DEPLOYMENT STRATEGY FOR CENTRAL EUROPE

Innovation transfer in the medical sector from clinics to companies (InTraMed C2C)

Ref. code: 2CE096P1

CENTRAL EUROPE Programme 2007 – 2013

PRIORITY 1: Facilitating innovation across Central Europe

Document Classification

Title	Deployment strategy for Central Europe
Output	4.3.6
Reporting Period	Apr. 2010 – June 2013
Contractual Date of Delivery	30 June 2013
Actual date of Delivery	30 June 2013

Authors	Dieter Westphal; Lead Partner
Work package	4 - 4.3 Implementation
Dissemination level	Public
Nature	Report
Version	1.0
Date	30/06/2013
Summary	Setting up a deployment strategy of the innovation transfer from clinics to companies for the Central Europe programme area. This deployment strategy will be available on the website (free of charge).

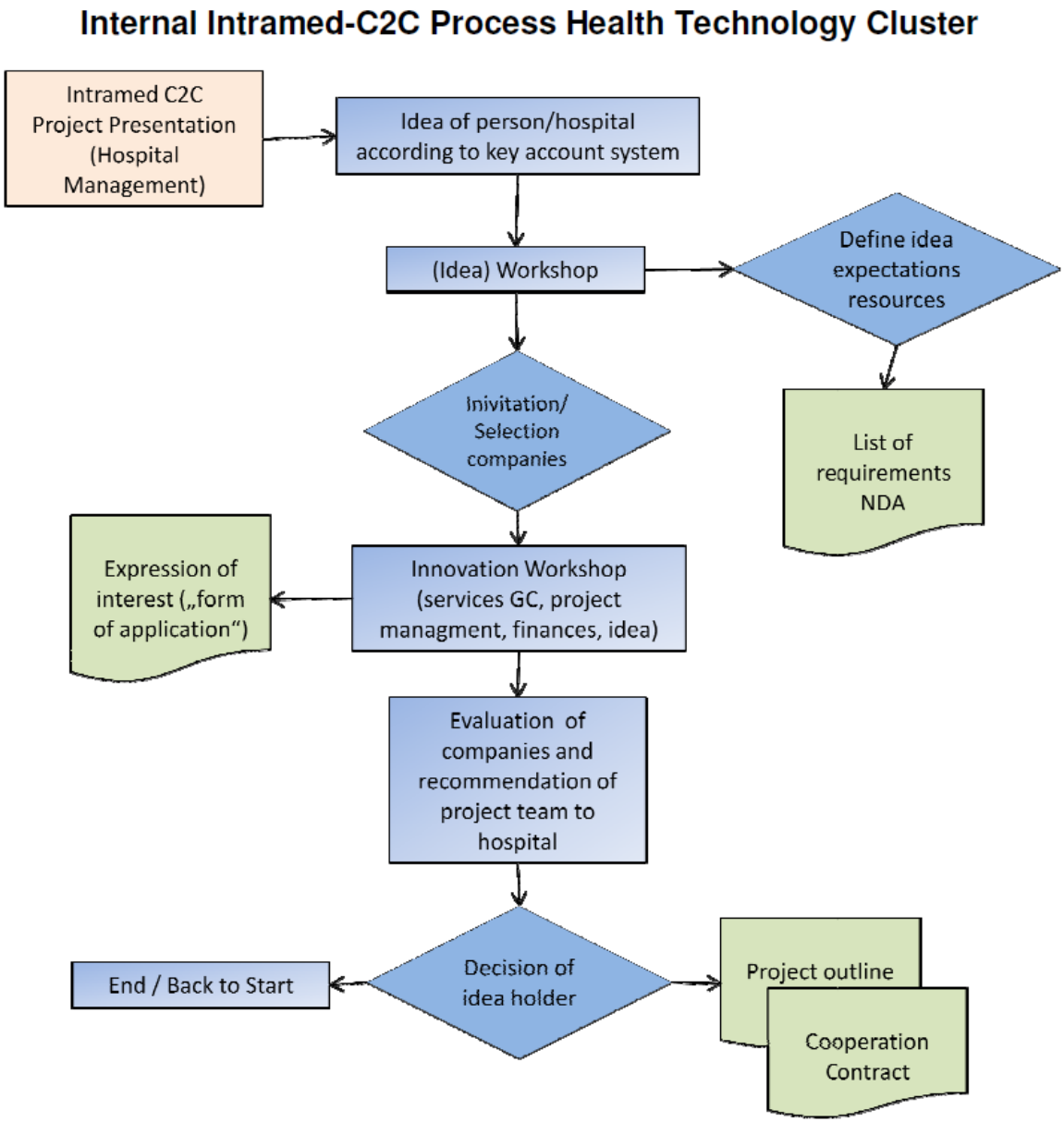
Based on the experience of the project, it is not possible to describe only one overall deployment strategy for all involved project partner regions and countries (as well as regions and countries beyond the project), but to describe several approaches.

These approaches take into account the different situations, boundary conditions, political situations, health care systems and other relevant conditions of the specific situation.

Therefore the most favourable approaches developed within the project will be presented.

The individual situation of different region or country (beyond the involved regions and countries of the project) might need to be adapted to the most appropriate approach presented in this section.

Austria (Clusterland Upper-Austria)



In Austria, the idea of an employee in general belongs to the employer, which is in this case the hospital. Furthermore, the implementation of an idea is not the daily work of a hospital and therefore it is not within the resources. These reasons require an official approval of the managing board of the hospital. Thus the process starts with a presentation of the Intramed-C2C approach and its benefits for the hospital. This presentation was done by the Cluster Manager of the Health Technology Cluster.

Once the managing board approved the Intramed-C2C process, hospital staff could be approached directly by the project managers of the Health Technology Cluster according to

the key account system, which divided hospital staff into three groups: physicians, nursing staff and technical staff.

Once an idea was identified, the holder of the idea and a project manager of the Health Technology Cluster further defined the idea within a list of requirements and determined the following steps. Expectations, goals and legal issues are discussed within this idea workshop. The NDA (Non-disclosure agreement) is an important part of this meeting.

The idea workshop is followed by an innovation workshop. Not only hospital staff but also selected companies are invited to this innovation workshop. During this workshop the holder of the idea did a presentation on the idea and companies were able to ask questions. The Health Technology Cluster was responsible for the organisation and administration of the workshop. Also, the services of the Health Technology Cluster and the procedure of Intramed-C2C were presented.

Each company was asked to fill out a form of application in order to express their interest in the project. Based on this form, the companies were evaluated using the following criteria: willingness to cooperate, expectations and goals, infrastructure and know-how in the field of interest and the willingness to invest. The decision which companies are part of the project consortium however is up to the hospital. As soon as the project partners are defined, a project outline and cooperation contract is drawn.

List of requirements

Product requirements

Title of project:	
Contract person:	
Current Situation: (~½ page)	*Available technology? Which tools or products are currently used? And why are these products inapplicable?* *(You may provide a picture)*
Requirements: (~ ¼ page)	*Requirements that need to be fulfilled and "nice-to-have"*
Product benefits:	*Additional advantages?*
Cost of product:	*How much are the customers willing to pay for the product?* *How much is the currently used product?*
Target group:	*Potential customer of the product?*

Project Outline

The project outline is used to evaluate the companies according to their compentences, interest and intention

Specification of project	
Project Titel:	Functional wagon
Project start:	
Duration of project:	
Estimated project budget	Labor cost: Investment cost: External Expertise: R&D Institutions:
Your input: (max. ½ page) - Concept of product – solution proposal? - You competences / special know-how? - Which role is applicable: Project partner, external expert, service provider or project coordinator?	
Describe the project benefit for your company? (max. ¼ page)	

Name, Legal Status and number of employees	
Name	
Legal Status	
Number of employees	

Italy - TIS Innovation park

The project implementation has been prepared very carefully with the commitment of the local public entity who is responsible for the management of the public hospitals (Bolzano, Bressanone, Brunico, Innichen, Silandro, Merano, Sterzing) in South Tyrol. In parallel we have been collaborating with some private clinics (Bonvicini, Villa Melitta) and rehabilitation centres (Salus Center) where we presented the product initiative and the goals of the InTraMed project.
These meetings have been followed by presentation meetings in the hospitals and clinics where we introduced the innovation process to the clinical staff.

Picture: Meeting at the hospital Bolzano

Online-Tool / Questionnaire (in German and Italian language)

In addition to the presentations in the hospitals we have created an Online-Tool which could be used to share an innovative product idea with TIS innovation park in order to step into the product development process.

Picture: Online-Questionnaire

After receiving the input from the employees of the hospital, we again confronted the clinical staff and the decision makers with the product ideas. In parallel we started to evaluate the idea, check the feasibility and analyse the market for existing products.

In most cases we have completed a specification sheet with all technical details with the help of the innovator. Having collected all important data we have been searching for companies that could be interested in the production of the innovative product.

At the moment all product development processes are still on-going. So far we had two cases where a NDA has been signed. In one case the innovator has already agreed with a company to develop a new product for handicapped people. In the second case we are still clarifying the technical features in order to develop a brand new product or to decide for an adaption of an existing product.

Other product ideas have been collected in the following fields of health care & medicine:

- Diagnosis
- Hygiene

- IT in the Health Care Sector
- Instruments for the emergency medicine
- Dosing of pharmaceuticals
- Technical support

The innovation process InTraMed-C2C at TIS innovation park

Innovation process

Challenges

Due to the fact that the health care and medicine topic has not been followed by TIS innovation park earlier, we had to work hard on stimulating the stakeholders, decision makers in the medical sector and companies at the very beginning of the project. Most of the dialog partners had doubts, that this initiative could be successful in South Tyrol because of the few companies that are actively working for the health care and medicine sector up to now.

After having implemented the questionnaire and presenting the innovative ideas, most of our partners are convinced that this process should be retained, also after the InTraMed-C2C project has finished, because they realized that the opinion and expertise of the medical staff is a brilliant source for innovation.

Additionally we have invited companies, decision makers and clinical staff to a workshop at TIS innovation park to exchange their ideas and to learn from each other. The topic of this workshop was: “Efficient Health Care through Innovations”. Beside the presentations all

companies had the possibility to present their products and their knowledge at a small expo at TIS.

Workshop and Expo at TIS innovation park

Another challenge that we have been confronted was, that the employers – local hospitals – have no experience how to deal with IP rights and the patent commercialisation. This issue is still open and will be elaborated in more detail in collaboration with the human resource manager of the public hospitals.

Marketing and promotion material

Marketing material

Database system

Not all innovations could have been inserted to the database system as the innovator did not agree on publishing the idea. Some ideas have been inserted but unfortunately have not been responded in the way as it has been supposed to. For the product idea “Mobile thermometer for measuring the body core temperature” we got the contact of one interested company thanks to the commitment of Forum MedTech Pharma and the company network of Andreas Frömer. This product idea has led to another innovation workshop in South Tyrol. A company from the Forum MedTech Pharma network has been involved too.

Training Activity

This initiative is described in more detail in the document 4.3.4. Training Activities.

