



MHRD

Government of India
Ministry of Human Resource Development

Request for Proposal (RFP)

for

**Appointment of System Integrator for
MHRD - SWAYAM MOOCs Project**

Volume – 2

**Ministry of Human Resource
Development**

Government of India

Ref: No. 8-26/2014-TEL

21st November 2015

Table of Contents

1	SWAYAM Web Portal Ecosystem.....	6
1.1	SWAYAM Portal – Key Features	7
1.1.1	Layer 1: SWAYAM Partners, Stakeholders and Users	10
1.1.2	Layer 2: Access Channels	13
1.1.3	Layer 3: Data Input.....	17
1.1.4	Layer 4: Integration Gateways	18
1.1.5	Layer 5: Interoperability and Meta Data Standards.....	24
1.1.6	Layer 6: Management and Monitoring Services	24
1.1.7	Layer 7: Integrated Web Portal	25
1.1.8	Layer 8: Tools and Technologies	26
1.1.9	Layer 9: Database and Data Quality Management	45
1.1.10	Layer 10: Infrastructure.....	48
1.1.11	Layer 11: Security	51
1.1.12	Layer 12: Compliances, Regulation and Policies, Government of India Guidelines ...	57
1.2	SWAYAM Portal - Other Requirements	58
1.2.1	General Features.....	58
1.2.2	MOOC functionality.....	63
1.2.3	Examination module functionality	69
2	Scope of Work.....	74
2.1	Overview of Bidder's Scope of Work	74
2.2	Tentative Implementation Plan	76
2.3	Detailed Scope of Work.....	78
2.3.1	TRACK I – Portal Design and Implementation	78
2.3.2	TRACK II – Infrastructure	83
2.3.3	TRACK III – Contact Centre Operations	85
2.3.4	TRACK IV – Capacity Building	93
2.3.5	Operations and Maintenance	95
2.4	Project Management and Governance	98
2.4.1	Project Governance	98
2.4.2	Transition Management.....	99
2.5	Roles & Responsibilities	100
2.5.1	Roles and Responsibilities of Bidder	100
2.5.2	Roles and Responsibilities of MHRD	100
2.6	Acceptance Criteria	101
2.6.1	Hardware Environment Acceptance Criteria.....	101

2.6.2	Solution Acceptance Criteria.....	101
2.7	Change Request Procedure	102
2.8	Service window	111
3	Project Deliverables and Payment Schedule	114
3.1	Activity Schedule and Deliverables.....	114
3.2	Payment Schedule for Capital Cost	115
3.3	Operating Cost	116
3.3.1	Payment Schedule for Annual Support Cost for Applications	116
3.3.2	Payment Schedule for Annual Support Cost for System Software	116
3.3.3	Payment Schedule for Operations & Maintenance Cost	116
3.3.4	Payment Schedule for Contact Centre Cost	116
3.3.5	Payment Schedule for Capacity Building Cost	117
4	Service Level Agreement (SLA) & Penalties	119
4.1	Service Level Agreements (SLAs).....	120
4.1.1	Functional Availability	121
4.1.2	Operations	122
4.1.3	Infrastructure Performance	125
4.1.4	Project Implementation	126
4.2	Penalties	127
5	Annexure 1: Solution Requirements.....	134
5.1	Operating System.....	134
5.2	Database	134
5.3	Replication Methodology	138
5.4	EMS	138
5.5	Anti-Virus.....	150
5.6	Centralized AV management server	151
5.7	Intrusion Prevention System.....	152
5.8	Virtualization.....	153
5.9	Enterprise Portal.....	154
5.10	Customer Relationship Management.....	156
5.11	Data Management.....	158
5.12	Reporting & Visualization.....	158
5.13	Analytics and Data Mining	159
5.14	Unstructured Data Analysis	160

----- This page has been intentionally left blank -----

Section 1:

Key Requirements

1 SWAYAM Web Portal Ecosystem

SWAYAM aims at creating a comprehensive and integrated system for enhancing the efficiency and effective education at all levels and especially a transformational change in the mode, pedagogy and style of learning for students.

SWAYAM (Study Webs of Active –Learning for Young Aspiring Minds) PROGRAMME was conceptualized by the Ministry of Human Resource Development (MHRD) in detailed consultation with all stakeholders, including the professors from Central universities, the State universities, course takers, examination agencies Government of India. It will be implemented as a “Mission Mode Project (MMP)” and will adopt the guidelines of the National e-Governance Plan (NeGP).

MHRD envisages setting up a holistic MOOCs Platform to enable course takers to enroll for a course online and for free of cost, giving increased focus on self-learning initiative as a key activity for our aspiring youths to pursue the right career choice or the learning capabilities so that they join the workforce with better skills for enhancing growth and development. Also the convenience of studying online will provide more opportunities for remote students due to the reach and accessibility of the online platform. SWAYAM is expected to have in excess of 2000 courses from various streams of education disciplines.

The decision to design the web portal to establish a strong online presence providing an industry best user experience to all the stakeholders like course takers, course providers in a single platform and encourage and facilitate an open learning environment. The portal development will adopt the principles of e-Governance, and creation of a nationwide networked infrastructure for evolution of IT-enabled state-of-the-art system for students or course takers. The scope of SWAYAM spans all the territory of India.

MHRD is planning to select a System Integrator (SI) through tendering process that would design, develop, implement and maintain the SWAYAM for a period of three years after Go Live date.

With this background, SWAYAM has been conceptualized as a comprehensive, multi-pronged, transformational project. Key aspects of this project include:

1. Collaborative multi-stakeholder platform.
2. Self-assisted pedagogy and learning methodologies.
3. National framework for education credit exchange based on certified curricula.
4. Helping students developed learning path for skill development.
5. Availability of pedagogy in multiple Indian languages.
6. Industry demand driven availability of the courses.
7. The last element of the strategy is to ensure a robust and inclusive governance mechanism.

It is aimed at creating an ecosystem that provides best of its class services to all its ecosystem partners. Accordingly, the ecosystem partners have been categorized into the following 6 categories:

S. No.	Stakeholder	Details
1.	Course Takers/Students	including students, dropouts, fresher's, working professionals
2.	Educational Institutions	IHEIs, universities, private institutes, NIOS, NCERT, UGC (CEC) etc.
3.	Educators/ Course Providers	Teachers, professors, Subject Matter Experts, Teaching Assistants
4.	MHRD	Admin, authorized partners, Entities
5.	Partners	Other learning systems, Intl universities etc.
6.	Examination and Certification partners	For conducting exams on the portal

An estimate of the system users is as given below:

	Year 1	Year 2	Year 3
Total Number of Users	50,00,000	1,50,00,000	3,00,00,000
Concurrent users (@2% of total)	1,00,000	3,00,000	6,00,000

1.1 SWAYAM Portal – Key Features

The SWAYAM Portal shall be designed, developed and deployed by the System Integrator (SI) and should be able to deliver at all the functionalities, technical and operational features listed below, in order to meet the service requirements envisaged from this portal.

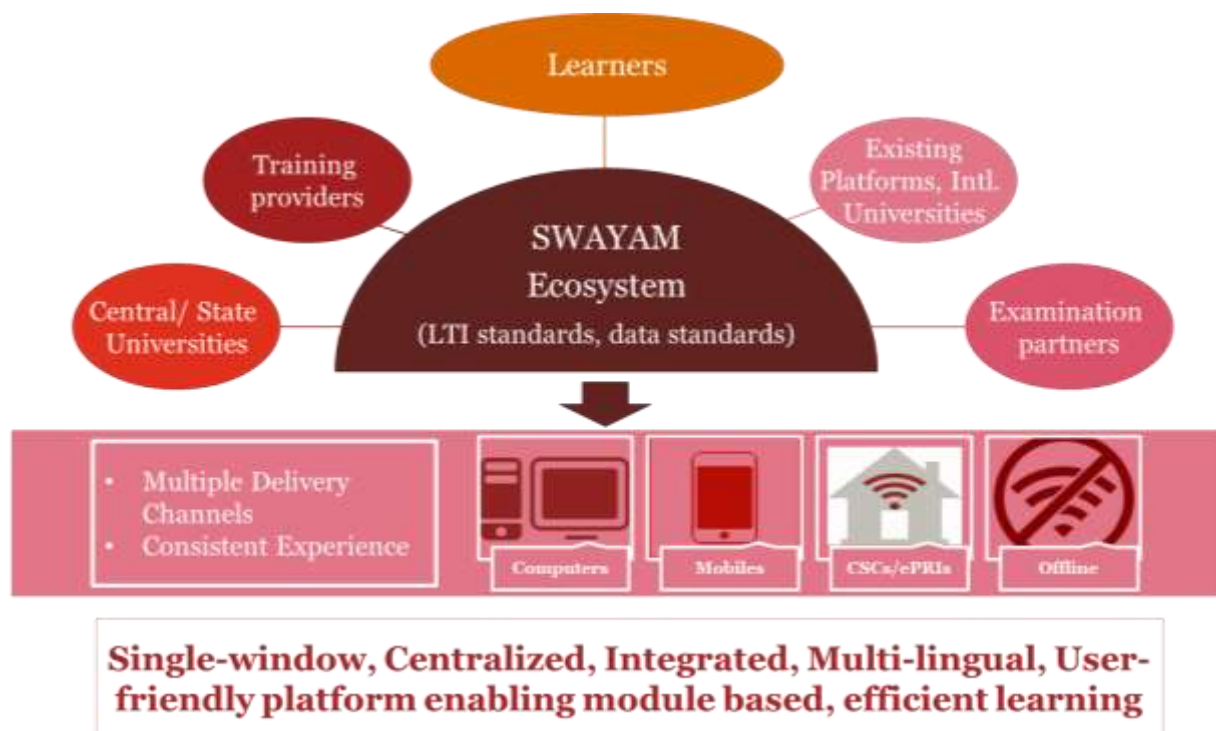
The main key functionalities of the portal will:

- Content Creation, Approval and Publishing
- Course Design, Enrolment and Selection
- Student Enrolment and registration
- Course Payment and refund
- Registration of educators
- Document Storage and Archival
- Course Catalogue and Dashboards
- Certificates
- Publishing Activities
- Email and Messaging

- Alerts and Reminders
- Static vs Active Content
- Master Data Management
- Student Management
- Role based access
- Business rule configurations
- Integration with external agencies
- Request and Issues Tracking

The SWAYAM is proposed to be a core, automated, scalable and integrated software application, deployed centrally at the having a Web Portal interface for all stakeholders through Internet and/or National Knowledge Network (NKN).

The success of the project will be largely dependent upon how the platform creates avenues/opportunities for all ecosystem partners. The overview of the SWAYAM is shown below:



The core modular, fully integrated and automated SWAYAM will have interface for various types of Users/stakeholders, like Educators, Course takers, Examination and certification agency as well as other applications. It is envisaged that the core application should have decoupled but integrated core database, though there may be logical partitioning for effective data retrieval and storage. In addition to the above, it is also proposed that the entire application should have flexible and scalable architecture with defined 'Business Logic layer' and a 'Data Access Layer' to support the efficient data handling between the 'Application Layer' and the 'Database Layer'. It is also envisaged that the portal will be supported by an 'Enterprise Service Bus', which would enable effective data exchange between various applications. The functionalities and features of

SWAYAM should be granular and modular enough for the administrators to enable or disable any particular functionality, at any given time, as per the requirement, through ‘Application Admin’ interface, without the need for a developer/code level change/custom UI change.

SWAYAM should have functional modules, along with automation and user friendly features. It is a necessary requirement that the application should have complete integration between different modules and an efficient data sharing mechanism so that each module can showcase complete automated workflow functionality for a seamless backend processing. The SWAYAM is envisaged to catering to the information and services needs of variety of Stakeholders on demand and supply side as well as other ecosystem partners. The portal is expected to have additional features to aid the differently abled Users.

Integration with Payment Gateway, SMS Gateway, eMail Messaging services, and other National or State schemes/programmes as well as external systems/applications is required. Contact centre is also envisaged which should be integrated with the SWAYAM overall and provide service through IVRS services.

Considering the tight implementation timelines defined for this initiative, it is necessary that all the technical documents, with versions, traceability matrix and updates, are maintained by the SI as per standard Software Development Life Cycle (SDLC) and submitted to MHRD as per agreed milestones and timelines without fail.

With this in view and SWAYAM Framework explained above, the indicative SWAYAM architecture is shown below:

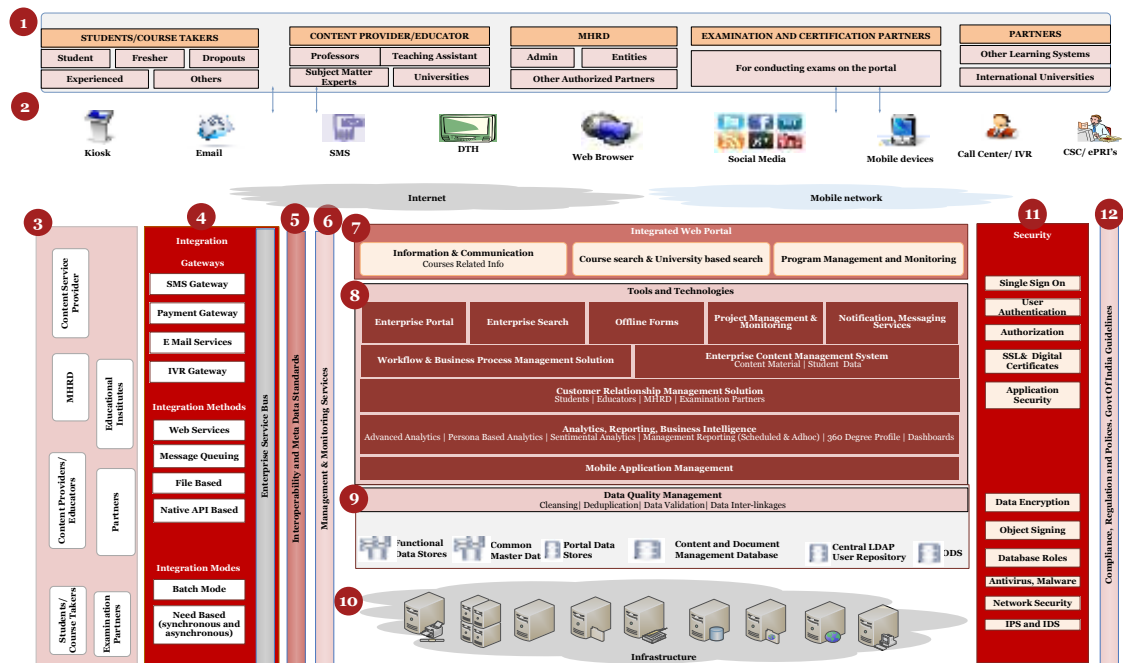
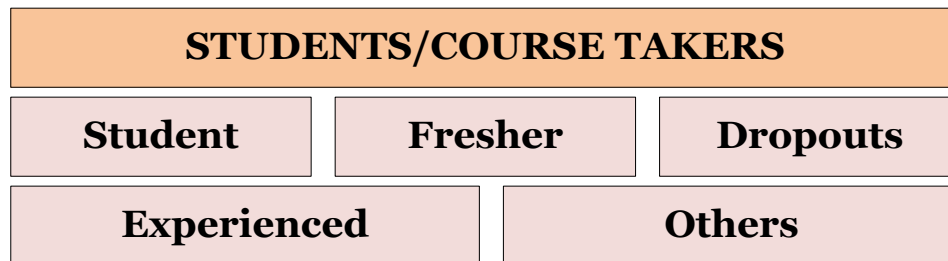


Fig 1: SWAYAM Portal indicative Architecture

The various layers depicted in the above indicative Architecture (refer to Fig. 1), and the high level requirements for each of those layers are described below. The specifications for these layers are in addition to those:

1.1.1 Layer 1: SWAYAM Partners, Stakeholders and Users



1. **Students:** As described in the previous section, one of the key focus areas of the SWAYAM is to cater to the requirements from the demand side, and provide assistance to various students in assisting them in mapping the Courses with their requirements, and hence assist them in getting a suitable course to undergo. This category of Users will include students/dropouts/Freshers/working professionals etc.

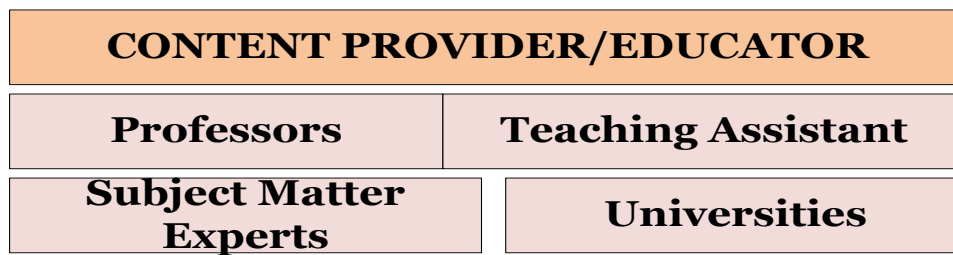
It is envisaged that after the registration and enrolment details of the Course takers, the Portal will enable a 'Personalized Dashboard' view, to manage all the activities pertaining to the course takers, based on Access Rights provided to the authorized User. Some of the Dashboard features are mentioned below:

- a. Search and View Courses.
- b. Notices (students should able to view the notices targeted to them), events in day/week/monthly basis, assignments, tests, quizzes, contents etc.
- c. Track progress of courses, Assignments, outcomes and overall status of the course.
- d. Current trending courses. This is envisaged to be a future requirement and would be made available to students as per the model decided by MHRD.

The key requirements with respect to Course takers Registration, and Enrolment, but not limited to, are mentioned below:

- a. Portal should provide the facility for registrations of the students by providing basic profile information.
- b. Portal should allow for background checks/verification for all the students using UIDAI/PAN etc.
- c. Portal should have the background verification done using email/SMS. Once authenticated and approved, a registration number and password would be provided to the students.
- d. Portal should allow the student to login.
- e. All the profile management features like change password, update the profile, modify etc should be available to the students.

- f. Portal should publish details about available courses and allow a student to apply for a course of his/her choice.
- g. Portal should provide the facility of showing the pre-defined standard dashboard the students.
- h. Portal should provide the students to select the language of their choice (if applicable)
- i. Portal should provide interactive search and filter criteria that would help the students select the right courses
- j. Portal should allow browsing catalogue based on the educational taxonomy.
- k. Portal should allow the students to view the most recommended courses based on the analytics done at the backend.
- l. Portal should send alerts to the students whenever an interested student wants to pursue the course.
- m. Portal should provide the facility to select/de-list the courses.
- n. Portal should allow the view/download the complete profile and course progress
- o. Portal should suggest additional course based on analysed learning behaviour and outcomes.
- p. Portal should provide facility to view and generate various MIS and Analytical reports for the students regarding the progress of the course, assignment submission, assessments, quizzes etc.
- q. Portal should allow the students to view the course progress, pre-requisites
- r. Portal should allow downloading the contents for the specified course the student is enrolled to.
- s. Portal should allow online interactions through rich mediums like group chat//forums/screen sharing/white boarding/collaborative document editing etc. between the authorized representatives of the Educators/Universities etc as required.
- t. The portal should be capable to provide rich collaboration features like scheduled or adhoc group audio/video conferencing
- u. Portal should be able to send the alerts to the students once the assignment has been assigned via email/sms
- v. Portal should allow the students to submit the assignments with upload capabilities in required formats.
- w. Portal should provide schedule of the quizzes and tests on their dashboard
- x. Portal should allow the students to take quiz at a scheduled date and time.
- y. Portal should have the capability of the scorecard feature where the students can view the scores/grades/credits from various assignments, exams, MCQs etc.



