Software Requirements Specification

for

Student Collaboration Platform

Version 1.0 approved

Prepared by ZAL

organization

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Revision History

Name	Date	Reason For Changes	Version
zal	9/18/2016 12:00 – 13:40, 14:45 – 17:15	Putting content for 3.2, 3.3, 4.1, 4.2	1
	9/19/2016 11:00 – 13:00, 14:45 – 17:00		
	9/20/2016 13:15-17:15, 19:45-21:45	Corrections by letter at Sep.5th 4.3 - 4.6, 4.7-4.12	
	9/21/2016 13:15 – 17:00, 19:30 – 21:15	4.13-4.16 First edit up to 4.10	
	9/22/2016 10:00 – 13:45	Finishing first edit reading/terms normalization	

1. Introduction

1.1 Purpose

<Identify the product whose software requirements are specified in this document, including the revision or release number. Describe the scope of the product that is covered by this SRS, particularly if this SRS describes only part of the system or a single subsystem.>

This document describes requirements for Version 1 (Rev.1) of the "Student Collaboration Platform" to be developed to facilitate student initiating and joining in person or online sessions with classmates for the purpose of studying, working on group assignments and projects, and test preparation. The Platform shall allow users to initiate, manage and follow up sessions easily and naturaly. By "sessions" it is meant in-person or online group meetings and exchang the messages including but not limited to virtual message boards, blogs and forums

1.2 Document Conventions

Italics used for terms or labels that may be included verbatim or with modifications in the developed software.

<Describe any standards or typographical conventions that were followed when writing this SRS, such as fonts or highlighting that have special significance. For example, state whether priorities for higher-level requirements are assumed to be inherited by detailed requirements, or whether every requirement statement is to have its own priority.>

1.3 Intended Audience and Reading Suggestions

<Describe the different types of reader that the document is intended for, such as developers, project managers, marketing staff, users, testers, and documentation writers. Describe what the rest of this SRS contains and how it is organized. Suggest a sequence for reading the document, beginning with the overview sections and proceeding through the sections that are most pertinent to each reader type.>

This document is intended to be used as a guidelines for development, unit and system testing and as a basis for future enhancements - it describes features that are planned for this and for the future versions.

1.3.1 Interchangeably of terms

1.3.1.1 The words "*category*", "*topic*", "*role*" may be used in this document interchangeably.

1.3.1.1.1 In the context of the study's related session "*category*" and "*topic*" have the same meaning.

1.3.1.1.2 In context of User classification "*category*" and "*role*" have the same meaning.

1.3.1.2 Use of the name Student Collaboration Platform in terms of developed software within this document is used with "*System*" and "*Product*" interchangeably.

1.4 Product Scope

Developed software shall consist of client side software and server software. Client side software shall enable users of the system to perform allowed actions to initiate, manage and follow up collaboration sessions. Server side software shall receive requests from Client side software and transmit responses with the results of the requested information or actions. Communication between Client and Server sides shall be performed via TCP/IP and *SMS. No other protocols (if they are not based on TCP/IP) shall be required on this version and revision*

<Provide a short description of the software being specified and its purpose, including relevant benefits, objectives, and goals. Relate the software to corporate goals or b usiness strategies. If a separate vision and scope document is available, refer to it rather than duplicating its contents here.>

1.5 References

There are no references at this time

2. Overall Description

2.1 Product Perspective

This product is intended to be developed as a new system that is differs from existing social platforms (like Facebook and Twitter) by its close alignment with the learning and studying process while leveraging similar collaboration features to those available in existing social platforms with the maximum concentration on academic enhancement.

Currently, colleges and universities nation-wide struggle with the problem of non-negligible percentages of their student bodies never finishing their studies to earn college degree.

Varying from school to school, between 25% to 60% of incoming first-time full-time students do not earn a degree from that school within 5 years of starting their study programs. The Government Loan agency and the various national scholarship foundations are pressing schools to visibly improve their graduation rates in the immediate future. Some Universities may lose access to loans and scholarship funds if graduation rates do not increase within specific timetables. Therefore colleges and universities will be interested in this product as a tool to facilitate student collaboration and engagement with teaching stuff.

2.2 Product Functions

2.2.1 User Registration via client software (web application, mobile application). Registration data described in the section 2.3 shall allow categorization of new User into predefined roles (including, but not limited to, student, member of the faculty, administrator of the group, administrator of the system)

2.2.2 User authentication. After authenticating a registered user shall be allowed to request data and receive information from the system in accordance with the privileges corresponded to that User's role.

2.2.3 Creation of study-related sessions. This includes but not limited to selecting and renaming a topic, specifying/modifying description, choosing location, inviting collaborators, setting time date and recurrence, associating with the teaching assistants and predefined topics defined by faculty,. Selection of locations shall default to a predefined list provided by the respective Teaching Institution and/or may be expanded to allow selecting an address by searching or pinpointing on an electronic map (maps.google.com)

2.2.4 Inviting collaborators. Inviting can be initiated by the creator of the study session, any confirmed invitee or a supervising faculty member for the topic of the session (TODO possible compromise of security!). Invitation shall provide ability to easily respond and will set an event in the individual's electronic calendar. Calendar event shall be in the format accepted by end User's communication device

2.2.5 Registering for the announcements of the categories and topics created, thus any User could select announced study session without formal invitation received, send his/her request to participate (in the form of participation defined for the event/events) and receive acceptance or rejection

2.2.6 Create of categories and topics in the categories for the purpose of not just creating/assigning sessions, but also to notify Users who subscribed for the announcements about categories/topics/sessions

2.2.7 Notification/Announcements shall be sent to the subscribers by push messages and/or emails and SMS

2.2.8 Registered Users shall be able to associate subscriptions with multiple communication media (multiple emails and SMS).Thus it will allow to group of people to be registered as a one User

2.2.9 Student Collaboration Platform (System) shall control all scheduled sessions and send reminders to the invitees responded via pushing notifications

2.2.10 Product shall allow User to moderate his/her Geo-location visibility to the other Users, thus allow collaborators see their and other's location on the map

2.2.11 To be attractive for the Teaching Institution the product shall contain component that controls submission of assignments with proper reminders and registration of the submittal date/time

2.2.12 Backend component shall support all features via requests, provide security measures and also ensure backup of the platform info and keeping journal of all events and communications.

