Leaf Doctors

Software Engineering Project

Task 1:   Design Thinking
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1 Contents

2 Introduction

2.1 Motivation

In the module BTX8081 Software Engineering and Design we realize a case study in a group of four. The project consists of typical tasks like analysis, design and implementation. The complete study counts 25% of overall grade and is based on documents, software and/or presentation.

2.2 Goal

The following description is adopted by the official assignment.

A regional health authority wishes to procure a patient management system (PMS) to manage the care of patients suffering from mental health problems. The overall goals of the system are

1. *To provide medical staff (doctors and health visitors) with timely information to facilitate the treatment of patients.*
2. *To support patients and their relatives in coping with the disease.*

Most mental health patients do not require dedicated hospital treatment but need to attend specialist clinics regularly where they can meet a doctor who has detailed knowledge of their problems. The health authority has several clinics that patients may attend. To make it easier for patients to attend, these clinics are not just run in hospitals. They may also be held in local medical practices or community centers. Patients need not always attend the same clinic and some clinics may support 'drop in' as well as pre-arranged appointments.

The nature of mental health problems may be that patients are often disorganized so may miss appointments, deliberately or accidentally lose prescriptions and medication, forget instructions or make unreasonable demands on medical staff. In a minority of cases, they may be a danger to themselves or to other people. They may regularly change address and may be homeless on a long-term or short-term basis. Where patients are dangerous, they may need to be 'sectioned' – confined to a secure hospital for treatment and observation.

Users of the system include clinical staff (doctors, nurses, health visitors), receptionists who make appointments and medical records staff. Reports are generated for hospital management by medical records staff. Management have no direct access to the system.

The system is affected by two pieces of legislation

1. *Data Protection Act that governs the confidentiality of personal information*
2. *Mental Health Act that governs the compulsory detention of patients deemed to be a danger to themselves or others.*

The system is NOT a complete medical records system where all information about a patients' medical treatment is maintained. It is solely intended to support mental health care so if a patient is suffering from some other unrelated condition (such as high blood pressure) this would not be formally recorded in the system.

In our group, we focus on the role **doctor** and the mental health problem **obsessive-compulsive disorder**.

3 Planning

3.1 Project management

We use Microsoft Teams for communication and regularly meetings. Additionally, we created a WhatsApp group to organize spontaneously.

The data transfer and thus the prevention of data loss is achieved by Git. This project documentation, however, is the only document saved in the Microsoft Teams group "GREEN", because in this way we can edit the file at the same time without merge conflicts.

3.2 Literature research

3.2.1 What is OCD?
Obsessive–compulsive disorder (OCD) is a mental disorder in which a person feels the need to perform certain routines repeatedly (called "compulsions"), or has certain thoughts repeatedly (called "obsessions"), to an extent which generates distress or impairs general functioning. The person is unable to control either the thoughts or activities for more than a short period of time.
Source: https://en.wikipedia.org/wiki/Obsessive%E2%80%93compulsive_disorder#:~:text=Obsessive%E2%80%93compulsive%20disorder%20(OCD),distress%20or%20impairs%20general%20functioning.

3.2.2 How to treat OCD?
The most effective treatments for OCD are Cognitive Behavior Therapy (CBT) and/or medication. More specifically, the most effective treatments are a type of CBT called Exposure and Response Prevention (ERP), which has the strongest evidence supporting its use in the treatment of OCD, and/or a class of medications called serotonin reuptake inhibitors, or SRIs.

Exposure and Response Prevention is typically done by a licensed mental health professional (such as a psychologist, social worker, or mental health counselor) in an outpatient setting. This means you visit your therapist's office at a set appointment time once or a few times a week.

Medications can only be prescribed by a licensed medical professional (such as your physician or a psychiatrist), who would ideally work together with your therapist to develop a treatment plan.
Link zum Dokument, plus eine kurze Beschreibung. Was ist die Quintessenz?
Source: https://iocdf.org/about-ocd/ocd-treatment/

3.2.3 International classification of diseases 10
According to ICD 10, OCD can be divided as follows:

ICD10 Code	Code Description
F42	Obsessive-compulsive disorder
F42.0	Predominantly obsessional thoughts or ruminations
F42.1	Predominantly compulsive acts [obsessional rituals]
F42.2	Mixed obsessional thoughts and acts
F42.8	Other obsessive-compulsive disorders
F42.9	Obsessive-compulsive disorder, unspecified

Source: http://www0.sun.ac.za/aotc/icd10/mf_icd10_codelist.php?showmaster=mf_icd10_node3&icd10_block=F00-F99&icd10_subblock=F40-F48&icd10_n3=F42

3.3 Interview

After the diligent Literature research, the interview was created as part of the first section of the Project, the *Design Thinking.* Since the Project has its roots in the study of human psyche, our first instinct was to contact the only Medical Staff that, according to our prior information, worked at a psych ward, Prof. Dr. Holm. We considered the fact, that Prof. Holm might be fully booked and therefore we decided to have other contacts: Prof. Dr. Lehmann and Prof. Dr. Nüssli.

For the Interview, we created five open-ended questions, that would have allowed for spontaneous following questions. The interview would have been performed in German (or Swiss German, depending on the personal preference of the interviewee). Below are the intended interview questions that were created for this task.