2. **Content Providers:** Apart from managing the demand side, the other key objective and purpose of the SWAYAM will also be to manage the supply side, and provide the instructor to create and share assignments for the students. This category will constitute of the experienced educators i.e. teachers, professors and subject matter experts from various central, state universities. The educator will upload the course, assignment and quizzes on to the Portal.

The key requirements with respect to educators along with teaching assistant registration are mentioned below:

- a. Portal should allow registration facilities of the content providers i.e. educators and teaching assistant
- b. Portal should allow educators and teaching assistant to register and upload profile.
- c. Portal should have the background verification done using email/SMS. Once authenticated and approved, a registration number and password would be provided to the educators and teaching assistant.
- d. Portal should allow the educators and teaching assistant to login. All the profile management features like change password, update the profile, modify etc should be available to the Educators and teaching assistant.
- e. Portal should provide the facility of showing the pre-defined standard dashboard to educator and teaching assistant.
- f. Portal should allow access to registered educators along with the teaching assistant with SWAYAM who will advise on various topics related to the course contents.
- g. Portal should allow the educator to upload multiple files in different formats in the form of audio as well as video files.
- h. Portal should provide the instructor to able to assign a due date to the assignment and quizzes
- i. Portal should allow the educator to create as assignment and should able to assign it for that particular course.
- j. Portal should allow the educator to add instructions/procedures to the students before attempting the assignment.
- k. Portal should allow the educator to define the format of assignment that students will going to attempt
- l. Portal should allow the educator see the overall status of the assignment

- m. Portal should able to auto grade the examinations if it is in the form MCQs and in case of offline exams, TA should able to mark and enter the score in the system.

1.1.2 Layer 2: Access Channels



It is envisaged that the SWAYAM will be hosted on cloud located on Indian territory accessed by all the stakeholder, authorized users as well as citizens through various means and mechanisms and request/obtain required services through various channels. Some the key access channels envisaged for the SWAYAM are described below:

1. **Web Browser:** Access over Internet/through Web Browsers will be one the key access mechanisms for the SWAYAM. All the SWAYAM ecosystem partners will connect to the Portal via Internet. The solution should be accessible via the NKN Gateway. The access rights for the contents and modules of the SWAYAM will be managed through the 'Role Based Access Control' (RBAC) mapped to individual/group login credentials. The SWAYAM should have both static and dynamic information/content that should be available and accessible through a web browser via Internet. The kind of information/content to be displayed on the web portal will be managed and controlled through the 'Application Admin' module and 'Content Management' module of the Portal with an intention of making most of the information available for Stakeholders consumption through the web portal. The SI is required to develop a comprehensive browser based information control and display feature through these modules.
2. **Mobile Devices:** It is envisaged that the SWAYAM will also be accessible through various Mobile devices and smart phones, through defined mobile application or normal browsing through a mobile device. All the features and functionalities as defined for the access mechanism through Web Browser/Internet will also be applicable in case of accessing the Portal through any mobile device. The SI will need to optimize the SWAYAM web content, with user friendly features so that the Users can easily browse and operate the service features through these devices. Some of the key requirements related to Mobile Apps, but not limited to, are mentioned below:
 - a. The native Mobile Apps should provide an intuitive and user friendly GUI that enables users to navigate and apply actions with ease. The GUI should be responsive with very little or no delays or time lag at launch or whilst navigating through screens.
 - b. The Mobile Apps should enable ease of configuration and changes to existing GUIs, and support the introduction of new screens.
 - c. The Mobile Apps should provide on screen tips and online help to aid users while interacting with it.
 - d. Should make use of data available in the existing Database and reduce duplicate data entry
 - e. Provide way for users to provide feedback on the mobile apps, a quick way to report bugs, and provide suggestions or criticisms.

- f. Incorporate analytics into mobile app, to track and identify users experience and actions.
 - g. Apps should be easily customizable and easy to Administer data in the SWAYAM Database
 - h. Network level security, traffic should be encrypted using secured connectivity
 - i. Should provide mobile Apps download based on phone OS and services
 - j. Apps should structure overall content with proper tagging to make them screen reader friendly.
 - k. Apps should ensure compatibility with all platforms like Windows, Android, Blackberry & Mac iOS etc.
 - l. Apps solution should develop Resolution independent design structure i.e. Mobile Apps should adjust itself automatically as per the screen resolution of the Mobile i.e. 1024*768, 1200*800 etc.
 - m. Mobile Apps should work flawlessly across different platforms
 - n. There should be minimum use flash contents so that home page should be loaded quickly
 - o. It should not occupy excess mobile RAM.
3. **Contact Centre:** Contact Centre is one of the important aspects envisaged under SWAYAM ecosystem for providing technical support. The Contact Centre is envisaged to be running its operations 16*7*365 and will provide required information as well as assist the stakeholders in availing various services. Considering the criticality of the services and Contact Centre operationalization in short time duration, the SI is required to provision services from an existing operational Contact Centre on per seat basis and should not create a new captive infrastructure. The Contact Centre personnel should perform following key functions, but not limited to:
- a. Should support a voice based workflow and selection options that will guide the caller through the different options available to request and interact with support services.
 - b. Should provide support in 10 languages – English, Hindi, Bengali, Telugu, Marathi, Tamil, Urdu, Gujarati, Kannada and Malayalam
 - c. Should support Dual Tone Multi Frequency (DTMF) using telephone touchpad
 - d. Should support redirection to human assistance
 - e. SWAYAM should have a provision to capture the feedback of the stakeholder for services availed. This feedback shall be collected voluntarily via portal/Contact Centre. MHRD at later stages shall decide upon making this feedback public.
 - f. **Grievance Redressal/Suggestions:** It is envisaged that the Users might face certain issues and challenges during their normal online/offline interactions with the various stakeholders or through SWAYAM. Some of them may also like to provide constructive feedback and suggestion with regard to improvement areas in SWAYAM's overall functioning, or record their grievances. These issues, suggestions and feedbacks may be of different nature and categories, but any citizen should be able to reach out through the

concerned medium i.e. Internet or Contact Centre, and record their concerns, especially their grievances, if any. It is therefore required that even if any citizen is not registered in the system, they should be able to log their Grievances for taking necessary corrective actions through SWAYAM.

4. **Email/SMS:** The SWAYAM is envisaged to send alerts/intimations/automated messages to registered email and mobile number, based on preferences set up/opted by individual users. An authenticated SMTP mail service (also known as a SMTP relay or smart host) is envisaged to be integrated under the NIC/DeitY framework for sending mails from SWAYAM, and delivered to intended inbox or mobile device. For text messages, integration with either 'Mobile e-governance Service Delivery Gateway' (MSDG) or another SMS Gateway, as identified by MHRD is envisaged. The MSDG is established to deliver Government services over mobile devices using mobile applications installed on user's mobile handsets. As MSDG is developed based on IIP/IIS (Interoperability Interface Protocol/Interoperability Interface Specifications) standards of government of India, it provides seamless integration with backend department through existing NSDG/SSDG eGov exchange infrastructure and provides different set of mobile based services to both departments and citizens. However, the SI is free to provide another SMS Gateway services at no additional cost to MHRD as part of integrated SWAYAM solution, but the services and its quality should not be compromised. The solution should have the capability to provide each participant on the SWAYAM platform with a secured email id for official communication with other system stakeholders on a DNS domain provided by MHRD. This service should be accessible from the student dashboard and controlled by MHRD policies.
5. **Social Networking Capability:** With the view of increasing the reach of SWAYAM, it is envisaged that the Portal will be integrated with social networking sites and propagate information related to courses through these channels. It is also envisaged that the Portal will receive feedback and suggestions/service requests and other information through these sites. Such type of integration with social networking sites and their chat forums can provide an effective medium for communication between all stakeholders. It is also envisaged that the information gathered through these sites may also aid in validation of basic demographic.

Some of the key features for Social Media Collaboration, but not limited to, are stated below:

- a. The Social Collaborative Platform must have Web 3.0-based features such as -activities for task management, communities, bookmarking, profiles for expertise location, file sharing, wikis, blogs, video/photo sharing with communities - that are accessed via a browser, iOS, Android, Windows based smartphones/tablets as native or mobile web application or through e-mail or instant messaging software.
- b. The Social Collaborative platform shall provide tools to facilitate all stakeholders in forming communities of interests with a basic purpose
- c. All features of any Social Media community of interest will be available through these platforms
- d. The Communities of Interests must have functionality for bulletin board/threaded discussion and should have functionality for media library for photos, videos and brochures uploads
- e. SWAYAM should provide functionality for user to make queries to an expert via online discussion

- f. SWAYAM should provide smart search, which will help users search based on the tags defined, contents in the files or words inside blogs, wikis, forums, date etc. and the results should be annotated based on whether they are found in a community or files or wiki etc.
- g. Activities management feature of the tool must support the following features:
 - i. View and prioritize all your individual and team activities
 - ii. Filter and view your activities by keyword, priority, and status
 - iii. Start a new activity and set goals, due date, and tags for it
 - iv. Add relevant activity entries, including messages, e-mails, tasks, files, instant messages, and Web links Organize activities according to how you work, adding activity entries as they happen, or providing comments to existing entries
 - v. Ability to invite others to participate in an activity so they can view the information and add entries to get the task done quickly
 - vi. Notify another user when an item has been added to a task
 - vii. Create repeating activities from a template that can contain entries, to dos, tags, members
- h. File sharing feature of the tool must support the following features:
 - i. Ability to upload and download multiple files.
 - ii. File sharing capabilities which supports sharing file publicly within intranet, restricted to certain people within the organization or private; reporting such as how many times a shared file had been downloaded and who had downloaded must be out of the box.
 - iii. Subscribe to update notifications in case a new version of the previously downloaded file becomes available.
 - iv. Control access to individual files.
 - v. File upload possible from regular desktop operating systems and smart-phones such as Android or iOS based.
- i. Extensive reporting capabilities with out of the box solution is envisaged so that the different community owners should know how many people are participating in discussions or contributing towards intellectual capital. How many people are active on corporate collaboration tool and helping each other?
- j. The Social Platform must have out of the box integration with proposed Portal and Web Content Management platform, so that users can access contents, applications and collaborate with the peers in-context.
- k. Portal should support moderation of sites to avoid spam, advertisements and inappropriate content.
- l. Portal should enable marking of all electronic content (text, photo, video or otherwise) as Copyright of MHRD

- m. Portal should allow document tagging

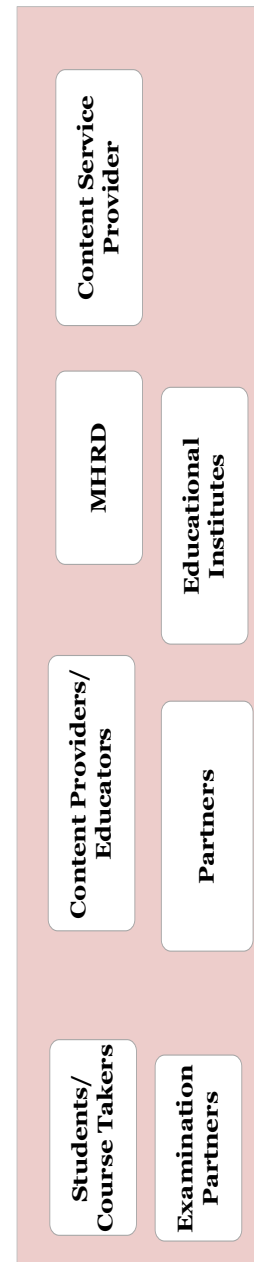
1.1.3 Layer 3: Data Input

The information/data will be uploaded on to the SWAYAM through various sources and stakeholders. It is envisaged that there will be adequate checks and balances within the overall design of the SWAYAM so that the data entered is proper and complete. Also, the data/information uploaded through various channels will be constantly updated to keep the same more relevant and up to date. Some of the key sources for entering the data/information on to the SWAYAM, (but not limited to) are course takers, course providers, MHRD etc.:

Course providers will be the key users responsible for creating, managing and uploading the content over SWAYAM. Each of the uploaded content is envisaged to be reviewed by the authorized personnel from SWAYAM before publishing the content in different sections and modules of the SWAYAM. The SWAYAM is envisaged to have an interface with MHRD (or its designated entities) for review of content. Users from various authorized universities/agency/organization would be responsible for creating, managing and uploading all types of content, to be used by various stakeholders through SWAYAM. The content is envisaged to be available in both static (PDF, HTML, etc.) as well as 'Audio Visual Content'. SWAYAM should have feature for getting feedback from the all the stakeholders and SWAYAM officials on content to be developed, changed and published. This feedback should be consolidated and presented to MHRD, so that further action can be initiated, on whether course content needs to be updated, modified, deleted or added.

Some of the key aspects of the content that would be made available through SWAYAM will be, but not limited to:

- a. Course Contents
- b. Course schedule calendar/project plan



Following are the key aspects related to Content expected to be available on the SWAYAM:

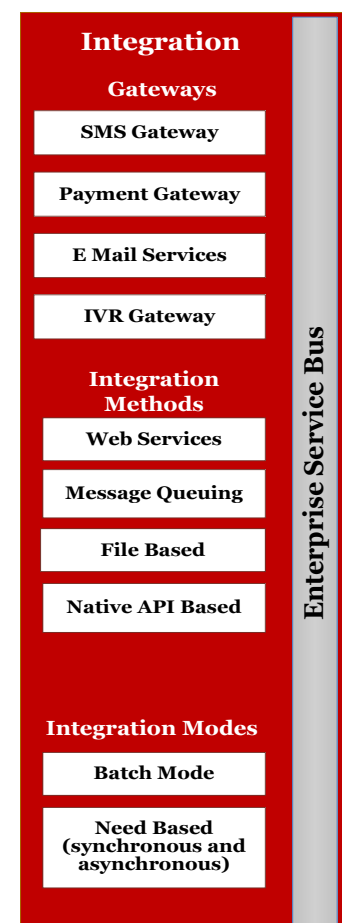
- a. **Audio Visual Content** – The content should include not just the training material but also testimonials from the satisfied stakeholders
- b. **ELearning System** - One of the important aspects of the enriched content would be the eLearning system, as part of the SWAYAM. This eLearning system within the SWAYAM is envisaged to have content related to repeat training and refresher courses, along with various assessment tests in order to assess the course takers' enhancement in knowledge, skills and capability. The SWAYAM should provide the capability for uploading and publishing the content related to eLearning system, through an easy, efficient content authoring tool, as per requirement of various stakeholders. The development and uploading of eLearning content would be the responsibility of the Course Providers.
- c. Interface with MHRD (or its designated entities) for review of content, and vetting of content to determine the mode for dissemination and take steps in this regard
- d. Allow course curriculum developed to be shared with all stakeholders. It should have feature for any feedback from the stakeholders and SWAYAM on course content to be captured. This feedback should be consolidated and presented to MHRD created entity so that further action can be initiated, whether course content needs to be updated, changed.

Note: With respect to this RFP, the SI is only required to provide the capability within the SWAYAM solution design to ensure all uploaded content is available/accessible by all the defined target audience/stakeholder, as per defined Portal features and functionalities. The SI will not be required to develop any specific content, other than that related to SWAYAM web pages. Also, it is a necessary requirement that the SI must design SWAYAM sections/web pages/modules dynamic and modular enough, so that the displayed content can be managed/changed dynamically as per requirement from different stakeholders in real time. An interface will be provided to the Course Providers, who would be responsible for periodic uploading of the content. In addition to the above, it will be the responsibility of the SI to define the guidelines for developing Content by the Course Providers. These guidelines for designing and managing the Content should be submitted to MHRD for review and approval, and any changes suggested by MHRD should necessarily be included in the same. It is necessary that all the approved content should be published using the Content Management System only.

Educational Institutes: All the educational institutes will be registered on the SWAYAM, and upload all the relevant details about their institute, faculty, course curriculum, fees structure, batches and duration, certifications provided, if any.

1.1.4 Layer 4: Integration Gateways

An Enterprise Services Bus (ESB) within the service-oriented architecture (SOA), combined with the modular and concurrent design of high-performance of the SWAYAM is envisaged to be designed and implemented for communication between interacting software applications in a distributed computing, heterogeneous and complex ecosystem.



The proposed ESB product should have a proven expertise in providing the functionalities required by MHRD. Following are some of the key features of the envisaged ESB, but not limited to:

1. The solution should support static/deterministic routing, content-based routing, rules-based routing, and policy-based routing, as applicable in various business cases.
2. The solution should have capabilities to receive input message in heterogeneous formats from various different systems, interpret those messages, process and transform those messages to generate output and feed them to various different clients as per formats applicable.
3. The solution should have features to communicate across different services, process them and expose as single aggregate service to facilitate business functionality
4. The solution should have facility to run validation rules on input messages before beginning transformation and processing. On validation failure, system shall be able to generate meaningful error codes which can be passed back to the invoker.
5. The solution should support message queuing, synchronous and asynchronous processing, fall back options in case upstream and downstream systems become unavailable temporarily.
6. The solution should offer standard security features in the ESB orchestration layer and provide option to make all communication across systems as secured.
7. The solution should provide option to enable WSS (Web service security) of various kind (Token based, certificate based, mixed-mode) from web service exposure interface. The enablement shall be configurable using web based administrative interface.
8. The solution should have event processing capabilities, on various system interruptions. System shall be able to generate alerts and email notifications to select groups.
9. The solution should support standard message exchange patterns, web services, SOAP/HTTP, SOAP/HTTPS standards.
10. The solution should have various adaptors to connect and communicate across heterogeneous external systems. The adaptors shall support secure communication, error handling for exception scenarios, transformation capabilities.
11. The solution should have provisions to manage priority of messages in queue and switch the priority of messages at run time. System shall also be able to configure parallel message processing.
12. The solution should support delayed message delivery in case of transmission failure. It shall support putting failed messages in redelivery queue for retransmission.
13. The solution should not operate in single point of failure (SPOF) mode. It shall be load balanced to make sure high availability and minimal time lag in message processing and output transmission.
14. The solution should be implemented using SOA and must support the ESB design pattern.
15. ESB should support SOA standards such as XML, XSLT, BPEL, web services standards and messaging standards.

