



MONITORING GRID

D.T2.5.3 - Preliminary model of “Monitoring Grid”

Version 1
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1. Introduction

The current development of a growing and aging population in Austria will continue in the future. On the one hand, migration gains of around 30,000 to 35,000 annually lead to an increase in population. On the other hand, in addition to the stagnating birth rate and increasing life expectancy, the strong birth cohorts, which are gradually changing into retirement age, are responsible for the aging process. According to this, the population of Austria will grow from 8.84 million (2018) by 7% to 9.43 million by 2040 and by 2080 finally by 12% to 9.93. The share of the population 65+ will increase from 18.8% (2018) to 29.3% (2080) in the next six decades.¹

This demographic development has very important effects on the health and social system. One of the effects is the pressure on public spending.²

It is therefore important to react to these developments as quickly and as early as possible. One way to reduce costs in this area is to implement digital tools that enable older people to live a longer life at home.³ One of these tools is the **Monitoring Grid**.

The development of the here presented Monitoring Grid is based on the eCare network of Bologna and other EU good practices. In order to make the Monitoring Grid applicable to the Austrian population, both Austrian legislation and the needs of the older population were taken into account.

The present document aims to collect the most important information about of how the Monitoring Grid was developed. It consists of 2 thematic parts. First, it gives an overview of the Monitoring Grid. This overview describes the concept, which is the basis of the monitoring grid, the different categories, the possible combinations and the home emergency call. Second, the technical development will be described.

¹

https://www.statistik.at/web_de/statistiken/menschen_und_gesellschaft/bevoelkerung/demographische_prognosen/bevoelkerungsprognosen/index.html#index1

² https://news.wko.at/news/oesterreich/Demografische_Entwicklung_in_Oesterreich.html

³ C. Fiori, The eCare Network in Bologna: No longer home alone, page 285, Italy, 2014.

2. Overview of the Monitoring Grid

The Monitoring Grid is a simple monitoring tool, which is used for older people to enable them to live independently at home as long as possible. In this respect, it represents the basis for weekly calls. These calls serve to identify a deterioration in mental and physical health as quickly as possible. This means, it not only pursues the goal of recognizing a deterioration in the state of health as quickly as possible, it also intends to manage and facilitate phone interviews with frail elderly people, thus constituting a true "guide" to handle phone interviews.

The following part of the present document should give an overview of the most essential components of the Monitoring Grid: First, the basis of the monitoring grid will be briefly discussed and the concept will be presented. The description of the concept includes the introduction of the categories, the combinations, the presentation of the results and the home emergency call. After that, the technical development of the software will be introduced.

2.1. The basis of the Monitoring Grid

In the course of the development, which is based on the eCare network of Bologna, both the Austrian legislation and the needs of the older population were taken into account.

As already mentioned, the development and elaboration of the Monitoring Grid in Austria is based on the Monitoring Grid that is part of the **eCare network in Bologna**. Especially the following characteristics are complied with the Monitoring Grid of Bologna:⁴

- The Monitoring Grid is divided into 3 frailty factors:
 - Clinical factors
 - Functional factors
 - Social factors
- The target group of the Monitoring Grid are people over 75 years old.
- Combinations, which make further observation necessary, were worked out.
- The Monitoring Grid constitutes a true "guide" to handle phone interviews.
- The participants are contacted by phone.
- The participants are contacted regularly.

Since the Monitoring Grid is being used for the first time in Austria, there are no specific legal regulations on this. The Austrian Structure Plan (Österreichischer Strukturplan Gesundheit - ÖSG) and the "Framework Directive for the IT infrastructure at use of telemonitoring (Rahmenrichtlinie für die IT-Infrastruktur bei der Anwendung von Telemonitoring)"⁵ are key planning tools that were observed during development.

The Austrian Structure Plan (Österreichische Strukturplan Gesundheit - ÖSG) contains planning statements for selected areas of outpatient and acute inpatient care, for outpatient and inpatient rehabilitation and for large medical-technical devices. The quality criteria in the Structure Plan aim to achieve the same care standards in the various care structures across Austria. The Structure Plan ensures that health care is

⁴ C. Fiori, The eCare Network in Bologna: No longer home alone, page 285, Italy, 2014.

⁵ Bundesministerium für Arbeit, Soziales, Gesundheit und Konsumentenschutz, Rahmenrichtlinie für die IT-Infrastruktur bei der Anwendung von Telemonitoring, Austria, 2018.



distributed throughout Austria in a balanced manner, is easily accessible and is offered in a comparable quality at a high level.⁶

Since the monitoring grid focuses primarily on the observation of the state of health and thus represents a kind of telemonitoring, the above framework was viewed as a guideline. The Framework Directive, which is only a recommendation, concerns telemonitoring for patients who want to use additional telemonitoring for the treatment/ monitoring of their illness.

The monitoring grid collects a lot of data (health data, contact details, ...) of the interviewed people. Hence an important topic that has to be considered during the development is the General Data Protection Regulation (GDPR).

In order to ensure compliance with legal regulations, the development of the monitoring grid was accompanied by the legal department of the Samaritan Burgenland Department of Home Care, in particular by a data protection officer.

In order to make the monitoring grid as efficient as possible, the **needs of elderly** developed in WP 1 were of course taken into account during development. Three dominant needs were highlighted:

- **Social contact:** The monitoring grid is able to help combat social isolation. The weekly contact can help to bring people out of social isolation or not to let them come into social isolation at all. The older people are looking forward to the calls. They feel taken seriously and important. However, it should be noted that the calls must take place regularly. Clear structures and a stable environment play an enormously important role for older people. Because of this the interviews will be scheduled on the exact day and time.
- **Self-determination:** It is important that a self-determined life is given to the elderlies. This means that they can make independent decisions on all issues affecting them. Older people are called by specialist staff once a week. Through these calls, a deterioration in the physical and mental state of health should be recognized in a reasonable amount of time and nursing measures can be taken at an early stage. This is to ensure that the elderly can live a self-determined and independent life at home for as long as possible.
- **Professional support:** For elderly it is particularly important that professional support is provided. Medical and nursing care has to be guaranteed so that the patient can feel safe. Residential area managers, who contact the residents once a week and ask them different questions about their physical and mental health status, are trained nurses who can look back on years of experience.

⁶<https://www.sozialministerium.at/Themen/Gesundheit/Gesundheitssystem/Gesundheitssystem-und-Qualitaetssicherung/Planung-und-spezielle-Versorgungsbereiche/Der-%C3%96sterreichische-Strukturplan-Gesundheit-%E2%80%93-%C3%96SG-2017.html>



2.2. Presentation of the concept of the Monitoring Grid

As mentioned in the introduction, one of the aims of the Monitoring Grid is to identify a deterioration in mental and physical health of elderly persons as quickly as possible. To ensure this, the residential area managers call the elderly once a week. The Monitoring Grid provides the basis for the telephone calls.

To be able to collect and evaluate the data effectively, a distinction is made between the following categories:

1. Personal data
2. Medical history
3. Clinical factors
4. Functional factors
5. Social factors

As you can see in the tables 3 - 5, the possible answers in the categories “clinical factors”, “functional factors” and “social factors”. are assigned to points. The more points the interviewee gains, the worse is the state of health. Points from 0 (healthy, no limitations, ...) until 100 (ill, great limitations, ...) can be reached per item. The tables also show that the different items are assigned to a different number of points. It is necessary to weight the points. Some item will have more impact on the health status than others.