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2.2.13 Client component shall allow registering with multiple backend systems thus providing ability for the User to be registered with multiple collaboration platforms associated with the different institutions

2.2.14 Access to Teaching Institution Database - in order to accrue information the System shall provide "Adapter" supporting acquisition of the data. Such adapter shall be unique for every contract but follow the same security requirements described in **Error! Reference source not found.**.

2.3 User Classes and Characteristics

The purpose of the User classes (categories) is to restrict access to the System's data and functionality for the group of the Users.

2.3.1 User Categories

2.3.1.1 Current Students (officially admitted into the institution and have regular data in Teaching Institution Database)

2.3.1.2 Perspective Students (those who might have not regular data in Teaching Institution Database)

2.3.1.3 Teaching stuff including:
2.3.1.3.1 Professors
2.3.1.3.2 Assistants
2.3.1.3.3 Tutors. This category might need special rules to be blended with Student category (2.3.1.1)

2.3.1.4 Faculty/Institution Administrators

2.3.1.5 Moderators. This is to control eligibility of the scheduling sessions, announcements and other data originated from End Users. It is needed to restrict use of the System for the purposes that System is not developed and intended for.

2.3.1.6 Third party system administrators that shall support backend components in case of their "cloud" residency

Every class or category of the users shall be associated with the particular set of available permissions.

2.3.2 Permissions/Privileges

2.3.2.1 Create/Edit Category of Study Sessions

2.3.2.2 Create/Edit Study Session

2.3.2.3 Initiate sending invitations/announcements to other Users of created/edited Category of Study Sessions without approval from Moderator. Otherwise request for approval shall be send to Moderator that will proceed with the finalizing changes.

2.3.2.4 Finalizing changes that will allow System to send invitations/announcements to other Users (usually approved by Moderator)

2.3.2.5 Subscribe to the available Categories of Study Sessions. When the categories particular User subscribed to has been changed or when new Study Session of such category created, System shall send announcements/invitations. This permission might be used to restrict access of Faculty/Institution Administrators or Perspective Students (those who might have not regular data in Teaching Institution Database)

2.3.2.6 Access to the raw data in System's DB

2.3.2.7 Request accusation of the data from Teaching Institution Database

2.3.2.8 Ability to change/generate temporary password to assist Registered Users who getting trouble with Log In

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2.3.2.9 Ability to see current location of other Users. This permission might need to be revoked from particular Users rather than from User Category

<Identify the various user classes that you anticipate will use this product. User classes may be differentiated based on frequency of use, subset of product functions used, technical expertise, security or privilege levels, educational level, or experience. Describe the pertinent characteristics of each user class. Certain requirements may pertain only to certain user classes. Distinguish the most important user classes for this product from those who are less important to satisfy.>

2.4 Operating Environment

2.4.1 Front End (Client application/component)

2.4.1.1 Mobile devices

2.4.1.1.1 Android based devices (smartphones and tablets)

2.4.1.1.2 iOS devices (iPhone/iPad) – shall not be planned for this revision

2.4.1.1.3 MS mobile devices - shall not be planned for this version

2.4.1.2 Desktop/laptop computers –shall be used "thin client" approach – application shall work on common browsers that support HTML5/CSS3 without any installation.

2.4.2 Back End applications/components (Open Source Products)

2.4.2.1 Relational DB

2.4.2.2 Web Server that support communication with DB and Web Services.

<Describe the environment in which the software will operate, including the hardware platform, operating system and versions, and any other software components or applications with which it must peacefully coexist.>

2.5 Design and Implementation Constraints

Development shall be performed on Open Source IDE, Libraries and products
Commercialization aspect of the product shall be decided before publishing of the pilot project

<Describe any items or issues that will limit the options available to the developers. These might include: corporate or regulatory policies; hardware limitations (timing requirements, memory requirements); interfaces to other applications; specific technologies, tools, and databases to be used; parallel operations; language requirements; communications protocols; security considerations; design conventions or programming standards (for example, if the customer's organization will be responsible for maintaining the delivered software).>

2.6 User Documentation

Besides SRS, used to create Unit and System tests, there shall be Software Development Specification (SDS) that describes development components on the level needed to modify, maintain and enhance the system.
User manuals shall be limited to the documents to maintain the back end components. Front End components shall be accompanied by online or embedded help pages/screens

<List the user documentation components (such as user manuals, on-line help, and tutorials) that will be delivered along with the software. Identify any known user documentation delivery formats or standards.>

2.7 Assumptions and Dependencies

By the functionality, the project very close to the existing social networks, therefore to be successful it shall be developed in the way that allows to not compete with the existing networks but provide some flavor that would attract Teaching Institutions to adopt it as a platform for the enhancement of teaching and studying processes.

