# „TELL US!" – ABOUT ACCIDENTAL INJURIES

## CROWDSOURCING FINAL REPORT

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# Executive Summary

Research must benefit society. To achieve this goal, the Ludwig Boltzmann Gesellschaft has launched its second crowdsourcing project "Tell us!" – about accidental injuries. A project that aims to connect science and society. Important empirical knowledge from traumatic accidents gained within clinical settings is rarely translated into research. In the context of this project, patients and experts had the opportunity to participate in a very early stage of research: identifying research questions.

### Crowdsourcing: "Which questions on accidental injuries should research address?"

Every year, about 800,000 accidental injuries are treated in Austrian hospitals. Leisure-time accidents alone cause a total economic cost of around €100 billion annually. During the diagnosis, initial care, treatment and rehabilitation of accidental injuries, important empirical knowledge is constantly created. This knowledge, gained in everyday clinical practice, has not yet been systematically fed back into research. In addition, the experiences of patients contain valuable knowledge to inform research practices.

### "Tell us!" - about accidental injuries

A target group-specific crowdsourcing campaign was advertised via multipliers and opinion leaders, flanked by broadly effective public relations work. In total, the project was presented 29 times in the form of lectures and talks. Twelve of the talks were held at morning meetings in Austrian hospitals with a focus on accidental care. A total of 933 people were reached directly. 272 social media postings with a total of 3,632 interactions and 101 mentions were published via three social media channels (Instagram, Twitter, Facebook). At the beginning of the campaign, 61,372 people were reached using social media. In addition, the project was presented and promoted by 39 entries in online media, 13 newspaper articles in print media, ten newsletter entries, presentations via ten different Citizen Science platforms, via three large email waves (> 500 recipients), in two radio reports and one TV report on Austrian television. The total cost for the project amounted to €112,570.

### Results: 826 research questions from 39 countries

In total, more than 826 research questions from 39 countries were generated over a period of six months. 175 questions were collected through the campaigning efforts (21%) and a further 651 (79%) questions were gathered using an online platform for patients (clickworker.com). By far the largest part of the research questions were received from Germany (58%), from Austria (14%) and from the USA (12%). The average age of the participants was 36 years (from 18 - 78 years). It took participants about five minutes to enter a research question online. 11% of the participants used the possibility of multiple submissions; one participant submitted 13 research questions. 80% of the research questions were submitted by patients; 20% were submitted by experts from medical-therapeutic professions: including nurses (31%), doctors (18%), physiotherapists (14%) and occupational therapists (11%).

### Next steps & outlook

Using an inductive clustering procedure, a total of 14 clusters were formed from the submitted research questions, which will then be worked on in a systematic process by a newly founded research group (starting in October 2020). The establishment of a new research group and the research activities themselves will be carried out by using Open Innovation in Science methods and principles.

# LBG – Open Innovation in Science

The Ludwig Boltzmann Gesellschaft (LBG) is research organization with a thematic focus on medicine, life sciences, as well as the humanities, social and cultural sciences. Ludwig Boltzmann research units are founded by means of highly competitive tendering procedures, equipped with a critical mass of staff and established for a limited period of time (4 - 7 years). Their scope of action is dedicated to the **focus on relevant social issues.**

In recent years, the LBG Open Innovation in Science (OIS) Center was established with funds from the National Foundation for Research, Technology and Development (Natfe), thus creating an optimal "Experimentation-space". Further developing the national Open Innovation Strategy is also strongly recommended in the 2018 OECD report.[1]

The methodological knowledge and scientific work of the LBG OIS Center is used in the Ludwig Boltzmann research units and for the new processes of **priority setting** for novel research initiatives. Thus, in terms of OIS, new knowledge regarding the qualified application of Open Innovation methods and principles in science is generated. Since its foundation in 2016, the OIS Center has been a **central international actor for the further development of the system of science using Open Innovation in Science**.

In contrast to other research organizations with funding programs, the LBG as a research organization has taken up **cross-sectional issues** that benefit the **Ludwig Boltzmann Research Units**. In recent years important impulses for the Austrian research landscape have originated from this organization (see "Tell us!" - about mental illness[2] and the research groups that have emerged from them[3,4]).

## Why does the LBG use Crowdsourcing as a method?

Crowdsourcing refers to the "outsourcing of traditionally internal subtasks to a group of voluntary users (e.g. via the internet)". [5] In most cases, problems are given to be solved by so-called "swarm intelligence". Crowdsourcing of questions, on the other hand, is a novel approach described by Eugene Ivanov as "crowdsourcing in reverse"[6], which has been used in pilot projects at Harvard Medical School[7], the Ludwig Boltzmann Gesellschaft[8] and recently also Cambridge University in the so-called "THIS Institute"[9].

Crowdsourcing of research questions has the potential to systematically open and to bring innovation processes into research by integrating unusual knowledge carriers[10], **especially in the translational biomedical field**[11].

The use and importance of crowdsourcing in research has increased in recent years. A study published in 2018 by NESTA (**N**ational **E**ndowment for **S**cience, **T**echnology and the **A**rts) on the

[1] https://read.oecd-ilibrary.org/science-and-technology/oecd-reviews-of-innovation-policy-austria-2018_9789264309470-en#page1
[2] https://www.redensiemit.org
[3] http://dot.lbg.ac.at
[4] http://village.lbg.ac.at
[5] https://www.wired.com/2006/06/crowds
[6] https://innovationobserver.com/2018/02/27/crowdsourcing-in-reverse-asking-crowds-to-ask-questions
[7] https://sloanreview.mit.edu/article/experiments-in-open-innovation-at-harvard-medical-school
[8] *https://www.redensiemit.org*
[9] *https://www.thisinstitute.cam.ac.uk/wp-content/uploads/2018/08/THIS-Institute-Generating-ideas-and-exploring-consensus-978-1-9996539-2-7.pdf*
[10] *Boudreau KJ., Lakhani KR. Using the crowd as an innovation partner. Harvard Business Review. April 2013. https://hbr.org/2013/04/using-the-crowd-as-an-innovation-partner*
[11] *Budge JE., Tsoti M., Howgate JD., Sivakumar S. & Jalali M. (2015). Collective intelligence for translational medicine: Crowdsourcing insights and innovation from an interdisciplinary biomedical research community. Annals of medicine, 47(7), 570-575.*

application of crowdsourcing has shown that crowdsourcing is already being taken up in scientific discourse as the most prominent method in for instance collective information research.

<u>**Figure 1 – Prominent topic clusters in collective information research**</u>[12]
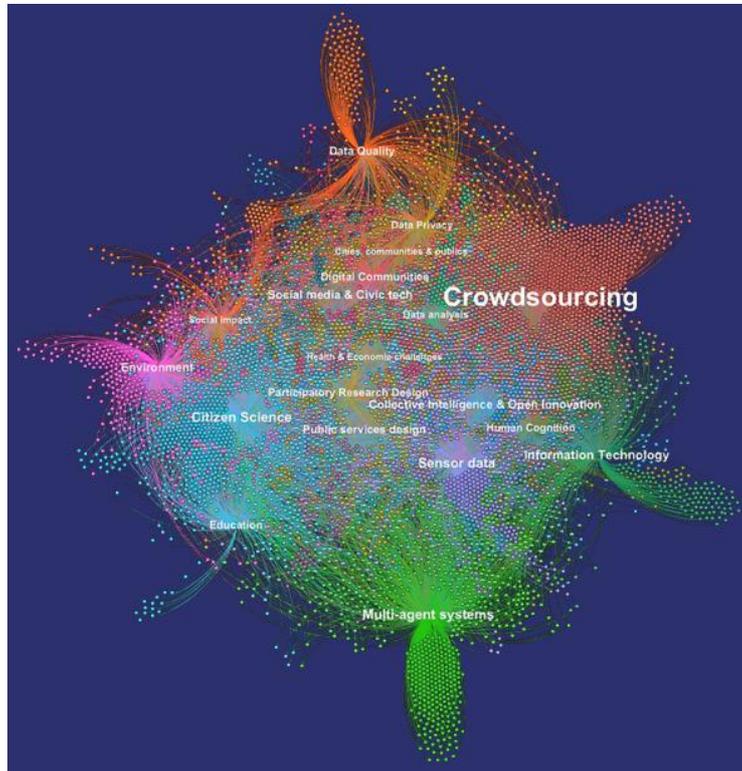


The networking of different professional actors and disciplines, which have so far hardly ever interacted with each other coupled with the integration of unusual knowledge carriers (e.g. patients and their relatives) reflect the open innovation approach of the Ludwig Boltzmann Gesellschaft.

**Using the previously outlined approach the Ludwig Boltzmann Gesellschaft acts as an international innovator. With its second crowdsourcing project "Tell us! - about accidental injuries, the LBG once again positions itself as a European pioneer in the field of Open Innovation in Science.**

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[12] *https://www.nesta.org.uk/blog/mapping-collective-intelligence-research*

# "Tell us!" – about accident injuries

As the owner of the **Ludwig Boltzmann Institute for Experimental and Clinical Traumatology (LBI Trauma)**, the Ludwig Boltzmann Gesellschaft possesses a globally recognized and very well-established research institute focused on accidental injuries. The LBI Trauma pursues the approach of translational research particularly intensively.[13] **Therefore, LBI Trauma is involved in project development from the very beginning as an idea generator and cooperation partner.**

## Crowdsourcing Design

In order to set up a crowdsourcing project, it is important to systematically initiate preparatory measures. The following important steps will be described in more detail below:

**Figure 2 – Crowdsourcing Design**



- Defining the problem
- Defining the search field
- Stakeholder Mapping
- Target Group Mapping
- Establish incentives
- Formulate questions
- Develop a platform
- Campaigning

### Defining the problem

Every year, about 800,000 accident related injuries are treated in Austrian hospitals.[14] The total economic costs of accidental injuries resulting from leisure-time accidents alone amount to about 100 billion Euros annually[15]. According to the current report of the Global Burden of Disease[16], about one third of all DALYs (Disability-adjusted life years) worldwide are associated with injuries caused by accidents (see Figure 3).