For example:

Person XY says:

- Yes, she has a serious heart and respiratory disease -> 100 points
- Yes, she has diabetes, but only mild one -> 50 points

This means after answering these two questions, the person gets from the system 150 points.

In the following chapter the categories are described in more detail:



2.2.1. Category “Personal data”

The first category are the personal data. Here the personal data of both the interviewee and the interviewer are requested. These are shown in the table below:

1	Personal Data		Comments	Further help
1.1	Name of the interviewee	Name		enter once
1.2	Date since which the interviewee is using the monitoring grid	Date		enter once
1.3	Date of birth	Date		
1.4	Care level	Drop Down (1-7)		inquire every 6 months
1.5	Family doctor	Name		inquire every 6 months
1.6	Nursing Care at home	Name of the Organisation		inquire every 6 months
1.7	Exemption of the prescription fee	Yes/ No		inquire every 6 months
1.8	Living will available	Yes/ No		inquire every 6 months
1.9	Person of trust	Name, adress and telephone number		inquire every 6 months
1.10	Highest completed level of education	Drop Down		enter once
1.11	Last employment	Name		enter once
1.12	Interviewer	Name		
1.13	Interview date	Date		
1.14	Duration of the call	Time in minutes		
1.15	Personal Assessment of the call	list of possible choices	Type of communication, Voice range, Participant can follow the conversation, ...	
2	Medical history		Comments	
2.1	Last visit of the hospital before participation of the MG	Date	Reason	enter once
2.2	Last fall	Date		enter once

Table 1: Personal data



Some of the above items are self-explanatory, others will be briefly described in the following passage:

- **1.1 Name of the interviewee:** The name is only mentioned in the context of data collection. Evaluations that may be published are created anonymously. The name of the interviewee only needs to be entered once (this is also true for “**1.2 Date since which the interviewee is using the Monitoring Grid**”, “**1.9 Highest completed level of education**”, “**1.10 Last employment**”). This is data, that does not change.
- **1.3 Care level:** In Austria, the need for care is measured by the care level. This is why this is important for us.
- **1.6 Exemption of the prescription fee:** This is an indicator of income. In Austria, people get a prescription under certain conditions. One of these requirements is low income.
- **1.8 Person of trust:** This information is important if something happens during the phone call. In an emergency case the residential area manager has in addition to the “**1.4 Family doctor**” contact and the “**1.5 Nursing Care at home**” contact also the contact dates of the person of trust.
- **1.11 to 1.13** provide some information about the interviewer, the interview date and the duration of the call.
- **1.14 Personal Assessment of the call:** This item includes a list of possible choices to also describe the telephone conversation in a narrative way.

2.2.2. Category “Medical history”

The following table shows the requested data in the category “medical history”:

2	Medical history		Comments	
2.1	Last visit of the hospital before participation of the MG	Date	Reason	enter once
2.2	Last fall	Date		enter once

Table 2: Medical history

These two indicators “**2.1 Last visit of the hospital before participation**” and “**2.2 Last fall**” are important for assessing the participant’s state of health.



2.2.3. Category “Clinical factors”

3	Clinical factors	Yes, serious	Yes, mild	No	Don't know/ Not relevant	Comments
3.1	Heart and respiratory disease	100	50	0	0	Type of disease
3.2	Chronic disease, e.g. Diabetes, Hypertension	100	50	0	0	Type of disease
3.3	Mental Diseases, e.g. Depression	100	50	0	0	Type of disease
3.4	Diseases with frequent visits of the hospital	100	50	0	0	Type of disease
3.5	Further diseases (Does this disease result in serious suffering for you? Yes -> Yes, serious (100) No -> Yes, mild (50))	100	50	0	0	Which?
3.6	Medication (With more than 4 drugs -> Yes, serious With less or equal 4 drugs -> Yes, mild (50))	100	50	0	0	Which?
3.7	Chronic pain	100	50	0	0	Localisation
3.8	Skin changes	50		0		
3.9	Wounds	75	50	0	0	
3.10	Were you in the hospital last week?	100	50	0	0	Reason
3.11	Were you at the family doctor last week?	100	50	0	0	Reason
3.12	Do you regularly measure your blood pressure? (only if the person has indicated that he/ she has high/ low blood pressure)	0		10	0	Values/ Results
3.13	Do you regularly measure your blood sugar? (only if the person has indicated that he/ she has diabetes)	0		10	0	Values/ Results
	Maximum sum	1045				

Table 3: Clinical factors



The answer options are “Yes, serious”, “Yes, mild”, “No”, “Don’t know, not relevant”. Depending on which answer is given the respondents gain more or less points. In addition, there is a field available in which the residential area manager can fill in some comments.

The clinical factors ask about the physical state of health from the elderly (table 3). The older person is specifically asked whether he or she suffers from the following disease and also how serious the disease is:

- 3.1 Heart and respiratory diseases
- 3.2 Chronic diseases
- 3.3 Mental diseases
- 3.4 Diseases with frequent visits of the hospital
- 3.5 Further diseases: In order to be able to differentiate between “Yes, serious” and “Yes, mild”, the following question will be asked: Does this disease result in serious suffering for you? If this question is answered with yes, the disease is a serious one and the asked person gets 100 points. If it is answered with, the disease is a mild one and the asked person gets 50 points.
- 3.6 Medication: If the asked person is taking more than 4 drugs, the answer option “Yes, serious” should be selected. The person gets 100 points. If the person is taking less or equal 4 drugs, the answer option “Yes, mild” should be selected. The person gets 50 points.
- 3.7 Chronic pain: If the interviewee suffers from severe pain, the person gets 100 points. Otherwise she/ he gets 50 or 0 points.
- 3.8 Skin changes: If the interviewee perceives skin changes, she/ he gets 50 points, otherwise 0 points.
- 3.9 Wounds: If the person questioned has severe wounds, she/ he gets 75 points, otherwise 50 or 0 points.
- 3.10 Were you in the hospital last week?: When the respondent has been in the hospital for a serious problem, the person gets 100 points. If the respondent has been in the hospital for a check-up or something like this, she/ he gets 50 points. If the respondent has not been in the hospital, she/ he gets 0 points.
- 3.11 Where you at the family doctor last week?: See 3.10
- 3.12 Do you regularly measure your blood pressure?: This question has only to be answered, if the interviewee stated in the question 3.2 Chronic disease, that she suffers from high/ low blood pressure. If she/ he regularly measures her/ his blood pressure, the person gets 0 points. If she/ he does not, 10 points are awarded.
- 3.13 Do you regularly measure you blood sugar?: This question has only to be answered, if the interviewee stated in the question 3.2 Chronic disease, that she suffers from diabets. If she/ he regularly measures her/ his blood sugar, the person gets 0 points. If she/ he does not, 10 points are awarded.



