Hacking Ion 2018 – knowledge management to develop entrepreneurship in the field of ionizing radiation metrology

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Abstract. Hacking Ion 2018 was the first scientific marathon (Hackathon) in the area of Ionizing Radiation Metrology (IRM) in Brazil and Latin America. The event took place during the 2018 IRM Congress, on the campus of the Institute of Radiation Protection and Dosimetry (IRD), and was aimed at stimulating entrepreneurship among students of the IRD Graduate Program, based on generating technologies in order to present solutions for the development of research in the area of IRM. The event was attended by 16 students, divided into 4 teams, with a time limit of 48 hours to think and develop solutions based on the proposed themes. At the end of the third day, they presented their projects to a judging panel and to the participants in the Congress. Throughout the process, the students were guided by a representative of the Brazilian Service of Support to Micro and Small Enterprises (SEBRAE), who initially offered a lecture and a startup preparation workshop. The winning project was the School in Glasses team, which developed a distance learning platform that uses virtual and augmented reality in the area of radioprotection. It is understood that this event serves as a stimulus for students to develop ideas in their respective areas of research, so that new work tools can arise in the aid of Knowledge Management in IRM.

Keywords: Hackathon; Knowledge Management; Ionizing Radiation Metrology.

1. Introduction
1.1. Presentation

With the theme "constant evolution", the V Brazilian Congress of Metrology of Ionizing Radiation (CBIRM) event at the Institute of Radiation Protection and Dosimetry (IRD), from 26 to 28 November 2018, to discuss the research and the growing demand for metrological services in radionuclides, neutrons, X-rays and gamma, electrons and elementary particles, focusing on quality [1].

Promoted by the IRD in conjunction with the National Institute of Metrology, Quality and technology (INMETRO) and the Brazilian Society of Metrology (SBM), the Congress aimed to discuss the commitment that the metrology area has with society, for meeting the growing demand for metrological services across various segments, with increasing quality and developing high-level research. Metrology is essential to maintain adequate levels of safety in order to support measurements that cover the areas of health, industry, environment, agriculture, and power generation [1].

It is noteworthy that the IRD is an institute designated by INMETRO as a national reference in the Ionizing of radiation Metrology (IRM). The IRD acts in favor of the health and safety of the population and workers exposed to radiation, promoting the preservation of the environment. It is the laboratory designated by INMETRO as a reference in the area of ionizing radiation, through its national Laboratory of Ionizing Radiation Metrology (LNIRM). Its responsibility is the realization, maintenance and dissemination of the quantities related to ionizing radiation in Brazil [1].

Focusing on the theme of the event, and using the concept of a Hackathon Marathon, which aims to
develop innovation projects in a short period of time. The objective of this paper is to describe the Hackathon process in a research institution in the nuclear field, focusing on stimulating innovation. This is because, in a previous study, it was acknowledged that the IRD has potential for the generation of products, where, by utilizing the data of its postgraduate studies, it was possible to nurture the introduction of new technologies in the market, susceptible of intellectual protection, and consequently the immediate return to society [2].

1.2. The Hackathon phenomenon

The term "Hackathon" comes from neologism formed by English words hack (slicing, altering or having access to a file or computer network) and Marathon (marathon), being understood as a computer programming event, as well as a contest to launch, Develop and present instances of digital innovation prototype [3].

Thus, a hackathon would be an event in which programmers and others involved in software development collaborate intensively on projects. These activities encourage creativity, and can be geared towards specific challenges. That is, it has emerged as an effective approach to incentivizing innovation with digital technologies in a wide range of spaces (music, open data, fashion, academia and more). The term originally arose in 1999, during an event [4]. However, it can currently be applied to several areas of knowledge.

Usually hackathons last twenty-four (24) to forty eight (48) hours, and would have the following elements/characteristics:

a) end customer centered (focused on a single process);
b) highly multifunctional (where people from different areas of knowledge work with a problem);
c) starting from scratch (reimagining the characteristics of a product and weighed in its efficiency);
d) concrete and focused result (creation of a prototype); and

e) interactive and continuous (aiming at adopting new experiences implemented) [2; 3].

