Games' "Social Tech Booster"

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Abstract. The society has organized itself towards facing existing social needs like the care for children with Down syndrome, Deafness or Autism Spectrum Disorders, among several other pathologies. As a result, several organizations emerged towards handling these issues, composed of doctors, therapists, psychologists, among other professionals, but excluding technology experts. On the other hand side, the finalist students from technology universities usually have a final course where they have to create a complete project from scratch. This article proposes a method for applying the effort and enthusiasm of such students in the above mentioned social causes through games' development.

Keywords: Social games · Deafness · Autism Spectrum Disorders · Down syndrome

1 Introduction

Children that are born with "differences" have a large set of Social Care Structures (SCS) created by the society that help to take care of such "differences" in their growth. Some example pathologies are the Autism Spectrum Disorder (ASD), Down syndrome or Deafness. The professionals of these structures are mainly composed of Doctors, Therapists, Sociologists, and other specialists on the specific therapeutic for the tackled pathologies. Usually these structures are not equipped with dedicated technology experts or engineers that might help to create or develop ICT solutions that help the therapies.

Nevertheless, a literature review shows a clear benefit from the usage of technology in such therapies, namely the development of Digital Games, as mentioned in [1–3].

Giving the fact that this children audience is not the "mainstream", developing ICT solutions for this target does not attract as many big ICT enterprises as desired, exception made to some generic initiatives, e.g. in terms special interfaces for accessibility issues.

On the other hand side, some initiatives can be found in terms of collaboration between Universities and these kind of SCSs. These initiatives put together the efforts of the personnel from the SCSs, the Professors from the universities and usually some

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students, as well. Actually, the form of these partnerships divide the professionals from the SCSs and the professors from the universities as seniors that think about ICT systems or approaches that might improve some therapies, and the students as the juniors that design and develop such systems, usually as their final course project or master's dissertation *proof of concept* thesis prototype. In some cases, the developed prototypes are digital games, naturally, given their interaction means, as well as the entertainment aspect they bring to the therapies.

In these collaboration initiatives between Universities and SCSs, the students that finish their prototypes go to the final presentation and finish their courses, usually with a distinction for applying their learnings to concrete social targets. After that, they go to the next stage of their life. The result of this phase transition is that the prototype becomes orphan, meaning that no support may be provided, nor new versions developed according to some usage feedback. The consequence of this result is that although the prototype had received several credits, it will never become a product with a wide usage. In other words, it will not reach the final target users.

This paper proposes a new approach called Games' Social Tech Booster. The idea is to create a mechanism to apply technology to social issues through the games, based on the creativity, the technological know-how and enthusiasm from finalist students from ICT universities and, especially, guarantee the improvement of the prototypes that result from the partnerships, in order for them to really reach their target market.

2 State of the Art

The application of Games in health is not a new topic. In fact several serious games can be found in the industry, where the objective of the game is a serious aspect that is achieved through a gameplay that provides an entertainment and joyful environment where the player likes to be. Even some mainstream quite old games, like the Sid Meier's Civilization or the SimCity, provide the players with knowledge, e.g. in what concerns the Aztecs, or the organization of traffic, for the above mentioned examples.

In what concerns the production of games that target some examples of "differences" that children might have, some examples can be found as well. Depending on the size of the target audience, the number of existing games naturally increases.

A literature review organized by the pathologies children may have shows that one of the cases where the scientific community has put an interesting effort is the deafness. Some examples:

- American Sign Language recognition in game development for deaf children – [4] – A game that uses gesture recognition technology to help young deaf children practice American Sign Language skills.
- SMILE: an immersive learning game for deaf and hearing children – [5] – Science and Math in an Immersive Learning Environment), an immersive learning game that employs a fantasy 3D virtual environment to engage deaf and hearing children in math and science-based educational tasks.

- A gesture-based American Sign Language game for deaf children – [6] – A game designed to facilitate language development in deaf children for the American Sign Language.
- Kinect-Sign – [10] – A game devoted to teach the portuguese sign language to listeners.

Another example area that received much attention from the scientific community is the Autism Spectrum Disorder, as summarized in [11]. Some examples can also be found, like:

- [7] – Where a game was created for children diagnosed with autism spectrum disorder helping them to exercise face and objects recognition.
- [12] – Where a proposal is made towards providing expression recognition through a game.

In terms of technological devices' advances, some sensors appeared in the market, mainly devoted only to entertainment gamming, like the Kinect or the PlayStation sensors. These sensors have challenged researchers to use them with the focus of some of these child growth "differences", as well. Some efforts include:

- [8] – Where an extension to the kinect SDK was proposed towards recognizing gestures previuously saved.
- [9] – Where the kinect SDK was extended to include the hand skeleton added to the already existing body skeleton provided.

Although several other initiatives might be found, some contact with the doctors and therapists in the field shows that no sistematic approach exists and several other systems might be developped, as well. In other words, all these professionals thank the "ICT world", namelly in what concerns the adoption of games to complement the treatments they provide, but they feel the lack of dedicated ICT professionals to develop several other possible systems, i.e., there is a big potential application of ICT, especially in what concerns the digital games that target pathologies far from the mainstream.

