



Personalised Health Monitoring and Decision Support Based
on Artificial Intelligence and Holistic Health Records

D5.9 – Social Analytics for the study of societal factors and policy making II

WP5 AI for Early Risk Assessment and Personalised
Recommendation

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Executive summary

Since the importance of public opinion on social media platforms has become prominent in recent years and particularly in the COVID19 pandemic, it has been realised that policy making could be more successful when the policy makers benefit from integrating this publicly available, user-generated data through the technique of social media analytics.

Administrations around the world are engaging in initiatives to determine policies based on foresight and forward-looking approaches due to the growing impact of relevant factors from unexplored territories such as social media. As the number of social media platforms and their users grows exponentially the need to address the public sentiment towards any intervention becomes significant. It also adds value to the process of creating a new policy or improving on any existing policy as the information from social media would provide a first-hand account of the public perception about the intervention. As building a policy is a complex process with so many relevant factors intertwined and affecting different aspects of the intervention, the policy makers may welcome new tools and techniques that gather and analyse real-time information based on public sentiments on social media.

The ever-growing popularity of social media has made people somewhat dependent and the public use these platforms to express their sentiments about everything impacting their lives. This generates enormous chunks of 'big data' everyday which makes it an asset to explore and analyse. Understanding this data presents opportunities for the policy makers to make informed policy decisions. The conclusions drawn from peoples' general discussions and opinions helps tapping into the collective wisdom of people, that may provide fruitful ideas to approach a problem.

The T5.4 – “Social Analytics for the Study of Societal Factors and Policy Making” in the iHelp project was conceived to create a Social Media Analyser tool based on the above-mentioned assumptions. This tool will help the policy makers gather and analyse streams of social media through multiple platforms and draw meaningful information that would help in creating a new policy or improve on the existing policies. The social media analyser tool will apply state of the art techniques i.e., Complex Event Processing (CEP), Sentiment Analysis (SA), Natural Language Processing (NLP) to the gathered datasets and present the results. The results of this information will be furnished on an intuitive dashboard integrated within the project to draw significant conclusions that will assist them to create policies regarding Pancreatic Cancer.

This deliverable is the second iteration of this series of deliverables and a continuation of the previous version, i.e., D5.8 – “Social Analytics for the study of societal factors and policy making I”, which provided an overview of the Social Media Analyser tool along with the technical requirements, user scenarios and the interface. It also provided multiple user interaction scenarios to provide a sensation of how this tool could serve the purpose and needs of the target users. The document discusses the evolution of this tool over the course of the project and how this task becomes relevant in combating Pancreatic cancer.

The objective of this deliverable is to present the development of the Social Media Analyser tool since its conceptualisation. Initially, this tool was conceived as a standalone component working in isolation and outside the main architecture of this project. However, as the task progressed, it was realised that the tool should be somewhat brought within the architecture of the project, also integrated with the different other components of the project, e.g., the Decision Support System (DSS) Suite.

1 Introduction

The unprecedented rise in the use of social media has made a great impact on the effectiveness of a policy. The opinions and views shared by the social media users are shaping an overall perception about any specific policy. These opinions and views are prone to be influenced by incorrect information and hoaxes and causes an outbreak of excessive information including false or misleading information in digital and physical environments known as an “Infodemic”¹. Therefore, it becomes imperative to study these societal factors to understand how a policy could be shaped that is effective and immune to the misinformation disseminated.

This deliverable is in continuation of the previous D5.8 – “Social Analytics for the study of societal factors and policy making I” where the importance of using societal data and social media analysis to identify lifestyle patterns that could help in developing or improving the policy making process. A social media analyser tool is being developed within the scope of the iHelp project to monitor social media streams from multiple platforms and identify societal patterns that would help in extracting meaningful data regarding Pancreatic cancer. The analysis of this data will be visualised in DSS dashboard to provide assistance in decision making.

According to a report from PewInternet published in 2012, “66 % of social media users have employed the platforms to post their thoughts about civic and political issues, react to others’ postings, press friends to act on issues and vote, follow candidates, ‘like’ and link to others’ content, and belong to groups formed on social networking sites”². A further publication from the same organisation in 2018 establishes that social networking sites have emerged as a key venue to engage in civic-related activities³. This emergence of social media platforms has somewhat forced all organisations and bodies (commercial, non-commercial, governmental bodies etc) to operate in the social networks to keep active and effective relationship with their customers.

With these vast possibilities for engagement, communication and collaboration, new opportunities for interaction, dissemination and opinion making arise and allows a policy maker to identify prospects for effective communication. This will allow to build a narrative about health care interventions around Pancreatic cancer and drive the general perception and introduce new activities based on the needs of common citizens identified by the study of these societal factors and lifestyle patterns.

This tool could also play an instrumental role in identifying false/fake information regarding a health care intervention regarding Pancreatic cancer. The impact of fake/false news concerning health pose a risk to global health. During a WHO health security conference in Munich in February 2020, it was discussed that the outbreak of COVID-19 resulted in a massive “Infodemic” (overabundance of information), some of which could have been intentional dissemination of misinformation or disinformation to create panic, terror and/or to get the personal benefits. This made it difficult for people to find reliable sources and trustworthy information when they needed it. While the tool may not verify the social media posts exclusively for authenticity, technologies like Social Media Analysis and Sentiment Network Analysis will provide an indication about the general perception about the specific topic of interest.

¹ https://www.who.int/health-topics/infodemic#tab=tab_1

² <https://www.pewresearch.org/internet/2012/06/06/main-report-15/>

³ <https://www.pewresearch.org/internet/2018/03/01/social-media-use-in-2018/>

During the first iHelp review meeting in M18, a working prototype of this tool was demonstrated, and the results were presented to highlight the effectiveness of this tool in the scope of iHelp. The prototype also demonstrated the overall functionality of this tool and provided an insight about the further developments planned to make it a formidable technology tool that could work beyond the scope of this project.

1.1 Objectives of Deliverable

Over the course of the project, the Social Media Analyser tool has been developed beyond its conceptual model. The development of this tool was achieved through the support of multiple workshops and discussions with partners who realised that this tool could add a lot more value to policy making process. It was further established that this tool has a potential to become one of the exploitable assets from the project and can be commercialised beyond the project.

The deliverable will further justify the need of this tool within the scope of iHelp. It would showcase how the task has developed by going beyond state-of-the-art to become a specialised Open-Source Intelligence (OSINT) gathering component.

1.2 Document Structure

This deliverable is comprised of the following sections:

- **Section 1** – The first section identifies the challenges in the policy making process and provides an overall introduction of this deliverable and focuses on the significance of the Social Media Analyser tool in combatting these challenges. It further explains the objectives of this deliverable and the relationship of this task with the other Work Packages in the project.
- **Section 2** – This section discusses the technologies used in development of this tool and how this task strives to go beyond the state-of-the-art technologies and describe the capabilities of this tool. It further presents a comparative analysis of this tool with the other tools in the market.
- **Section 3** – This section discusses the current functionalities which are being developed under the conceptualised idea as well as the new functionalities which have been proposed after research and discussions held with partner during brainstorming sessions and workshops.
- **Section 4** – This section shows the new and improved User Interface and User Experience after the first iteration of this tool.
- **Section 5** – Section 5 discusses the impact on the policy making process by the growing digitization. It further explores how this tool address the needs of a policy maker and what opportunities does it present to the policy makers to improve or create a new policy.
- **Section 6** – Although the T5.4 – “Social Analytics for the Study of Societal Factors and Policy Making” does not involve any of the pilots from the projects however, pilot partners may find value in the components developed in this task. In this section the pilot partners provide their comments about the Social Media Analyser and how it may impact their activities in the project.
- **Section 7** – This section outlines the expected outcomes from this task.
- **Section 8** – this section provides the conclusions drawn from the discussions in this deliverable.

