SOCIABLE DELIVERABLE D4.3
"Modular Services Platform"

Project Acronym	**SOCIABLE**
Grant Agreement No.	**238891**
Project Title	**Motivating platform for elderly networking, Mental reinforcement and social interaction**
Deliverable Reference Number	**SOCIABLE_WP4_D4.3**
Deliverable Title	**"Modular Services Platform"**
Revision Number	**V1.0**
Deliverable Editor(s)	**Singularlogic (SLG)**
Authors	**Stelios Pantelopoulos (SLG), Salichos Petros (SLG), Eleytherios Syrigos (SLG), Paolo Mattarelli (CEDAF), Michele Fabbri (CEDAF), Simone Passuti (CEDAF), Inmaculada Gomariz Soto (UPV)**

Project co-funded by the European Commission within the ICT Policy Support Programme		
Dissemination Level		
CO	**Confidential**	**CO**

Statement of originality:

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

Revision History

Revision	Author(s)	Organization(s)	Date	Changes
0.1	Stelios Pantelopoulos	SLG	15/09/2011	Provision of Structure and Table of Contents
0.2	Inmaculada Gomariz Soto	UPV	12/10/2011	UPV Contribution on BoL
0.3	Mattarelli Paolo , Michele Fabbri	CEDAF	14/10/2011	CEDAF Contribution on Back-Office
0.4	Stelios Pantelopoulos	SLG	20/10/2011	Description of Cognitive Training Games's Modularity
0.5	Stelios Pantelopoulos	SLG	31/10/2011	Fine Tuning of the Report, Executive Summary, Conclusions
0.6	Stelios Pantelopoulos	SLG	07/11/2011	Version for Quality Control
1.0	Stelios Pantelopoulos	SLG	15/11/2011	Version for Delivery

Abstract

The present document reports on three important aspects of the SOCIABLE platform, namely modularity, extensibility and configurability. In terms of modularity, the deliverable illustrates the modular nature of the SOCIABLE platform and explains how additional cognitive modules could be added. In terms of extensibility, the deliverable reports how the SOCIABLE platform can be extended with additional applications (notably cognitive training games). Finally in terms of configurability, the deliverable presents tools and techniques provided by the SOCIABLE platform with a view to managing elderly/patient data, as well as to configuring cognitive training sessions and games. Note that the present report accompanies the prototype implementation of the presented modularity, extensibility and configurability characteristics within the SOCIABLE platform. Deliverable D4.3 includes both the report and the respective prototype implementation.

Table of Contents

List of Figures

List of Tables

Executive Summary

SOCIABLE is currently conducting pilot operations of its ICT based cognitive training model in seven different pilot sites where the SOCIABLE surface computing platform is deployed. The project aspires that its pilot operations will serve as a starting point for sustainable deployments at the seven pilot sites, as well as for the successful exploitation of the SOCIABLE ICT platform in the care services market. Towards this goal, the SOCIABLE platform is expected to provide three important features that are prerequisites to its expandability, technological longevity and wider deployment and use. In particular, the SOCIABLE platform should be modular, extensible and configurable.

This deliverable presents the modularity, extensibility and configurability of the SOCIABLE platform. The modularity of SOCIABLE stems from its baseline architecture, which specifies the main building blocks of a SOCIABLE system along with the structuring principles that drive their integration. In the scope of this deliverable we briefly present the main modules of a SOCIABLE system, with emphasis on the software modules that have been produced within the project. However, the SOCIABLE architecture is not presented, since it has been illustrated in deliverable D3.2. Special emphasis is given on the discussion of the modular natures of the games, which permits game packages to be added and/or removed from the SOCIABLE platform.

In terms of extensibility, the SOCIABLE platform implements build-in features and processes that facilitate extensions through game packages. In the scope of the deliverable we explain the artifacts that a game developer should provide in order to enable the seamless deployment of the game over the SOCIABLE platform. Furthermore the process of deploying extension packages (for cognitive games) is discussed. While extensibility in terms of cognitive game is the most important expandability characteristic of SOCIABLE, the deliverable illustrates also how extensions to other modules (i.e. the back-office and the book-of-life) have been carried out during the course of the project's the SOCIABLE ICT platform's evolution.

A major part of the present deliverable is allocated to the configurability of the platform. Different configurability aspects are discussed/presented including how to configure cognitive training games on the basis of the provided configuration files, but also how to configure SOCIABLE games and sessions through the back-office module of the system. Configurability features target the IT administrators that deploy SOCIABLE packages (games), but also the medical experts and health professionals who are offered with opportunities to customize the SOCIABLE sessions.

Overall, the extensibility, modularity and configurability of the SOCIABLE platform contribute to a sound basis for the expandability and sustainability of the project's technological developments. Moreover, they can be seen as enablers for a wider ecosystem that could enable third-parties to deploy game packages for the SOCIABLE

platform. The later ecosystem could be extremely important for the wider penetration and adoption of SOCIABLE as a novel ICT based cognitive training platform in an international basis. This is because it guarantees that a wide variety of games (including novel ideas from third-party) can be designed, developed and deployed independently on top of SOCIABLE surface platforms.

Last we note that the modularity, extensibility and configurability features are part of the SOCIABLE platform, which has been implemented and is available in an electronic CD that accompanies the present report. Hence, the present report is only part of deliverable D4.3, which is actually complemented by the prototype implementation.

1. Introduction

The main deliverable of SOCIABLE WP4 is the SOCIABLE surface computing platform, which comprises a wide range of middleware elements and software applications that are operating over third-party surface computers (such as the Microsoft Surface Table). As part of deliverable D4.2, the SOCIABLE partners have already released and deployed the interim version of the platform, which is already used by the seven pilot sites of the project in the scope of pilot operations. At the same time SOCIABLE WP4 works towards providing the final version of the SOCIABLE platform (deliverable D4.5), including improvements, enhancements and fine-tuning based on the actual use of the interim version.

Previous WP3 and WP4 deliverables have provided insights on the design, implementation and integration aspects of the SOCIABLE platform. The present deliverable reports on three very crucial aspects of the SOCIABLE platform, namely modularity, extensibility and configurability. Modularity refers to the ability to separate and recombine components of the SOCIABLE platform, notably cognitive training applications and back-office features. Extensibility refers to the ability of extending the capabilities of the platform with new software packages, in a incremental fashion, Finally, configurability refers to the ability of configuring the platform in order to accommodate different business/medical needs.

Modularity is particularly important towards enabling the distributed development and modules of the SOCIABLE platform. Indeed, modularity has helped SOCIABLE partners to engage independently in the development of modules, which have been later combined into a unified platform. The SOCIABLE architecture (described in D3.2) is a key enabler of this modularity. Note that modularity is also a very important property towards creating a SOCIABLE eco-system beyond the technical partners of the SOCIABLE consortium. In particular, modularity can enable third-parties (e.g., Independent Software Vendors (ISVs)) to develop SOCIABLE platform-compliant modules, which will be later deployable over the SOCIABLE platform. In the scope of this deliverable, we illustrate how the SOCIABLE platform enables modular development and deployment. In terms of modular development, we illustrate how cognitive games can be developed as independent modules that enhance the functionality of the platform. In terms of modular deployment, we also revisit the SOCIABLE modular packaging and deployment paradigm, which has been initially illustrated as part of the SOCIABLE platform specifications (D3.2). As part of the modularity discussion, the deliverable illustrates the interfacing of the various modules of the SOCIABLE platform i.e. cognitive games, book-of-life and back-office modules.

Extensibility is another important property which enables the SOCIABLE platform to be continually extended with new functionalities and features. Extensibility is closely related to modularity, given that the ability to develop and deploy new modules leads to extensibility. In the scope of the present deliverable we illustrate how one can extend the SOCIABLE platform with new functionalities e.g., relating to any of

the existing modules of the platform or even with new modules and applications (such as new cognitive training games).

Configurability is another important property of SOCIABLE. It enables non-technical experts (notably medical experts and health professionals) to configure the platform to their needs. Relevant configuration options have to do with the management of patient data, management (e.g., scheduling) of cognitive training sessions, as well as with the localization of the platform. These options are provided by one of more of the existing modules of the platform, as discussed in a dedicated section of this deliverable.