Poland - John Paul II Hospital

The InTraMed-C2C Project was implemented by the John Paul II Hospital in Krakow in accordance with the schedule. In order to achieve the project goals the Managing Team carried out the following actions set out in the WP4 – Implementation":

1. "Action plans" were established and implemented
2. Local Steering Group was established
3. Pilot innovation workshop was organized in September 2011
4. Report on pilot innovation workshop was written

1. Establishing and implementing „Action plans"

The tasks identified in the document "Action plans" were successfully carried out as described below:

a) an informing letter describing the InTraMed-C2C Project was prepared in August 2011. It was distributed among 42 hospitals in Malopolska listed in the report *3.3.1 - Evaluation of clinics in every region*. In this way the John Paul II Hospital in Krakow reached all target groups;
b) we established cooperation with the Medical Technology Transfer Center – Technology Park Ltd. The Managing Team received support from the company mainly with respect to contact lists of potential investors and workshop participants, and exchange of knowledge and experience in the process of commercialization of medical innovations;
c) on 29 September 2011 there was the first meeting of the Local Steering Group established in the beginning of the project which is described under point 2 in this report;
d) cooperation with LifeScience Cluster Krakow facilitated participation in meetings and other professional events focused on innovations in medicine;
e) cooperation of the Managing Team of the InTraMed-C2C Project, the Medical Technology Transfer Center –Technology Park Ltd. and lawyers of the John Paul II Hospital in Krakow resulted in the preparation of a confidentiality agreement template which was used during innovation workshop. The tool became a very important component of innovation management;
f) during meetings with representatives of target groups the Project Manager each time presented a motivation programme prepared in the InTraMed-C2C Project. The presentation of reciprocal benefits from participation in innovation workshop was the usual component of the meeting agenda;
g) the Managing Team developed the mode of innovation workshop with the participation of an information broker. The presence of an information consultant helped workshop participants to obtain an appropriate scheme of commercialization and a tool for innovation management;
h) during meetings with the Local Steering Group the following solutions and tools facilitating commercialization of innovations in the medical sector were presented:

– systematization of problems regarding cooperation of hospitals combined with R&D institutes and introducing clear principles regarding intellectual property rights, study results and patents such as implementation of the Swedish model, regulations on innovation management, establishing the benefits for medical staff as a motivational factor, etc.;

- drawing attention to establishing scope of work and responsibility for employees in such a way that they clearly define intellectual property rights regarding innovations and identify who is the owner of the IP rights (employer or employees);
- establishing regulations on implementation of innovations from medical sector to business – the most important thing is to prepare concrete actions which will be of pilot type and will facilitate us to develop appropriate approach after detection of errors and inaccuracies;
- expanding knowledge and forming appropriate attitudes among medical staff through organization of meetings and courses – it is important to share concrete information and practical examples in the form of case studies, as lectures are not the best way of education in this case;
- creating individual approach to doctors regarding the medical disciplines they represent, identifying pioneers and most prominent people to cooperate with, as innovations that are likely to be implemented in small and medium enterprises frequently appear in everyday work;
- establishing in hospitals Innovation Teams which would have full competences in managing innovation implementation;
- initiating and stimulating interest in technology brokers who with their knowledge can serve as intermediaries between authors and stakeholders during bilateral meetings;
- organizing bilateral meetings where experts confront and evaluate the potential of innovative projects, only then financial issues are raised;
- establishing concrete rules, regulations and process pathways for medical staff to be presented during bilateral meetings;
- preparing good practices which should be disseminated in the sector of medicine and small and medium enterprises;
- establishing hospital consortia which would make use of services and resources offered by one Innovation Team or technology transfer center.

i) The Managing Team of the InTraMed-C2C Project, after each innovation workshop prepared other bilateral meetings for the interested parties for instance a visit to the ESPEFA company which is described under the point *4.2.3 - Follow-up-meetings*;
j) After each innovation workshop the Managing Team of the InTraMed-C2C Project monitored the fate of the medical innovation, which was the topic of a given meeting. It was most frequently done via email or phone contact with stakeholders;
k) The John Paul II Hospital in Krakow will propose Good Practices in commercialization of innovations in the medical sector based on the experience gained from the implementation of the InTraMed-C2C Project. Good Practices will be discussed under the point *2.2.8 - Final report*.

2. Establishing the Local Steering Group

The aim of the Local Steering Group (LSG) is to develop innovativeness, improve quality and effectiveness regarding commercialization and technology transfer and to foster links between the medical sector (hospitals, clinical departments, medical universities) and business (mainly small and medium enterprises) in the Region of Malopolska.
The Local Steering group consists of 9 members who represent institutions focused on innovations in medicine. Their experience and knowledge facilitate realization of the following goals:

- Share experience in commercialization of innovations,
- Define problems which appear during commercialization of innovations in the medical sector,
- Propose solutions and tools facilitating commercialization of innovations in the medical sector,
- Plan new actions regarding the Local Steering Group, including support for the Managing Team of the InTraMed-C2C Project in current activities.

Detailed information on the Local Steering Group is provided under the point *4.1.2. Implement Local Steering Groups*. Three meetings of the Local Steering Groups have been held so far:

- 29.09.201 – the first meeting focusing on defining the areas of cooperation between the members of the Local Steering Group and the John Paul II Hospital in Krakow. The participants identified many problems and difficulties which appear during commercialization of innovations in the medical sector. “Brain storming” helped formulate answers and propose solutions in this respect;
- 23.03.2012 – during the second meeting the Local Steering Group discussed an innovation solution submitted by a research team of the Institute of Zootechnics – State Research Institute. Participants analyzed possibilities of commercialization and the LSG members declared support in transfer.
- 30.01.2013 – the third meeting of the Local Steering Group focused on the organization of the Final Conference of the InTraMed-C2C Project. The participants declared to cooperate in this respect and proposed speakers with their presentations. They also discussed a schedule of training for medical staff as required in the InTraMed-C2C Project.

Cooperation with the Local Steering Group in the InTraMed-C2C Project provides first of all an invaluable opportunity of using extensive knowledge and diverse experience of its members regarding innovation management.

3. Organization of pilot innovation workshop in September 2011

Pilot innovation workshop took place on 27 September 2011 at Kossak Hotel in Krakow. The event was preceded by a number of organizational tasks described under the point *4.1.3 - Prepare workshops*:

- A letter was distributed among hospitals in Malopolska informing about the InTraMed-C2C Project. The aim was to describe the activities undertaken in the project and to encourage participation in innovation workshop;
- Cooperation was established with Kamil Kipiel, technology broker. He has experience in technology brokerage services in the area of technology and knowledge transfer, especially in the field of life science, including medicine. His presence during the workshop provided the participants with a strategic support element.
- A series of meetings of the Managing Team was organized to discuss the scheme and agenda of innovation workshop. Establishing the form of this event was of extreme importance because of the lack of regulations regarding innovation management in hospitals;
- In cooperation with Kamil Kipiel a search for participants of pilot innovation workshop was performed in target groups defined in the InTraMed-C2C Project;
- Upon dissemination of information on pilot innovation workshop the following institutions declared their participation:

Hospitals and medical organizations

- The Department of Otolaryngology at University Hospital in Krakow,
- Dr. Jasinski Provincial Rehabilitation Hospital in Zakopane,
- Strabismus Center in Krakow,
- St. Anna Hospital in Miechow,
- St. John of Jerusalem Hospital in Szczyrzyc

SMEs

- Silvermedia Ltd.

Business related institutions

- Medical Technology Transfer Center –Technology Park Ltd.
- Cluster LifeScience Krakow

- All the interested institutions received official invitations to participate in pilot innovation workshop
- The Managing Team of the InTraMed-C2C Project in cooperation with the Medical Technology Transfer and lawyers of the John Paul II Hospital in Krakow prepared a confidentiality agreement template which was used during innovation workshop;
- A number of administrative tasks were performed to successfully organize pilot innovation workshop.

4. Report on pilot innovation workshop and conclusions

Report

Pilot innovation workshop, which was held on 27 September 2011 at Kossak Hotel in Krakow, was attended by 12 participants. They represented 5 medical organizations, one small and medium enterprise and 2 business-related institutions. After analysis in WP3 – *Concept and design*, which revealed that the usual form of cooperation between hospitals and companies was implementation of final products offered by enterprises, the Managing Team decided to conduct pilot workshop which was a reverse image of the situation. Silvermedia Ltd., aiming at extensive development of its offer and products for the medical sector, decided to participate in the workshop to encourage hospitals to cooperate. The underlying determinant was to encourage the participants to support Silvermedia in the process of developing the final product i.e. Screening Platform. This IT tool can be extended to include new applications, however ideas must come directly from the medical sector. With this solution two aims will be reached:

- Silvermedia will gain support from specialists in the medical sector, who will provide their knowledge to improve the Screening Platform,
- Medical sector will create a completely new IT tool which will meet the expectations of specialists working in hospitals, as functionalities of the Screening Platform will respond to the needs emerging in everyday work.

During pilot innovation workshop Krzysztof Bederski Project Manager presented a motivational programme developed under the InTraMed-C2C Project. In this way the participants were made aware of the fact that cooperation between hospitals and business may be completely different than before. Attempts to change the way of thinking and showing benefits of cooperation to both sides were invaluable.

Discussion during pilot innovation workshop was very interesting, and representatives of medical organizations understood well the need to change the mode of cooperation between hospitals and business. A very important aspect of the event was submission by the participants of three innovative ideas to extend the Screening Platform:

- Developing remote rehabilitation system for patients,

- Monitoring and studying eye disorders such as lazy eye syndrome,
- Novel method for examining neonates.

Detailed report on the course of pilot innovation workshop was presented under the point *4.2.2 - Pilot workshop report*.

Conclusions

- Pilot innovation workshop was a significant step in the process of building awareness of the potential benefits of cooperation between medical sector and business.
- Presentation of the motivational programme developed in the InTraMed-C2C Project changed the perception of cooperation between hospitals and enterprises among workshop participants.
- As at the time of pilot innovation workshop there were no regulations regarding innovation management in hospitals, it became a very important topic during discussion and experience sharing.
- The Managing Team of the InTraMed-C2C Project developed and tested the following tools and approaches to commercialization of innovations in the medical sector:
    - Confidentiality agreement template for workshop participants,
    - Scheme and course of innovation workshop,
    - Motivational programme for participants of innovation workshop,
    - Presence and support of technology broker,

Summary

The John Paul II Hospital in Krakow realized all tasks described in WP4.1 and WP4.2. Each activity was preceded by preparations with the involvement of the whole Managing Team of the InTraMed-C2C Project. The tasks were difficult because of many national and regional requirements. Detailed analysis in WP3 – *Concept and design* facilitated the implementation of the InTraMed-C2C Project. An especially important aspect from the Managing Team's viewpoint was filling the information gaps in the related area. Due to activities in WP4 of the InTraMed-C2C Project the following results were obtained:

- Assumptions defined in the „Action plans" were implemented;
- A Local Steering Group was established, with their knowledge and experience providing active support for the Managing Team in the process of technology transfer and innovation management;
- Pilot innovation workshop was organized with the aim at fostering cooperation between hospitals and business and identifying possibilities of further cooperation;
- Tools and approaches to commercialization of innovation in the medical sector were developed for use in the future innovation workshops.

Actions in WP4 were also supported by tasks undertaken in WP2 - *Communication, knowledge management and dissemination*, including:

- Participation in professional events organized in Malopolska and in Europe,
- Organization of promotional stands and meetings during events related to innovation management,
- Presentations at conferences concerning innovations in medicine
- Preparation and distribution of information material on the InTraMed-C2C Project,
- Publication of papers on the InTraMed-C2C Project in professional journals.

Parallel activities of the Managing Team in WP2 and WP4 regarding implementation of the InTraMed-C2C Project assumptions facilitated achievements of specific goals.

