DELIVERABLE REPORT
D3.1.2
"System Architecture"

collaborativeproject
MASELTOV
Mobile Assistance for Social Inclusion and Empowerment of Immigrants with Persuasive Learning Technologies and Social Network Services
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RE	Restricted to a group specified by the consortium (including the Commission Services)	
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partner		organisation	ctry
01		JOANNEUM RESEARCH FORSCHUNGSGESELLSCHAFT MBH	AT
02		CURE CENTRUM FUR DIE UNTERSUCHUNG UND REALISIERUNG ENDBENUTZER-ORIENTIERTER INTERAKTIVER SYSTEME	AT
03		RESEARCH AND EDUCATION LABORATORY IN INFORMATION TECHNOLOGIES	EL
04		FUNDACIO PER A LA UNIVERSITAT OBERTA DE CATALUNYA	ES
05		THE OPEN UNIVERSITY	UK
06		COVENTRY UNIVERSITY	UK
07		CESKE VYSOKE UCENI TECHNICKE V PRAZE	CZ
08		FH JOANNEUM GESELLSCHAFT M.B.H.	AT
09		TELECOM ITALIA S.p.A	IT
10		FLUIDTIME DATA SERVICES GMBH	AT
11		BUSUU ONLINE S.L	ES
12		FUNDACION DESARROLLO SOSTENIDO	ES
13		VEREIN DANAIDA	AT
14		THE MIGRANTS' RESOURCE CENTRE	UK

CONTENT

1. EXECUTIVE SUMMARY

The overall goal of work package 3 is to make a transition from identified user requirements from work package 2 towards a technical specification and an implementation plan of the final MASELTOV system. A major part of those specifications is the system architecture which was developed within task 3.1 “Technical Scenarios and System Architecture”.
This deliverable is the second and final iteration of D3.1.1 and depictures the final definition of technical use-cases and the system architecture of MASELTOV.

Technical use-cases definitions are the first step towards the system architecture and are very useful to get a common understanding of technical functionalities. The development of a common picture of the technical implementation of the MASELTOV system, agreed by all technical partners and able to fulfil all technical requirements, was a major result of work package 3 and its final version is documented in this deliverable.

It was already depictured in D3.1.1 how all technical partners had to identify and define their technical use-cases. Furthermore real interactions of users with the MASELTOV system and how this fulfils the user’s real needs, which were identified in work package 2, were shown.
The logical clustering of related technical requirements led to software components which could be seen as the elementary blocks needed – together with relations between them - to build the system architecture.

This document contains a complete update of all technical use cases and shows the final status of technical functionalities provided by the MASELTOV system. All technical use-cases are structured in thematic clusters of assistance:

- bureaucratic advisor service
- health care service
- navigation service
- language learning service
- recommendation services
- community building service
- serious games service
- profile and configuration service
- administrative and system triggered services

The first version of the system architecture was defined at a very early stage of the project in month 8 where real technical developments hadn’t started at all and it wasn’t clear whether the proposed architecture would stand upcoming technical challenges. In the meantime it could be said that the architecture was well-defined and still fulfils all MASELTOV requirements.

All responsibilities in this document assigned to the former MASELTOV project partner Busuu (abbreviation “BUS”) can be seen as placeholder for the future language learning partner in the MASELTOV consortium.

2. FINAL TECHNICAL MASELTOV USE CASES

All use-cases are specified on a logical level and from a technical view point using a defined spread sheet template. For each identified Maseltov service cluster, there is a dedicated chapter with a table showing corresponding use-cases, with the defined workflow and technical requirements as well as assignments of responsibilities, work task and dedicated user requirements. This is a technical specification to be used as a look up table for defined functionalities to be developed and also as a tool for controlling of the development progress and feature completeness, whether all defined requirements have been implemented by responsible partners.

2.1 Bureaucratic advisor service

bureaucratic advisor										
use cases		**assigned user-requirements (D2.3)**	**priority**	**tasks**	**deliverables**	**lead (techn.)**	**lead (req.)**	**other coop.**	**workflow**	**Technical requirements**	**component**
AS. UC1	**get advice / information to different MASELTOV Topics (static information in the WIKI)**	PCE-9	1	6.2	D6.2, M18	FLU	CURE, NGOs	-	(1) User starts "bureaucratic advisor service"; (2) user choose from different categories of advice (job, find accommodation, working, legal, administration office, ...); (3) Show information from the MASELTOV Wiki.	button bureaucratic advisor service in the GUI	Bureaucratic Advisor (FLU)
		SNS-8								query category list from server (Wiki)	Wiki Server FLU)
		SNS-9								GUI with list of categories to choose from	Wiki Server FLU)
		SNS-10								choose category legal advice in the Wiki GUI	Wiki (FLU)
		SNS-11								query information for the category	Wiki Server FLU)
										POIs and addresses mentioned in the text could be linked to the POI service showing them in a map. Navigation could be started there.	POI Service (FLU)
AS. UC2	**get to find a flat**	PCE-21	1	6.2	D6.2,	FLU	CURE,	-	start UC AS.UC1 for category "find accommodation". User starts	button bureaucratic advisor service in the GUI	Bureaucratic Advisor (FLU)
		SNS-5								query category list from server	Wiki Server

									"find flat" via user interface and get suitable website/estate agencies for searching a flat, tips and recommendation.	(Wiki)	(FLU)
		SNS-4b								GUI with list of categories to choose from	Wiki Server (FLU)
										choose category find accommodation in the Wiki GUI	Wiki (FLU)
										query information for the category	Wiki Server (FLU)
AS. UC3	**get alerted for administrative tasks (visa, etc.)**	PCE-9	4	6.2	D6.2, M18	FLU	CURE, NGOs	-	user provides input about most important dates for immigrants issues, e.g., visa termination date, health care, etc.	Wiki pages provide information about some important deadlines.	Wiki (FLU)
										Optionally a Wiki page can contain a link <do you want to add a reminder?>	Wiki (FLU)
										clicking on the link the proper action will be taken	Wiki (FLU)
AS. UC4	**get to find an administration office**	PCE-22	1	6,2	D6.2, M18	FLU		-	start UC NVS.UC1 with category "administration offices"		

AS. UC5	**get appropriate vocabulary support**	PCE-3	1			FLU	CURE, NGOs	BUS	start UC LLS.UC1 for the category "bureaucratic issues". This vocab list could be pre-defined in the Wiki by NGO.	Needs to look up User Profile to choose appropriate level of vocabulary to return to user/send them to correct page selection (LLS.UC1)	Language Learning Service (BUS)
		PCE-8									
AS. UC6	**get advice on how to appropriately fill in forms**	PCE-17	1	6,2	D6.2, M18	FLU			start UC AS.UC1 with category "forms".	button bureaucratic advisor service in the GUI	Bureaucratic Advisor (FLU)
										query category list from server (Wiki)	Wiki Server (FLU)
										GUI with list of categories to choose from	Wiki Server (FLU)
										choose category forms in the Wiki GUI	Wiki (FLU)
										query information for the category	Wiki Server (FLU)
AS. UC7	**get personal appropriate help**		4			FLU		TI	Start social radar. Looking for people nearby with experience in "bureaucratic issues" UC CBS-UC2. Start	Start Geosocial Radar with knowledge category “bureaucratic issues”	Geosocial Radar Service (TI)
										Start Forum with search string	Forum (TI)

									social network/forum search for "bureaucratic issues" UC CBS-UC4. It is a matter of TRUST (see focus group London)	"bureaucratic"	
AS. UC8	**get into serious game on how-to administrative tasks**	PCE-10	4			FLU		COV/OU	Start UC: SGS-UC1	Start serious game	Serious Games Service (COV)
		PCE-4									
		PCE-5									
		PCE-6									
		PCE-11									
AS. UC9	**get access to "how-to administrative issues"**	PCE-1	1	6,2	D6.2, M18	FLU	CURE / NGO		In the Wiki there will be a section for FAQs for administrative issues filled by NGOs. Start UC AS.UC1.	button bureaucratic advisor service in the GUI	Bureaucratic Advisor (FLU)
		PCE-2								query category list from server (Wiki)	Wiki Server (FLU)
		PCE-4								GUI with list of categories to choose from	Wiki Server (FLU)
		PCE-5								choose category FAQ in the Wiki GUI	Wiki (FLU)
		PCE-6								query information for the category	Wiki Server (FLU)
		PCE-8									
		PCE-9									
		PCE-10									