1. Was sind die Herausforderungen, wenn Daten zu psychischen Erkrankungen erfragt werden?
2. Gibt es Unterschiede bei der Anamnese von physischen und psychischen Erkrankungen?
    a. Wenn ja, welche sind das?
3. Was sind besondere Daten, also krankheitspezifische Angaben, die beim Patienten / bei der Patientin erfragt werden müssen?
4. Bezüglich Zwangsstörungen: Wann gilt ein Patient / eine Patientin als gefährlich?
5. Um die Diagnose stellen zu können, müssen diverse Bedingungen erfüllt sein. Diese lassen sich überprüfen, in dem man eine Rating-Skala hinzuzieht, z.B. die Yale-Brown Obsessive Scale (Y-BOCS). Macht es Sinn, ein User Interface auf Basis einer solchen Skala aufzubauen?

On the 20th October 2020 Prof. Dr. Holm was contacted to establish the Interview Date. Shortly after, Dr. Lehmann and Dr. Nüssli were also contacted. Sadly, to this date, no answer has been given.

4 Results

4.1 Personas

Our team, team Green, has chosen the target user group *Doctor in a clinic* therefore, the personas that were created, refer specifically to the medical staff.

4.1.1 Persona Dr. Peterman

Name	Dr. Peterman	
Age	50 years old	
Role	Chief Doctor, Psychiatry, University of Psychiatric Services Bern	
Skills	Empathy and compassion; emotional resilience and initiative to work, capacity to monitor developing situations and anticipate issues	
Goals	View and edit new patient data. Ability to search and find Patient data	
Pain points	Reading the handwriting from other doctors that is illegible	

Table 1: Persona 1

4.1.2 Persona Dr. Noob

Dr. Noob just finished his studies and is not trained in the proper ways of the MHS-PSM system. Regardless of this, he has a notion on how things should work in a clinic. When an OCD Patient gets into his office, he goes out of his way to help in every possible way. He is open to new treatment options and mostly, he wants to use digital solutions to support his decisions. Should such an application arise, this would mean an easier workflow and could re-imagine the process for OCD patients that would work in this environment. He also likes Burgers and Tacos. So, a lunch break is always in his schedule.

Name	Dr. Noob	
Age	30 years old	
Role	Doctor, Psychiatry, University of Psychiatric Services Bern	
Skills	Digitally inclined, change oriented, empathic, highly initiative to work and self-growth	
Goals	Help as many patients as possible, by treating the cause of the OCD and not the symptoms	
Pain points	Not having access to the most recent patient medication plan	

Table 2: Persona 2

4.1.3 Persona Dr. Fix-It

Dr. Fix-It is the commanding doctor at a well renowned psychiatric hospital. Besides her work with patients she oversees other non-patient related tasks.
During her shift she wants to serve as good as possible patients that arrive at the main Headquarters of the chain clinic. For this reason, she asked around to find developers who could find a reliable way to summarize information. Once this information was acquired, she included the Digital solution in her workflow, further helping her patients.
Although Dr. Fix-It is a workaholic, who likes to work many hours a day, she wants to have quality time to spend with her husband and children over the weekend. Being with her family should not hinder her work, that is why, she can see the patients collected information at any time. With the help of this information, she can act accordingly and, in any case, restructure the workflow of the upcoming week.

Table 3: Persona 3

Name	Dr. Fix-It	
Age	45 years old	
Role	Doctor, Psychiatry, University of Psychiatric Services Bern	
Skills	Digitally inclined, change oriented, empathic	
Goals	Better herself and help change the world one Patient at a time	
Pain points	Not having enough time to analyze the Patient data	

4.2 Storyboards

The storyboards were designed in the perspective of a doctor. The project focus will be on the following storyboards. The stories behind them were promising and offer a variety of use cases.

4.2.1 Doctor – patient: Anamnesis based on patients' documentation
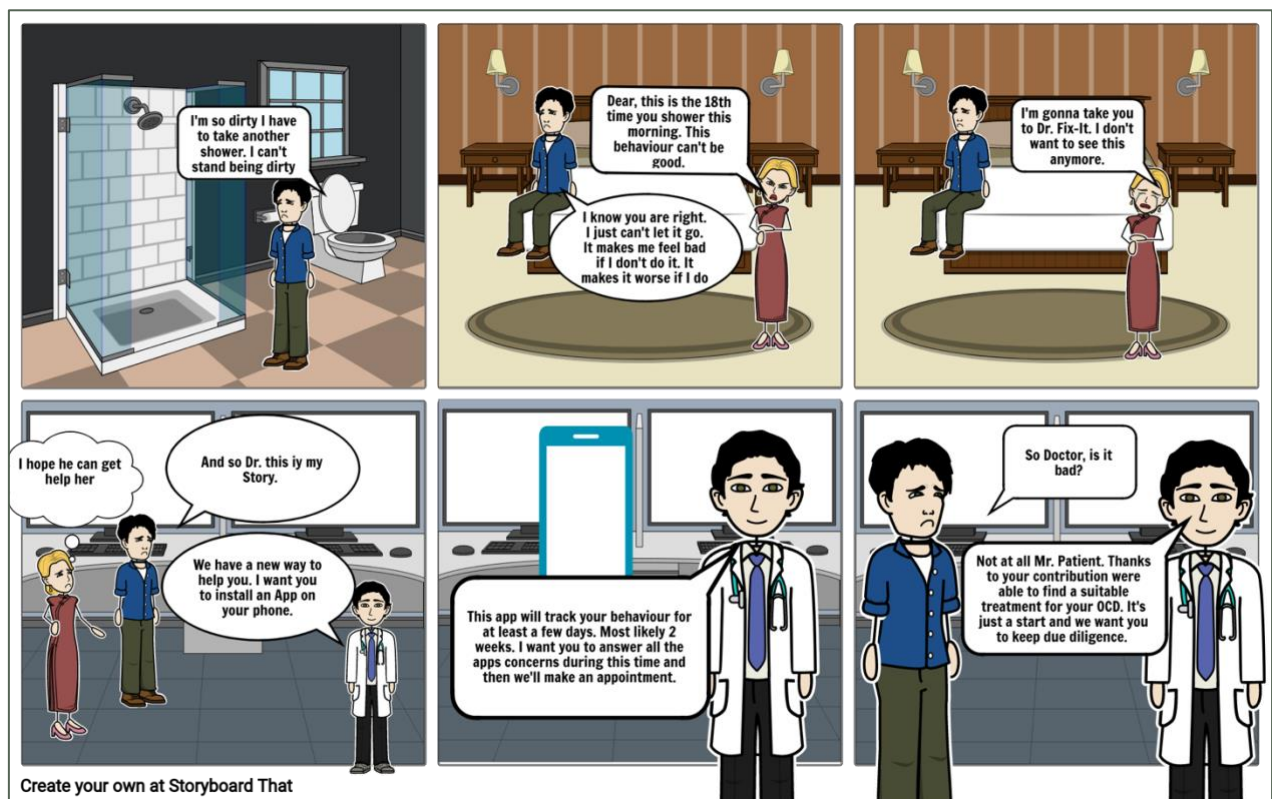
Ill. 1: Storyboard Patient – Doctor Anamnesis