1.3 Relation with other WPs

As explained in section 1.1 of this document the social analyser tool is a component that primarily works in isolation and does not have a significant relation with any other work packages in the project. However,

this task collaborates with the T4.3 – “DSS Suite with Visual Analytic Tools” where the DSS suite will be used to display the visual results. As the Social Media Analyser tool extracts data from the social media and store it in the HHR database, the component would be communicating with the T3.2 – “Primary Data Capture and Ingestion” to store the data.

The following architectural diagram explains the role of T5.4 and the Social Media Analyser tool in the WP5 – AI for Early Risk Assessment and Personalised Recommendation and how it relates to the rest of work package components.

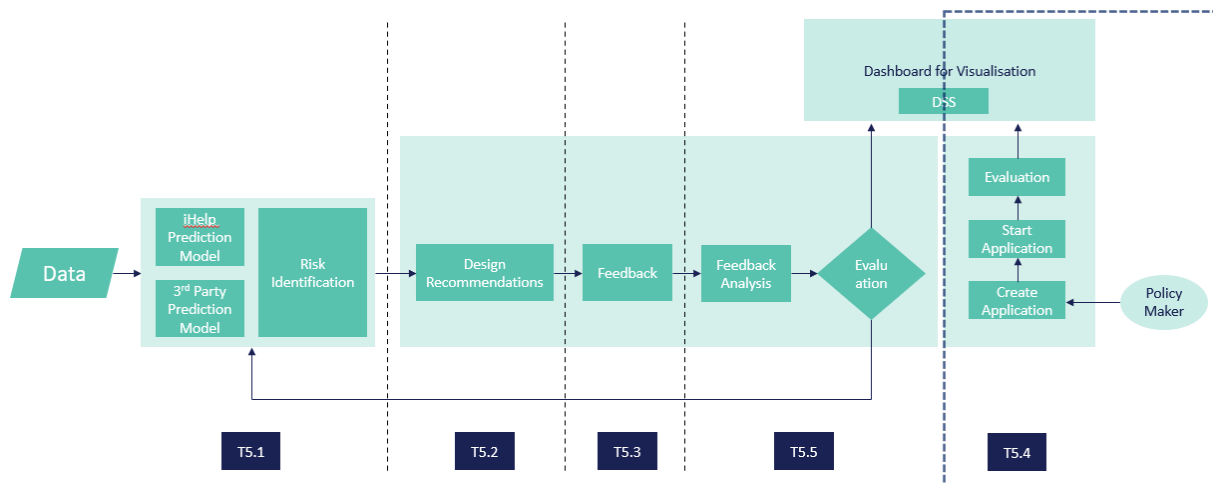


Figure 1: WP5 Architecture

Since the agreement on making the Social Media Analyser tool as part of the DSS, it was realised that the tool would not require a separate login instance and the user should be able to use the same login token to access the tool, which is used to login in ton the DSS.

To access the DSS, two roles i.e., Model Builder and Health Care Professionals (HCPs) have been defined in the system. As the Social Media Analyser tool becomes part of the DSS, the Model Builder will not be required to use this tool whereas HCPs may find it interesting to use and conclude some outcomes. Therefore, a new role i.e., Policy Maker will be created to access the Social Media Analyser while the HCP will be changed in to a rights-based role so that the willing users could have extended access to the tool.

1.4 Updates since D5.8

As this deliverable is the second version of D5.8 – “Social Analytics for the Study of Societal Factors and Policy Making I”, there a few changes that are being made to explain the development of this as the project progresses:

- Section 2 of this deliverable discusses the task taking into consideration the new concepts in social media studies and how the Social Media Analyser has evolved in its capacity to become a specialised tool to aid the policy maker
- Section 3 of this deliverable presents the functional upgrades in the Social Media Analyser tool during this time. This section in the D5.8 – “Social Analytics for the study of Societal Factors and Policy Making I”, discussed an overview of the tool along with the background, while in this respective deliverable it also introduces newly identified functionalities that are implemented in the context of the Social Media Analyser.

- Section 5 of this deliverable provides a perspective on the impact of digitalization in Policy Making and explains how the social media tool, strives to address the needs of a policy maker. It also outlines the opportunities in policy making using a social media tool.
- Section 6 is added to this deliverable where the pilot partners in the project have provided their input about how they would see value of a Social Media Analyser tool in health care policy making process.

2 Going Beyond State of the Art

The research conducted in the prospects of using social media data to conclude results is becoming more significant in the health care sector. A large percentage of internet users seek some health information online which may or may not be true. The increasing use of social media for expressing opinion and information about topics of interest has given rise to the concepts of Infodemiology – an area of science research focused on scanning the internet for user-contributed health-related content, with the ultimate goal of improving public health, and Infoveillance – is a type of syndromic surveillance that specifically utilizes information found online.

This large amount of publicly available information has shifted the world into a new digital information age and terms like Open-Source Intelligence (OSINT), that refers to this publicly available information have become significant. Due to the unprecedented rise in the use of social media platforms, organisations are relying heavily on OSINT to draw conclusions in different activities.

The developments in the Social Media Analyser tool and discussions with the partners allowed the T5.4 – “Social Analytics for the Study of Societal Factors and Policy Making” to go beyond the traditional methodology of extracting data from the social media platforms using the keyword search technique from archived posts from public databases. By using advance techniques to gather information from the social media platforms, this task relates to some aspects of Social Media Intelligence (SOCMINT) where the tool gathers crowd sourced information prevalent on the social media networking platforms.

As organisations around the world are making use of social media to promote their policies, campaigns and dissemination of information, several tools and techniques are being developed to measure the success and effectiveness of these interventions. The Social Media Analyser tool in iHelp has been developed to provide a holistic solution to measure the impact of a policy in the healthcare industry. Consultations and discussions with clinicians and policy making individuals led the task to have a focused approach in building the tool with specific functionalities to address the requirements of the policy makers. Due to the approach several new functionalities were conceived to make this Social Media Analyser a specialised tool for healthcare industry.

There are various social media products in the market with various capabilities, however as these tools are built to cater multiple industry sectors, they provide a generic set of functionalities to extract the data and draw analytics which would provide an overall picture of the impact of activities. These products employ a ‘Push Strategy’ function where the organisations could publish their content and monitor the impact through the provided metrics and analytical tools. While this would be an effective strategy but in order to achieve a conclusive overview with detailed analysis of specific healthcare intervention on social media, a bespoke solution catering multiple functionalities becomes crucial for the healthcare industry. The task T5.4 – Social Analytics for the Study of Societal Factors and Policy Making in iHelp strives to provide the required functionality within one environment to add maximum value for the policy makers.