		PCE-12									
		PCE-18									
		PCE-19									
		PCE-20									
		PCE-21									
		PCE-22									
		SLL-8									
		SNS-7									
		NAV-4									
AS. UC10	**enter/manage legal information and support categories in the Wiki interface**		1	6,2	D6.2, M18	FLU			NGO (and/or local government) enter the relevant Wiki information for different categories using the Wiki interface on the web. In order to avoid problems with the information update, the Wiki will be used as an information platform and NGOs provide the most important links where the necessary information is available (e.g. wien.gv.at). The new information will be immediately available in the mobile system.	Open administration page of the wiki system in a browser	Wiki Server FLU)
										Manage categories	Wiki Server (FLU)
										Enter content	Wiki Server (FLU)
										Link POIs	Wiki Server FLU)

2.2 Language learning service

language service										
use cases		**assigned user-req. (D2.3)**	**priority**	**tasks**	**deliverables**	**lead (techn.)**	**lead (req.)**	**other coop.**	**Workflow**	**Technical requirements**	**component**
LLS.UC0	**start language learning lesson**	SLL-1	1	8,3	D8.3.1(M10) D8.3.2(M24) D8.3.3(M33)	BUS	NGOs	CUR?, OU	User starts manually "language learning" in the GUI and has to select a category. She is prompted for recommendations. Predefined lessons and dedicated vocabulary is selected according to user profile (level, interests, ...) . There are thematic vocabulary clusters from busuu like "at the doctor". Personal progress in language learning is stored in the user profile. (BUS)	Start language learning button	Language learning service (BUS)
		SLL-2								Query multiple language learning categories	Language Lesson Learning (BUS)
		SLL-3								Query recommendations for given user profile (retrieve current language level of user: PCS.UC2)	Recommendation service (AIT)
		SLL-4								vocab is queried from server side from the busuu system or Maseltov Wiki	Language Lesson Learning (BUS)
		SLL-9								Run language learning session	Language Lesson Learning (BUS)
										Store personal progress of the user: calls PCS. UC2	Language Lesson Learning (BUS), Profile service (AIT)

LLS. UC1	**get fast access to a current language topic (vocabulary and phrases support)**	SLL-1	1	7.1 7.5	D7.1.1(M6) D7.1.2(M18) D7.5.1(M24) D7.5.2(M33)	BUS	NGOs (vocab for tasks i.e. visa)		Triggered by another component which defines a learning topic. Show the user basic survival vocab and phrases with regard to this topic. The topic is pre-selected according to the context in the App (Like visa form). Vocab for a task is defined in the WIKI by NGO/BUS/User. (OU: vocab needs to appropriate if there is a selection of different levels of vocab that can be chosen: requires looking up current user language ability level, e.g. PCS.UC2 to identify language level, then push to appropriate vocab list)	Topic Language learning Service launch able from another component	
		SLL-2								Identify current language level of user (PCS.UC2)	Language Lesson Learning (BUS)
		SLL-5								Query survival vocab from language learning service	Language Lesson Learning (BUS)
										Query survival vocab from Wiki	Language Lesson Learning (BUS), Wiki service (FLU)
										Run language learning session	Language Lesson Learning (BUS)
										Store personal progress of the user (PCS.UC2)	Language Lesson Learning (BUS), Profile service (AIT)
LLS. UC2	**get access to virtual cognitive tutor**		3	7.1 7.5	D7.1.1(M6) D7.1.2(M18) D7.5.1(M24)	BUS			User can select from a list of situations he/she faced (History of recognized context/situations stored in the user profile) in the past. And appropriate vocab for those situations can be included in a learning session. Start LLs.UC0 to start training.	Start cognitive learning button	Language learning service (BUS)
										Identify current language level of user (PCS.UC2)	Situated Language Service (BUS)
										Query context/situation history of the user	Situated Language Service (BUS), Profile service (AIT)

										vocab is queried from server side from the busuu system	Situated Language Service (BUS)
										Run language learning session	Situated Language Service (BUS)
										Store personal progress of the user (PCS.UC2)	Situated Language Service (BUS), Profile service (AIT)
LLS. UC3	**get into serious game: train language skills**		3			COV			start use case SGS.UC5	Button in the user interface	Language learning service (BUS)
										Link to SGS.UC5	Serious Games service (COV)
LLS. UC4	**get ad hoc text translation (image based)**	SLL-7a	1			CTU			User starts this tool in the scope of the Language Learning User Interface. A camera view is opened to enable the user to take pictures of textual information he wants to translate. After taking the picture text is extracted, language is identified, translation is done using online services and the translated text is presented/overlaid to the image for the user.	Start text lens button	Language learning service (BUS)
		SLL-7b								Start "text lens" with camera mode	Text Lens (CTU)
		SLL-7c								Read Image from mobile phone camera	Text Lens (CTU)
										Extract text from image	Text Lens (CTU)
										Translation of text with online translation engine	Text Lens (CTU)
										Show translation in the camera view	Text Lens (CTU)
										Turn text into audio and	Text2Speech (JR)

										play	
LLS. UC5	**get learning progress indicator**		2	5.2, 2.5	D2.5.1 (M8), D2.5.2 (M13), D2.5.3 (M18), D5.2 (M18), (and possibly D5.4.1 (M24), D5.4.2 (M32))	OU		AIT, FLU	Objective: The level of language skills is calculated from the behaviour of the user in terms of language learning, lessons took, language serious games took, language test? The result will be stored in the user profile as an input for language learning offers and as feedback to the user. Subjective: user has opportunity to rate their own progress (what their goal is, how much progress they are making towards their goal, how happy and satisfied they are with their progress, how happy they are with the tools and services, how happy they are with mentor or peer support and feedback (ratings system)	user behaviour data stored in the user profile on the client	Situated Language Service (BUS), Language Lesson Learning (BUS), User profiling (AIT)
										sent to the server by user profile system components	User profiling (AIT)
										analyses done on the server side	Recommendation service (AIT)
										Calculated learning progress indicator is sent back to the client via the user profile components	Use profiling (AIT)
										(Makes recommendation for next learning step)	Recommendation service (AIT)
										user feedback forms	User profiling (AIT)
										ratings tool ("rate my teacher")	User profiling (AIT)

2.3 Community building service

community building service										
use cases		**assigned user-requirements (D2.3)**	**priority**	**tasks**	**deliverables**	**lead (techn.)**	**lead (req.)**	**other coop.**	**workflow**	**Technical requirements**	**component**
CBS. UC0	**social network analysis**		3	8,1	D8.1.1 M18 ; D8.1.2 M30	TI			Done by the administrator of the system via specific software. Getting Statistics on the use of the Maseltov social network. Social relationships in the social network are viewed in terms of network theory consisting of nodes (individuals) and connections or links (relationships between the individuals/threads). The timeline and the density of a conversation can be considered as well. These analyses about the usage behaviour in the social network detect the popularity of users and of conversations/topics.	Start Web app in a desktop browser	
										Software for Administrators	social network analysis gui (TI)
										Form for social network analysis	social network analysis gui (TI)
										data collection on SN database	social network analysis gui (TI)
										visual network representation (as a graph)	social network analysis gui (TI)
										data interpretation	social network analysis gui (TI)

									These characteristics can be used to update the user profiles and to evaluate the popularity of the social network itself.		
CBS. UC1	**get opinion mining analysis**		3	8,1	D8.1.1 M18 ; D8.1.2 M30	TI		AIT, FLU	The Opinion Mining Engine can extract from MASELTOV Social Network public opinions on certain things/objects/features/services related to a specific 'domain'. This means that the Opinion Mining Engine is able to extract from sentences keywords that express positive (“good”, “nice”) or negative (“bad”, “disgusting”) feelings (i.e. sentiments) extract from the sentences keywords that are distinctive of a specific domain (for example “apartment” , “flat”, “room”, “price”, … for the “Accommodation” domain)	Collection and analysis run on scheduled time and in background mode	Opinion Mining (TI)
										Specific 'analysis domain' (e.g. MASELTOV service offering, administration, restaurant, ...) are identified	Opinion Mining (TI)
										ontologies related to identified domains are build an implemented in the system	Opinion Mining (TI)
										Specific discussion areas are configured into forum platform	Social Network Service (TI)
										Data from contribution/post/discussions on forum are collected and indexed	Opinion Mining (TI)
										It's possible to extend data collection and indexing on external source (i.e. specific thematic forums)	Opinion Mining (TI)

									associate sentiment keywords to the corresponding domain keywords (“the flat is located near to the station and the price is good but the beds are uncomfortable”) collect all positive (“plus”) and negative (“minus”) sentiments related to domain keywords in order to give a vote to the domain keywords/features. The Opinion Mining analysis runs offline, for example during the night, and related reports can be visualized by means of the Opinion Mining GUI. For each domain of interest a specific vocabulary must be defined. For each language syntax rules, phrase structure rules and appropriate parsers are needed. Telecom Italia is able to manage opinions in Italian	Opinions (called 'sentiment') are extracted and voted against related ontology	Opinion Mining (TI)

									on pre-defined domain vocabulary. According to this, TI can define by itself one specific vocabulary on one domain of common interest. The domain that has been chosen is "Accommodation/ Real Estate market". If the domain vocabulary and syntactic rules for sentiment extraction are provided by linguistic experts, Telecom Italia is available to evaluate the feasibility of implementing opinion mining in languages different from Italian.		
CBS. UC2	**subscribe to Geosocial radar service**	GSR-1	1	8,2	D8.2.1 M18 ; D8.2.2 M30	TI			At the first start-up, users have to subscribe him/herself to the service. By subscribing, the user explicitly authorizes MASELTOV platform to localize his position.	Subscribe Button	Geosocial Radar Service (TI)
										Authorize user localization	Georadar platform (TI)