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[13] *https://trauma.lbg.ac.at*
[14] *https://www.kfv.at/rund-800-000-unfaelle-pro-jahr-in-oesterreich*
[15] *„Die Zukunft der Prävention" – Mehrjahresprogramm 2017, Kuratorium für Verkehrssicherheit (KfV).*
[16] *https://ourworldindata.org/grapher/disease-burden-from-injuries*

## Figure 3 — Global Burden of Disease
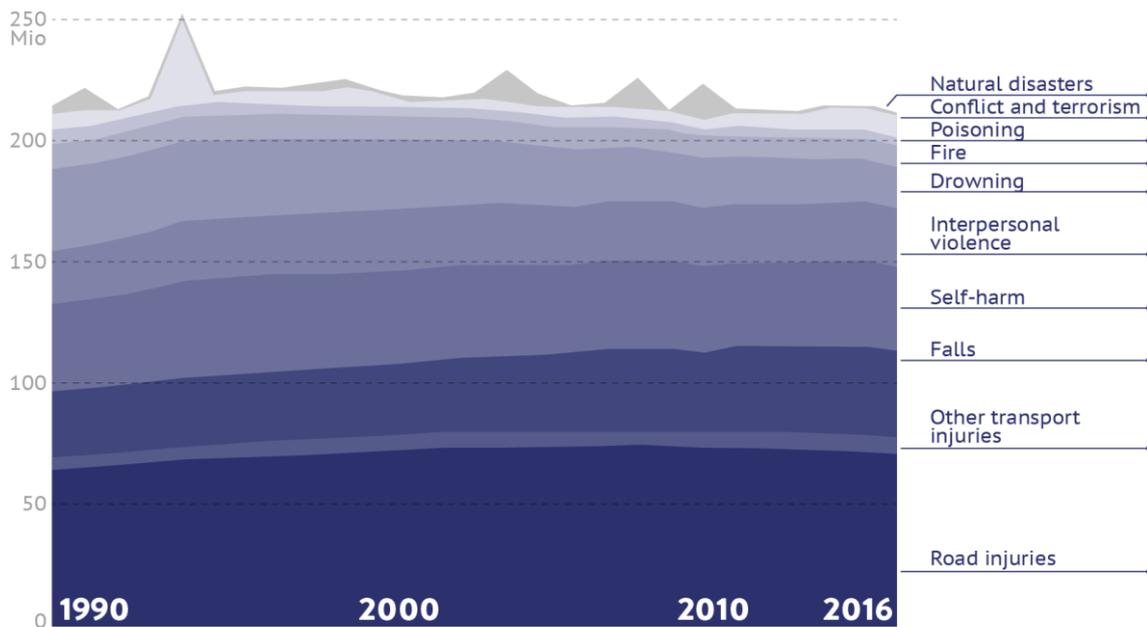


For this reason, the resulting burden on the Austrian health care system is **highly relevant to health policy**. Our aim, therefore, was to stimulate and initiate innovative research activities by means of novel approaches in the field of accident research (traumatology).

Researchers from specialized disciplines ranging from molecular biology to physics carry out research in the field of traumatology. Especially in the setting of the LBI Trauma, usually generated knowledge is systematically transferred to clinical applications **(bench-to-bedside)**. Conversely, knowledge gained from practical experience, i.e. from daily work with patients, is rarely becoming a part of research and thus remains unused **(bedside-to-bench)**:

## Figure 4 — Flow of Knowledge in Traumatology
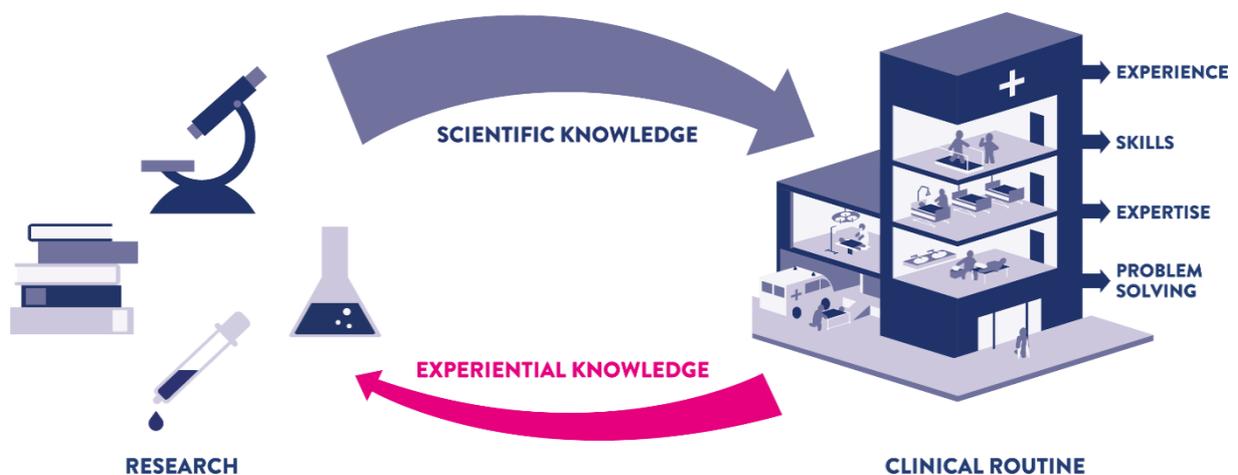
## Defining the search field

The definition of the search field is essential for a crowdsourcing project. Defining a framework in which to search for questions is the basis for all further activities. **It forms the foundation for all further steps which are important for identifying target groups** (who do you want to address?) as well as for the formulation of the question (which question do you want to ask?) and subsequently for all communication measures.

The field of traumatology is very broadly defined and can range from intensive care to tissue regeneration - for this reason it was particularly **important to narrow down the search field**. In this way, the area within which information should be collected at all, and which target groups can be found in it can be clearly defined. As seen in Figure 5, the search field was defined from the time of first diagnosis via acute treatment, follow-up, follow-up treatment and rehabilitation. An important exclusion criterion for the search field was the prevention of accidents and intensive medical first aid.

### Figure 5 — Search field „Tell us!"
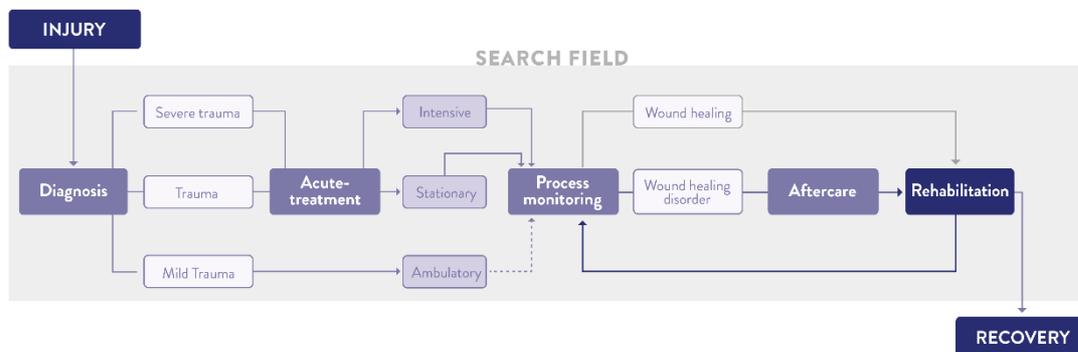


## Stakeholder Mapping

Based on the definition of the search field, a stakeholder mapping was carried out to identify the most important national and international organizations in the field of accidental injuries. The stakeholder mapping serves to identify potential multipliers. No specific criteria were defined for this purpose. The following stakeholder groups were identified:

- ▶ Patient organizations
- ▶ Medical associations and interest groups
- ▶ Industry partners
- ▶ Insurance
- ▶ Research organizations

From this rough overview, organizations were filtered out that were either targeted as cooperation partners or possible multipliers and opinion leaders for the communication of the campaign.

## Target Group Mapping

In order to find out which target groups should be addressed via crowdsourcing, a systematic target group mapping was carried out based on the previously defined search field. In contrast to stakeholders, target groups are defined as a concrete grouping of potential knowledge providers who are addressed by crowdsourcing and who are highly likely to contribute. Based on the defined exclusion criteria, topics and target groups were identified that should explicitly not be addressed (Table 1):

### Table 1 - Exclusion criteria: What and who should not be addressed?

| |
|---|
| Mental trauma as primary disease (possible as a secondary condition) |
| Chronic degenerative diseases as primary disease (possible as a secondary condition) |
| Definition classified as non-medical trauma |
| Problems or illnesses that go beyond injuries (e.g. personal problems) |
| Disrupters who do not take the initiative seriously |
| Age < 18 years |

As a first step, two large groups covering all target groups were defined:

- ▶ **Experts** working with patients affected by accidental injuries
- ▶ **Patients** with lived experience

As a second step, individual target groups were defined within the two superordinate groups based on the defined search field (Table 2).

### Table 2 — Target groups

| Experts |
|---|
| Orthopedists |
| Trauma surgeons |
| Surgeons |
| Anesthetists |
| Neurologists |
| Oral and maxillofacial surgeons (MFS) |
| Radiologists |
| Psychiatrists |
| Nurses |
| Nursing assistants |
| Physiotherapists |
| Sports physiotherapists |
| Psychologists |
| Occupational Therapists |
| MTAs (Medical Technical Assistance) |
| Orthopaedic technologist |
| Orthopaedic technology mechanics |
| **Patients** |
| Patients with a high degree of suffering |

| Makers [17] |
| Interested public |
| Researchers in the field of accidental injuries |

### Expert interviews - getting to know the target groups

Semi-structured interviews were conducted with a total of nine experts in order to get to know different target groups: four interviewees were are from the medical sector, four have a therapeutic background and one person works in nursing. The interviews lasted 40 minutes on average, were transcribed and summarized. **The aim of the semi-structured interviews was to find out which questions are understandable for the respective target groups and which communication channels should be used to reach them in the best possible way.**

The most important finding from these interviews is that **no "one-size-fits-all" communication is possible due to the different, very heterogeneous target groups.** Therefore, a specific approach to the individual target groups is indispensable in communication measures. For each of the 21 sub-groups, a detailed profile for a target group(-specific) approach was consequently formulated (profiling).

### Motivation for participation: What type of incentives?

Based on the expert interviews, a strategy for the incentive structure (incentives) for participation was developed. Monetary incentives are used in many solution-oriented crowdsourcing projects. However, as evident from the expert interviews the motivation for target persons to articulate their questions stems from different needs throughout (especially the motivation for people to have their observations heard via crowdsourcing was an important motivational driver). For this reason and because the financial means for monetary incentive structures were not available, this method was largely dispensed with.

As the project progressed, "Tell us!" - about accidental injuries was awarded the Citizen Science Award 2018[18] from the Center for Citizen Science and therefore had the opportunity to offer individual prizes to three participants. This promotion was valid from May 2018 to June 2018.

## Posing a question

Once the target groups had been defined, the project team set about defining a suitable question at an early stage. The following aspects are of particular importance when formulating the question:

- ▶ Generally understandable and no technical terms
- ▶ Open formulation of the questions
- ▶ Interlocking of question and "call-to-action"

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[17] *Makers: Persons who can identify problems, search for new approaches and solve problems innovatively are known in the health care sector as "Patient Innovators". For further information, please contact the project partner "Patient Innovation" (https://patient-innovation.com).*

[18] *https://www.zentrumfuercitizenscience.at/de/p/tell-us*

After several iterations within the project team, which had already gained experience with the formulation of questions from previous crowdsourcing projects (internal expertise), the question was formulated as follows:

## "WHAT QUESTIONS ABOUT ACCIDENTAL INJURIES DOES RESEARCH NEED TO ADDRESS?"

### Development of the online platform

The submission platform was created by the company Code Q. A catalogue of requirements was jointly developed (implementation: November 2017- April 2018). At the beginning of January 2018 (six months before the start of crowdsourcing) the landing page went online with the possibility of registering for a newsletter.

