
Patrick
Meghai
Naihua
Doryliz
Maria T
Chih-na
Xiao-Li

FACT SHEET

Psychological problems and disorders in Norway - fact sheet

Prevalence of mental disorders in Europe: results from the European Study of the Epidemiology of Mental Disorders (ESEMeD) project

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World Health Organization

Health Topics | Countries | News | Emergencies

Home / News / Fact sheets / Detail / Mental health of older adults

Mental health of older adults

12 December 2017

Key facts

- Globally, the population is ageing rapidly. Between 2015 and 2050, the proportion of the world's population over 60 years will nearly double, from 12% to 22%.
- Mental health and well-being are as important in older age as at any other time of life.
- Mental and neurological disorders among older adults account for 6.6% of the total disability (DALYs) for this age group.
- Approximately 15% of adults aged 60 and over suffer from a mental disorder.

Self-stigma issues

- Fear of discomfort in facing a practitioner
- Choosing services,
- Fear of community
- Sharing personal issues

ISSN: 0161-2840 print / 1096-4673 online
DOI: 10.1080/01612840500280638

Taylor & Francis Group

STIGMA: BARRIER TO MENTAL HEALTH CARE AMONG ETHNIC MINORITIES

Faye A. Gary, EdD, RN, FAAN

Soc Psychiatry Psychiatr Epidemiol (2015) 50:1079–1087
DOI 10.1007/s00127-015-1028-z

CrossMark

ORIGINAL PAPER

The role of fear in mental health service users' experiences: a qualitative exploration

Angela Sweeney · Steve Gillard · Til Wykes · Diana Rose

Received: 21 August 2014 / Accepted: 9 February 2015 / Published online: 22 February 2015

Abstract
Purpose Although studies suggest that fear plays an important role in shaping mental health service users' experiences, evidence is patchy and the contexts, conditions and consequences of fear have rarely been researched. This paper explores the role of fear in adult mental health service users' lives and describes its implications for mental health services.
Methods Four community health service user focus groups (N32) were held. Each group was reconvened after 7–14 days. An initial thematic analysis generated a service user definition of continuity of care (reported elsewhere).
Conclusions Our model suggests that fear plays a substantial role in the lives of adult mental health service users. This has particular consequences for therapeutic relationships, engagement with services and engagement with the wider community. This lack of engagement is associated with adverse outcomes. Further research into the role of fear and the factors that mediate against it is warranted.

Keywords Fear · Control · Stigma · Qualitative research · Service users' experiences

Interoperability

- Standardization
- Common Platform
- Information Exchange
- HL7 Fast Healthcare Interoperability Resources (

PERSPECTIVE

YOUR DOCTOR'S OFFICE O

cumstances (such as when a vendor creates a PHR specifically for a covered entity), vendors such as Microsoft and Google are not covered by HIPAA. Microsoft says it will seek patients' consent before sharing data with third parties, but none of these application suppliers are covered by HIPAA. Whatever the business model for PHRs, lawmakers should require that the consumer user be clearly informed about the identity of the system's operator and the financial terms of any direct or indirect use of patient data.

It's difficult to predict what roles Google, Microsoft, and health plans will play in the PHR marketplace in the long run. There aren't major technical barriers to entry, but data sharing will require the development and adoption of technical and content standards — and a desire on the part of physicians and patients to contribute information to commercial repositories, with their growing contin-

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No Small Change for the Health I

Kenneth D. Mandl, M.D., M.P.H., and Isaac S. Kohane, M.D

The economic stimulus package signed by President Barack Obama on February 17 included a $19 billion investment in health information technology. How can we best take advantage of this unprecedented opportunity to computerize health care and stimulate the health information economy while also stimulating the U.S. economy? A health care system adapting to the effects of an aging population, growing expenditures, and a diminishing primary care workforce needs the support

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BOOK

Healthcare interoperability standards compliance handbook: Conformance and testing of healthcare data exchange standard

Oemig F, Snelick R

Springer International Publishing, (2016), 1-662

DOI: 10.1007/978-3-319-44839-8

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Abstract

This book focuses on the development and use of interoperability standards related to healthcare information technology (HIT) and provides in-depth discussion of the associated essential aspects. The book explains the principles of conformance, examining how to improve the content of healthcare data exchange standards (including HL7 v2.x, CDA, and FHIR), the rigor of conformance testing, and the interoperability capabilities of healthcare applications for the benefit of healthcare professionals who use HIT, developers of HIT applications, and healthcare consumers who aspire to be recipients of safe and effective health services facilitated through meaningful use of well-designed HIT. Readers will understand the common terms interoperability, conformance, compliance and compatibility, and be prepared to design and implement their own complex interoperable healthcare information system. Chapters address the practical aspects of the subject matter to enable real-world application of previously theoretical concepts. The book provides real-world, concrete examples to explain how to apply the information, and includes many diagrams to illustrate relationships of entities and concepts described in the text. Designed for professionals and practitioners, this book is appropriate for implementers and developers of HIT, technical staff of information technology vendors participating in the development of standards and profiling initiatives, informatics professionals who design conformance testing tools, staff of information technology departments in healthcare institutions, and experts involved in standards development. Healthcare providers and leadership of provider organizations seeking a better understanding of conformance, interoperability, and IT certification processes will benefit