2.2.4. Category “Functional factors”

4	Functional factors	Yes	Rather yes	Rather no	No	Don't know/ Not relevant	Comments
4.1	Do you feel well?	0	10	50	75	0	
4.2	Do you sleep well?	0	10	50	75	0	
4.3	Did you go for a walk this week?	0			80	0	
4.4	Did you fall last week?	80			0	0	
4.5	Have you lost weight?	80			0	0	
4.6	Do you have fever?	100			0	0	
4.7	Do you have problems putting on and/ or taking off your clothes?	75	50	10	0	0	
4.8	Do you need help washing yourself?	75	50	20	0	0	
4.9	Do you have respiratory problems?	100	60	40	0	0	
4.10	Has your sense of taste or smell changed?	80	40	20	0	0	
4.11	Do you make use of occupational or physiotherapy?	20			0	0	
	Maximum sum	760					

Table 4: Functional factors



The answer options are “Yes”, “Rather yes”, “Rather no”, “No” and “Don’t know, not relevant”. Depending on which answer is given the respondents get more or less points. The exact point distribution of points can be found in table 4. In addition, there is a field available in which the residential area manager can fill in some comments.

The functional factors are based on the 12 activities of daily living (ADLs):

- 4.1 Do you feel well?
- 4.2 Do you sleep well?
- 4.3 Did you go for a walk last week?
- 4.4 Did you fall last week?
- 4.5 Have you lost weight?
- 4.6 Do you have fever?
- 4.7 Do you have problems putting on and/ or taking off your clothes?
- 4.8 Do you need help washing yourself?
- 4.9 Do you have respiratory problems?
- 4.10 Has your sense of taste or smell changed?
- 4.11 Do you make use of occupational or physiotherapy?



2.2.5. Category “Social factors”

Since social isolation was identified in the needs assessment¹, which was worked out in WP 1, as a major potential threat to health status, special attention should be given to this issue.

5	Social factors (Social Isolation)	Yes	No	Don't know/ Not relevant	Comments
5.1	Do you live alone?	50	0	0	
5.2	Do you get support from family, neighbours or friends?	0	50	0	
5.3	Do you make use of food delivering or purchasing guide?	0	50	0	
5.4	Do you make regular use of home care?	0	50	0	
5.5	Do you go to the day care center regularly?	0	50	0	
5.6	Do you make regular use of home visits from doctors?	0	50	0	
5.7	Do you get help with cleaning work?	0	50	0	
	Maximum sum	350			

Table 5: Category "Social factors"

The answer options are “Yes”, “No” and “Don’t know, not relevant”. Depending on which answer is given the respondents get more or less points. In addition, there is a field available in which the residential area manager can fill in some comments.

The social factors are important to counteract possible social isolation and must be seen in this context. This means: If an item contributes to social isolation, 50 points are given. A detailed explanation can be found with the respective item.



- 5.1 Do you live alone? When a person lives alone, there is a risk of becoming socially isolated. If this question is answered with “yes”, the person receives 50 points.
- 5.2 Do you get support from family, neighbours or friends? If a person does not receive support from family, neighbours or friends, there is a risk of becoming socially isolated. If this question is answered with “no”, the person receives 50 points.
- 5.3 Do you make use of food delivering or purchasing guide?
- 5.4 Do you make regular use of home care?
- 5.5 Do you go to the day care center regularly?
- 5.6 Do you make regular use of home visits from doctors?
- 5.7 Do you get help with cleaning work?

Delivering of food or purchasing guide, regular use of home care, regular visit of a day care center, home visits from doctors, or help with cleaning work are also some kind of social contact. If this social contact is given the risk of becoming socially isolated is lower. So if these questions are answered with “no”, the person receives 50 points.

2.2.6. Combinations

Possible combinations			
Consecutive number	Name	Draft number	Possible answers
1	Fall	4.4	80
	Chronic diseases	3.2	100
	Hospital	3.10	100
2	Chronic pain	3.5	100
	Feeling bad	4.1	75
	No support	5.2	75
3	Depression	3.3	100
	Living alone	5.1	50
	No support	5.2	75
4	Medication	3.9	100
	Depression	3.3	100
	Chronic diseases	3.2	100
5	Chronic diseases	3.2	100
	No support	5.2	75
6	Diabetes	3.2	100
	Wounds	3.7	75
7	Visiting family doctor last week	3.11	100
	Fever	4.6	100
	Diabetes	3.2	100
	Chronic wounds	3.7	75
8	Chronic diseases	3.2	100
	No visit to the hospital	3.10	0
9	Chronic diseases	3.2	100
	Wounds	3.7	75
	Fever	4.6	100

Table 6: Possible combinations

These possible combinations were worked out together with our residential area managers and should be observed separately. If one or more of these combinations occur, the system should inform the residential area manager, who then decide whether steps need to be taken.



2.2.7. Presentation of results

In order to be able to observe the state of health over time, it was decided to display it in a line diagram. Examples of what this might look are shown in Figure 1 and 2.

Each category shall be mapped separately in a line diagram (Figure 1 - Example for clinical factors), but also a line diagram should be worked out, where all results can be seen summarized (Figure 2 - Example for a line diagram, where all categories are summarized).

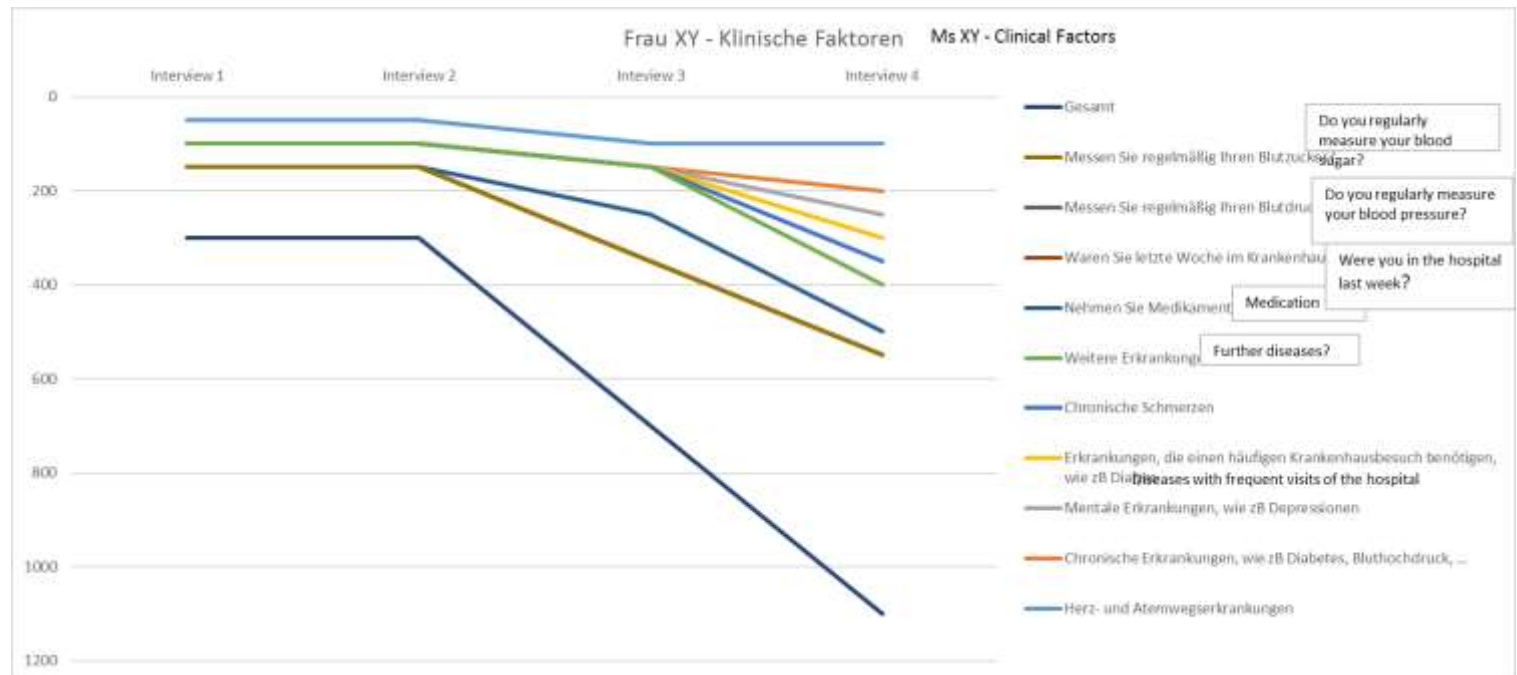


Figure 1: Presentation of the results (Clinical factors)