# The "Tell us!" crowdsourcing campaign

The crowdsourcing campaign was systematically developed from July 2017 and the last submissions were collected at the end of October 2018. In addition to the design of the target group-specific communication with potential participants, a network of cooperation partners and advisory board members was established and additional supporters (e.g. opinion leaders) were won over for the project (community). This concept was presented to the LBG Board of Directors in a comprehensively documented communication strategy on February 28, 2018.

In addition, a research project was carried out at the LBG OIS Center with the aim of better understanding the mechanisms of crowdsourcing research questions.

## Team

The core team consisted of colleagues from the LBG OIS Center, LBI Trauma, LBG Public Relations and external supporters (communication & programming of the crowdsourcing platform).

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### *LBG OIS Center Implementation Team*
Lucia Malfent (Project Management)
Benjamin Missbach (Project Management)

### *LBG Research Team*
Marion Pötz (Scientific management)
Susanne Beck (Post-Doc, in project from August 2017)
Tiare Brasseur (PhD student, from October 2017)
Daiana Nielsen (until incl. August 2017)

### *LBG Public Relations*
Manon Oschounig (Communication, Social Media: Twitter)
Emilie Brandl (communication, press releases)

### *LBI Trauma*
Heinz Redl (project initiator)
Veronika Hruschka (project initiator)
Cornelia Schneider (Communication, Social Media: Facebook)

### External partners
#### *Communication and Outreach*
Jessica Vanscheidt (Communication & Outreach: Germany)
Birgitte Pram (Communication & Outreach: Scandinavian Countries)
Lorenz Pichler (Communication, Social Media: Instagram)
Peter Limacher (Communication, Science et Cité)

#### *External service providers*
Antonio Ortiz (Design)
Andreas Scheiblecker (photographer for subjects)
Adnan Pjanic (research work)
Roland Schütz (Code Q, Website & Crowdsourcing Platform)
Johanna Rohrhofer (Winnovation, Consulting)
Gertraud Leihmüller (Winnovation, Consulting)

## Partners

For a successful crowdsourcing campaign, it is of great importance to find partners supporting the project in terms of content, have a wide reach and visibility and convey a positive image. Partner organizations can become multipliers and potentially increase the significance of the project.

### Partner organizations

**16 different partner organizations** were recruited for the project. In the compilation and selection process it was crucial to achieve a balance of different stakeholder groups. Particular attention was paid to winning a mix of the following:

- ▶ **Structurally important specialist organizations** (Allgemeine Unfallversicherungsanstalt - AUVA; Landeskliniken Holding Niederösterreich; Upper Austrian Red Cross) Generally understandable and no technical terms
- ▶ **Associations and interest groups** (Medical Technical Services (MTD) Austria; Austrian Society for Trauma Surgery - ÖGU; Austrian Society for Hand Therapy - ÖGHT; Physio Meets Science)
- ▶ **Scientific organizations** (Cochrane Rehabilitation; Medical University of Vienna - Center for Medical Statistics, Informatics and Intelligent Systems; Science in Dialogue)
- ▶ **Initiatives on citizen participation** (Austria researches; European Citizen Action Service - ECAS; BürgerSchaffenWissen; Science et Cité)
- ▶ **Sport organizations** (FK Austria Wien; Bundessportorganisation — BSO) and
- ▶ **Organizations related to innovation & research** (Patient Innovation; OpenKowledgeMaps)

**Figure 6 — Partner organizations**

## Figure 7 — Geographical distribution of the partner organizations
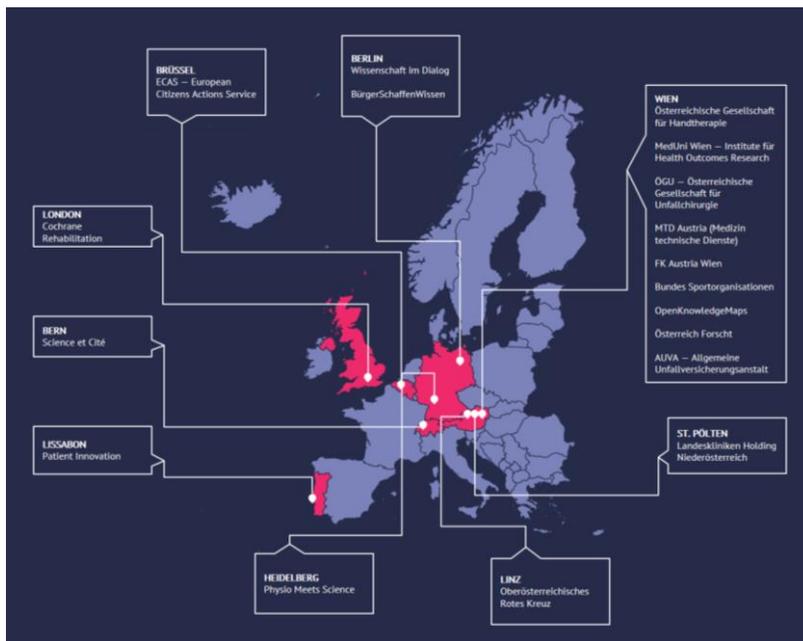


## Advisory Board

As with the partner organizations, **balance and heterogeneity** were also important in the **composition of the Advisory Board**. The tasks of the Advisory Board included: i) acting as a representative of the project to the public; ii) underlining the credibility of the project; iii) individually providing expert advice to the crowdsourcing team; iv) strengthening internationality; v) functioning as a multiplier and vi) making important dissemination channels useable.

For this reason, the Advisory Board is composed of persons with a clinical background, researchers and other/institutional representatives from various fields (see Figure 8):

## Figure 8 — Advisory Board
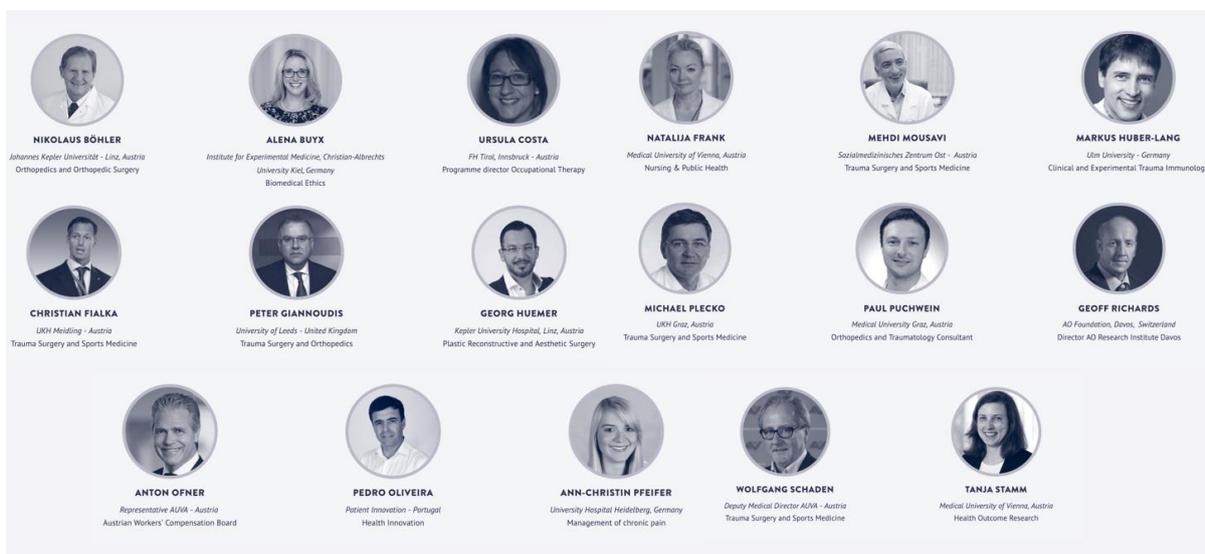
## Figure 9 – Geographic distribution Advisory Board
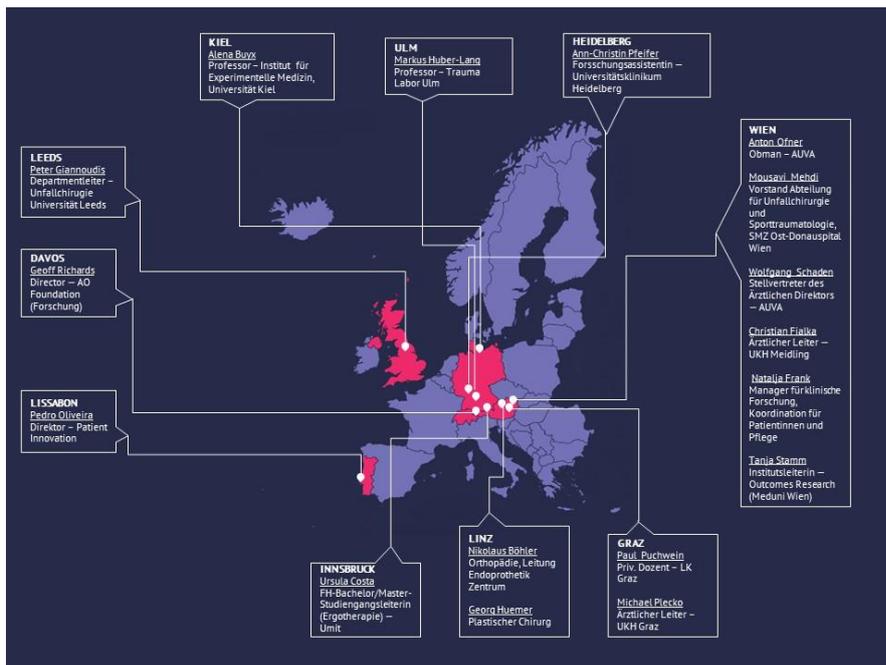


## Campaign materials

The campaign design and materials were selected based on the following criteria and requirements:

▶ Appeal to the defined target groups
▶ Pleasant and clear design
▶ Clinical context
▶ Authenticity of the photo models
▶ Usability of the subjects on several channels
▶ Suited to the corporate identity of the Ludwig Boltzmann Gesellschaft