CBS. UC2.1	**get nearest interested volunteer ("Geosocial radar")**	GSR-1	1	8,2	D8.2.1 M18 ; D8.2.2 M30	TI		AIT	Certain Knowledge Profile of volunteers can be searched (list of available knowledge). A list is shown to the user with volunteers. Info (language, proximity, knowledge, rating, gender) can be shown on a specific volunteer. The selected volunteer may be contacted by chat. When the user contacts volunteer to get assistance, the georadar can send some information to user profile module about his/her request	Selection of the required knowledge from a list	Geosocial Radar Service (TI), User Profiling & Recommendation (AIT)
		GSR-3								Volunteer search Start Button	Geosocial Radar Service (TI)
		GSR-4								Localize user that needs assistance and available volunteers	Georadar platform (TI)
		GSR-5								Calculate available volunteer distance from user	Georadar platform (TI)
		GSR-8								Show list of volunteers ordered by distance	Geosocial Radar Service (TI)
										Selection of a volunteer and show detailed info (language, knowledge, rating,…). Send information to the user profile	Geosocial Radar Service (TI), User Profiling & Recommendation (AIT)
										Contact Volunteer Button	Contact Volunteer Button
										Back to Volunteer Button	Geosocial Radar Service (TI)
CBS. UC2.2	**sign up as a volunteer (and define privacy issues)**	GSR-1	1	8,2	D8.2.1 M18 ; D8.2.2 M30	TI		AIT	User can sign up as a volunteer and has to define his special knowledge/profession (law, mechanic, …). Available	Show volunteer form and fill the required info	Geosocial Radar Service (TI)
		GSR-2								Sign up Button. Send information to the user profile	Geosocial Radar Service (TI), User Profiling &

									Daytimes could be defined. Availability can be changed "on-the-flight", whenever needed by the user. When user registers himself as volunteer, the georadar can send volunteer profile to the user profile module.		Recommendation (AIT)
										Save volunteer info into Georadar DB	Georadar platform (TI)
										Temp Add/Remove availability Button	Geosocial Radar Service (TI), User Profiling & Recommendation (AIT)
CBS. UC2.3	**list of my contacted volunteers**	GSR-6	1	8,2	D8.2.1 M18 ; D8.2.2 M30	TI		AIT	User can view his history of received assistance from volunteers. User is invited to vote the satisfaction level about the assistance received. For each aid, involved volunteer and volunteer ratings are shown. When user rates the received assistance, georadar can send this rating to the user profile module.	Show received assistance history	Geosocial Radar Service (TI)
										Show volunteers rating and positive feedback percentage.	Geosocial Radar Service (TI), User Profiling & Recommendation (AIT)
										Aid Vote Button	Geosocial Radar Service (TI)
										Update volunteer rating	Georadar platform (TI)
CBS. UC4	**get into forum (i.e. to find accommodation , job,...)**	SNS-1	1	8,1	D8.1.1 M18 ; D8.1.2 M30	TI			User starts this function from the MASELTOV main Dashboard. Links the user to the social network platform to take part in the discussion about a certain topic like accommodation and jobs - from the	Open MASELTOV forum	MASELTOV forum (TI)
										open a topic to find/offer job	MASELTOV forum (TI)
		SNS-3									
		SNS-4a									

									migrant's point of view. (Special Job demands of migrants i.e. open minded boss) Links to and discussions on concrete job offers are possible. (This is not a job or accommodation finding portal but can offer links to those kind of portals)		
CBS. UC5	**get into social network get relevant news/events**		1	8,1	D8.1.1 M18 ;	TI			Start UC CBS.UC4 for the topic news/events	access to news section to read news	MASELTOV forum (TI)
										forum	MASELTOV forum (TI)
CBS. UC6	**get into social network GIVE & RECEIVE aid bazar**	SNS-6	4	8,1	D8.1.1 M18 ; D8.1.2 M30	TI			Start UC CBS.UC4 for the topic Give&Receive like offering to look after kids, … offering help	Start Forum	MASELTOV forum (TI)
										access to advertisement section to post/read ads	MASELTOV forum (TI)
CBS. UC7	**access social network**		1	8,1	D8.1.1 M18 ;	FLU		TI	press a button on MASELTOV main Dashboard that links to MASELTOV Forum	Forum Button	MASELTOV Dashboard (FLU)
CBS. UC8	**share a content on external social network (FB/TW/...)**		1	8,1	D8.1.1 M18 ;	IT			User wants to share specific forum content on facebook/twitter/...	"share this" button	twitter/Facebook api
CBS. UC9	**connect maseltov social network user id to external**		4	8,1	D8.1.1 M18 ;	TI			User wants to connect his MASELTOV id to his Facebook/twitter/... account. This functionality is not	Facebook connect button	Facebook api

	social network account (Facebook, Twitter …)								needed anymore.		
CBS. UC10	**follow a specific interesting topic**		1	8,1	D8.1.1 M18 ;	TI			User wants to read all incoming discussions on a specific forum topic	subscribe discussion button	MASELTOV forum (TI)
CBS. UC11	**send a private message to another Maseltov forum user**		1	8,1	D8.1.1 M18 ; D8.1.2 M30	TI			User wants to send a private message to another Maseltov forum user	send a private message button	MASELTOV forum (TI)
CBS. UC12	**being notified new topics in a specific forum section**	SNS-2	1	8,1	D8.1.1 M18 ;	TI			User wants to be notified when a new topic is posted in a specific forum section (i.e. job offering)	Use subscribe discussion button	MASELTOV forum (TI)
CBS. UC13	**public message**		1	8,1	D8.1.1 M18 ;	TI			MASELTOV administrator wants to send a public message to all Forum users.	He writes a post in the specific “Last News” section	MASELTOV forum (TI)
CBS. UC14	**sending thanks to a specific maseltov forum user**		1	8,1	D8.1.1 M18 ;	TI			A MASELTOV forum user wants to thank another user for his/her help on a specific question.	like by the use of a specific button	MASELTOV forum (TI)

CBS. UC15	**requesting help from administrator**		4	8,1	D8.1.1 M18 ; D8.1.2 M30	TI		OU?	A MASELTOV forum user has a problem with the forum and needs to raise a help request with an administrator (give feedback). Problems could be social (offensive posting), functional (help with how to use the tool) or technical (failed functionality, crash report).	Structured feedback form allowing support to identify problem and provide suitable response	MASELTOV forum (TI), feedback indicators (OU, T7.2)
CBS.UC16	**receive a private message from another maseltov forum user**		1	8,1	D8.1.1 M18 ; D8.1.2 M30	TI			User receives a private message from another MASELTOV forum user. New messages and forum news are notified via iOS style red circle on the forum application icon with the number of new events inside, i.e. a new private message and 2 new forum news: opening the forum application there will be a "1" near "private messages" and a "2" near forum news tabs.	read private message button	MASELTOV forum (TI)