16. ESB should support all industry standards interfaces for interoperability between different systems
17. ESB should support the following integration security standards:
 - a. Authentication
 - b. Authorization
 - c. Encryption
 - d. Secure Conversation
 - e. Non-repudiation
 - f. XML Firewalls
 - g. Security standards support
 - h. WS-Security 1.1
 - i. WS-Trust 1.3
 - j. WS-Secure Conversations 1.3
 - k. WS-Basic Security Profile
18. The solution should support graphical user interface to configure various integration scenario
19. The solution should support routing to all internal & external systems.
20. The solution should have comprehensive auditing capabilities to support any internal or external audits.
21. The solution should provide configurable logging feature for supporting error handling.
22. The solution should include feature of service registry for managing all services
23. The solution should support Business Activity Monitoring. One should be able to do a real time analysis of the data flowing within the ESB. One should be also able to monitor Key Performance Indicators.
24. The solution should be able to interoperate and connect with applications deployed on a number of platforms including, AIX, HP-UX, Sun Solaris, Windows, Linux etc.
25. The solution should support a whole suite of adapters such as Data Handler for XML, Exchange, Lotus Domino, industry standard packaged solutions etc.
26. The solution should support various messaging patterns e.g. synchronous, asynchronous, pub/sub, multicast, etc.
27. The solution should support SQL access to relational databases such as Oracle, DB2, MS SQL, Sybase, and Informix. Integration capabilities with NoSQL databases would be also advised.

28. The proposed ESB should support Time Control and Notification for messaging
29. The ESB should have an capabilities of Routing, Enrichment, Update, Transformation Processing
30. The ESB should support for Message Expiry configuration

There are four integration gateways envisaged as part of the solution design. The key requirements with respect to each of these are mentioned below:

1. **SMS Gateway:** SMS services are envisaged to be made available as part of the solution design. The SI may integrate the solution with MSDG, and use the services available through it, or deploy its own SMS Gateway services at no extra charge to MHRD but it is a mandatory requirement that all the SMS based services (alerts and notifications) should be available as part of the solution. Following are some of the key requirements for the SMS services through the solution:
 - I. Should contain required details/information and targeted to the applicant or designated officers of SWAYAM and other stakeholders and users as per prevailing TRAI norms
 - II. Facilitate access through access codes for different types of services
 - III. Support automated alerts that allows to set up triggers that will automatically send out reminders
 - IV. Should provision for sending International SMS
 - V. Should provision to receive messages directly from users
 - VI. Should provision for personalized priority messages
 - VII. Resend the SMS in case of failure of the message
 - VIII. Provide messaging templates
 - IX. Provide central repository for all users
 - X. Allow group to be formed for group messages
 - XI. Store history for all messages along with logs
 - XII. Should provision to print the SMS and logs
 - XIII. Support built-in user profiles for administrators and standard users
 - XIV. Provide simple text based search
 - XV. Should provision to send SMS to email directly using email integration

Email Services: Email services are envisaged to be made available as part of the solution design to send alerts/intimations/automated messages to registered email ids, based on preferences set up/opted by individual users. An authenticated SMTP mail service (also known as a SMTP relay or smart host) is envisaged to be integrated with the solution for sending mail from the solution, and delivered to intended inbox.

2. **Payment Gateway:** The solution is envisaged to have integration with payment gateways, to enable authorized Users make financial transactions, as per rights and privileges provided to him/her. The SI is required to make the provisions for integration with such third party gateways and provide payment services, as per requirement of the MHRD. Some of the key features of payment gateway are mentioned below:
 - a. Should support secure integration with Payment Service Providers
 - b. Should support a unified interface to integrate with all Payment Service Providers
 - c. Should support integration with Payment Service Providers using web services and over HTTP/S protocol
 - d. Should manage messages exchange between UI and payment service providers
 - e. Should support beneficiary's payment transactions tracking against various services
 - f. Should support bank accounts reconciliation
 - g. Should provide logs for all transactions performed through the Payment Gateway for future financial dispute resolution that might arise between entities and either beneficiaries or Payment Service Providers
 - h. Should maintain and keep transactions logs for time period required and specified by the financial regulations followed in country
 - i. Should support redundant Payment Discovery
 - j. Should submit Periodic Reconciliation Report to government entities
 - k. Should support transaction reports to monitor and track payments
 - l. Should support real-time online credit card authorization for merchants
 - m. Should support compliance with emerging trends and multiple payment options such debit card, credit card, cash cards and other payment gateways
 - n. Should provide fraud screening features
 - o. Should support browser based remote administration
 - p. Should support multicurrency processing and settlement directly to merchant account
 - q. Should support processing of one-time or recurring transactions using tokenization
 - r. Should support real time integration with SMS and emails
3. **IVR Services:** IVR services are envisaged as part of Contact Centre facility, which will be integrated with the solution, to provide information and services to the people who would contact the Contact Centre: Some of the key feature of the IVR services are mentioned below:
 - a. Should provide multi-lingual content support
 - b. Should facilitate access through access codes for different types of services

- c. Should support Web Service Integration
- d. Should support Dual Tone Multi Frequency (DTMF) using telephone touchpad - in-band and out-of-band
- e. Should support for Voice Extensible Markup Language (VoiceXML)
- f. Should support speech recognition that interprets spoken words as texts (Advanced Speech Recognition).
- g. Should support playing of pre-recorded sounds
- h. Should support redirection to human assistance, as per defined rules
- i. Should be able to generate Data Records – (CDRs) and have exporting capabilities to other systems
- j. Should provision for voice mailbox and voice recognition

There are multiple ways of integration of the solution with other systems is envisaged. These may be through Web Services, Message Queuing, File based or API based. The integration and data sharing mechanism may be either in Batch Mode or Needs basis (synchronous or asynchronous). Some of the key requirements of the interface/integration are mentioned below:

1. The interface should have
 - a. Interface Definition
 - b. Interface Owner
 - c. Interface Type
 - d. Interface Format
 - e. Frequency
 - f. Source System
 - g. API/Service/Store Procedure
 - h. Entitlement Service
 - i. Consuming System
 - j. Interface Layout (or) Schema
2. Should have provision for exceptional scenarios
3. Should have syntax details such as data type, length, mandatory/option, default values, range values etc.
4. Error code should be defined for every validation or business rule
5. Inputs and outputs should be defined

6. Should be backward compatible to earlier datasets
7. Data exchange should provide transactional assurance
8. Response time and performance characteristics should be defined for data exchange
9. The failover scenarios should be identified
10. Data exchange should be auditable
11. Data exchange should abide by all laws on privacy and data protection

1.1.5 Layer 5: Interoperability and Meta Data Standards

The solution is envisaged to be integrated with other applications as and when required. The following integration and interoperability related guidelines should be followed while designing and developing the entire solution:

1. Should be built on Service Oriented Architecture (SOA)
2. Should use open or industry standard based message exchange protocols to ensure interoperability between participating systems.
3. Should use of portable data and exchange protocols like XML and Web Service etc. as preferred much as possible
4. Should ensure guaranteed delivery of messages by capturing the acknowledgment or confirmation of delivery and receipt of messages
5. Should ensure integrity of data-in-transit through public network
6. Should have proper error handling mechanism and message resend capability
7. Should have the ability to view failed messages and reason for their failure
8. Should ensure proper auditability and accountability of exchange of data between the proposed solution and other systems
9. Should be developed using the published metadata standards by DeitY
10. The information and forms collected from various sources and the development of the solution web portal shall have to be converted into appropriate electronic open standard format(s) as mentioned in Interoperability Framework for E-Governance in India issued by Department of Electronics & Information Technology (DeitY)

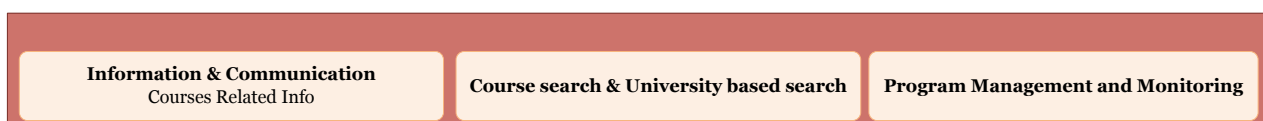
1.1.6 Layer 6: Management and Monitoring Services

The solution is envisaged to utilize various tools and technologies for management and monitoring services: The SI is required to monitor the service levels as defined in this RFP. SI will also be required to procure, install and operate management and monitoring tools to maintain the SLAs. The tools should be transferred to MHRD at the completion of the contract with complete knowledge transfer, capacity building and training. The SI will ensure that the reports for monitoring the SLAs like system uptime, connectivity uptime,

and performance of servers etc. are generated automatically from the system and made available to MHRD. Some of the key requirements for these services are mentioned below:

1. Should provide reports to authorized users for end-to-end performance monitoring and control.
2. Should provide tools and metrics to support testing, solution performance monitoring, fault isolation, verification and validation of the end-to-end solution.
3. Should have the ability to monitor in real-time all the activities and transactions of all the solution components.
4. Should have the ability to show the statuses of all components, process.
5. Should have the ability to show all the services running across the solution and the recent reference bindings with an actual view of the service flows showing service-to-service relationship as well as drill down to service specific information
6. Should have the ability to monitor and show all the statuses of the different infrastructure layers supporting the Portal platform
7. Should have the ability to monitor the performance of the middleware showing capacity levels and transaction information
8. Should have the ability to show recent faults and errors and be able to display recent error messages and exceptions handled
9. Should support meeting specific SLAs by issuing customized and configurable alerts
10. Should be able to produce reports showing various performance metrics
11. Should support monitoring policies (runtime, security policies) and report alerts when necessary

1.1.7 Layer 7: Integrated Web Portal



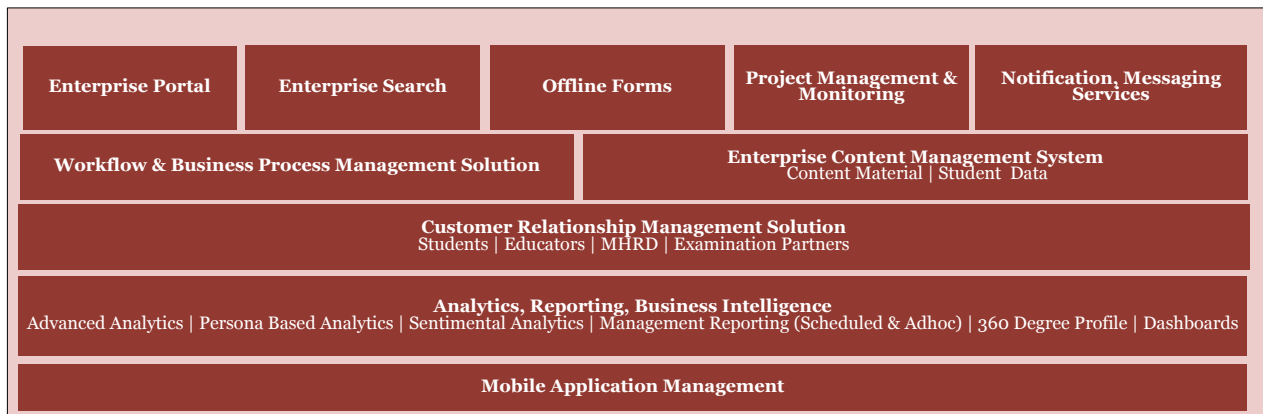
The solution is envisaged to be an integrated Web Portal providing various information and services, hosted in the cloud, as decided by MHRD and will be accessible to all the stakeholders as per access right provided to them. Overall the solution is envisaged to cater to 4 key functional areas:

1. **Information and Communication:** The Solution is expected to provide comprehensive and updated information about the courses available on the platform, It is envisaged that the solution will enable creating a 360 profile of each registered entity, the details of which will be available to all stakeholders, as per access rights provided to the individual users and the search criteria/filters used. Similarly, the solution is envisaged to send alerts/notifications/custom messages regarding events and workshops, etc. to the intended recipients. Contact Centre integration is envisaged to enable the stakeholders for resolving

their technical queries. Outbound calls are also envisaged to help reach out to the callers, and inform them about the action taken, or any updates on the issue recorded by them.

2. **Program Monitoring and Management:** One of key focus areas of the solution would be to monitor the activities and functioning proposed to be set up under this project.

1.1.8 Layer 8: Tools and Technologies



The solution is envisaged to have all the tools and technologies, as depicted in the diagram above, in order to provide a state-of-the-art Portal providing integrated features. The key requirements for the tools and technologies required for the solution are mentioned below:

1. Enterprise Portal:

- a. Proposed portal will be single integrated user interface for all stakeholders. Backend COTS/bespoke applications will be exposed through Portal console using single-sign on.
- b. Portal should enable personalization and configuration at user level as well as SWAYAM level. The portal should be capable of directing relevant content and information to individual users/roles, and provide end user customization.
- c. Portal should enable content publishing within portal framework. It should support or should be capable of integrating with an advanced content management solution. Intention is that the Portal should enable content publishing within portal framework.
- d. The portal should support workflows.
- e. The portal should not allow concurrent sessions for same user. The system should automatically log out a customer in case of session breakdowns (e.g., communication failure, high inactivity period - these should be parameterized)
- f. The portal should implement security features, such as password complexity, automatic blocking (temporary/permanent) of user logins after given number of unsuccessful login attempts (should be parameterized), controlled access to content stored on the portal and logging of security incidents. It should by its own or through an integrated Identity Management solution be capable of managing security rights and privileges by individual, group and role, and should support Single Sign On.
- g. Portal should support HTTPS protocol on Secure Socket Layer (SSL).

- h. The portal should support the leading browsers such as Internet Explorer, Firefox, Chrome etc. including standard backward compatibility
- i. The portal should be able to expose/publish functional applications seamlessly
- j. The portal should provide search engine with advanced full-text search capabilities. The search engine should be able to search for requests within the portal.
- k. Should provide support for comprehensive audit trail features such as:
 - i. Daily activities log should be merged into the history log files
 - ii. Date, time and user-stamped transaction checklist should be on-line generated for different transactions
 - iii. All transaction screens should display system information
 - iv. Daily activity reports should be provided to highlight all the transactions being processed during the day
 - v. Unsuccessful attempts to log-in to the system should be recorded
- l. Portal should be compatible to mobile devices
- m. Portal should be interoperable with industry standard databases (Oracle, DB2, Microsoft etc.)
- n. Portal should be capable of Supporting Multilingual content capabilities
- o. In addition the portal should provide the following capabilities
 - i. Should have multilingual capabilities with regional, localization and Unicode support.
 - ii. Should be able to integrate with common office application
 - iii. Should authenticate users from Active Directory/LDAP, claim based authentication
 - iv. Should support web services APIs, BLOB Storage, custom code solutions, REST, WSRP
 - v. Should support virtualization
 - vi. Should support customization of Look and feel of the portal
 - vii. Should support a broad range of standards, preferably open standards. Some examples are DOM 1.0, HTML 5, HTTP, HTTPS, MathML, ODBC, ODF (IS26300), Open XML (IS29500), OpenSearch, OpenType, PDF 1.7, PDF/A, RTF, RSS, ATOM, SOAP, SVG, REST, UDDI, Unicode, URI/URN, W3C XML Schema, WCAG 2.0, WebDAV, WSDL, WSRP, XHTML, XML, XML Web Services, XMLDsig, XPATH, XPS, XSLT
 - viii. Should be able to connect to mobile devices.
 - ix. Should integrate with email servers

- x. Should integrate with instant messaging services
- xi. Should integrate with any other portal products through open standards such as HTML, XML, RSS, web services, and WSRP.
- xii. Role Based Access
- xiii. Should support encryption and compression features
- xiv. Should support multiple roles with associated access controls.
- xv. Should support upload, store, organize and share documents
- xvi. Should support Podcast Publishing, Rich media streaming and transcoding, Rich media search and organization
- xvii. Should preferably be XHTML 1.0/WCAG 2.0 AA compliant
- xviii. Should have content authoring capabilities
- xix. Should have workflow capabilities with regard to the content approval/publishing process
- xx. Should support Publishing content in web viewable formats
- xxi. Should provide multi-channel output capabilities
- xxii. Should support editions (versions/rollback) of the web site managed
- xxiii. Users should be able to upload documents in multiple formats
- xxiv. Users should be able to upload multiple files at the same time
- xxv. Should support 'Drag-and drop' file upload
- xxvi. Should be able to 'send' documents to a project or group area by email
- xxvii. Should be able to have embedded viewers for accessing documents in multiple formats without requiring other applications
- xxviii. Should support creating and editing rich documents inside the browser
- xxix. Should have multi-user editing the same document.
- xxx. Should support version control, change tracking and comments in these documents
- xxxi. Should support approval workflow
- xxxii. Should support check In/check Out capabilities
- xxxiii. Should support version Control Capabilities (the number of major versions supported, minor versions, and branching)
- xxxiv. Should support document linking capabilities (static, dynamic, and/or other)

- xxxv. Should supports the import of content into the repository
- xxxvi. Should support document and text indexing capabilities
- xxxvii. Should have offline capability for uploading content
- xxxviii. Should support image indexing capabilities
- xxxix. Should be able to support to store and manage documents in the same repository
 - xl. Should Support Managed Metadata
 - xli. Should support Records Management
 - xlii. Should support Document Sets
 - xliii. Should support content archiving capabilities
 - xliv. Should Support Digital Asset Management
 - xlv. Should be able to add Site Feeds within a portal
 - xlvi. Should support federated search
 - xlvii. Should be able to customize search
 - xlviii. Should be able to perform read/write/update data to other RDBMS
 - xlix. Should provide offline support for forms
 - I. Should provide support (out-of-box) drag and drop of documents directly from File Manager/Windows Explorer to Browser for upload of documents in a document library.
 - li. Availability of document metadata when offline
 - lii. Should support creation of ad hoc query by users
 - liii. Application forms should be created as templates and data could be stored separately.
 - liv. Data entry for E-forms could use a common office interface
 - lv. Data could be collected in an offline manner; no connectivity to capture data should be required.
 - lvi. Bulk update of data should be available to any data source
 - lvii. While the bulk data is getting uploaded it should also tell for errors if it encounters any.

2. Enterprise Search:

- a. Should be able to support both structured and unstructured data, and a combination of them.
- b. Should support surmised/contextual search.

- c. Should support search and contextualize results based on user profiles and roles.
- d. Should be able to search information from all possible data sources present in the ecosystem which includes but not limited to internal and external data sources such as portal, integrated content management system, databases etc. The solution should be capable of making content from multiple enterprise-type sources, such as databases and intranets, searchable to a defined audience
- e. The solution should be capable of searching in external data repositories (of both structured and unstructured data) which will have interface with the solution
- f. The search solution should support automatic spelling checks, query suggestions.
- g. The solution should support dynamic result clustering.
- h. The solution should index data and documents from a variety of sources such as: file systems, intranets, document management systems, e-mail, databases and other integrated external systems.
- i. Preference will be given to
 - i. Enterprise search platforms with futuristic capabilities like context based search, machine learning and natural language processing capabilities, content analytics and searching with subjective questions or phrases etc.
 - ii. Enterprise search platforms should have the capacity of searching but not limited to all types of structured, unstructured, semi-structured, social media, web content, enterprise systems etc.
 - iii. The search platform must be scalable to search billions of records.
 - iv. The search engine should have the ability to securely search internal, external systems or applications preferably without needing to index them at all times.
 - v. The search should show results to the user based on the authorization and authentication of the user.
 - vi. Security profiles of the underlying systems should be respected so that users can only see the information for which they are authorized.
 - vii. The search platform should preferably provide a platform that is easy and quick to customize. A web-based intuitive administrative interface is preferred.
 - viii. The search platform should be able to handle industry specific taxonomies and ontologies, as may be required during the course of operations.
 - ix. Search users should be able identify and extract specific entities relevant to their interest area fairly easily and quickly.
 - x. The search platform should have the ability to showcase the relevant information to the user in a context to create a 360° view of an entity available in SWAYAM framework.