## Figure 10 – Photoshooting (23th of January 2018)
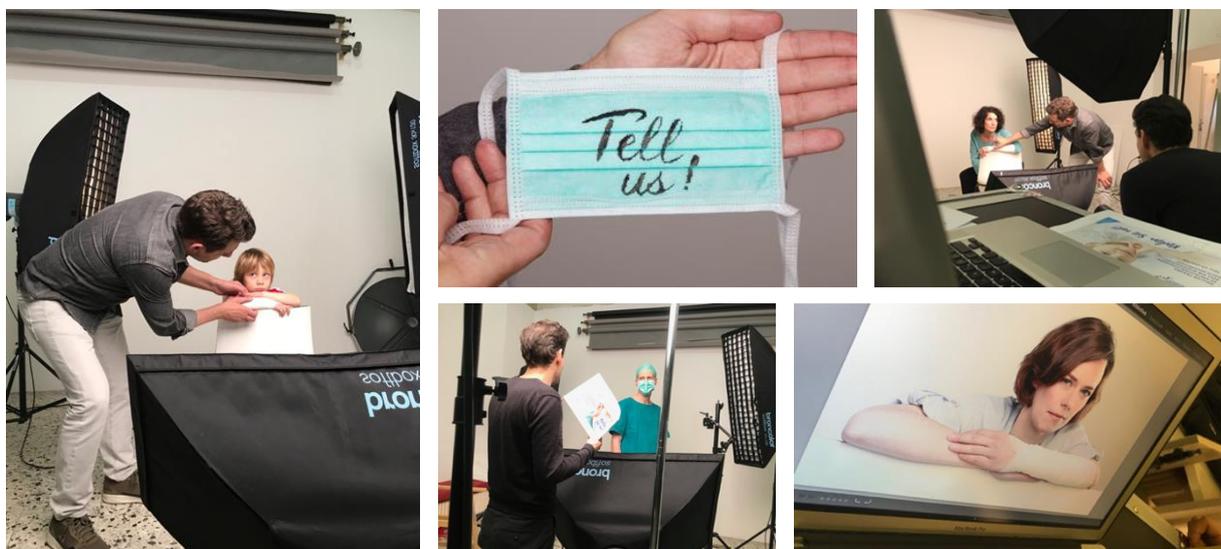
**Figure 11 — Overview: Campaign subjects**



## Information materials (posters, flyers, stickers, masks)

All subjects were formulated bilingually (English & German). Important to note here: The call-to-action: "Tell us!", and the website URL were present on each subject (call-to-action). All subjects were integrated into the appropriate formats for online and offline use. Particularly when using online material, it is important that all material created adheres to the same format.

**Figure 12 — Overview: Merchandise**

# Timeline

<u>Figure 13 – Timeline</u>
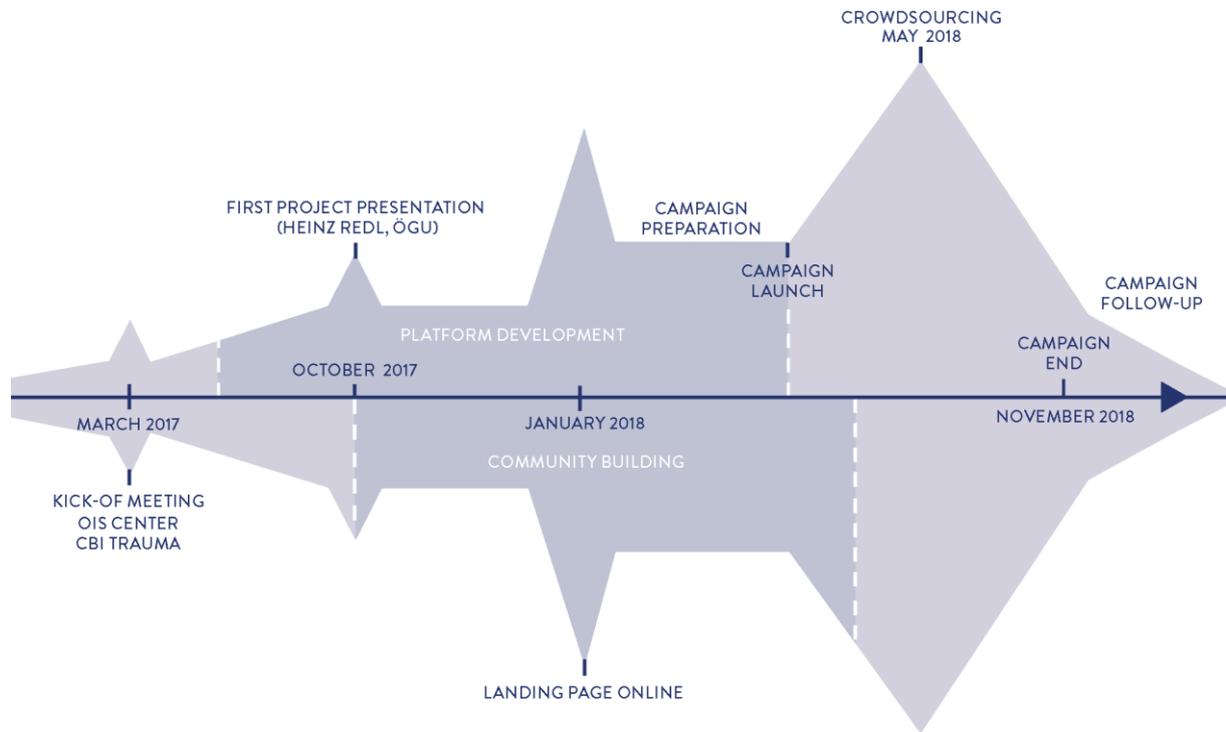


ÖGU = Österreichische Gesellschaft für Unfallchirurgie
(Austrian Society for Trauma Surgery)

# Communication activities

All communication activities were conducted in line with a a priori developed communication strategy[19]. Particular attention was paid to achieving a combination of online and offline communication. The communication strategy focused on **opinion leaders, flanked by a broadly effective multi-channel campaign**. The greatest effort in communication lies in identifying and activating interested parties and consequently bringing them to the online platform to motivate participation in the project.

## Influencer Relations

Due to the fact that the target groups of "Tell us!" – about accidental injuries are very highly heterogeneous, they generally have **little time and resources available** and are therefore quite **difficult to reach**, we have developed **personal contacts with multipliers and opinion leaders in addition to public relations work** (Influencer Relations).

We have compiled a list of the most important centers for the treatment of accident related injuries in Germany, Austria, Switzerland, Italy and Liechtenstein (especially in the Alpine region):

- ▶ 736 hospitals, private and specialist clinics and rehabilitation centers identified
- ▶ 323 Doctors in private practices and
- ▶ 123 medical centers contacted

A total of **80 VIP contacts** were defined, who were given particularly intensive support and were supplied with additional information about the project (by e-mail, telephone calls and personal meetings). Within the campaign, these VIP contacts became active as opinion leaders.

## Roadshow

Between October 2017 through August 2018, we held **29 lectures and talks** presenting the project, held **nine informal talks** and announced the project at various public events. A total of **933 people were directly reached through this activity** (see Figure 14).

Particularly noteworthy are **12 presentations in the context of morning meetings in various Austrian hospitals** with a focus on accident care.

## Figure 14 — Overview roadshow and conferences (national)
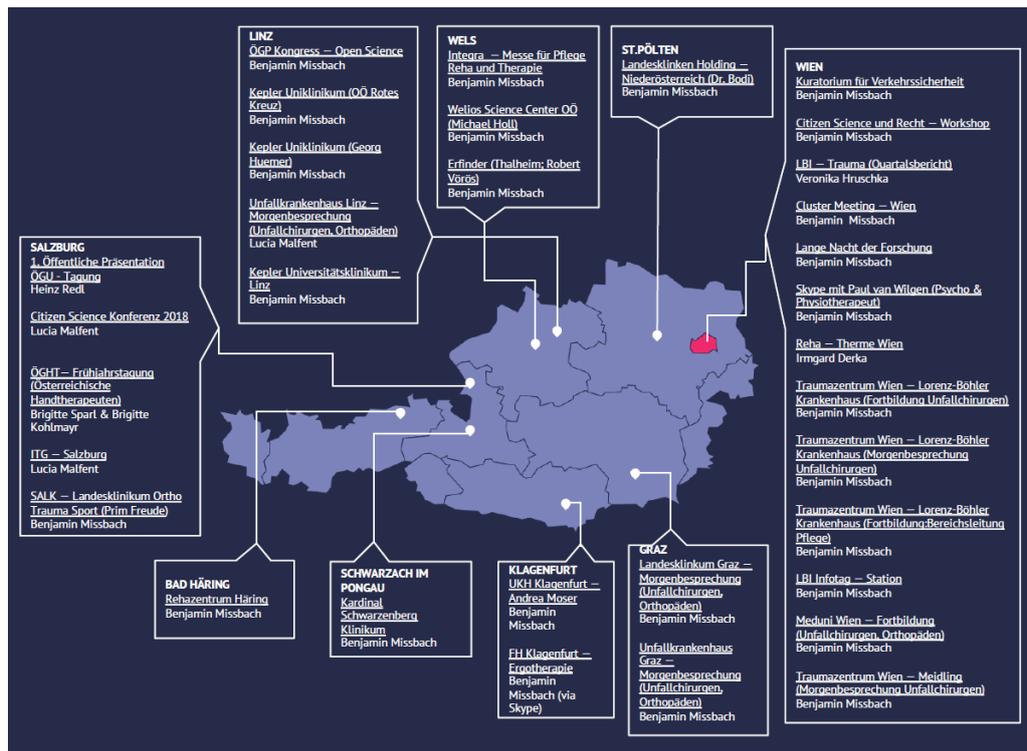


## Social Media

Communication via social media was of particular importance for the project because it enabled us to address different target groups in a specific manner. Based on the identified target groups, three channels of communication were selected:

▶ Twitter (@TellUs_Online)
▶ Facebook (@redensiemit)
▶ Instagram (@tellusonline)

Both the Twitter and Facebook account of the first "Tell us!" project were reactivated. The Instagram account was newly set up. Support was provided via the Twitter channel of the OIS Center (@OIS_Center) and the Facebook page of the Ludwig Boltzmann Gesellschaft (@LudwigBoltzmannGesellschaft). Facebook was used for the German-speaking target group, Twitter and Instagram for the English-speaking target group.
One person per channel was responsible for the management and updating of content. The content was jointly created, individually adapted to the used channel, entered via buffer (scheduling tool) and published in a coordinated manner. For instance, all partner organizations and Advisory Board members were introduced in a separate posting on Twitter and Facebook.

Table 3 — Overview Number of postings/Social Media channel

|  | Facebook | Twitter | Instagram |
|---|---|---|---|
| Number of postings | 109 | 129 | 34 |
| Number of interactions | 2.436 | 508 | 688 |
| Change in likes/followers during the campaign | +10,6 % | +42 % | 156 (start at 0) |
| Number of mentions of other users | 12 | 83 | 6 |

Pre-Campaigning: Crowdspeaking campaign

In addition to the coordinated postings, a crowdspeaking campaign was coordinated via ThunderClap.it one month before the campaign launch. Crowdspeaking is a method of reinforcing messages via social media in such a way that these tweets, shares or likes are not posted at any random time but are sent out in a coordinated manner at a self-selected time (campaign start). In total we have reached 50 supporters through ThunderClap with a social reach of 61,372 people. The posting was sent out at the start of the campaign by the participating supporters on 8 May 2018:

Figure 15 — Crowdspeaking Posting of 8 May 2018 (reach: 61,372 people)

In addition to regular postings by our cooperation partners and Advisory Board members, cross-posting agreements were made. The aim of cross-postings is to allow our own publications to be distributed via other channels, i.e. other social media networks. For this it is important to:

1) identify a suitable partner
2) know the social reach of the cross-posting partners (number of people in the social network, target groups, etc.)
3) choose a suitable timeframe for a posting.