They can also be classified as:

a) centered technology (centered on technology focuses on the development of a specific technology);
b) Single application (a single application is focused on improvements);
c) Type of application (focuses on a specific platform);
d) Specific Technology (creating applications that use a specific language); and

e) focused on focus (aimed at developing software, for example, to address or contribute to a goal).

Finally, they can also promote inclusion of gender, inclusion by age and non-technical inclusion, that is, people from different areas [4].

1.3. Hackathon in Brazil

In Brazil, even if in its infancy, there are a number of events professionally organized by some companies, such as Hackathon Brazil, Cia Makers, Cloud Shop and Campus Party [3; 5; 6; 7].

Formed by professionals from various areas, HackatonBrasil offers services such as "HackProduct" (which focuses on innovating or creating a new product) or the "Hack Service" (aimed at services, companies and IT ideas).

Cia Makers organizes Hackathons for startups, uniting market professionals and members of the academic universe [3].

The Cloud Shop understands that a well-organized Hackathon motivates and transforms the way people think in and out of the company, solves, accomplishes and inspires leaders [5].

The Campus Party gathers people together to create technological solutions, collaboratively or in a competition [6].

Finally, Sebrae also Hackathons, aiming at entrepreneurship, in which the participants develop projects that are not necessarily of technology [7].

1.4. Hackathon and knowledge management

Some authors relate Hackathon with knowledge management. Thus, knowledge creation depends on the context, the space and the relationship between people, so that the information received meaning through the interpretation to become knowledge [8].

Knowledge always originates from people, so that the conversion of individual knowledge into a resource available to others is the central activity of knowledge creation, thus generating the spiral of
knowledge creation, resulting from transformation of tacit knowledge into explicit knowledge and applicable to the organization's strategies [9; 10].

There would then be four different ways of converting tacit knowledge into explicit knowledge: socialization, externalization, combination and internalization, where socialization would be a process of sharing experience, externalizing is expressed by models, the combination happens when people are able to combine isolated elements of knowledge to constitute a new knowledge and internalization refers to learning by practice [9].

In this sense, organizational innovation has an administrative character that involves the strategic management and the decentralization of tasks [11], which can be achieved through the Hackathon.

2. Methodology
The HackingIon 2018 was the first scientific marathon in the area of IRM performed in Brazil and Latin America. The event aimed to stimulate entrepreneurship among the students of the graduate program of IRD, based on generating technologies in order to present solutions to boost the development of research in the area of IRM (Figure 1).

Figure 1: Event Folder.

The scientific marathon proposed a challenge for the participants, who had 48 hours in total immersion in the project to develop technological solutions and present something entrepreneurial.

The competition began at the opening of the CBIRM 2018 and ended shortly before the closing ceremony of the Congress, when the winning team was announced. There were consultants for the teams and a specific program to guide the development of activities. An appraiser committee chose the best project.

The winning team received a ticket for the Brazilian Congress and Metrology 2019, sponsored by the SBM and the Brazilian Support service for Micro and small Enterprises (SEBRAE). On the last day the projects of the teams that competed in the HackingIon were presented. The four teams had to deliver a presentation in Power Point and a Pitch (presentation that promotes the startup developed).

In general, a Hackathon follows the following steps:
   a) inscription, where participants, after defining their profile, are invited to a challenge;
   b) lecture and team formation;
   c) Development of the work, where mentors give guidance and take doubts for the teams to model their ideas and plan how they will do their projects; and
   d) Delivery and presentation of projects, where a jury stand will evaluate and choose the best works.

3. Discussion and Results
During the whole process, the students were instructed by a representative of Sebrae, who initially
offered a lecture and a workshop to prepare startups. Sixteen (16) students participated in the event, divided into four (4) teams, who after lectures and workshops of SEBRAE on business modeling, developed their projects (Figure 2).