2.4 Serious games service

serious games service											
use cases		**assigned user-requirements (D2.3)**	**priority**	**tasks**	**deliverables**	**lead (techn.)**	**lead (req.)**	**other coop.**	**workflow**	**Technical requirements**	**component**
SGS. UC0	**get into Mixed Reality serious game : like train for administration / immigration office**	NAV-4	1			COV	NGO - Game Scenarios		The Mixed Reality Game is started once the user is with his mobile phone located next to the place the game is associated to (like near an administration office). He gets a task to perform (like post a letter). The user has to take a picture of the item he learned about (i.e. the letter) and this will be posted to the social network	Context aware services enabled	Context Awareness (JR)
		PCE-17								Implemented model for mapping location data to games	Serious Games Service (COV)
										Developed games for multiple scenarios	UC1,2,4,5
										Interface with social network	Serious Games Service (COV)
										Feedback to the profile with regard to the language skills and achieved interaction skills	Serious Games Service (COV)
SGS. UC1	**get into virtual reality serious game: learning about**	PCE-14	4			COV	NGO - Game Scenarios		The Virtual Reality Game is started by the user by the GUI. The game is story-driven as detailed in D7.3 and D7.4.1. In playing through the game, they experience multiple scenarios	Finalization of game content	Serious Games Service (COV)
		PCE-11								Multiple choice dialogue structure has been implemented in Unity and content assets developed	Serious Games Service (COV)

	healthcare, jobseeking, shopping and travel								in which cultural differences present challenges. As they progress, they earn MASELTOV credits stored in the user profile.	Navigation path has been defined (D7.4.1) and content aligned to support learning objectives	Serious Games Service (COV)
										Feedback to the profile with MASELTOV credits earned	Serious Games Service (COV)
SGS. UC2	**get into serious game: train for job application**	PCE-4	3			COV			Continued play of the virtual reality game SGS.UC1. The topic job-interviews is covered by the game.	This is a specific part of the narrative within the serious game in SGS.UC1.	Serious Games Service (COV)
		PCE-5								Player can participate in 4 job interviews, each replicated in 2 different cultures. They can move between "dimensions" and observe how interviews differ in different cultures.	Serious Games Service (COV)
		PCE-6									
SGS. UC3	**get access to avatar like assistance service**		2			COV			Avatar assistance is embedded in the game (D7.3). The player can rapidly navigate the game world and speak to characters	Potential implementation of text-to-speech dependant on file size implications.	Text-2-speech (JR)
										Decision model for problem identification is implemented as	Avatar Assistance Service (COV)

									in either the healthcare, jobseeking, travel, or shopping scenarios.	conditional logic in the dialogue system (D7.3)	
										User interface featuring avatar and dialogic interactions is implemented in serious game (D7.3).	Avatar Assistance Service (COV)
										Information resource on common problems and solutions suitable for implementation	Avatar Assistance Service (COV), via liaison with NGOs. Anticipated to include BUS inputs also.
SGS. UC4	**get into serious game: get into local culture (virtual / real world) game**		3			COV			Start UC SGS.UC1 and play through game. The topic cultural awareness is covered by the game.	Specific case study / developed prototype example of SGS.UC1	Serious Games Service (COV)
										Intended as 2nd exemplar of the approach in SGS.UC1	Serious Games Service (COV)
SGS. UC5	**get into serious game: train**		2			COV		BUS	The game itself focuses on playful cultural learning as specified by the DoW, rather	Specific case study / developed prototype example of SGS.UC1	Serious Games Service (COV)
										Intended as 3rd exemplar of the	Serious Games

	language skills								than language learning. However, the intent is to allow the in-game journal to link to context-sensitive language learning resources provided by BUS. The game is started in SGS.UC1	approach in SGS.UC1	Service (COV)

2.5 Health care service

health care service						**FLU**	**FHJ**				
use cases		**assigned user-requirements (D2.3)**	**priority**	**tasks**	**deliverables**	**lead (techn.)**	**lead (req.)**	**other coop.**	**workflow**	**Technical requirements**	**component**
HCS. UC1	**find nearest pharmacy / doctor / health care organization such as hospital…**		1	6.3, 6.4	D6.3.1, D, M18;D6.4.1, M18	FLU	FHJ		Start UC NVS.UC1 with a pre-selection of relevant POI categories like pharmacy/doctor/health care organizations/...	Button to start function in the GUI	Health Care Service (FLU)
										Link to NVS.UC1	POI Service (FLU)
HCS. UC2	**get information about appropriate health care service**	PCE-14	1	6,4	D6.4.1, M18	FLU	FHJ		Start UC AS.UC1 for to view information from the wiki for health-care topics	Button to start function in the GUI	Health Care Service (FLU)
		PCE-15								Link to AS.UC1	Wiki (FLU)

	(administrative, rights, organization, etc.; official information)	PCE-16								
HCS. UC3	**get appropriate language lesson on health care issues (at doctor, at pharmacy…)**	PCE-13	4			FLU		BUS	Start UC LLS.UC0 for the topic health care	Button to start function in the GUI	Health Care Service (FLU)
		SLL-1								Link to LLS.UC0	Language Lesson Learning (BUS)
		SLL-2									
HCS. UC3.1	**get appropriate emergency vocab for health care issues (accident)**	PCE-13	4			FLU		BUS	Start UC LLS.UC1 for the topic health care	Button to start function in the GUI	Health Care Service (FLU)
										Link to LLS.UC0	Situated Language Learning Service (BUS)

HCS. UC4	**find appropriate local medicaments**	PCE-16	4	6,4	D6.4.1, M18	FLU	FHJ		The user selects "find medicaments" an can enter search text like name, or also ingredients. The purpose is to find medicaments which have different names in different countries. External databases have to be identified to query this information from. Also information from the Wiki could be used.	Button to start function in the GUI	Health Care Service (FLU)
										Enter search string or select from a list	Health Care Service (FLU)
										query external DB (TBD)	external server (TBD)
										Show list of results	Health Care Service (FLU)
HCS. UC5	**connect to nearest local volunteers on health care issues**		4			FLU	FHJ	TI	start UC CBS.UC2 and preselect search for people with knowledge on health care	Button to start function in the GUI	Health Care Service (FLU)
										Link to CBS.UC2	Geosocial Radar Service (TI)
HCS. UC6	**get support on how to register at doctor**	PCE-14	1	6,4	D6.4.1, M18	FLU	FHJ		is part of UC HCS.UC2		
		PCE-15									

HCS. UC7	**initiate international emergency call**		3	6,4	D6.4.1, M18	FLU	FHJ		User can make an emergency call. The used numbers will be defined in the later stage.	triggering phone from URL in WIKI (same requirements of triggering the route module)	WIKI (FLU)
HCS. UC8	**get access to “how-to health care issues”**		1	6,4	D6.4.1, M18	FLU	FHJ		start UC AS.UC9 for the topic health care	Button to start function in the GUI	Health Care Service (FLU)
										Link to AS.UC9	

2.6 Navigation service

navigation service										
use cases		**assigned user-require-ments (D2.3)**	**priority**	**tasks**	**deliverables**	**lead (techn.)**	**lead (req.)**	**other coop.**	**workflow**	**Technical requirements**	**component**
NVS. UC1	**get information on set of POIs**		1			FLU			User starts "POI" from the user Interface. POIs are shown in a map and can be filtered by category and keywords. By choosing a POI the user can get all details. Open databases have to be found, combined and evaluated. (OSM, local databases, ...)	Navigation Button on the Dashboard	POI Service (FLU)
										POI Button on Navigation menu	Navigation Service (FLU)
										send current location to server to get POIs within 2000m	POI Service (FLU)
										POI to be shown on map as default, POI categories can be filtered	POI Service (FLU)
										Specific category search within the map	POI Service (FLU)

NVS. UC2	**navigate to selected POI/address/**	NAV-1	1			FLU			User starts "Navigate to (use as start/destination)" from a selected POI, or he can enter an address manually for start and destination point. Route will be queried from public transportation routing service (will be available in Vienna/London). Routing instructions are shown in a List /Map with details.	Routing modules enables the user to enter the start and end locations via text, selecting point on the map.	POI Service (FLU)
		NAV-2								In map view selecting POI will result in viewing the route	POI Service (FLU), Navigation Service (FLU)
NVS. UC3	**get context aware, situated assistance for navigation (AR, etc.)**		1	4.1	4.1.1(m6); 4.1.2(m18)	JR		FLU	Once a route is calculated (NVS.UC2) the user can get real time augmented reality navigation assistance along the foot path segments of the route. This will be made available by a button in the GUI of NVS.UC2 named like "start AR navigation assistance now"). Augmented Reality technology will be integrated for intuitive guidance without language barriers. An automatic feedback on usage performance will be	Query user profile component for static information on the current user	User Profiling PCS.UC2 (AIT)
										Button in the GUI of NVS.UC2 (FLU) to start the AR navigation assistance	POI Service (FLU), Navigation Service (FLU)
										Route or target coordinates have to be passed by FLU	POI Service (FLU), Navigation Service (FLU)
										Optimising pedestrian routes based on OSM data	Situated Navigation Assistance Service (JR)
										Incorporate context information	Context Awareness (JR)
										Recognition of route deviations and reinitiating	Situated Navigation Assistance Service (JR)

									generated and sent to the user profile to calculate progress indicators.	route calculations	
										Provide augmented reality aided guidance	Situated Navigation Assistance Service (JR)
										Tactile and visual response for guidance	Situated Navigation Assistance Service (JR)
										Feedback on usage performance	User Profile (AIT)
NVS. UC4	**provide text-to-speech information**		2		?	JR			The text to speech engine pre-installed on Android based mobile devices could be used directly by every technical partner using standard Android APIs.		
NVS. UC5	**get feedback on correctness of user path (ok, wrong)**		3		4.1.1(m6); 4.1.2(m18)	JR			The system keeps track of the user along the pedestrian route and gives positive feedback. Usually users get only alerts on wrong behaviour. Positive feedback - like "You are on the right track!" could foster people feeling safe and confident. To be discussed with NGOs and technical partners. Will be part of NVS.UC3	runs as a background service while using AR Navigation	Situated Navigation Assistance Service (JR)
										relates to WP7 T7.2: motivational feedback	

