



SAICON

Greece, www.saicon.gr

With the collaboration of a strong multidisciplinary team (ICT experts, university teams from the energy and ICT areas, innovation consultants), a Greek SME combined the educational and commercial potential of gamification by designing, developing and testing an app

Executive Summary

SAICON and EPIS, two ICT companies, initiated a project aiming to combine the educational and commercial potential of gamification in a new application to train users around electricity issues. Using the gamification methodology, SMARTEGE, the aim of the application was to modify users' behaviour towards electricity management, via an educational and emotional involvement with the app. Key companies and university teams joined efforts to provide know-how and expertise in specific domains during the development and pilot testing of the application. This strategic collaboration led not only to the validation of the scope of the application and its proven impact to create behavioural change, but also generated a valuable resource for the companies to develop educational gamified applications in new/different markets and target areas.

CASE N°: SE57

SECTOR: INFORMATION TECHNOLOGY

TECH INTENSITY: LOW-MEDIUM TECH

LIFE CYCLE STAGE: ESTABLISHED

INNOVATION VECTORS: PRODUCT

OI PARTNERS: PSR, OTHER SME, LEAD USERS/CUSTOMERS

KEYWORDS: Electricity user, behaviour modification, gamification

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- INNOVATION CHALLENGE & MARKET OPPORTUNITIES
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- BUSINESS IMPACT
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BACKGROUND

Founded in September 2005, SAICON successfully combines innovative methodologies and advanced technology solutions to address managerial and IT challenges. Both an IT/software engineering and a management consulting company, SAICON conceptualizes, develops and implements bottom-line solutions for business and IT transformation. For this purpose the company puts state-of-the-art IT and telecommunications systems and technology at the service of partners and clients.

SAICON's business offering combines intelligent technology infrastructure with unique managerial competence in order to design and produce working solutions and offer them to their target market segments under various business models. The company offers gamification consulting services to clients who wish to improve their customer relationship strategies and related actions. It also specializes in the development and commercial exploitation of multi-player casual games for all types of end-devices (Java ME, iOS, Android, Windows, etc.).

SAICON also demonstrates strong experience and a unique solutions' bundle offering in business engineering, e-learning engineering, research and development of advanced software technologies and their application to complex technical problems. The company's main activities can be summarized as follows:

- composition, design and development of management systems (i.e. MIS, corporate performance measurement, revenue assurance, process performance measurement, etc.);
- composition, design and development of systems for new telecommunications technologies and IT environments (i.e. e-business, m-business, risk management, e-learning, etc.);
- business exploitation of the above mentioned systems;
- consultancy services in operational planning and programming, implementation of business plans using advanced methodologies, management systems and new telecommunications and information technologies.

The company's areas of expertise relate to the provision of advisory services and the implementation of advanced solutions in the following areas:

- design and implementation of advanced wireless and mobile applications;

- design and development of services for smart phones;
- business processes optimization;
- analysis and development of management information systems with respect to the performance of business processes;
- analysis and development of e-learning systems (requirements analysis, production of e-learning content, development of e-learning environments, e-learning operating environments support);
- requirements analysis for the implementation of Enterprise Resource Planning (ERP), Supply Chain Management (SCM) and Customer Relationship Management (CRM) systems;
- analysis and development of corporate portals and corporate knowledge management systems;
- development of business plans for companies that operate or aspire to do business in the field of new technologies telecommunications and information technology;
- preparation, implementation and management of projects, funded by Greek, EU and international public funding programmes.

SAICON aims to continue developing innovative ICT solutions and creating value for the benefit of society, its clients and partners and its shareholders by ensuring global exposure and monetization opportunities through international partnerships in the gaming, advertising, brand licensing, mobile/web aggregator and television markets.

INNOVATION CHALLENGE & MARKET OPPORTUNITIES

Over the last two decades an accelerating paradigm shift has been observed in electricity grids and markets. The power grid, which is enabled by technologies such as renewable energy sources (RES), microgeneration, telemetering and tele control, is moving towards demand-side management under the pressure to save energy and the low carbon economy on the one hand and the deregulation of the electricity market on the other. Demand-side management requires the user to be an active agent interacting in real time with the grid and the markets rather than a passive consumer whose only interaction with the grid is paying their bill and reporting faults. Seen in this

way, the majority of electricity users can be considered as technologically illiterate, lacking fundamental knowledge and skills which in turn hinders the uptake of new technologies and distorts related policies.