Agreements have been made with the following organizations, among others:

▶ **Diagnosia** (medical app for health professionals, Austria)
▶ **3D Heals** (Orthopaedic 3D Printing Organization, USA)
▶ **Inspire2Live** (Patient Association, The Netherlands)

What is important in cross-postings above all is that the content of the partners overlaps so that the target audience is not irritated by content that is not related to the topic at hand. This was considered in all cross-postings. Postings were formulated in such a way that they could be linked to the content of the respective partner project and at the same time convey the core messages of the campaign.

## Landing Page & Website

The landing page is the central element of a crowdsourcing campaign. It aims to provide a simply designed platform containing information for anyone who is interested in the project. The main goal of creating such a platform is to provide information about the project and to bind interested parties to the project in the long term (e.g. via social media or newsletter entries).

As an information platform about the project a landing page should contain the following elements:

1) Campaign subject
2) Newsletter subscription option
3) Frequently Asked Questions (FAQs)
4) Social media buttons
5) Recognition value

**It is absolutely necessary to create the landing page at least 6 months before the launch of the project.** This should be done in order to be able to refer to a specific link in the subsequent communication and to collect newsletter registrations. All in all, the website:

▶ was **accessed 8,660 times,**
▶ spread over **4,880 users** with an average number of 1.34 sessions per user
▶ **91.5 %** of those interested were **new users**,
▶ **8.5 % recurring users**,
▶ the **average duration** of a session was **1:16 minutes**.

31.8 % of the website users came from Austria, 18 % from Germany, 15.2 % from the USA, 8.3 % from Great Britain and 5.9 % from France. The remaining hits were spread over more than 20 other countries. The top 3 cities were Vienna (23.3 %), Paris (5.4 %) and London (5 %).

Mobile & browser-based use

When the website was accessed via mobile, Android was used as the operating system for 56% and iOS for 42% of accesses. The users also selected different screen resolution aspect ratios; 28% of users choosing a 360x640 aspect ratio and 18% using a ratio of 375x667. 40% of users accessed the website via Google Chrome, 17% via Safari, 14% via Firefox. The user behavior we have identified is important for future projects in order to address target groups more precisely.

## Additional communication measures

- ▶ 39 entries in online media (including: Euroscientist, Innovationobserver)
- ▶ 13 newspaper articles in print media (including: Wiener Zeitung, Presse, derStandard, etc.)
- ▶ represented on ten international Citizen Science platforms (e.g. Österreich Forscht, BürgerSchaffenWissen, Science et Cité, etc.)
- ▶ ten newsletter entries (European Citizen Actions Service, OpenAIRE, etc.)
- ▶ three waves of emails to > 500 contacts
- ▶ two own newsletters sent to > 80 people
- ▶ two official emails from AUVA (Anton Ofner) and LBG (management)
- ▶ two press releases in Austria (APA)
- ▶ four international press releases (Germany, Denmark, Norway, Sweden)
- ▶ two radio reports (Ö1 "Wissen aktuell", "Abendjournal")
- ▶ a TV report (ORF2 "bewusst gesund" on all screensavers in Lower Austrian hospitals (with the support of LKNOE)

## Awareness of the campaign

Participants provided information about the channels through which they became aware of the campaign. 27% of participants said that they learned about the campaign through colleagues, 12% through email newsletter and 13% through social media.

**Figure 16 — "How did you hear about the project?" (Mentions of participants, total numbers)**
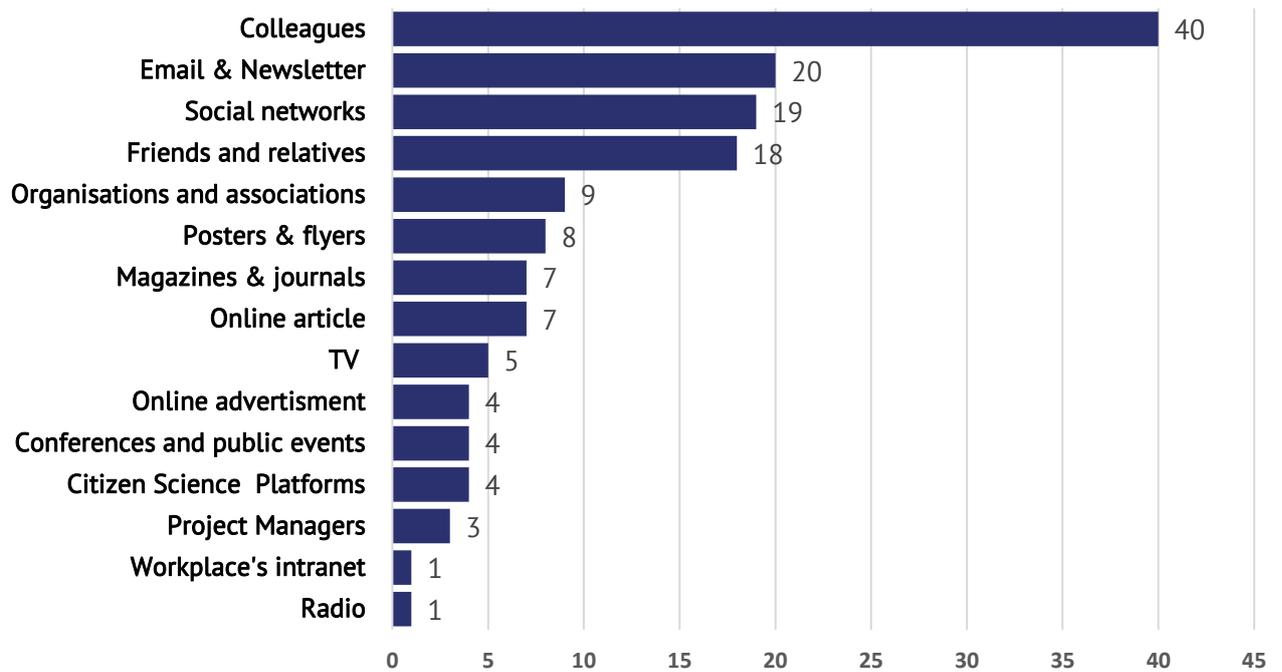
# Expenses

How much does a crowdsourcing project cost? Overall, "Tell us!" – about accidental injuries cost **€112,570 (excluding personnel expenses)**. The expenses for the development of the platform are to be seen as a major one-off investment cost.

Figure 17 — Expenditure (in % and categories)



- Travel expenses & congress participation
- Per diem allowance & hospitality
- Communication & campaigning
- Platform development & website
- External assignments
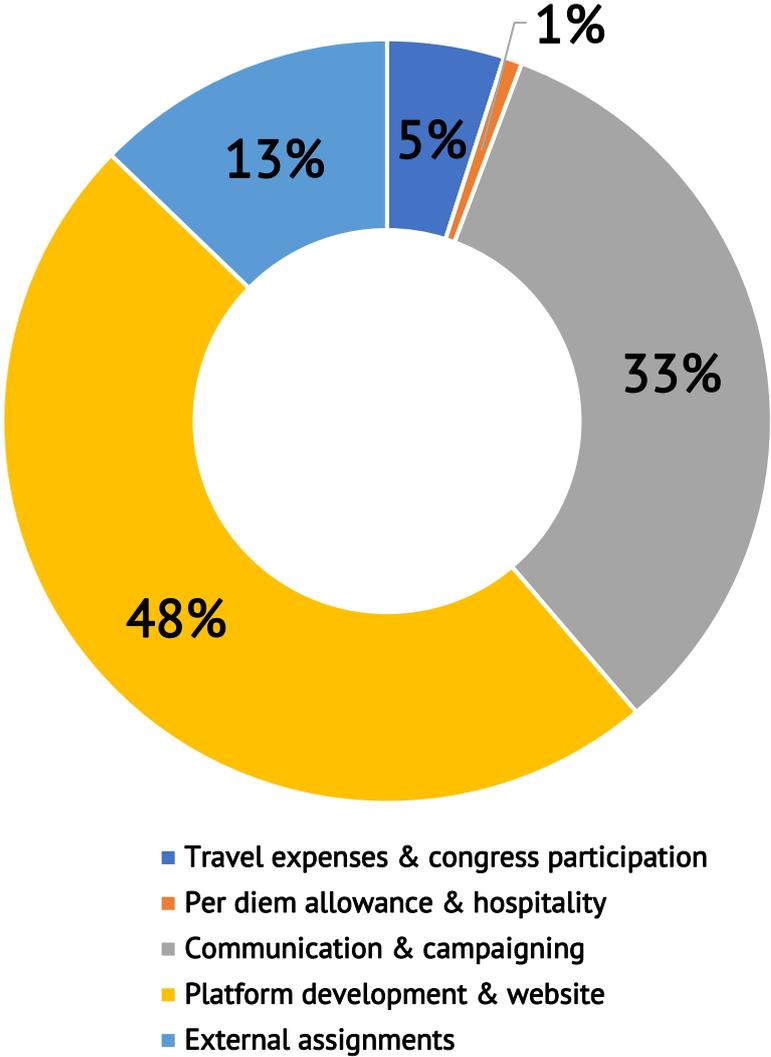
# Results

With the help of communication activities designed to have a broad impact, it was possible to collect a **total of 826 usable research questions** in the period from May to November 2018.

Figure 18 shows the filtering process that led to the 826 usable research questions.