An important factor that adds to the feature of the social media analyser tool that makes it effective in the policy making process is that the tool works on the “Pull Strategy” where the user can extract the required information from the social media streams without publishing any content. This empowers the user to get the sense of the organic public perception about the topic of interest before having any influence. The proactive approach will allow the policy maker to identify the users on a particular social media platform

who are sharing opinion about the health care intervention. These identified users can be defined as the ‘influencers’ within the context of iHelp. The Social Media Analyser tool allows to monitor these ‘influencers’ and gauge the impact of their social media posts. This means that based on the social interaction on their posts, these influencers can be further engaged to disseminate effective communication regarding a health care intervention or policy.

The holistic approach in the T5.4 – “Social Analytics for the Study of Societal Factors and Policy Making” presents a strong case for the Social Media Analyser tool to become a formidable tool in analysing social media streams to improve any existing or creating new policies in the health care industry.

3 Building further Capabilities of Social Media Analyser

The T5.4 – “Social Analytics for the Study of Societal Factors and Policy Making” runs until the end of the project, i.e., M36. This means that there is ample time and resources available to expand the capabilities of the Social Media Analyser tool. The research in the concepts of OSINT and SOCMINT has opened new opportunities to build further capabilities and exploit the Social Media Analyser tool as an asset in this project.

The extensive discussions among partners and HCPs along with the workshops held during the GA meetings resulted in realising the need of new functionality and intuitive dashboard that use more widgets and analytical tools to display deep insights to assist the policy makers.

As this social media tool was conceptualised to gather data within the limitations of iHelp therefore the purpose and functionality was designed around micro-blogging social media platforms, primarily to monitor text-based social media posts. The improvements in the design and functionality over the course of this project has also been done in context of Pancreatic Cancer, which limits the capability of this analyser tool to an extent. However, it has potential to build the functionality and scope to monitor other social media platforms that use imagery or pictorial posts.

3.1 Existing functionalities

The first version of the Social Media Analyser tool was designed based on some primary functionalities which enabled the tool to extract Open-Source Intelligence (OSINT) and generate alerts based on the defined functionality.

The Social Media Analyser tool allows the user to create multiple applications running simultaneously to scan different social media streams for specific topics of interest relating to Pancreatic Cancer. This allowed the policy maker to extract meaningful information on multiple topics and collate information from various applications by tapping into multiple social media platforms at any given time. The tool applies the CEP technique to analyse the post to identify keywords and generate the alerts. The overall functionality is then supported by the NLP and SA to measure the sentiment and subjectivity of a particular post.

The tool has been equipped to obtain data by monitoring the discussions on the social media platforms. Policy Maker can use the condition settings function in the system to funnel the incoming data and make them specific to topics of interest. During the first phase of development the focus remained on building the core capability of the tool to connect to the social media platforms and be able to monitor and harvest data from the online discussions. The policy maker could apply multi-layered conditioned based on the keywords uploaded in the application and the functionality allowed the system to identify the information and furnish the results.

A Graphical User Interface (GUI) has been designed to represent the results in the form of charts and graphs for better understanding. As the policy maker is more likely to be a non-technical individual, an intuitive graphical interface becomes imperative in drawing conclusions and actionable results. The first prototype of the Social Media Analyser tool has the GUI where the total number of alerts generated is displayed to provide an idea if there is enough buzz about the topic on social media. These social media posts are plotted on a scatterplot graph to give an overall picture of public sentiment about the topic. Furthermore, these outcomes can be used to draw charts to analyse the polarity and subjectivity of these posts to provide a

public opinion, the daily alert count, a breakdown of alerts/per day and a distributed pie chart highlighting the overall sentiment about the topic will provide the policy maker quantifiable decision support.

3.2 New functionalities

Based on the research and discussions during the development of this tool it was realised that Social Media Analyser would require some new functionalities to make it a robust and a strong tool to create an impact that would help the policy makers. As the tool strives to gather Social Media Intelligence (SOCMINT), it is important for it to possess the capability to penetrate further into the social media discussions to understand the societal factors that affect and influence a public perception about a health care policy.

To derive meaningful insights from the social media posts it is necessary to include new functionalities beyond the capabilities developed in the first version of the tool. The Social Media Analyser tool monitors the social media post and capture the details of the users, it provided an opportunity to build a function to follow a user who is recognised as an “influencer”. The “influencer” in the context of the iHelp project would be anyone who is creating an impact by attracting attention from other users on the social media platform.

Section 4.6 explains the interface with the list of potential “influencers” that have been identified across the applications running in the system. The influencers can further be approached and used in some capacity to disseminate awareness/information regarding any existing or new policies rolled out. These influencers can become effective intermediaries to advocate the policies or information about the healthcare intervention around Pancreatic Cancer. Within their social circle, they may hold much more influence than the traditional methodology of information dissemination.

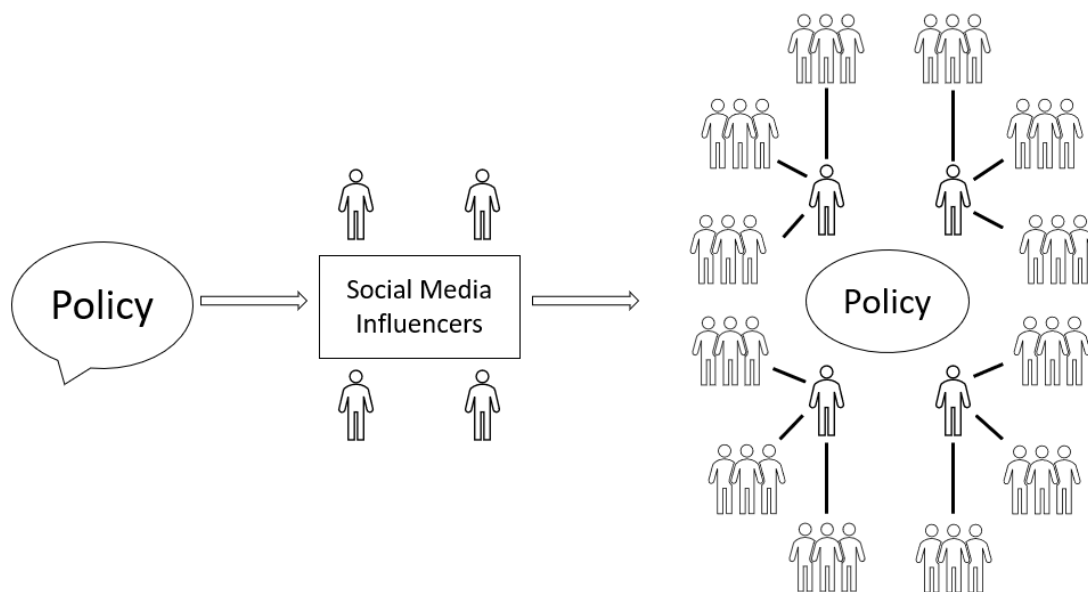


Figure 2: Dissemination of information using influencers

It is also crucial to understand the impact of a policy or healthcare intervention on regional level. It is highly likely that a certain policy may have a different impact in two regions. Factors including culture, religion, race, climate along with all others that form the social fabric of any specific region, may play an important role in building a public opinion. The Social Media Analyser tool will be upgraded with a heatmap

functionality which would be able to identify the geographically tagged social media posts relevant to the topic of interest.