In order to illustrate the above aspects, we have opted to provide practical examples. The structure of the deliverable is as follows: The next section (Section 2) is devoted to the description of the modularity characteristics of the SOCIABLE platform. Modularity is presented for each different module of the platform. In particular, we present the different sub-modules and functionalities of each module, as well as how these modules are integrated. Likewise, Section 3 discusses the extensibility and gives practical examples on how the cognitive games, the back-office and the book-of-life can be extended. Section 4 is dedicated to the configurability of the platform, notably on how medical experts and health professional can customize the SOCIABLE platform to their needs (e.g., to the requirements of their cognitive sessions organization). Finally, section 5 is the concluding section of this deliverable.

2. SOCIABLE Modularity

2.1 Software Modules of the SOCIABLE Platform

The main specifications of the SOCIABLE platform have been detailed in deliverable D3.2 of the project. This deliverable includes the SOCIABLE software architecture, which consists of:

- The SOCIABLE baseline middleware infrastructure, which provides the SOCIABLE shell applications as well as a packaging and deployment infrastructure. This infrastructure provides the means for users' authorization and authentication, for the customization of the users' access, as well as for the modular deployment of game packages. Hence, this infrastructure cannot be considered as a self-sustained module that could involve independently. Rather it is an enabler for the rest SOCIABLE modules to interwork and interoperate.
- A number of cognitive training games which operate over the SOCIABLE middleware infrastructure and are visualized over the SOCIABLE shell applications. Cognitive training games can be developed independently and accordingly used to enhance the SOCIABLE platform. Hence, they are considered as software modules of the SOCIABLE platform.
- The Book-of-Life (BoL) application, which is a specialized application that boosts the social interaction of the elderly. BoL is an independent module of the SOCIABLE platform, which can be enhanced and evolved independently. Thanks to the modular nature of the SOCIABLE architecture, enhancements to the BoL do not impact the rest modules of the platform.
- The back-office module of the SOCIABLE platform, which provides the means for managing data associated with the elderly and the cognitive training programmes where they participate. From a software development perspective, the back-office module is independent from the rest modules of the SOCIABLE platform (i.e. cognitive games and BoL). Hence, it can also be developed and enhanced independently of the rest modules.

Overall, the SOCIABLE architecture ensures the modular nature of the SOCIABLE platform. The main application modules of SOCIABLE can be developed and evolved independently, thanks to the SOCIABLE database infrastructure (described in D4.4) and middleware infrastructure (described in D4.2 and D3.2). In the following paragraphs we described the main modules comprising the SOCIABLE platform, according to the SOCIABLE architecture. The emphasis is put on the modules that can be developed and evolved independently.

2.2 Cognitive Games

The SOCIABLE platform is particularly modular in terms of cognitive training games. This can be clearly manifested from the fact that a number of different cognitive games have been independently developed during the course of the project's

evolution. In particular, the project has defined twenty-seven cognitive training games for implementation and integration within the SOCIABLE platform. These games are described in deliverable D2.2 and their implementation and integration in the SOCIABLE platform has been a gradual and incremental process. This process was empowered by the modularity of the SOCIABLE platform and has resulted in the gradual enhancement of the SOCIABLE platform with cognitive cognitive games. In particular:

- Twelve cognitive training games were integrated in the interim version of SOCIABLE platform.
- Nineteen cognitive training games have been incrementally deployed on the SOCIABLE platform at the time of writing of this deliverable.
- Twenty-seven cognitive training games will be part of the final version of the SOCIABLE platform (i.e. at the end of the project).

The development/implementation of the cognitive training games is therefore performed independently for each one of the cognitive games. The implementation process entails various stakeholders, as illustrated in Figure 1. In particular:

- The development of the game hinges on the provision of the game scenario, the graphics and media corresponding to the game, as well as a flow chart of the game.
- The game scenario, the game graphics and the game flow chart are provided to the game programmer/developer, who implements the scenario of the game over the SOCIABLE surface platform.
- Once the game is implemented, it is deployed in the SOCIABLE platform using the back-office tools.
- The developed game is reviewed by the medical experts, who can use it under realistic conditions. The medical expert can provide hints and suggestion for improving the game to the programmer/developer. This gives rise to another deployment cycle, which can lead to an additional review of the game by the medical expert.

This lifecycle is the SOCIABLE standardized process for cognitive games development. Note that according to this cycle its different game asks for a separate implementation, which is inevitable given the different scenarios and graphical representation of the various games. However, the games developer can reuse elements at the component level, including components for scoring the games, as well as user interface components (e.g., mixed reality components), which are common across different games.

The lifecycle is however modular given that each game can be seen as an individual module that can be developed and deployed independently over the SOCIABLE platform. The modular deployment of the games is further illustrated in Figure 2, which depicts the process of a game module deployment. As illustrated in Figure 2 a game module/package consists of:

- The files comprising the games including media, graphics and binary files.
- The resource files which accompany the module, including resources for the localization of the module in the target languages (as illustrated in the SOCIABLE

localization framework in D3.3) and configuration files for tuning/configuring the game.

- A deployment descriptor (XML) file, which contains the deployment setting of the specific module.

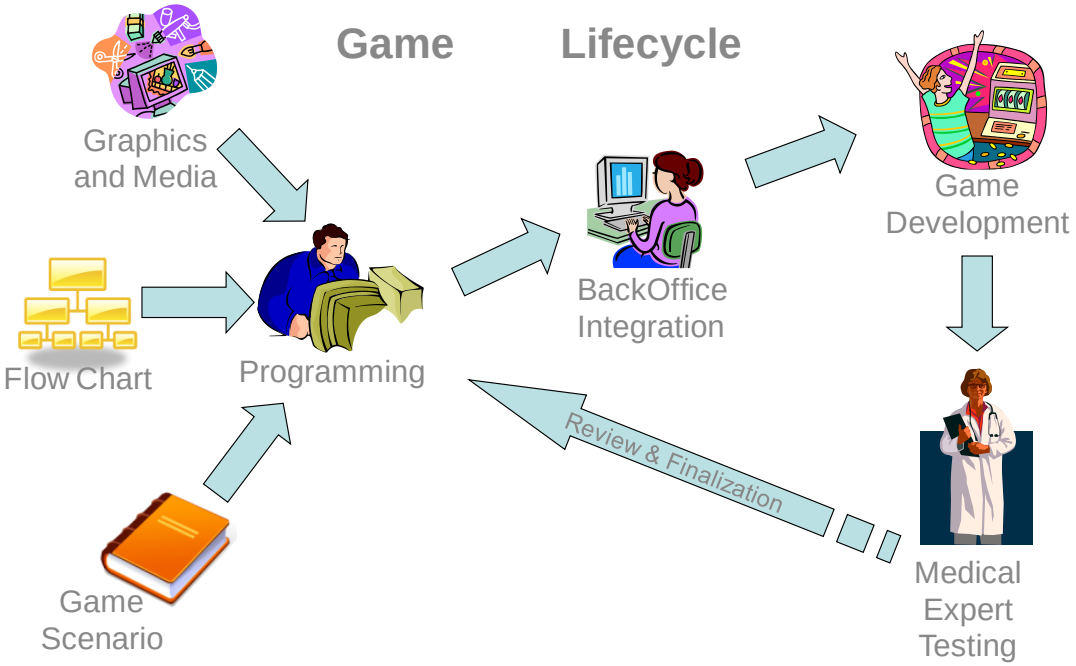


Figure 1: SOCIABLE's Modularity is aimed at supporting the games development lifecycle and the participation of relevant stakeholders