<List any assumed factors (as opposed to known facts) that could affect the requirements stated in the SRS. These could include third-party or commercial components that you plan to use, issues around the development or operating environment, or constraints. The project could be affected if these assumptions are incorrect, are not shared, or change. Also identify any dependencies the project has on external factors,

3. External Interface Requirements

3.1 User Interfaces

Here shall be perspective snapshots – <mark>TODO</mark>: to be created later

3.2 Hardware Interfaces

3.2.1   When System accessed from Mobil Devices the client side software shall support of the use of:

    3.2.1.1   Device's screen, connectivity, location services,

    3.2.1.2   Optionally – device's audio and photo/video capabilities

    3.2.1.3   Keyboard functionality

    3.2.1.4   Touch screen functionality

3.2.2   When System accessed via Common Internet Browser the client side software shall support of the use of:

    3.2.2.1   Keyboard functionality

    3.2.2.2   Optionally, touch screen functionality

3.3 Software Interfaces

3.3.1   Client side software shall access

    3.3.1.1   File system of the mobile device in order to perform "submitting assignments" feature

    3.3.1.2   Accessing User's Google Drive or other cloud storage

    3.3.1.3   Activating email software

    3.3.1.4   Access Contacts to send SMS messages

    3.3.1.5   Activate maps software to show locations

3.3.2   Server Side software shall have specially designed "adapters" to communicate with the existing Teaching Institution Database.

Developing such "adapters" shall be included in any contract with the Teaching Institution.

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3.4 Communications Interfaces

System shall communicate with End User by generating event notifications and responses to the User requests.

3.4.1   All communications supposed to be via TCP/IP (internet) or SMS.

3.4.2   There shall be no special "Customer Service" accessed via phone or other then electronic communication methods.

3.4.3   Partial functionality of the "Customer Service" could be provided by the System Administrator accessed via emails

3.4.4   To support "submitting papers" System could use "Upload" feature supported by web browser or request to upload document from mobile device

4. System Features

4.1 System functionality

System shall function as an independent processes that are running on the different physical devices such as Server(s), User's mobile devices, User computers (in means of access via browser).
Processes shall communicate with other processes by sending "messages". That shall be asynchronous in the means that the sender of the message continues operation without blocking until receiving response to the "message"

4.1.1   System shall control direct access between the Users of the System. As the direct access introduces the risk of unintended use, such ability shall be controlled by special privilege.

4.1.2   All communications between Users shall be performed in the sequence:

4.1.2.1   User initiates communication by selecting its nature and topic, for example creating study's related session using Client side component of the System (*Client Side*) and submits that to the Server side component of the System (*Server Side*)

4.1.2.2   *Server Side* sends actual announcement/notification to the subscribers. In the used example, it would be a group the Users with role "Moderator". One of the Moderators performs analysis and finalizes the creation, thus its *Client Side* sends notification to the *Server Side*.

4.1.2.3   *Server Side* sends actual announcement/notification to the subscribers of the categories to which this created session belongs to.

4.1.2.4   *Client Side* of the particular User receives notification/invitation and shows that allowing to confirm participation. Confirmation sent by its *Client Side* in for of message to the *Server Side*.

4.1.2.5   *Server Side* accounts User's Id and starts to generate reminders

Thus creator of the session communicates with other Users, but indirectly. TODO – again needed decision of allowing direct contact that will duplicate other social networks and create un-needed competition,

4.2 *User Registration*

This is a base feature that is the base of the following Authentication that prevents client software to access the system by any one that is not known to the System.

4.2.1 Registration data shall include

4.2.1.1 Full Name of the User

It may serve as a bridge between System and Teaching Institution Database.

4.2.1.2 Optional Student Id/Faculty Member Id used in the Teaching Institution data

4.2.1.3 Optional Nick Name by which User may want to be seen for the other users. If it is empty, then User shall be seen by Full Name

4.2.1.4 User Name that shall be used in followed Registration/Log In procedures.

4.2.1.5 TODO: Define policy of storing User Name on the client software.

4.2.1.6 User email, which also may be used as User Name

4.2.1.7 Password.

4.2.1.7.1 Password field in the Registration/Log In forms shall not show typed data, but on Registration form it shall have corresponded Confirm Password field (with also not shown content).

4.2.1.7.2 Password shall not be sent to the server side in unencrypted form.

4.2.1.7.3 It may be also required to store password in the System database in the encrypted form either.

4.2.1.7.4 Server side configuration shall have properties that governs password's strong-ness.

4.2.1.8 Optional - User phones numbers including number to send SMS

4.2.1.9 Optional - User photo

4.2.1.10 Category of the User as it described in 2.3 User Classes and Characteristics. TODO: - decide how to make sure Users will not mess with the categories

4.2.1.11 Generated by the System *User Registration Id.* That shall be not shown to the end User but used in the Authentication process and all communications between client and server software including keeping session alive.

4.2.1.12 Preferences such as:

4.2.1.12.1 Publishing (allowing other Users see information about) current location

4.2.1.12.2 Publishing shared schedule

4.2.1.12.3 Publishing emails and phones numbers

4.2.1.12.4 Preferred communication method (use of the email and/or SMS)

4.2.1.12.5 List of the devices from where User asks to allow authentication without re-requesting user name/password

4.2.2 Description and Priority

To access the System one shall be authenticated on the base of the data stored in the System at the moment of User's Registration. Therefore, this feature has maximum developing priority.

4.2.3 Sequences

Registration function could be invoked as a part of the authentication process performed when software initiated on the mobile device or System's website is accessed via browser.

4.2.4 Functional Requirements

4.2.4.1 Mobile devices software on its loading shall check is the *Registered User Id* stored in the software related preferences (by Android terminology) and then:

4.2.4.1.1.1 If yes - shall ask to Log In with the System with the stored Registered User Id.

4.2.4.1.1.2 Otherwise (in case of initial installation or wiped down application data), it shall ask to *Register* or *Log In* with the *Registered User Name*.
Note, frequently used terms Log In (for already registered) vs. Sign In (for the registration) could be confusing for some potential users (international students for the first place), therefore the preferred terms shall be *Log In* (for already registered) vs. *Register*

4.2.4.2 Web page accessed via browser could be performed to only one and single page showing at first *Log In* content. Initially it shall check is the *Registered User Id* stored in cookies (private computer) or in session data (public computer) and then shall do the same as described above with the only difference – it shall allow User to choose the way to use the computer as private or public. Usually that is performed by the showing check box and then use chosen method to store *Registered User Id* into cookies or use it only within current session

4.2.4.2.1 *TODO*: Define time to keep session alive or introduce it as a System parameter that shall be set during the server side installation.