NVS.UC6	**user feedback tool**		3	T7.2		OU			The user has the opportunity to provide feedback on the tools. Functional help may include a "Help" button with information on how to use the tool, or a Structured Form that allows the user to request individualised help from the MASELTOV support team. User may also wish to report tool has crashed, or does not function correctly. "Rate my service" tool may allow the user to rate the quality of the service generally or each specific instance (e.g, "the navigation tool worked but it made me walk across a fast road to get to my destination")	Help button. Feedback tools to allow structured feedback from user to MASELTOV support team. Rate my service tool? Mechanism for MASELTOV support teams to identify outstanding help calls, and respond to users.	User profiling (AIT).

2.7 Recommendation service

recommendation services											
use cases		Ass. user-req.	priority	tasks	deliverables	lead (techn.)	lead (req.)	other coop.	workflow	Technical requirements	component
RCS. UC0	**User Interest collection and classification**		1			AIT			Monitor user interests and needs from app usage patterns, accessed information, used tools and services, visited places, carried out activities and so on which are stored in the user profile. In order to generate advanced personalised recommendations the monitored user's interests and activities are taken into consideration.		
										Analyse user related data stored in the user profile	recommendation service (AIT), user profiling (AIT)
										> app usage patterns	recommendation service (AIT), user profiling (AIT)
										> used MASELTOV services	recommendation service (AIT), user profiling (AIT)
										> accessed information (wiki categories)	recommendation service (AIT), user profiling (AIT)
										> visited places	recommendation service (AIT), user profiling (AIT)
										> carried out activities	recommendation service (AIT), user profiling (AIT)
										> context/situation	recommendation service (AIT), user profiling (AIT)
RCS. UC1	**Recommendation of a situated language learning lesson**		1			AIT		JRS, BUS	The recommender based on the current user activity recommends a language learning lesson, given also that language	get Context Information generated by JR from the user profile	recommendation service (AIT), context-awareness (JR)
										get learning topics and level from user profile	recommendation service (AIT), language

									learning has been defined as an interest in the user profile. A learning topic is deduced from the context information queried from the context awareness component and UC LLS.UC0 is started		lesson/situated learning (BUS)
										compare with user interests RCS.UC0	recommendation service (AIT)
										generate recommendation	recommendation service (AIT)
										send to notification system	recommendation service (AIT), Android Notification Bar
										store in user profile	recommendation service (AIT), user profiling (AIT)
										Add to the list (GUI) of pending recommendations	recommendation service (AIT), user profiling (AIT)
RCS. UC2	**Recommendation of available public Services nearby**		1			AIT		FLU	User triggered through the user interface or event driven from events coming from MApp applications. Recommendation of Translation, Food, community service, cultural events, legal and immigration services, etc. Local Information has to be pulled from local databases /		
										get available public services nearby	recommendation service (AIT)
										compare with user interests RCS.UC0	recommendation service (AIT)
										generate recommendation	recommendation service (AIT)
										send to notify system	recommendation service (AIT), Android Notification Bar
										store in user profile	recommendation service (AIT), user profiling (AIT)

									electronic newspapers / city homepage. Based on the User Profile.		
RCS. UC3	**Location based Recommendation of MASELTOV Services**		1			AIT		JRS	Triggered from background services, which transmit the current user location. Based on the preferences the user has specified the respective recommendations are issued. If the User Profile contains interest in sports and the user is located close to a stadium, the recommender issues a recommendation on an upcoming basketball game. The recommender issues recommendations based on rules that have a precondition that matches user preferences and the current user location is close to the location the recommended event will take place.	Define Rules for Recommendations	recommendation service (AIT)
										get Context Information from Context awareness component	recommendation service (AIT), context-awareness (JR)
										get location related possibilities/topics	recommendation service (AIT)
										compare with user interests RCS.UC0	recommendation service (AIT)
										generate recommendation	recommendation service (AIT)
										send to notify system	recommendation service (AIT), Android Notification Bar
										store in user profile	recommendation service (AIT), user profiling (AIT)
RCS.	**get recommendation**		1			AIT		FLU	Triggered by events that are generated by Map		

	about nearby POIs (cultural places, shops with cheap clothes, house hunting, etc.)								services. Recommendation of nearby according to the user interests as specified in the user profile.	get list of POIs in the surrounding area	recommendation service (AIT), POI service (FLU)
										compare with user interests RCS.UC0	recommendation service (AIT)
										generate recommendation	recommendation service (AIT)
										send to notify system	recommendation service (AIT), Android Notification Bar
										store in user profile	recommendation service (AIT), user profiling (AIT)
RCS. UC5	**Enable feedback on recommendations**		4	T7.2		AIT?	OU		User should be able to report back to MASELTOV support team their satisfaction rating, after receiving a recommendation. The recommender asks the user if she wishes to rate the recommendation received and if it receives a positive reply it presents the user with a screen for user feedback.	Feedback recorded into user profile, perhaps to inform future recommendations.	User profiling (AIT), Recommendation service (AIT)

2.8 Profile & configuration service

profile & configuration service										
use cases		**Ass. user-req.**	**priority**	**tasks**	**deliverables**	**lead (techn.)**	**lead (req.)**	**other coop.coop.**	**workflow**	**Technical requirements**	**component**
PCS. UC0	**receive, store and provide user-related data sent from MASELTOV modules**		1			AIT			The User Profile stores user preferences and events that are generated by MApp applications. MASELTOV platform components can query the User Profile for obtaining the stored information through the provided User Profile interfaces.	All MApp applications send events to the User Profile.	all
										The format of events and notifications to be sent to the User Profile has been defined in D5.2	AIT
										The User Profile provides interfaces to receive events from MApp applications	User Profiling (AIT)
										The events transmitted to the User Profile from MApp applications are stored in a back end database and can be processed to discover usage patterns	User Profiling (AIT)
										The User Profile provides interfaces to query user-related	User Profiling (AIT)

										data	
PCS.UC1	**Usage history of the MASELTOV system**		1			AIT			Number of times different services accessed, duration of time spent on each MApp service by end users. Each MApp application should send activation and termination events to the User Profile to be recorded for further statistical processing.		
										User Profile provides interface to receive usage-data from other MASELTOV modules (interface needed, see PCS.UC0)	User Profiling (AIT), ALL MAPP Modules
										User Profile stores user-related data history	User Profiling (AIT)
										Back end services run analyses - aggregations, favourites,... usage chains	User Profiling (AIT)
										Back end services may use user data stored in the User Profile to generate statistics	User Profiling (AIT)
										Back end services provides statistical data to other modules and GUIs	User Profiling (AIT)
										GUI component to visualise statistics	Recommendation and Profiling (GUI component) (AIT)
PCS.	**Status of language learning level**		1			AIT		OU,	Records the user's language learning level to be used for personalized recommendations.	Triggered by LLS.UC0? reports back to LLS.UC0	
										Triggered by LLS.UC1	