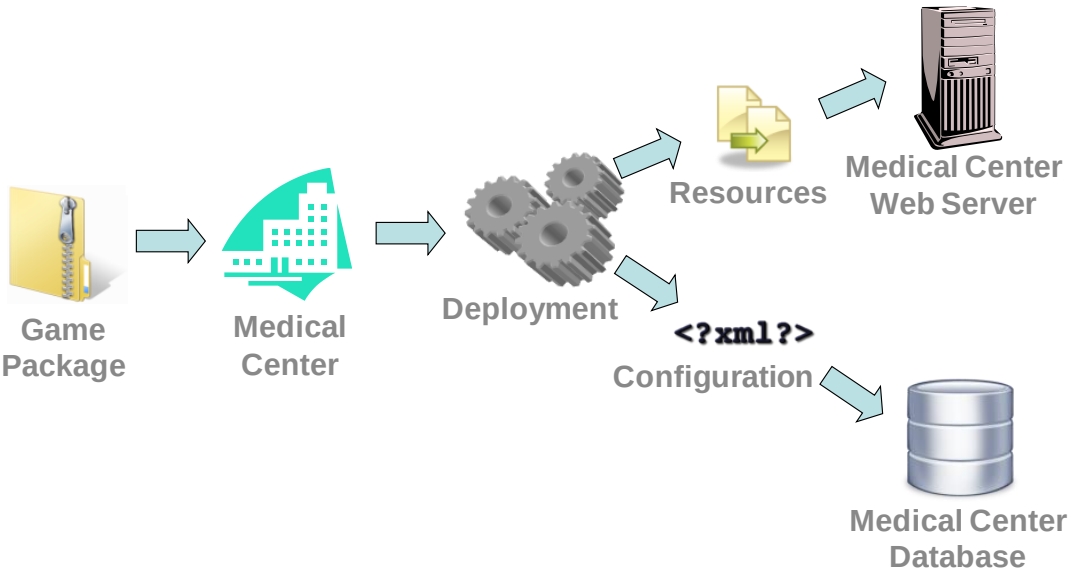


Figure 2: SOCIABLE Cognitive Games Modular Deployment Concept

The above-mentioned lifecycle and modular deployment concepts and processes, specify the requirements for developing SOCIABLE games as modules that can be deployed over the SOCIABLE platform. In particular, they specify the artifacts (i.e. metadata) that should accompany each developed game. These artifacts are further illustrated in the following section, which explains the requirements for developing a SOCIABLE-compliant cognitive game.

2.3 Back-Office Module

2.3.1 Overview of the Module

The Back-Office application offers the following functionalities (Figure 3):

- Patient management:
  - Creating and editing
  - Statistics consultation
- Training program management:
  - Definition of activities for a program with game assignment with a specific difficult level
  - Consultation and editing of results of an activity
- Game management:
  - Creation and editing of difficult levels
  - Resource customization (text, images and sound)
  - Cognitive skills consultation
- Patient Social activation management:
  - Relationships, hobbies, questionnaires
  - Back-office users and permissions management
- Generic Management:
  - Care centers, cities, region, country, etc.

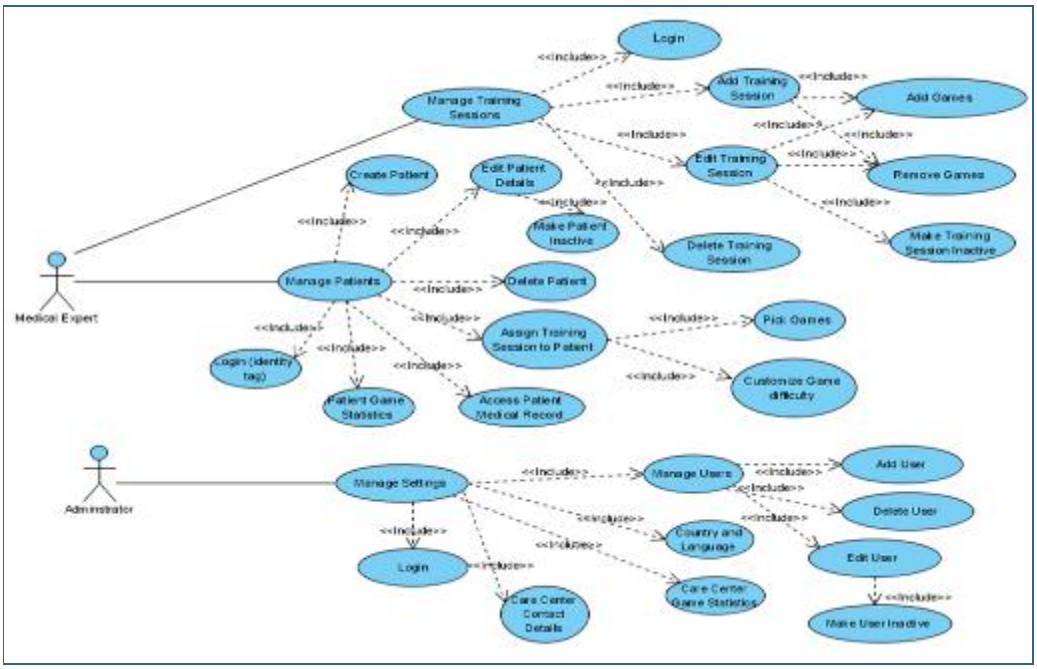


Figure 3: Main Back-office Features and Functionalities

2.4 Book-of-Life Module

The "Book of Life" application is a personal diary, containing life experiences, emotions and thoughts, which is created by the elderly user through the SOCIABLE ICT platforms. Through the book of life, elderly users are able to share information

about their life (e.g., photos, sounds) with other users. The book serves as both a collective memory and an individual memory.
Each book has 4 different chapters, corresponding to different life stages (infancy, adolescence, adult, maturity). The application enables the customization of the content of the different chapters (texts, photos, sounds). For each chapter the user has a set of default questions, photos and sounds, but it is possible to include new ones provided by the user or his relatives.

The workflow of the "Book of Life" application is:
Step 1: Pre-session assessment. When starting the application the elderly is asked for his current mood and level of isolation.

Step 2: Menu. After the assessment the main menu of the application appears: The elderly has 4 different possibilities:

- **New book of life**: The elderly (alone or in a group) can create a new book of life. He has to select a chapter and then complete it by adding text, photos and sounds. The elderly can indicate if he wants to share this chapter with other SOCIABLE users.
- **See books of life**: The elderly can see an existing book of life. He can see one of his books (individual or group) or a book of other user who has decided to share his book with other SOCIABLE users. The different chapters of the selected book are shown.
- **Modify book of life**: The elderly can choose one of his books (individual or group) for modifying a chapter. The different chapters of the book are shown. At each chapter the user has the possibility of modifying the text, the photos and the sounds included. The user can also indicate if he wants to share this chapter with other SOCIABLE users.
- **Friend management:** The elderly can find users with common hobbies and become friends. The elderly can share his books with friends.

Step 3: Post-session assessment. When exit the menu the elderly is asked again about his current mood and level of isolation. After that the application is closed.

The following diagram shows graphically the workflow previously described:

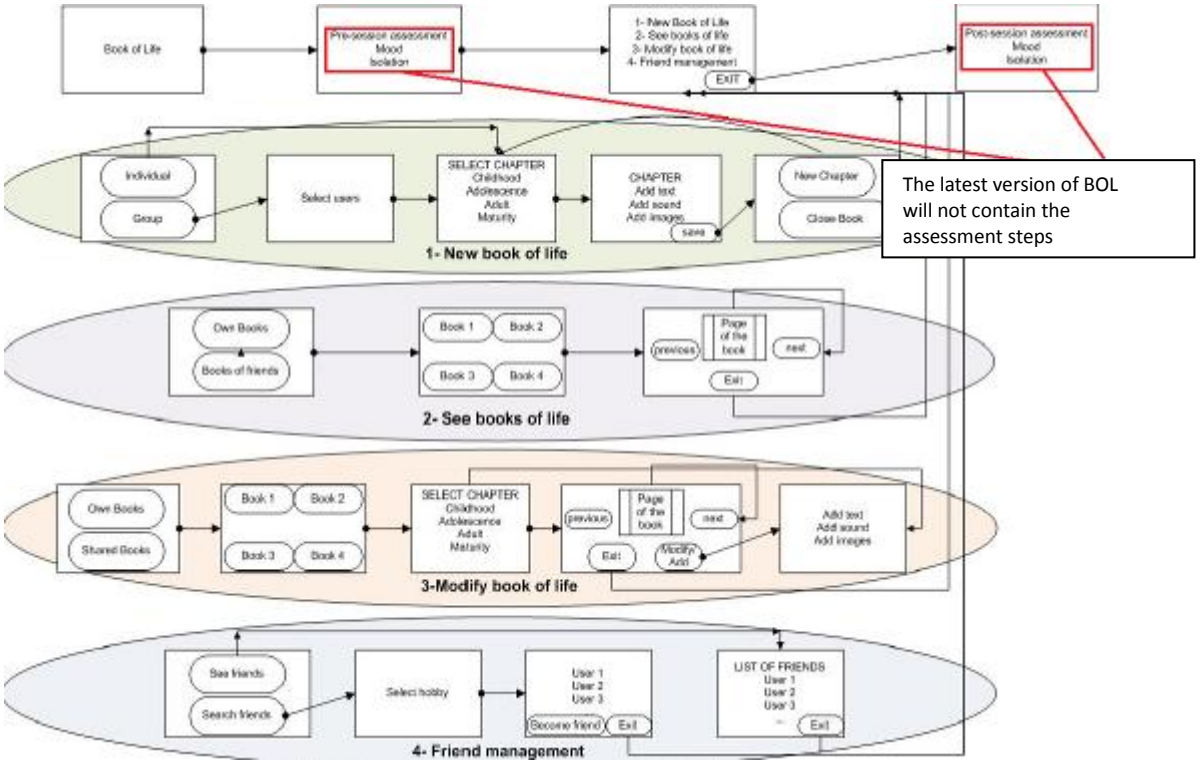


Figure 4: Book-of-Life Workflow (note: the latest version of BOL does not contain the assessment steps)

3. SOCIABLE Extensibility

3.1 Extending the SOCIABLE Platform with Cognitive Games

In the scope of the previous section we have illustrated the modular deployment of the SOCIABLE cognitive training games, which enables the independent and incremental deployment of cognitive training games for the SOCIABLE platform. This enables the extensibility of the SOCIABLE platform with additional cognitive games, which creates the prospect of a future marketplace of SOCIABLE compliant cognitive games for either surface tables or surface PCs.