4.2.4.3 Registration shall be performed in three phases:

4.2.4.3.1 Phase 1 - Initial phase - Setting initial data (User Name and User email) on the System's website or in the mobile application's Registration Activity. This phase performed by User

4.2.4.3.2 Phase 2 - Sending prompt message to confirm Registration willingness.

4.2.4.3.2.1 On mobile device that could be sent as a SMS with the confirmation code.

4.2.4.3.2.2 In case of the access via browser the System shall send link by email that User shell click or copy-paste into the browser's address bar to confirm Registration willingness.

4.2.4.3.2.3 That method (4.2.4.3.2.2) may be the only one to be implemented on the first phase of the development.

4.2.4.3.3 Phase 3 - Confirmation phase - Until receiving confirmation from the User, the Registration shall not be considered finished.

4.2.4.3.4 Other mandatory data shall be requested from User either on the Initial phase or on the Confirmation phase. TODO – decide phase before development or on early stage of the development.

4.2.4.3.5 Registration data shall be associated only with the Registration Id, thus it shall be changeable on the User's request

<Itemize the detailed functional requirements associated with this feature. These are the software capabilities that must be present in order for the user to carry out the services provided by the feature, or to execute the use case. Include how the product should respond to anticipated error conditions or invalid inputs. Requirements should be concise, complete, unambiguous, verifiable, and necessary. Use "TBD" as a placeholder to indicate when necessary information is not yet available.>
<Each requirement should be uniquely identified with a sequence number or a meaningful tag of some kind.>
REQ-1:
REQ-2:

4.3 User authentication

4.3.1 Description and Priority

Authentication shall prevent un-authorized access the System. Therefore, this feature has maximum developing priority.

4.3.2 Sequences

User's authentication shall be the first phase of the loading *Client Side* on mobile device or on browser.

4.3.3 Functional Requirements

4.3.3.1 Authentication shall be performed by entering User Name or User's registered email and password

4.3.3.2 User Name or User email could be stored in the *Client Side* along with the Registered User Id, thus requesting to type password only

4.3.3.3 As alternative, by the System policy it could be enabled authentication by MAC address that is unique for the accessing device. For that case System shall keep list of the devices from where User asks to allow authentication without re-requesting user name/password

4.3.3.4 Mobile devices software

4.3.3.4.1 In order to support communication of the client software with the System and also to notify User of the events generated on the Server side, client software may be built on the base of "single Service – multiple Activities" (Android terminology).

4.3.3.4.2 That schema allows to perform authentication on the first started Activity and then carry that Authentication via Service, until it is finished.

4.3.3.1 Web page accessed via browser

4.3.3.1.1 In the case when alternative authentication is not available by system policy or because of the use of unrecognized computer, the authentication shall be performed on the first access to the system's "entry" page and then be carried via "Session variable".

4.3.3.1.2 If saving cookies allowed by the browser's settings, then that could be used to store User Name.

4.3.3.1.3 Storing passwords by browser may be restricted by System policy set on the System's Server side installation. For that the code of web page shall generate unique form name for the password field, thus preventing browser to recognize it as a "Password"

4.4 Creation of study-related sessions

4.4.1 Description and Priority

Ability to create study's related sessions is a "selling point" of the System, therefore its implementation has maximum priority

4.4.2 Sequences

End User shall have ability to initiate study's related session.

4.4.2.1 For that, mobile device's main activity shall contain button to open corresponded activity.

4.4.2.2 On web page (that uses Single Page approach) link "initiate study's related session" shall be visible all times.

4.4.2.3 Touching/clicking "initiate study's related session" shall open corresponded activity

4.4.2.3.1 On mobile device (in case of tablet it may be part of the screen that shows main activity and other part that shows chosen activity).

4.4.2.3.2 On web page chosen activity shall substitute previously chosen activity.

4.4.2.4 Upon filling form's fields and clicking *Submit* (that shall be unavailable unless all mandatory fields correctly filled out) System shall send notification to the Moderator group (users that have privilege as a Moderator).

4.4.2.5 Creator of the session receives temporary privilege to Edit this session. Such privilege associated with the study's related session and all its reassurances until such session

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becomes obsolete.

4.4.2.6   Submitted session shall be finalized by the User with that privilege (usually someone with the Moderator role).

4.4.2.7   Only after Finalizing the System shall start sending announcements and notifications

4.4.3   Functional Requirements

To create study's related session User shall fill out form and then touch/click *Submit* button. The form shall contain fields:

4.4.3.1   Name of the session

4.4.3.2   Description/Topic

4.4.3.3   Categories the session shall belong to. Categories shall be selectable from the predefined/stored categories or created on the fly while putting data to the form.

  4.4.3.3.1   Predefined data could be accrued from Teaching Institution Database by the "Adapter" specially designed for that contract

  4.4.3.3.2   In case new Category created on the fly, System shall send additional request to Moderator group to finalize Category

4.4.3.4   Location - in form of the address, map's pin coordinates or selected from the list of the predefined/stored locations. Predefined data could be accrued from Teaching Institution Database by the "Adapter" specially designed for that contract

4.4.3.5   Date/Time of the session

4.4.3.6   Reoccurrence (revolving) of the session

4.4.3.7   Duration of the session

4.4.3.8   Optional date/time to submit assignment associated with this session and submission method (for example email of the professor)

4.4.3.9   TODO: -potential Security Breach. List of attendees to send the announcement. List of attendees could be compiled from the System by requesting those who previously registered for any of the chosen categories. Besides that there shall be available option to choose any User that allowed to be chosen without category.

4.4.3.10   If User that created study's related session has no permission to finalize the creation, the System shall send additional request to Moderator group to finalize.