The specific approach for establishment of Innovation Hospitals in Gorenjska region

Stanič Uroš *, Dolinšek Slavko **, Andreja Cerkvenik Škafar***, Irena Grmek-Košnik****, Jana Stanič*****, Gregor Cerinšek******

*Biomedical Research and Innovative Society, Ljubljana, Slovenia
**Innovation Development Institute University of Ljubljana, Ljubljana, Slovenia
***Gynaecology and Obstetrics Hospital Kranj, Kidričeva cesta 38a, 4000 Kranj, SI
****Institute of Public Health Kranj, Gosposvetska 12, 4000 Kranj, SI
*****Kosezi d.o.o., Iskra Techno, Ljubljana, Slovenia
*kosezi@siol.net

Abstract - The objective to convert hospitals in EU regions to innovative type is of high priority for their economic growth, employment and wellbeing of EU citizens. The results presented in the paper were obtained in Gorenjska region through the implementation of the InTraMed C2C Central Europe project. The system approach consisted of identification of the state of the art in innovation at each of the involved hospitals, SWOT analysis, seminars and workshops related to innovation process and culture. Among large spectrum of ideas gathered at these events the managers of hospitals agreed that first priority should be given to most needed biomedical engineering (BME) prototypes, which were supported also by small and medium enterprises (SMEs) business interest. Finally, through open innovation approach five ideas were selected for development of prototypes and later testing. Some of these selected BME ideas will be presented in the paper.

I. INTRODUCTION

The literature on innovation in hospitals has recently started to observe hospitals as providers of complex services and healthcare system hubs. In this approach, hospitals are regarded as combinative providers of diverse and dynamic services, able to go beyond their own institutional boundaries by becoming part of larger networks of healthcare provision, which are themselves diverse and dynamic (inter-hospital agreements on the shared use of equipment, community health networks set up to tackle a range of pathologies or even social problems). This approach makes it possible to extend the model of hospital innovation to incorporate new forms of innovation and new actors in the innovation process.

In this paper the results will be presented that were obtained through the implementation of the InTraMed C2C Central Europe project [1] during second and third (last) year. According to the project Action Plan the Innovation Seminars and Workshops were done, the final selection of the innovation ideas were selected and the introductory workshops with SMEs and research institutes for five ideas of the three participating hospitals took place.

II. MAIN CONCLUSIONS FROM THE INNOVATION SEMINARS AND WORKSHOPS

In the context of the InTraMed project, Institute for Innovation and Development (IRI UL) has organized and delivered 4 innovation seminars and 3 innovation workshops within 4 different health care institutions in Gorenjska, Slovenia, i.e. University Clinic of Respiratory and Allergic Diseases Golnik, General Hospital Jesenice, Institute of Public Health Kranj and Hospital for Gynecology and Obstetrics Kranj. The participants were the decision makers within each health care institution (i.e. top management and deputes, specialists, financial management, human resource management).

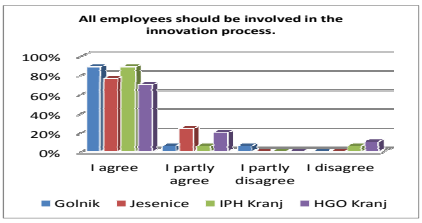
The main objectives of **the innovation seminar** were: 1) introduce the key characteristics of the innovation and innovation processes; 2) introduce the innovation model focusing on idea generation and idea filtering; 3) introduce the main mechanisms, tools and best practices to develop and maintain the innovation system within the health care institutions.

All participants of the innovation seminar received the "idea generation form" in order to describe several different ideas related to the identified problems that are emerging in the context of their daily work. All the forms were gathered and analyzed by the general director of the respective health care institution and the expert from the IRI UL which acted as the process facilitator. After this preliminary filtration of ideas, the authors of ideas were guided step by step through the innovation process (from idea to realization) in the context of the innovation workshop. Therefore the main objectives of **the innovation workshop were:** 1) general overview of the gathered ideas; 2) using the innovation model and idea management in practice, focusing on the gathered ideas;

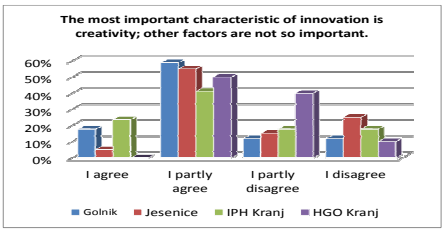
3) introducing the supportive mechanisms for idea development and commercialization.

At the very beginning of the innovation seminar, the participants received a questionnaire in order to identify their current understanding of innovation. Some main results are as follows:

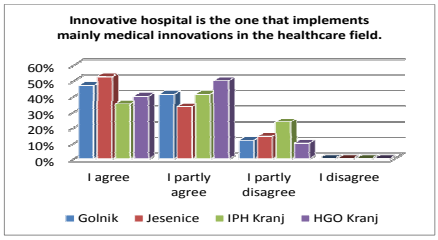
1) The majority of participants agreed that innovation is of crucial importance to enhance the quality of services and achieve the competitive adventage of the healt care instituion. The concept of innovation has a strong value for them and they furthermore agree that all employees should be involved in the innovation process.



2) Innovation as a concept was mainly understood as "somethin new, not including the added value yet". Furthermore, the participnats considered creativity as a key and main characteristic of the innovation process; other factors were not considered so much important when compared to creativity. It was explained to the participants that innovation is understood as a useful novelty, which brings new solution(s) to the identified problem(s) and therefore always has the added value. Innovation always involves creativity; however, it also involves successful ralization, implementation and commercialization of new ideas.

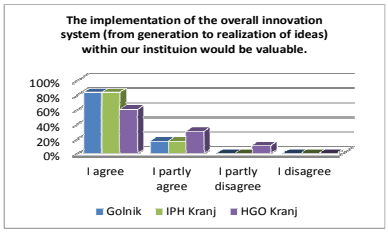


3) The majority of participants also considered innovative hospitals as those focusing mainly on medical innovation in the health care field. These innovations are crucial in order to enhance the quality of primary services provided. However, other (supportive) functions can also greatly contribute to better innovation performance of the helath care instituion.

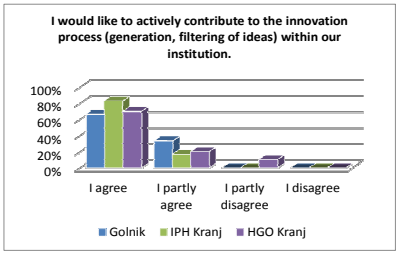


The innovation seminar was followed by the innovation workshop. At the end of the workshop participants received a new questionnaire in order to receive the feedback in terms of reaching the objectives set by the innovation seminar and innovation workshop. Some main results are as follows:

1) The majority of participants agreed that their institution would benefit from implementing the innovation system. They could benefit using the tools for generating, filtering, sharing and storing the ideas that could furthermore be ICT-enhanced.



2) Despite the high burdens and responsibilities of their day-to-day job, the participants would like to actively participate in the innovation process. This also gives a clear signal to the top management in terms of the necessary implementation of the innovation system and active encouragement of all employees to contribute to its realization.



III. METHODOLOGY

The methodology consists of analyses of the innovation state of the art in hospitals in Gorenjska, Slovenia and definition of innovative hospitals through 10 innovation enablers. The synthesis consists of Action plan for evolution from Non-innovative to Innovative hospitals and its implementation, what is presented in the paper [2].

A. IMPACT of innovation seminars and workshops on SWOT analysis

The objective of InTraMed project is to activate the innovation potentials of hospitals to become major actors in regional development, employment and wellbeing through transfer of knowledge to SMEs and Industry. In Gorenjska region 5 key health care actors were actively involved in the project: 4 hospitals (among them one university clinic) and National Institute of Public Health.

SWOT analysis considerably changed in favour of innovation:

Strengths:

- Good quality of services at primary, secondary and tertiary level
- Good coverage of services adapted also to specific needs of life and sports activities in Alps
- Awareness of innovation potentials
- Enhancement of competitiveness due to introduction of innovation culture
- Establishment of long-term cooperation with economy(SMEs and industry) and research

Weaknesses:

- Legal status of clinics and hospitals not adapted to the market economy,
- Unexploited private-public partnership
- Lack of the managers of clinics with innovation skills

Opportunities:

- Introduction of innovation culture in the management of clinics
- Transparent motivation scheme for innovative achievements
- Strengthening of long–term business cooperation with industry/ SMEs and academic sphere/ research
- Establishment of local Medical and Technological Technology Parks on the grounds of clinics
- Clinics could become the key actors for economic growth, employment and wellness of the region
- Establishment of BME Alliance in Gorenjska/ Slovenia

Threats:

- Absence of willingness of political actors to change the legal status of clinics adapted to the market economy and the need of innovation culture
- Resistance of staff to the introduction of innovation culture to clinics
- Faster growth of BME innovation in other EU regions

B. Impact of seminars and workshops on 10 innovation enablers

The positive effects of the implementation of the InTraMed C2C project might be assessed also through methodology of 10 innovation enablers originally developed for innovation level of SMEs:

Table 1: 10 Innovation enablers Changes due to the InTraMed C2C project

Innovation Enablers definitions	**Hospitals starting point**	**Hospitals today**	**Innovative hospitals (ideally)**
Strategy	xx	xxx	xxxxx
Structure & Organisation	xx	xx	xxxxx
Innovation Culture	x	xxx	xxxxx
Financial Resources	x	xx	xxxxx
Human Resources	xxx	xxxx	xxxxx
Information & Technology	xxxx	xxxx	xxxxx
Idea Generation & Creativity Process	xx	xxx	xxxxx
Implementation of Innovation	x	xxx	xxxxx
Market Orientation & Operation	x	xx	xxxxx
Exploitation of the innovation	x	x	xxxxx

C. Realisation of Action plan for evolution from Non-innovative to Innovative hospitals

TO DO list of actions to be performed in each of involved hospitals to build innovation organization:

Actions to be accomplished later:

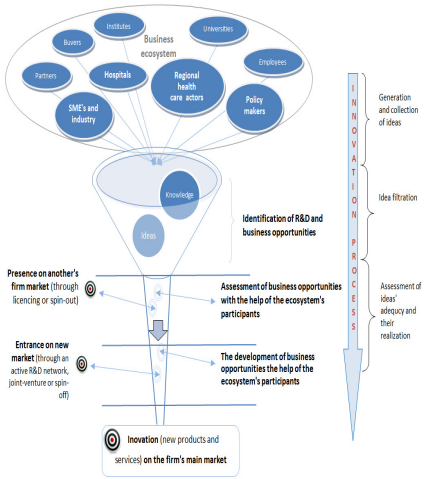
1. Amend the Hospital Long -term Strategy document with the Innovation articles
2. Amend the Hospital Statute with innovation elements
3. Establish The Innovation & Transfer office or at least nominate the responsible person for the management of innovation
4. Introduce Transparent Motivation scheme document
5. Test the present legislation environment for innovation friendliness

Actions accomplished during implementation of the InTraMed C2C project:

6. Prepare the templates for the submission of innovation ideas
7. Categorise innovation ideas
8. Identify main circles in categories of experts/employees
9. Prepare the list of SMEs and/or industrial partners
10. Prepare the list of academic (research, education) and business partners
11. Gather the most innovative and urgent ideas for further processing to innovation projects

It is evident that in order to raise the interest for innovation among the managers and doctors we first did the actions for which they were personally interested and involved. Realisation of the cited actions the Open Innovation approach was extensively used.