- xi. The search platform should support dynamic categorisation of results in order to accelerate searching process.
 - xii. The search platform may automatically identify and cluster related information to achieve better user satisfaction.
 - xiii. The system must be able to search, filter and publish results in various formats and on multiple parameters like student demographics, education levels, interest areas etc.
 - xiv. The proposed system must have a search feature which should be capable of including full word matches, partially matching words, misspelt words and different tense of words in the result
 - xv. The proposed system should have capability of crawling different structured and un-structured data sources
 - xvi. The system should be able to extract and combine data into a single unified analysable view from different source systems like transactional systems (RDBMS), data warehouses, csv files,.doc files, excel files, PDF files, DBF files, emails, XML files etc.
 - xvii. The proposed system should allow the business users to run tagging and text enrichment from the front end himself
 - xviii. The proposed system should have an in-built thesaurus which should be referenced by the search feature for finding similar meaning words from the database and including those records in the search results
 - xix. The proposed system should have a stemming feature for including different forms of same word in the search results i.e. a search for "running" should include "Run", "Ran" in the results
 - xx. The proposed system should have a feature for specifying stop words that should not be included in the search i.e. "and", "for", "with", "from", etc. should not be considered for deciding the search results
 - xxi. The proposed system should have the capability of crawling documents like word doc, excel files, PDF files, etc. and combine these sources with other unstructured as well as structured data sources
- 3. Offline Forms:** A critical component with respect to data upload by various stakeholders, the Offline Forms are envisaged to be able to capture the complete details of each stakeholder/User through different interfaces and enable SWAYAM to create a 360 degree profile for them. This 360 degree profile information will then be available for search and display, through the use of various filters and keywords, based on access rights provided to the User initiating the search. Some of the key requirements with respect to eForms are mentioned below:
- a. The offline Forms should be available for data input by all stakeholders. The offline forms should be such that the online and offline experience should be the same for the User. It is therefore required that the SI should engage an efficient tool to design the UI, to achieve enhanced User experience and usability of the solution.

- b. The Offline Forms should support recording information offline through Internet and future uploading. Information uploading should also be possible in bulk for multiple instances of the Offline Forms.
- c. Should be able to integrate to the proposed portal, and the underlying database.
- d. Should support information exchange as XML.
- e. Should support offline validation of information.
- f. Should be compatible with all leading browsers such as Internet Explorer, Firefox, and Chrome etc.

4. Project Management and Monitoring:

- a. The proposed tool should be a comprehensive one, capable creating and tracking multiple projects and associated resources with proper timelines, handled by multiple user roles
- b. Should make the project planning module available to stakeholders on an ongoing basis
- c. The tool should provide a centralized repository providing enterprise level visibility to all projects running in the organization at summary level. The repository will act like a centralized dashboard. By clicking on any Project, users should be able to navigate inside a particular project details area. This should be able to provide configurable views to display Cost, Schedule, Tracking etc.
- d. Should provide the option of creating new projects, generating a unique Project ID for every new project created, along with proper approval processes. Should have functionalities to link projects, sub projects, activities and tasks. Should also have functionalities to create Ad hoc project, where a work break down structure is not required
- e. Should have functionalities to input and track milestones, dates and Key Performance Indicators. Can be used to monitor schedule.
- f. Should provide capabilities to assign project owner, project manager, accountable person and key stakeholders
- g. Should support for template based DPR/Draft project plan
- h. Should capture approvals and feedbacks (Administrative and/or Technical Sanctions)
- i. Should monitor each activity/task in the project and track completion of each module/activity, leading to the overall commissioning of project
- j. Should track changes/revisions made to the project plan & budgets
- k. Should allow activity scheduling using PERT/CPM
- l. Should provide individual workspace sites for each project so that project team members can collaborate with each other
- m. Should support for attachments such as drawings, specs, instructions etc., in formats such as PDF, CAD, Visio, text/flat files, PPT, XLS, DOC, RTF, TIF, GIF, JPEG etc.,

preferably using document libraries for individual projects with appropriate version control, governance and search functionality

- n. Should monitor all projects consolidated, individual projects and individual tasks. Must be able to show aggregated projects based on certain parameters. Should maintain project percentage completed status -based on work to date.
- o. Should enable what-if modelling scenarios
- p. Should provide an enterprise resource pool containing all the user details at a centralized location.
- q. Should offer different resource types and options to help support project managers effectively plan resource requirements
- r. Should graphically display resource capacity, allocation details etc.
- s. Should provide issue and risk registers and customizable templates
- t. Should do analysis of resources used on a project compared to the estimates for different categories, i.e., money, time, materials, overheads etc.
- u. Should establish security measures to ensure that the personnel are allowed to review/edit projects they are involved with. Provide role based access to users based on hierarchy.
- v. Should provide configure & control options to set user permissions to access various modules & artefacts. Should allow creation of User Groups so that users can be grouped together and permissions can be assigned group wise
- w. Should enable online project management process by enabling team members to easily manage, track, and report on their project activities through familiar tools, like the Web, and also allow print facilities
- x. Should establish security measures to ensure that the personnel are allowed to review/edit projects they are involved with.
- y. Should provide a consolidated dashboard with drilldown features and enable role specific view of project status. Should provide easy to use report templates to easily create configurable reports and allow easy import and download of reports
- z. Should allow simple and hassle-free integration with commonly available office applications without any vendor dependency.
- aa. Should provide enhanced copy-and-paste capabilities.

5. Notifications and Messaging Services:

- a. The system should have a comprehensive logging/audit and exception handling mechanism
- b. System should have various adaptors to connect and communicate across heterogeneous external systems. The adaptors should support secure communication, error handling for exception scenarios, transformation capabilities.

- c. The proposed solution should have the ability to show recent faults and errors and be able to display recent error messages and exceptions handled
- d. The proposed solution should integrate with the “Logging Engine/audit engine” and the “Exception Management” components
- e. System should have event processing capabilities, on various system interruptions. System should be able to generate alerts and email notifications to select groups.
- f. System should have email integration capabilities and shall accommodate event or criteria driven email notification to select user group.
- g. System should support configurable email notifications in case events like document deletion, document access removal, documents submission for approval.
- h. System should support generation of predefined alerts and notifications for various business activities

6. Workflow and Business Process Management:

- a. System should support easy workflow configuration, its maintenance, and need based modification, addition alteration of the steps.
- b. System should support process modelling based on BPMN2 notation standard
- c. System should have facility to simulate a process before launching it so that appropriate changes can be made based on findings.
- d. System must facilitate dynamic web form design functionality
- e. System should provide business rule engine and a management platform. Users shall be able to modify the business rules online without any need of deployment. System shall also have business rule connector so that it can talk to any 3rd party business rule engine
- f. System should have complex XML based data management capabilities.
- g. System should allow saving custom BPM templates so that end user can tailor a business process based on any of the custom template.
- h. System should offer performance monitoring features for the business processes. The system shall be capable of identifying, reporting inefficient processes and operations and/or those with high level of error and omission
- i. System should expose W3C standard web services and REST based web services so that it can communicate to any other technology layer seamlessly.
- j. System should have capabilities which will enable business activity monitoring and capture audit trail of all transactions as well. Web based dashboard shall be made available for accessing all reports. The BAM framework shall provide capability to generate various graphical reports on data.
- k. System should provide dashboard view for showing multiple reports. Dashboard view and content can be customized for individuals.

- l. System should provide option to define KPI (Key Process Indicators) on processes and enable dashboard and drill-down reports on KPI.
 - m. System should have email integration capabilities and shall accommodate event or criteria driven email notification to select user group.
 - n. System should have web based interface for performing all the administration work. Admin should be able to add new queue and add multiple work steps to it.
 - o. System should support various message routing capabilities e.g. the system should be capable of allowing automatic temporary re-routing of jobs to one or more other users, sequential routing, parallel routing, rule based routing etc.
 - p. The system should be capable of referring to the appropriate documents/records through link or index, without the need of attaching the physical documents with the workflow. The system should be able to extract documents from the Document Management system through the link.
 - q. The system should provide option to enable human interaction through mobile devices.
 - r. System should have capabilities to allocate and distribute generated tasks to users and user groups. The task allocation methods may be through pull or push model in offering or allocating mode randomly or in round-robin mechanism. Participants of the task can be specified during design time statically or during run time using expressions or through organization entity identification process. System shall offer capability to specify time limit to a task.
 - s. System should have ability to escalate human tasks based on pre-defined criteria and expire select tasks as applicable by specifying expiration date.
 - t. System should have the ability to persist various process data and state in storage space.
- 7. Enterprise Content Management:** A “Content Management System” (CMS) within the SWAYAM is envisaged, allowing the administrators to dynamically update the individual content elements/sections/forms/formats/notices etc. that change regularly, without the constant need of a programmer/developer. The CMS should offer easy administration of the overall SWAYAM, simply requiring nominated and authorized Users to log-on to a secure area of this Application and complete simple web forms and upload to the centrally controlled database, so that the changes are reflected throughout the Application pages/sections, as applicable. The formats for various reports/notices and other communications like promotional messages can also be designed through this module and uploaded on to the SWAYAM. Some of the key features are mentioned below:
- a. Easier and quicker mechanism of creating, deploying, managing, editing, manipulating and storing content on Web pages, including but not limited to text and embedded graphics, photos, video, audio, and link as well as Automated Templates (that can be automatically applied to new and existing content), through editing tools/framework.
 - b. System should have facility to upload pre designed pages
 - c. Catalogue and index content, select or assemble content at runtime, or deliver content to specific visitors in a requested way, such as other languages.

- d. Workflow based lifecycle from content creation to review and approval, and finally publishing of the content, as per Access Control to Users and Groups
- e. Comprehensive Audit Trail to capture the entire Content Life Cycle
- f. Search, Archiving and versioning of the Content, for ready reference and management.
- g. Provide a means of allowing each user to work within a virtual copy of the entire web portal; document set, and/or code base i.e. Content Virtualization. This will enable changes to multiple interdependent resources to be viewed and/or executed in-context prior to submission.
- h. Ability to display content in multiple languages.
- i. Act as a collaboration platform allowing content to be retrieved and worked on by one or many authorized users. Changes should be tracked and authorized for publication or maybe ignored reverting to old versions. Other advanced forms of collaboration may allow multiple users to modify (or comment) a page at the same time in a collaboration session.
- j. ECM solution should integrate with the portal and other solution components within the environment
- k. Should be able to address both structured and unstructured sources
- l. Should support Sorting and filtering of the search results and saved searches
- m. Should be able to address multiple sources crawling and searching like Databases, File Systems, Content/Document Repositories, Web and Web portals, Email systems. Should be able to Search highlight and collapsible summary of the search items
- n. The Content Management System should by itself or when integrated with the enterprise search system should be able to provide a User friendly and intuitive with type-ahead and dynamic search results to show to the user as he types
- o. Should provide rich text editor for content editing and multiple file upload functionality
- p. Content management repository with support for all types of content - including document management, record management, web content management and digital asset management
- q. The ECM product should provide the ability to create and administer documents, records and web content via a single user interface that simplifies the administration experience
- r. System should provide Administration services such as archiving and removal, configuration migration, audit trails and system reports, and backup and recovery using a web-based user interface
- s. All the searches should be automatically filtered by user's security privileges
- t. The versioning feature should allow to easily track new revisions and roll back to previous versions
- u. Should support single-sign on

- v. Should provide support for web content and document management workflow
- w. Should support/interoperable with multiple databases like Oracle/SQL Server/DB2/MySQL etc.
- x. Should support content rights management
- y. Should support large volume high speed scans
- z. Should have ability to compress scanned images
- aa. Should provide support for annotations
- bb. System shall provide consistent look and feel to the users and standards defined for content, structure and presentation of the Web portal.

Note: The Enterprise Content Management is envisaged to be used as a 'Knowledge Repository' in the entire SWAYAM framework.

8. Customer Relationship Management Solution: Some of the high level expected features are:

- a. The proposed CRM solution shall be the central access point for all stakeholder interactions and relationships.
- b. The proposed solution must already exist and is a proven solution.
- c. The proposed solution must provide comprehensive and easily accessible on-line help facilities to the users.
- d. The solution must allow users to track phone calls, letters, email messages, tasks, and other information relating to a stakeholder in one place so that the users can work more productively.
- e. The solution must track and manage correspondences simply and seamlessly by evaluating the incoming messages and automatically matching them with appropriate conversation.
- f. The proposed solution must have the ability to integrate with Contact Centre infrastructure using any of the mentioned industry standard interfaces (AGC/Nortel/CISCO/Aspect etc.). They need to be TAPI compliant.
- g. The solution must be able to launch into the correct application screens when choosing a work item from the queue.
- h. The solution must be able to provide a 360-degree view of the caller based on the information in the CRM data model. This view should include contact information, account information, service request history, activities, tasks, escalations etc.
- i. The solution must be able to view complete interaction history of caller's previous interaction history.
- j. The solution must be able to automatically send an acknowledgement for an incoming email.

- k. The solution must be able to create and manage cases to capture caller issues.
- l. The solution must be able to create a case based on an issue from an inbound email.
- m. The solution must be able to create different kinds of case types.
- n. The solution must be able to track the progress of a case from open till closure
- o. The solution must be able to search for duplicate cases and link the duplicate service
- p. The solution must be able to create multiple tasks under a case
- q. The solution must be able to send the notification messages via email
- r. The contact centre executive should have access to call scripts which will guide the agent through the calls and should support branching logic
- s. The application should be configured to fetch/load all stakeholder/account and transaction information from different application based on client id/contract/application number.
- t. The application should be integrated to other applications for single stakeholder view
- u. The implementation should include business logic definition required for providing single stakeholder view.
- v. The implementation shall enable business rules to be easily changed.
- w. The solution implementation of business logic must be independent of any existing application logic, so that in the future if that application is to be phased out, it should be smooth transition.
- x. The solution should be configured to provide audit trail facility to track the agent's activities on cases logged.
- y. The application should be configured such that the access to the stakeholder information must support user level authentication and access rights
- z. The solution must be able to create and manage cases to capture caller issues.
- aa. Each case has to be attached to a caller's profile stored in the CRM data model
- bb. The Solution should be configured to provide Audit Trail facility to track the agent's activities on cases logged.
- cc. The application should be configured to Track Response Time for handling Customer calls/queries
- dd. The application should be configured such that the access to the customer information must support user level authentication and access rights
- ee. The application should be configured to enforce role-based access based on users, groups, roles, etc. The Application should be configured to setup users, groups, roles, and their permissions.

- ff. The solution must be able to automatically assign a case to an owner based on configurable assignment rules
- gg. The solution shall provide a calendar management and scheduling engine for supporting service activities.
- hh. Create campaigns including details such as campaign type, campaign status, offer, expected response, proposed start and end date, actual start and end date
- ii. Capture campaign financials details such as costs and expected revenue
- jj. Associate target product to campaign
- kk. Associate sales literature such as product brochures to campaigns
- ll. Support workflow based approval to route planned campaign to management for approval
- mm. Associate campaign with other related campaigns
- nn. Campaign responses are tracked for users to capture prospect/stakeholder's response if they are interested or not interested in the offer.
- oo. Campaign responses can be automatically converted into a lead or opportunity and associated with the relevant stakeholder record.
- pp. Campaign Performance analysis and reporting including details such as activity completion, types of responses, responses over various channels, campaign ROI of costs versus revenue.
- qq. The proposed solution must be able to support all or selected CRM functionality on the offline client.
- rr. The access of CRM data on the offline client must be controlled by the CRM system and provides access and relevant data to authorized individuals only.
- ss. The proposed solution must provide CRM data and functionality to your mobile workforce anywhere through browser enabled mobile devices.
- tt. The business intelligence capabilities must cut across all modules in the CRM application with integrated reporting and analytics.
- uu. The knowledge base must be equipped with a search engine that can search for relevant information based on key word search.
- vv. The proposed solution must provide an integrated reporting tool for new reports to be created as required.
- ww. The proposed solution must have comprehensive reports for various activities in CRM.
- xx. The ad-hoc reporting tool must enable reports to be exported to other formats like Excel and PDF format.

- yy. The proposed solution must provide CRM analytic capabilities that provide complete scenario analysis to measure the effectiveness of current activities and generate performance details.
- zz. Pre-built dashboards should include key operational metrics for executives depicting key Customer Service KPIs
- aaa. The proposed business intelligence must be able to drill down from the summary level to the transaction level details.

9. Analytics, Reporting, Business Intelligence: The following are the various types of analytical functionalities that will be required by various Users, but not limited to:

- a. **Statistical Analysis:** The system should generate reports comprising of complex statistical dynamics and multiple parameters from historic data. These reports may be generated through the UI provided within the solution to authorized Users. It should also present patterns found in historical and transactional data to identify risks and opportunities. The proposed tool should be capable of providing viewable descriptive statistics like mean, median, max, min etc. and also should be capable of performing/aiding advanced statistical modelling and analysis including but not limited to correlation, regression, scoring, ranking, clustering, network plot, decision trees, scenario analysis, ANOVA etc.
- b. **Persona Based Analysis:** The proposed system should have advanced clustering and segmentation capability and should provide persona based segments for analysis based on user profile and behaviour. It would provide a window to understand what the Users are doing on the system and what they are not doing, specifically analysing each Users focus/usage area, and hence improve the services quality and the content as well as features/functionalities related to it.
- c. **Predictive Analysis and Forecasting:** The system should have the capability of generating predictive statistical models. It should be capable of capturing patterns and signals in data, analyse them and provide insights into future trends in the form of graphs and charts, based on certain parameters, statistical modelling and historical data. These may be used by the Authorized Users to identify trends at certain location/period and take appropriate decisions. The tool should provide enhanced forecasting capabilities with Scenario Analysis allowing users to see impact of variable values on the forecasted trend
- d. **Fraud/Anomaly Detection:** The system should display alerts/information, based on certain pre-defined criteria, if there is any deviation from the standard trend/output. Access to such information/reports should be restricted to certain authorized Users/decision makers only. These may be used by users for decision making purposes or further investigations as required.
- e. **Outliers/Inliers Detection:** The system should utilise complex algorithms to determine the Outliers/Inliers as per requirements defined by various stakeholders, graphically as well as analytically. The system is envisaged to constantly evolve and assist authorised Users to determine the parameters for detecting outliers.
- f. **Statistical Scoring:** The solution needs to have capability to score the partners bases on social and financial performance on a quarterly basis that combines business rules, anomaly detection and advanced analytic techniques. The solution needs to have capability to calculate the deviation for each agency and Skill counsel. The solution

should have capability to calculate risk scores based on specific characteristics of the activity including geographic zones etc.