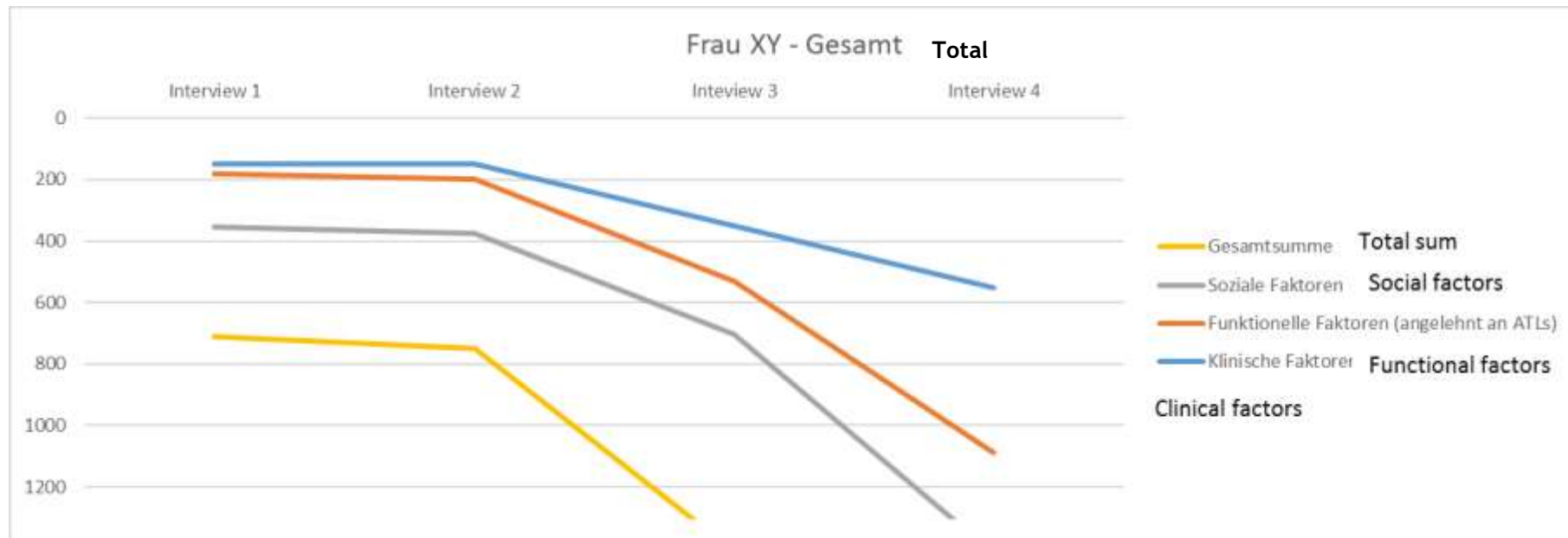


Figure 2: Presentation of the result (Total)

2.2.8. Home emergency call

The monitoring grid shall be extended by the home emergency call.

In the course of working out the needs of the elderly, it turned out that the residents not only want to be called, but also want to be able to call the nursing people themselves. To make this possible, the home emergency call already in use will be extended by this function. The yellow button, shown in Figure 1, shall then connect the user of the home emergency call to the responsible person of the Samariterbund. This button is therefore marked as a “service button” for the participants

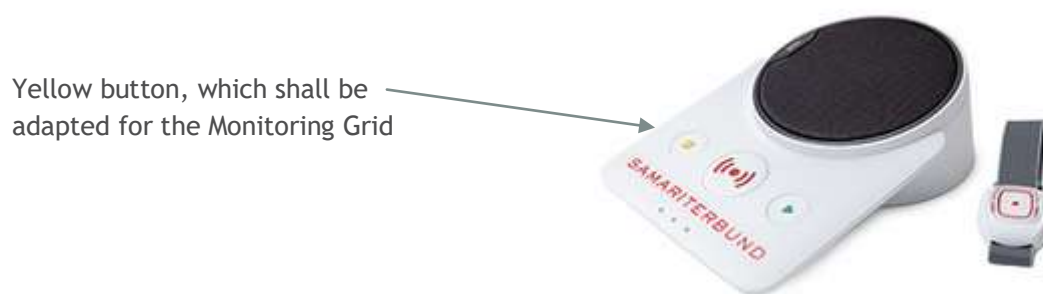


Figure 3: Home emergency call of the Samariterbund Burgenland

Anyone who wants to have a home emergency call can order it from the Samariterbund Burgenland. There is a one-time connection fee of € 49.90 and a monthly fee of € 22.90 (for fixed network) or € 34.90 (for Samaritan Federation GSM SIM Card). In Burgenland, there are currently 198 people living at home and 4 people living in assisted living homes, who take advantage of the home emergency call (as at June 10th 2020).

The home emergency call helps people in crisis situations in the following steps:

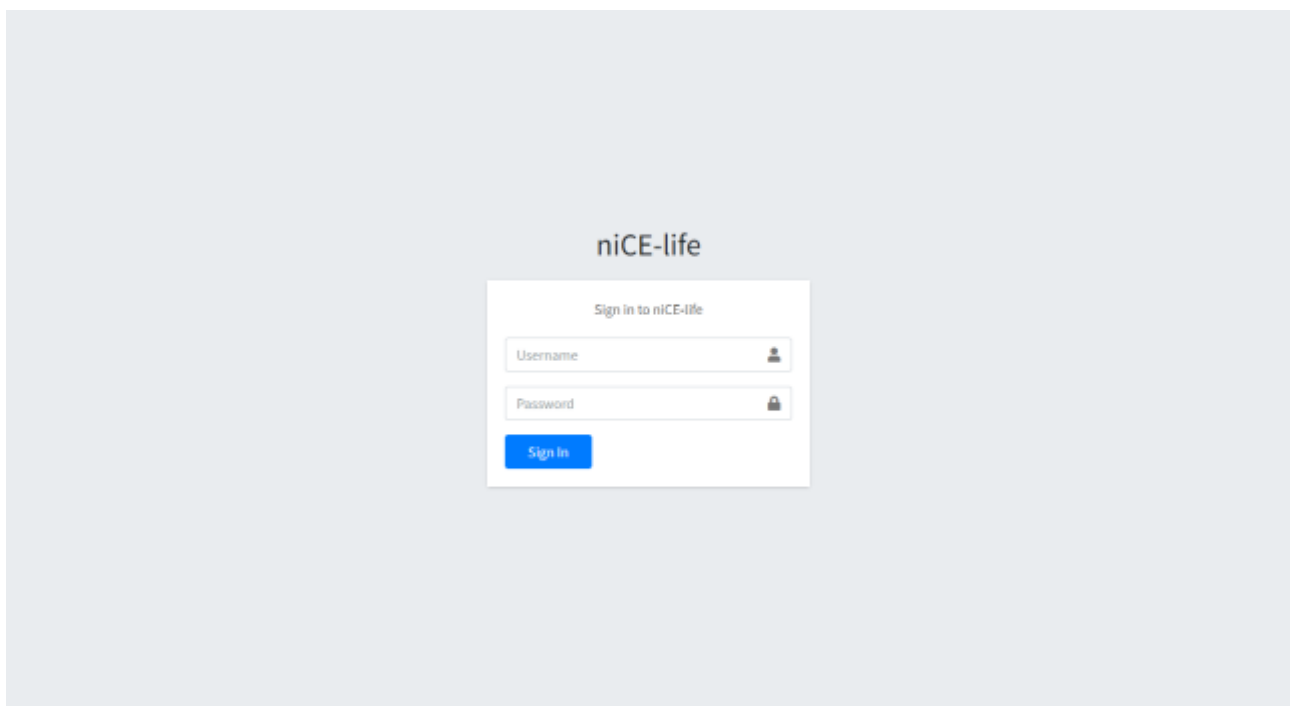
1. A **transmitter**, worn on the wrist or around the neck, is connected to the control centre of the Samariterbund
2. In an emergency, the person who needs help presses the transmitter and thus **triggers an alarm** in the rescue centre of the Samariterbund. This is manned 7 days a week, 24 hours a day and is therefore always available.
3. The integrated hands-free facility of the base station can be used to **communicate** with the headquarters. The data of the calling person is immediately transmitted to the rescue centre and the situation will be evaluated. The rescue workers notify the contact persons specified and, if necessary, immediately take the appropriate measures.
4. Depending on the respective accident or emergency situation, all **appropriate measures will be taken**. Ambulances are ready 24 hours a day.

The device is checked daily and regularly maintained and monitored. The battery lasts for 120 hours in the event of a power failure.

3. Technical development

Technical realization of the proposed solution is based on JAVA platform where so-called thin client is being used. Spring Framework is a Java platform that provides comprehensive infrastructure support for developing Java applications. The ORM module provides integration layers for object-relational mapping APIs, including Hibernate, which was used in our case. The Web layer consists of the Spring-MVC framework and is based on Model-View-Controller framework. The application is secured over set of protocols, so the data are protected.

The resulting application consist of several main components. One of them is a login form. This page serves for secure authentication and authorization of the user. For this purpose a username and password must be provided.



The screenshot shows a web browser window with a light gray background. At the top center, the text "niCE-life" is displayed. Below it, a white rectangular box contains the login form. Inside the box, the text "Sign in to niCE-life" is centered. There are two input fields: "Username" and "Password". The "Username" field has a small user icon to its right, and the "Password" field has a small lock icon to its right. Below the input fields is a blue button with the text "Sign in" in white.

Figure 4: Login Form



In case of successful login, user can see list of persons who are monitored by the system. In case the number of monitored people will grow in future, there is a search option which can immediately locate person.

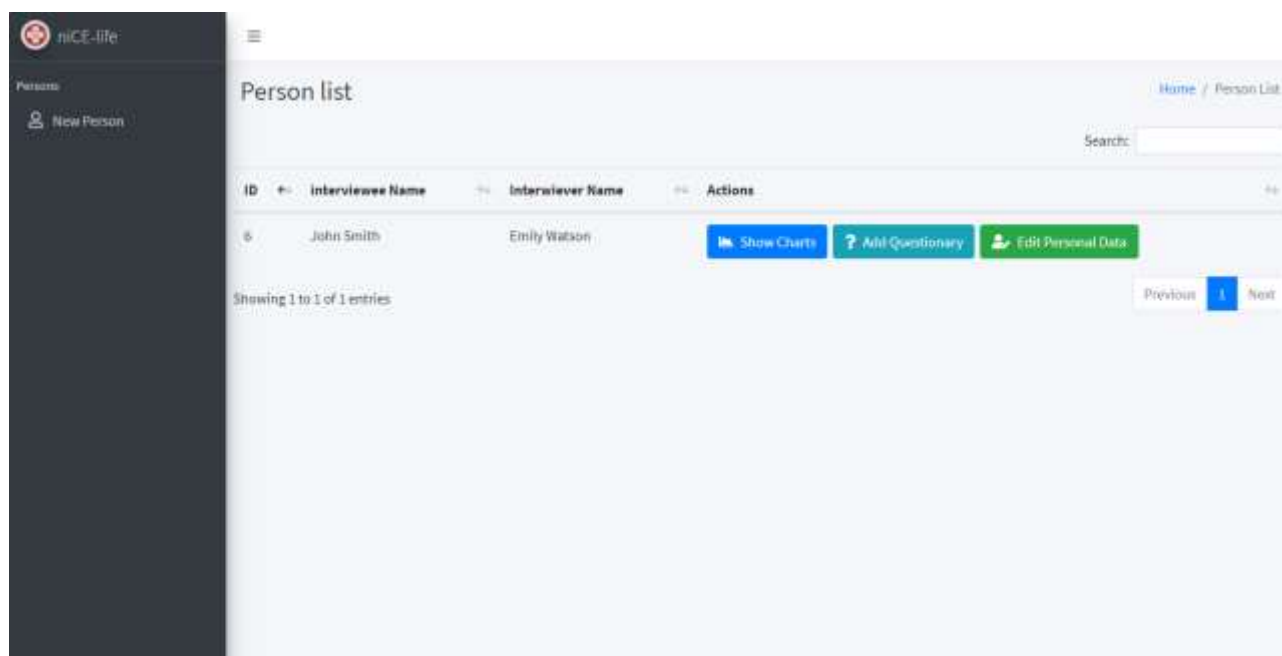


Figure 5: Person list

Any person, which is in database, can be easily updated using the button “Edit personal data”.