The development of a new cognitive training game for SOCIABLE requires from the game developer to provide the following artifacts:

- The graphics of the game, which are typically produced and provided by the game designer in a popular format (such as PNG or JPEG).
- The binary executable of the games, enabling its execution/operation over the SOCIABLE surface platform.
- A set of configuration files that can be used for configuring/customizing the game's behavior. These configuration files are likely to be provided for more than one languages (e.g., in the case where the files contain text). The configuration files are an essential element of the configurability of the SOCIABLE platform, which is more extensively discussed in the following section about configurability.
- The (XML-based) deployment descriptor of the module, whose structure has been presented in the scope of SOCIABLE deliverable D3.2.

Overall, the SOCIABLE cognitive games can be developed and deployed independently, while being configurable in terms of their data (and metadata), difficulty levels and localization.

3.2 Extending the SOCIABLE Platform with new Back-Office Functionalities

After the completion of the back-office **Basic Edition**, that includes features for managing patients, resources, user and permissions, graphs and reports, a **Professional Edition** of the back-office has been developed that includes the following new features:

1) Programming and editing of trainings (see 4.3 Session Management)
2) Managing of battery tests
3) Creation of Reports and Graphs:
    - Reports to support management of activities
    - Graphs with results of the games execution

Each report and graph can be:

- Printed
- Exported in excel and pdf

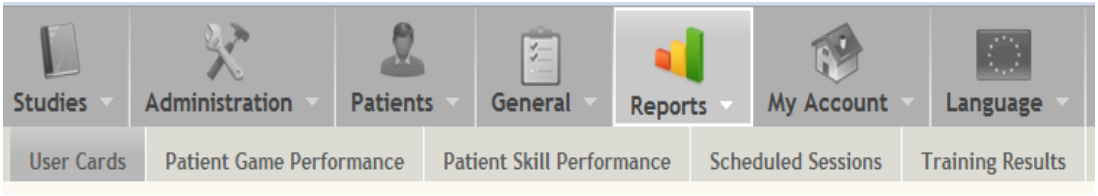


Figure 5: New menu of the back-office application with extended features

Some available reports are illustrated in the following figures.

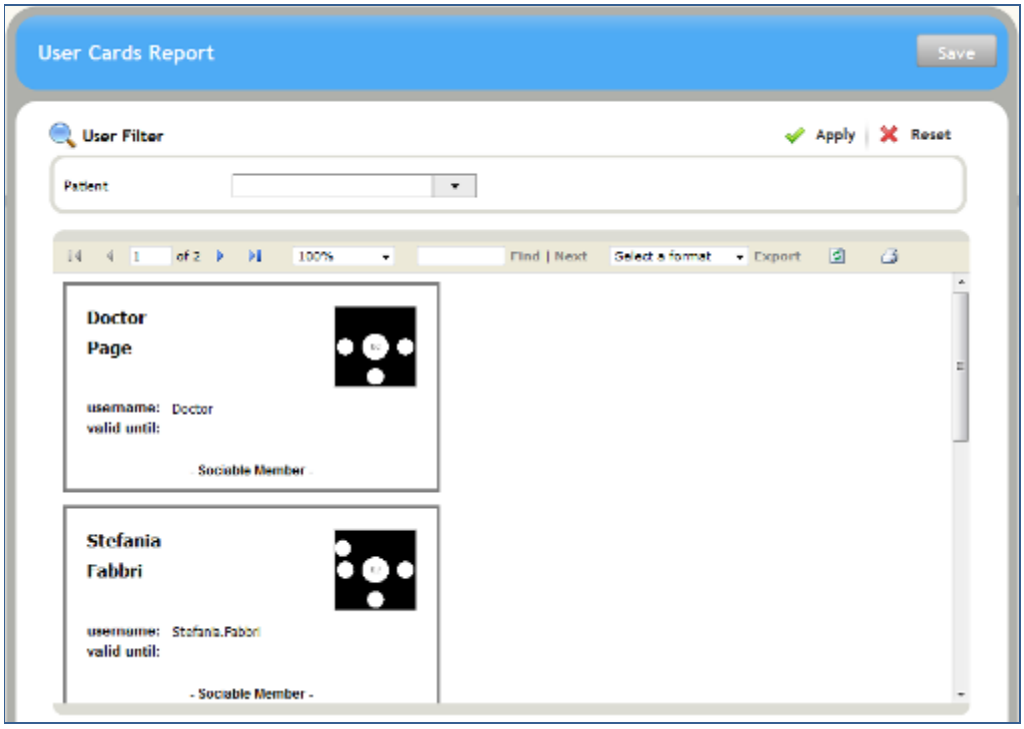


Figure 6: Report for the production of User Cards

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC
1	id	Pathology	Period	Group	T0, T1, T2	name	Age	Education	Mini Mental State Examination	Clock Drawing Test	Rey's Auditory Verbal Learning Test - Immediate	Rey's Auditory Verbal Learning Test - Delayed	Rey's Complex Figure - Copy	Rey's Complex Figure - Delayed recall	Phonological Verbal Fluency	Trail Making Test - A	Trail Making Test - B	Trail Making Test - B-A	Boston Naming Test - Name	Boston Naming Test - Verb	Digit Span - Forward	Digit Span- Backward	Geriatric Depression	ADL	IADL	Clinical Dementia Rating	Questionnaire Level of Expertise in ICT	LSNS 18	Social Preferences Questionnaire
2	CFC.1.001	A	1	1	0	xxxxxxxx	68	5	29	7	53	9	33	19	39	180	360	180	3	3	6	5	3	6	7	0		58	44
3	CFC.1.002	A	1	1	0	xxxxxxxx	72	8	29	10	30	8	37	12	38	180	240	60	0	0	6	4	1	6	5	0		65	40
4	CFC.1.003	A	1	1	0	xxxxxxxx	70	5	30	9,5	39	10	34	21	34	120	240	120	0	0	7	6	1	6	8	0,5		63	47
5	CFC.1.004	A	1	1	0	xxxxxxxx	65	5	26	9,5	49	11	32	16	22	120	300	180	0	1	6	4	1	6	5	0		54	45
6	CFC.1.005	B	1	1	0	xxxxxxxx	82	5	24	8	15	1	33	23	16	240	480	240	2	3	6	5	2	6	5	0,5		46	50
7	CFC.1.006	A	1	1	0	xxxxxxxx	65	8	30	10	32	7	33	16	37	240	420	180	0	0	9	6	1	6	8	0		54	45
8	CFC.1.007	A	1	1	0	xxxxxxxx	69	8	30	9	44	9	32	17	30	180	240	60	0	0	9	4	0	6	8	0		54	49
9	CFC.2.008	A	1	2	0	xxxxxxxx	73	13	30	10	57	14	33	10	38	30	80	50	0	0	8	7	3	6	8	0		33	41
10	CFC.2.009	A	1	2	0	xxxxxxxx	68	5	30	8	53	12	32	16	34	65	140	75	0	0	9	5	0	6	8	0		38	33
11	CFC.2.010	A	1	2	0	xxxxxxxx	69	5	29	9	37	7	25	10	26	120	320	200	0	0	7	4	6	6	8	0		32	34
12	CFC.2.011	A	1	2	0	xxxxxxxx	75	5	29	10	39	7	13	7	21	120	300	180	2	2	6	4	1	6	5	0		40	44
13	CFC.2.012	A	1	2	0	xxxxxxxx	76	8	30	10	34	8	5	0	23	90	200	110	1	1	6	4	3	6	5	0		36	41
14	CFC.2.013	B	1	2	0	xxxxxxxx	77	8	25	7	49	6	34	15	26	130	300	170	2	2	6	3	1	6	5	0		36	37

Assessments

Figure 7: Report for the Export of Assessment data

3.3 Extending the SOCIABLE Platform with new Book-of-Life Functionalities

Before first pilot operations, was decided the development of the next functionalities and enhancements:

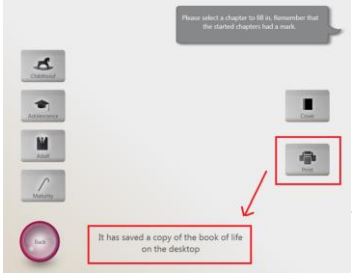
- Inclusion of augmented reality contents in BOL.
- Possibility of recording the elderly voice instead of typing.
- Improving usability of BOL.
- Possibility of find users with same hobbies in the BOL.
- Possibility of customization of the BOL appearance.