A heat map will be added to the social media tool interface as explained in the section 4.1 to provide an overview of the impact of a certain policy or healthcare intervention in different regions. The policy maker will be able to create a tailored dissemination or awareness activity plan based on this map rather than a universal activity.

The dashboard will be equipped with new analytics widgets that would enhance the capacity of this tool to provide actionable insights. These insights will be helpful in drawing a conclusive picture based on the Social Media Intelligence (SOCMINT) collected through the applications running in the tool. Some of the analytics widgets will be, as listed below.

- Alert Count Weekly Breakdown
- Regional Breakdown
- Age Demographics
- Gender Breakdown
- Top Mention
- Keyword Cloud
- Impressions & Engagement Counter
- Date Filter
- Location Filter

The discussion around agreement on finalising the widgets to shape up a formidable dashboard will continue in the forthcoming meetings and workshops. The final interface of this tool will be presented in the next iteration of deliverable, on M36.

4 Improved UI/UX

In the first deliverable D5.8 the first iteration of the user interface and design was conceived. As the concept of employing social media analytics in iHelp is new, there were no initial guidelines for developing an interface and environment for such a tool. Therefore, the first mock ups were designed to highlight the functionalities of this tool. The approach was to design a separate interface for each functionality and hence the first user interface of the tool was created.

As the task progressed, several discussions were held among partners which changed the perception of the Social Media Analyser tool within the architecture of the project. Initially, the tool was being designed to work completely outside the project architecture and would have been presented as an add-on tool with a separate dashboard. As the importance and advantage of the tool was realised, it was decided that the tool will be part of the main architecture despite it having no real connections with the other work packages. The dashboard for this tool will be merged within the DSS dashboard so that the policy maker and clinicians will be able to use the tool without logging in to the tool separately. This resulted in scrapping the login functionality screen from the first iteration of the tool as the tool will be using the same token used by the user who logs in to the DSS.

Furthermore, the new mock ups were designed incorporating the existing and new functionalities conceived. The overall interface was adjusted to make it coherent with the rest of the components developed in the project. A detailed description of each interface screen is in the subsequent sections.

4.1 Applications List Screen

As the users log into the system, they will reach the Applications list screen. This screen presents an overview of the existing applications created in the system with a list of options to examine the applications and perform several actions to achieve the desirable results. The user can navigate into a specific application detail or go to the rules screen to edit or review the rules defined for the application with an ability to start or stop a particular application.

It further provides a summary of the total alerts generated by the applications with analytical displays to provide an overall picture of results extracted by the tool.

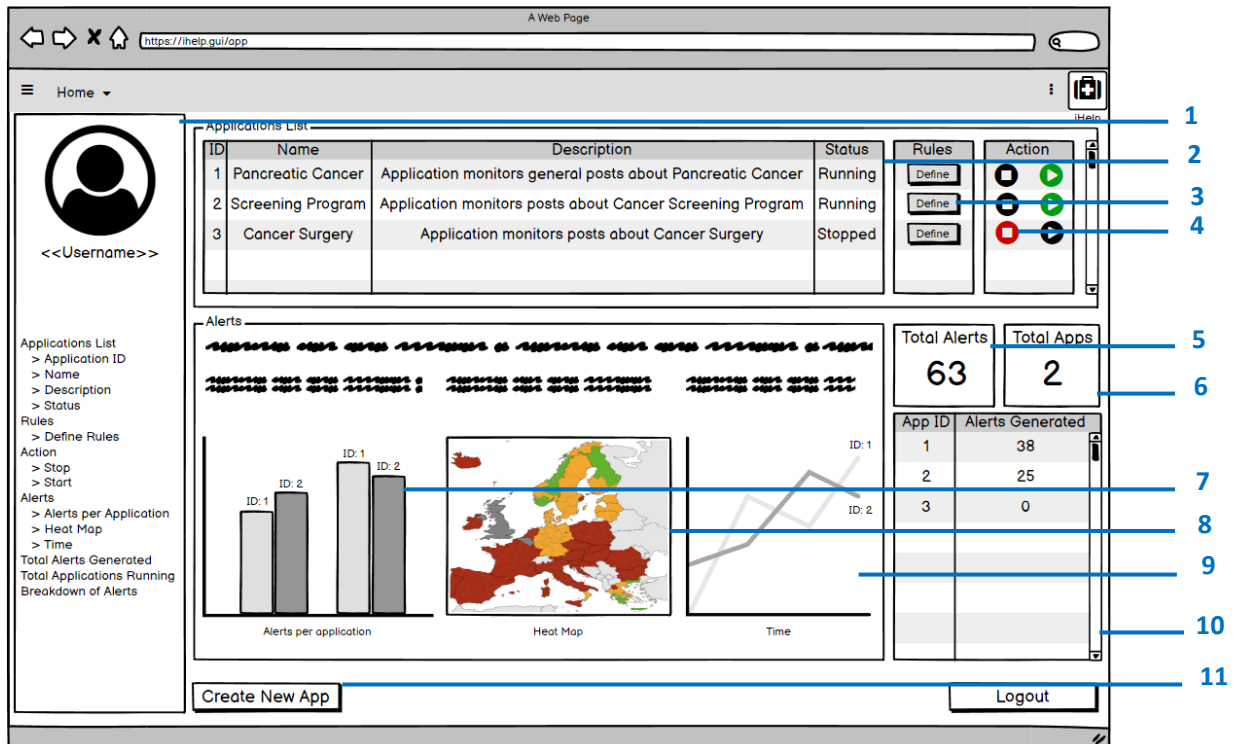
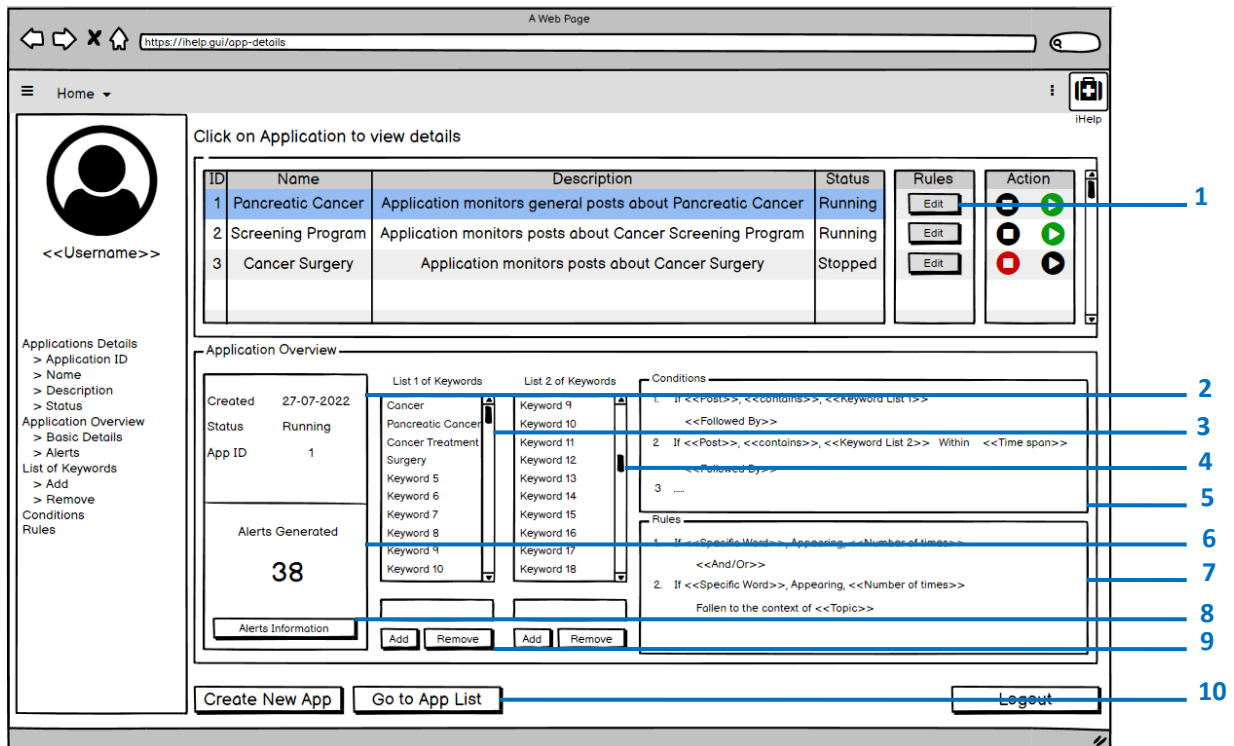