1 Min Demo of the Project

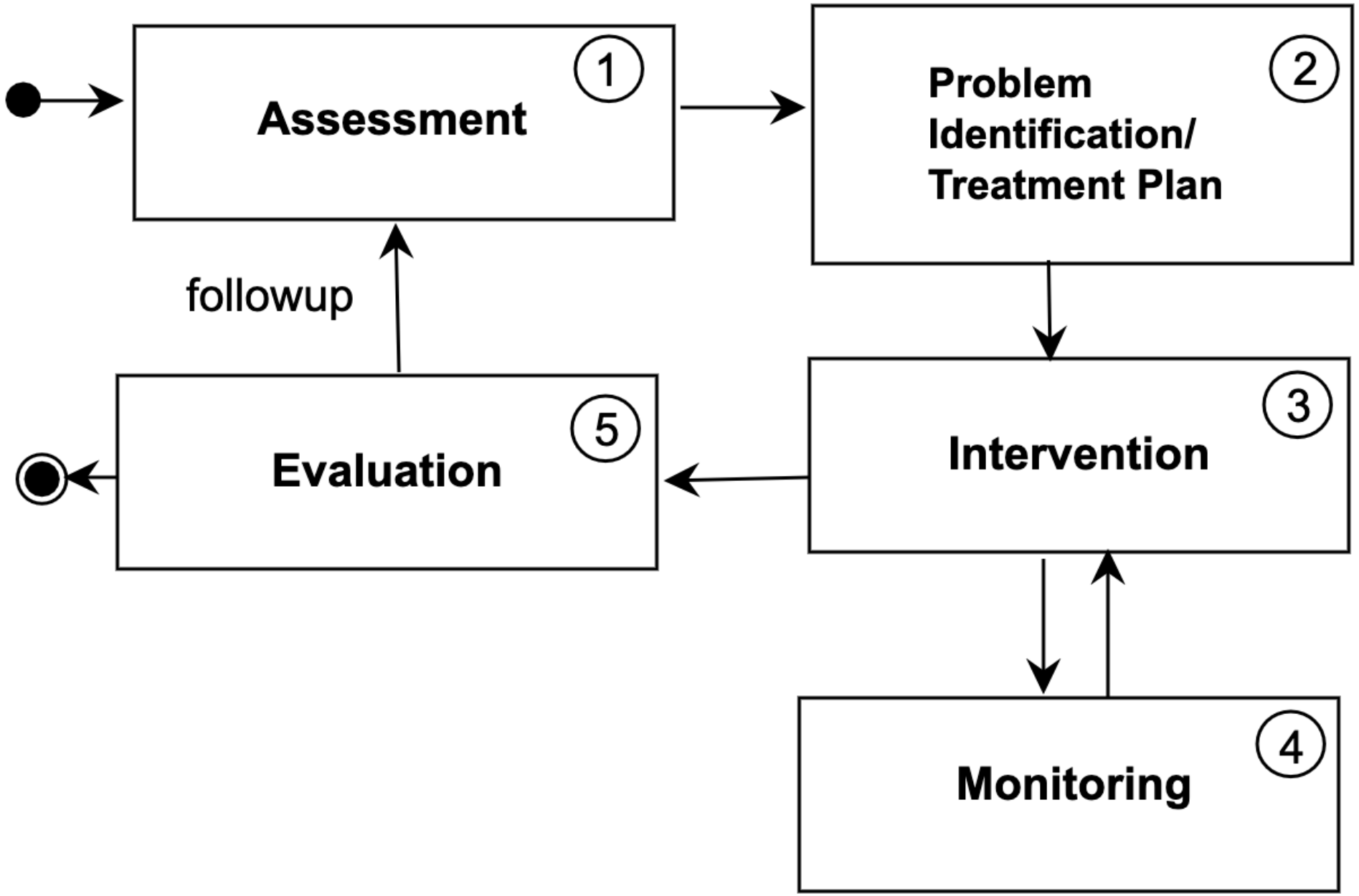
Data collection

- Heart Rate
- Electro-Dermal Activity (EDA)
- Blood Pressure
- Temperature
- EEG
- ECG
- Sleep Data
- Voice Data
- Video Data

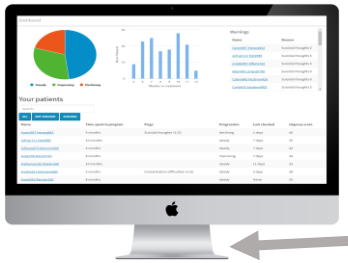
Actigraphy device

Høgskulen på Vestlandet

Workflow model for mental and neurological clinical interventions

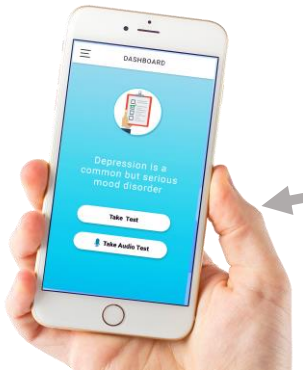


Høgskulen
på Vestlandet



Web Client

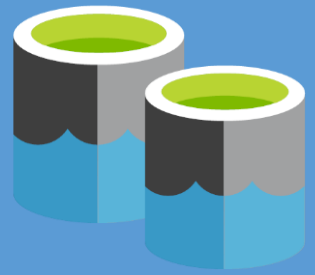
- Therapists' dashboard to visualize patient's information and monitor their progress
- Interface to create Internet Delivered Therapies like Cognitive Based Therapy.



Mobile Client

- collects biological markers using sensors
- Provides CBT interface
- Conversational Agents interface
- Sensor devices connects to mobile-client using standard Bluetooth protocol.