4.4.3.11   Created and finalized (by User if he/she has such privilege or by Moderator) session shall be available to be Edited. Process of the Editing shall be the same as Creation, but all previously data shall be shown (and available to be edited)

4.4.3.12   Editing of the session shall be finalized in the same way as the Creation

4.4.3.13   When study's related session is finalized, the System shall associate it with virtual message boards, blogs and forums

4.5 *Inviting collaborators*

4.5.1   Description and Priority

Inviting collaborators is a part of Edit/Creation of study-related sessions, therefore its implementation has the same maximum priority

4.5.2   Sequences

Editing or Creation of study-related sessions only prepares the list of the persons or categories of the Users that shall receive invitation to participate (notification). Invitation itself would be sent by the System after Creation or Edit is finalized.

4.5.3 Functional Requirements

4.5.3.1 When User with appropriate privilege Edits session, there shall be several modes:

4.5.3.1.1 Change only list of invitees – that will produce special notification to the Moderators telling that other sensitive data is not changed, therefore the Moderator may check is the invitation shall include some questionable persons

4.5.3.1.2 Change list of invitees and/or some other data that need finalization– that will produce special notification to the Moderators telling that sensitive data is changed and that needs special attention

4.5.3.1.3 Change only data that does not need finalization, for example, number of the reoccurrences or date/time of the sessions

4.5.3.2 Categorization by the types above shall be performed by the System on the base of the Server Side setup that describes which field belong to sensitive data. That shall not be exposed to the End User who fills the form's fields

4.5.3.3 Upon Finalizing, Creator of the session receives *Confirmation*.

4.5.3.4 If Creator of the session belongs to the category of the Users that subscribed to the one of the category that session belongs then he/she receives the same type of the invitation to participate as the other subscribers

4.5.3.5 Accepting the Invitation shall register that answering User for the session (and its reoccurrences) thus associating his/her *User Id* with the study's related session

4.5.3.6 TODO: Decide shall all reoccurrences be created as a separate sessions thus allowing individual edit or un-registering

4.5.3.7 System shall not relay on the individual's calendar application to set notification of the upcoming sessions, but rather create and send notifications by its own.

4.5.3.8 Sending notifications shall be performed by the way that every particular User had chosen in the preferences.

4.5.3.8.1 For Mobile devices System shall use Push notifications

4.5.3.8.2 For User's that do not have mobile devices supported by the System, notification shall be sent by email

4.5.3.9 Received Invitation shall be accompanied by Calendar data in standard form (.ics or .vcf) to allow to set session and its reoccurrences to the standard Calendar application.

4.5.3.10 TODO: decide on implementation of Activity "Show upcoming study's related sessions" and ability to subscribe without receiving formal invitation. Showing such list may introduce breach of using System for non-intended purposes

4.6 *Registering for the announcements*

4.6.1 Description and Priority

System communicates with the Users in the way of "*Responding for the User Requests*" and also by "*Polling messages*". Therefore, Registering for the announcements is not the only way that allows System to communicate with the Users (in case direct access would be declared forbidden – see multiple TODO), but also is the mechanism that shall guard Users of the "annoying" messaging. Thus, Registering for the announcements is a fundamental part of sending Inviting collaborators, therefore its implementation has the same maximum priority

4.6.2 Sequences

While registering with the System, User shall have ability to declare willingness to receive future announcements/notifications that correspond to the available in the System Category of Study Sessions. If new Category of Study Sessions created then all Users shall receive announcement of that event with invitation to register (subscribe) for that category

4.6.3 Functional Requirements

4.6.3.1   While Registration every User shall have ability to subscribe to Category of Study Sessions of his/her interest. There shall be a multiple list

4.6.3.2   Any time any User shall have ability to change subscription by adding new categories and deleting those that are out of User's interest.

4.6.3.3   TODO: Decide should it be some 'categories' that User is subscribed by default and also those that could not be unsubscribed

4.6.3.4   Some privileges assigned for the Users shall make them subscribers of the 'hidden' categories. For example, Moderators could not unsubscribe from the notification of Finalizing edit/creation of study's related session. Also this could not be a category to subscribe at will.

4.7 *Create of categories and topics*

4.7.1 Description and Priority

Generally, any User shall have the ability to create a new Category/Topic for the future study's related sessions, but that shall have some restrictions:

4.7.1.1   Not all Topics could be accepted by the Teaching Institution

4.7.1.2   Some Topics could be out of the purposes the System developed

4.7.1.3   Too many topics available for the selection for the creation/editing of study's related sessions might make system impractical

Therefore creation of the categories/topics shall have Finalization phase performed by the User with special role (Moderator).
Creation of the categories/topics is a fundamental part of Inviting collaborators, therefore its implementation has the same maximum priority.

4.7.2 Sequences

4.7.2.1   To create new Category/topic User shall initiate corresponded Activity by tapping button or clicking link

4.7.2.2   Link or button to initiate such activity shall be presented on the Main Activity screen on mobile devices and on Main content of the Web page

4.7.3 Functional Requirements

4.7.3.1   User shall have the ability to choose Activity "Create new Category" while selecting the categories while creation/editing study's related session.

4.7.3.2   Ability to choose Activity "Create new Category" shall also be a part of mobile application and web page

4.7.3.3   There shall be two fields in the form – "Name" and "Description" accompanied by check box – "Send Announcement".

   4.7.3.3.1   After submitting form with new Category it becomes available for the creator to choose it in Create/Edit study's related session activity

   4.7.3.3.2   For the other Users it shall become available only after Finalizing by Moderator.

4.7.3.4   Upon Finalizing or Rejection by Moderator:

   4.7.3.4.1   Creator of the category shall receive corresponded message

   4.7.3.4.2   In case Moderator Finalizes creation, all subscribers to the announcements of new/edited Category shall receive System's generated notification with the prompt to decide would they subscribe to the messages related to that category or not

4.7.3.5   Creator of the category among with the Users with special privilege "Edit existing Categories" shall have the ability to edit category name and description.