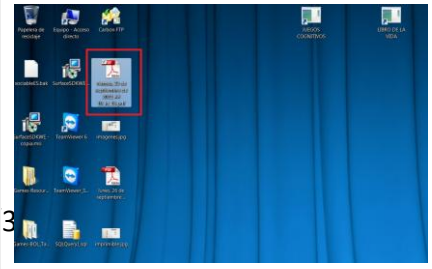
After the first pilot operations, was developed the next new functionalities:

- There is a possibility to print the BOL.

Book of Life printed version will be in the desktop.
Technical requirements:

- Tablet/surface has to have installed acrobat reader
  Tablet/surface has to have installed the printer.





- Multiple recording in a single chapter of the BOL.
- Users can add more recordings, while combinations of recordings and text are possible. Users at home can use microphone to record as centre´s users do. UPV tested it.
- Several textual areas have been changed to images, with a view to making friendlier the next screen functionality.

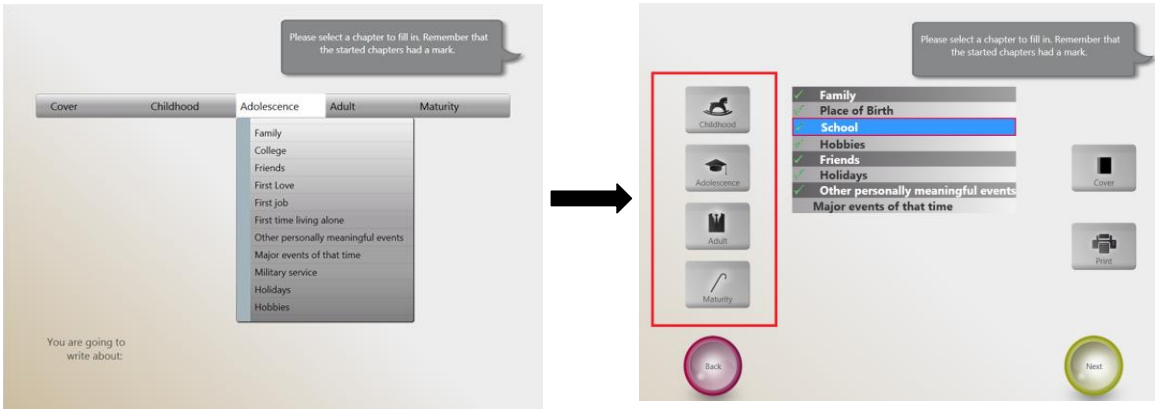


Figure 8: Some Textual Areas were replaced by images

- Users are allowed to navigate across multiple chapters

Figure 9: Navigation across multiple chapters


Childhood
Holidays
Play your recording
Play your songs
martes, 13 de septiembre de 2011 Childhood Holidays.wav
Play
Pause
Stop
Previous recording
Next recording
1 / 1
Previous Image
Next Image
Edit
Main Page

4. SOCIABLE Platform Configurability

4.1 Congitive Games Configurability

The previous section has presented the artifacts that should accompany the final version of each implemented/integrated cognitive game. These artifacts accompany are prerequisites for the successful deployment of the game over one of the SOCIABLE devices (i.e. surface table or surface PC). At the same time these artifacts enable the configurability of the SOCIABLE cognitive games, in terms of both run time operation and deployment. In particular, the configurability of the platform is enabled by a set of configuration files that accompany each game and ensure two aspects, namely: (a) the configuration of the data and difficulty level(s) of the game, (b) the localization of the game in the target languages (i.e. four languages in the case of SOCIABLE pilot operations). The configuration files are in general proprietary and specific to each game i.e. taking into account the configurability needs of each game. However, the configurability of the games hinges on the provision of:

- Files specifying different sets of game data and characteristics (e.g., names and questions in the «Guess Who» games).
- Files specifying game data for specific levels (e.g., corresponding to the complexity and volume of the play data).
- Files specifying game data for the different target languages.

Languages and levels are orthogonal in terms of the above three types of configuration files. Hence, in order to support the configurability of a specific game for X levels in Y languages and W features, it is expected that X*Y*W configuration files will be provided (i.e. one distinct file per level per language). As a characteristic example, Table 1 illustrates a configuration file for the «Synonyms» game corresponding to the easiest level (comprising the lesser number of words (pairs)) in English. Likewise, Table 2 illustrates a configuration file for the «Synonyms» game corresponding to the hardest level (comprising the greatest number of words (pairs) in Norwegian. The «Synonyms» game has three difficulty levels and is available in five languages (i.e. Norwegian, Italian, Spanish, Greek, English). Therefore, the game comes with 15 configuration files covering all the combinations of levels and languages. Note that the «Synonyms» games deals with a single set of game data (i.e. the words of the synonyms).

As another example the «Guess Who» game can be considered. This game has two distinct set of game data, one dealing with names (see Table 3) and another dealing with questions (see Table 4). The localization of this game in five languages for all sets of game data requires 10 distinct configuration files.

Overall, the merit of the configuration files is evident (in the given examples). The game deployer (e.g., IT administrator at the pilot site) can easily configure the game in terms of game data (features) and difficulty levels in all target languages. An exhaustive presentation of the configuration files of all the games is beyond the scope of this document. The examples presented above (along with accompanying tables/samples) illustrate the concept. Note that these examples are better

comprehensible when one understands the description and operation of the respective cognitive games, which have been presented in deliverables D3.1 and D2.2. The aim of the present presentation is to illustrate the concept of the configuration files, as well as how they are used to boost the configurability of the SOCIABLE platform (notably of the cognitive games). All the configuration files of the implemented/integrated games can be found in the CD accompanying this report.

Woman	Lady
Happy	Joyful
Noisy	Loud
Shiny	Bright
Tiny	Miniature
Speak	Talk
Normal	Regular
Strange	Weird
Listen	Hear
Filthy	Dirty

Table 1: Configuration file for the «Synonyms» game (in English for the easiest Level (i.e. Level1)

Uren	Skitten
Bil	Kjøretøy
Elev	Student
Pc	Data
Potte	Krukke
Smykke	Halsbånd
Bilde	Foto
Farge	Kulør
Varg	Ulv
Vann	Tjern
Fest	Selskap
Hånd	Neve
Stamp	Balje
Regnskap	Budsjett
Skjorte	Bluse
Løpe	Springe
Køye	Seng
Trening	Trim
Stemme	Røst
Flo	Høyvann
Mengde	Flokk
Ringe	Telefonere
Person	Individ
Ovn	Komfyr
Slektning	Familiemedlem
Handle	Kjøpe
Modig	Djerv
Teppe	Matte
Elv	Bekk
Akseptere	Godta

Bjørn	Bamse
Gevær	Børse
Bart	Mustasje
Støy	Bråk
Løshår	Parykk
Politi	Lensmann
Garderobe	Klesskap
Fjære	Lavvann
Låve	Fjøs
Skuespill	Teater
Interesse	Hobby
Magasin	Ukeblad
Opptreden	Show
Diskutere	Drøfte
Tilbud	Rabatt

Table 2: Configuration file for the «Synonyms» game (in Norwegian for the hardest Level (i.e. Level3)