Faced with these contemporary problems, an approach which aims to modify public behaviour is a powerful tool for shaping savvy electricity end users. In the same vein, gamification, loosely defined as a practice of using gaming technology and mechanics in non-gaming contexts, is a promising educational methodology which can be used to modify behaviour.

Together with EPIS Ltd, an SME operating both in the field of software development and ICT consultancy services, SAICON decided to combine the educational and commercial potential of gamification in a new application methodology which would encourage users, through education and increased involvement, to engage in good practices, activities and actions relating to electricity consumption, production and energy saving.

Apart from the educational value of such a service and its potential commercial application with various educational establishments (other than energy efficiency), trends revealed that utilities were willing to invest in gamification to keep their customers engaged so that business and energy goals could be reached. This approach can help energy utilities to attract new customers and retain existing ones through positive brand reputation, improved customer responsiveness and engagement and improved customer satisfaction. It also helps to encourage the public to change their attitudes towards their daily use of energy.

OPEN INNOVATION TRAJECTORY

Concept development

The team focused on designing and developing a gamified application to educate electricity users, regardless of their profile, and modify the way they perceive their relationship with the electricity grid. To that end, they decided to combine the persuasive modelling skills of SAICON with the gamification and cognitive learning competencies of other partners.

The alignment of the gamification methodology characteristics with the basic characteristics of learners and the capabilities of mobile devices was expected to create a new educational tool offered through ICT devices, while enabling easy

familiarization with the educational content as well as encouraging a change in learners' behaviour and engaging them in problem solving. The expected learning outcomes for the user are to know, understand and apply the basics of electricity use and generation to efficient energy management as well as to analyze, evaluate and create energy-efficient scenarios.

In order to pursue this goal and achieve their objectives, SAICON and EPIS formed a collaborative team consisting of themselves, KiNNO, an innovation intermediary, and two research teams with the academic and scientific support of TEI of Sterea Ellada, Department of Electrical Engineering, Lab of Electrical Installations & Electrotechnical Applications and Athens University of Economics and Business – IST LAB Wireless Research Center, to provide know-how and expertise in specific domains during the app development. The partners were selected based on their profile to add value to the project (i.e. knowledge, expertise and skills in relation to specific building blocks that the leaders – SAICON and EPIS - lacked).

At an early stage in the development of the project idea, the opportunity to receive external funding arose. The team therefore applied and managed to obtain a grant under the framework of the Programme for the Development of Industrial Research and Technology (PAVET) 2013, as well as co-funding from the European Regional Development Fund (ERDF) of the European Union, national funds and an own contribution from the partnering companies.

The development process, IPR and competition strategy

The OI project and the application were named SMARTEGE. SMARTEGE set out to utilize gamification methodology in an educational game application available for all types of devices (mobile and desktop) and focusing on the energy management area. With this clear concept in mind, the team had to work on the definition of the profile of SMARTEGE target users, coming to the conclusion that the ideal user was ICT literate and interested in learning more about energy efficiency, so as to become familiar with sustainable patterns and to adopt as many of them as possible in their daily routine ("real world" outcome).

An initial survey examining the knowledge level and the perceptions of the potential SMARTEGE users with regard to energy-related issues provided the necessary data set to evaluate the

impact of the application through a before and after comparison. It also served as the key input for defining the user requirements for the app.

Next the methodological framework was designed: the gamification methodology was aligned with educational methods and practices, with a view to developing an application with substantial educational value. This correctly adapted combination of methodologies was enriched with educational and informative material which was relevant to the pilot scenario for applying energy management.

On another level, SMARTEGE aimed to apply the acquired knowledge not only in a virtual but also in a real-world environment. For this reason, the SCADA (Supervisory Control And Data Acquisition) component was developed to offer remote access to real users' installations for accessing, controlling and measuring consumption in real time, via a web services Application Programming Interface (API).

In order to achieve its objectives, SMARTEGE had to adopt innovative educational methods, such as a simulated environment tool and libraries of virtual objects, thereby enabling the user to learn in a highly interactive way and manage either real or virtual data coming from respective real or virtual environments which has been obtained in real time conditions. The objective was to increase the user's ability through educational content which had been developed following a student-centric learning approach. Game mechanics were employed to motivate and encourage the user to adopt the desired behaviour.