4.7.3.6　　Editing categories have to undergo the same "Finalizing by Moderator" process as Creation, but with some difference in "Send Announcement" check box.

    4.7.3.6.1　　This box shall be always checked and uncheckable (or just hidden) for creation, but enabled for unchecking on Edit.

    4.7.3.6.2　　Status of that check box shall be used as a suggestion for the Moderator to decide shall subscribers receive notification about change or not. For example, if the name or description have small changes like fixing typos, then notification could be omitted.

4.7.3.7　　When Category of Study Sessions is finalized, the System shall associate it with virtual message boards, blogs and forums

4.8 *Notification/Announcements*

Notification/Announcements is the base for all communications between System's components, which mandates maximum priority in the implementation.

4.8.1　Sequences

4.8.1.1　　Anything initiated by the User is formed by Client side component of the System to the request to Server side component of the System. Received request gets short response with only meaning "*Request has proper format and understood by the System*" or not.

4.8.1.2　　In case of correct format, *Server Side* generates message(s) and sends them in appropriate format (mobile devices perform *Polling messages* in the same way as email clients do) to Users that are subscribers for such type of the request

4.8.1.3　　*Client Side* running on recipient's device presents the message to the User in the form of the corresponded announcement/notification accompanied by the ability to follow up.

4.8.1.4　　Thus, the initiator of the original event or announcement has no direct access to the Users that will receive that message or announcement and also could not select particular users – only category of subscribers. Indirect communication makes system protected from the unauthorized use and hacker's attacks (see corresponded <mark>TODO</mark>s)

4.8.2　Functional Requirements

4.8.2.1　　Notifications/announcements shall contain:

    4.8.2.1.1　　Id of the event it belongs to (for example id of created Category of Study Sessions)

    4.8.2.1.2　　*Type* that will allow *Client Side* present it in the corresponded Activity

    4.8.2.1.3　　Name/Description that *Client Side* will present in the Notification area of Mobile device

    4.8.2.1.4　　Content of the message that *Client Side* will show to the User in corresponded Activity.

    4.8.2.1.5　　Depending on the type (4.8.2.1.2), it may be other information that would be revealed in course of development.

    4.8.2.1.6　　Notification shall not contain information to whom it sent besides this particular User. Only User with special role (Administrator or Moderator) may access information about list of the Users to whom particular announcement has been sent. That makes system protected from the unauthorized use and hacker's attacks (see corresponded <mark>TODO</mark>s)

    4.8.2.1.7　　*Server Side* shall keep log of all messages, notifications and announcements generated by the System

4.8.3　Types of the *Notification/Announcements*

4.8.3.1　　Notification "Request to finalize Category" with modification - "new/edit". Sent to the group (category) of Users with corresponded privilege (Moderator). This will have follow up messages:

    4.8.3.1.1　　Notification "Category Finalized" with modification - "new/edit". Sent to the User who is creator/editor of the particular category.

4.8.3.1.2   Notification "New/Edited Category" sent to the Users subscribed for the announcements of category creation or to the Users subscribed to the edited category.

4.8.3.2   Notification "Request to finalize Session" with modification - "new/edit". Sent to the group (category) of Users with corresponded privilege (Moderator). This will have follow up messages:

4.8.3.2.1   Notification "Session Finalized" with modification - "new/edit". Sent to the User who is creator/editor of the particular study's related session.

4.8.3.2.2   Notification "New/Edited Session". This is the Invitation to participate in the Session. It is sent to the Users who subscribed for the announcements of one of the category for which this session belongs or to the Users subscribed to the ANY category (TODO - decide on such subscription).

4.8.3.2.3   Only one notification shall be sent to the Users subscribed to multiple categories that match categories the session belongs to.

4.8.3.2.4   This Notification shall be shown in the Activity that will allow to reject or confirm participation. In case of confirmation, Activity shall show options for the reminders to be sent to this particular User

4.8.3.3   Notification "Reminder of Session" sent to the Users who confirmed participation. This notification sent by the schedule of the *Reminders* that User set at the moment of the confirming participation

4.8.3.3.1   System shall allow User see all upcoming events with confirmed participation and edit reminders for them along with ability to unsubscribe to any particular session (see TODO about individualization of reoccurrences)

4.9 *Subscriptions*

4.9.1   Description and Priority

Like Notification/Announcements, subscriptions is the other part of base for all communications between System's components, which mandates their maximum priority

4.9.2   Sequences

To receive Notification/Announcements User shall at first notify the System of the willingness to receive them. That is performed by subscription to some categories of the events that System supports.

4.9.2.1   While Registration or while changing preferences User may select other categories to subscribe or unsubscribe

4.9.2.2   TODO: Decide is the subscription to "New/Edited Category" (4.8.3.1.2) may be optional

4.9.3   Functional Requirements

4.9.3.1   *Server Side* shall associate every Category of Study Sessions or other type of the category with the list of the User's Ids - those who choose the subscription.

4.9.3.2   When User decides to unsubscribe, his/her id shall be deleted from that corresponded list, but record of the deletion shall be kept in the System's log.

4.9.3.3   Certain category of the Users may not be able to delete subscriptions. For example Moderators could not unsubscribe from Finalizing of creating Category of Study Sessions.

4.10 *Pushing notifications*

4.10.1   Description and Priority

Pushing notifications is a commonly used term in regards of the way how End User receives information he/her previously subscribed for in publish/subscribe model.

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Push in most cases implemented by a polling technique, particularly under circumstances where a real push is not possible, such as sites with security policies that require rejection of incoming HTTP/S requests. The difference quite small but have meaning that User allows certain application to constantly run on his/her device for the purposes of support Pushing notifications. In regards of this System, Pushing notifications implemented by *Polling messages by Client Side* to *Server Side*. That *Polling messages* are the requests about potential messages - announces and notifications generated by *Server Side*.