This storyboard shows the process the patient must do in order to go to a doctor. The first contact shown here is a point where the whole process starts documenting the illness of the patient. Because OCD must be observed over at least 2 weeks before drafting a first diagnose the patient is asked to do a log about his behavior. Eventually this data is then transmitted to the doctor and the doctor can review the documentation.

4.2.2 Doctor – nurse: medication process
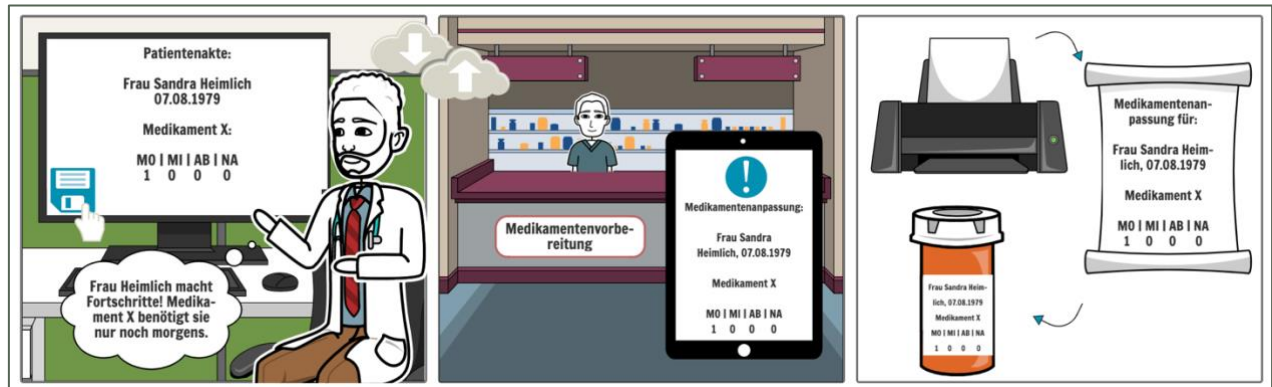
Ill. 2: Storyboard doctor - nurse (medication)

In this case, the doctor changes the prescription of a stationary patient. He commits the update to a web application. Employees of care have access to this platform as well but with different roles. They either get a notification about the change or read the latest updates. The employee of care prints out the latest prescription in form of a sticker. Afterwards, he put it on the patient specific medicine box. The nurse will have the updated and correct medicine before their next patient visit. By this, the two of them do not need to meet each other to be updated and the communication can follow digitally.

4.3 Main features

The main features were discussed out of the point of view of a doctor.