Alessandro
Francesco
Federico
Matteo
Marco
Luca
Giovanni
Antonio
Tommaso
Riccardo
Paolo
Leonardo
Fabio
Michele
Giorgio
Claudio
Enrico
Carlo
Giacomo
Simone
Daniele
Stefano
Lorenzo
Chiara
Martina
Elena
Monica
Lisa
Caterina
Gloria
Manuela
Arianna

```
Cristina
Maria
Valentina
Laura
Paola
Anna
Lucia
Sofia
Roberta
Barbara
Agnese
Giada
Ilaria
Patrizia
```

Table 3: Configuration file for the «Guess Who» game regarding the list of names (in Italian)

```
Ο άνθρωπος-μυστήριο είναι άνδρας.
1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,
23

Ο άνθρωπος-μυστήριο είναι γυναίκα.
24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,
43,44,45,46

Ο άνθρωπος-μυστήριο δεν φοράει γυαλιά.
1,2,3,4,6,8,9,10,11,14,16,17,18,19,20,21,22,23,25,26,27,2
8,29,30,31,32,37,38,40,41,42,43,44,45,46

Ο άνθρωπος-μυστήριο φοράει γυαλιά
5,7,12,13,15,24,33,34,35,36,39

Ο άνθρωπος-μυστήριο είναι ντυμένος/η για τη δουλειά.
1,11,12,13,17,20,21,22,25,26,27,29,30,32,33,38,40,41

Ο άνθρωπος-μυστήριο είναι συνταξιούχος.
7,8,9,24,28,35,36,37,44

Ο άνθρωπος-μυστήριο δεν έχει βγει στη σύνταξη.
1,2,3,4,5,6,10,11,12,13,14,15,16,17,18,19,20,21,22,23,25,
26,27,29,30,31,32,33,34,38,39,40,41,42,43,45,46

Ο άνθρωπος-μυστήριο έχει σκουρόχρωμα μαλλιά.
1,2,3,4,5,6,10,16,19,20,21,23,24,26,29,31,32,34,38,39,41,
42,45,46

Ο άνθρωπος-μυστήριο έχει ανοιχτόχρωμα μαλλιά.
7,8,9,11,12,13,14,15,17,18,25,27,28,30,33,35,36,37,40,43,
44
```

```
Ο άνθρωπος-μυστήριο δεν έχει τριχοφυία στο πρόσωπο.
2,3,4,5,6,7,9,10,11,12,14,15,16,17,19,20,22,23,24,25,26,2
7,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,4
6

Ο άνθρωπος-μυστήριο έχει τριχοφυία στο πρόσωπο.
1,8,13,18,21

Ο άνθρωπος-μυστήριο είναι απλά ντυμένος/η.
2,3,4,5,6,8,9,10,14,15,16,17,18,19,22,23,24,27,28,30,31,3
3,34,35,36,37,39,41,42,43,44,45,46

Ο άνθρωπος-μυστήριο φοράει κοντομάνικο.
3,4,6,9,10,14,15,16,18,19,23,34,38,40,46

Ο άνθρωπος-μυστήριο φοράει ριγέ πουκάμισο.
3,9,45

Ο άνθρωπος-μυστήριο φοράει μπλε μπλούζα.
1,10,13,14,15,17,20,21,22,23,31,36,40,41,42

Ο άνθρωπος-μυστήριο φοράει κόκκινα.
5,16,18,19,25,34

Ο άνθρωπος-μυστήριο φοράει μακρυμάνικο.
1,2,5,7,11,12,13,17,20,21,24,25,26,29,30,31,32,33,35,36,4
1,43,44,45

Ο άνθρωπος-μυστήριο φοράει γραβάτα.
1,11,12,13,20,21

Ο άνθρωπος-μυστήριο φοράει κοστούμι.
11,12,13,21

Ο άνθρωπος-μυστήριο φοράει στολή.
20,32,40

Ο άνθρωπος-μυστήριο βρίσκεται σε εσωτερικό χώρο.
11,13,16,25,30,35,37,40,41,43,44,45

Ο άνθρωπος-μυστήριο βρίσκεται σε εξωτερικό χώρο.
2,4,5,9,12,14,17,18,22,23,27,28,33,34,36,38,39,42

Ο άνθρωπος-μυστήριο βρίσκεται στο σπίτι.
16,30,35,37,43,44

Ο άνθρωπος-μυστήριο εργάζεται σε εξωτερικό χώρο.
17,22,27,33

Ο άνθρωπος-μυστήριο εργάζεται με ασθενείς.
20,40
```

```
Ο άνθρωπος-μυστήριο γυμνάζεται.
18,42

Ο άνθρωπος-μυστήριο έχει χάσει βάρος.
6,46

Ο άνθρωπος-μυστήριο ασχολείται με κάποιο άθλημα.
9,19,28

Ο άνθρωπος-μυστήριο παίζει τέννις.
28

Ο άνθρωπος-μυστήριο παίζει γκόλφ.
9

Ο άνθρωπος-μυστήριο παίζει μπάσκετ.
19

Ο άνθρωπος-μυστήριο διαβάζει.
34,35,39

Ο άνθρωπος-μυστήριο διαβάζει ένα λογοτεχνικό βιβλίο.
35

Ο άνθρωπος-μυστήριο κρατά ένα τετράδιο σημειώσεων.
34,39

Ο άνθρωπος-μυστήριο μιλάει στο τηλέφωνο.
12,13,25,29,38

Ο άνθρωπος-μυστήριο είναι φοιτητής/φοιτήτρια.
4,23,34,39

Ο άνθρωπος-μυστήριο φοράει καπέλο.
8,9,22,27,32

Ο άνθρωπος-μυστήριο είναι χαρούμενος/η.
1,2,3,4,5,6,8,9,10,11,12,14,16,17,18,19,20,21,23,24,25,26
,27,28,29,31,32,33,34,35,36,37,39,40,41,42,44,45,46

Ο άνθρωπος-μυστήριο είναι λυπημένος.
15,22,30

ΤΟ άνθρωπος-μυστήριο είναι θυμωμένος/η.
7,13

Ο άνθρωπος-μυστήριο έχει πονοκέφαλο.
15,30

Ο άνθρωπος-μυστήριο είναι έγκυος.
```

```
31

Ο άνθρωπος-μυστήριο οδηγεί.
12,23,33,36,38

Ο άνθρωπος-μυστήριο είναι μέσα στο αυτοκίνητο.
12,23,36,38

Ο άνθρωπος-μυστήριο χρησιμοποιεί τον ηλεκτρονικό
υπολογιστή.
44,45

Ο άνθρωπος-μυστήριο στέλνει μήνυμα μέσω του ηλεκτρονικού
υπολογιστή στο γιο του/της.
44

Ο άνθρωπος-μυστήριο πίνει καφέ.
37

Ο άνθρωπος-μυστήριο έχει βγει για ψώνια.
3

Ο άνθρωπος-μυστήριο κοιμάται.
43

Ο άνθρωπος-μυστήριο είναι στην παραλία.
14

Ο άνθρωπος-μυστήριο είναι λευκός/η.
1,2,3,4,6,7,8,9,10,11,12,13,14,15,17,19,20,22,23,24,25,27
,28,29,30,31,32,33,34,35,36,37,38,39,40,41,43,44,46

Ο άνθρωπος-μυστήριο είναι μαύριος/η.
16,18,21,42

Ο άνθρωπος-μυστήριο είναι Ασιάτης/Ασιάτισσα.
5,26,45
```

Table 4: Configuration file for the «Guess Who» game regarding the list of questions (in Greek)

4.2 Game Selection

The previous paragraph has illustrated how deployers (such as IT administrators) can configure, deploy and use the SOCIABLE cognitive games. In most cases the configuration of the games will be requested by a medical expert or health professional. Accordingly, the configuration files will be edited by technical personnel (i.e. technical experts, integrators, deployers, IT administrators). We should not also rule out the possibility of computer literate medical experts, which could edit the configuration files themselves.

However, medical experts are offered with other configuration options, which include the ability of selecting cognitive games for the elderly/patients that they supervise (typically taking into account the profile and needs of the elderly). Such a selection is supported by the GUI (Graphical User Interface) of the SOCIABLE platform as illustrated in Figure 10. This is another high-level configuration option of the SOCIABLE platform. Additional high-level options are also presented in following sections.