**Figure 18 — Flow Diagram**
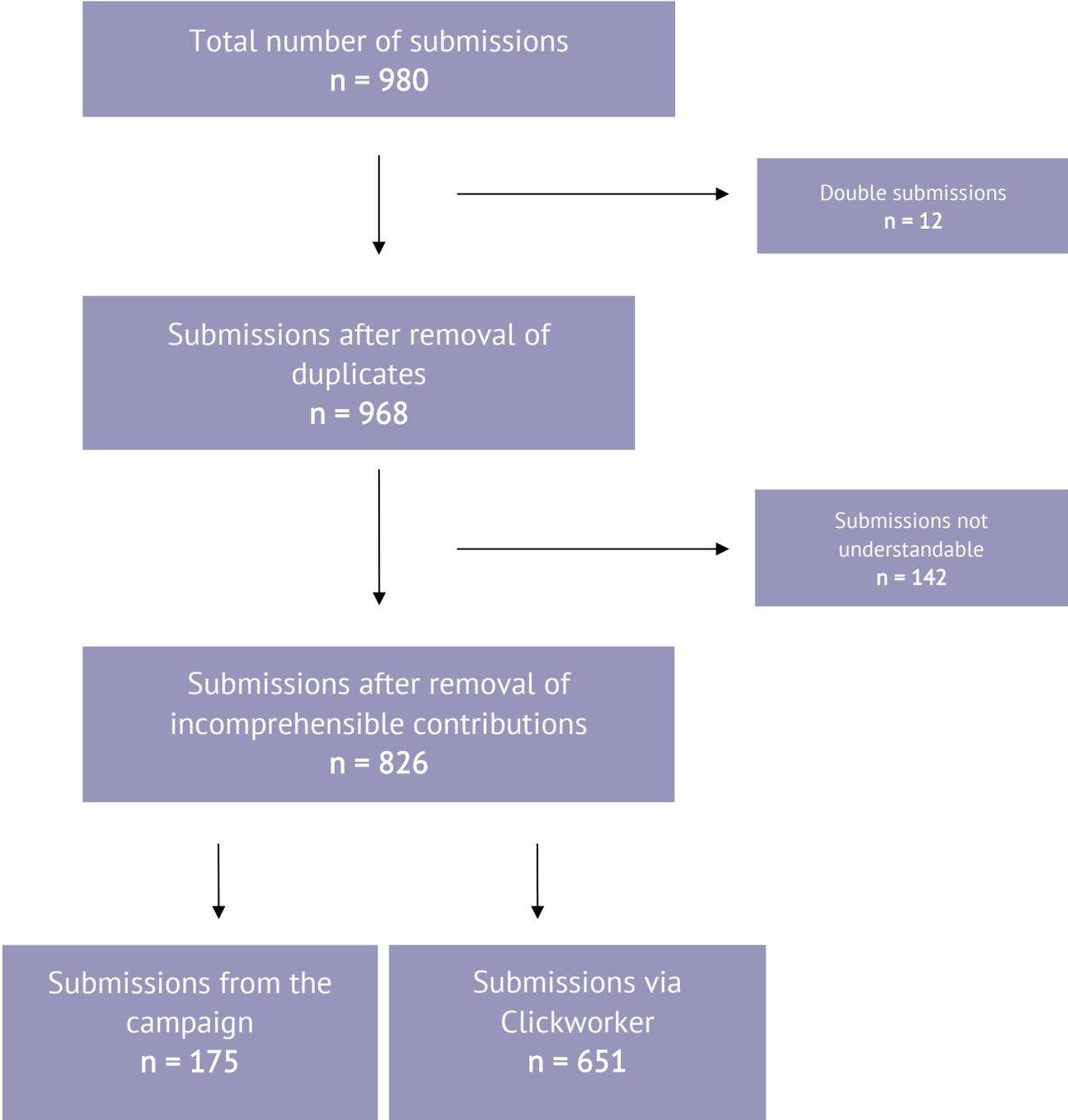
## Research questions

A total of **826 research questions were submitted** by participants from different target group segments. Via the "Tell us!" **campaign**, **175 questions were collected (21%)**, and a further **651 questions were collected via the patient platform (clickworker.com) (79%)**.

**Figure 19 — Number & origin of research questions**



651
Questions from
patients platfrom

175
Questions
from campaign
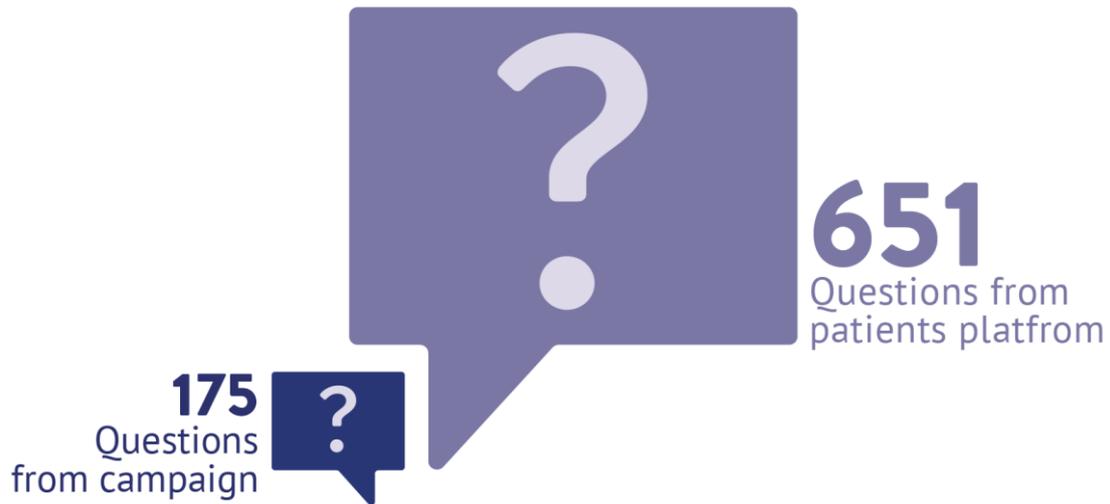
## Description of the participants

On average, the participants were 36 years old. The youngest participants were 18 years old (n = 24) and the oldest participants were 78 years of age (n = 2).

**Figure 20 — Distribution of participants by age group**



8,5%

34,0%

57,5%

■ 18 - 35 years

■ 36 - 55 years

■ ≥ 56 years
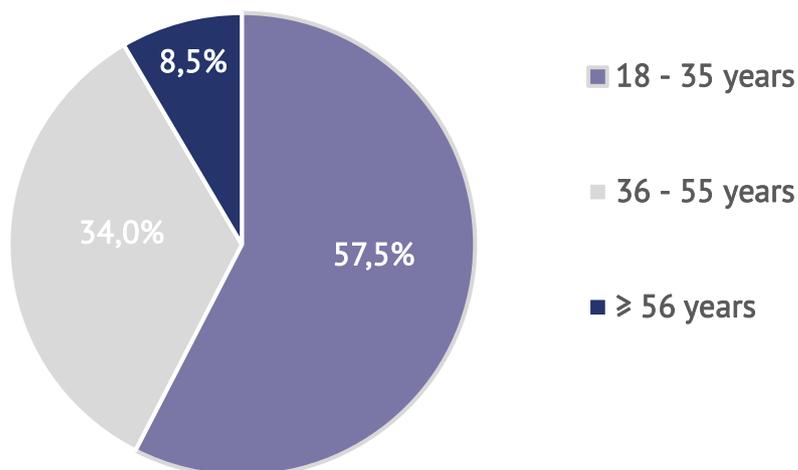
▶ 50,9 % female
▶ 48,1 % male
▶ 1,0 % diverse

The submissions come from a total of **39 countries**. The **vast majority of questions were** submitted **from Germany** (58%), **14% came from Austria** and **12% from the USA** (see Figure 21). Submissions were also received from the UK, Italy, India and Pakistan.

Figure 21 — Origin of research questions (Top 3 countries)



| 58% | 14% | 12% | |

from
**GERMANY**
(471 submissions)

from
**AUSTRIA**
(112)
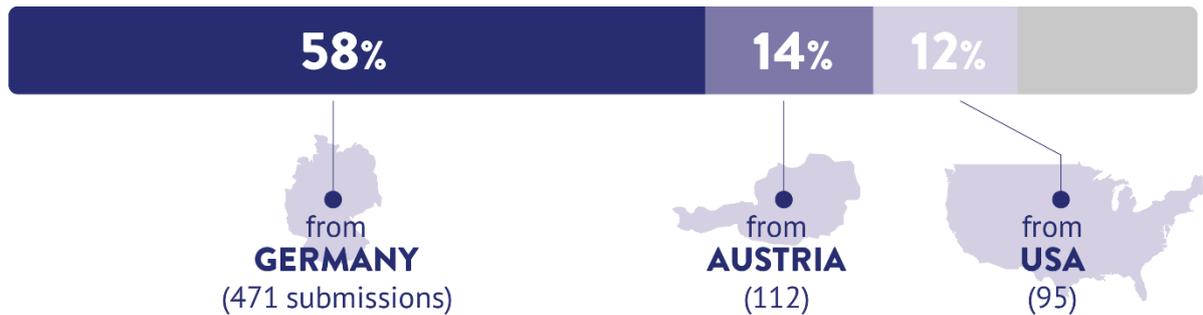
from
**USA**
(95)

Most of the submissions came from patients (80%), 20% of the questions were formulated by experts with experience in the medical field[19].

Figure 22 — Distribution of research questions between patients and experts



**20% EXPERTS**

31% Caregivers

18% Medical Doctors

14% Physiotherapists

11% Occupational Therapists

**80% PATIENTS**

**826 QUESTIONS**

Within the group of experts, among others a large number of people from medical-therapeutic professions were involved: nurses (31%), doctors (18%), physiotherapists (14%), and occupational therapists (11%).

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[19] *25 % of the participants stated that they already had research experience. 85 % of the participants are relatives of patients.*

## Figure 23 — Distribution of submissions from experts

| Professional group | Percentage |
|---|---|
| Caregivers | 31% |
| MDs | 18% |
| Physiotherapists | 14% |
| Occupational therapists | 11% |
| Other professional groups | 11% |
| Emergency assistants | 8% |
| Medical technical assistants | 4% |
| Psychologists | 2% |
| Radiotechnologists | 1% |
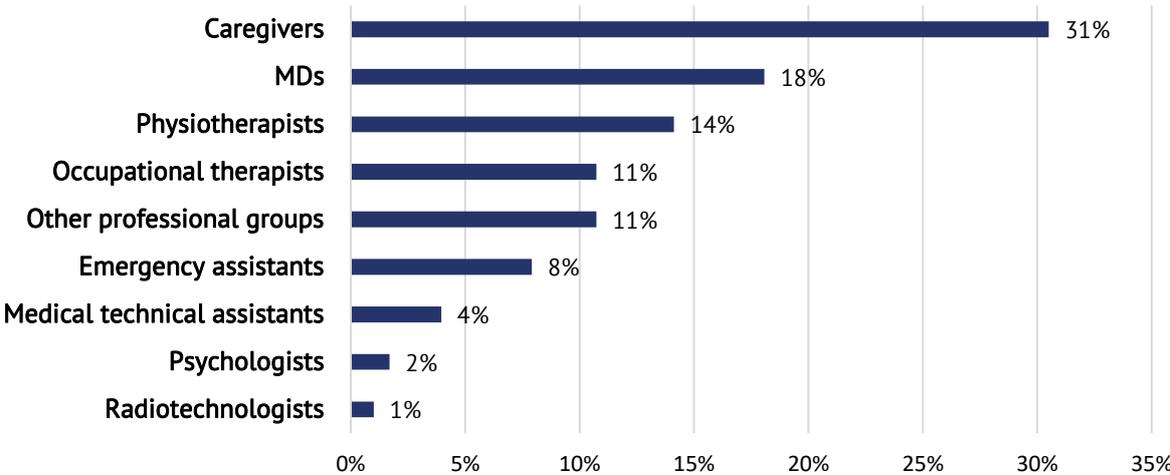
## Submissions

On average **it took the participants approximately five minutes to submit a research question**. Participants had the opportunity to submit several research questions. In total, **89% of participants submitted one question**, and **3%** submitted **five or more research questions. The possibility of multiple submissions was used by 11 % of the participants** (see Figure 24). The maximum number of submitted research questions per person was 13 research questions.