4.3.1 Functional features

4.3.1.1 Anamnesis based on patient's documentation

For a psychiatric disorder like OCD it is very important that a thorough documentation is properly created for the first 14 days. This is the usual case when an OCD patient visits a doctor. Most documentation happens during meeting with the physician and may be very inaccurate. This App will log, with cooperation from the patient, the crucial time the characteristics and discomfort patients suffer. At the end of the start time a doctor will receive directly from the App what the patient documented and so do a first assessment.
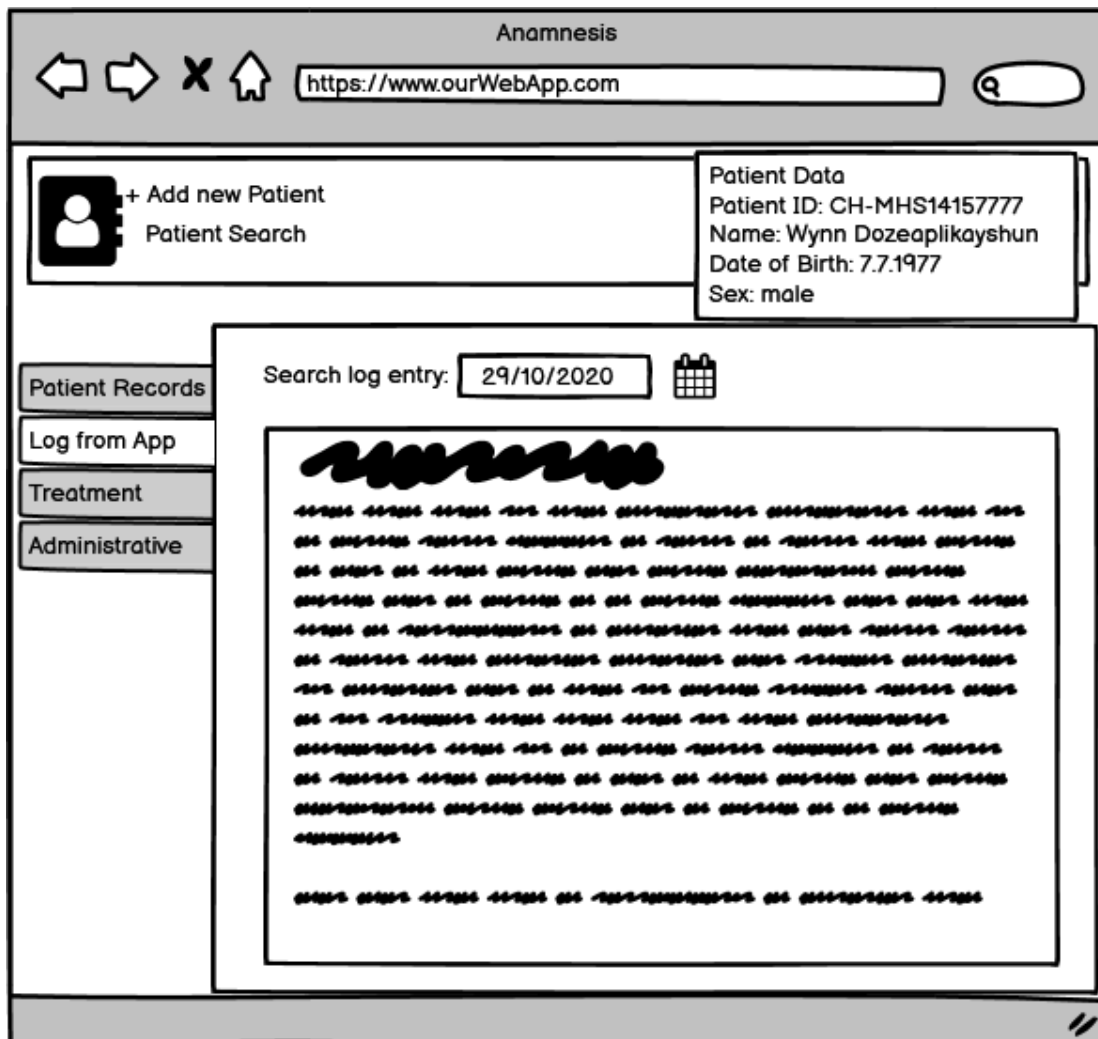
Ill. 3: Screen prototype of recorded data from patient in the doctor's app.

After receiving the data from the patient, the doctor will be able to review all the information gathered up to that time. Will be able to isolate the factors that define OCD characteristics and will be able to do a first diagnose. Further use of the app and the log features will also work to fine tune the therapy chosen by the doctor.

4.3.1.2 Electronic health recording (EHR)
While patients stay in a clinic, their medication plan can change over time. The adjustments can happen at any time of the day by different persons. Furthermore, it happens that the physical patient record can't be found because it was handed out to many places.
Basically, this prototype is about to make changes within a medical process visible to others. In this case, it is about the change of a prescription. The employees of care need to know when their patients received a new doctor's order as fast as possible.

Ill. 4: Screen prototype of prescription changes in medical health recording

After the doctor has made changes in the medication, the application checks the prescription change column. Date and time of this action will be saved in the background for documentation purposes. The thick in the column will disappear after the responsible staff has notified and reacted to the change.

A web application like this supports the nurse because he / she is involved in the medication process. Even if doctor and employees of care do not meet, the modifications are visible to every authenticated party. In a next level and to extend the feature, the change could also refer to any kind of therapy adjustment.

4.4 Project Scope

The focus lies in the anamnesis of obsessive-compulsive disorders. We want to know what a practicable way is of determining the disease with support of a web application. This includes a logical structure of the user interface components and specific user input fields. In particular, it is about adapting medical data and notifying other actors of this adaptation. An interface for self-documentation of the patient is also to be established. Health professionals should be able to access this documentation.

4.5 Out of Scope

The web-application is not a medical device. Further this system will not replace the interactions between medical staff and patients, and it is not a complete electronic health record.

5 Discussion

5.1 Storyboards

In the *Design Thinking* task, nine storyboards were created, of which two were selected as the base of the prototype that would be designed. Each storyboard has the story description written under each storyboard block. The main perspective stays the role of the doctor. However, to get different ideas, each of us took a different role.