Following this cognitive process, the users are expected to shift from being passive recipients to active players, interacting with the application's environment. As the users progress in the game, they are able to unlock different levels, which correspond to the energy management of buildings of increasing complexity, learning the basics of electricity use and markets, making decisions on energy production and saving strategies, being rewarded for their progress and offered assistance to improve or encouragement to try harder when lagging behind.

To engage users in the learning process, gamification mechanics such as badges, leaderboards, levels, quizzes, counters and social interaction were designed and incorporated. These components have proved to raise users' interaction with the game, enabling them to signal their achievements to other players and compete for knowledge which enhances fair competition as part of the game.

Special emphasis was put on the social dimension of the game by employing social media and

promoting interaction and information exchange among users in order to win points. Finally, at the most advanced levels and by purchasing the appropriate hardware, the user can emulate, monitor and control the production and use of electricity in a real installation.

The proposed methodology and the educational model that was developed sought to establish a good practice approach to a modern learning methodology and tools. At the same time, the application turned out to be an interesting tool that energy utilities could use to increase customer engagement and encourage them to help achieve energy saving targets and manage peak demand.

KINNO was responsible for developing the methodological framework based on international standards and literature. KiNNO also managed the adaptation of content data (energy oriented context) for SMARTEGE and supported the development, implementation and results analysis of the field study. SAICON was responsible for the development of the game software for mobile devices (mobile smartphones, tablet and desktop). EPIS was responsible for the development of SCADA and its connection to the virtual sensors (virtual reality sensors) which were used in the game and their representation in the web environment.

TEI supported the implementation by providing user scenarios involving power generation and consumption, such as sources, monitoring and measurement inputs and processes, etc., so that the game scenarios could illustrate "real" situations that could be addressed in practice. Furthermore, TEI provided user-friendly, low-cost, modular and flexible measurement techniques and power consumption control techniques that they developed for use in conjunction with the SCADA application.

The AUEB team contributed to the customization and configuration of the gamification practices, enabling their effective application in an educational context, as well as to the appropriate design of the application for mobile devices and the energy case.

The key elements that enabled a smooth development process were:

- the joint vision and detailed definition of the scope of the app;
- the correct definition of the needs which offered valuable guidance to the development team in subsequent development phases;
- a clear definition of the roles among the partners, and

- the practices followed to capture the user requirements.

The partners clearly specified the background IP and know-how that each brought to the project. As far as the competition is concerned, existing applications, such as Electric Box, Energy Quest, Ollie's World, Electricity, Power Matrix, Energy Ville, etc., focus mostly on conditioning children and teenagers to adopt a more 'green' attitude and were designed mainly to promote commercial products and processes. SMARTEGE, on the other hand, aims not only to educate or entertain but also to modify the behaviour of adults who are electricity consumers. In this sense, potential SMARTEGE users are all electricity users. Furthermore, utilities can use the SMARTEGE gamification application as a means to interact with customers and retain their engagement in achieving their business and energy goals.

Commercialization and follow-up

The pilot application was tested by the selected target group and the survey results suggested that the users' knowledge of the electricity market and their motivation to become active agents of change did increase. However, several challenges arose during the roll-out of SMARTEGE. One of the major issues raised was that, because of the complexity of TEI's IT network, remote access was not initially possible. However, remote access to the IT network was necessary in order to implement the scenario in which the user could apply SMARTEGE to monitor their consumption and control the power distribution lines remotely through specific relays, electrical appliances and installations. The efforts of the team to overcome this challenge helped to resolve the issues with some delay. This did not have any effect on the development of software with which the SCADA subsystem communicated.

The launch of the application for iOS on iTunes was also delayed with the consequence that fewer users than expected participated in the pilot actions. This delay was due to the control process, approval and distribution of applications via iTunes which is time-consuming and requires several steps and documentation. Last but not least, a delay in payment of the related fee, due to the implementation of capital controls in the Greek banking system, added an extra delay to the iOS launch. The upload of the application on iTunes was finally achieved thanks to the persistence of the SAICON team.

Hardware failures also occurred such as the destruction of the installation board – a microprocessor which collects data from sensors,

stores them on a local basis and controls electrical panel switches - which was replaced. During the roll-out, software challenges were experienced such as the relatively slow loading of the GUI (Graphical User Interface) front-end (the environment that allows the user to interact with the app) in some devices, as well as the slow processing of historical data transferred via web services. The SAICON and EPIS teams resolved these challenges by optimizing the code and developing new web services.