In what concerns the University role and the above-mentioned collaboration innitiatives, as mentioned above, as the students proceed to the next stage of their lifes and leave an orphan prototype, the challenge is to overcome this aspect and, somehow, guarantee a continuation of these prototypes into the stage of products ready to reach their target market.

3 Games' Social Tech Booster

This paper proposes the concept called Games Social Tech Booster (GSTB), which is intended to become an enabler for the application of technology to social issues through games. The concept is based on students from Information and Communication Technology university courses, at their final year and especially afterwards.

The idea is to put together the energy and enthusiasm of these young students, or ex-students, the know-how of professionals from what we might call Beneficiary Organizations and University Professors. In terms of personnel organization, the GSTB will

be made of seniors, the professors and the specialists from the Beneficiary Organizations; and juniors, some ex-students that will be hired after their final project or master's dissertation prototype is finished.

Moreover, a third and fourth potential GSTB partner kind is proposed: Finance support partners/Sponsors and Enterprises. Figure 1 represents all the potential partners from GSTB.

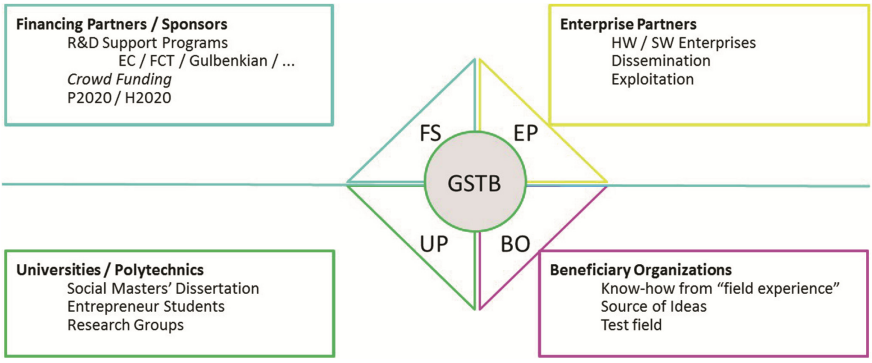

Fig. 1. Potential GSTB partners

As represented in Fig. 1, four distinct potential GSTB partner kinds were identified. At the baseline:

- Beneficiary Organizations – these are the structures created by the society to handle the social issues, which are equipped with doctors, therapists, etc. These structures are the source of the macro problem specifications. As they are the ones with the knowledge of the therapies and that deal with the children that will become the end-users of the games, they have the know-how of what are the main Needs.
- UP – Universities and Polytechnic – the Universities and Polytechnics are the labour source – the ex-students. As they have their final course projects, they provide topics for the finalist students to choose as their final course project, or masters' dissertation thesis, along with the beneficiary organizations. From the students' perspective, this will be an interesting option, especially if they have the willing to perform some sort of social work or if they have some entrepreneurship spirit.

These two potential partners are the baseline of the GSTB. Two other potential partners have also been identified:

- Financing Partners / Sponsors – As the main GSTB cost is the hiring of ex-students to transform their prototypes into products, the GSTB financing aspect becomes a core issue, as usual. Several potential financing entities were already identified. First, at a national level, several foundations were considered, as for example the Gulbenkian foundation or the EDP foundation, at the Portuguese national level. The Horizon 2020, at the European level and the corresponding Portugal 2020 have also been tackled in the perspective of applying R&D based on the GSTB concept.

- Enterprise Partners – finally, as the GSTB has an enterprise spirit, other enterprises were also identified as potential partners. Here HW and SW enterprises may contribute with their systems/games design and development know-how, but other enterprises will be needed for aspects like exploitation and dissemination, as well.

The proposed operational process is made of 4 phases and goes as follows: 1st, the Professionals from the Beneficiary Entities, along with the professors of the Universities identify projects that might be implemented towards helping therapists in their work. 2nd the finalist students that find such projects worth to implement, or that look at these projects and feel the enthusiasm or opportunity to apply their learnings to concrete social causes, apply for these projects and develop the expected prototype solutions. 3rd, the main GSTB phase, some of these students are hired to continue their prototypes towards improving them to become products. Finally, the products are deployed to the market through partner enterprises.

Figure 2 shows the 4 phases of the GSTB Business Model.

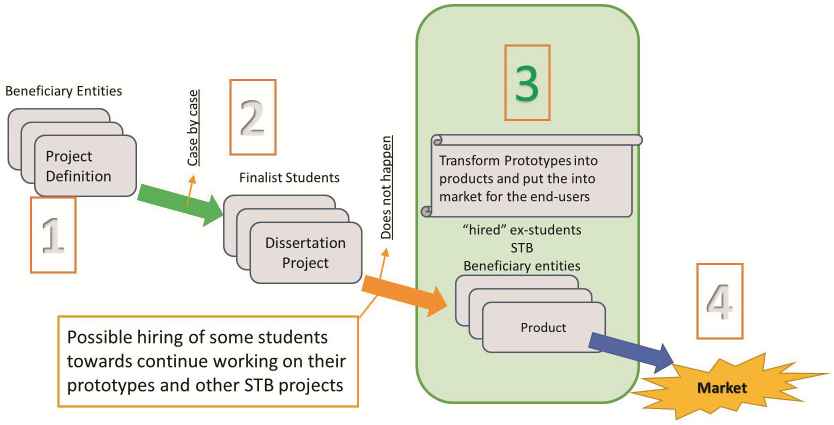

Fig. 2. GSTB business model

In other words, the process shown in Fig. 1, represents the Business Model of the GSTB, divided into 4 phases with the following roles:

1. Idea / Need identification – the first phase involves the GSTB itself and the Beneficiary Entities and targets the identification of the projects to be developed afterwards, as well as a macro-specification of such projects.
2. Prototyping – the second phase involves the GSTB, the University Professors and finalist students. This phase intends to perform the design and development of a prototype solution. This is a *proof of concept* prototype made for the student to finish his or her studies.
3. "Productization" – the third phase, the main GSTB aim, involves some ex-students, and the objective is to pick the developed prototype games and turn them into products towards reaching the final end-users. This final phase works in a cyclic manner, transforming the prototypes into products as mentioned, but also gathering the usage

experience feedback and transforming the products from one version in their next version, based on such feedback.

4. Deploy to market - Provide the market-ready products to partner enterprises that have the distribution channels ready to put the products in the market. After a time-frame, when the revenue starts being retrieved from the market, both the STB and the Beneficiary entities should benefit from it. The first needs to guarantee sustainability, the second owns part of the property rights.

Figure 3 represents the GSTB working structure in one picture.

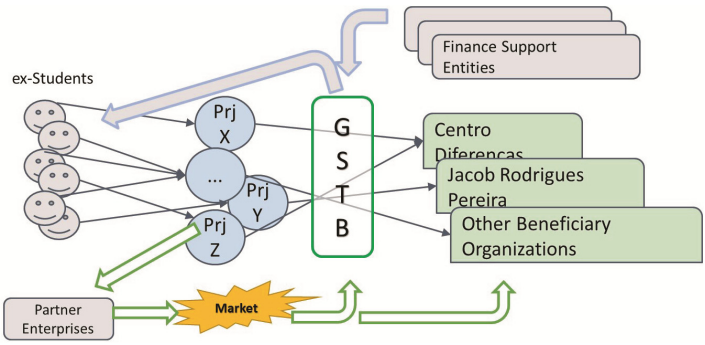

Fig. 3. Working structure of GSTB

At the top-right side of the Fig. 3, the finance support entities introduce the budget into the GSTB that is mainly used to hire ex-students. These ex-students (on the left hand-side of Fig. 3) work on projects for the beneficiary organizations (on the right-hand side). The GSTB itself works only as an enabler, as the Booster perspective induces.

4 Validation

The implementation of the STB concept has already started in the field with distinct prototypes already developed in collaboration with Beneficiary Organizations. Table 1 show some examples:

Table 1. Three sample projects already at the prototype stage.

Name	Short description	Benef. Org.
Kinect sign	Game devoted to teach Portuguese Sign Language to Listeners	Instituto Jacob Rodrigues Pereira (deaf children)
Game wizard	Wizard created to generate "Super-Mario"-like games through a user-friendly interface	Centro Diferenças
Reino dos Fonemas	Game created to teach phonemes to children with language learning difficulties.	Centro Diferenças

As shown in Table 1, two beneficiary organizations were tackled by these three sample projects. The GSTB idea is to work as a network of Polytechnics and Universities, as well as several Beneficiary Organizations. The already finished prototypes show that the distance between the prototype and the final products is not big and that the next stage of the GSTB itself is not difficult to achieve.

5 Conclusions and Future Work

The Games Social Tech Booster, proposed in this paper, intends to find a solution to guarantee the continuity of the prototypes designed and developed by finalist students as a result of the collaboration initiatives between Universities and the so called Beneficiary Organizations.

The main idea of this paper's proposal is not to introduce new forms for gamming nor new technologies, but rather to propose a new usage of existing knowledge from distinct areas that brought together might result I added value to the society. In other words, putting together the know-how of therapists, along with the enthusiasm of ICT finalist students with the orientation of their professors, may result games that help the therapy in several pathologies. GSTB proposes an approach to guarantee the evolution from the prototypes that result from the collaboration between Universities and Social Care Structures into products that really reach the end-users.

The concept of the GSTB have been presented, in the form of a Pitch, to distinct persons, from both Beneficiary Organizations, R&D Organizations and Research and Innovation Accelerators, as well as other backgrounds towards receiving inputs in what concerns the operational aspects and the philosophy of the concept. The acceptance is unanimous and the collaboration for the formation of a not-for-profit Association has already started.

In terms of future work, the network aspect has to grow, both involving other Universities and Polytechnics, as well as other Beneficiary Organizations.

The already involved BOs are providing macro project definitions and at the moment this paper is being written, 5 prototype systems are already finished and 4 are being designed and developed.

The concept was included in a Portugal 2020 proposal and more calls for proposals are being tackled. When the first financing success case occurs, ex-students will start to be hired and the operational "productization" process will start.

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