									Called by LLS.UC0, LLS.UC1. Users may be asked to self-identify their level of expertise, or have them objectively test their ability through setting some tasks, and then scoring these tasks to identify their ability level.	Maintain user learning level status. Defined using indicator based on Common European Framework for Languages? (http://en.wikipedia.org/wiki/Common_European_Framework_of_Reference_for_Languages)	
										see PCS.UC5	User Profiling (AIT)
PCS. UC3	**most visited places / frequency aspects**		1			AIT		JR	Analyse the history of visited places stored in the user-profile received from the Context-Awareness module in order to trigger recommendations	receive visited places from context-awareness module (interface needed, see PCS.UC0)	User Profiling (AIT), Context Awareness (JR)
										receive most visited places from context-awareness module – Update once a day	User Profiling (AIT), Context Awareness (JR)
										store user-related data history	User Profiling (AIT)
										visualise statistics	Recommendation and Profiling (GUI component) (AIT)
										Information will be used for recommendations	Recommender (AIT)
PCS.	**Recording of categories of requested**		1			AIT			The User Profile event logging interface may be used for receiving and storing user-	User Profile interface to receive requested information categories (interface needed, see PCS.UC0)	User Profiling (AIT), MASELTOV Forum (TI), Wiki (FLU),

	information in the system								behavioural data on requested information categories in the wiki, forum or language learning system. The data may further be used for profiling user interests, and issuing targeted recommendations.	Language lesson learning (BUS), situated language learning (BUS)
									User Profile stores user-related data history	User Profiling (AIT)
									Back end services run analyses - most visited categories	User Profiling (AIT)
									Back end services store statistics	User Profiling (AIT)
									User Profiles provides application usage statistics to other modules (interface needed)	User Profiling (AIT)
									GUI to visualise statistics	Recommendation and Profiling (GUI component) (AIT)
PCS. UC5	**Recording of learning behaviour accurate profile**		1			AIT			User Profile receives and stores user-behavioural data on learning progress from language learning modules. The recorded data will be used for learning user interests, recommendations and progress overviews in the profile GUI	User Profile interface to receive learning progress	User Profiling (AIT), Language lesson learning (BUS), situated language learning (BUS)
										store user-related learning history	User Profiling (AIT)

									run analyses - aggregations/overviews	User Profiling (AIT)
									generate statistics	User Profiling (AIT)
									provide statistics to other modules (interface needed)	User Profiling (AIT)
									GUI to visualise statistics	Recommendation and Profiling (GUI component) (AIT)
PCS. PCS. UC6	**User Interface for entering profile data**		1			AIT			The User profile provides a GUI for users to enter and browse their profile data. The GUI is presented to the user during the MASELTOV initialization and stays available on the Main-Dashboard menu	A user interface to enter/alter profile data	Recommendation and Profiling (GUI component) (AIT)
PCS. PCS. UC6	**visualise profile date**		1			AIT			Relevant user related information either entered by the user or	User enters personal information	User Profiling (AIT)

	and progress								learned by the system (interest sensing RCS.UC0) will be visualised for the user. Also the current progress and aggregated behavioural patterns should be depicted.	MApp modules send behaviour and progress information to the user profile	User Profiling (AIT) All components
										User interface to visualise profile data (histories, statistics,...)	Recommendation and Profiling (GUI component) (AIT)
PCS. UC7	**encrypt profile data**		3			AIT			For security and privacy reasons any user-related data should be encrypted	Encrypt and anonymise user related data	User Profiling (AIT)
PCS. UC8	**Storing the history of context recognitions**		1			AIT			Any context recognitions (hypotheses) produced by the component Context Awareness (JR) will be sent as events to the User Profile to be stored as part of the user history. The stored history can be further queried by other MASELTOV platform components.		
										receive context recognitions (interface needed, see PCS.UC0)	User Profiling (AIT), context awareness (JR)
										store user-related data history	User Profiling (AIT)
										run analyses - aggregations/overviews	User Profiling (AIT)
										generate statistics	User Profiling (AIT)

										provide statistics to other modules (interface needed)	User Profiling (AIT)
										GUI to visualise statistics	Recommendation and Profiling (GUI component) (AIT)
PCS. UC9	**Allow privacy configuration (location / behaviour tracking)**	GSR -2	1			AIT		JRS	The User Profile allows the user to switch on or off the collection of events from other MApp applications giving thus the option to the user to allow or prohibit the collection of private data related to him/her.		
										Provide user interface to enter/change privacy configuration	Recommendation and Profiling (GUI component) (AIT)
										Show disclaimer and ask for user permission to allow the collection of events from other MApp applications	Recommendation and Profiling (GUI component) (AIT)
PCS. UC10	**Feedback and Progress Indicators for end user**	7,2				AIT	OU		User Profile allows users to provide feedback and progress indicators user in order to (a) allow them to pass feedback to their peers, mentors, and technical support on their experiences of their learning and the tools and (b) to help end users understand their progress through tasks (e.g. 3/10 modules completed, % correct answers in a quiz, etc.).	GUI component that allows users to rate their progress in the overall learning journey through the MASTELTOV platform. In addition to quantitative rating, free form comments can be sent as well.	Recommendation and Profiling (GUI component) (AIT)

PCS. UC11	**Feedback and Progress Indicators for mentor**	7,2	4			AIT	OU		Feedback from end user to be passed to mentors to enable them to better support end users. Progress reports on end users to be accessible to mentors to enable them to understand how/when to offer support. Feedback tools to allow mentors to communicate support back to end users.		
PCS. UC12	**Feedback and Progress Indicators for MASELTOV support and development team**	7,2	4			AIT	OU	CUR?	Feedback from end users, to enable improvement, troubleshooting, and user support. End users will be able to rate how much they like a tool/service, how much they enjoyed using it, how useful it was, if they encountered any problems with it. This will support WP9 (Field Trials and Evaluation) work.	GUI that allows users to rate the effectiveness of the various MApp applications. In addition to standard quantitative rating, it will allow feedback in free form.	Recommendation and Profiling (GUI component) (AIT)

2.9 Administrative and system triggered service

Administrative and system triggered											
use cases		**ass. user-req.**	**priority**	**tasks**	**deliverables**	**lead (techn.)**	**lead (req.)**	**other coop.**	**workflow**	**Technical requirements**	**component**
ADS. UC1	**Registering to the Maseltov Service at first start of the Maseltov App**					FLU		TI/AIT	User starts the application and gets a welcome screen. He can click on next where the registration form is shown. Afterwards, the thank you screen is shown and the application can be started	Welcome Screen displayed	Start-up procedure (FLU)
										Create Unique ID	Start-up procedure (FLU)
										Create Account, Login and Enter basic personal information (starting PCS.UC6)	User Profile (AIT)
										Thank you screen displayed	Start-up procedure (FLU)
ADS. UC2	**Startup procedure of the MASELTOV App (Technical view, components to be started and**					FLU		JR, AIT, ...		Start ADS.UC1 for Registration (on first start up)	Start-up procedure (FLU)
										Check whether user is logged in	Start-up procedure (FLU)
										Start Login Screen if necessary	Start-up procedure (FLU), User Profile (AIT)

	what data they need)									Start Context Awareness Background Service	Start-up procedure (FLU)
										Start Recommendation Background service	Start-up procedure (FLU)
										...	
										start Dash-board	Start-up procedure (FLU)

3. FINAL SOFTWARE COMPONENTS

Software components can be seen as thematic containers for related technical functionalities and should help to get their structure into the technical image of the MASELTOV system. This chapter was updated to show the final set of software components developed within the project.

3.1 Dashboard components

With regard to the client side and particularly the frontend components the consortium agreed on having a kind of dash-board for the mobile app showing the thematic clusters of assistance provided by the MASELTOV system.

The dash-board includes direct links - represented with icons - to different tools and information services provided by the MASELTOV system (see Figure 5: Dash-board concept without thematic clusters). This would avoid the hierarchical 2-step access but could lead to visually overloaded dash-board. If it could be managed to keep the number of icons needed to provide access to all MASELTOV functionalities as little as bellow 14, this second approach would be preferred. If additional entries are needed it could also be thought of adding a menu for common functionalities like the user profile or configuration.