Figure 3: Applications List

1. Panel showing the profile of the user and summarising the functionalities available in this interface
2. Summary of existing applications in the system with the name, description, and status of each application
3. Control button to define the rules and conditions for the application. User will reach the 'Edit Rules' screen in the tool which is described in section 4.4
4. Quick action button to stop or start an application
5. Number of alerts generated by all applications in the system
6. Number of active applications at any given time
7. Bar chart representing the alerts generated by the active applications
8. Heat Map to show the frequency of alerts generated in different regions
9. Line chart representing the number of alerts generated over time
10. Breakdown of the number of alerts generated by each application
11. Control button to take user to 'Create Application' screen explained in the section 4.3

4.2 Application Details

This section of the tool presents an overview of a selected application. The action is triggered by simply selecting any application from the summary table. The lower half of the screen shows the basic details of this application with the number of alerts generated by the application. It further shows the two lists of keywords which are used to scan the social media platform posts with the option of adding or removing keywords while the application is running. Also, the section provides an overview of the conditions and rules defined in this application to generate alerts.



The screenshot displays the 'Application Details' page in a web browser. At the top, there's a navigation bar with 'Home' and a user profile icon labeled '<<Username>>'. Below this is a table of applications with columns for ID, Name, Description, Status, Rules, and Action. The first application, 'Pancreatic Cancer', is selected. To the right of the table are 'Edit' buttons for each application. Below the table is the 'Application Overview' section, which includes a 'Created' date (27-07-2022), 'Status' (Running), and 'App ID' (1). It features two lists of keywords: 'List 1 of Keywords' (Cancer, Pancreatic Cancer, Cancer Treatment, Surgery, Keyword 5-10) and 'List 2 of Keywords' (Keyword 9-18). A 'Conditions' section lists rules like 'If <<Post>>, <<contains>>, <<Keyword List 1>>'. An 'Alerts Generated' section shows a count of 38. At the bottom, there are buttons for 'Alerts Information', 'Add/Remove' for keywords, 'Create New App', 'Go to App List', and 'Logout'.

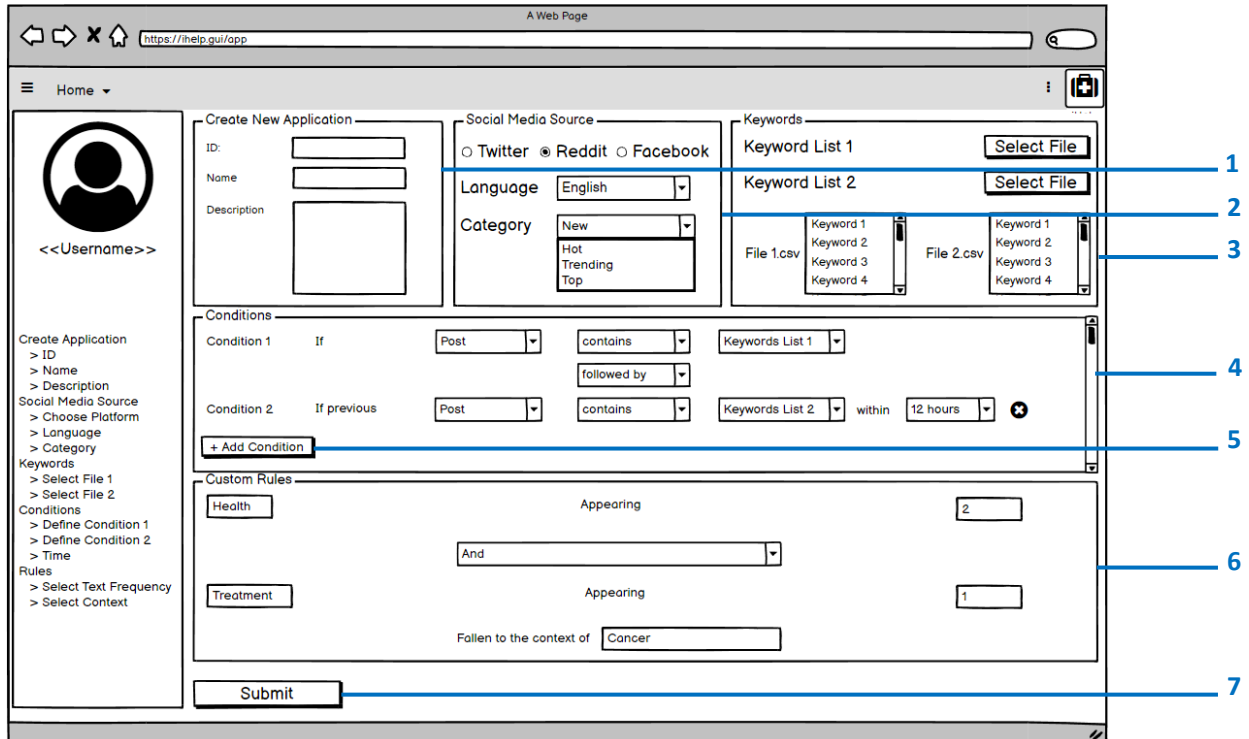
Figure 4: Application Details

1. Control button to edit the rules applied in this application
2. Basic details of selected application including date of creation, status, and application ID
3. List 1 of keywords uploaded in the system
4. List 2 of keywords uploaded in the system
5. Summary of conditions defined in the application
6. Alerts generated by this application based on the rules and conditioned defined
7. Summary of rules applied in this application
8. Control button to take the user to detailed alerts information interface explained in section 4.5
9. Control buttons to upload new or remove existing keywords form the lists
10. Control button to 'Applications List' screen described in section 4.1

4.3 Create Application

This screen allows user to create a new application to scan the social media posts from a particular social media platform. The interface allows the user to define and describe the application, choose the social media platform, and upload the lists of predefined keywords. The user can upload up to two lists of keywords in MS Excel format. Once uploaded, the keywords are shown in the lists as appeared in the illustration below.