Resource Server



Data Lake

ID-porten
HelseID
OpenID Connect,
OAuth2.0
BankID,
Buypass

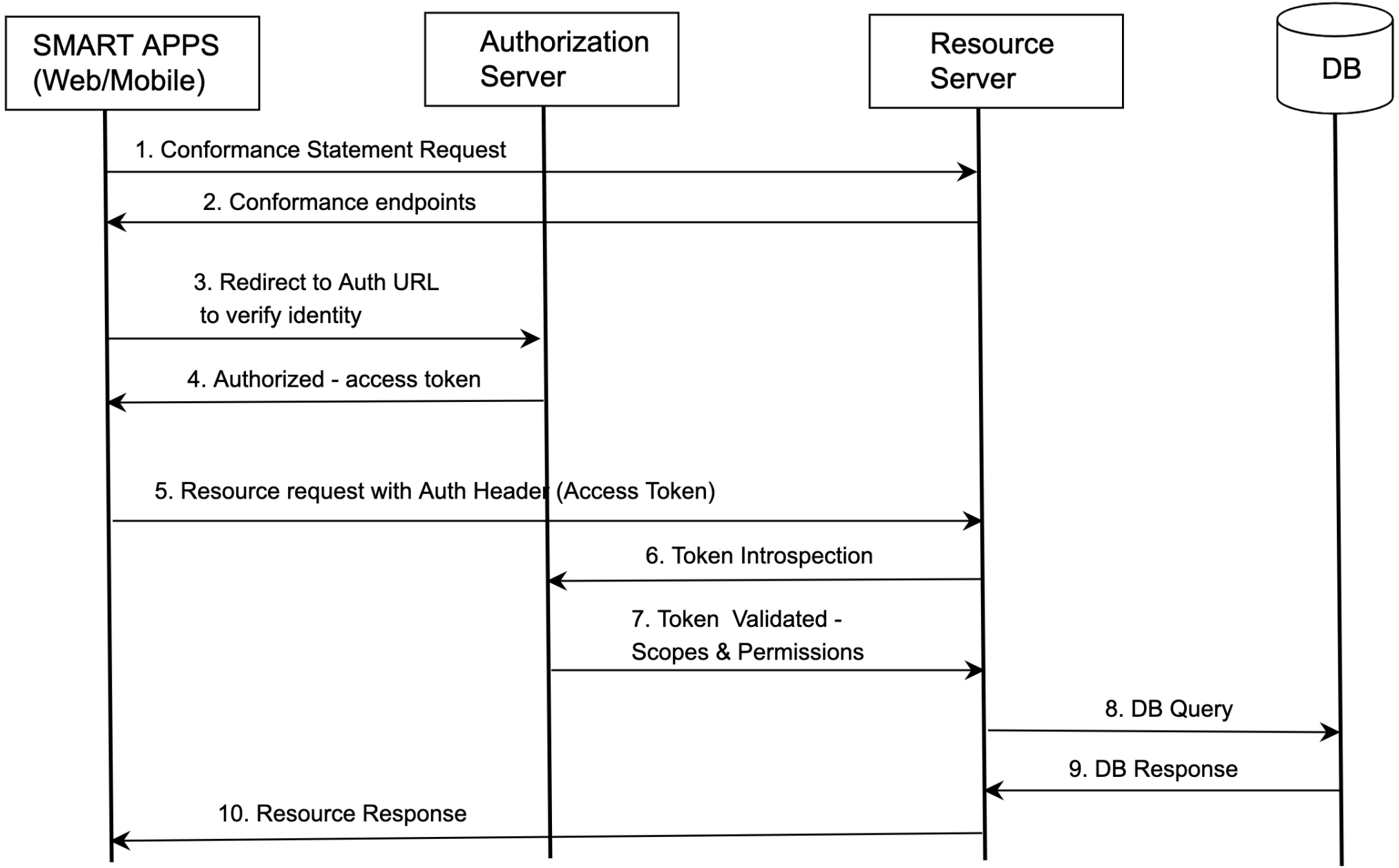
Authorization Server

- Application Platform
- Research ToolBox
- Data Processing
- Data Analytics
  - Recommendation Engine
  - Big data Analysis
  - Process