5.1.1 Doctor storyboard
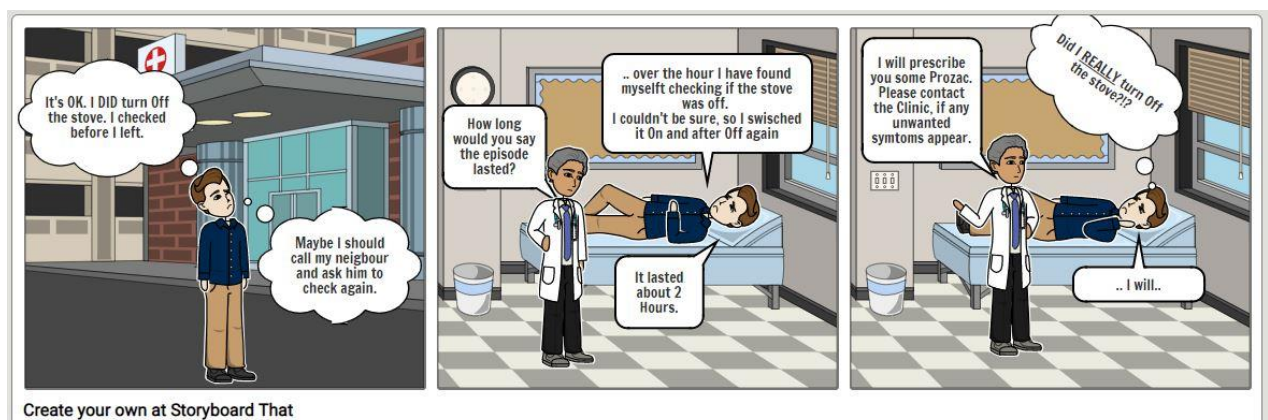
Patient is on his way to the Psych clinic. On the way there, he cannot seem to stop thinking about his latest fixation, the stove. He has been having this constant fear that his apartment will catch fire, because he felt the stove On.	The Patient explains his fears to the Doctor, describing exactly how his latest episode started and how long it lasted. The Doctor listens patiently to the Patient, in order to give the best diagnostic.	The Doctor announces his diagnostic and prescribes *Prozac* for the Patient. The Patient zooms out, letting his fear overwhelm him.
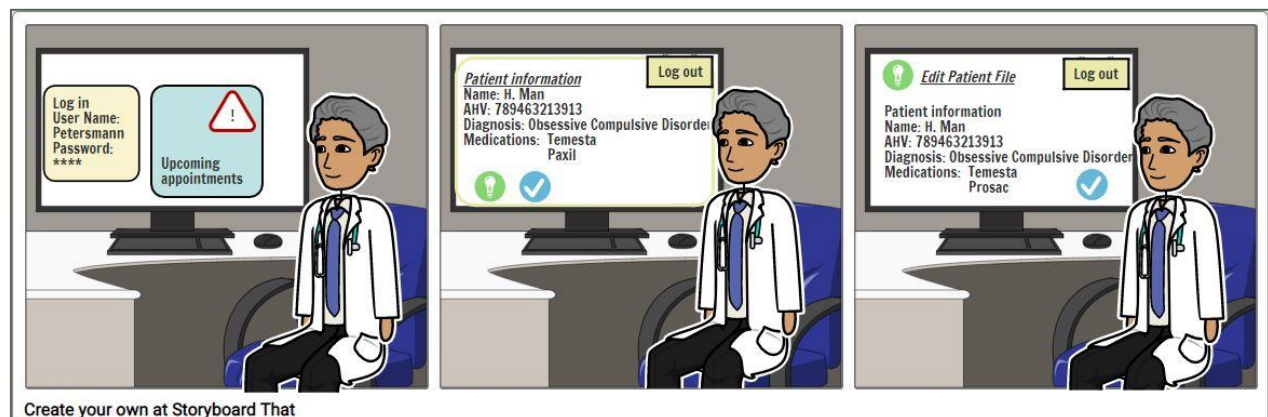
|		
The Doctor uses the MHC-PMS System to log into his account. He uses his MedReg Number to	When selecting a Patient from the Database, he can review,	The Doctor presses on the *Green* button and now he can edit the Patient information.