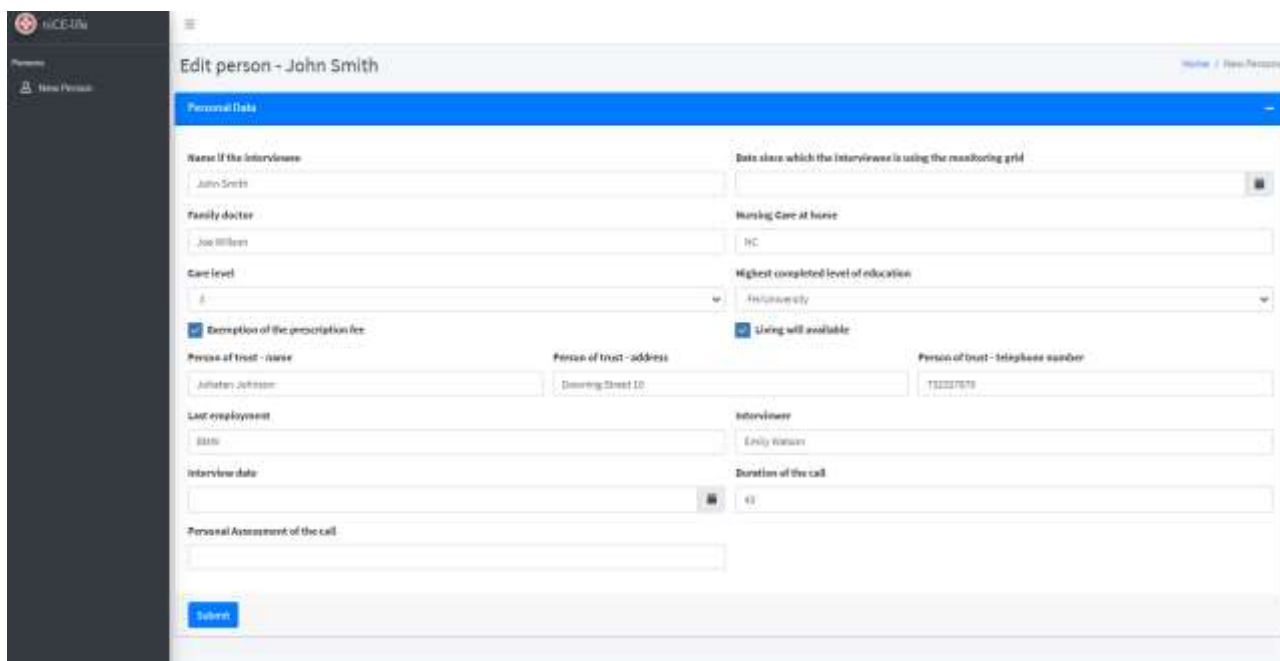
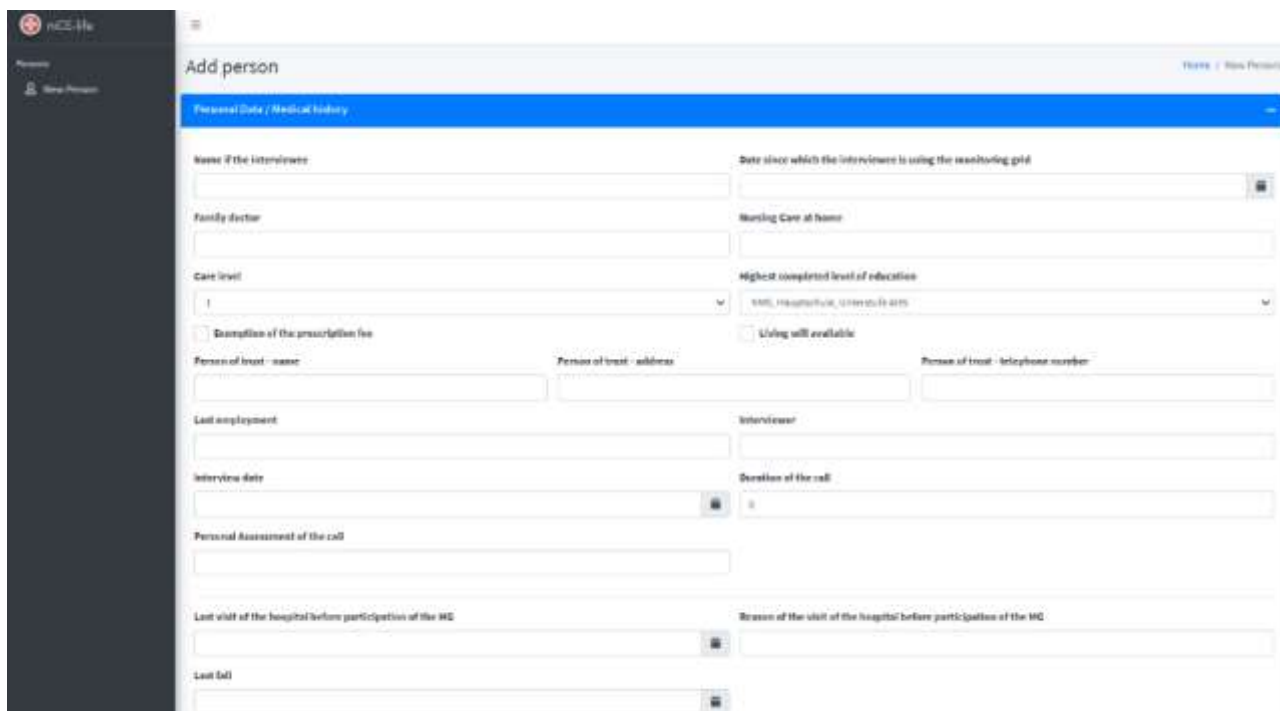


Figure 6: Edit existing person



Another possibility is to create a new record, which is depicted in the figure below. There are several records, that will serve in future for further reference.

To each monitored person can be regularly added result of a questionnaires, which are then securely stored to database and evaluated to assess current state.



The screenshot shows the 'Add person' form in the niCE-life system. The form is titled 'Add person' and has a blue header bar with 'Personal Data / Medical history'. It contains various input fields for personal and medical information.

Fields include:

- Name of the interviewee
- Date since which the interviewee is using the monitoring grid
- Family doctor
- Nursing Care at home
- Care level (dropdown menu)
- Highest completed level of education (dropdown menu)
- Description of the prescription fee
- Living with available
- Person of trust - name
- Person of trust - address
- Person of trust - telephone number
- Last employment
- Interviewer
- Interview date
- Duration of the call
- Personal Assessment of the call
- Last visit of the hospital before participation of the HQ
- Reason of the visit of the hospital before participation of the HQ
- Last call