Figure 1: Gathering and selection of innovative ideas –



IV. RESULTS

The practical "learning by doing" open innovation approach [22, 23, 24] was the shortcut to introduction of innovative culture to hospitals in Gorenjska region. We focused on medical problems identified by doctors and selected by leading hospital staff. In total 5 ideas were selected for development through involvement of SMEs/industry and RTDI organisations:

IDEA NO 1: **The granny birthing rocking chair**

Humankind has existed for millennia and women have been giving birth for millennia. The positions in which they gave birth have changed over history, with developments in society and medicine. For decades, opinions have clashed regarding the advantages of the upright position (sitting up, using a birthing stool, being on all fours) versus lying down during labor [3].

In her book *Ina May's Guide to Childbirth*, Ina May Gaskin reports that in traditional societies all over the world women have given birth in an upright position. Seeking greater control over labor, greater comfort of the staff that supervised the labor, and the use of anesthetics during labor, women began to give birth lying in bed, on their backs. Gaskin points out that as early as 1882, in his book *Labour among Primitive People*, George J. Engelmann emphasized the importance of women's instincts and spontaneity in selecting the best position when giving birth [4].

Our maternity hospital, Hospital for Gynecology and Obstetrics Kranj, already has some experience with women giving birth sitting on a stool. This method is used in the second stage of labor, during the expulsion of the baby, but women are advised not to sit on the stool for too long. We identified the need to design an advanced birthing stool in order to further develop our doctrine, named the Granny Rocking Chair as a birthing chair. This would enable women to give birth in a position that is much more comfortable and natural than lying on their backs [5]; this is also what modern women increasingly demand. There is increasing evidence that, if women move around [5,6,7] and use a comfortable position in a homey environment supported by people they know well and trust [8], the first stage of labor (dilation of the cervix) is shorter and less painful due to more intense contractions. Having a bath or shower during labor [9], using steady movements, flexing muscles, dancing, using birthing balls, stools, squatting, and so on [10] are all methods that relax the woman, reduce her labor pain, and enable faster and easier labor with fewer injuries to the birth canal [4,11]. However, other studies indicate no statistically significant reduction of instrumental deliveries when giving birth in the upright position [12].
The second stage of labor (full dilation of the cervix to the birth of baby) on the Granny Rocking Chair takes place with the woman kneeling. This makes good use of gravity because it shortens labor compared to lying down—which is, however, more convenient for the medical staff helping with the delivery. Giving birth in an upright position (sitting, squatting, or standing) is more natural and physiological, and thus also easier and less dangerous for both the baby and the mother [5]; in addition, it is also an important factor that reduces birth canal injuries and the need for episiotomy [11]. The disadvantages reported include a greater loss of blood during labor—that is, more than 500 ml, but less than 1,000 ml [3, 12].

Experience shows that touching the mother's skin and nipples, gently massaging her, and her touching and looking at the baby's head also stimulate the mother to push her baby out more effectively [4]. A camera would be attached to the Granny Rocking Chair, so that the mother and her partner could watch the gradual crowning of the baby's head (and see their first glimpse of the baby's hair).

One of currently available aids enabling delivery in the upright position include the birthing stool is shown in Figure1.

Fig.1 Birthing stool

IDEA NO 2: **Functional electrical stimulation (FES) supported labor**

Clinical practice shows that many women in labor cannot or do not have enough strength to participate in activating the muscles that help expel the baby, and so midwives and obstetricians must help them by pressing against their abdominal muscles. The concept is based on the FES of the abdominal muscles, the pelvic floor muscles, or all the muscles that help expel the baby and enable easier and faster expulsion.

Description of the problem:

Towards the end of the second stage, when the head has already reached the pelvic floor and started to press against the rectum, during contractions the woman gets a "pressing" sensation down below and starts to push voluntarily. The uterine contractions are thus accompanied by contractions of the mother's abdominal muscles. Nature uses these two forces to complete the delivery as soon as possible. The innovation idea is to support the cited natural forces by FES of abdominal muscles FESAM. The FESAM methodology was first developed and applied to support ventilation in SCI and tetraplegic patients [13, 14].

IDEA NO 3: **Machine for specimen management in clinical microbiology**

Nothing is more important to the effectiveness of the laboratory than a specimen hat has been appropriately selected, collected, and transported. If specimen collection and management are not priorities, the laboratory can contribute little or nothing to patient care or related investigations. It stand to reason, then, that if laboratory data are used to supply critical information that either confirms or leads to a diagnosis and successful treatment, those involved in selecting, collecting, and transporting these microbiology specimens must understand the needs of the laboratory regarding the specimens. In addition, laboratories must know the needs of the physician in order to direct their technical efforts toward providing results that are accurate, significant, and clinically relevant.

Specimens for microbiology analysis are likely to contain living organisms whose recognition depends on rapid, professional specimen management. Understanding this simple concept should motivate specimen collectors to select the correct anatomic site from which to obtain the specimens, collect the specimen using the proper technique and supplies, package the specimens in a container designed to promote survival of the causative organism and to eliminate leakage, which might pose a safety hazard and transport the specimen to the laboratory expeditiously or make sure that if it is stored, storage is brief, properly done, and at a temperature that will not damage the suspected organism [15].

Specimens for microbiology analysis should be promptly delivered to the laboratory for accessioning and plating. Everyone involved should remember that microorganisms are living things. They multiply and die very rapidly. The microbiology division is different from other sections of the laboratory. Maintenance and manipulation of living organisms require processes very different from those used in chemistry and hematology [16]. Our innovation is a machine for providing the proper supplies and collection of diagnostics specimens. It allows 24-hour service, guaranteed data protection, discretion of personal data. Due to the dispersion of health care institutions full coverage of all the provinces, accessibility to the Public health institutions, nursing homes, health centers and hospitals is required. There is great opportunity to export Bioavtomat especially in the EU region, high added value, new jobs.

IDEA NO 4: **Humanoid robot for vaccination**

In the event of a pandemic there is a major problem on how to vaccinate big capacity of people in a very limited time, so a continuous operation is required to guaranteed the same high quality of vaccination. It is impossible for vaccination team to fulfill that requirement [17,18]. Humanoid robot would allow more of a rational packaging and the using of the vaccines. Vaccination is the most efficent achievement of modern medicine. Vaccination is compulsory in Slovenia, starting at the age of three months old. Over the course of life people receive many doses of vaccine. In the event of outbreaks of communicable diseases, immunization is often a measure to prevent the spread of diseases such as individual outbreaks of measles, diphtheria, as well as in cases of terrorism. Vaccination is also important in travel clinics and deprived areas such as Gorenjska and Carinthia for tick borne encephalitis [19]. The advantages of our inovation are: High capacity vaccination coverage, repeatable high quality and quick response time in the event of a pandemic or other disaster. Humanoid robot will have a sensor manipulation and positioning of the extremities-hands, cooling and disinfecting the injection site, injection of the vaccine dose and installing the patch. Robot should allow traceability services to the telecommunications link with patient records and future national vaccination program and E-Health. Humanoid robot for vaccination, according to the application and

testing in Slovenia represent a great potential for global marketing especially in the developing countries of Africa and others developing countries. High added value, high income and new employment.

IDEA NO 5: **EKG based system for 24 hours monitoring of life function**

University Clinic of Respiratory and Allergic Diseases Golnik, University Clinical Centre Ljubljana, General Hospital Celje and many other hospitals in Slovenia identified the need for continuous monitoring of vital functions: electrocardiogram (ECG), respiratory rate (RR), transcutaneous oxygen content in the peripheral blood (satO2), heart rate (HR), blood pressure (BP) and body temperature (TT). With close monitoring of these parameters, patients can be closely monitored and according to dynamic changes necessary medical assistance can be provided.
The objective of the innovation idea is development of pilot EKG based monitoring system that could be implemented in the health centers all over Slovenia [20, 21].

Short summary:

Penetration of innovation culture through the implementation of InTraMed C2C project at chosen hospitals in Gorenjska, Slovenia was fast and caused strong interest among the leading doctors, directors and nurses. To achieve invaluable good results, the experienced team of BME external consultants was engaged as moderators. Next step will be dedicated to the preparation of research and development project proposals as the engaged SMEs are not fully able to financially cover the development costs. In hospitals the innovation organization should be established that will be capable to manage any innovation ideas proposed by their staff. The good practice of "Innovation hospitals" is planned to be disseminated to other 29 hospitals in Slovenia and also to hospitals in the neighboring countries and other EU regions.

ACKNOWLEDGMENT

The research presented in the paper was co-financed by the InTraMed – C2C project which is implemented through the CENTRAL EUROPE Programme co-financed by ERDF. The authors express their appreciation to Franc Preložnik, Jože Jelenc and Franc Setnikar for their valuable engineering, design and marketing contributions as well as Helena Cvenkel, Nives Justin and Bogo Filipič for their technical support.

REFERENCES

[1] InTraMed – C2C project, CENTRAL EUROPE Programme co-financed by ERDF

[2] Activation of Innovation Potentials of Medical Staff in Design of New Telemedical Applications in Slovene Hospitals U. Stanič, F. Strle, J. Stanič, S. Dolinšek, MIPRO2012 Invited paper

[3] Gupta LK, Hofmeyr GJ, Shehmar M. Position in the second stage of labour for women without epidural anaesthesia. Cochrane Database Syst Rev. 2012 May 16;5.

[4] Gaskin IM. Modrost rojevanja. Sanje, Ljubljana, 2007.

[5] Pajntar M, Novak Antolič Ž. Nosečnost in vodenje poroda. Cankarjeva založba, Ljubljana, 1994.

[6] McCarthy A, Hunter B. Obstetrics and Gynaecology. Churchill Livingstone, London, 1998.

[7] Lawrence A, et al. Maternal positions and mobility during first stage labour. Cochrane Database Syst Rev, 2009 Apr 15;(2).

[8] Schuiling KD, Sampselle CM. Comfort in labor and midwifery art. Imag J Nurs Sch. 1999;31(1):77–81.

[9] Stark MA. Therapeutic showering in labor. Clin Nurs Res. 2013 Jan 15.

[10] Sutton J, Scott P. Die Optimierung der Kindslage. Hippokrates, Stuttgart, 2010.

[11] Da Silva FM, et al. Risk factors for birth-related perineal trauma: A cross-sectional study in a birth centre. J Clin Nurs. 2012 Aug;21(15–16):2209–18.

[12] Thies-Lagergren L, et al. No reduction in instrumental vaginal births and no increased risk for adverse perineal outcome in nulliparous women giving birth on a birth seat: Results of a Swedish randomized controlled trial. BMC Pregnancy Childbirth. 2011 Mar 24;11:22.

[13] STANIČ U, Lenart L, Šorli J, Kandare F, Jaeger R. Augmentation of pulmonary ventilation by electrical stimulation of a abdominal muscles. V: Neuroprosthetics from basic research to clinical application / A. Pedotti et al. (eds.). Berlin [etc.]: Springer, cop. 1996. Str. 635-638.

[14] Kandare F, Exner G, STANIČ U, Jaeger RC. Functional electrical stimulation of respiratory muscles in spinal cord injury. V: Mechanics of breathing / A. Aliverti et al. Milano: Springer, cop. 2002. Str. 291-313.

[15] Miller JM. A guide to specimen management in Clinical microbiology. ASM 1999. Washington 2 and ed.

[16] Murray PR. Baron EJ, Pfaller MA, Tenover FC, Yolken RH. Manual of clinical microbiology. 7ed. Washington: ASM; 1999.