The commercialization route that the partnership identified was twofold: the commercialization of SMARTEGE as a service and as a product (including licensing, technical support services and helpdesk services). A preliminary agreement was concluded and a short exploitation study was carried out to clarify the context of foreground IP ownership and granting it to the partner who developed the related result. In cases of foreground IP created by more than one partner a Joint Ownership Management Agreement was put in place that defined clearly how joint IP will be managed and exploited.

SMARTEGE is freely available in Android and iOS app stores, as well as through desktop browsers. The presentation of the findings of the SMARTEGE app as well as of the project (methodological framework, software design and development etc.) to a wider community, the interaction with international key stakeholders in the fields of education, gamification, behaviour research and ICT, as well as the targeted exchange of ideas, experiences and practices are of great importance for the further development, exploitation and market uptake of SMARTEGE. Under this framework, several presentations and participation in external events (conference, workshops, etc.) were carried out by some of the partners for networking and dissemination purposes.

Last but not least, SMARTEGE can be applied in different sectors/learning pilots. Since SMARTEGE has been tested in an operational environment with a specific focus, it is considered to be TRL 6 if tested in the context of a different sector or application. This represents a major step up in demonstrated Technology Readiness Level; however, the team is aware that both achieving TRL9 in the energy field and adapting it to other sectors require not only technical customization, but also market research in the selected sectors to validate the suitability and marketability of the solution. At the time of the interview, the consortium was considering which sectors to select from the market feasibility perspective.

The team was also considering the options of enhancing intelligence (dynamic user profiles)

and applying process mining techniques to the platform.

BUSINESS IMPACT

The user interface of the SMARTEGE app (front end) is obviously designed to satisfy daily operations and be appealing to a specific group of users (energy users). The supporting gamification sub-processes which were developed are easily adaptable to any category of users, regardless of the thematic/sectoral field or educational content. Both the cognitive content (libraries and quiz) and the gamification mechanisms (point systems, scoreboards, rewards, messages and prompts, levels, etc.) have been implemented at managerial level in a general way, thereby allowing a simple, easy and quick conversion to cover a wide range of different requirements and applications.

These mechanisms have now been tested, optimized and validated in a specific thematic/sectoral field or educational content and have demonstrated impact in changing the behaviour of the target group, thus creating an integrated system of proven effectiveness.

Creating and optimizing such a generic and easily adaptable functionality as a separate module is a valuable resource for SAICON which has utilized its experience in designing and implementing front end environments for games and gamification apps. In an OI context with other SMEs and research organizations, it has managed to create not only an integrated system for generating gamified educational applications, but also valuable know-how on technology and knowledge transfer practices and techniques.

There are no figures available so far for the business impact on the company since the SMARTEGE app is freely available. The indirect impact (application in other sectors, commercialization/offering through utility companies) cannot yet be valued.

LESSONS LEARNED

A company with a long track record in software development and ICT consultancy services decided to create a new module for developing gamified applications with an educational focus in the energy management area. With the collaboration of a strong multidisciplinary team (ICT experts, university teams from the energy and ICT areas,

innovation consultants) SAICON combined the educational and commercial potential of gamification by designing, developing and testing an app.

The most important achievement for SAICON was the ability to move from the most specific point to the most general one; although the initial concept focused on energy, the framework developed can eventually be applied in many sectors and applications as a behavioural change and educational tool, thereby opening the door to new markets for SAICON.

Main lessons learned:

1. Even generic ICT frameworks and projects require multidisciplinary partnerships as a key to their success.
2. Although IP issues in the ICT/app development industry are rather vague due to the existing regulatory and legal frameworks, a clear, joint IP asset strategy is required (especially regarding foreground) to set both the boundaries and foundations for a successful outcome.
3. Joint vision among the partners and a clear definition of roles throughout the project's implementation are the most critical aspects of an OI effort, according to the interviewee. To keep the excitement going, as well as to maintain the pace between the partners' involved (coming from different environments) the OI 'project' needs a well-crafted product development plan supported by market research and a clear definition of needs and solutions, design and development paths.
4. The challenges faced throughout the roll-out would be impossible to tackle without the support and joint efforts and expertise of each partner.