Healthcare Provider Clients

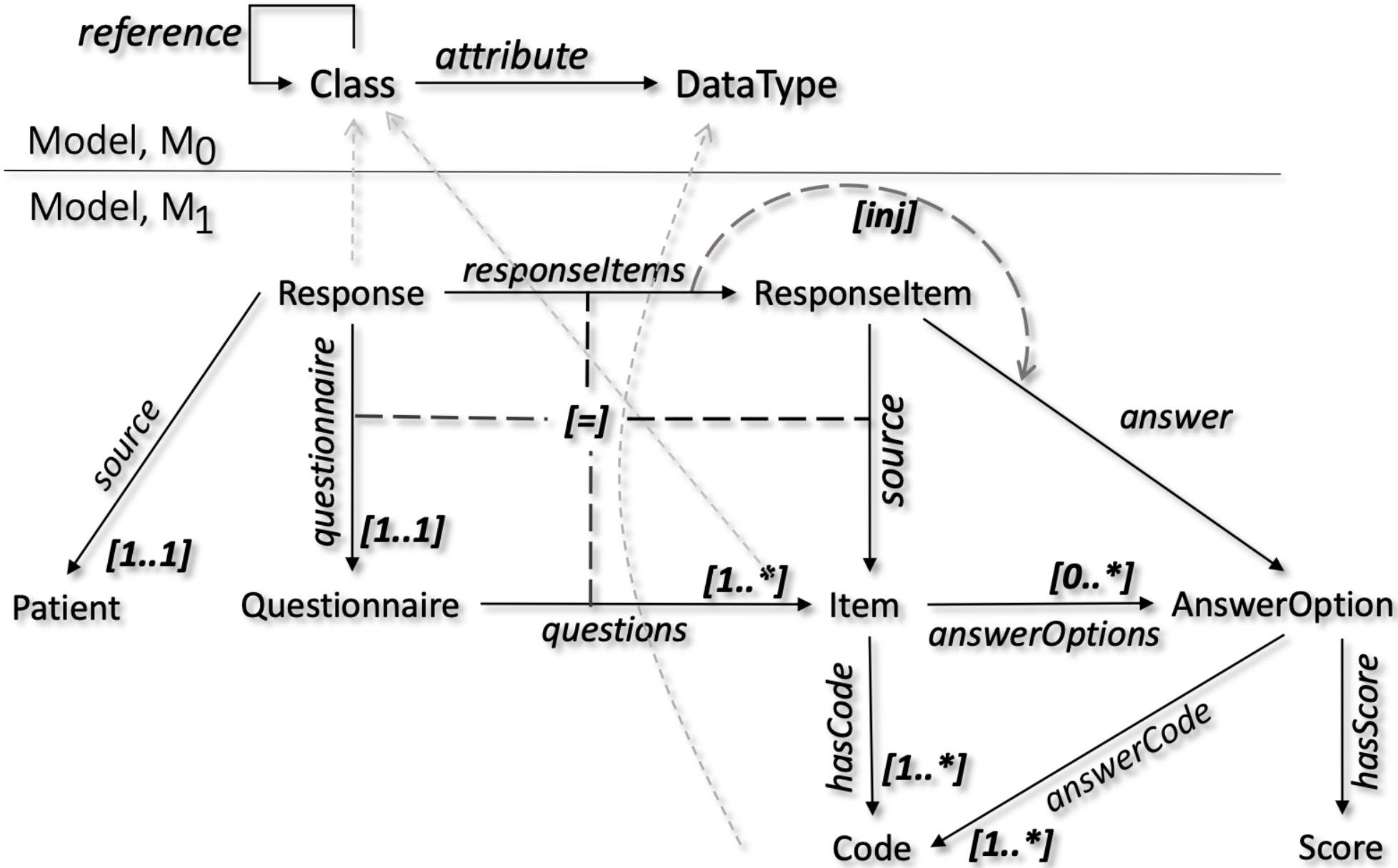
- Other National Resources
- External Tools and Applications
- Regional clinical and core system
- Middleware
  - Legacy System

Sequence diagram showing the authentication process



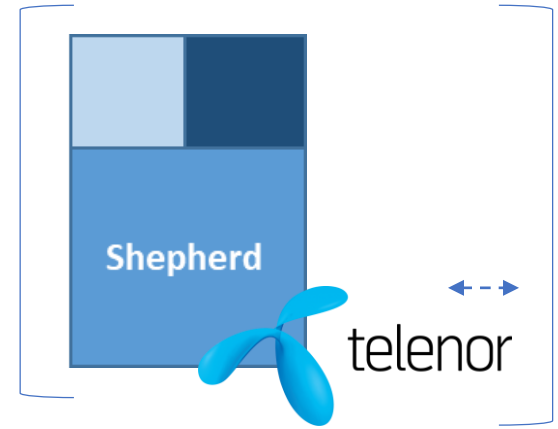
Høgskulen
på Vestlandet

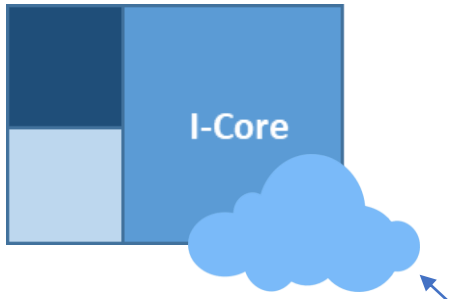
Entity model with constraints (Diagram Predicate Framework)

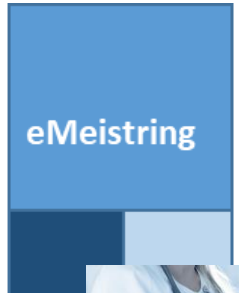


Demo: Client application -> Intromat core (HL7 FHIR)

Patients:
Peter (I-phone)
Pamela (Samsung)