[17] Rizvi SZ, Yousuf S, Kanwal N, Akbar S. Automation of Vaccination and Blood Sampling Procedures. In : Engineering Sciences and Technology, 2005. SCONES Conference publications.: Available from http://ieeexplore.ieee.org/xpl/login.jsp?tp=&arnumber=4382894&url=http%3A%2F%2Fieeexplore.ieee.org%2Fxpls%2Fabs_all.jsp%3Farnumber%3D4382894

[18] Yousuf S, Kamran R. Emerging Technologies, 2007. ICET 2007. International Conference. Conference publications.: Available from http://ieeexplore.ieee.org/xpl/login.jsp?tp=&arnumber=4516338&url=http%3A%2F%2Fieeexplore.ieee.org%2Fxpls%2Fabs_all.jsp%3Farnumber%3D4516338

[19] Grmek Kosnik I, Krt Lah A. A campaign to increase the vaccination rate in highly endemic tick-borne encephalitis region of Slovenia. Vaccine 2013;31:732-4.

[20] Telehealth :A Myth or Reality?, R.Trobec and U.Stanič,Proceedings 34.Conf. Mipro 2011/GVS pp.326-331, May 23-27.2011, Opatija, Croatia, ISBN 978-953-233-060-1

[21] R. Trobec and I. Tomašić, "Synthesis of the 12-lead electrocardiogram from differential leads", IEEE Trans. Inf. Technol. Biomed. 15, 615-621, 2011.

[22] Bigliardi, B., Dormio, A. I., & Galati , F. (2012). The adoption of open innovation within the telecommunication industry. European Journal of Innovation Management, 27-54.

[23] Chesbrough, H. W. (2003). Open innovation. The imperative for creating and profiting from technology. Boston: Harvard Business Press.

Implementation of the InTraMed-C2C system

Created by: Budapest University of Technology and Economics/
Health Technologies Knowledge Centre (BME EMT) – PP10

Version number: v4.3
12th of March, 2012

Table of Contents

Implementation Components in the InTraMed-C2C Project

Framework

The aim of the project is to promote the utilization of hospital innovations by developing and implementing InTraMed-C2C system. The implemented system contains components that are driven by a single framework and innovations are utilized correctly through them.

The framework is a process control system that embodies logical and control relationship between individual components.

The InTraMed-C2C framework can be considered as a control sequence to consist of the following components:

- ✓ The InTraMed-C2C basic steps
  - key player identification
  - SWOT Analysis on innovation transfer
  - development of motivation system
  - search for international innovation projects, exchange of experiences
  - initial steps to find innovation – identify professional fields
- ✓ development of InTraMed- C2C website –database design and development
- ✓ Operation of the innovation transfer system

We consider events and activities in the first two phases of our project as an element of the framework (foundation phase):

Key Players Identification and Selection, Organization of Regional Workshop

After having identified the key players of clinical exploration of the innovation in the region, it is necessary to organize an informative and opinion-gathering workshop for decision-makers and opinion-makers. This workshop positions the project's objectives and methods.

As a result of the workshop the importance of the clinical innovation will be clear to all participants. Everyone will be aware of the fact that supporting innovations and promoting the implementation of innovations make health care more efficient.

In case of the Central Hungarian Region we addressed the ministry, the medical professional association and the representatives of innovation agencies and hospital associations. They were, in fact, an active but – regarding their findings – not too effective audience. The main findings dealt with the topic of motivation and workload.

Presentation of the Project through the Media

We planned to publish professional articles in order to present the project. So we issued a comprehensive description of the project and a progress report about the second working period in IME, a journal for health care leaders.

The project was showed up at an event of the eVITA National Technology Platform where the interest was intense.

Region Analysis in Terms of Presence and Success of Innovations

According to the representatives of the opinion-maker civil society organizations, cardiology and surgery are the two medical fields where considerable innovation can be found beyond the daily routine. We notified the representatives of the two medical fields of the event through professional organizations of the areas – the national professional societies – as well as asked the great authorities of the companies to hold keynote lectures.

After the keynote lectures we initiated a moderated discussion to determine whether the speciality is worth the attention – in other words has appropriate innovation potential –, or not.

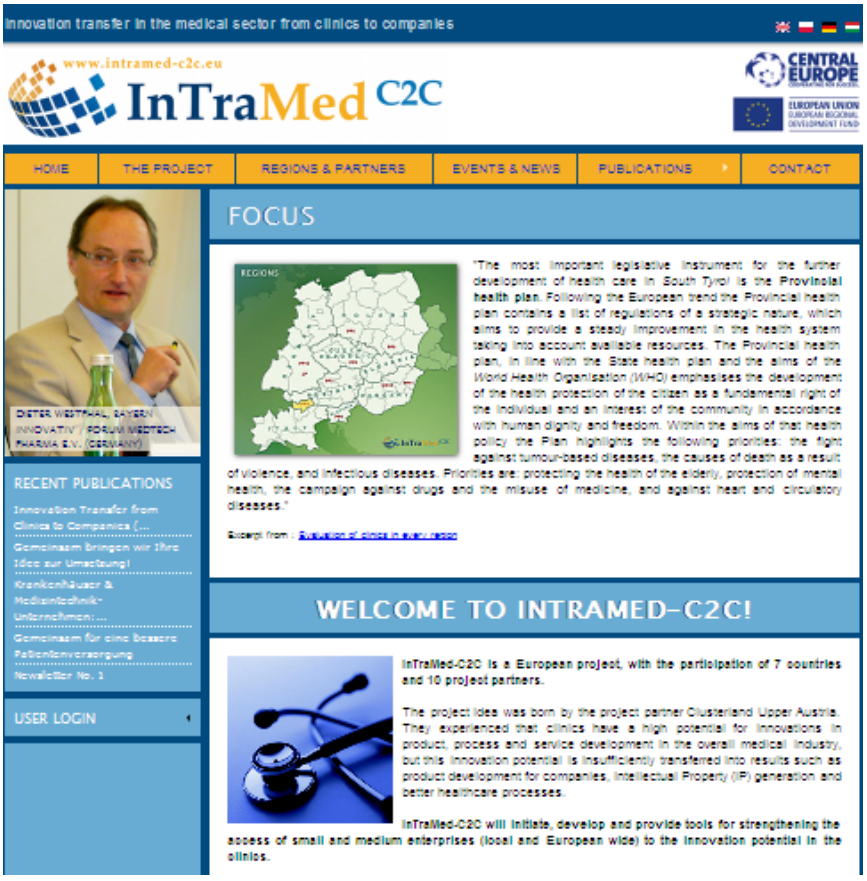
Development of Methodologies

We explored the innovation motivations of doctors and health care staff working for region's health institutions through interviews with the representatives of clinical sector. The survey painted a poor picture of motivations in many respects, but all respondents agreed that the social rank of innovation should be recovered to its previous level through increasing the state engagement in this sector and evolving the central motivational tools.

According to the accumulated experience the clinical innovation SWOT analysis of the region was completed and integrated into the core materials of InTraMed-C2C.

InTraMed-C2C Website Development, Database Design and Development

InTraMed-C2C website has been finished (www.intramed-c2c.eu).



The website contains relevant information and articles about the project, project partners and events.

BME EMT designed a database to upload and follow-up innovations. The database is tested by the project partners in the third and fourth working period. (The database, as key element of InTraMed-C2C system, is described in detail in the Annex).

The Innovation Transfer System

The Innovation Transfer System is the last element of the InTraMed-C2C framework, which has an automatic mechanism to search innovative ideas and to connect the innovation owner with the implementer, using valid information and methods.

The object, mentioned above, can be achieved through the following steps:

- ✓ Activities to explore the innovation – organization of exploratory workshop(s)
- ✓ Contact the innovator
- ✓ Organization of innovation workshop(s)
  - the idea is innovative
  - the idea is not innovative
- ✓ Upload the innovation to the InTraMed-C2C database
- ✓ Trace the innovation – update the database
- ✓ Reports on the innovations – close the database item

The process, which is actually the operation of InTraMed-C2C system itself, is summarized in Figure 1.

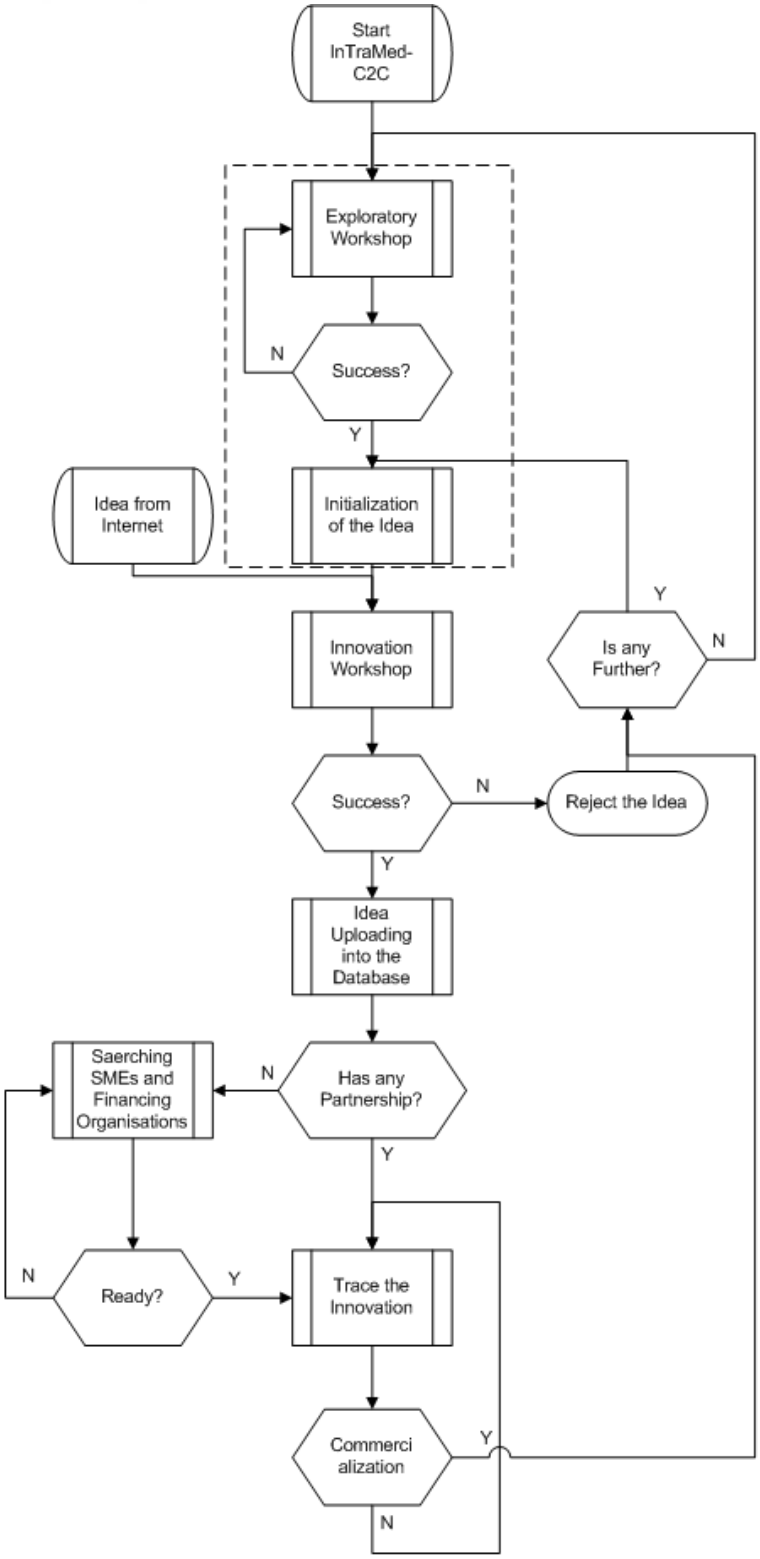


Figure 1. The system of InTraMed-C2C

This is the InTraMed-C2C framework itself. The framework is actually a description of the components of the innovation implementation support system as well as the implementation process itself.