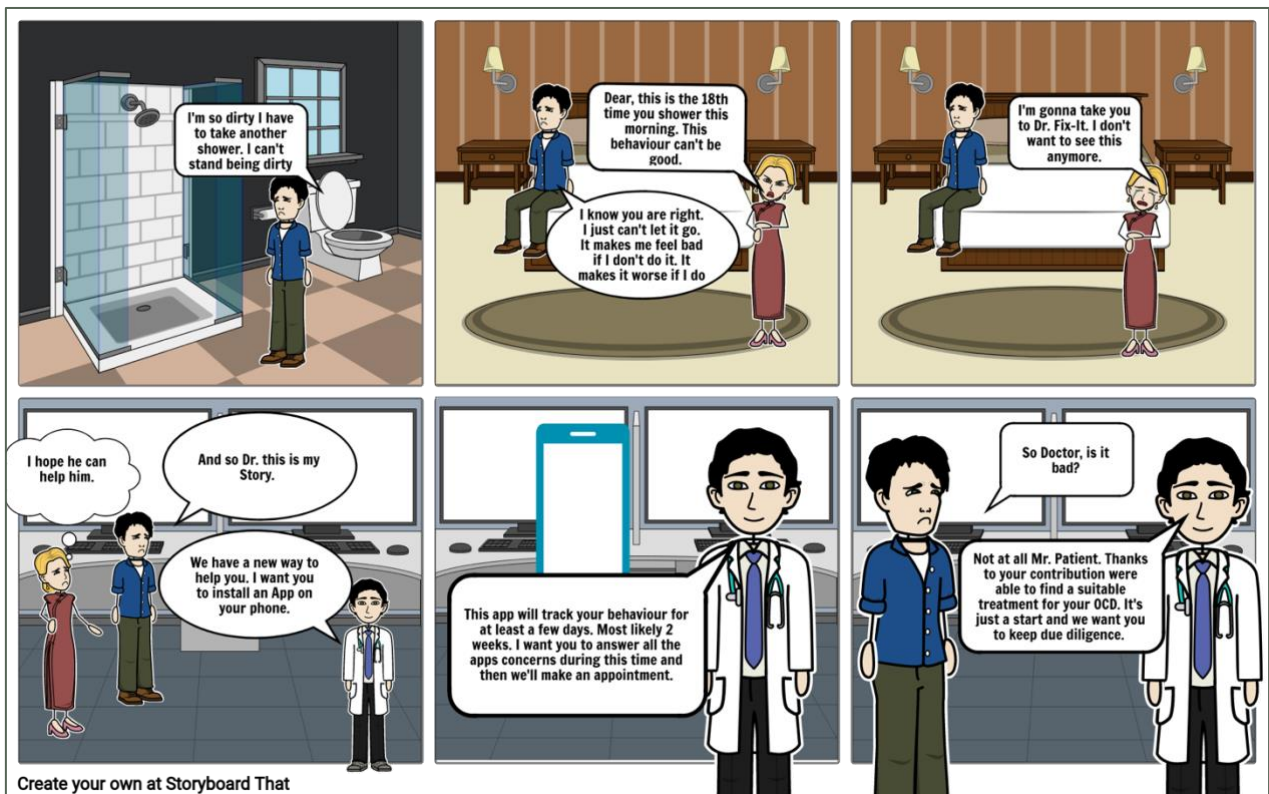| Authentify his acknowledged Status as Chief Dr. In the System he can see the Upcoming Appoints that the Medical Assistant created.	but also edit the Information available. If he wishes to just read the Information, he will press on the *Blue* button.	Once he is satisfied with the results, he will press the *Blue* button to send the information to the Database.
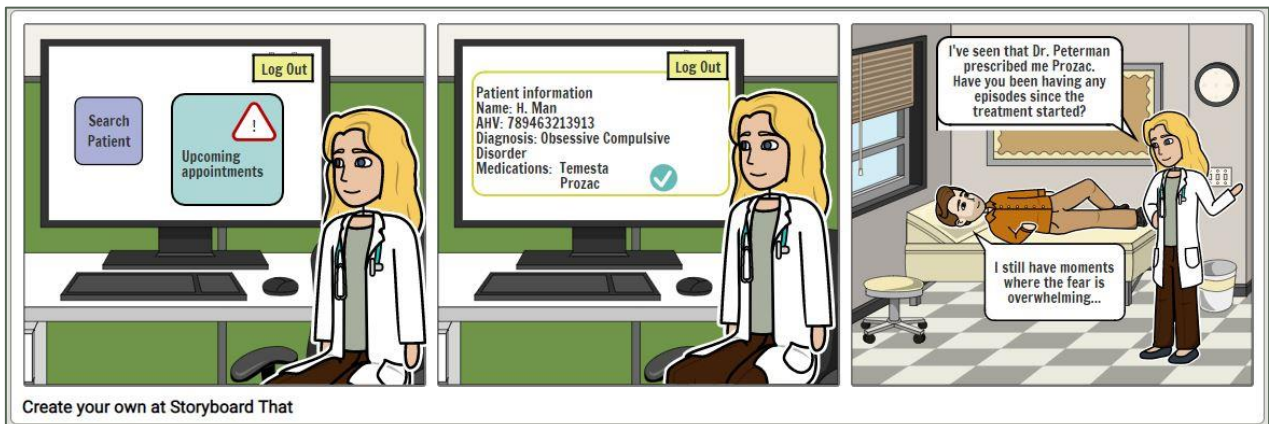
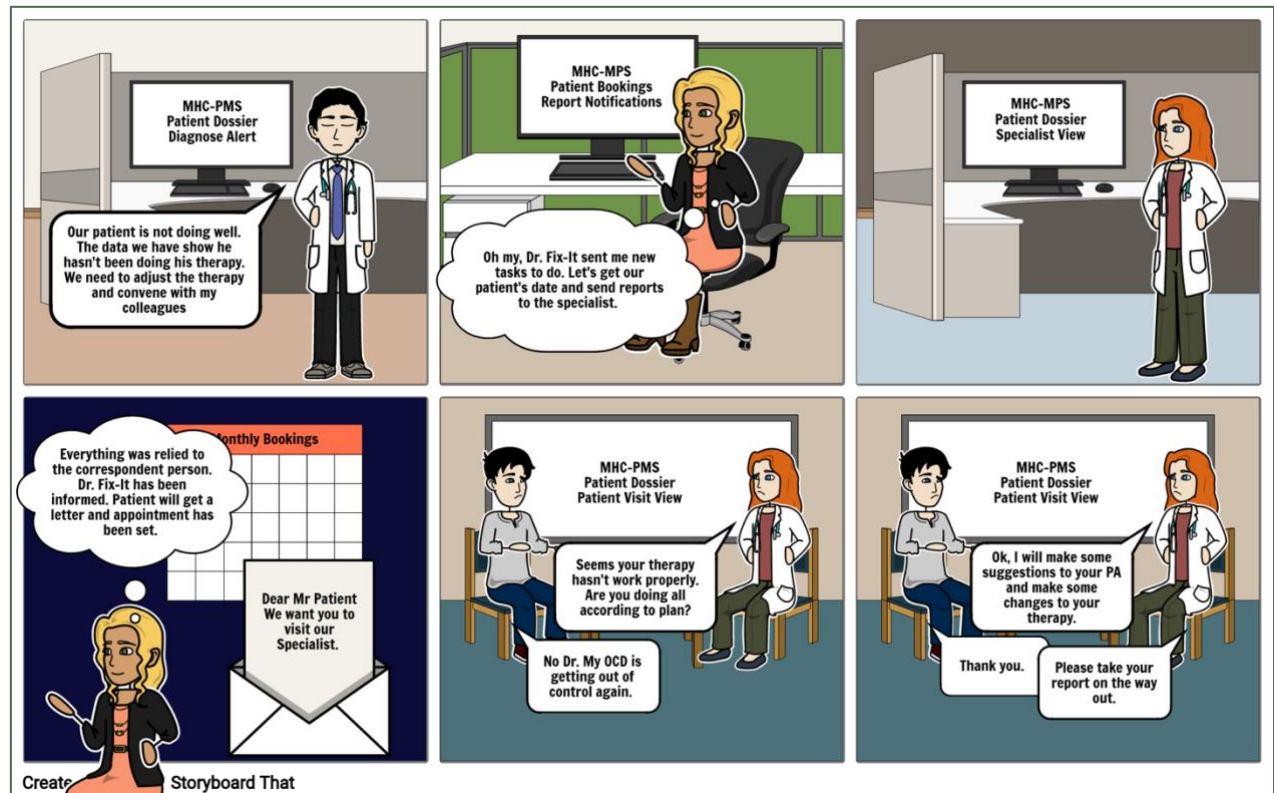| Another Doctor logs in the MHC-PMS system. She gets a notification, that a Patient will arrive soon for a check-up. She can use the *Search Patient* button to search for Patients.	She carefully reads the Patient Information and plans on how the Appointment will be structured.	The Appointment goes as planned and the Patient seems to have improved.