User can define specific conditions and rules in context of the keywords lists to achieve focused results. It enables the user to define how the data gathered from this application will be analysed and the information extracted. It allows the user to create a nested condition instance using a combination of keyword strings. Furthermore, the user will define specific rules for the keywords to appear in a specific context, for the alerts to be generated.



The screenshot shows a web browser window with the URL `https://ihelp.gui/app`. The page title is "A Web Page". The interface is titled "Home" and features a user profile icon labeled "<<Username>>". The main content area is divided into several sections:

- Create New Application:** Includes input fields for ID, Name, and Description.
- Social Media Source:** Radio buttons for Twitter, Reddit (selected), and Facebook. Includes a Language dropdown (English) and a Category dropdown (New, Hot, Trending, Top).
- Keywords:** Two sections for "Keyword List 1" and "Keyword List 2", each with a "Select File" button and a list of keywords (Keyword 1-4).
- Conditions:** Two conditions defined. Condition 1: "If Post contains Keywords List 1 followed by". Condition 2: "If previous Post contains Keywords List 2 within 12 hours". A "+ Add Condition" button is present.
- Custom Rules:** Includes a "Health" rule with "Appearing" frequency of 2, and a "Treatment" rule with "Appearing" frequency of 1. A dropdown menu is set to "And". A "Fallen to the context of" field is set to "Cancer".
- Submit:** A large button at the bottom of the form.

Numbered callouts (1-7) point to the following elements:

1. "Select File" button for Keyword List 1.
2. "Select File" button for Keyword List 2.
3. Keyword lists for File 1.csv and File 2.csv.
4. Condition 1 configuration.
5. "+ Add Condition" button.
6. Custom Rules configuration.
7. "Submit" button.

Figure 5: Create Application

1. Option to define the details of the new application including Application ID, Name and Description
2. Option to choose the desired social media platform with a further option to choose a specific language
3. The user will upload up to two keywords lists in MS Excel format. Once uploaded, the keywords will be listed in the designated area
4. The conditions for the application are defined. The user can restrict the system to trigger an alert only if the conditions are met
5. Control button to define further conditions to create a focused approach to generate alerts
6. The user can apply further rules on top the conditions selected, to will determine that the data is extracted when specific keywords appear in a specific context
7. Control button to submit the application and start generating alerts

4.4 Edit Rules

This interface is a clone of the 'Create Application' interface in principle however the main difference here is that this screen allows the user only to review the selected application. The user can alter the conditions applied at the time of creation of this application or add further conditions to make it more specific to the topic of interest. The rules can also be changed based on the requirements of user. The primary settings of this application i.e., ID, Name, Description, Social media platform source and keywords files are disabled.

The dynamic approach allows the system to revisit the application results in real-time by tweaking the settings while it is running.

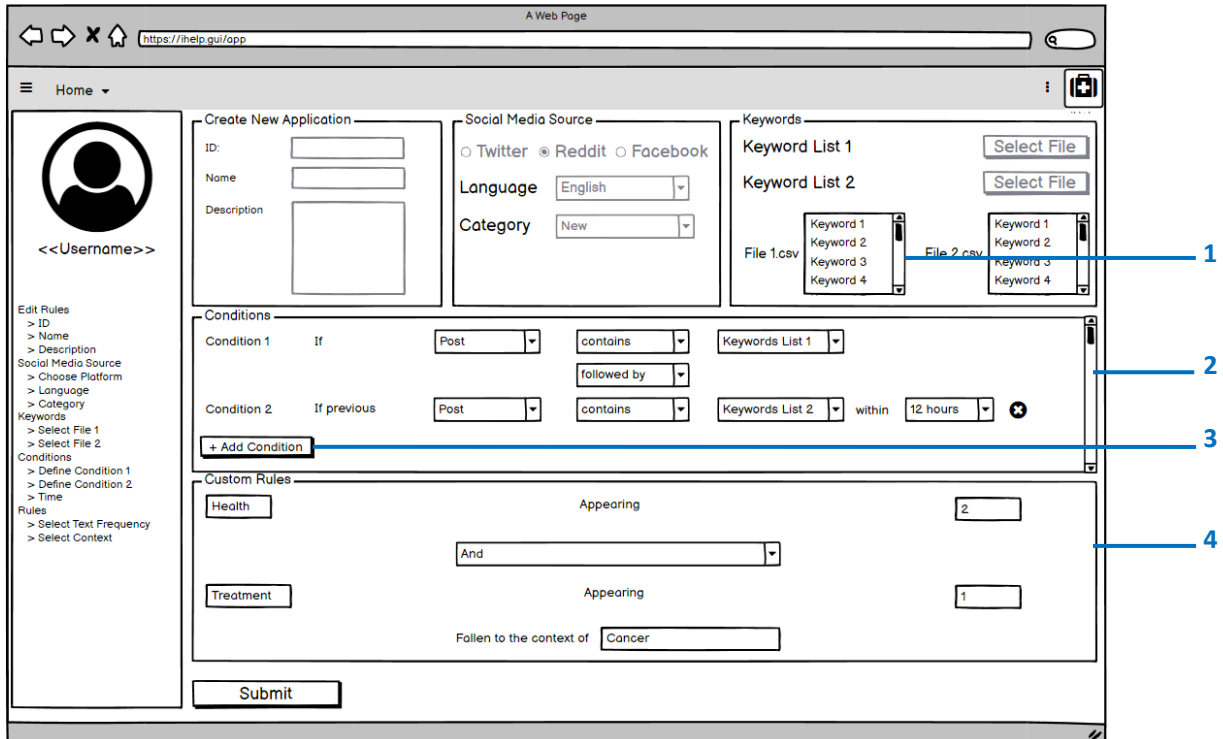


Figure 6: Edit Rules

1. List of keywords used in this application
2. Defined conditions used in this application. User can add, amend, or remove conditions as per requirement
3. Control button to add new condition instance
4. Defined rules used in the application. User can make required changes for the application to generate alerts

4.5 Alerts Information

The “Alerts Information” interface of the Social Media Analyser tool provides in depth details of a particular alert generated in an application. The sections provide the details of the user of the social media platform including the user ID and time of the post along with the actual text of the post that generated the alert.

The system determines the sentiment of the alert using the Sentiment Analysis technique and determines the polarity and subjectivity rating of the alert. The user can also see the actual keyword(s) that triggered the alert based on the conditions defined in section 4.3.

This interface also allows the system to start following a social media user if their posts are creating impact on social media. These individuals could be identified as ‘influencers’ within the scope of this topic. This provides the policy maker with an opportunity to reach out to these influencers and collaborate with them so that they may provide effective advocacy to build a positive perception about the health care intervention.