In case of Web access Pushing notifications supported by MVC used for the implementation, therefore only while System's web page is open and session is not expired.

On mobile devices Pushing notifications supported only while Application's service is running.

This feature is a core functionality and shall have maximum priority for implementation.

4.10.2 Sequences

4.10.2.1   *Client Side* periodically sends requests to the *Server Side*. Requests contain User's Id accompanied by some information that might be needed.

4.10.2.2   *Server Side* responses with acknowledgment of receiving request or with the message that carries information about Notification/Announcements

4.10.3 Functional Requirements

4.10.3.1   TODO – Polling requests shall be sent in encrypted form.

4.10.3.2   Frequencies to send requests shall support receiving reminders on time (at list every minute), but shall be limited to …(TODO – for example 10 sec)

4.10.3.3   While waiting the response *Client Side* not block other processes on the User's device. In other words, Requests/Responses shall be implemented using Asynchronous model.

4.10.3.4   Every Request shall be responded by Notification or acknowledgement (dummy message) indicating that there is no notifications

4.10.3.5   Physical length and frequency of sending polling requests shall be optimized to minimize use of mobile data

4.11 *Geo-location*

4.11.1 Description and Priority

This is low priority feature that has meaning only for the mobile application, but its implementation might attract potential Users. Those Users who set preference to show their location will send in polling requests (4.10.3.5) Geo-location data provided by their mobile device.

4.11.2 Sequences

4.11.2.1   User sets in the preferences "Publish Location"

4.11.2.2   *Client Side* includes location information into the pooling requests

4.11.2.3   *Server Side* uses User location to customize generation of Notifications. For example "You are too far from the place where study's related session located" or "You're in close proximity of the session X of the category Y".

4.11.2.4   Special Activity (low priority) might show location of the users on the map. The use of such Activity shall be restricted, thus to use it Users has to be assigned special permission (2.3.2.9).

4.11.3 Functional Requirements

4.11.3.1   Mobile device shall have ability to report location to the applications (physically and by permissions).

4.11.3.2   Activity to show Users on the map shall use existing software that allows to be employed by third party applications (for example Google Maps)

4.11.3.3   (TODO) *Server Side* shall log Users position and keep logs for some period of time

4.12 *Submission of assignments*

4.12.1 Description and Priority

Purpose of the System is to help Students to prepare assignments, therefore ability to schedule study's related session, using reminders and then submitting assignments in the single application would be very attractive. Although that shall be supported by the Teaching Institution.
In simplest way if submission might be performed by email, then study's related session could be associated with the email of the professor to submit assignments

4.12.2 Sequences

4.12.2.1   In response to the reminder of the submission of the assignment (4.8.3.3) or by just opening corresponded Activity, User selects materials that shall be attached and clicks "Submission" button

4.12.2.2   *Client Side* either prepares email or sends data to *Server Side*.

4.12.3 Functional Requirements

There might be some different implementations of the feature depending on the level of cooperation of Teaching Institution. In the most independent way it could be implemented on the base of email:

4.12.3.1   *Client Side* shall invoke email app transferring required for the submission information.

4.12.3.2   In BCC there shall be email address of the System. Thus *Server Side* will receive and keep copy of the submission (as an evidence of timely submission)

4.12.3.3   Alternatively email may be formed by *Server Side* and sent to the Teaching Institution addressee with CC to the submitter.

4.13 *Backend component*

4.13.1 Description and Priority

Server Side shall be composition of data base, web server (with appropriate resources to create web pages and respond to the requests) and interface between them. It is a core component with maximum development priority.

4.13.2 Sequences

On the earlier stages of the development database could be temporary substituted by model data files in JSON format.

4.13.3 Functional Requirements

4.13.3.1   Server Side shall be implemented as RESTful services

4.13.3.2   Type of the DB and coding languages for RESTful implementation along with the Web Server type shall be defined at the start of the actual development. For the prototyping could be used IIS, MS SQL Server and Java or Ruby and POSTGRES on some Cloud services

4.13.3.3   *Server Side* component shall be developed with the consideration of the use load balancers and backup equipment

4.14 *Registering with multiple backend* systems

4.14.1 Description and Priority

This is low priority development task, although it shall be taking into the consideration to have placeholders for the information needed for actual implementation

4.14.2 Sequences

Client Side running service shall allow to send request not to only one *Server Side*, but to multiple ones.

4.14.3 Functional Requirements

4.14.3.1 While Initial Registration User shall provide URL to the *Server Side* he/or she registered with

4.14.3.2 That Base Url shall be associated with the User Id assigned in course of the Registration.

4.14.3.3 Preferences and data kept by *Client Side* shall be associated with Base Url.

4.14.3.4 On application start it might ask User shell it connect to all available Base Urls or only to particular ones

4.14.3.5 Some preferences might be application related (for example, "Auto start service on devise reboot"), but most preferences shall be individual to Base Url associated with particular backend (for example, "Publish Location")

4.15 Access to Teaching Institution Database

4.15.1 Description and Priority

That feature has a special priority as the way to integrate System to the existing Teaching Institution Information environment. Integration shall be performed via special software component – "Adapter" which shall run as a service or by the schedule on the Teaching Institution server(s) and have access to its database. For security reasons "Adapter" shall have very strict access to the data, otherwise it may be suspected as a compromising data agent.

4.15.2 Sequences

One of the possible solution (to be agreed by Teaching Institution) is:

4.15.2.1.1 Teaching Institution approves the use of stored function or Virtual table/snapshot that could be surveyed by the regular SQL Select statement.

4.15.2.1.2 Invocation of this function/virtual table shall respond with the record set containing data that Teaching Institution agree to expose to the System.