5.1.2 Patient storyboard

The patient is having another acute episode of OCD.	This leads to a discussion with a family member.	It is decided that a personal physician has to be involved.
The patient and his wife made an appoint with the specialist and told what has happened so far.	In order to have an accurate diagnosis, the patient is asked to track all his OCD characteristics with an app.	After all data is gathered, the personal physician is able to do a first diagnose and start treatment and therapy.

| The doctor treating the patient is still tracking data provided by the subject. He notices things are starting to go wrong and needs to do something about it.	The MPA receives the task from the doctor to contact a specialist.	The specialist receives the data and starts working on the case as soon as possible. Returning all findings to her MPA.
The MPA from the specialist organizes everything that must be done. An invitation to an appointment is sent and the personal physician is also notified about the outcome.	A first appointment with the specialist is happening and both patient and doctor are discussing, with the help of the monitor in the background, what the best course of action is.	At the end of the session, the specialist makes the required changes. Communicates her findings with the patient and will eventually send a report.

5.1.3 Nurse storyboard
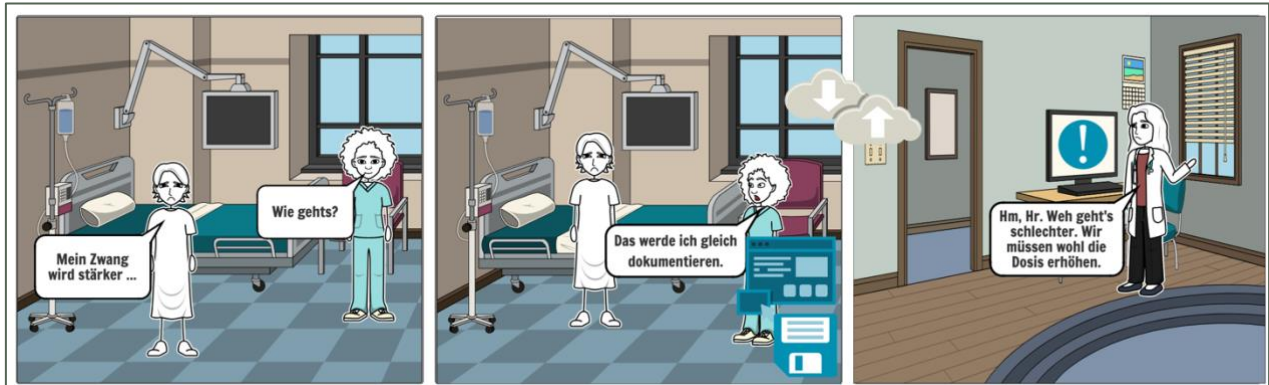
This scene takes place in the regularly patient visit. Besides measuring the vital signs, the nurse asks about the well-being. The patient answers in this case that he is feeling worse than the last time.

The nurse must document everything during the visit. This includes the vital signs, the state of mind and other useful parameters. This happens with help of a smart device. The changes will be saved immediately on the platform.