The key requirements for Analytics/BI solution are mentioned below:

- a. Unstructured Data Analysis: The majority volume of the data handled by the portal is expected to be unstructured, and hence proposed solution should be extremely capable of handling unstructured data. The solution should be able to accept commonly used text sources like word, pdf, xls, xml files. There should be mechanism to convert data not in ready text format (webpage, pdf etc.) to text and also the functionalities to identify and extract entities such as names, persons, organisations/companies and locations from text data. It should also be able to use a customized list of entity pattern (such as PAN card, UID numbers etc.) based on rules
- b. The solution should create a single source of truth by integrating disparate data from multiple sources and use that for analysis.
- c. The solution should have built-in, or integrated tools for enterprise grade ETL operations from a large array of traditional and non-traditional data sources and should have high performance transformation capabilities
- d. The solution should provide for Data Mining through the use of powerful wizards that can help create complex data mining models quickly and should support simple but rich set of APIs to extend the use of the Data mining models.
- e. The Reports generated by the system should be made accessible through an interface to be viewed by the authorised users. The tool should enable different types of users to perform analysis on data across the Enterprise without the need to Subset/sample/create multiple views of data. The interface for the authorised users should be simple with user friendly features like dropdown list, drag and drop utilities etc., and should be built with focus on users with elementary statistical knowledge.
- f. Proposed solution should be capable of seamless integration with leading Office tools both for import and export of data and reports in multiple formats. The solution should allow data to be accessed from any industry standard data source using native connectors. It should also allow data load jobs to be scheduled to automate the process of loading data into the system for Analysis.
- g. Proposed solution should have capabilities for online analytical processing
- h. Proposed solution should have embedded Advanced Analytics and statistical tools capable of performing advanced statistical modelling and analysis on data (including but not limited to regressions, ANOVA, clustering etc.).
- i. The proposed solution should support geospatial and locational intelligence
- j. The analytics and reporting solution should integrate a market leading Data Visualization tool capable of interactive visualizations. Preference would be given to tools with auto charting facilities
- k. The proposed solution should be capable of search based data discovery
- l. All tools in the solution should comply with same security, access, administration attributes.

- m. The solution should have support for Big Data sources. The tool should be able to analyse big data and generate visualizations on the fly, without any performance degradation. Features like generating word clouds or creating network plots are required.
- n. Solution should be capable of generating highly formatted, interactive reports/dashboards with or without parameters. Should also have strong ad hoc report generating capabilities
- o. The solution should provide for a browser based interface to view reports
- p. Should allow for connectivity with leading RDBMS (Oracle, DB2, SQL Server, Teradata etc.). Preference will be given to solutions which have the ability to be used on market leading database appliances. Compatibility to leading Operating Systems is must.
- q. The solution should have the ability to format (page size, row, columns, fonts, colours, tables etc.).
- r. The solution should allow for data manipulation (slice & dice multidimensional data on the fly, pivoting, sorting, Ranking, rearranging columns, etc.). The solution should have drill-down capabilities (ability to drill down to various levels of a hierarchy).
- s. The solution should have the capability of raising exception alarms (e.g. email notification). The solution should provide for exception reporting (ability to set certain thresholds).
- t. The solution should have user friendly GUI to allow easy generation of reports and exporting capabilities (ability to export resulting data to other applications such as Spreadsheet, Notes, CSV.).
- u. The solution should have integration capabilities e.g. ability to integrate in existing portal. The solution should be able to publish all the reports on the portal and have the ability to archive reports and use in Enterprise Content Management System.
- v. The solution should be able to distribute reports and also have the ability to save data for later use or to a local PC/laptop or for other users to view. It should support offline viewing. It should be able to send reports electronically to other users.
- w. The solution should be able to sort/filter without re-querying
- x. The solution should have the ability to schedule reports
- y. The solution should have the capability to provide refresh-only capability to a user group.
- z. The solution should provide a rich set of data mining features that can be used for classification, regression, clustering, detection of outliers and anomalies, feature extraction, association analysis etc.

The solution should support information exchange between the data mining tool and the Analytics tool so that inputs for data mining can be taken from analytics tool and vice – versa on a common user platform.

Note: It is required that the analytical reports should be aggregated/clustered at various levels, based on requirements defined by various stakeholder. These aggregations/clusters should cover at least the following, but not limited to:

1. Geographical clusters

2. Industrial clusters
3. Demographic clusters
4. Socio-economic clusters

10. Sentiment Analysis:

- a. Should be capable of performing sentiment analysis of unstructured data, in form of texts mainly (and other forms), and coming up with insights on customer attitude and response.
- b. Preference would be given to solutions capable of analysing languages supported by portal, besides English
- c. Should be capable of real time processing of information
- d. Should have in built predictive analytics capabilities
- e. Should be capable of capturing feeds from multiple sources (like social media), analyse them and come up with insights. The analysis should be real time so as to ensure continuous tracking and detecting shifts in sentiment
- f. Should have intelligent sentiment classification capability
- g. Should support APIs and integration to portal, and also mechanism to modify the sentiment keyword
- h. Should come up with advanced Search/Mining engine to as to enable comprehensive capturing of texts/sentiments
- i. Should have strong filter and parsing capabilities to remove noise from the feed and compare the content with predefines sentiment glossary

11. MIS Reports: This reporting feature of SWAYAM is envisaged to allow authorized Users the ability to have a customized view of the entire list of reports they use or wish to use. Required security will be applied to this module providing a restricted access as per different category of Users within the SWAYAM ecosystem. This module will be further linked to the Personalized Dashboard where the same links to these reports can be displayed in small portlets, so that any User may not always search for their frequently used reports from the Reports module, and they can add it to their own Dashboard for ease of use. All the reports made available need to be controlled through 'Admin' module for variable access depending upon the nature and status of the User. The access control list of the reporting servers needs to be mapped and configured with the admin access control policies.

Following are the kinds of reports proposed as part of SWAYAM, but not limited to:

- a. **All/Fixed Reports** – This subsection within the Reports module will have a list of all fixed reports as a hyperlink, which will display the reports as per pre-defined logic/query on the screen, with the option of exporting the report to different formats (PDF, HTML, word, spreadsheet or comma separated values), Print and/or Save the reports. All these may be one click fixed reports or maybe dynamic to allow changes to only certain parameters (like date or period range, location, etc. though dropdown fields) in the pre-defined query and then execute the command to prepare the report. The Users will also have the option is make the

selections as 'Default' so that every subsequent time the reports are generated on a single click as per the selected parameters, without having to change those every time.

- b. **Custom Reports/Adhoc Reports** – An UI interface will be provided to specific users that will give them view of the solution database providing the ability to generate custom reports as and when required by selecting any particular field, table or column (as per Database design) by drag and drop feature. The UI will help form simple queries and execute them by providing the user with ability to select fields/tables from the display and enter certain basic parameters. The filter criteria and other user friendly features will also be provided for ease of use. The screen view of the report will be displayed and then the user will have option of exporting it to different formats as also mentioned above. The key features of this functionality will be as follows:
 - i. This functionality will be permission restricted. Based on the type of rights/permissions granted to any user, they will have ability to view the tables of the solution database through the User interface.
 - ii. Report Builder tool may be used to implement this functionality so that Users can easily create and execute queries by only entering the basic parameters. However the decision of SWAYAM in this matter will be final and binding on all parties concerned.
- c. **My Reports** – This subsection will have a list of reports as a bookmark that is frequently used by the internal users, as a kind of personalized section displaying only the preferred reports for any User. These frequently used reports will be a subset of the All/Fixed reports and would be bookmarked to appear on his/her personalized dashboard also, as customized by the individual Users.
- d. All the required reports, by each of the stakeholders/Users, must be immediately generated. The solution architecture and the Database design must enable fast retrieval of data, supported by optimized solution interface.

12. Mobile Application Management:

- a. Should provide an enterprise App Store, hosting different Apps, including the solution App. Should be able to support Apps built using any mobile app technology
- b. Should enable App development and Support for both Smartphones and Tablets, along with App delivery, licensing and configuration
- c. Should have features to assist in Device Activation and provisioning
- d. Should support version tracking and centralized updates of app versions across devices remotely. Should have functionalities to ensure secure App deployment and also to enforce regular updates remotely
- e. Should provide App Security features allowing remote administrators to handle user management, data encryption, data backup and compliance.
- f. Should provide Role Based Access control
- g. Should be able to capture and track all events at device and console. The information should be visible from remote admin consoles.
- h. Solutions with integrated Mobile Device Management functionalities would be preferred.

- i. Should support Single Sign-On
- j. Should come with mobile threat prevention and recovery system
- k. Should support authentication using digital signatures
- l. Should provide facilities for secure App connectivity, ensuring secure connectivity for Apps.
- m. Should have facility to download and upload files, including eForms

1.1.9 Layer 9: Database and Data Quality Management



As part of the scope of work, the SI will be responsible to provide server and client user licenses for Database & database tools, as required. SWAYAM reserves the right to procure the licenses, as per actual requirement and from time to time, through the SI.

Some of the key requirements for the Databases are mentioned below:

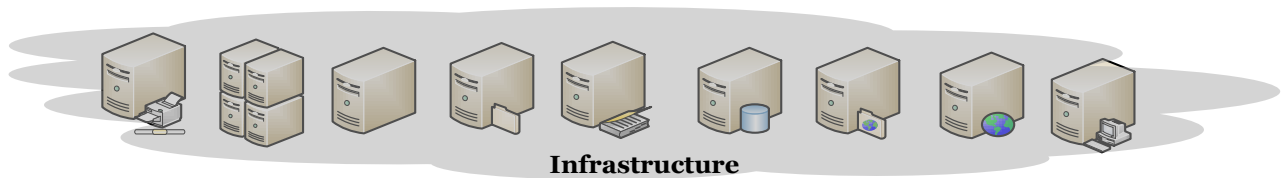
1. Operational Database Management:
 - a. All the applications implemented should have provision for optimizing the number of static connections to the database using connection pooling. All the applications implemented should also optimize the duration of connection to the database by using techniques like session time out.
 - b. SI should calculate for total number of RDBMS Licenses (Processor license as well as Named user) required for stated scope. The number of licenses required for RDBMS database and its licensing basis i.e. processor or named user should be explicitly mentioned by the SI in consultation with MHRD
 - c. Database should have perpetual and enterprise wide licenses. They should have proven scalability credentials to cater to any system load.
 - d. It should provide Unicode support.
 - e. It should support User-defined Data Types & User-defined Functions.
 - f. The database should support database encryption, backup encryption and support for external key management.
 - g. Database should support advanced data compression, self-healing and deployment in various cluster topology.
 - h. Database should support multiple languages such as English, Hindi and other Indian languages.

- i. Database should be compatible for hosting on various industry standard platforms such as Windows, AIX, UNIX, LINUX etc.
- j. The database platform should support enhanced configuration and management of audits.
- k. The database platform should support Failover Clustering and disaster recovery solutions.
- l. It should support online indexing operations and parallel indexing operations
- m. Database should support Schemas, Roles Based Privileges & Authentication.
- n. The data platform should support policy-based system for managing one or more instances across enterprise
- o. It should provide a scripting shell that lets administrators and developers automate server administration
- p. Other than built in database access logic in application, a separate database security layer will be required to control direct access to database server by any unauthorized user.
- q. It should support Module Signing using Certificate
- r. The database platform should support defining resource limits and priorities for different workloads, which enables concurrent workloads to provide consistent performance
- s. Database security should provide different layers of database users with overall control of database security administrator, only authorized database administration users with assigned privilege should be allowed to access database.
- t. A separate audit trail should be maintained for any direct modification, deletion and addition in RDBMS database in database structure or records. User, even the database administrator should not be allowed to tamper with audit log. Database server should support most granular column encryption to encrypt sensitive data.
- u. The selected RDBMS should have abilities for fault tolerance, linear scalability, mixed workload capability
- v. Database should support option of different partitioning schemes within the database to split large volumes of data into separate pieces or partitions, which can be managed independently. It should support physical columns. The partitioning should enhance the performance, manage huge volumes of data and should provide foundation for Information Life Cycle Management.
- w. The RDBMS should preferably provide options for Automated/manual performance analysis with diagnosis of the cause of performance related issues with possible resolutions.
- x. RDBMS licenses should be unrestricted and full use licenses (read, write and modify).
- y. RDBMS should allow storing scanned images, text documents, XML, multi-media inside the tables. It should be part of the basic database distribution without any additional cost to the organization.

- z. RDBMS should provide strong encryption capabilities within database for stored information in the tables as well as the information transmitted over network.
 - aa. RDBMS should support the separation of security functionality from application functionality and database administration functionality.
2. **Data Quality Management:** During the Data Quality Assessment and review by SWAYAM or any external agency, any corrections required should be identified in the data migrated by the SI, if any, and the SI shall correct and re-submit the data. Any corrections identified by SWAYAM in the migrated data during Data Quality Assessment and Review should be addressed by the SI at no additional cost. Data inter-linkages should be done by the SI with other external systems such as NPR/UIDAI, PAN and/or with other national IDs as directed by MHRD. The key requirements with respect to DQM are mentioned below:
- a. Solution should provide data quality determination and analysis, error correction, recovery processing and related quality control procedures and processes.
 - b. The solution should have set of data access methods that support direct real time access as well as batch and Data as a Service.
 - c. The solution should have data migration service for initial loads and periodic updates.
 - d. The solution should have data migration management capability to ensure consistency as data moves across the real time enterprise.
 - e. A flexible, extensible and open data model to hold the master data and all needed attributes (both structured and unstructured). In addition, the data model must be application neutral, yet support OLTP workloads and directly connected applications.
 - f. The solution should have metadata management capability for items such as business entity matrix relationships and hierarchies.
 - g. The solution should have source system management capability to fully cross-reference business objects and to satisfy seemingly conflicting data ownership requirements.
 - h. The solution should have data quality function that can find and eliminate duplicate data while insuring correct data attribute survivorship.
 - i. The solution should have set of data quality functions that can manage structured and unstructured data.
 - j. The solution should have a data quality interface to assist with preventing new errors from entering the system even when data entry is outside the applications themselves.
 - k. The solution should have continuing data cleansing function to keep the data up to date.
 - l. The solution should have internal triggering mechanism to create and deploy change information to all connected systems.
 - m. Data should be sufficiently accurate for the intended use and should be captured only once, although it may have multiple uses.
 - n. Data should be captured at the point of activity.

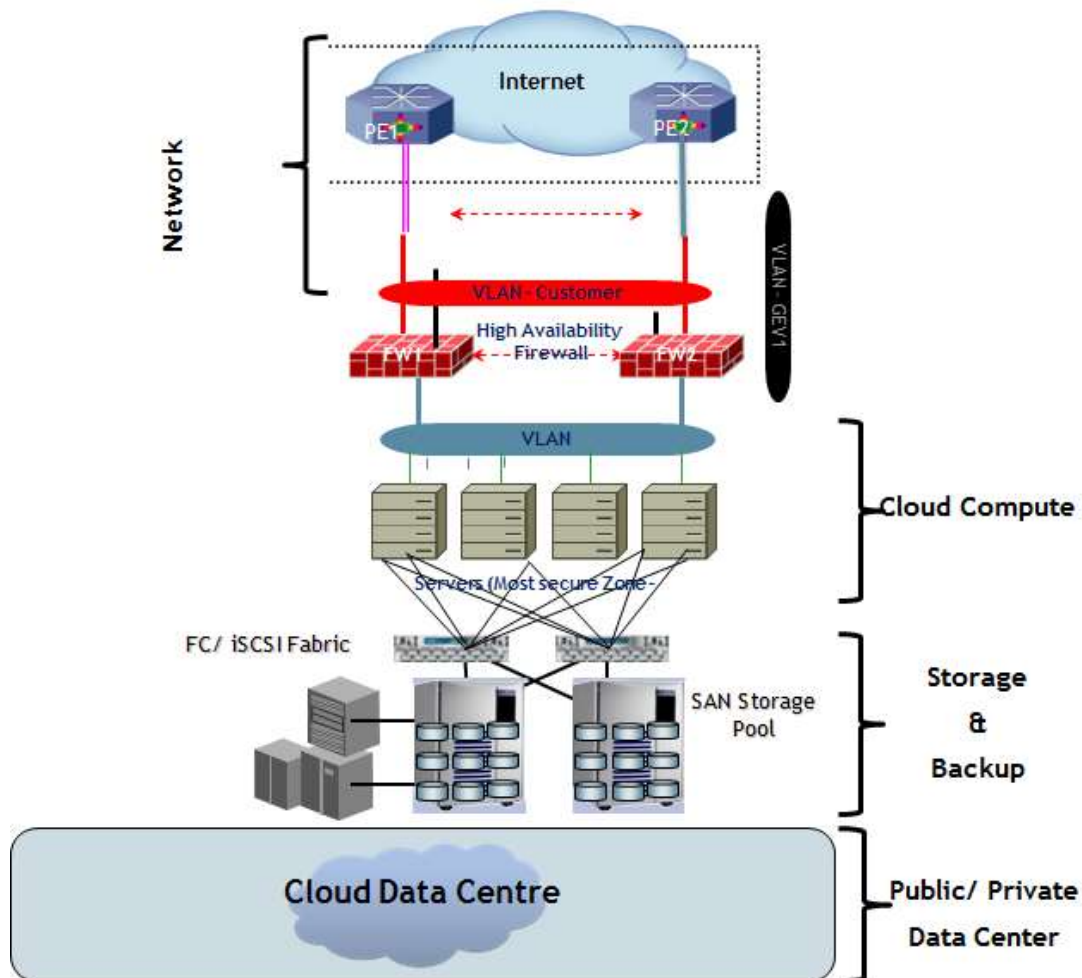
- o. Where appropriate, base data, i.e. denominators and numerators, will be input into the system which will then calculate the result.
- p. Data should be recorded and used in compliance with relevant requirements, including the correct application of any rules or definitions.
- q. Relevant guidance and definitions should be provided for all statutory performance indicators.
- r. Data should reflect stable and consistent data collection processes across collection points and over time.
- s. Progress toward performance targets should reflect real changes rather than variations in data collection approaches or methods.
- t. Source data should be clearly identified and readily available from manual, automated or other systems and records.
- u. Protocols should exist where data is provided from a third party.
- v. Data should be captured as quickly as possible after the event or activity and must be available for the intended use within a reasonable time period.
- w. Data must be available quickly and frequently enough to support information needs and to influence service or management decisions.
- x. Data captured should be relevant to the purposes for which it is to be used. This will require a periodic review of requirements to reflect changing needs.
- y. Data requirements should be clearly specified based on the information needs of the stakeholders and data collection processes matched to these requirements.
- z. A periodic assessment of information needs to be undertaken to verify the completeness of data
- aa. The data shared by any other sources should be cleansed and de-duplicated by using algorithms and migration scripts by the SI after a mutual agreement with MHRD. SWAYAM reserves the right to decide the names of the States whose data will be migrated, cleansed and seeded in phased manner.
- bb. This refined data may subsequently be seeded with National ID (NPR/UIDAI). The solution will generate sequence number for each stakeholder who registers on the portal. This in turn may be linked with National ID.
- cc. The system should have the capability to identify the duplicate data and standardize the same
- dd. The system should allow comprehensive data validation techniques before saving data to the database

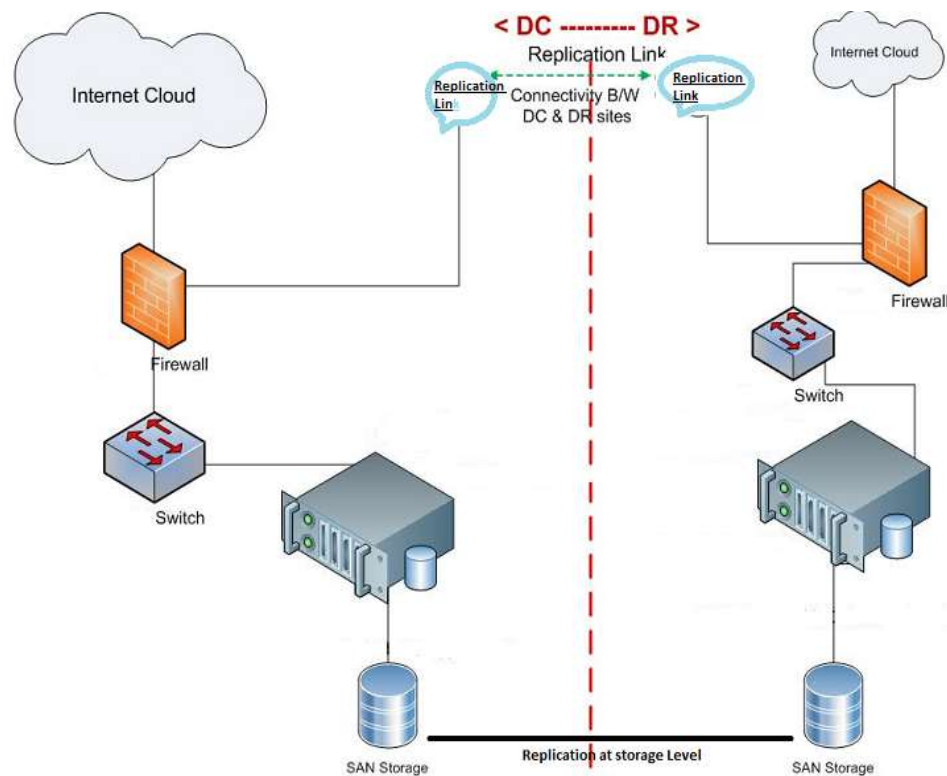
1.1.10 Layer 10: Infrastructure



It is a necessary requirement that the underlying infrastructure of SWAYAM should be able to support the technical platform and performance levels of the entire solution. *MHRD will procure Infrastructure, based on bidder's recommendations.*

The proposed Cloud and DC/DR architecture is shown below for reference.