The most important element of the tools is the device to evaluate decision point, hereby the embranchments of the process can be handled. There are two decision points which are not trivial to evaluate. These are:

- ✓ determine the success
- ✓ deciding to become a product

The two other embranchments actually check the existence of quantities. These are the followings:

- ✓ (idea-maker) has any partnership – OK
- ✓ (idea-maker) has further idea

These embranchments refer to the contact system surrounding the innovation and the existence of further ideas.

We need to revise the flowchart elements, to define their contents, input and output parameters (their data), and the activities related to their implementation. In addition we need to define the actors in the process, and describe their roles.

Use Case Diagrams for the Framework

The InTraMed-C2C system is operated by its users. From the aspect of the system there are central users and occasional ones. Knowing the roles the connection diagram of the roles can be worked up (see Figure 2).

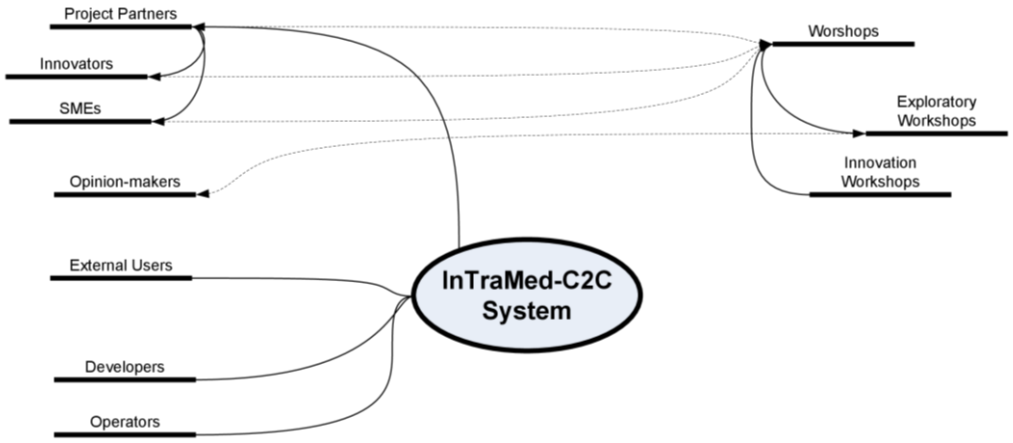


Figure 2. The roles of InTraMed-C2C and their connections

Using the role connection diagram we can construct the Use Case one (Figure 3). This is, actually, the workshop's Use Case diagram. It is clear that the two types of workshops are the exploratory and innovation ones. The project partners can be innovators as well as SMEs. Besides them opinion-makers in health care also have a role.

The users of InTraMed-C2C system are the external visitors of the site as well as operators and developers.

It is the Use Case diagram which describes a more accurate hierarchy of these actors. The following diagram (Figure 3.) shows a Use Case diagram of the workshop:

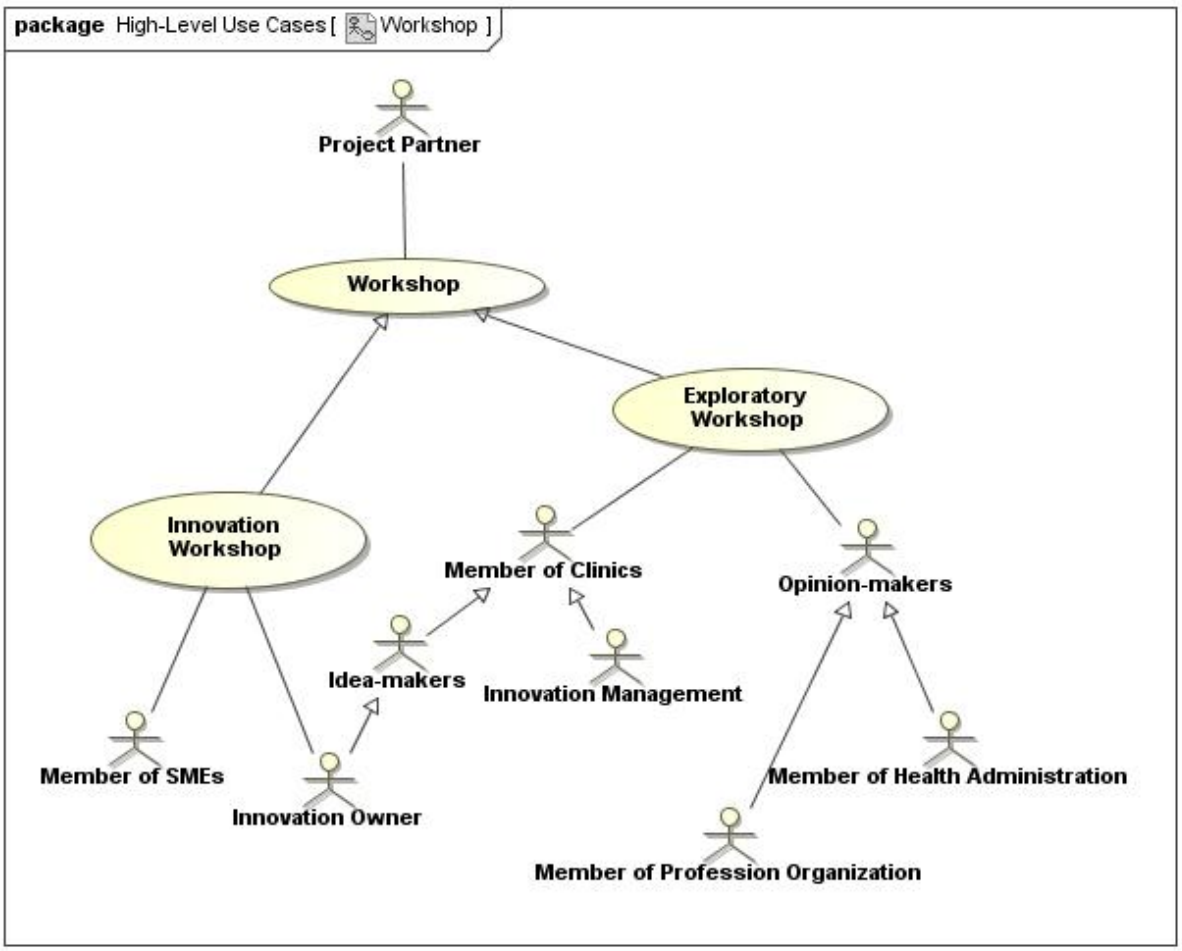


Figure 3. Use Case diagram of the workshop

Use Case diagram shows how the participants in the two types of workshop relate to the system. It is worth noting that the Innovation Owner is a special generalization of the Idea-maker, that is, while the entity participating in the exploratory workshop is an Idea-maker, he participates in the innovation workshop as an Innovation Owner.

Activities of the Exploratory Workshop

The Activity diagram, expanding the Use Case diagram of the exploratory workshop (see dashed line frame in Figure 1.), can be seen in Figure 4.

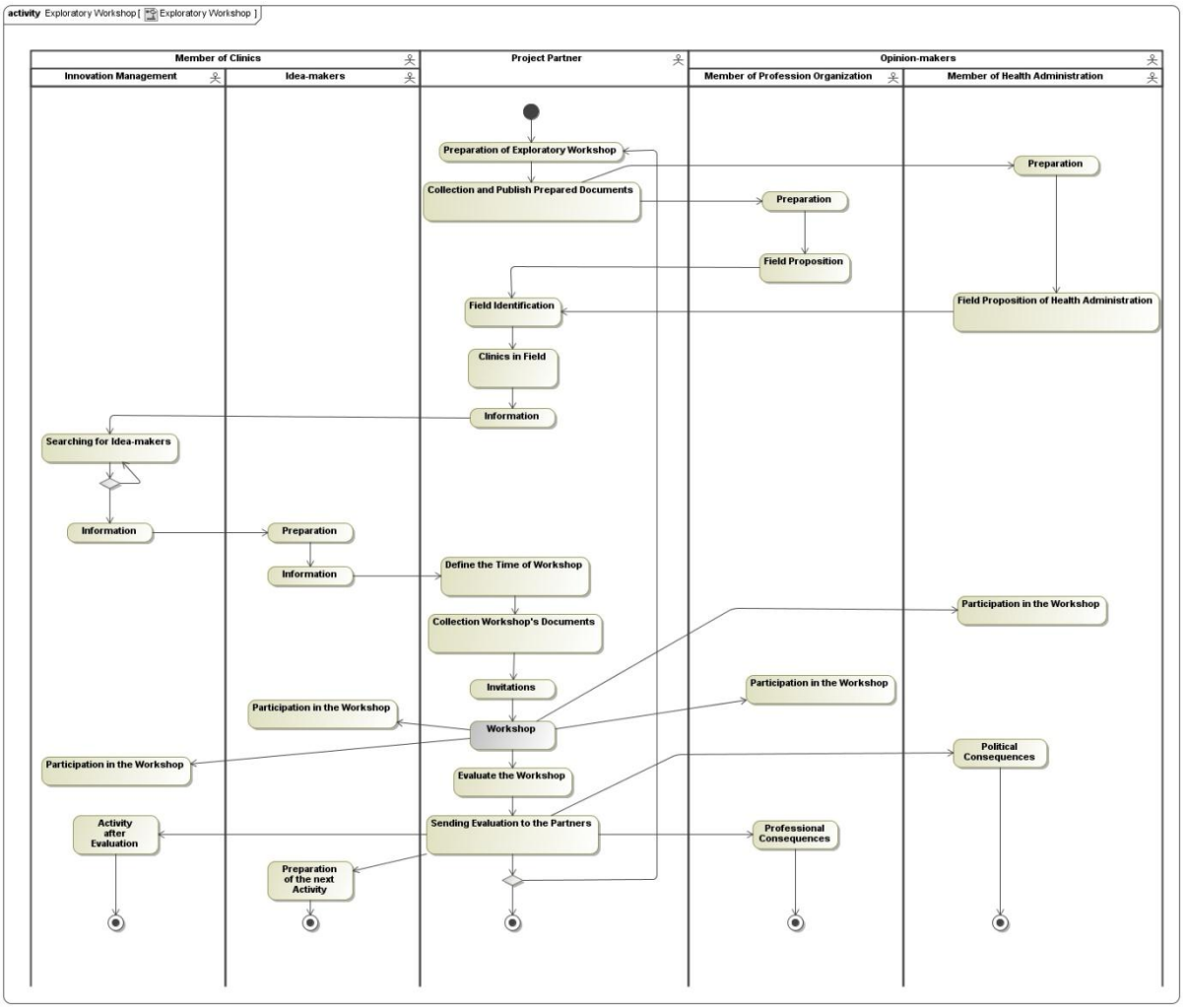


Figure 4. Activity diagram of the exploratory workshop

Different actors in the process have effects to be in their fields. The activities in a field are chronologically constrained as it is shown in the figure above.