At the same time, other authorized persons are able to monitor the patient visits. Any signs of improvement and weakening can be seen remotely.
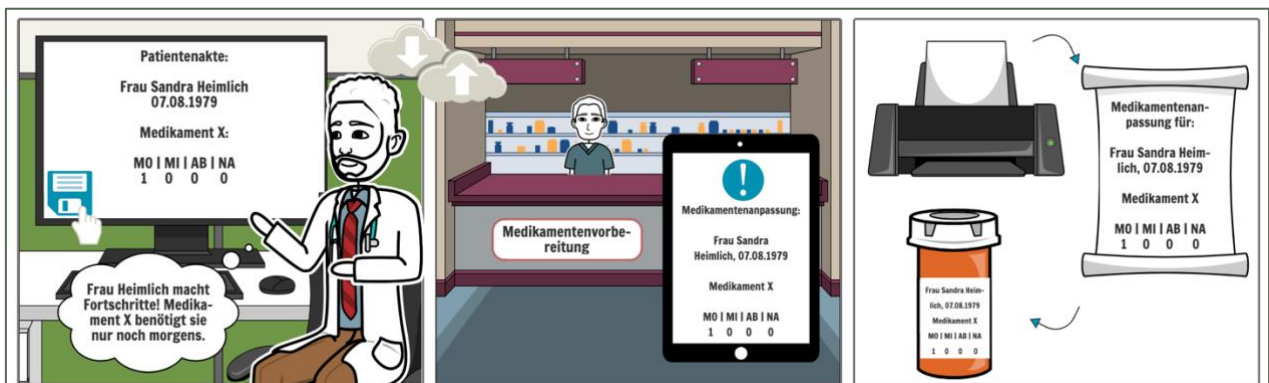

In this case the doctor changes the prescription for a patient. He changes the patient-specific data in the web application.

The employee prepares the drug boxes for the patients. On the web application he can check the latest prescriptions. Sudden changes become visible.

The updated prescriptions can be printed out as a sticker and put on the corresponding drug box.
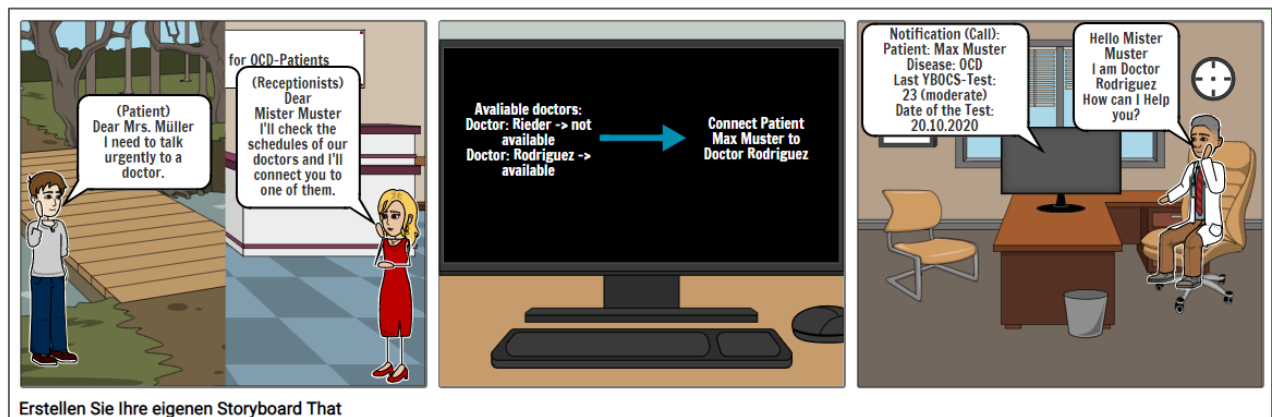
5.1.4 Secretary storyboard
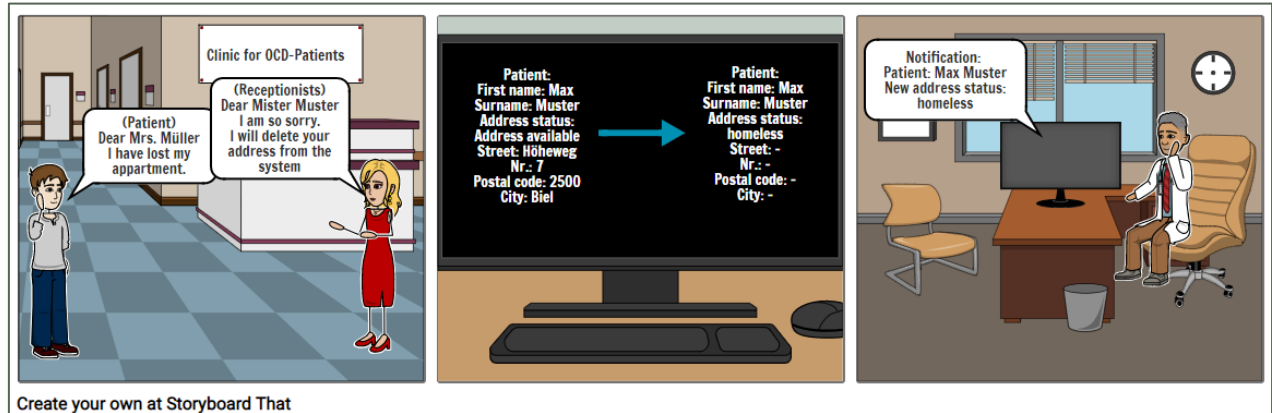
The patient informs the clinic that he has lost his apartment.	The receptionist changes the address status in the system.	The doctor gets the information of the patient by a notification.

The patient calls the clinic because he doesn't get his disease under control and needs to talk urgently to a doctor	The receptionist checks the schedule of the doctors and connects the patient to one of the doctors.	The doctor gets a first all the necessary information of the patient and then gets connected to the patient.

6 Glossary

OCD → Obsessive-compulsive disorder
EHR → Electronic health record
CBT → Cognitive Behavior Therapy
SRI → Serotonin reuptake inhibitors
ERP → Exposure and response prevention