## Figure 24 — Number of research questions per participant in %

| Number of research questions | Percentage |
|---|---|
| ≥ 5 Research Questions | 3% |
| 4 Research Questions | 1% |
| 3 Research Questions | 2% |
| 2 Research Questions | 5% |
| 1 Research Question | 89% |
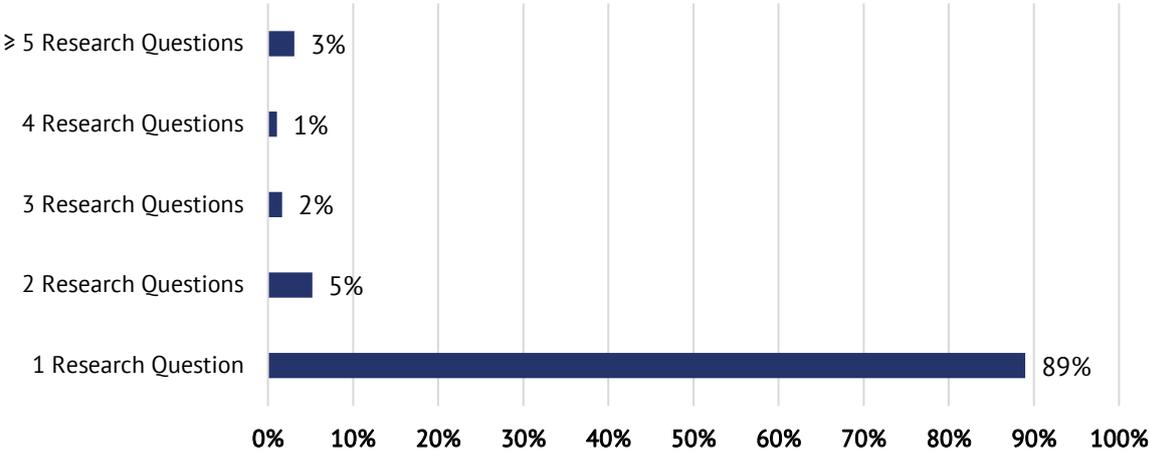
# Analysis & processing of the results

## Clustering of research questions

Further processing of the research questions was carried out from 11th to 13<sup>th</sup> of December 2018 in an **inductive clustering procedure**. The aim of the clustering was to assign the questions to certain topics (so-called clusters) in order to get a better overview of the topics submitted.

## Pre-screening

In order to further narrow down the number of questions for clustering and to only include questions in the subsequent process that can be further processed, two people (project leader Benjamin Missbach, LBG OIS Center; Johanna Rohrhofer, Winnovation) independently examined the questions with regard to the following criteria:

- ▶ **Comprehensibility**: Is the question formulated in an understandable way?
- ▶ **Thematic:** Does the question fit the topic of accidental injuries?
- ▶ **Specificity:** Is the question formulated specifically enough?
- ▶ **Duplicates:** Are there duplicates?

The agreement between the two persons entrusted with the selection of research questions was very high (**Interrater Reliability (IRR) = 98.1 %**). Any valuations that deviated from each other were discussed and resolved by consensus. In the course of the pre-screening a further **263 questions were sorted out** and finally **563 questions were used for the clustering**.

## Inductive clustering

At the FH Gesundheit (Innsbruck) all questions were analyzed over three consecutive days. Representatives from the following disciplines took part in the clustering workshop (6 hours in total):

- ▶ Trauma Surgery
- ▶ Medical ethics
- ▶ Occupational therapy and action science
- ▶ Clinical social work
- ▶ Health management
- ▶ Accident patient
- ▶ Traumatology research

<u>**Figure 25 — Clustering Innsbruck FH Gesundheit (December 2018)**</u>
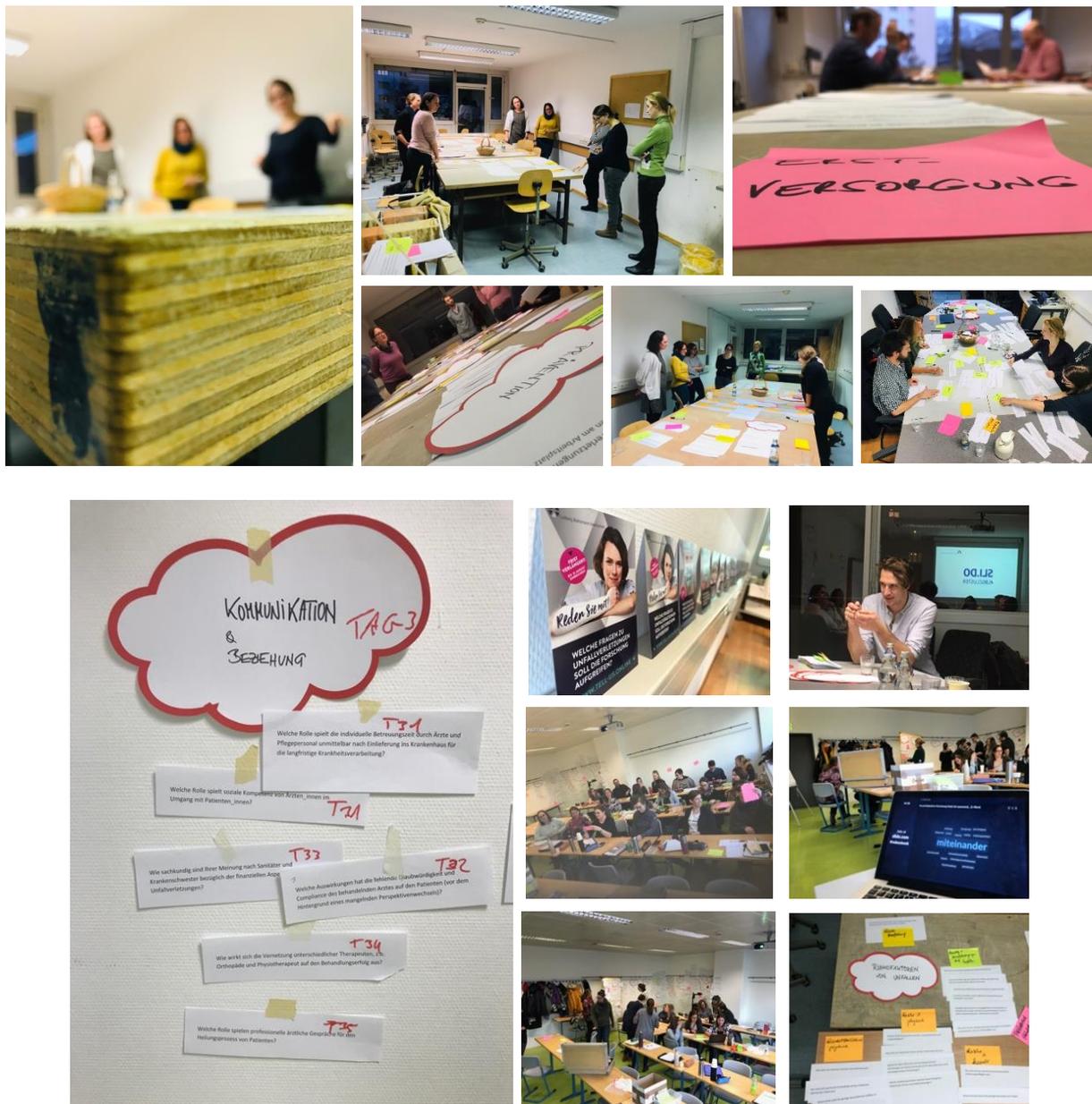


Together with 20 students (MSc) from the field of action sciences, the 563 questions were subsequently assigned to 14 clusters as final research questions. This was done as part of the master's course "Research Seminar I: Study Design & Scientific Discourse" in a further 3-hour workshop. The following clusters were formed.

# Cluster: Overview

WOUND HEALING

CAUSE OF ACCIDENTS

AGE

INTERDISCIPLINARITY

RISKFACTORS

COMMUNICATION AND RELATIONSHIP

PRIMARY CARE

CONTEXTUAL FACTORS

THERAPY

EFFECTS

PREVENTION AND HEALTH CARE

HOSPITAL MANAGEMENT

TYPES OF INJURIES

DIAGNOSTICS
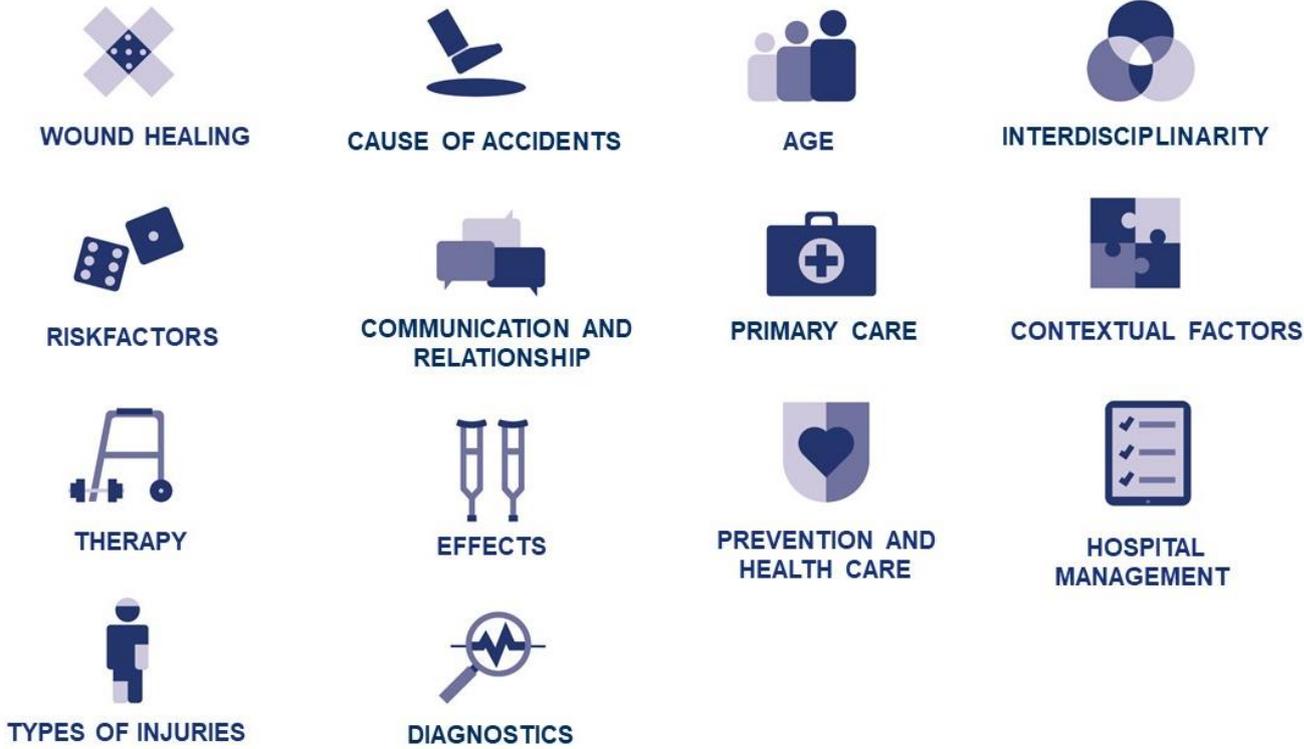
# Major learnings from the project