The projects presented were:

a) Digital certifying – which made a proposal for a digital bank on doses;

b) GamerIon – which presented a game involving concepts about IRM;

c) XRayOptimize team – which presented an online X-ray examination proposal; and

d) School in Glasses – which developed a distance learning platform that uses virtual reality and increased in the area of radioprotection as a teaching tool. The winning project was the School in Glasses team (Figure 3).

In relation to the HackingIon, it is worth noting that the event developed the entrepreneurial spirit and brought innovation in the area of IRM. In this sense, for the representative of Sebrae, Ms. M., who tutored the projects, ”The experience was innovative and fostered excellent results. I was very proud of all the participants and felt admiration for all that they presented here”.

According to the event coordinator, Mr. G., "The realization of HackingIon is a pioneering and innovative initiative".

For participant V., student of the master program of the IRD, ”It was very good to work in a team
and see the knowledge generated among all the participants...it is certainly a learning that I will take for life ".

The same opinion can be observed by participant E., also a master's student, "Was a very enriching experience. We have succeeded with our project to bring innovative solutions and provide access to information on radiological protection".

4. Conclusion

It can be said that despite being a recent practice, which has emerged and is predominantly used in the area of information technology (IT), the Hackathons have been spreading to all sectors that seek to optimize specific problems quickly and effectively.

The greatest potential of the hackathon would be to provide an opportunity for people from different areas of knowledge to collaborate together in the short term, generating new work and personal relationships (Networking).

Generally, the Hackathon should start some before the marathon itself, and it is important to complete research on the problems of an institution, so that they serve as a basis and guidance for projects to be executed during the event.

After the themes are defined, teams must be trained, oriented by collaborators, considering the profiles and potential of the institution. With regard to the awards, this can act as a motivational factor, presenting a goal to be achieved that benefits not only the company and its customers, but also its collaborators. At the end of the marathon, the election of the best project must be made by a jury composed according to the company's criteria.

Although it is considered a relatively recent tool, the concept of Hackathon has already been discussed by the Japanese philosopher Kitaro Nishida in the 1920s, but was Nonaka and Konno (1998) who made the adaptation of this philosophical concept to the environment of knowledge management.

Finally, it is understood that the association of IRD with INMETRO, which has the greater commitment to bring more quality to the citizen, and with the SBM, whose mission is to promote the culture and practice of metrology as instruments of competitiveness and quality of life and social cohesion, materialized in a fruitful partnership for the realization of the event for which promising results for the science, technology and innovation of the country are expected.

References

[1] CBM 2018 Congresso Brasileiro de Metrologia das Radiações Ionizantes.
[2] Costa CO 2016 Um estudo sobre possíveis proteções de propriedade intelectual geradas na pós-graduação do IRD Congresso Brasileiro de Metrologia das Radiações Ionizantes.
[3] Siqueiral FS, De Araujo CO, Variz RC, Martin AFC, Rosini AM 2017 Hackathon e gestão do conhecimento para planejamento estratégico da empresa Cia Makers – Escola de Inovação VII Congresso Internacional de Conhecimento e Inovação.
[4] Briscoe G, Mulligan C 2014 Digital Innovation: The Hackathon Phenomenon Creativeworks London.
[5] Hackathon, a maratona a qual toda empresa deve participar 2017 Revista Exame.
[6] Você sabe o que é Hackathon? 2018 Campus Party.
[7] Inovação. 2018 Sebrae.
[8] Nonaka I, Konno N 1998 The concept of "ba": Building a foundation for knowledge creation California Management Review, 40 (3), 40-54.
[9] Nonaka I, Takeuchi H 1997 Teoria da criação do conhecimento organizacional Gestão do Conhecimento Porto Alegre: Bookman.
[10] Razuck FB, Cavalcante GV 2020 Gestão do conhecimento na área nuclear: mapeamento do conhecimento crítico de um programa de pós-graduação do Instituto de Radioproteção e Dosimetria Brazilian Journal of Radiation Sciences, 08-01A, 01-18.
[11] Posolli GE 2012 Gestão da inovação e do conhecimento Curitiba: Editora Intersaberes.