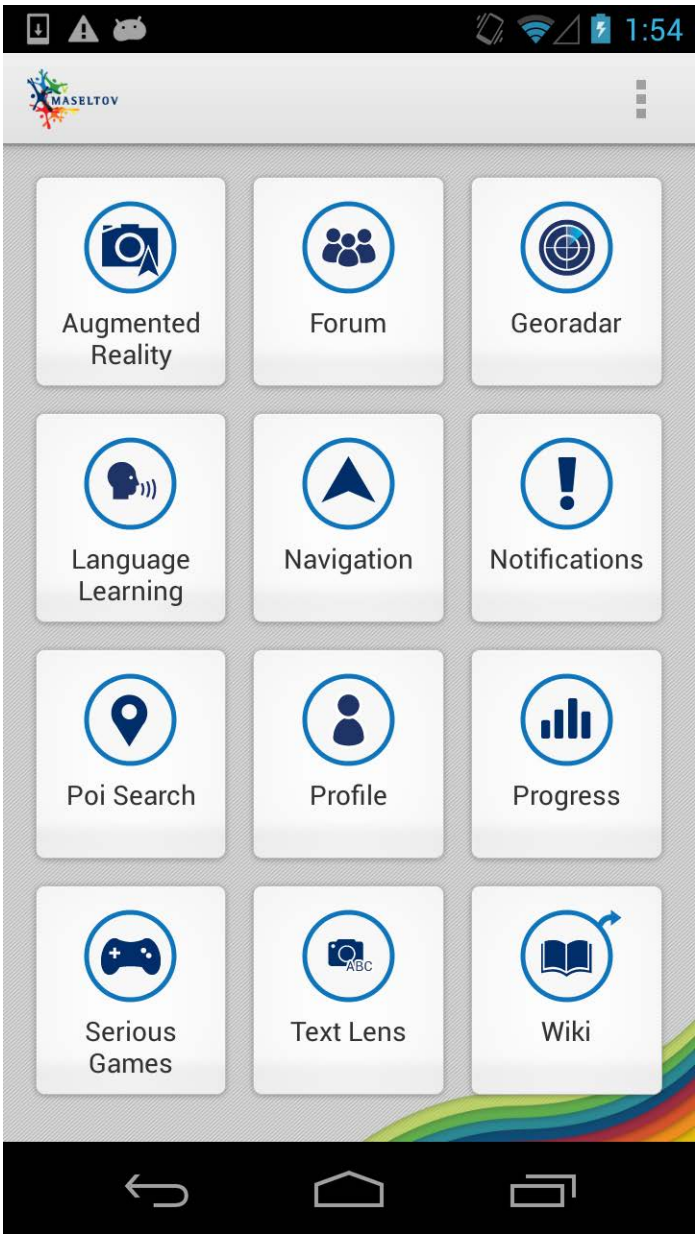

Figure 1: Dashboard concept for MASELTOV

From the current point of view, the following icons – links to MASELTOV functionalities and tools - have to be present on the dashboard at minimum:

1. **Augmented Reality (JR)**
2. **Forum (TI)**
3. **Georadar (TI)**
4. **Language learning (BUS)**
5. **Navigation (FLU)**
6. **Notifications / pending recommendations (AIT)**
7. **POI Search (FLU)**
8. **Profile (AIT)**
9. **Progress (AIT)**
10. **Serious games (COV)**

11. Text Lens (CTU)
12. Wiki (FLU)

Additionally, within the dashboard the user can find additional information to the following topics over the menu icon: disclaimer, used license and info.

3.2 Software components

The following list shows all identified system components, which have been derived from the technical use-case analyses during the system specification phase of the project under strong involvement of all project partners:

Client Side:

- User Interface component (Android native)
  - Bureaucratic advisor service (FLU)
  - Language learning service (BUS)
  - Maseltov Forum (TI)
  - GeoRadar (TI)
  - Serious games service (COV)
  - Health care service (FLU)
  - Navigation service (FLU)
  - Profile & configuration service (AIT)
  - FAQ access (JR)
- Background component
  - Recommendation service (AIT)
  - Context awareness (JR)
  - Notification System, deprecated (JR)
- Software component
  - Text lens (CTU)
  - Situated navigation assistance service (JR)
  - Text-2-Speech, deprecated (JR)
  - POI service (FLU)
  - Navigation service (FLU)
  - Wiki (FLU)
  - Avatar assistance service (COV)
  - Serious games service (COV)
  - Language lesson learning (BUS)
  - Situated language service (BUS)
  - Geosocial radar service (TI)
  - Maseltov forum (TI)
  - Social network connector (TI)
  - User profile (AIT)

Server Side:

- Web-based user interface component
  - Wiki website (FLU)
  - Social Network Analysis GUI (TI)
  - Opinion Mining GUI (TI)
  - Community building service admin (TI)

- Software component
  - Wiki server (FLU)
  - User Profiling & Recommendation (AIT)
  - Social network connector (TI)
  - Maseltov Forum (TI)
  - Geosocial Radar Platform (TI)
  - Opinion mining (TI)
  - Social network analysis (TI)
- External Systems (MASELTOV will connect to)
  - Routing services
  - POI repositories
  - Map providers
  - Language learning platform
  - Social network platforms

All those identified system components can be seen as a container for implementing a bundle of technical functionalities with a clear responsibility of implementation. Interfaces between those components have to be defined during the integration process of MASELTOV. A figurative visualization of those components and their logical and physical scope of implementation can be found in the chapter System architecture.
A detailed final specification of each component listed above can be found in deliverable D3.2.2 System Specification.

4. MATCHING OF TECHNICAL USE-CASES TO EVALUATED USER REQUIREMENTS

Respective to a user-centric software development process it is needed to approve technical requirements and planned implementation with real needs expressed by users. Therefore a matching of evaluated functional user requirements from work package 2 with technical use-cases defined within work package 3 has to be done. The technical implementation plan and defined technical functionalities have to be assessed on whether they are able to cover each of the defined and agreed functional user-requirements. The matching was done by compiling a matrix which integrates all user requirements in the horizontal axis and all technical use-cases in the vertical axis. The Matrix depictures very clearly which user-requirement is covered by which technical functionality of the MASELTOV system.

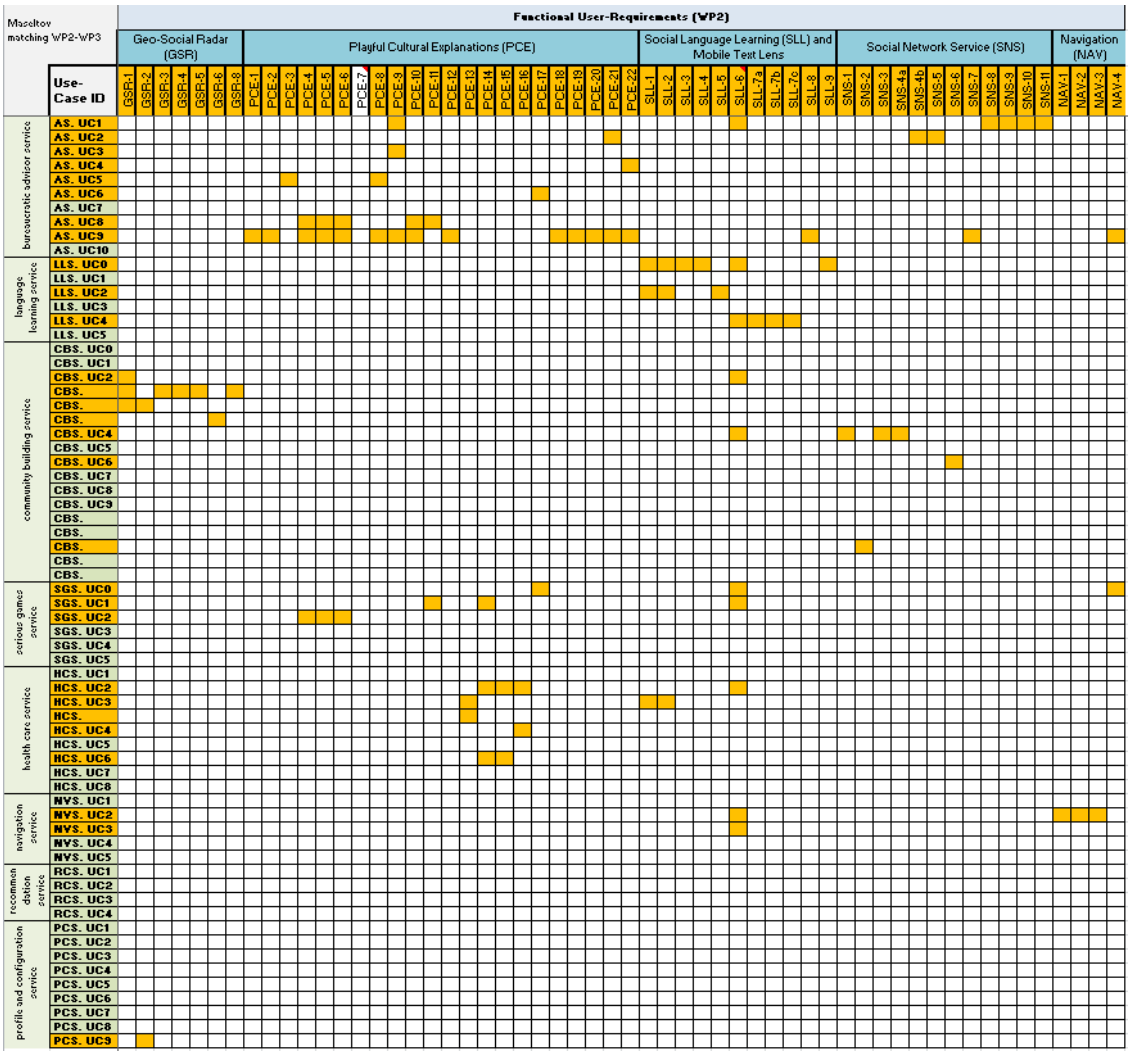

Figure 2: Matching of functional user requirement with technical use cases

Although the readability of this huge matrix within this document is poor, it can be still clearly seen that only one user-requirement (horizontal axis) is currently not covered by the current system architecture. Furthermore, it is shown that there are much more planned technical functionalities than requested by user-demands. This is mainly because the technical solution also involves functionalities and user-interfaces for other actors than end-users like administrators, service providers and content producers, etc.