The key requirements envisaged for the IT infrastructure design for SWAYAM are mentioned below:

1. All the modules should be maintained in redundancy with Active-Active/Active – Passive Clustering based on the requirements, architecture and performance.
2. SI will need to provide the published benchmarks for the stated systems along with the sizing assessment sheet being certified by the OEM for the stated systems:
 - a. Servers should be sized to ensure optimal power and space usage.
 - b. The database layer should utilize the database servers for consolidating the database requirements. The architecture should provide both vertical and horizontal scalability.
 - c. The systems architecture should clearly highlight the strengths e.g. reliability, availability, serviceability of individual critical components and sub components etc.
 - d. Redundancies should be maintained at different interconnecting fabrics so as to avoid any single point of failure/performance bottleneck
 - e. Networking equipment should be capable of processing IPV4 & IPV6 traffic.
3. SI should utilize virtualization technology to optimize the solution and provide benefits for the overall Cost of ownership and ease of maintenance. This should be substantiated with detailed Cost-Benefit analysis.

Note:

1. It is necessary that the Bidders should do the sizing according to the envisaged volumes of transaction and User load.

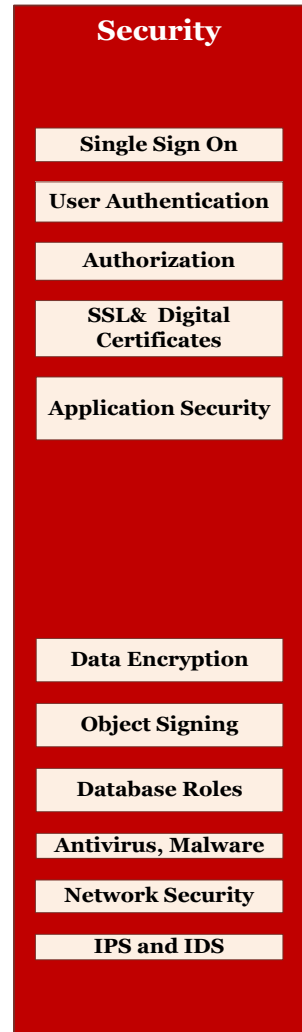
2. Bidders are required to provide a detailed Bill of Material (BOM) as part of their technical proposal. Based on the BOM provided, MHRD will reserve the right to procure part or complete infrastructure components.

1.1.11 Layer 11: Security

Security is one of the utmost important aspects envisaged in the entire solution design of SWAYAM. All key dimensions like, authentication, sessions management, context sharing and role based access control, should be an integral part of the SWAYAM architecture.

The key security requirements are mentioned below:

1. **Identity and Access Management:** The key requirements for Identity and Access Management are mentioned below:
 - a. The solution should be capable of uniquely identifying all users of the system and their activities
 - b. The solution should have the capability of providing user access rights to system and data which will be in line with the defined functional requirements
 - c. The identified solution should support both on premise and cloud implementation, or a hybrid of the two
 - d. The solution should be a directory based solution supporting LDAP
 - e. The user account management component of the solution should address requesting, establishing, issuing, suspending, modifying, and closing user accounts and related privileges, with a proper approval process
 - f. The system should be able to perform regular audits and management reviews of all accounts and related privileges
 - g. Should provide Single Sign-On facility
 - h. Should support Mobility
 - i. Should have Fraud Prevention/Detection capabilities
2. **Access Control:**
 - a. SWAYAM must ensure that the access rights of all stakeholders and users to information and information processing facilities shall be removed upon termination of their employment, or adjusted upon change. SI will need to deploy process and technical control to implement the same.
 - b. SI will create single profile/user database which will act as a master source to provide role based access to the all users.



- c. All the modules and the connector/plugin required should be provisioned and supplied as part of the solution.
- d. The solution should also have risk based and knowledge based authentication. The solution should be able to generate additional challenge response scenario based on the change in behaviour.
- e. The solution should be capable of being deployed on smart phones based on J2ME, Blackberry, Windows Mobile, iPhone and Android.
- f. Solution should have the capability to define access based on time of day, day of week or by group or user defined access
- g. The solution should have the capability to delegate the role if required for a set of specified user as decided by MHRD during the course of the project.
- h. The solution should be able to deploy and configure password policy as approved by MHRD.
- i. All the user activities should be recorded in the system. The system should provide the feature to configure the logs as and when required.
- j. The solution should have the option of blocking multiple sessions for the user.
- k. The application should support role based access control to enforce separation of duties.
- l. The application should display the last login status (successful/unsuccessful, time) to the user.
- m. The application shall limit more than one session per user or process ID.
- n. The application should not store authentication credentials on client computers after a session terminates.
- o. SI shall also deploy solution to manage administrator access the components deployed such as operating system, network, database etc.
- p. Users should not be able to browse past their user role rights. User should not be able to access an unauthorized page by entering the location into the URL.
- q. Users' activity should not be cached when handling sensitive information.
- r. The user must be made aware of and agree with the use the application will make of cookie sessions. Any information stored within the cookie must not be disseminated to third parties without the users' consent.
- s. SWAYAM should be able to deploy and configure password policy as approved by MHRD. The password policy should include the complexity requirements, password expiry, masking of password when typing, authentication for password reset etc.
- t. SWAYAM should lock out the user account upon defined number of failed login attempts. Account shall be locked out for defined duration before providing as option to unlock.

- u. SWAYAM should ensure secure session management in the application – invalidating session when user logs out, session time out, placing logout on all links that require authentication, protecting session ID, changing session ID etc.
3. **Authentication, Authorization and Single Sign-on:** There should be a provision of logging into the system through Internet as well as NKN.SWAYAM should comply with all requirements of security, reliability and non-repudiation as per the government of India guidelines. The SI will need to ensure provision for authentication using digital certificates as per the government of India guidelines. MHRD will however reserve the right to procure digital certificate for the end users whenever required.
- a. Users must be provided ‘single sign on’ functionality for the entire SWAYAM and module deployed.
 - b. Once the users enter their login credentials, the user credentials from the user authentication server database must be verified and then only the access should be granted inside the SWAYAM modules. The personal ‘Dashboard’ facility should be available for all the users after successful login as a first interface within the application. The type of information and content, to be displayed on the personal ‘Dashboard’ of Users should be dynamically controlled through the Access control module/Admin Module. However, it should be noted that for each user there should be only one session at a time should be maintained i.e. when one User logs-in to the application using his/her own credentials, then the same credentials must not be allowed to be used for logging into the application through same or different computer.
 - c. The logged in users with the adequate privileges, as granted through the ‘Admin’ module, should be able to access the modules in SWAYAM. The external Users (if granted access through well-defined registration process) should be able to register grievances, track the status and resolution, as well as provide feedback/suggestions on services, facilities, etc.
 - d. The system should provide the single sign-on facility i.e. once any Users credentials are verified, he/she should be able to navigate through all the modules and functionalities of the integrated application, to which that User is authorized to access.
 - e. The portal security solution must examine all traffic to all resources of SWAYAM and all access attempts to the portal or directly to any resource managed/access by the portal, should be intercepted by the security solution, and examined for authentication and authorization requirements defined for the resource.
 - f. Any access to end users to database should only be via application/portal authorization
 - g. The portal should also provide a dashboard to the MHRD users and other Government officials to display a summary of course content pending approval, list of course providers, course takers and examination agencies pending for verification and authorization.
 - h. Solution should allow a user to access various functions, forms, screens, sub modules, information, etc. as per the authorization and user role permitted by the portal administrator as per available guidelines and policies.
 - i. Public user can browse the portal with rights to view public content available on the website, remaining all types of users shall enter the solution using appropriate secured authorizations.

- j. The proposed solution shall support flexible definition and modification of authentication, authorization, encryption, and data integrity assertions and requirements for each security policy
 - k. The solution should support multiple authentication methods such as Username password, two factor authentication, digital certificate and Biometric based authentication. The SI along with MHRD shall roll-out strong authentication for users in phased manner.
 - l. The solution should have the functionality to provide authentication based on the role.
 - m. The application should not store authentication credentials on client computers after a session terminates.
 - n. Portal should validate the mobile number and email address provided by each registrant by means of sending confirmation passwords via both SMS and email.
 - o. Should support authentication – SMTP AUTH, POP Before SMTP, File system, Database, LDAP etc.
 - p. Authentication should be done for all valid Users. A valid User for this application should be the one who has been set-up in the application such that he/she can access the application and perform tasks as per assigned roles and responsibilities as well we access rights within the system. Authorized Users should have to access the login screen for authentication.
 - q. The application should have a configured directory of all authorized Users.
 - r. User Management should be a management and authentication feature within the application that should provide administrators with the ability to identify and control the state of users that should have right to log into the “SWAYAM” and take or provide services through it.
 - s. Through the User authentication server ‘Rights Management Services’ (RMS), there should be a form of User authentication functionality that should allow various users to access the “SWAYAM” and work as per their defined Roles and Responsibilities. Rights Management Services should be used for restricting access to rights-protected content/sections/modules/screens/Fields, etc. to authorized users only. Rights to all active users should be granted based on their hierarchy and level in the organization, designation, assigned roles and responsibilities, location etc. among other parameters. It is also proposed that the new rights can be created through the Rights Management UI interface as well as existing rights be managed through the same. The access to the section of the application should be strictly based on “Role Based Access Control” (RBAC) for the Administrator(s) only as defined in the ACCESS Policy. The details of any change in the module should be captured in the Audit Trail of the application. Also there should be facility to assign/modify/deactivate/delete rights globally for the desired Groups within the system.
4. Application Security
- a. SWAYAM must comply with the Application Security Plan and security guidelines of Government of India as applicable

- b. SI will define and follow the secure coding guidelines. Secure coding guidelines shall include controls against SQL injection, command injection, input validation, cross site scripting, directory traversal, buffer overflows, resource exhaustion attacks etc.
 - c. SI should incorporate validation checks into applications to detect any corruption of information through processing errors or deliberate acts.
 - d. SI should shall validate the data output from an application to ensure that the processing of stored information is correct and appropriate to the circumstances
 - e. Should implement secure error handling practices in the application
 - f. SWAYAM should have Role based access, encryption of user credentials. Application level security should be provided through following security controls:
 - i. Prevent SQL Injection Vulnerabilities for attack on database
 - ii. Prevent XSS Vulnerabilities to extract user name password (Escape All Untrusted Data in HTML Contexts and Use Positive Input Validation)
 - iii. Secure Authentication and Session Management control functionality shall be provided through a Centralize Authentication and Session Management Controls and Protect Session IDs from XSS
 - iv. Prevent Security Misconfiguration Vulnerabilities (Automated scanners shall be used for detecting missing patches, misconfigurations, use of default accounts, unnecessary services, etc. maintain Audits for updates
 - v. Prevent Insecure Cryptographic Storage Vulnerabilities (by encrypt off-site backups, ensure proper key storage and management to protect keys and passwords, using a strong algorithm)
 - vi. Prevent Failure to Restrict URL Access Vulnerabilities (By providing authentication and authorization for each sensitive page, use role-based authentication and authorization and make authentication and authorization policies configurable
 - vii. Prevent Insufficient Transport Layer Protection Vulnerabilities (enable SSL for all sensitive pages, set the secure flag on all sensitive cookies and secure backend connections
 - viii. Prevent Invalidated Redirects and Forwards Vulnerabilities
 - ix. For effective prevention of SQL injection vulnerabilities, SWAYAM should have monitoring feature of database activity on the network and should have reporting and mechanism to restrict or allow the traffic based on defined policies.
5. **Information Security Management System (ISMS) – ISO 27001: 2013 Certification:** It is required that the security management system should be designed, established and implemented based on ISO 27001:2013 standards. The key activities for the SI are mentioned below:
- a. Should prepare information security policy and supporting procedures for ISO 27001:2013 certifications. The policy and procedure should be submitted prior to Go-Live of business critical services.

- b. Should perform Risk Assessment and Risk Treatment Plan for the application and infrastructure based on the approved Risk Assessment Methodology
 - c. Should implement all the controls as identified during the Risk assessment and treatment plan as per the agreed timelines
 - d. Must ensure that the policies and procedures should be aligned with MHRD policies (if any) and also comply with CERT – IN guidelines.
 - e. Will ensure that all the observations highlighted during the audit are tracked to closure
 - f. Should support/provide information/documents for conducting information security audit on a periodic basis through a third party/nominated agency identified by MHRD.
6. Data Encryption, Object Signing & Database Roles
- a. All the interfaces between various applications and user are encrypted using appropriate protocols (such as HTTPS, IPSec etc.), algorithm and key pairs.
 - b. SWAYAM should support 128-bit encryption for transmission of the data over the Internet.
 - c. Object signing and encryption of attachments (documents) shall be compliant to published DeitY standards.
 - d. Proposed solution must be secured to both internal and external parties (such as through password encryption)
 - e. The Network/Transport level should include Network Link Encryption (IPSEC) and encrypted HTTP session using SSL (HTTPS)
 - f. SWAYAM should use audit controls, electronic signatures, data encryption and other methods to assure the authenticity of transaction and other relevant data
 - g. SWAYAM should treat the following events as security incidents: unsuccessful log-on, intrusion detection, malfunctioning of encryption facility, etc.
 - h. Database server should support most granular column encryption to encrypt sensitive data
 - i. SI should ensure logs include at least the following:
 - i. Authentication and Authorization events – logging in, logging out, failed logins. These should include date/time, success/failure, and resources being authorized, the user requesting the authorization and IP address or location of the authentication attempt.
 - ii. Logs of all administrator activity
 - iii. Logs for deletion of any data
 - iv. Logs of modification to data characteristics: permissions, location, field type
 - j. SI will develop a procedure for archiving the log files and ensure security of the log files
 - k. SI will maintain separate environment for production, test and development to reduce the risks of unauthorized access or changes

- l. SWAYAM should have the functionality to record all the administrator, user level activities including the failed attempts
 - m. Should protect logging facilities and log information against tampering and unauthorized access
 - n. SI will prepare the information security baseline document for all the infrastructure components such as database, operating system, router, switch etc. based on CERT-In technical guidelines and best practices.
 - o. SI should make provisions for secure content management on the portal.
7. Privacy policy and notice
- a. SI should develop a privacy policy to be posted on the web portal. Privacy policy should be in line with the Information Technology (Reasonable security practices and procedures and sensitive personal data or information) Rules, 2011
 - b. Privacy policy should include at least the following:
 - i. Clear and easily accessible statements of its practices and policies
 - ii. Type of personal or sensitive personal data or information collected under rule 3 of the above Information technology rules, 2011
 - iii. Purpose of collection and usage of such information
 - iv. Disclosure of information including sensitive personal data or information as provided in rule 6
 - v. Reasonable security practices and procedures as provided under rule 8
 - c. SI should include a provision for user consent on the privacy policy before the personal data or information is collected from the user. Consent should be in the form of opt in
 - d. SI should include in the consent, statements on transfer of personal data outside India (through cloud services etc.) and opt in consent from the user shall be taken for such transfer to happen
 - e. SI should provision in the web portal for user to opt out of information sharing and in such cases user shall be information of discontinuation of services by the organization
 - f. SI should ensure compliance to the IT act 2008, Amendment 2008 and Information Technology (Reasonable security practices and procedures and sensitive personal data or information) Rules, 2011

1.1.12 Layer 12: Compliances, Regulation and Policies, Government of India Guidelines

Compliance, Regulation and Polices. Govt Of India Guidelines

The SWAYAM must comply with DeitY's security guidelines, compliances, regulations and other guidelines as well as policies. The technical solution of SWAYAM must be in conformance with

eGovernance Standards of DeitY. The entire SWAYAM solution must be capable of incorporating any changes as a result of changes in the regulations and policies of the government from time to time.

1.2 SWAYAM Portal - Other Requirements

An indicative set of requirements is given below:

1.2.1 General Features

- a. The portal authentication system should support authentication using industry standard protocol LDAP
- b. The portal authentication system should support OAuth 2.0 based Federation Protocol
- c. The portal will be able to grant specific access rights to each login as per the business requirement and policy of the MHRD.
- d. The portal should support HTML 5.0, and CSS 3.0 based responsive and adaptive design to support PC, Tablet and Smart Phones (Windows 8.1 & above, iOS 8 & above, and Android 4.4 & above). The portal should be backward compatible with platforms released 3 years back.
- e. Portal must support Mozilla Firefox (40 and above), Google Chrome (45 and above) and Microsoft Edge/Internet Explorer 10 and above. The portal should be backward compatible with browsers released 3 years back.
- f. The portal should support techniques for search engine optimization. All content published must have a properly formatted URL and allow pages to contain custom tags for search optimization and analytic tools.
- g. The portal should be hosted on secure SSL channel for security sensitive activities like Login, profile update etc.
- h. All personally identifiable user information (PII) stored in the database should be encrypted using strong cryptographic algorithm.
- i. The portal architecture and design should support N-tier architecture for better scalability, performance, availability and supportability and high availability at each layer
- j. Web frontend layer should support auto-scaling of resources based on configuration parameters to handle increase or decrease in user load
- k. Cache technique should be used for static content
- l. Cache technique should be used for user session management.
- m. Session management should be outside the web frontend layer
- n. The data scalability and manageability should be integral part functionality of the database.