The findings to be derived are divided into three important sub-areas that will be of importance for the implementation of further crowdsourcing projects of LBG:

**Figure 27 – The most important findings: What we have learned**

Successful communication: **interweaving online and offline activity**

**The importance of influencers** for the success of a campaign

**The right balance** between research and implementation requirements
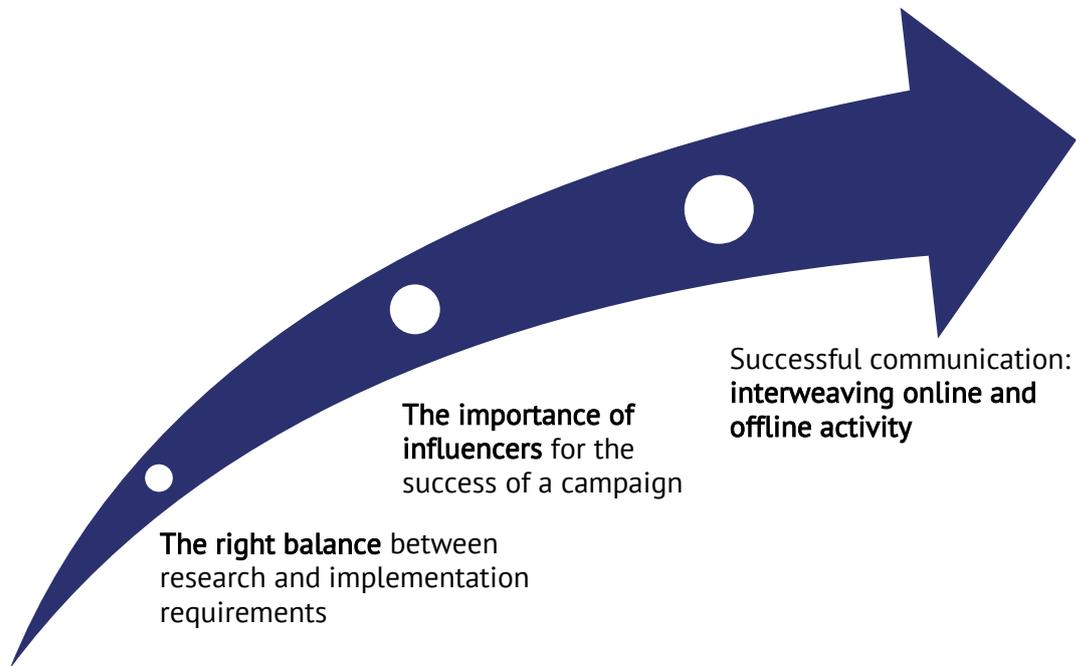
## Successful communication: interweaving of online and offline activity confirmed

The recipe for success for the implementation of a crowdsourcing campaign is the **interweaving of online and offline communication**. This findings was already evident from the first "Tell us! – about mental illnesses and was confirmed in "Tell us!" – about accidental injuries. Additional experience was gained in a new area, with new target groups and through the use of new communication channels.

Both the direct approach via conferences, in hospitals, at trade fairs as well as targeted involvement of opinion leaders have proven to be decisive factors for success. Feedback from the participants showed that **about one third was made aware of the project by colleagues (27%), i.e. by means of a trustworthy network.**

In addition, online measures were crucial in encouraging participants to submit a research question (12% via email or newsletter and 13% via social media). For a successful social media campaign, the following findings are important:

▶ building trust through a consistent narrative
▶ Introduction of the cooperation partners & Advisory Board members

## Importance of influencers for a campaign

Influencers are divided into different categories, depending on their reach (followers), interaction, personalities and the way they communicate with their followers. The aim of Influencer Relations is to draw attention to one's own project/product through targeted postings. In the case of "Tell us!" – about accidental injuries, it was specifically a matter of posting the "call-to-action" in order to encourage participation. When working with influencers, care must be taken to clearly **define transparent communication with a common goal from the outset.**

After identifying potential influencers, it was particularly important to find out **which motivational strategy would work particularly well for a collaboration**. When working together with influencers, no monetary incentives were given for the placement of postings, but instead the influencers were inspired to take part in the project with the following incentives:

- ▶ becoming a member of the Advisory Board (e.g. Dr. Georg Huemer; plastic surgeon, 33K Instagram Follower),
- ▶ via cross-postings (Diagnosia - medical app for health professionals; 3D Heals - orthopaedic 3D printing organization; Inspire2Live - patient association) or
- ▶ through activating new cooperation partners (e.g. European Citizen Action Service - ECAS)

The **information to be posted should always be prepared in such a way that it matches both the corporate identity of the campaign, the mission of the respective influencer and it should be posted in a coordinated manner**. It is also important to prepare information in such a way that influencers have little effort in processing it prior to posting (e.g: writing posts & templates, providing pictures in appropriate formats, etc.).

## The right balance between research and implementation requirements

The "Tell us!" – about accidental injuries crowdsourcing project evolved from a Lab for Open Innovation in Science project and was first initiated by the two participants Heinz Redl and Veronika Hruschka. In addition to **the implementation project, of which the objective was to generate new and innovative research questions in the field of accidental injuries**, a research project was also launched. **The aim of the research project was to find out which conditions influence the quality of the submissions on the platform and to identify boundary conditions.**

The defined goals of the implementation and research team led to different challenges in the course of the project:

- ▶ the development of the platform (number of questions, total length of the survey)
- ▶ the planning of the communications of the campaign (when to communicate which information) and
- ▶ the communication of the results (when may results be communicated? which results may be communicated?).

### Time is a scarce commodity: Keep barriers to participation low

The topic of **entry barriers** is **particularly important** for all future projects taking place in the digital space: **the more barriers to participate** are available (registration; formulation of entry information - letter, accompanying research questions, etc.), **the more time participants have to spend** on submitting their question(s). This can lead to **less motivation** to participate in the

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project even less to recommend it to others. The loss of potential participants was confirmed in numerous informal discussions with the project leaders. The consequence of higher entry barriers would necessitate a higher number of people to be contacted in order to reach a satisfactory number of participants overall.

### Bringing together Implementation and research

"Tell us!" - about accidental injuries is the first OIS Center project involving research and implementation. **The question of whether this project is ultimately an implementation or research project cannot be answered clearly** because the separation of research and implementation is de facto a constructed one. Nevertheless, there are different expectations based on different requirements of research and implementation.

**Research in the OIS Center should serve to improve the feasibility and application of Open Innovation in science projects**. At the same time, implementation projects should be designed in such a way that accompanying research can be carried. The following findings can be derived from the project:

▶ Clear distribution of competences and tasks
▶ Research and implementation projects should be developed jointly and co-creatively
▶ Make project design and the dissemination of results such as open (research) artefacts available to the public

**An overriding goal for the LBG is to achieve in-house expertise on crowdsourcing.** This requires tailor-made accompanying research for implementation in the context of Open Innovation in Science. In particular, this should improve both the method of crowdsourcing in identifying research questions and promote in-house expertise in order to develop a **sustainable business model** for the application of crowdsourcing in the identification of research questions. For this purpose, it is important to carry out a wide range of crowdsourcing projects in the future, namely:

▶ in different subject areas
▶ with various target groups
▶ and in various formats

# Outlook & next steps

"Tell us!" projects experiment with the use of crowdsourcing to systematically test the **inclusion of unusual knowledge carriers in research**. This systematic involvement in research using Open Innovation in Science is the focus of "Tell us!" projects of the Ludwig Boltzmann Gesellschaft.

The strategic importance of crowdsourcing as a "priority setting" method was demonstrated in the project "Tell us!" about accidental injury. Internationally, another organization acts in a similar way to prioritize (medical) topics for research: socalled Priority Setting Partnerships = PSPs facilitated by the James Lind Alliance (JLA). The cost of a PSP[20] is approximately around €100,000. About 70 PSPs have been carried out in the last 15 years, 36 additional PSPs are currently in progress (also international). The JLA is a non-profit organization of the NHS (National Institute for Health Research). The aim of a PSP, which takes about 18 months, is to create a TOP 10 list with questions on research priorities (quasi research questions). The process of generating these research questions takes place with the involvement of various stakeholders (e.g.: patient organizations) and is mainly carried out through several rounds of questionnaire submissions. A workshop at the end of this process serves to rank the questions. A disadvantage of the PSP model is that it lacks a sustainable exploitation strategy. A systematic translation of PSPs into research activities is currently lacking. The dissemination of results and the inclusion of funding organizations in their calls for projects seems to be the biggest problem of JLA. [21] JLA has a very good reputation in the UK - JLA priorities are held to high regard, but there is no systematic incentive system for the integration of PSPs for research funders, nor for individual researchers.

Due to the innovative set-up of the LBG, the National Foundation for Research, Technology and Development (Natfe) supported the establishment of a "Clinic2Research" research group with 4 million Euros and advocates this "new and exciting approach". In particular, the approach to topic identification is systematically interesting and highlighted with praise. [22]

Based on the recommendation made by the Council of the National Foundation, the LBG has set up a systematic process for the establishment of an LBG "Clinic2Research" research group. The aim of this process is to check the collected research questions for their novelty, to make a selection of topics and to establish a research group with the beginning of 2020 via an innovative tendering and group finding process and to fund it over a period of four years.

This development is very positive for the LBG and indicates that Open Innovation un Science activities, or rather the use of crowdsourcing to identify research questions, will continue to be firmly anchored within future LBG activities.

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[20] *http://www.jla.nihr.ac.uk*
[21] *http://www.jla.nihr.ac.uk/news-and-publications/psp-articles-and-publications.htm#Acne)*
[22] *https://www.rat-fte.at/files/rat-fte-pdf/einzelempfehlungen/2018/180913_Empfehlung_NSFTE&Oe-Fonds_2019.pdf*