The only uncovered functional user-requirement is PCE-7 “Provide short stories to entertain children when travelling” (Context: Children) due to the fact that it was prioritized by user-groups with “Low”. Consequently it was excluded and left uncovered by the technical solution.

As an update from the last version shown in D3.1.1 the functional user-requirement SLL-6 “Arab, Turkish and Spanish language has to be supported” (Context: Language) is now covered. In the meantime it was clearly decided which tools or services of MASELTOV will be available in which language. Following this agreement each partner is responsible for translating their own service into the defined languages.

A detailed overview of MASELTOV service or tool availability with regard to languages and cities can be found in deliverable D3.3.2.

5. FINAL SYSTEM ARCHITECTURE

The MASELTOV system architecture is derived from technical use-case analyses which thematically bundles technical requirements to system components which are made visible in **Figure 1**. *Schematic description of the MASELTOV mobile application.* The system architecture has been adapted to the needs of MASELTOV in twelve comprehensive iterations and is now designed to meet even upcoming challenges in the third project year.

Basically we have three different logical scopes in the system architecture:

1. Frontend services (mainly native apps on the mobile phone and some web based)
2. Cloud (client-server communication via internet protocol)
3. Back-End services running on the server side

The physical client for the MASELTOV application (MApp) is a mobile device based on the Google Android operating system. Client software is implemented natively using the Android SKD. We have three different types of components implemented on the client:

1. GUI components (frontend)
2. Background components (keeps running even if MApp is closed)
3. General software components (business logic)

GUI components are implementing graphical user interfaces of the MASELTOV application. Basically user interfaces of each MASELTOV service or tool are bundled within one GUI component, which could implement multiple screens and workflow logic. Background components will be started on start-up of the MASELTOV application and will run in the background to collect and process data relevant for real time functionalities like the provision of immediate and situational recommendations. Finally, the majority of client software components are general software components needed to implement the business logic of all services delivered by MASELTOV.

Basically it could be said that many MASELTOV services or tools are implemented in Client-Server architectures. While client software components are running physically on the mobile device of users, server software components have to be hosted on server computers connected to the cloud (internet) in order to communicate with the client side.

On the server side we have - in comparison to the client side - only two types of MASELTOV software modules. Firstly, we have server GUI components, which will implement graphical user interfaces mainly for the administration of the MASELTOV system but also the WIKI system. Those user interfaces will be implemented by the use of web technologies and could be accessed by normal web browsers via internet connections or in case of the WIKI they are delivering content which is embedded in client GUI components. Secondly we have general server software components serving as the back-end for corresponding client components connected by a direct web based communication channel.

Additionally, the system architecture also lists external 3rd party services on the server side which will be used directly by MASELTOV components like map and POI sources, open linked data or language learning platforms.

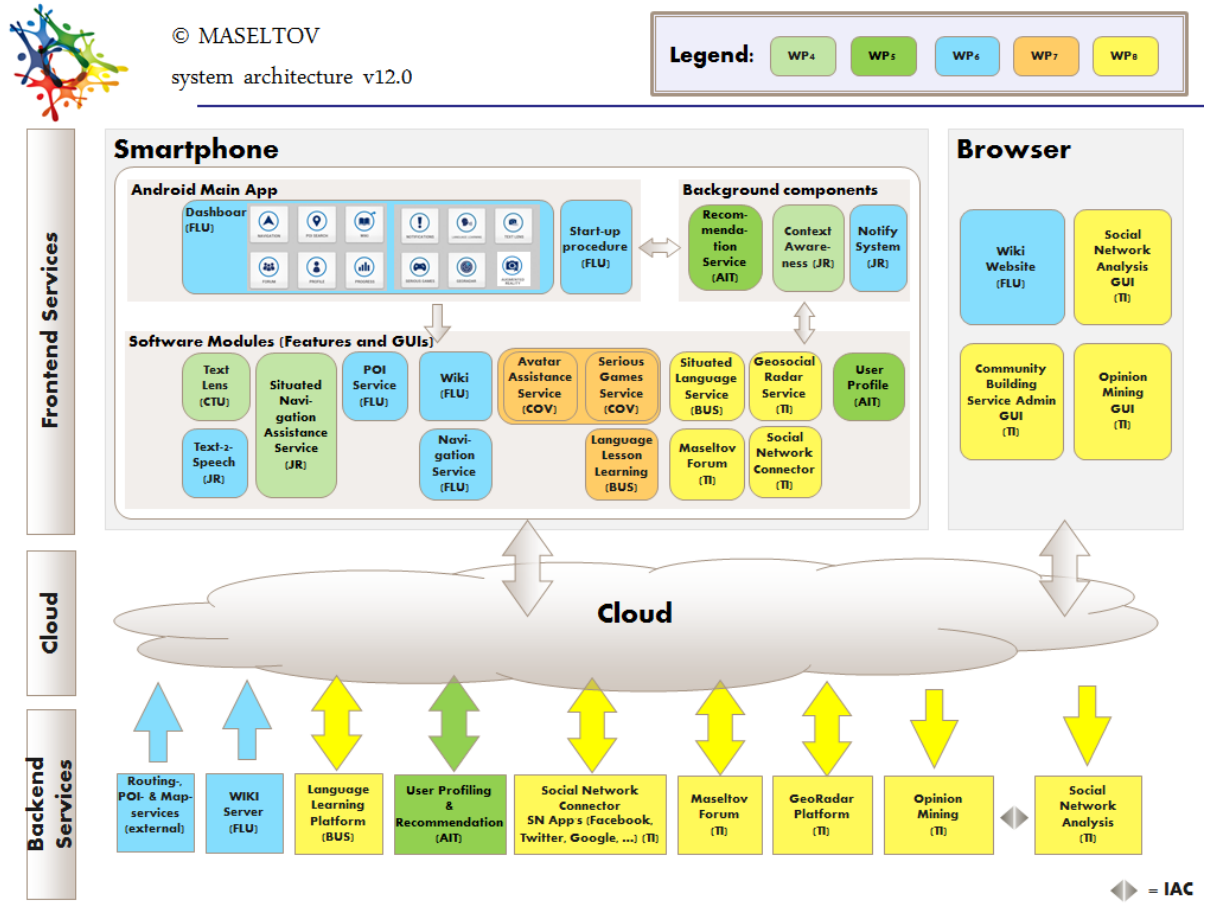

Figure 3. Schematic description of the MASELTOV system.

The detailed specification of each component visible in the system architecture above can be found in deliverable D3.2.2 System Specification.

6. SUMMARY AND OUTLOOK

This deliverable depictures the final state of the system architecture defined at the beginning of software developments within the project. Based on the findings and results shown above the development phase of all technical partners will be guided and controlled. Clear definitions of technical components, their technical requirements and responsibilities are a prerequisite for a decentralized development process, which is necessary in the scope of an international project like MASELTOV. Despite the concept of decentralized development it is

a major goal of MASELTOV to end up with one integrated service with only one user-interface design to provide a seamless user experience. The current status of system integration is monitored within task 3.3 and is documented in deliverable D3.2.2. Additionally, a detailed description of each component in the system architecture by the use of white-box and black-box descriptions can be found in deliverable D3.2.2.

Although this is the final deliverable of task 3.1 showing the final MASELTOV system architecture, it is very likely that there will be the need for minor updates or changes during the 3rd project year, as the main part of software developments and software integration is still ahead and will be done in the last third of the project. To ensure a thorough documentation upcoming changes to use-cases or to the system architecture will be collected by the leader of WP3 and reported in the last deliverable of WP3 D3.3.3.