It is to be seen that the activity sequence is initiated by the project partner, then there is a conciliation with the opinion-makers, after that comes the search for innovations in the clinics.

When the project partner has done with this, the next steps are the following: preparation of the exploratory workshop, notification of guests and hold the workshop.

Evaluation document about experiences of the workshop will be delivered to both opinion-makers and invited health care institutions. The evaluation contributes opinion-makers to get experience in this regard, and clinics – if necessary – can begin preparing the “from the idea to innovation” process.

The exploratory workshops are organized twice a year dealing with different professional medical areas. Thus, the further processes will have enough number of innovations.

So far the Budapest University of Technology and Economics, Healthcare Technologies Knowledge Centre has organized two exploratory workshops in the fields of cardiology and surgery. The two exploratory workshops have resulted one innovative idea. We wish to organize another exploratory workshop in the near future in the rehabilitation area.

Activity of the Innovation Workshop

The project partner decides, according to exploratory workshop, whether there is one or more appropriate idea for innovation. If there is one, or there are any, the project partner should organize separate innovation workshops for each.

On the one hand, the project partner should ask idea-makers to make their own presentations to present the idea, and – if they have – prepare their demo, too.

On the other hand, knowing the technical and technological area of the idea, the project partner should search for appropriate small and medium-sized enterprises to the meeting. This depends upon the project partner's preparedness and relations. We reckon that there must be invited at least three or five SMEs to the innovation workshop of one idea. Feedback carries the value of the innovation idea. In case the idea-maker has a document to describe the idea, and it is public, choosing the SMEs can be facilitated by sending the presentation materials.

The aim of the innovation workshop:

- ✓ challenging the idea from the constructor's aspect
- ✓ discussing issues about the process from the idea to innovation and product
- ✓ establishing connection between the idea-maker and the potential industry partner

If the workshop has achieved its objectives, the project partner can upload the idea to the database of the InTraMed-C2C web system.

It would be good if a seed financing could be found for the idea. Therefore – although this is not the purpose of our project – it would be worth also inviting a partner to the innovation workshop who undertakes the seed financing for such an idea.

The next figure shows the activity of the innovation workshop:

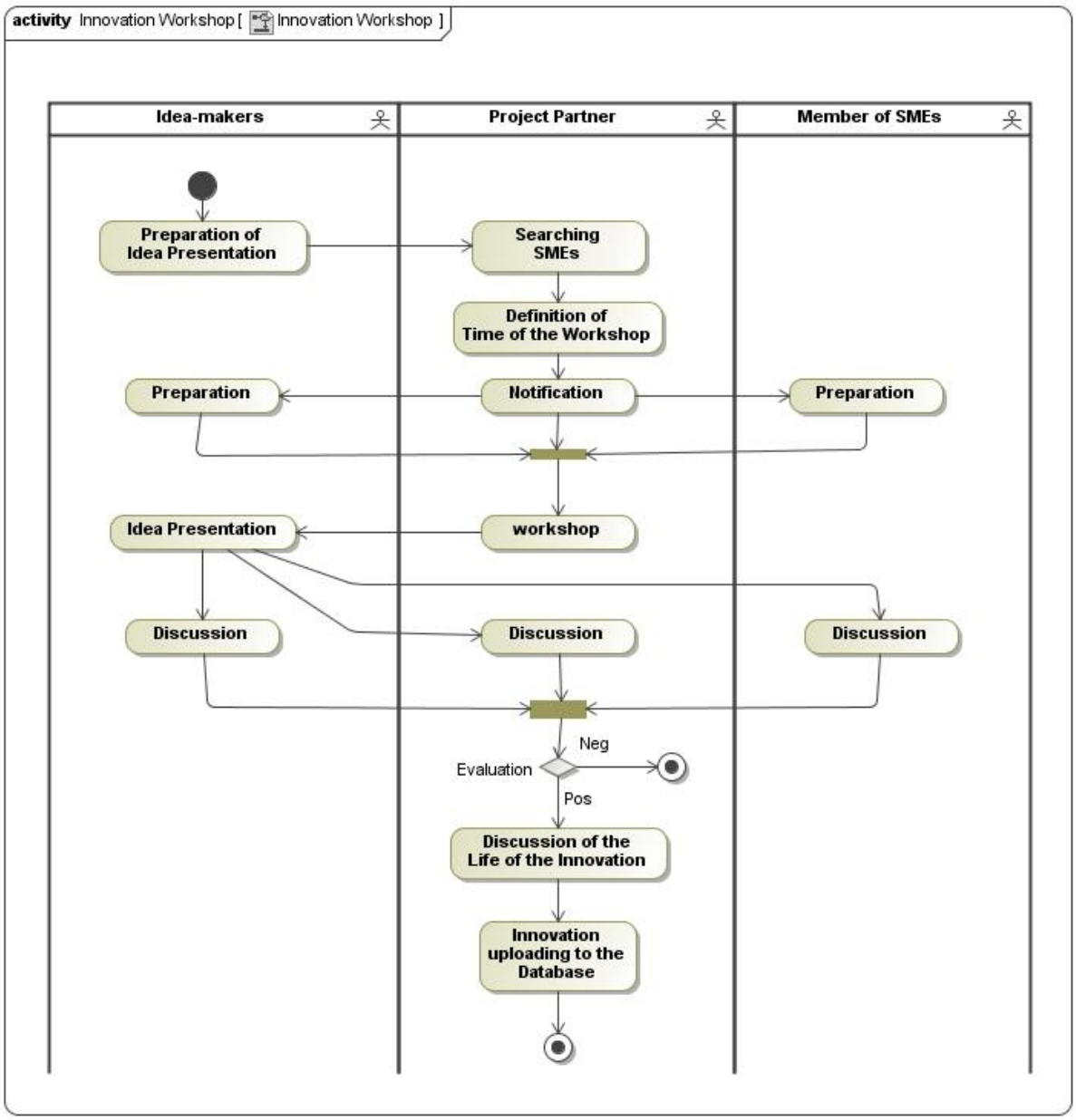


Figure 5. Activities of the innovation workshop

The result of the innovation workshop is a written summary report (minutes) about the meeting which evaluates the idea as an innovation considering the goals.

Evaluation after the Innovation Workshop

It is very difficult to determine an evaluation method for the idea. The course of innovation workshop, its mood, the activity of the participants, the number and depth of the questions put the Innovation Owner can determine the “practicability” of the idea.

In this working period BME EMT considers the practice to be decisive whether we could fix another appointment in the subject of the idea with the guests or not. If so, it means that there was present an industrial partner among hose who was interested in the idea and innovation might be taken on in this way.

If you could not fix the next appointment, the idea did not touch the guests, that is, the innovation workshop did not reach its goal, and the result is negative. In this case, there are two additional ways:

- ✓ Organizing another innovation workshop with other industrial participants. Experience of the previous workshop can help in selecting the new guests (partners without appropriate technology knowledge or without production capacity were selected etc.).
- ✓ The idea has to be dropped because of lack of interest or right criticism.

As any evaluation, it would be the best if there were tangible, numerical markers to the evaluation. This is a complex issue. The assessment can be made using a scoring sheet. The following questions must be answered on the sheet, then the total score of the answers must be determined. Using the total score the value of the idea can be looked up from a chart:

Question 1: Rate of audience's comprehension by the Innovation Owner's presentation

- O the audience did not understand the essence of the idea even after a lot of questions — 0 point
- O part of the audience understood the essence of the idea after the questions — 1 point
- O the idea became clear to everyone after the questions — 2 points
- O there was no clarifying question on the idea — 3 points

Question 2: Further considerations on the idea

- O the audience did not add thoughts to the idea — 0 point
- O the Innovation Owner did not accept the audience's thoughts — 1 point
- O additions brought on by the audience did not lead on — 2 points
- O the audience added more thoughts to the idea to lead on more directions — 3 points

Question 3: Recommendations and additions given to the Innovation Owner

- O there was no recommendation or addition to the idea — 0 point
- O there were few additions to the idea — 1 point
- O there were a lot of additions and proposals to the idea — 2 points
- O there were additions to the idea which were analysed further by the participants — 3 points

Question 4: Carrying-on the innovation workshop

- O the innovation workshop ended without any need for carrying-on — 0 point
- O at the end of the innovation workshop a claim arose to continuation but without concrete things — 1 point
- O at the end of the innovation workshop the moderator (agent) recommended another meeting — 2 points
- O at the end of the innovation workshop one of the invited partners asked for another meeting — 3 points

Question 5: Illustration of the idea

O the idea was discussed only verbally	0 point
O the idea was presented by illustrative slides	1 point
O an implemented prototype belonged to the idea	2 points
O the idea was documented too	3 points

Question 6: Novelty of the idea

O the idea is basically not novelty	0 point
O the idea itself is not new, but its details are novelty	1 point
O the idea is new, although some details are public domain	2 points
O every element of the idea and as a whole is new	3 points

After the 6 questions having correctly scored, the evaluation of the idea is the following:

Scores	Evaluation
0-3	The idea did not reach the criterion to become an innovation
4-9	The idea should be revised to become an innovation
10-14	The idea is to be taken care of for more, the innovation is likely feasible
15-18	The innovation is highly feasible

Participants should be notified about the evaluation results, attaching the appropriate justification. It is possible that the evaluation form with the questions mentioned above is completed by participants of the innovation workshop (invited potential partners).

Comments:

1. There is a long way from the idea to the matured innovation, to the first product. Everyone, who was heard by us at the innovation workshop, emphasized, that the pure idea was not enough! According to the most stressed opinion, you have to figure out how to make money from the idea, and what is the market value of the idea. For this, the Innovation Owner must invest in marketing activities seriously, that might not be trivially achieved. It is possible that the Innovation Owner has no other resource but his idea. In this case there should be found a “business angel” to add the most essential fund to the pure idea.

2. The serious inquirer takes special care to verify the novelty of the idea and the circumstances of the legal protection. If the idea does not have legal protection, the serious inquirer is not really interested in the idea.

3. Very often the organization, protecting the idea, blocks the innovation from InTraMed-C2C project, saying that the idea belongs to its owner until the organization is able to protect it from the outside world. It had occurred that the project had embraced an idea, and then, after having shown the pros and cons, the Innovation

Owners suddenly closed the communication channels because they feared for their property.

Considering these, the innovation workshops can be arranged at a certain percentage of cases, especially for ideas which have small innovation. The truly epoch-making ideas are protected by their owners, even taking the risk that under their own power the idea will not come to fruition! **This shows that the efficiency of the innovation transfer is inferior to the copyright issues!**

Working up the InTraMed-C2C Database, Testing Steps

The most important place within the project for taking care of innovative ideas is the InTraMed-C2C database.

The original aim of the database – formulated at the project start – was to help evaluating the uploaded innovation ideas and linking them to one or more SMEs ready to implement the ideas. The database had got through more testing steps, while we had asked for proposals and opinions of the project partners. In September 2011, according to the feedback, we had modified the database as we had thought it would be usable. In the usual semi-annual meeting in Debrecen we long argued about the database. After that we started a new phase of development, which culminated in the proposals given by the partners at the Budapest “mid-term” project meeting. We enhanced the database as we agreed there and by the end of February 2012, we “handed over” it to the project partners for testing. The InTraMed-C2C database is now in the “final testing stage”. In the Annex we present a detailed description about the database as it has been in the last developing and testing stage (February 2012). The matter is in English and made for the project partners.