Figure 7: Add new person - personal data form

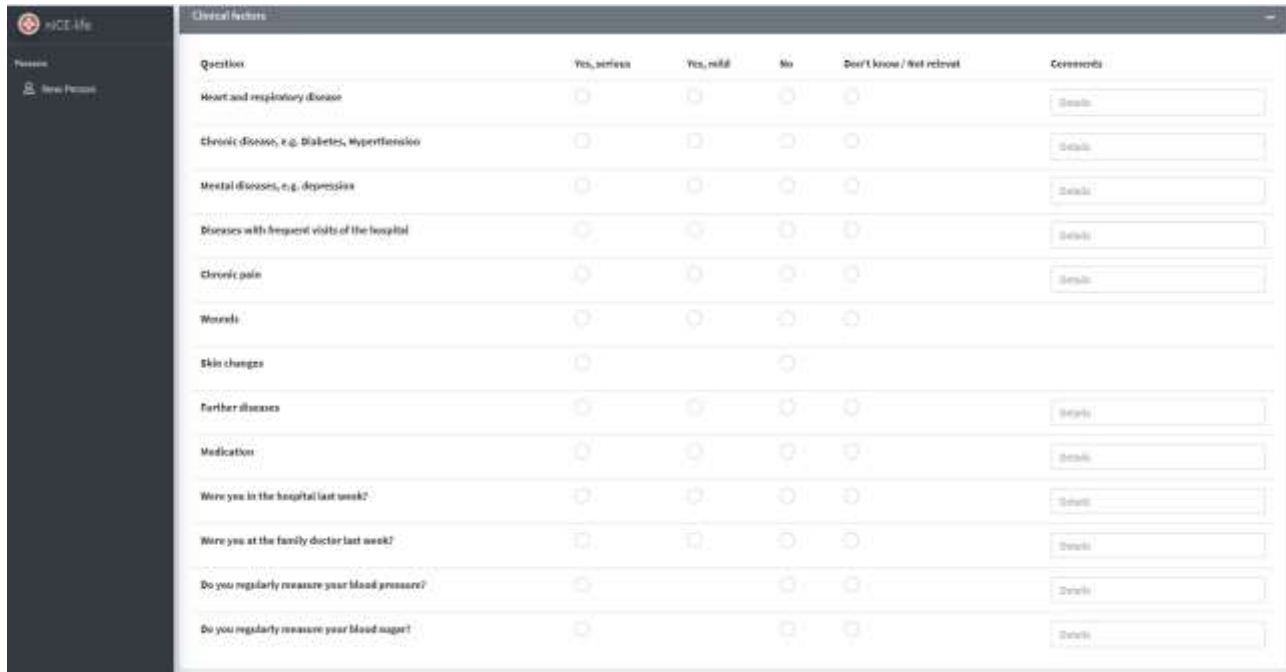


When a new record is available it depicted in another web page:

The screenshot shows a web application interface for adding a new person. On the left is a dark sidebar with the 'niCE-life' logo and a 'Persons' menu containing a 'New Person' option. The main content area is titled 'Add person' and includes a breadcrumb 'Home / New Persons'. Below the title are four expandable sections: 'Personal Data / Medical History' (highlighted in blue), 'Clinical factors', 'Functional factors', and 'Social factors'. Each section has a plus icon on the right. At the bottom left of the form is a blue 'Submit' button.

Figure 8: Add new person - new person and first interview

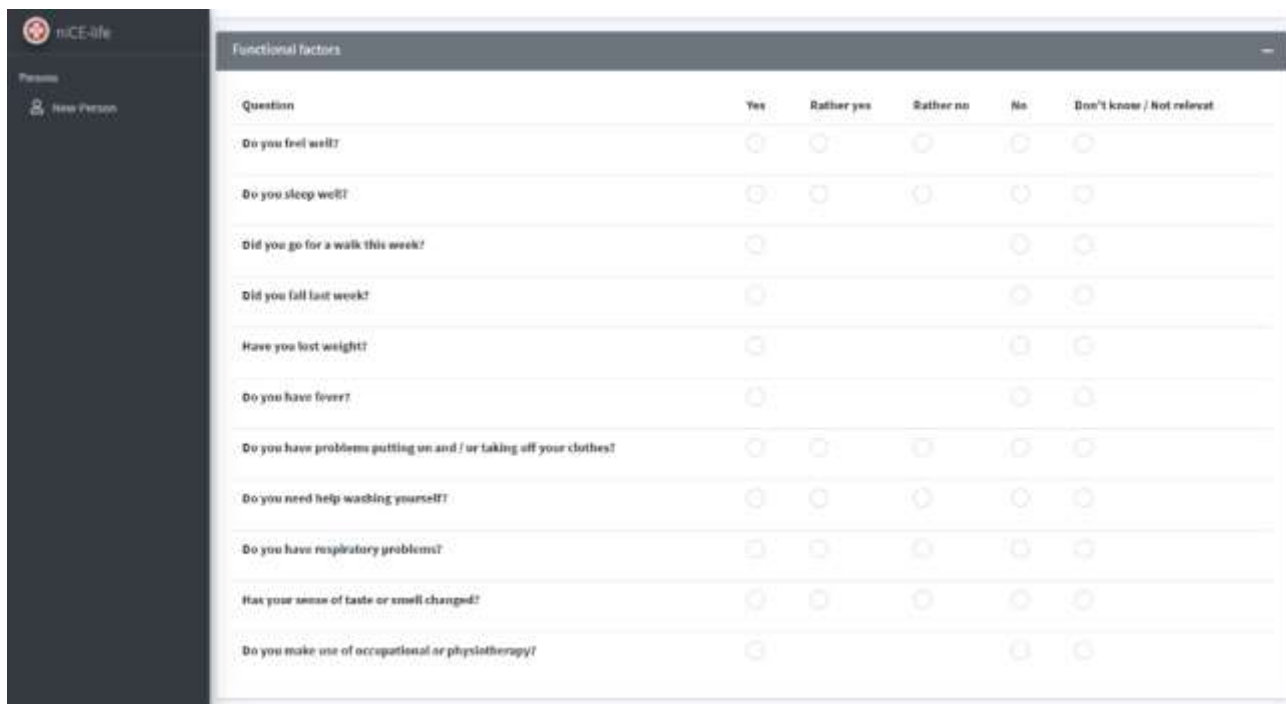
There are available several types of interview forms, which are depicted bellow:



The screenshot shows the 'Clinical factors' interview form. It features a sidebar on the left with the 'niCE-life' logo and a 'New Person' button. The main area is a table with the following columns: 'Question', 'Yes, serious', 'Yes, mild', 'No', 'Don't know / Not relevant', and 'Comments'. The table contains 14 rows of questions related to clinical factors, each with radio button options for the first four columns and a text input field for the 'Comments' column.

Question	Yes, serious	Yes, mild	No	Don't know / Not relevant	Comments
Heart and respiratory disease	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Chronic disease, e.g. Diabetes, Hypertension	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Mental diseases, e.g. depression	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Diseases with frequent visits of the hospital	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Chronic pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Wounds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Skin changes	<input type="radio"/>		<input type="radio"/>		
Earlier diseases	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Medication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Were you in the hospital last week?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Were you at the family doctor last week?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Do you regularly measure your blood pressure?	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Do you regularly measure your blood sugar?	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="text"/>

Figure 9: Clinical factors - interview form




The screenshot shows the 'Functional factors' interview form. It features a sidebar on the left with the 'niCE-life' logo and a 'New Person' button. The main area is a table with the following columns: 'Question', 'Yes', 'Rather yes', 'Rather no', 'No', and 'Don't know / Not relevant'. The table contains 11 rows of questions related to functional factors, each with radio button options for the first five columns and a text input field for the 'Don't know / Not relevant' column.