Figure 10: Game Selection Screens (for the Language and Executive Functions)

4.3 Patient/Elderly Data Management

The Back-office includes the Data Management of Elderly, in particular:

- Generalities (see Figure below)

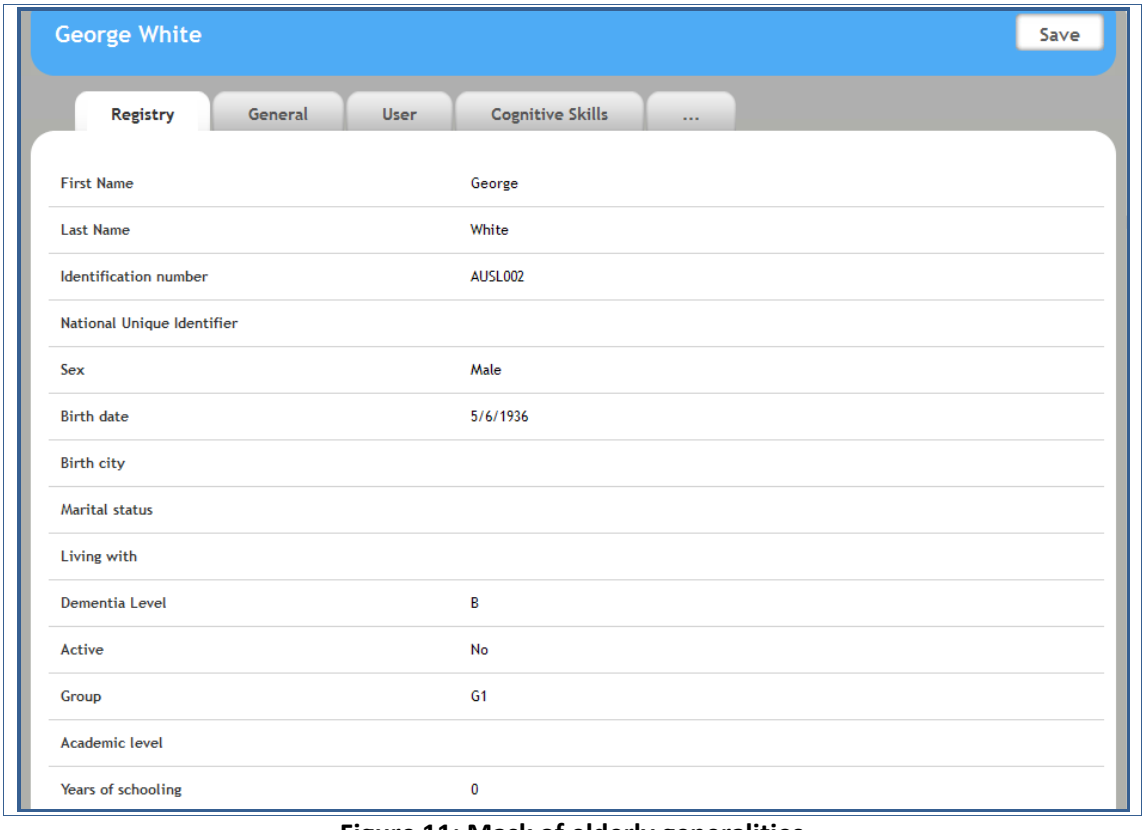


Figure 11: Mask of elderly generalities

- Information about unhealthy cognitive skills, helping the medical expert to schedule training proposing games that target respective skill (see figure below).

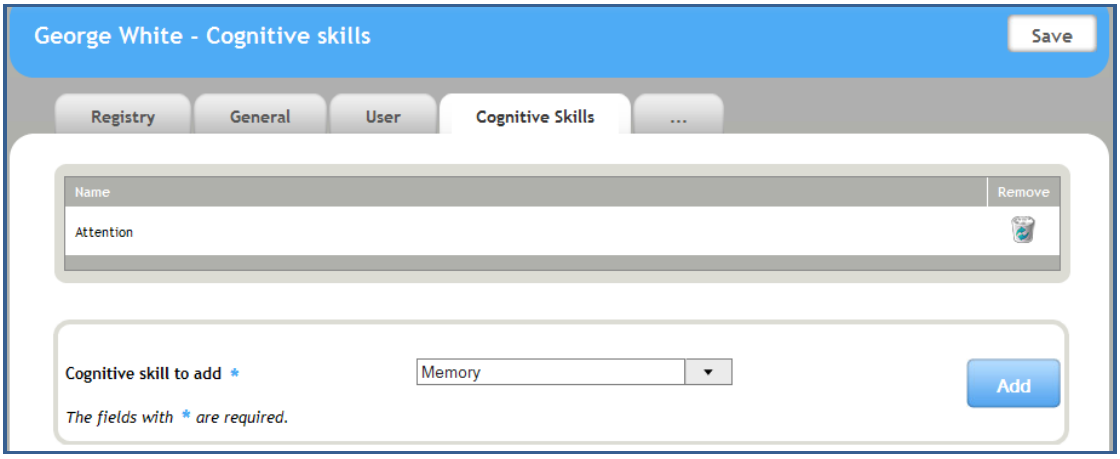


Figure 12: Mask of elderly cognitive skills

4.4Session Management

The back-office includes the planning of sessions, that can be created with templates; in general, with the session management features:

- it is possible to create planned session from scratch or with a template;
- templates are list of cognitive skills;
- each planned session created from a template will include a game for each cognitive skill defined in the template;
- planned sessions are created automatically for the period from template; user must specify only template and the day of the week.

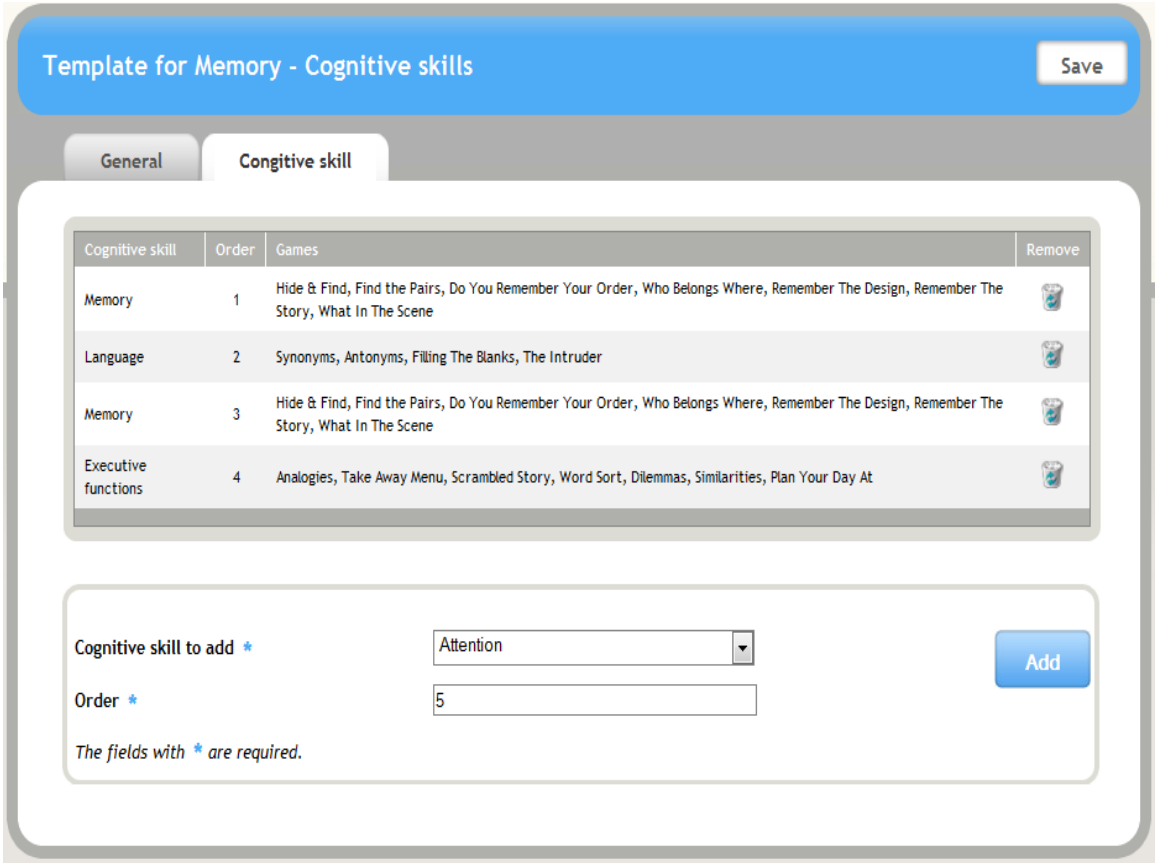


Figure 13: Creation of a template specifying a cognitive skill for each game to be played