Uploade to the InTraMed-C2C Database

Before reviewing the InTraMed-C2C database, its functions, a uniform terminology must be followed. Here are some findings:

1. The database does not know the concept of **idea**. The phrase is: **innovation**.
2. In the database we use **Agent** instead of **Project Partner**. The Agent is an operator who manages the input of the innovation -related data and performs innovation management within the system.
3. The **idea-maker (innovator)** is designated with **Innovation Owner**.
4. Only the Agent has the permission to input/edit/delete any data.
5. The Agent uploads the innovation to the database.
6. The Agent uploads the Innovation Owner to the database. The Innovation Owner belongs to the Agent's group.
7. The Agent connects the Innovation Owner to his own innovation.
8. The Agent can see the full content only of the innovations which has been uploaded by him.
9. The Innovation Owner can see the full content only of his own innovation.
10. The Innovation Owner and the Agent are free to communicate with each other through the system.
11. Anyone who logs in the system can see the extracts of all innovations.
12. Anyone who visits the system can connect to an innovation. He sends a notice about it to the Agent.

13. The Agent uploads the database the SME that wants to join, and connects it to the innovation.
14. The InTraMed-C2C database user who has the **Administrator** role has all access rights, he creates the Agents.

Ideas, achieved at least 10 points in the questionnaire mentioned in chapter Evaluation after the Innovation Workshop, have to be uploaded to the innovation database. Database is used to manage the innovations accurately, in documented form, and the evaluated innovations – through the Agent – shall get the appropriate developer, implementer enterprise. The innovation manager's task is to upload and track the innovation.

The evaluation of an innovative idea – based on the above-mentioned algorithm or anything else – finally ends with an Evaluation Report. The electronic copy of this will be placed in the database to indicate that this innovation is evaluated ("evaluated by database").

Similarly, the idea that is considered to be kept further can be relayed to one or more SMEs, that is, connection of the idea and the enterprise can be realized through the Agent. The database tracks this process. The Agent takes care of the Innovation Owners in his group and if a worthy idea comes up from the group, he finds suitable partner either in his own (not InTraMed) company database or in the project's ever-expanding company database, and he lists this partner at the innovation, too ('matching by database").

Despite the fact that the Innovation Owner and the potential implementer encountered, and the innovation workshop seemed to be successful, it does not mean that the innovation is "ship-shape". The progress of the innovation or even the standstill should be continuously evaluated. The manager of the innovation should assist the events to be smooth, continuous and progressive.

Evaluating the Established Contact

As a result of the initial increased attention there could be another decision point, which is intended to determine whether the established contact between clinic and SME is insufficient, wrecked or progressive and effective.

If the innovation manager considers the situation that it is necessary to find another partner, he can search for suitable one through another workshop. If everything looks good, he continues tracking.

If the innovation had started the process becoming a product, the innovation manager would have to continue managing the remaining ideas.

The progress above, of course, is not a sequential one. Activities related to each idea are shown in different locations, as several parallel innovations (ideas) can be managed. The flowchart (Figure 1. The system of InTraMed-C2C) shows the relationship of the activities and the decision points to ensure the proper, successful work.

Running the InTraMed-C2C System through Innovation Workshops

As we showed in the introduction of the thesis, new innovative ideas can get on the radar of the project by the framework of InTraMed-C2C system, primarily through

Hungary - University of Debrecen

Procedure of identification

In the framework of the InTraMed C2C project the Knowledge and Technology Transfer Office of the University of Debrecen (TTO) is responsible for the identification, evaluation, protection and commercialization of the innovative ideas (products, services, technologies, know-hows) of the clinicians and healthcare staff in the region.

The TTO has created the knowledge map of the University of Debrecen containing the healthcare related research activities (available innovative ideas, products, services, technologies…) and medical research groups of the university. The knowledge map serves as the basis of the idea identification procedure of the InTraMed C2C project.
If the medical staffs have innovative ideas to share with us they can contact the TTO directly. In that case we visit the clinicians and we record a face to face interview with him/her. We have developed a detailed questionnaire for that purpose which has three sections. The first section investigates the phase of development and the available forms of IP protection. The second one analyses the market potential, the possible ways of exploitation and the availability and capacity of expert groups (researchers and business people). Based on these assessment factors, the expected income and the chance of success are evaluated. Taking this into account the TTO can give advice on the next steps (further development of the idea, offer a grant application possibility, support from the innovation fund of UD, support by the TTO in order to apply for a patent, support in license negotiations).

TTO owns a wide network of industrial partners, investment funds, other knowledge centers, clinics and hospitals and different mediator organizations. At present UD TTO has active relationship with over 40 innovative SMEs in the region. With using our relations we are able to find, match and link the best cooperating partner companies and the innovative ideas of the researchers and clinical staff for the whole IntraMed project.

Pre-matching of innovative ideas

The established Local Steering Group is responsible for the management of the activities of the InTraMed C2C project in Észak-Alföld Region. The LSG discusses on the most relevant medical project ideas of the clinical staff of the region, selects the ones which are suitable for further development and gives advices on the commercialization.

With the help of the above mentioned detailed project evaluation questioner we are able to prepare a so called technology sheet, which contains a short description of the given medical technology, idea or project. It describes the background of the idea, the status of the development, the possible ways of utilization, investment claims. It serves as a marketing tool to find cooperating partners or investors.

The most valuable medical technologies, ideas and projects are all uploaded to the Medical Innovation Database of the InTraMed C2C project which serves as a matching tool.

Organizing innovation workshops

According to the stakeholders (participants of the regional workshops) the most useful tools for reaching the main purpose of the InTraMed C2C project are regional thematic workshops, speed dating and benchmarking of best practices of the project partners. Taking this and our experiences related to the pilot innovation workshops and follow up meetings into account we use the following structure by organizing/preparing innovation workshops at the university:

step 1.: selection of promising ideas/technologies/projects

step 2.: reporting the selected ideas to the LSG and obtaining their advise

step 3.: selection of the most suitable SMEs using our relationships

step 4.: inviting the clinicians and the representatives of the SMEs to the workshop

step 5.: signing confidentiality agreement with the participants of the workshop

step 6.: facilitating the discussions during the workshop

step 7.: follow up of the workshop

We already organized one regional workshop, five pilot innovation workshops and five follow-up meetings.

According to our experiences the workshops are very useful tools for building relationships and to find cooperating partners for the innovative ideas. Both the clinicians and invited SMEs are satisfied whit these kind of meetings.

Organizing dissemination events

The main purposes of the dissemination events are to inform the public (especially the clinicians and medical staff of the university) about the InTraMed C2C project and to highlight the opportunity for them to be involved in the Medical Innovation Database of the project with their healthcare related innovative ideas.

We organized two dissemination events so far. The second regional dissemination event was organized on the 16th of February, 2013 at our university for the staff of Medical and Health Science Center of UD in order to draw attention on the InTraMed C2C project. Altogether 137 people attended the event and visited our exhibition desk.

At the regional dissemination events we use marketing tools like flyers, roll-up and other gadgets to call the attention of the participants.

Organizing innovation and technology transfer training

An important objective of the Knowledge and Technology Transfer Office of the University of Debrecen within the InTraMed C2C project is to disseminate innovation culture among the clinicians and the staff working in the health care sector.
We organized our innovation and technology transfer training at the Medical and Health Science Center of UD in the middle of March, 2013 with the participation of clinical doctors, technicians and other healthcare staff. We invited professional speakers who could provide an appropriate overview on the effective ways of innovative idea commercialization.

workshops. We are working on using the evaluated experiences of our pilot innovation workshop in 2011. As a result of this, on 20th of February, 2012 a new topic–"**Electronic Voice-activated Assistant for the Mobility Impaired (eVA)**" – was discussed.

Workshop (20th of February, 2012) – Electronic Voice-activated Assistant for the Mobility Impaired (eVA)

We invited to the workshop the idea-maker, the expert and his colleagues representing the Óbuda University, John von Neumann Faculty of Information Technology, the representative of BME Tender and Project Management Group (who provided us very effective help at accounting and reporting to the Hungarian first level control authority), additionally representatives of business organizations who probably can contribute to the implementation of the idea.

Company	Name	Position
Hírközlési Mérő és Szolgáltató Kft.	dr. Zoltán Bognár	managing director
HIRTERV Bt.	dr. Tamás Somogyi	managing director
H-Lab Nonprofit Kft.	Tibor Török	managing director
GeoCoop Kft.	György Bajzik	managing director
Aviatronic Kft.	Péter Barna	managing director
Óbudai Egyetem NIK	dr. László Kutor	associate professor
Óbudai Egyetem NIK	Gergely Vitéz	research engineer
Óbudai Egyetem NIK	Gabriella Nagy	research engineer
BME EMT	Judit Mallász	communications manager
BME EMT	Lóránt Vajda	director
BME EMT	dr. Péter Hanák	chairman
BME EMT	dr. István Valovics	project manager
Közép-magyarországi Regionális Innovációs Ügynökség Khe.	András Révai	chairman
WHS-Egészségtár Kft.	Károly Fogarassy	senior consultant, managing director

12 people were present at the meeting (for more details see memo and photos in the Annex).

The innovative idea was based on the thought that nowadays people use multitude of remote controls in their homes. However, there are totally immobilized patients who cannot handle even a remote controller. These patients are, for example, in severe stage of multiple sclerosis, but people with damaged limb or spine face similar problems. These patients' power of mind and ability to speak are all right.

Development started off to satisfy a specific need – to meet the needs of a patient in Szentendre. It was basic condition to avoid the usage of cables in the flat.

The solution: wireless (ZigBee) technology.

Some of the main features: moving the bed (raise, lower, tilt etc.); using the television (power on-off, volume control, channel change etc.); Skype; nurse call; web radio.

Implementation: modular design. Speech recognizer: from BME (AITIA, free of charge).

Prototype was completed and placed in the Szentendre home mentioned above. Later another version was built and installed in Uzsoki Hospital for testing. These apparatuses are definitely not products, but breadboards. The project is still not in the stage to bring the system and service to market. Commercialization is still ahead, but it is not the profile of Óbuda University.

To be solved (among others):

- making business plan

- organizing the production

- organizing the service

A company present at the meeting undertook to participate actively in looking after the idea. Another one indicated to contribute to the subtasks of the development.

BME EMT keeps an eye on the progress of the innovative idea and supports it.

Running the InTraMed-C2C System through Innovation Partners

One of the essential thoughts of the project is that key players, who may be contributors or partners in the innovation transfer in the health sector, must be mapped. National and international associations of innovation, clusters may have key role in this.

BME EMT got in touch with INNOREG innovation agency in the first working period of the project.

INNOREG Central Hungarian Regional Innovation Agency is a founder of INNOPROD cluster.InTraMed-C2C project got an invitation to the March meeting of INNOPROD.

Workshop (1st of March, 2012) – INNOPROD Cluster Meeting in March

The discussion – as other, similar cluster discussions – began presenting one of the member companies, visiting its factory, followed by a round table discussion.

The company hosted the factory visit dos not act in the strict topic of InTraMed-C2C project (heal0th innovation transfer), however during the conversations with the members of the cluster an innovation idea that can fit into our project flashed. The managing director of Global Innovation Kft. indicated his willingness to cooperate with our project in relation to their idea. The basic idea was to customize the comfort feeling of various sitting and lying surfaces (pillows, mattresses etc.) for each user, because each one has different needs. Global Innovation Kft. has found out a simple, double valve control technology. They asked for the help of our project to spread the technology in the health care.