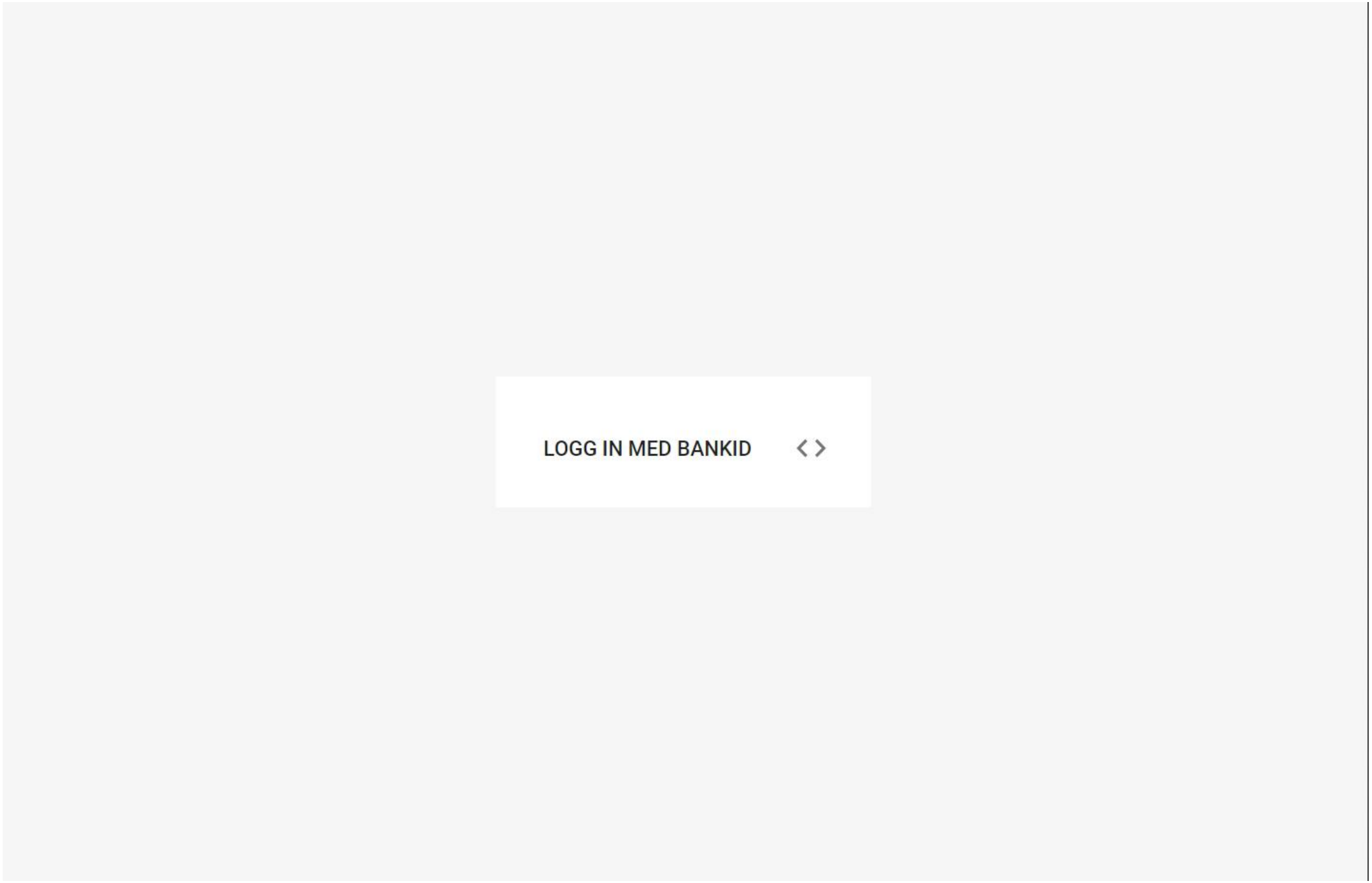






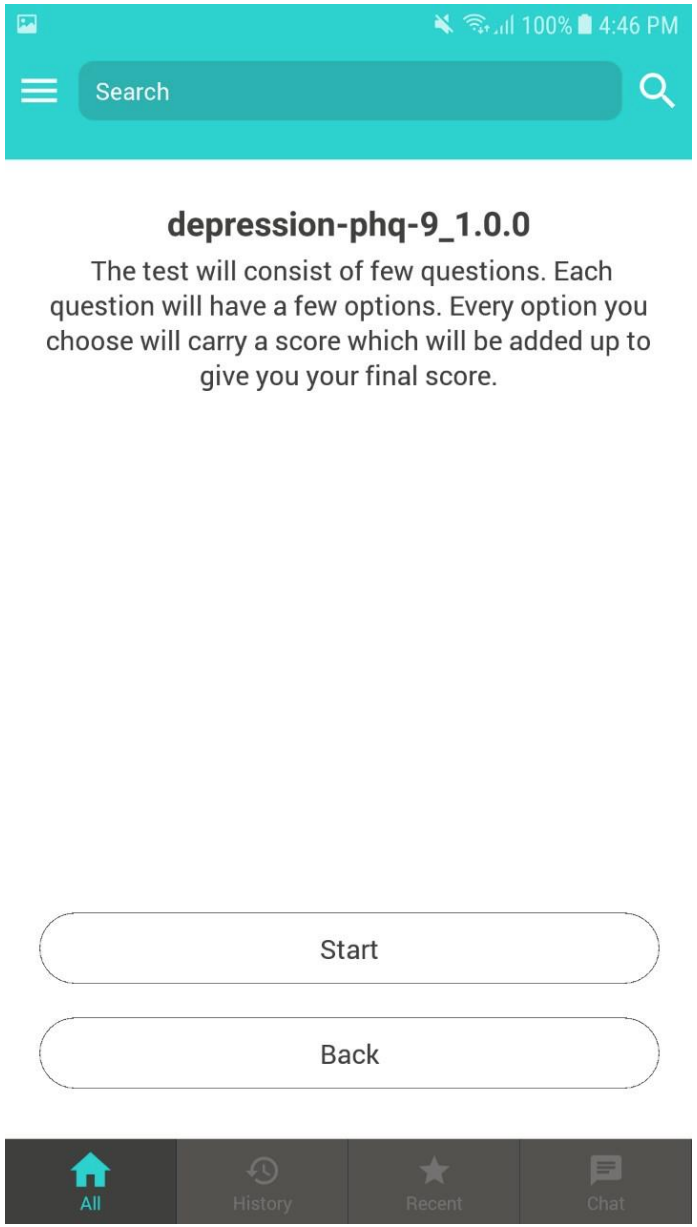
Therapist:
Turid (Tablet