- o. Disaster recovery and business continuity with RPO and RTO as defined in Section 2.3.2 below.
- p. Portal should be scalable to 10 Crore total user base including students, educators and admins.
- q. Portal should be able to host 10000 courses and a total of 2 lakh hours of video content.
- r. The proposed solution should provide comprehensive and easily accessible on-line help facilities to the users
- s. The proposed solution should allow for a graphical interface to view the summary data in dashboard. This would include trend graphs, graphs indicating how much of the target has been met etc.
- t. The proposed solution should provide analytics and reporting on user pattern, course pattern, study patterns, etc.
- u. The proposed solution should provide support for comprehensive audit trail features such as:
 - i. Daily activities log should be merged into the history log files
 - ii. Daily activity reports should be provided to highlight all the activity being processed during the day
 - iii. Unsuccessful attempts to log-in to the system should be recorded
- v. The portal must be hosted on “gov.in” domain. (e.g. “swayam.gov.in”)
- w. Portal navigation should be multi-lingual and support the following Indian languages:
 - i. Bangla
 - ii. English
 - iii. Gujarati
 - iv. Hindi
 - v. Kannada
 - vi. Malayalam
 - vii. Marathi
 - viii. Punjabi
 - ix. Tamil
 - x. Telugu
- x. The portal must have a native mobile app on Android, iOS and Windows devices.

- y. Portal must have limited functionality access for anonymous student.
- z. Anonymous students must be able to access the portal with following features (but not limited to)
 - i. Search (Courses, taxonomy based, educator, universities).
 - ii. Browse catalogue based on educational taxonomy
 - iii. News.
 - iv. Most popular courses
 - v. Recommended courses
 - vi. Announcements
 - vii. Any static content that must be visible to Anonymous user.
 - viii. About
 - ix. Contacts
 - x. Support information
 - xi. Ability to Language change
 - xii. App download links
 - xiii. Privacy policy
 - xiv. Help
 - xv. Terms of Usage.
 - xvi. Educational Universities.
- aa. The system must provide an easy intuitive form for onboarding of the student. The portal must provide following functionality
 - i. Capture basic profile information
 - ii. Background verification done using email/SMS
 - iii. Profile approval
 - iv. Basic dashboard shown
 - v. Profile management features (update profile, change password, etc.)
- bb. Portal must be accessible by authenticated student with full functionality.
- cc. Authenticated students must be able to access the portal with following features (but not limited to)

- i. Profile management.
- ii. Search (Courses, taxonomy based, educator, universities).
- iii. Browse catalogue based on educational taxonomy
- iv. News.
- v. Most popular courses
- vi. Recommended courses
- vii. Announcements
- viii. Any static content that must be visible to Anonymous user.
- ix. Dashboard
- x. Course details
- xi. Credits and progress.
- xii. Signup for Courses.
- xiii. Launch/attend course.
- xiv. Assignments/tests
- xv. Discussion forums
- xvi. Course FAQs
- xvii. Check course pre-requisites
- xviii. Login and authentication
- xix. Course rankings
- xx. Download course content (Docs, videos, etc.)
- xxi. About
- xxii. Contact
- xxiii. Support information
- xxiv. Ability to Language change
- xxv. App download links
- xxvi. Privacy policy
- xxvii. Help
- xxviii. Terms of Usage.

xxix. Educational Universities

- dd. Once the student has registered the system must get create email Id/password. They should also be able to register their mobile number.
- ee. Efficiency/Simplicity/Flexibility: To meet the need for web sites in constant change, the system should give full autonomy to the educators to handle all aspects of web content management: Creation, editing, custom approval workflow and publication.
- ff. The Search functionality must enable to search based on
 - i. Courses title
 - ii. Subject taxonomy
 - iii. Educator name
 - iv. Universities names).
 - v. All searches must be based free text.
 - vi. Provide autocomplete for search keywords.
- gg. Solution must be able to search in below languages.
 - i. Bangla
 - ii. English
 - iii. Gujarati
 - iv. Hindi
 - v. Kannada
 - vi. Malayalam
 - vii. Marathi
 - viii. Punjabi
 - ix. Tamil
 - x. Telugu
- hh. Educator Registration/Onboarding: The system must provide an easy intuitive form for onboarding of the educator based on an invitation. The portal must provide following functionality
 - i. Capture basic profile information
 - ii. Background verification done using email/SMS
 - iii. Profile approval

- iv. Basic dashboard shown
- v. Profile management features (update profile, change password, etc)
- ii. Educator other functionalities: Educator must be able to do all general functionality on students such as search, profile update etc.
- jj. The portal should be able to provide white labelling functionality, if required.
- kk. The portal should be able to support microsites, within the main system

1.2.2 MOOC functionality

- a. The solution should provide native device app for IOS, Android and Windows with the capability to take MOOC course Offline which the student has enrolled in.
- b. Should be an integrated platform to offer Self-paced as well as Live Scheduled Courses in which Lectures can be broadcasted on the web using live video streaming.
- c. Should have the search and indexing provision for courses
- d. Should allow the instructor to create self-paced online courses with recorded videos, documents, tests and assignments
- e. Should allow the instructor to create online courses with start and end date which will have self-paced materials with Live Online Classes by the teachers where the lecture video is broadcasted live online.
- f. Should allow the instructor to let other instructor to deliver a part of the course (as a guest teacher or as a co-teacher)
- g. Should facilitate a live lecture from educators at appointed time slot, to be attended by all students who have registered for the course. This facility may be made payable at a later stage.
- h. For later viewing, this lecture should be recorded by the system.
- i. Should allow instructors to create their online content libraries with unlimited spaces for contents
- j. Should support different types of file formats viz. Word files, presentation, spreadsheet, PDF, videos, audios, Flash to be added as courseware
- k. Should be able to upload the course in SCORM format
- l. Should have easy content authoring tool to create video content from PowerPoint and upload the same to the online content library
- m. Should have the ability to deliver video stream in different bit-rates depending upon the bandwidth of each user so that the user experience is not hampered in terms of unusual buffering

- n. Should have the top tier global content delivery network as a backbone to support smooth user-experience
- o. Should support Google drive, Dropbox, Box and One Drive online storage platforms so that the teachers can easily import their contents to their online content library
- p. Should allow instructors to embed contents in the MOOCs from popular sites like, YouTube, SlideShare, Scribd, authorSTREAM.
- q. Should support encrypted and secured video streaming to prevent unwanted copying of the video contents
- r. Should allow learners to use their same ID and Password to access the MOOC content in across the devices as well as on the portal based on LDAP and OAuth Protocols
- s. Should have separate dashboard for instructor and learners
- t. Learners' dashboard should also contain the details of the courses and the learner-details
- u. Learners' dashboard should display a calendar to scheduled task and events
- v. Learners' dashboard should display available courses published by NEP so that learners can enroll themselves into their chosen course(s)
- w. Learners' dashboard should offer a discussion board for learners to post their queries and connect with peer group and teacher asynchronously also
- x. Should be able to implement Single Sign On (SSO) with the main NEP site so that learners need not sign-in multiple times to consume MOOC materials
- y. Each instructor should have the ability to create and have his own content library, outside the course, with unlimited storage space
- z. Should support for various file types (doc, pdf, ppt, mp3, mp4, wmv, avi, flv)
- aa. Should have a place to view all files in one place (dashboard of content)
- bb. Should have the upload support for large files - up to 1 GB per file
- cc. Should offer the ability to add meta data (title, description, language)
- dd. In which the instructor should have the control over download permissions for the learners
- ee. In which the instructor should have the control over assigning the contents as open (available for public viewing) or for invite-only learners
- ff. Should enable learners to view all uploaded files in the browser or through mobile apps

- gg. Should enable learners to download the content files, if allowed by the instructor
- hh. Should have text chat functionality for live communication between the instructor and students
- ii. Should have whiteboard compatible with industry standard Interactive Whiteboards and writing devices so that instructor can comfortably write and teach respective subjects
- jj. Should have supporting tools to teach inside the whiteboard e.g. math tool bar, geometric designs, text option etc.
- kk. Should support breakout sessions so that instructor can divide the students in groups for group activity during live classes
- ll. Should support learner-management tools controlled by the instructor so that the instructor can allow some learners to speak in the class or even block/remove any/many learner(s) for making nuisance in the class
- mm. Should offer co-instructor functionality for teaching assistance and co-teaching options so that instructor can seek help in the class or even can invite a guest instructor in the class
- nn. Should allow the instructor to use media files and YouTube videos inside the class as class materials
- oo. Should have in-built poll feature to conduct instant poll
- pp. Should have screen sharing feature so that if instructor requires to share her/his computer screen with the learners
- qq. Should give duration based attendance reports of the learners
- rr. Should have the functionality of extending the class duration in case the teacher needs to extend the class
- ss. Should be able to become a complete white-labelled Virtual Classroom
- tt. Instructor should be able to create a test that can be open for all learners to be attempted as decided by the instructor
- uu. Instructor should be able to create a test that can be only be started at a certain future date and time to be attempted at any date
- vv. Instructor should be able to create a test that can be closed at a certain future date and time
- ww. Instructor should be able to shuffle questions within the test
- xx. Instructor should be able to shuffle sections within the test
- yy. Instructor should be able to shuffle answer options for each question

- zz. Instructor should be able to associate a test with a course (available only to the learners enrolled in the course) or to let any learner take the test (whether he's a part of a specific course or not)
- aaa. Instructor should be able to control the number of attempts that a learner can make
- bbb. Instructor should be able to add multiple sections, to group questions, within a test
- ccc. Instructor should be able to set different scores to each question within the same test
- ddd. Instructor should be able to assign negative marks to each question as a percentage of the total score of the question
- eee. Instructor should be able to set the maximum test duration that learners can take to attempt the test i.e. time bound test
- fff. Allow or disallow learners to review the test (after the learner has answered)
- ggg. Allow or disallow learners to pause the test while they are attempting
- hhh. Save settings as template and reuse the same settings for another test in the future
- iii. Should generate reports and analytics of the learners' performance in real time
- jjj. Instructor should be able to use a rich text editor with options like using image, font change, color of the font, drawing/annotation
- kkk. Learners can see the clock while attempting the test
- lll. Total number of attempted questions
- mmm. Learners and instructors can review total time a student took to attempt the test
- nnn. Specifically indicates which questions were answered correctly vs. incorrectly
- ooo. Learner and instructor should be able to see his rank among other learners who took the test
- ppp. Learner and instructor should be able to see his percentile score
- qqq. Learner and instructor should be able to see the highest and lowest scores among all the learners who attempted the test
- rrr. Learner and instructor should be able to see archived reports of all his previous attempts to the tests
- sss. Instructor should be able to download the cumulative report (of all learners who attempted the test), as xlsx file

- ttt. Should allow the instructor to create and share assignments to all learners in the MOOC
- uuu. Should allow the instructor to add description of assignment with rich text editor
- vvv. Should allow the instructor to attach multiple files for reference with an assignment
- www. Should allow the instructor to upload files in different formats (doc, ppt, audio, video, pdf etc.)
- xxx. The instructor should be able to assign a due date to the assignment
- yyy. Learner should be able to see all assignments in one place with the information of submitted, reviewed, un-reviewed and pending status
- zzz. Learners should be able to download reference files
- aaaa. Learners should be able submit assignment by uploading a file
- bbbb. Learners should be able to re-submit assignment before the due date
- cccc. Learners should be able to post a message along with the submitted assignment
- dddd. The instructor should be able to see all assignments in one place with the information of submitted, reviewed, un-reviewed and pending status
- eeee. The instructor should be able to get an email notification when a learner submits the assignment
- ffff. The instructor can evaluate and comment on the submitted assignments
- gggg. Should track the student performance in terms of the portion consumed of a document/video so that the teacher can track their content consumption pattern
- hhhh. Should track and provide overall performance report of the learners to view the progress of the learners
- iiii. Should give an overview of the cumulative learners' performance as total MOOC analytics
- jjjj. Should give content consumption report to the teacher so that teacher can modify the content according to the need
- kkkk. The solution should be able to collect with a mechanism to export the following data-points for learning analytics
 - i. Learner data-points
 - ii. Login timestamp of each user
 - iii. Summary of progress of student in a course

- iv. Content consumption status of each learner for each content type (e.g. video content) in a course
 - v. Class attendance
 - vi. First login and last logout for each class for each learner
- III. Objects data-points
- i. ppt - pptx - pps - ppsx - xls - xlsx - doc - docx - rtf – PDF
 - ii. accessed/not accessed
 - iii. number of slides/pages
 - iv. total accessed
 - v. number accessed in each view
 - vi. wav - wma - mp3 - mov - avi - mpeg - wmv mp4 - flv - swf
 - vii. accessed/not accessed
 - viii. duration
 - ix. total time viewed
 - x. time viewed for each access
- mmmm. Live Class data-points
- i. accessed/not accessed
 - ii. Total enrollments
 - iii. Percentage attendance
 - iv. Class time
 - v. email and name of each attendee
 - vi. duration
 - vii. first login time
 - viii. Last logout time
 - ix. Recurring/not
 - x. Status of the class
 - xi. No. of recording views
 - xii. Number of enrollments in the past 30 days for a class
 - xiii. Number of enrollments in the past 30 days for all classes in the course

- nnnn. Assignment data-points
 - i. Submitted/Not submitted
 - ii. Date and time of submission
- oooo. Test data-points
 - i. Attempted/Not attempted
 - ii. Date and time of attempt
- pppp. Course data-points
 - i. Email and name of each attendee
 - ii. Approval status
 - iii. Number of enrollments in the past 30 days
 - iv. Total Number of enrollments for all courses
 - v. Number of students according to state of access of course material
 - vi. Overall progress within a course of each object type
- qqqq. Teacher data-points
 - i. Number of classes and courses conducted
 - ii. Data of each class and course as given above for each tutor.
- rrrr. Native apps which are available in popular mobile platforms viz. iOS, Android and Windows Universal Apps and available across the respective stores
- ssss. Learners should be able to use the MOOC capability from Android, iOS and Windows devices
- tttt. Learners should be able to consume Course contents (videos, documents, etc.) on mobile devices
- uuuu. Learners should be able to take test on their mobile devices
- vvvv. Learners should get the mobile notification of the MOOC activities
- wwww. Mobile application should have the capability to be white-labelled as per requirements

1.2.3 Examination module functionality

The system should automate the process of registration, printing, and checking the exams after completing the exam by students/course takers. The application should be capable of providing other functionalities such as results inquiry, examination committee's registration and reporting. Also the examination management functionalities such as setting examination details, evaluation

component criteria, examination scheduling, seating arrangement, examination attendance, mark and grade entry, result publishing, revaluation and certificate management.

The detailed functionality is as given below:

1. Setting examination details

The system should allow the following:

- a. Fix the examination Name and pattern (semester/yearly) for
- b. Multiple courses in a program
- c. Single course
- d. Link exam with evaluation criteria (internal/external exams)
- e. Deciding the examination type as regular and supplementary depending on semesters/sessions Enable repeat and when required
- f. Register students for the selected examination

2. Evaluation Component Criteria

- a. The system should allow the following:
- b. Configure exam evaluation components say quiz, programming assignment, written assignment, projects, write-up, viva voce, seminar, examinations etc
- c. Configure evaluation scheme and revisions

3. Examination Scheduling

- a. The system should allow the following:
- b. Schedule the examination date and time and making it available to respective user groups
- c. Provision for fixing a set of examination patterns for certain course such as Quiz-1, Quiz-2, and Finals
- d. Schedule invigilators for the examination
- e. Generate and print students details for each hall or prometric centre
- f. Create and allot question paper bundle
- g. Archive and retrieve question papers

4. Seating Arrangement

- a. The system should allow the following:
- b. Allot venue and hall as per examination schedule

- c. Set the seat matrix and allocating based on seat availability

5. Examination Attendance

The system should allow the following:

- a. Set attendance criteria based on examination timetable
- b. Send alert (email, SMS or both) to facilities on finalizing attendance on daily/weekly basis
- c. Generate attendance report on demand

6. Marks and Grade Entry

The system should allow the following:

- a. Issue grade submission alert to faculty members
- b. Enter internal/external marks based on subject/class/student
- c. Enable/Disable relative grading and auto calculations
- d. Set various grading strategies (such as normal distribution, step-based)
- e. Calculate CGPA through a single click functionality
- f. Link grading and promotion
- g. Generate rank lists based on student, teacher, subject, class or a combination of multiple factors
- h. Issue result declarations
- i. Search facility with various constraints/filters
- j. Perform grade analytics

7. Result Publishing

The system should allow the following:

- a. Enable/disable result view to students and faculty
- b. Publish result analytics
- c. Enable/disable web based performance report and mark list printing
- d. Issue alerts to parents/guardians about the results and grade point secured

8. Revaluation

The system should allow the following:

- a. Apply for revaluation of papers

- b. Approve and process reevaluation requests
- c. Issue alerts to faculty for re-evaluation requests

9. Certificate Management

The system should allow the following:

- a. Print TC, Conduct/Migration/Provisional certificate etc
- b. Accept certificate requests from students
- c. Issue certificates with workflow based approval mechanism
- d. Archive records for future reference

Section 2:

Scope of Work

2 Scope of Work

2.1 Overview of Bidder's Scope of Work

The scope of work for the Bidder includes Requirements Study, Solution Design, Solution Development, Testing, Implementation, Management of hosting and Maintenance of the solution for 3 (three) years post go-live of the Solution.

The Scope of the work as mentioned in various sections of this RFP is envisioned to be implemented through 4 tracks, which are as follows:

1. Track I – Portal Design and Implementation

This track includes development/configuration of the Solution from requirement study phase to go-live phase.

2. Track II - Infrastructure

This track involves readying the IT cloud infrastructure (provided by MHRD) and configuring and installing the same

3. Track III – Contact Centre

SWAYAM will require Contact Centre operations on an outsourcing model including premise, manpower and infrastructure among others.

4. TRACK IV – Capacity Building

This track involves training MHRD officials and identified course providers on the usage of SWAYAM system.