Question	Yes	Rather yes	Rather no	No	Don't know / Not relevant
Do you feel well?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Do you sleep well?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Did you go for a walk this week?	<input type="radio"/>			<input type="radio"/>	<input type="text"/>
Did you fall last week?	<input type="radio"/>			<input type="radio"/>	<input type="text"/>
Have you lost weight?	<input type="radio"/>			<input type="radio"/>	<input type="text"/>
Do you have fever?	<input type="radio"/>			<input type="radio"/>	<input type="text"/>
Do you have problems putting on and / or taking off your clothes?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Do you need help washing yourself?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Do you have respiratory problems?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Has your sense of taste or smell changed?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Do you make use of occupational or physiotherapy?	<input type="radio"/>			<input type="radio"/>	<input type="text"/>

Figure 10: Functional factors - interview form



 niCE-life
 Home
 New Person

Do you have problems putting on and / or taking off your clothes?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you need help washing yourself?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you have respiratory problems?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Has your sense of taste or smell changed?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you make use of occupational or physiotherapy?	<input type="radio"/>			<input type="radio"/>

Social Factors

Question	Yes	No	Don't know / Not relevant
Do you live alone?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you get support from family, neighbours or friends?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you make use of food delivering or purchasing guide?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you make regular use of home care?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you go to the day care center regularly?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you make regular use of home visits from doctors?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you get help with cleaning work?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 11: Social factors - interview form



Results of the interview is evaluated and visualized using three types of charts:



Figure 12: Charts - overview



Figure 13: Charts 1 - line diagram

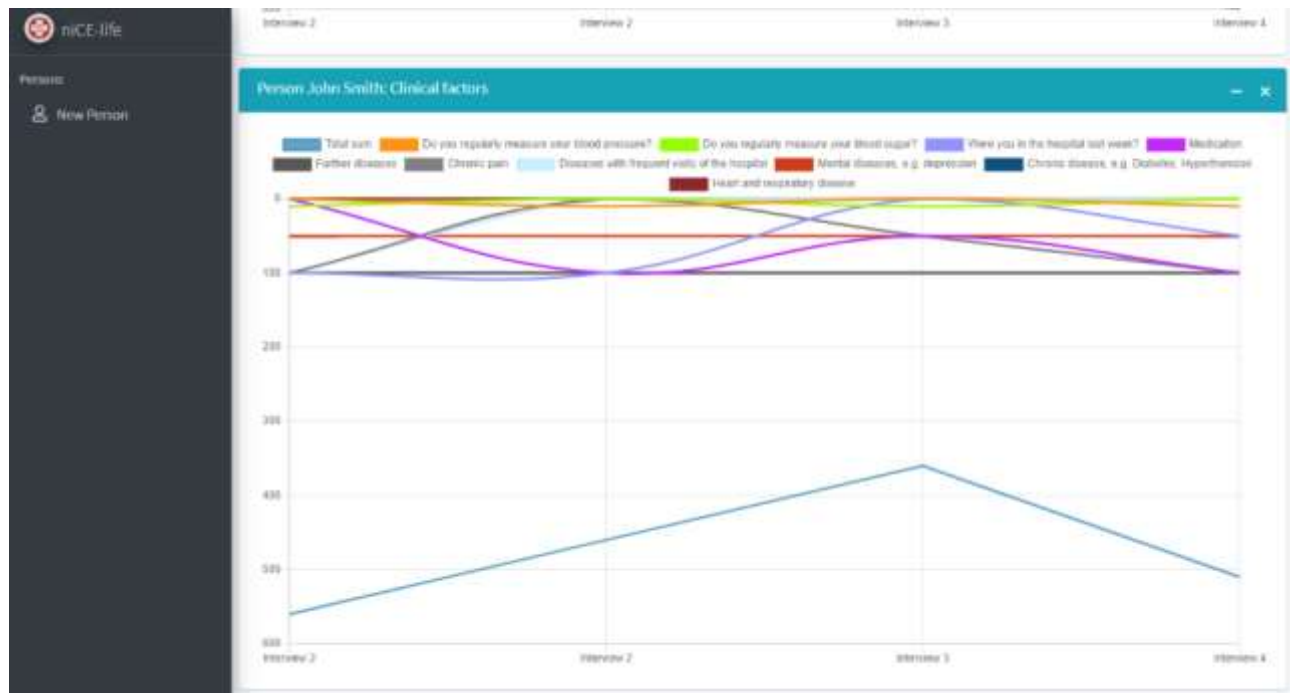


Figure 14: Charts 2

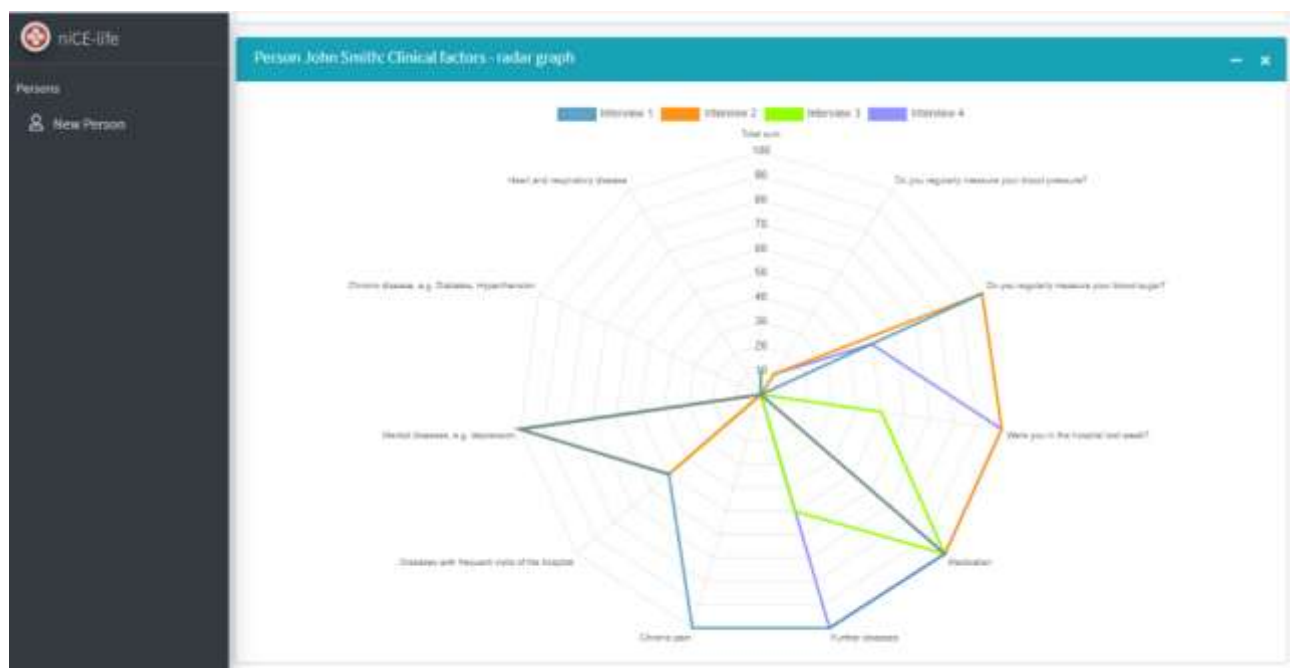


Figure 15: Charts 3 - Spider diagram

4. Conclusion

This document summarizes the concept and the technical development of the Monitoring Grid. It consists of 3 chapters, i.e. introduction, overview of the Monitoring Grid and technical development.

In the **introduction**, demographic change and the problems associated with were discussed. Because of these problems, it is necessary to develop new technologies that enable older people to live an independent life at home for as long as possible.

One of these new technologies is the Monitoring Grid presented in Chapter 2 “**Overview**”. In the overview, the concept, which was developed based on the eCare network of Bologna, Austrian legislation, other EU good practices and the needs of the elderly and presents the basis for the monitoring grid, has been described. After that the individual categories and the possible combinations were presented. If these combinations occur, then the carers should be informed by the system. Last but not least the home emergency call has been described.

Technical development was implemented using platform independent technology based on JAVA platform and frameworks like Spring, Spring MVC. The resulting application runs as a web service and provides an interface for secure tracking health status of monitored subjects.

After evaluation of the Monitoring Grid by different stakeholders in November 2020, the web application should be ready for testing in January 2021.

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