4.15.2.1.3 Such data may include:

4.15.2.1.3.1 Teaching subjects and their inner codes. That could be used as a predefined Category of Study Sessions.

4.15.2.1.3.2 Names and emails of the teaching stuff in association with subjects above

4.15.2.1.3.3 Names of the students and their inner IDs to support submission of the assignments and simplify Registering with the System

4.15.2.2 On the Teaching Institution environment shell run small software component that request above data by schedule (for example, daily) or service that triggers request by the changes in the involved DB tables. That component prepares result (or extracts changes) and transfers them to System's *Server Side*, where received data used to update System data

4.15.3 Functional Requirements

4.15.3.1 System shall not accrue data that is not needed, for example personal data of the students or teachers. Also, Teaching Institution's stuff shall approve sharing data and

have to be in full control of when and what data transferred to the system (that will allow to avoid suspicions in compromising data).

4.15.3.2   "Adapter" shall have the ability only read data.

4.15.3.3   "Adapter" shall be active transmitter rather the responder to the updating data requests. That means – it shall have no interface to request data. It shall transmit data to the system by its own schedule. In this case, it will introduce minimal risk of security breach to the Teaching Institution database

5. Other Nonfunctional Requirements

5.1 Performance Requirements

<If there are performance requirements for the product under various circumstances, state them here and explain their rationale, to help the developers understand the intent and make suitable design choices. Specify the timing relationships for real time systems. Make such requirements as specific as possible. You may need to state performance requirements for individual functional requirements or features.>

Client side component shall respond to User actions in a way that User will know that action taken into processing (keyboard/touch click/response)

Response time from the back end component shall follow standards usually used in real time systems. If response need significant time then the preliminary response indicating that back end started action shall be sent and indicated to the User by *Client Side*.

There is no other required functionality for the actions that involve human response/involvement than the generating and sending reminders

5.2 Safety Requirements

Product contains several components that may harm Users if not properly used. That is including but not limited to:

5.2.1   Using app while driving

5.2.2   Exposing non appropriate content – in this case support cheating.

All such safety endangerments shall announced to the perspective User while registration. Consent of assuming risks shall be obtained from the User before starting use of the Product.

<Specify those requirements that are concerned with possible loss, damage, or harm that could result from the use of the product. Define any safeguards or actions that must be taken, as well as actions that must be prevented. Refer to any external policies or regulations that state safety issues that affect the product's design or use. Define any safety certifications that must be satisfied.>

5.3 Security Requirements

Product contains several components that shall be properly guarded by special security requirements. That is including but not limited to exposing location of the Users to the not authorized parties, ability to leak the assignments. Such security risks shall be mitigated by special measures that are the part of the Product

<Specify any requirements regarding security or privacy issues surrounding use of the product or protection of the data used or created by the product. Define any user identity authentication requirements. Refer to any external policies or regulations containing security issues that affect the product. Define any security or privacy certifications that must be satisfied.>

5.4 Software Quality Attributes

Developed software shall be adaptable to the versions of the operating systems of the User's devices in means of future versions – that means that development shall minimize use of OS/device specific features.

That will insure software's availability, correctness, flexibility, interoperability, maintainability, portability, reliability, reusability and usability.

User interfaces shall be designed to support not only ease of use but also ease of learning (context help)

5.5 Business Rules

System supposed to have minimum support from individuals or roles and perform most functions automatically. Although under specific circumstances there might be need a special involvement of the individuals. For example, Moderator role enforces business rules. It is introduced to restrict use of the System only for the declared purposes.

6. Other Requirements

6.1 Internationalization requirements

6.1.1 User interface exposed to the Users by Activities on mobile devices and by Web page (on the browser) shall employ usual standards for localization/internationalization. That means:

6.1.1.1 The text of the messages labels and titles show to the Users shall be not set as a literals in the programming code, but combined in the resource files. Those file's content could be translated thus allow to use language by User's preference

6.1.1.2 Composing of the User interface shall consider use of Left to Right languages along with the Right to Left and vertical languages.

6.2 Legal requirements

6.2.1 Development shall be based on Open Source SDEs and software, but such components usually 'free of charge" until product started to have business use. As System considered to be a "developed for the future profit", this matters shall have Legal support

6.2.2 Several features of the System need Legal support as they could be considered as harmful

Appendix A: Glossary

All the terms used in this SRS, including acronyms and abbreviations explained inside the text. Word version of the document contains links to the text where term used.

- *"Adapter"* – Special component of the Student Collaboration Platform software (System) intended to be run on Teaching Institution Database environment to extract allowed data needed in the System.
- *Client Side* – Component of the System that runs on User mobile device or computer that User uses to access System via web browser
- *Finalizing by Moderator* – Process performed by individual that has special role in the System. Moderator has to filter messages, announcements, notifications and publishing any information in the System that is not allowed or is not intended by the purposes System is developed for.
- *Teaching Institution* – College, University or other type of the school that wants to collaborate with the Student Collaboration Platform. The collaboration could be a sponsoring use of the System by their students and stuff or also sharing its own information with the System

- *Polling messages* – Model used to implement Push Notifications of Publish/Subscribe paradigm. Physically, *Client Side* component that runs on the User device sends short requests to the *Server Side* asking is there any new information the User shall be notified with
- *Study's related session* – Main and starting point of developed System. Ability to organize schedule meetings with other students in order to use collective resources for the studying and followed up automatically generated reminders shall be a selling point for the Student Collaboration Platform
- *Server Side* – Component of the System with which all *Client Side* components communicate
- *Category of Study Sessions* – Every study's related session shall belong to one or more categories. That is obvious requirement but also it serves additional purpose – allow Users find topics of their interests and by subscribing to them receive corresponded notifications

Appendix B: Analysis Models

TODO: Data flow diagrams, state-transition diagrams, entity-relationship diagrams

Appendix C: To Be Determined List

<Collect a numbered list of the TBD (to be determined) references that remain in the SRS so they can be tracked to closure.>