The lower half of this section provides a collection of analytical metrics and graphs to build an overarching picture of public perception about the topic of interest. It has not yet been decided what analytical metrics will be embedded in this section as discussions are ongoing with partners on this subject.

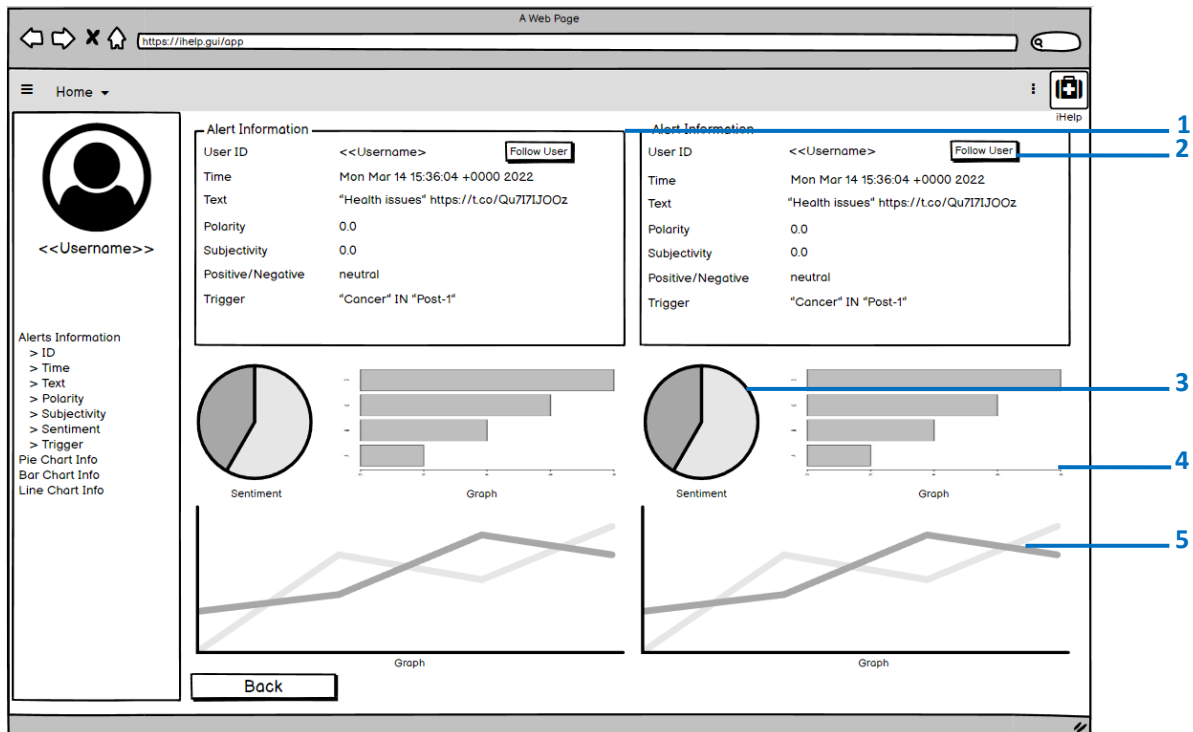


Figure 7: Alerts Information

1. This section provides an overview of the alert generated with specific details regarding the social media user, time and date stamp of alert, text of the post with sentiment analysis and the keyword that triggered the alert
2. Control button to follow the social media user on the specific platform and takes the system user to the 'Follow User' interface as explained in section 4.6
3. Pie chart to show the sentiment of the alert
4. Horizontal graph chart to provide analysis of the social media post. The nature of this graph will be finalised
5. Line chart to provide analysis of the social media post. The nature of this chart will be finalised

4.6 Follow User

This section of the Social Media Analyser tool presents the summary of the identified 'influencers' who have made an impact on the respective social media platform and can be approached for any collaborative actions to drive a narrative and build a perspective about the health care intervention.

It shows the details of the identified users being shortlisted along with the number of posts and the percentages. Furthermore, it also lists down the posts of these users that generated the trigger event

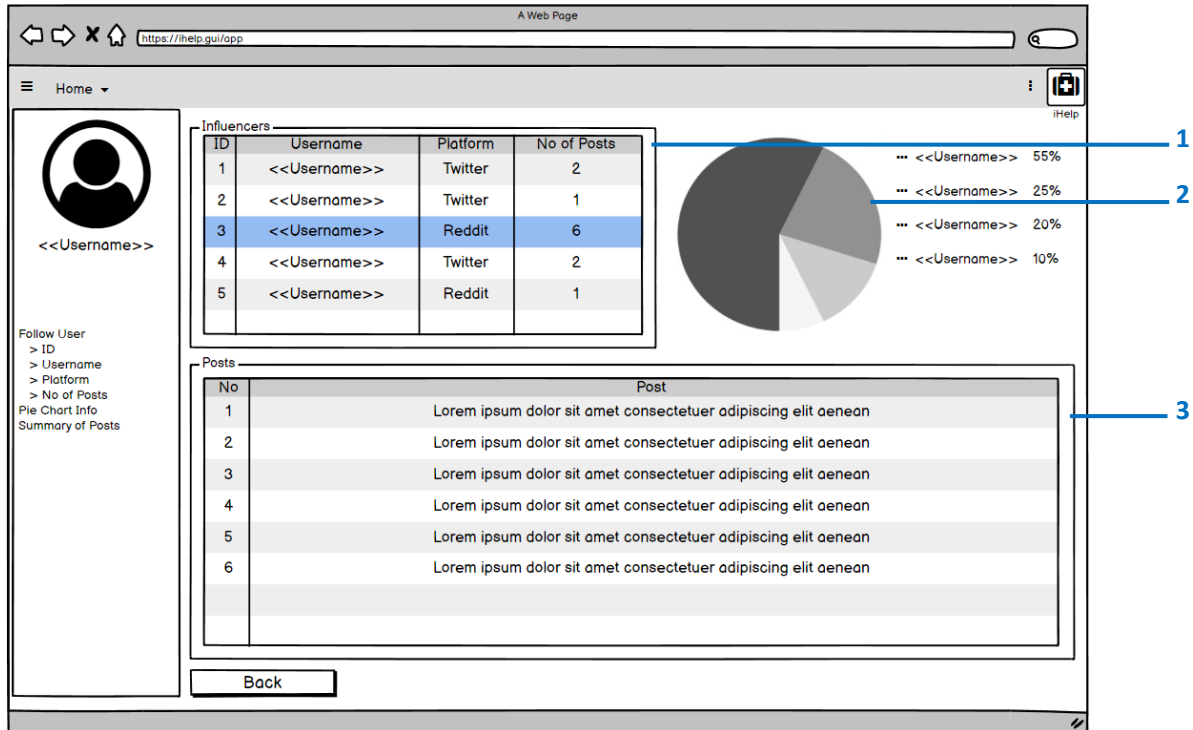


Figure 8: Follow User

1. Summary table of identified influencers along with the social media platforms and number of posts done
2. Pie chart to represent the contributions in percentage, by these influencers
3. List of social media posts by the selected influencer from the summary table

5 Impact of Digitalization in Policy Making

The impact of digitalization for public health and policy making is growing as more and more people gather and share health information online. Policy makers have an important role as they are responsible for transferring knowledge from the scientific community to the public with the purpose of improving population health. Using data from SM platforms enables public health communication, monitoring and predictions⁴. Being able to monitor current public opinion provides opportunities for health institutions and policy makers to stay updated and quickly respond to needs. Public engagement and public health communication is also an important aspect as it is necessary to counter the spread of misinformation and disinformation online.