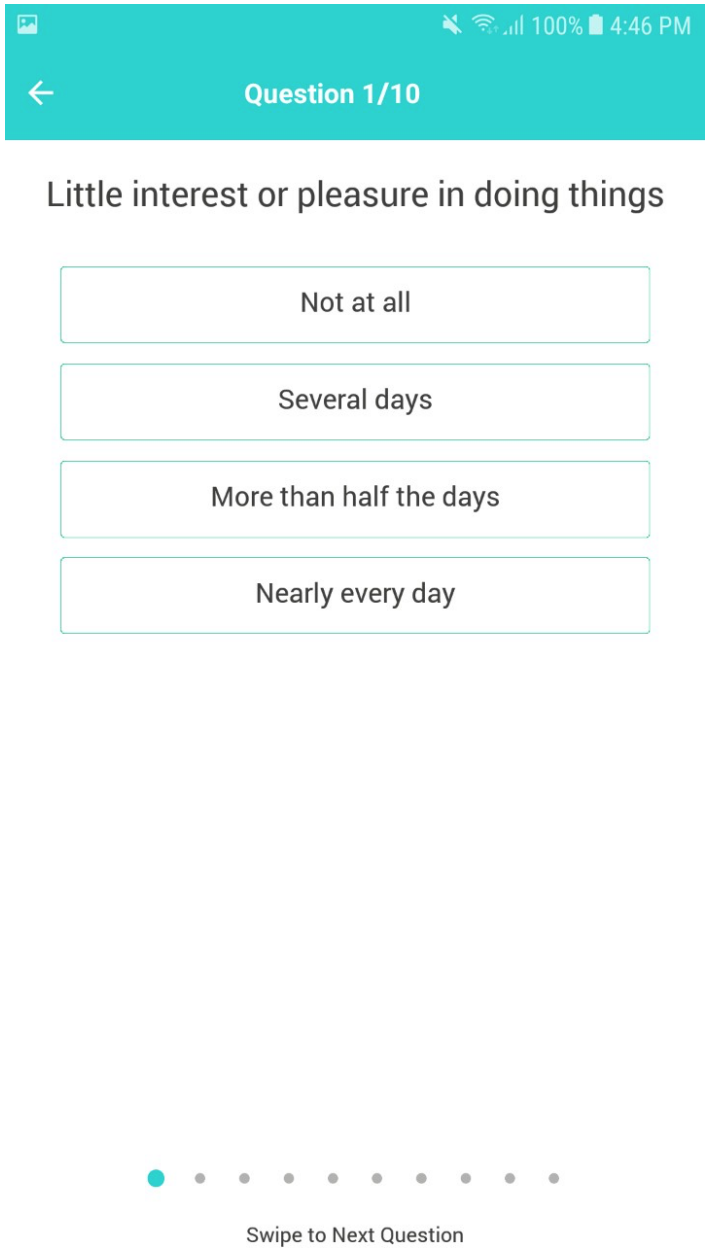
Demo: Client application

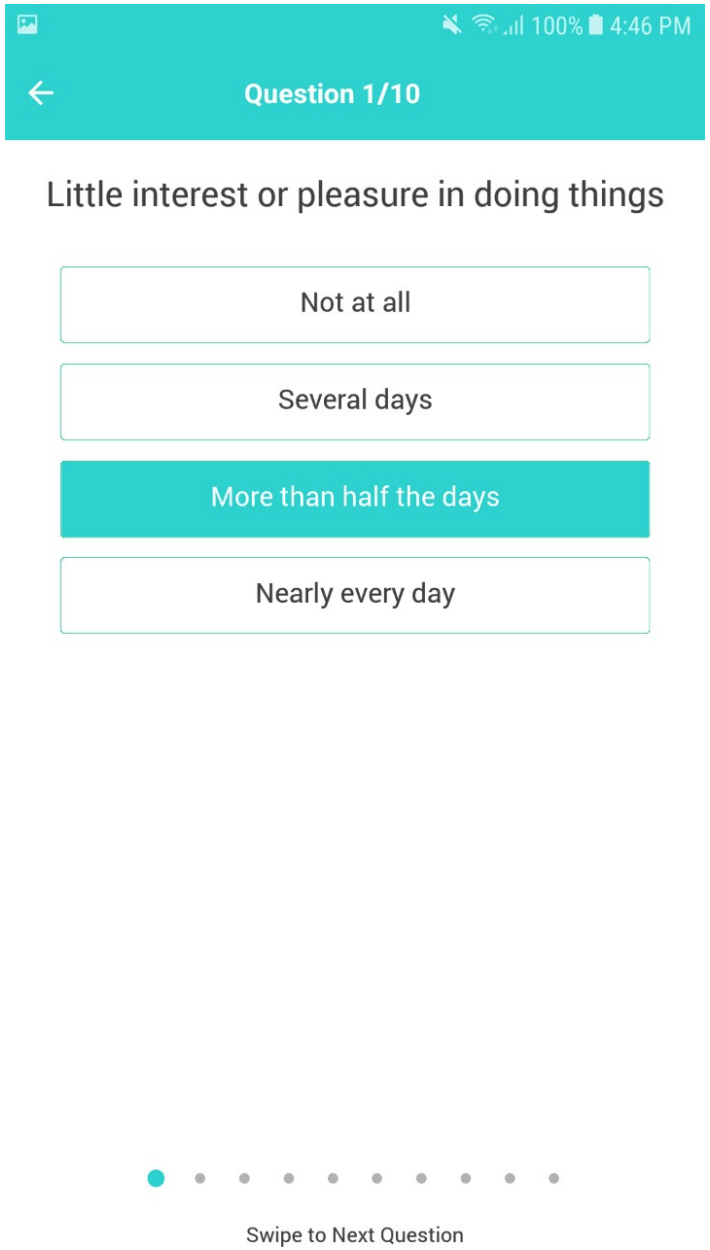


Demo: Intromat core (HL7 FHIR)