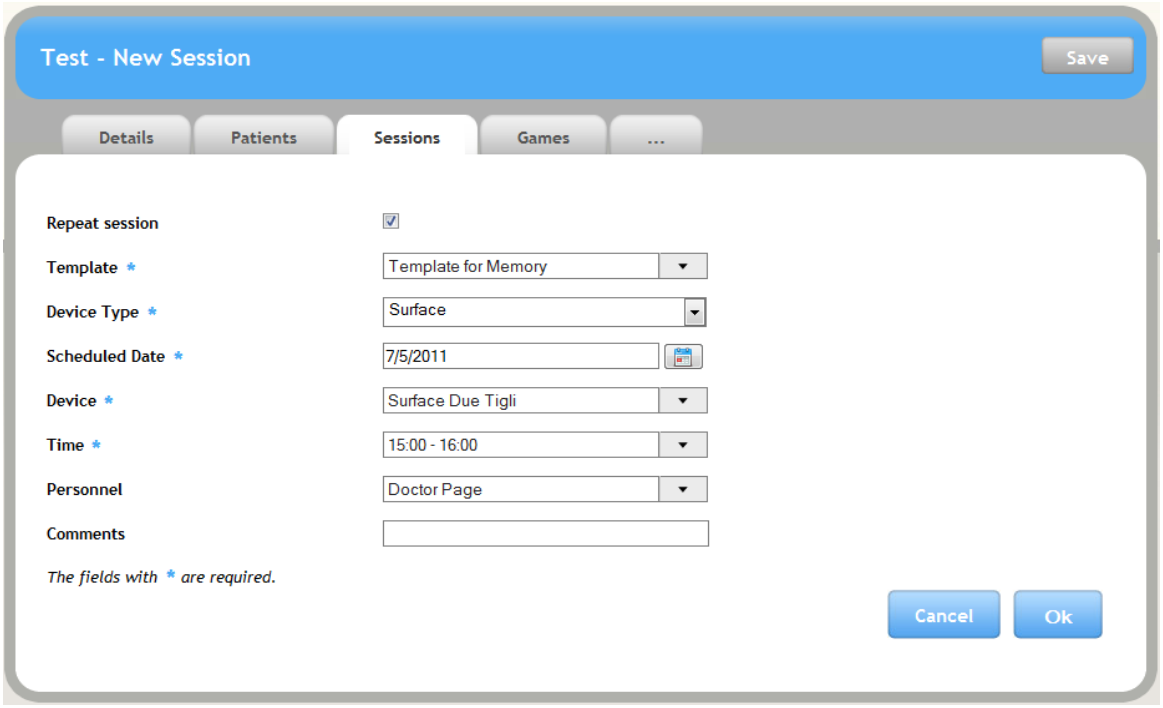


Figure 14:Creation of a session

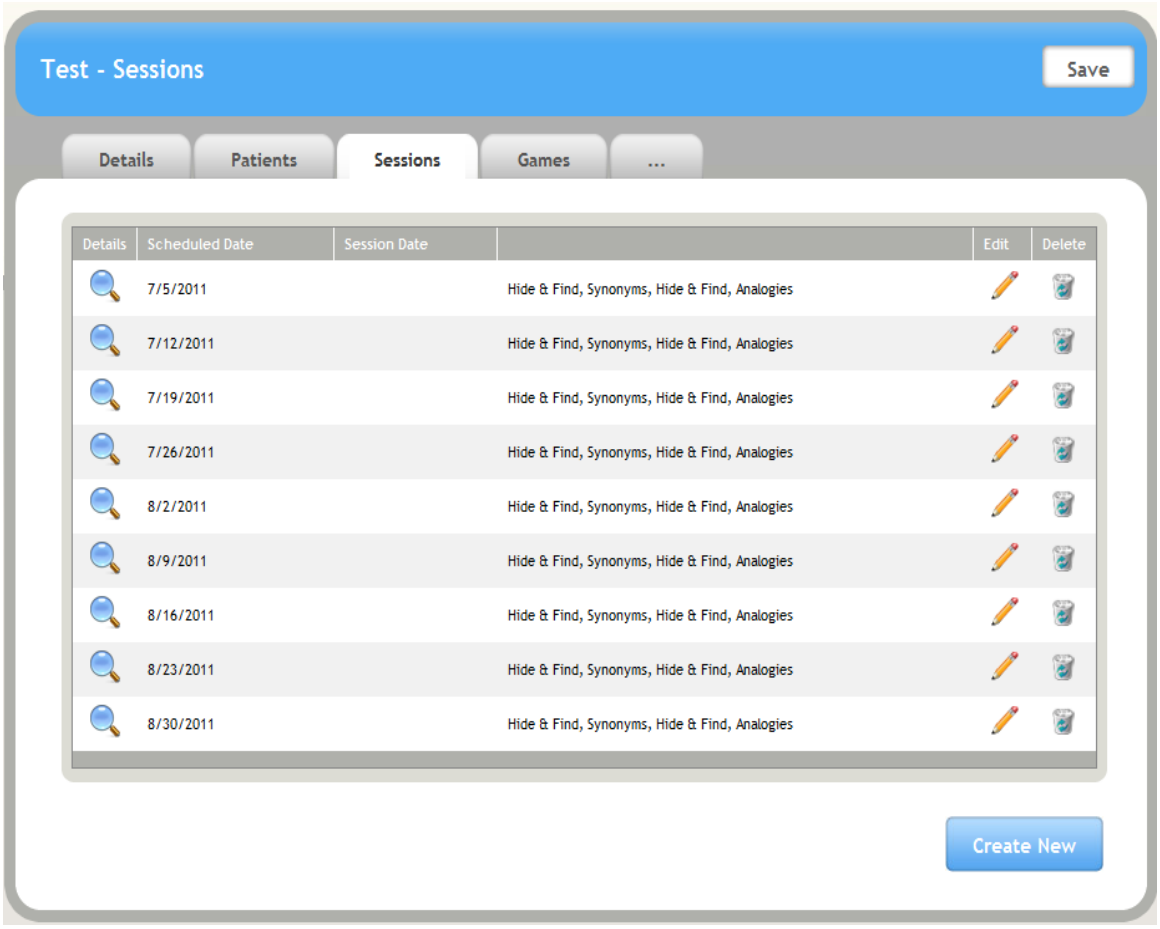


Figure 15:Automatic creation of all sessions for the period with all the available games

5. Conclusions

This deliverable has illustrated three important aspects of the SOCIABLE platform implementation, namely modularity, extensibility and configurability. The SOCIABLE platform is based on a modular architecture, which specifies that the various cognitive games, the book-of-life and the back-office applications are different modules of the SOCIABLE platform. This modularity has been already proven given that: (a) Cognitive games, the BoL and the back-office applications have been developed and integrated independently and (b) the SOCIABLE platform is gradually augmented with cognitive training games, which are developed and integrated in a modular fashion. The modularity of the SOCIABLE platform is overall particularly important for the later exploitation of the SOCIABLE platform, since it can allow third-parties (such as ISV (Independent Software Vendors) to develop, integrate and deploy cognitive games onto the SOCIABLE platform. This can be the starting point for an open innovative ecosystem of cognitive games for the SOCIABLE platform.

Closely related to the SOCIABLE modularity is the extensibility of the SOCIABLE platform. In the scope of the deliverable, we have illustrated how the various modules of the SOCIABLE platform have been extended (during the course of the project implementation). Furthermore, the deliverable has explained how the SOCIABLE platform can be extended with additional cognitive training games. Overall, extensibility is a key prerequisite for enhancing the functionality of the SOCIABLE platform towards fulfilling future requirements (e.g., for cognitive training and/or managing patients data).

Configurability is the third focal area of the deliverable. Configurability is related to the customization of the platform to the needs of different cognitive training sessions, as well as to the needs of different elderly groups. The SOCIABLE platform does not hard-code parameters associated with its operation. Rather it provides tools and techniques for configuring the platform (e.g., the games, the sessions) to the target ICT based cognitive intervention. The platform's configurability is chiefly expressed in the form of a toolset which has been made available to health professionals. Note that the configurability of the platform is related to its modularity, given that configuration tools and techniques are applied to the various modules of the SOCIABLE platform (i.e. each different module can be configured independently).

The modularity, extensibility and configurability characteristics of the SOCIABLE platform have been realized in the scope of the platform's implementation. The present report accompanies the prototype implementation of the SOCIABLE platform with these features built in.