5.1 Addressing the needs of Policy Maker

As health information now has the ability to be spread quickly online through social media there is a need for policy makers to gauge public opinion in real-time. Firstly, infoveillance is required to understand what type of information is spread. Secondly, as the public now gains health information online there is a growing demand for policy makers to engage and interact with the public via social media. Furthermore, there is also a need for policy makers and public health agencies to counteract the spread of misinformation and disinformation online. To make this possible, policy makers need to be continuously updated about the health information being spread through social media. With an updated view on public opinion, policy makers could adapt public health communication as needed.

5.2 Opportunities in Policy Making using Social Media Analyser

By using the Social Media Analyser tool, policy makers have the opportunity to stay updated with relevant discussions online. Although, limitations may include non-representativeness and that different target groups use a variety of SM platforms for different purposes.

⁴ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9004624/>

6 Added Value for Pilots

This section introduces and details the added value and extra knowledge that can be derived from the utilization of the Social Media Analyser from the different pilot partners of the iHelp project. To this end, the pilot partners have identified and analysed the impact of this tool in their identified scenarios and activities.

6.1 University of Manchester (UNIMAN)

UNIMAN pilot focuses on cancer prevention in the community. The pilot will generate impacts on societal factor includes raising awareness of health literacy in for people in the community and identify ways of changing behaviour. The pilot can also showcase the impact to the policy makers so that approaches implemented in the UNIMAN pilot can be broaden to wider population and health authorities.

6.2 Agostino Gemelli University Policlinic (FPG)

The UC managed by FPG deals with diagnosed pancreatic cancer patients undergoing specific therapies (radiotherapy). While our clinicians appreciate the importance of prevention and early diagnosis of this pathology, our focus deals with actual patients during their therapy.

The Social Media Analyser developed under T5.4 – “Social Analytics for the Study of Societal Factors and Policy Making” could have a potential impact on understanding the current perception of patients, their families, and caregivers at large, about the illness, the therapy, and secondary effects, especially those associated with radiotherapy. Since all the patients enrolled in the FPG pilot are diagnosed with PC, the main use of this tool could be in the areas of visits, therapies and general information level about the care pathways and the pathology. Specifically, the area of radiation therapy and risks of these treatments could be analysed and further investigated. Depending on the availability of data and the granularity of the analysis tool, a specific goal would be to assess the level of consciousness, in the population, of the lifestyle imposed to pancreatic cancer patients during the different phases of care, and about the choices that can influence his/her quality of life. Additionally, the results may also help in further understanding the actual needs of patients, families, and caregivers, as well as giving indication on the consideration given by the public to care pathways.

6.3 Medical University Plovdiv (MUP)

The MUP pilot in iHelp focuses on reducing the chances of Pancreatic Cancer in patients. Although it does not deal with this task in the project however, it could be interesting to understand the risk factors related to the Pancreatic carcinoma development and the possibilities for mitigating the risk will raise the awareness among the social media customers. The Social Media Analyser tool could provide a channel to monitor discussions between the patients at risk regarding the preventive programs they were advised to follow by the iHelp platform that could once more raise the importance of the prevention and early diagnosis. The number of the participants and followers of the iHelp platform at the social media is also one good indicator for the value and the significance of the IT product for the public health and society. The social media impact, from the other hand, could become a powerful asset into convincing the healthcare managers into changing the approach towards early diagnosis and prevention of this rare disease.

6.4 Taipei Medical University (TMU)

The TMU pilots has two aims. On one hand, it seeks to find the people at risk of developing liver and pancreatic cancer, by using data from electronic medical records. While on the other hand, seeks to evaluate the digital health solution can improve the quality of life of the patients under treatment of liver and pancreatic cancer. Under this T5.4 – “Social Analytics for the Study of Societal Factors and Policy Making”, we can monitor the liver and pancreatic cancer-relation health promotion postings by the ministry of health and bureau of health promotion in Taiwan. To this end, we will be able to evaluate the impact of the postings by using proxy such as how many likes, shares and comments these posting received.

7 Conclusion

The prime objective of this task is to develop a Social Media Analyser tool which can be used as an assistance to the policy maker in creating a new or improve the existing policy regarding Pancreatic Cancer. The tool will have the capability to scan the social media platform streams and discussions to provide an insight and engagement into the public perception about the policies on Pancreatic Cancer that affect patients and other members of public.

Even though the T5.4 – “Social Analytics for the Study of Societal Factors and Policy Making” primarily as a standalone task without engaging with the other work packages in the project, other than in some high-level context, it is expected that the results originating from this tool would provide a good level of support and assistance in the policy making process.

Evidence show that the public administration bodies are adopting web 2.0 tools such as blogs, microblogging, social media, etc to obtain crowd-sourced information that would help them shape their activities based on the perception to make it relatable and acceptable. The acceptance of Social Media Intelligence (SOCMINT) as a reliable source is allowing innovative solutions for the organisations to interact with the public. The Social Media Analyser tool in T5.4 – “Social Analytics for the Study of Societal Factors and Policy Making” is expected to become one such tool that would provide actionable insights to highlight trends and patterns of the people who express their opinion on social media. The social media analyser tool will serve as an asset to the policy maker in analysing policies and activities around Pancreatic Cancer.

Another expected outcome from this task is that the Social Media Analyser will prove to be a tool which could play an effective role in countering propaganda and fake information regarding the healthcare intervention or activity. Policy maker can cross reference the false information prevalent on the social media and can design activities to counter the false narrative.

The Social Media Analyser can prove to be a specialised asset in the health care industry and can be used for the betterment of health policy making process. The tool is recommended to be released as an open-source resource with flexibility of modification so that it can be used in industries beyond health care.

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List of Acronyms

AI	Artificial Intelligence
API	Application Programming Interface
CA	Consortium Agreement
CEP	Complex Event Processing
D	Deliverable
DoA	Description of Action
DBMS	Database Management Systems
DSS	Decision Support System
EC	European Commission
ED	Emergency Department
EU	European Union
FPG	Agostino Gemelli University Policlinic
GUI	Graphical User Interface
HHR	Holistic Health Record
ICE	Information Catalyst for Enterprise
M	Month
MUP	Medical University Plovdiv
NLP	Natural Language Processing
OSINT	Open-Source Intelligence
SA	Sentiment Analysis
SNA	Social Network Analysis
SQL	Structured Query Language
SOCMINT	Social Media Intelligence
TMU	Taipei Medical University
UNIMAN	University of Manchester
UPRC	University of Piraeus Research Centre
WHO	World Health Organisation
WOS	Web of Science
WP	Work Package