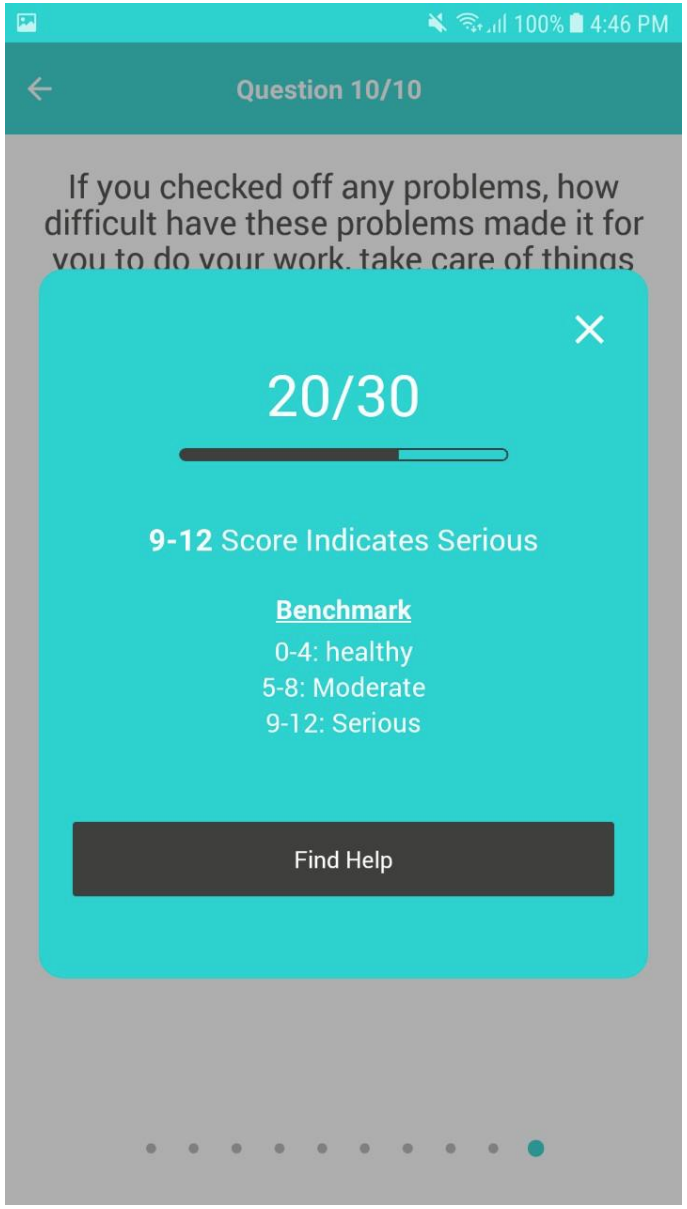
Screenshot of self-screening mobile application

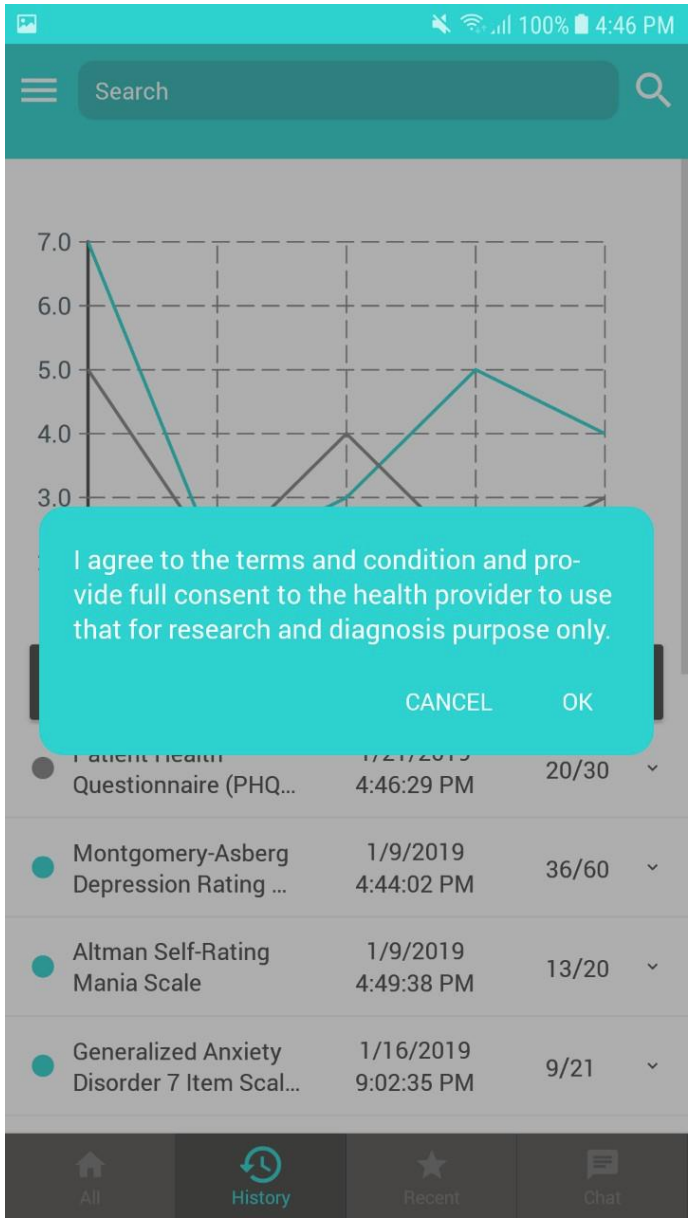


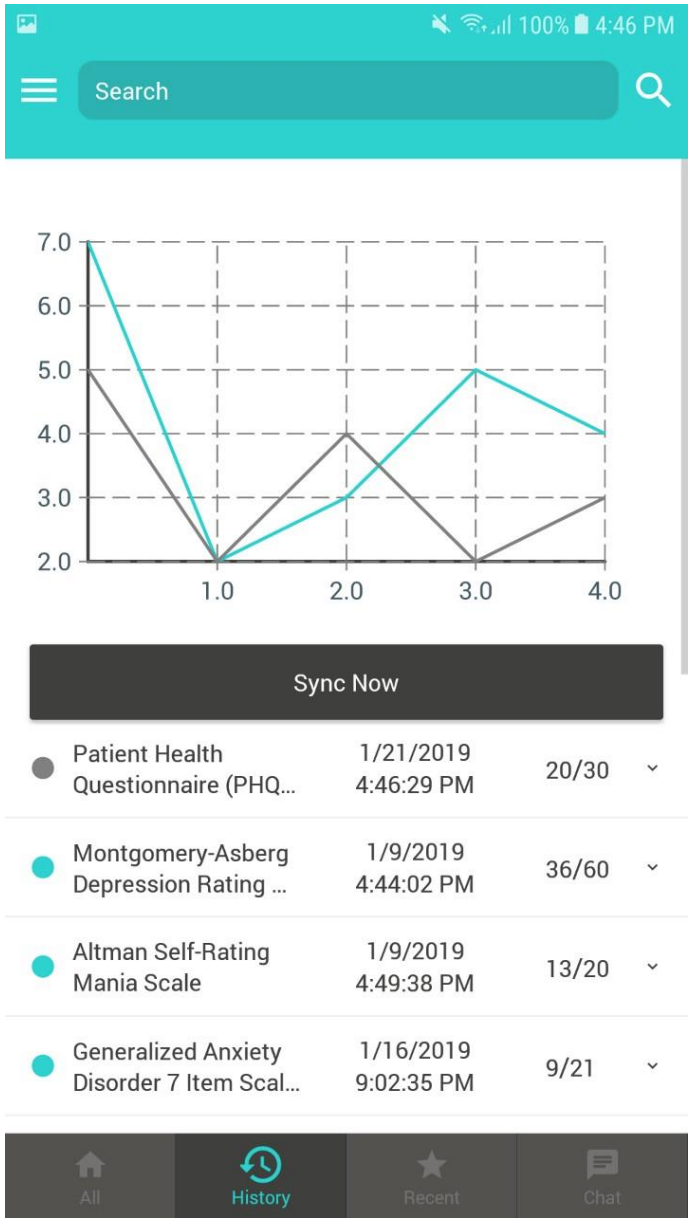




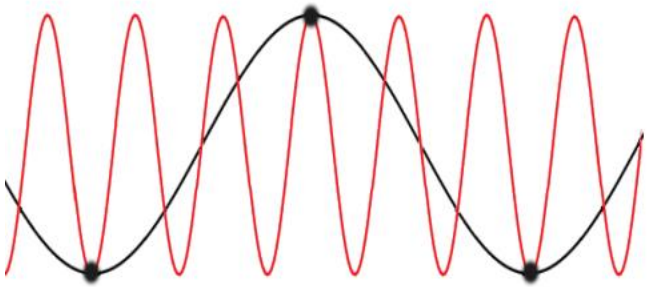
Screenshot of self-screening mobile application



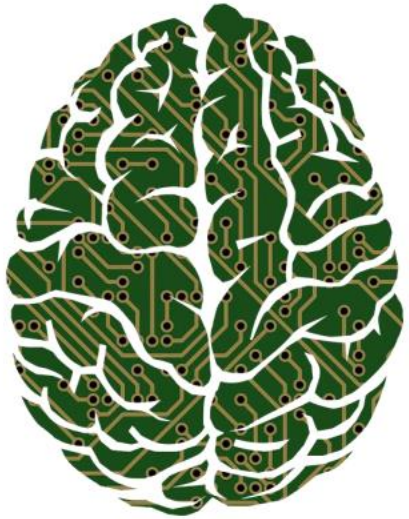




From data to context



sensor data



Machine Learning

Context -> treatment

Intromat-core

State predictions

Summary

We envision building an adaptive system:

- Based on SOA principles the INTROMAT Core architecture for self-assessment and evaluation of mental or neurological disorder
- HL7 FHIR standard to support interoperability for Health Information Exchange; it incorporates standard terminologies such as SNOMED-CT, LOINC, ICD-10 etc.

The solution will be used by several stakeholders including:

- Patients: Self—reporting mobile apps to manage their mental health
- Therapist: Web-based backend for visualization and managmenet of therapies and patients information
- Researchers: Aggregated patient data useful for research and for further analysis
- Industrial Partners: The proposed prototype with APIs can be extended to create healthcare services for mental health patients

Thanks!
For more information please visit www.intromat.no

Høgskulen på Vestlandet