Activities that shall be undertaken by bidder for each of these tracks are detailed in subsequent sub-sections. These activities could be mapped with phases of software development life cycle (SDLC). Track wise mapping of these activities with SLDC phases is mentioned in following table:

Phase	Track I	Track II	Track III	Track IV
	2.3.1 TRACK I: Portal Design and Implementation	2.3.2 TRACK II: Infrastructure	2.3.2 TRACK II – Infrastructure	2.3.3 TRACK III – Contact Centre Operations
Requirements Study	<ul style="list-style-type: none"> ▪ Requirement study 	<ul style="list-style-type: none"> ▪ Infrastructure Requirements Study and Finalization of BoM – software and hardware 	<ul style="list-style-type: none"> ▪ Requirement Analysis ▪ Business Process Analysis 	<ul style="list-style-type: none"> ▪ Requirement Analysis
Solution Design	<ul style="list-style-type: none"> ▪ Design 	<ul style="list-style-type: none"> ▪ Business continuity planning 	<ul style="list-style-type: none"> ▪ Designing approach for Contact Centre operations ▪ Selection & Deployment of Manpower 	<ul style="list-style-type: none"> ▪ Develop courses and eLearning modules
Construct	<ul style="list-style-type: none"> ▪ Hardware/Infrastructure Configuration ▪ Develop ▪ Integration & Data Migration ▪ Testing ▪ Third Party Audit (Security and Performance Audit) ▪ Training 	<ul style="list-style-type: none"> ▪ Implementing System software and tools 	<ul style="list-style-type: none"> ▪ Training 	<ul style="list-style-type: none"> ▪ Selection & Deployment of training Manpower
Implement	<ul style="list-style-type: none"> ▪ Go-Live Preparedness and Go-Live 		<ul style="list-style-type: none"> ▪ Set up IT Infrastructure (specific to SWAYAM like Toll free number) for Contact Centre Operations 	
Operate & Review	<ul style="list-style-type: none"> ▪ Hand-holding support 	<ul style="list-style-type: none"> ▪ Warranty ▪ Documentation 	<ul style="list-style-type: none"> ▪ Reporting ▪ Monitoring 	<ul style="list-style-type: none"> ▪ Feedback collection and analysis

2.2 Tentative Implementation Plan

Entire project as mentioned in the above section and in detail in further sections would be implemented by 15.05.2016. However, there are certain functionalities that are business critical and required to be enabled on priority basis by 31.03.2016. Rest of the functionalities and scope has to be completed by 15.05.2016.

The key business critical service categories that are envisaged to be completed by 31.03.2016 and 15.05.2016 are mentioned below for reference:

1. Phase 1: Business Critical Services Go-Live (3 months from T₀)

- a. Course taker registration and profile management
- b. Educator registration
- c. Course upload and availability to course taker
- d. Basic reporting

2. Phase 2: Final Go-Live (4.5 months from T₀)

- a. Advanced reporting
- b. Performance Testing
- c. All other features and functionalities

Tentative implementation plan based on the above timelines is shown below:

Activities	Weeks																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Successful Bidder Onboarding	█																	
Planning	◆																	
Requirement Assessment and Design of Solution		█	█	◆														
Setup of Development Environment on Bidder's infrastructure		█	█															
Procurement of System Software			█	◆														
Installation and user acceptance of all System Software components				█														
Phase 1																		
Development of Business Critical Functionalities					█	█	█	█	█	█								
Solution acceptance of Business Critical Functionalities											█							
Go live of Business Critical Functionalities												◆						
Phase 2																		
Development of remaining Functionalities													█	█	█			
Solution acceptance of entire solution																█	█	
Final Go live																		◆

2.3 Detailed Scope of Work

2.3.1 TRACK I – Portal Design and Implementation

The Bidder shall be entirely responsible for proposing the Solution which satisfies all features, functions and performance as described in this document. The bidder shall be responsible for design, development, and implementation of the proposed solution.

The following outlines the scope of work to be performed by the bidder during this track:

2.3.1.1 Requirement Study

The bidder shall perform the detailed assessment of the Solution requirements as mentioned in Section 1. Based on the understanding and its own individual assessment, Bidder shall develop & finalize the Functional Requirements Specifications (FRS) and the System Requirement Specifications (SRS) in consultation with SWAYAM and all the stakeholders mentioned in Section 1.1.1. While doing so, Bidder at least is expected to do following:

- a. Bidder shall liaise with stakeholders (and/or their designated agencies)
- b. Bidder shall bring in domain experts during the study.
- c. Bidder shall translate all the requirements mentioned in the document into System Requirements.
- d. Bidder shall follow standardized template for requirements capturing.
- e. Bidder must maintain traceability matrix from SRS stage for the entire implementation.

2.3.1.2 Design

The bidder shall design the solution architecture and specifications for meeting the requirements mentioned as part of this RFP. The Bidder shall be entirely responsible for the design and architecture of the system implemented to satisfy all requirements as described in this document including sizing of the required hardware. Solution architecture description provided in this document is for reference only and the Bidder is expected to provide the best solution which can address the requirements mentioned in this RFP.

The system architecture for the Integrated Solution shall be designed, developed & delivered as per following:

- a. General Guidelines
 - i. The system architecture should be based on open industry standards and protocols
 - ii. The system will be centrally deployed and globally accessed.
 - iii. The system shall be designed to be scalable and easily extensible.
 - iv. The system should be flexible to cater to changing business, industry and compliance requirements (including reporting requirements in proper formats)
 - v. India centric version as required by any of the modules shall be implemented

b. Applications

- i. The Solution design should be a 3-tier services based architecture for all environments
- ii. The Solution design should focus on developing workflow and business transaction, rules management, configuration management
- iii. All applications must take into account appropriate security, performance, efficiency and maintainability issues
- iv. The ownership of the product licenses would be with MHRD
- v. The products which would be part of the Solution must be of the latest commercially available Indian version
- vi. Products must be supported in terms of upgrades, bug fixes, functionality enhancements and patches to cater to changes to statutory requirements by their respective developer organization for a period of not less than three (3) years from the date of procurement
- vii. Upgrade to new releases should not become mandatory for the next three years from the date of installation.

c. Integration

- i. The integrated solution design should include Integration Framework for integration of both internal and external applications and services
- ii. The Integration framework should use SOA enablement for the underlying applications

d. Data

- i. Data will be owned, shared, controlled and protected as a corporate asset of the MHRD
- ii. Data should only be accessed through application/interfaces for create, update and delete. There should not be any direct access to the data layer for users
- iii. Bidder shall provide the details of data synchronization strategy both in batch mode and in real time

e. Data Security

- i. Bidder shall provide strategy to maintain data security at the application level
- ii. Bidder shall provide strategy to maintain data security at the database level
- iii. Bidder shall provide strategy to maintain data security at the messaging and middleware level
- iv. Bidder shall provide security strategies when the applications are accessed from outside the network or accessing resources outside the network.
- v. Bidder shall provide strategies of encryption and security for external transaction with partner network and systems

2.3.1.3 Develop

The bidder shall carefully consider the scope of work and provide a solution that best meets MHRD's requirements. The Solution developed may or may not be mix of Custom Development and Products with Customizations.

a. Products (Configuration & Customization)

- i. The successful bidder will be responsible for supplying the application, licenses, database and related software, integration tools, along with the source code and installing the same so as to meet MHRD's requirements mentioned in various sections of this RFP.
- ii. Bidder shall provision for procurement of licenses in a staggered manner as per the indicative transaction volumes. However, the transaction parameters are computed based on certain assumptions and these assumptions might undergo a change which might impact the overall transaction volumes. Bidder is expected to suggest the approach which can address this business eventuality when actual transaction volume is mark different from that of indicative transaction volume.
- iii. The Bidder shall perform periodic audits to measure license compliance against the number of valid End User software licenses consistent with the terms and conditions of license agreements, volume purchase agreements, and other mutually agreed upon licensed software terms and conditions. The Bidder shall report any exceptions to license terms and conditions at the right time to MHRD. However, the responsibility of license compliance solely lies with the successful bidder. Any financial penalty imposed on SWAYAM during the contract period due to license non-compliance shall be borne by bidder.
- iv. Bidder shall also supply any other tools & accessories required to make the Solution complete as per requirements. The Bidder shall supply:
 - Software & licenses
 - Supply tools, accessories, documentation and provide a list of the same. Tools and accessories shall be part of the solution.
 - Supply latest supported version of Database Software to support the Integrated Solution and any other software, tools and bolt-on/add-on application.
 - Product Documentation: Two sets of Product Documentation in hard copy and one soft copy to be supplied along with licenses and shall include but not limited to following:
 - Technical manuals
 - Installation guides
 - User manuals
 - System administrator manuals
 - Toolkit guides and Troubleshooting guides

- i. The successful Bidder shall identify, design and develop components/functionalities that are not covered within any product and are required to address the SWAYAM requirements mentioned in this RFP.
- ii. The Bidder shall supply the following documents along with the developed components:
 - Business process guides;
 - Data model descriptions;
 - Sample reports;
 - Frequently asked question (FAQ) guides;
 - Any other documentation required for usage of implemented solution

Bidder shall implement a system for monitoring the SLAs. The bidder shall ensure that the system addresses all the SLA measurement requirements and calculation of applicable penalties as indicated in the RFP.

2.3.1.4 Integration & Data Migration

The Bidder shall develop integration mechanism as specified in Section 1.1.4 with stakeholders such as other MOOC/elearning platforms, Indian or international universities etc.

The Bidder shall provide an interface of the Portal to the Course Providers so they can upload the content on the Portal. The Bidder shall provide the functionality to approve/reject/modify the content uploaded on the portal to the identified users of MHRD

2.3.1.5 Testing

The bidder shall provide the Testing strategy including traceability matrix, Test Cases and conduct testing of various components of the software developed/customized (e.g. including conference room pilots, unit tests, System integration tests, Stress tests, Security Testing and final user acceptance test.). Details of the testing strategy and approach should be provided in the response. The bidder is responsible to identify and inform the SWAYAM regarding testing requirements and impacts.

The successful bidder shall work in a manner to satisfy all the testing requirements and adhere to the testing strategy outlined. The successful bidder must ensure deployment of necessary resources and tools during the testing phases. The bidder shall perform the testing of the solution based on the approved test plan, document the results and shall fix the bugs found during the testing. Bidder has to perform load testing and stress testing of the solution based on next 3 years estimated business transaction volume. It is the ultimate responsibility of bidder to ensure that the end product delivered by the bidder meets all the requirements specified in the RFP. The bidder shall take remedial action based on outcome of the tests.

Bidder shall ensure that performance testing, load testing, security testing etc. other types of testing are done using LoadRunner/Silk performer/Rational Performance Tester/other tools of equal repute. Bidder shall benchmark the results of performance testing of the solution with the results that they have published in their bid. Bidder shall be responsible for procurement of licenses or other costs associated with these tools.

Bidder shall provide complete support to SWAYAM team or their representatives at the time of user acceptance testing. It would be bidder's responsibility to ensure that all issues raised during UAT are closed and signed-off from respective authority.

The Bidder is required to submit a certificate from the OEM to certify the implementation as well as provide support for the entire contract duration. The entire support cost from the OEMs should be clearly stated in the proposal and included in the commercial bid. There must not be any additional charges/cost raised to SWAYAM with regard to OEM support, for the entire duration of the project.

2.3.1.6 Third Party Audit (Security and Performance Audit)

SWAYAM shall appoint a third party auditor who shall be responsible for performing the Performance and Security Audit of the Portal. The Bidder needs to ensure that the Portal is in compliance with the Security Policy and Guidelines released by UIDAI and DeitY.

The third-party agency appointed by the SWAYAM shall conduct audit on minimum below mentioned parameters. The cost of audit shall be borne by the MHRD; however, the cost of rectification of non-compliances by the Bidder shall be borne by the Bidder. The audit shall be performed at least on the below mentioned aspects.

- a) Functional Testing
- b) Accessibility Testing
- c) Performance Testing
- d) Application Security Audit
- e) Penetration Testing
- f) Vulnerability Testing
- g) Database Server Controls

The illustrative deliverables for this activity are mentioned below.

1. First Round Audit Report (by Auditor)
2. Rectified solution and submission of next round of audit (by Bidder)
3. Next Round Audit Report (by Auditor)
4. If required, Rectified solution and submission of next round of audit (by Bidder)
5. Compliance Confirmation by the Auditor (by the Auditor)

2.3.1.7 Hand-holding support

Bidder shall also provide hand-holding support to MHRD personnel for a period of three months from the date of Go-Live of respective application. These personnel must be clearly identified exclusively for this role.

Bidder shall provide at least 2 people for hand-holding support at MHRD

2.3.1.8 Go-Live Preparedness and Go-Live

- a. Bidder shall prepare and agree with MHRD the detailed plan for Go-Live.
- b. The Bidder shall define and agree with MHRD the criteria for Go-Live and the timelines for the same.
- c. Bidder shall submit signed-off UAT report (issue closure report) ensuring all issues raised during UAT are being resolved prior to go-live.
- d. Bidder shall ensure that Go – Live criteria as mentioned in Go – Live plan is met and take approval from SWAYAM team on the same.
- e. Go-live of the application shall be done as per the finalized and agreed upon Go-Live plan
- f. Bidder shall not have more than 2 go-lives as mentioned in implementation plan in this RFP.

2.3.2 TRACK II – Infrastructure

This track is related to the configuration of infrastructure which will include server, storage, security devices and related system software. Bidder shall assess and recommend the IT infrastructure based on the solution proposed; however, the baseline technical requirements provided in this RFP in Section 5 have to be complied with.

IT Infrastructure is required to support the Envisaged Transaction Volume mentioned in Section 1.

Please note that MHRD will procure cloud infrastructure based on BOQ given by the selected bidder. The bidder does not have to procure any physical infrastructure.

The transaction volume mentioned in Section 1 is estimated as on date based on certain assumptions. However, due to all practical reasons and changing business requirement, that estimate may change and plans will be modified. The Bidder shall in accordance with MHRD take up upgrade initiatives. Bidder should provide detailed upscaling plan during tenure of the contract.

Activities for this track are as follows:

2.3.2.1 Infrastructure Requirements Study and Finalization of BoM

Bidder shall perform the detailed assessment of envisaged solution requirements and assess the infrastructure requirements (including Servers, Storage and Security etc.) for 1) Operationalization of the SWAYAM solution and 2) To provide the services to all the stakeholders in conformance with the SLA as mentioned in Section 4.

Bidder shall also provide, along with the bid, published benchmark report for the infrastructure recommended by the bidder.

During the proposal preparation the bidder shall:

- a) Review the technical specification and propose necessary additional infrastructure as per the latest specifications (including software and hardware), in its technical and commercial proposal, required for this project.

- b) Consider that the Infrastructure proposed by bidder shall address the performance, security and availability requirements as stated in the RFP.
- c) Consider the requirement of necessary redundancy/backup in the servers through clustering implemented in active-active or active-passive mode to meet availability and performance requirements of the solution. While finalizing the BoM for the solution, bidder shall ensure compliance to technical specifications of solution components as mentioned in this RFP.
- d) Ensure that all solution and software components (including products, tools and technologies etc.), which are being proposed for MHRD are at least 5 years away from its end of life.
- e) Do a detailed assessment and prepare a detailed network and system deployment architecture. This would be done keeping in mind the requirements being mentioned in the RFP.
- f) Design the solution and propose the hardware to comply with defined RTO/RPO and backup window, which is as follows:

S. No.	Application	RPO	RTO
1	Core Functions: CRM, Portal, Content Management System, E-forms	15 Minutes	30 Minutes
2	Other Functions: Data Warehousing, Analytics, ETL, Profile assessment,	2 Hours	4 Hours
3	Backup window	6 Hours	

Bidder shall also ensure that the DR facility is being sized to provide 100% performance level as of DC for Core functions as being highlighted above. For other set of functions, the solution should at least provide 60% of the performance level at the DR site. The solution for the same should be described in detail in the proposal. It is being suggested to carry out minimum 1DR drill, over a period of 6 months.

2.3.2.2 IT Infrastructure Installation

- a. The bidder shall be responsible for operationalizing the end-to-end solution for SWAYAM as in this RFP.
- b. The bidder shall deploy the application software at the Data Centre and Disaster Recovery of SWAYAM as per the procurement cycle and shall ensure that the application software services are made accessible to the SWAYAM employees at all the project locations specified in the RFP.
- c. Bidder shall ensure that the production operations of the application stack is tested from DR on a periodic basis, once the DR is being made operational

2.3.2.3 Business continuity planning

- a. Bidder shall prepare Business continuity and Disaster recovery plan as per the ISO 22301 standard.
- b. Bidder shall ensure that the documents created should be compliant to the certifications

- c. DC and DR Integration for all modules and components should be such that it is possible to operate any module from DR in case of any disruption at DC site. Bidder may suggest a better methodology for optimal usage and cost benefits. Bidder need to provide in detail the replication methodology being utilized for ensuring RPO/RTO and also no impact on the performance for application. Bidder needs to recommend the bandwidth requirement between DC-DR to ensure compliance with SLAs and RPO/RTO requirements. The estimation should be provided with detailed assessment for each of the applications.

2.3.2.4 Documentation

- a. The bidder shall undertake preparation of documents including that of Infrastructure solution design and architecture, configuration files of the Infrastructures, user manuals, Standard Operating Procedures, Information Security Management procedures as per acceptable standards.
- b. The bidder shall take sign-off on the deliverables (documents), including design documents, Standard Operating Procedures, Security Policy and Procedures from SWAYAM team and shall make necessary changes before submitting the final version of the documents.

2.3.2.5 Data Centre Hosting Space

- a. MHRD would ensure provision of power, cooling and underlying cabling for hosting the IT Infrastructure as required in this bid. The internet/bandwidth connectivity would be provided to the bidder based on the bandwidth and internet estimations. Thus, Bidder in his proposal needs to provide following -
- Internet/Bandwidth requirements for the solution
 - Any other requirement
- b. Data Centre & Disaster Recovery will have the following components that may be used commonly and hence bidder will not be including these components in the cost:
- Power and Cooling
 - UPS, DG set power backup
 - Fire prevention
 - Physical security surveillance
 - Internet/Bandwidth connectivity

2.3.3 TRACK III – Contact Centre Operations

This track includes running a Contact Centre operations for SWAYAM for a period of 3 years from the date of Go Live of the solution.

SWAYAM envisages outsourcing its Contact Centre operations to suitable bidder, who will be responsible for operating and managing the end-to-end Contact Centre services for MHRD Bidder shall follow the implementation plan for the Contact Centre launch as mentioned in Section 2.2.

Following are the key features of the proposed Contact Centre:

No. of Seats	Starting with 30 seats & then as per quarterly reviews
Languages supported	English, Hindi, & all regional languages. Each Call Centre executive should be from either of the following categories: <ul style="list-style-type: none"> ▪ English + 1 other Indian language
Operations	As per service window mentioned in Section 2.8 and consistent with the service level mentioned in the Section 4
Accessibility	Accessible through a Toll Free Number
Quarterly Review	Quarterly review of call volumes and number of seats required to provide services

2.3.3.1 Requirement Analysis and Planning

Bidder shall understand the business processes and requirements of SWAYAM Solution and various services to be provided through the contact center.

The bidder needs to plan the set up and operations of IT helpdesk at MHRD This shall include the following activities among others:

- a. Preparing in detailed plan for helpdesk set up with timelines and activities.
- b. Preparation of the resource requirement plan for the Services to be provided, including details of experience and skill of the resources required.
- c. Identification of the Subject Matter Experts in those technology/process areas
- d. Finalization of Communication Plan with SWAYAM

2.3.3.2 Selection & Deployment of Manpower

- a. Bidder shall select & deploy the skilled and qualified manpower required for running the Contact Centre.
- b. Minimum Manpower Profile – Manpower deployed by bidder for call center should comply with minimum qualification as mentioned in following table.

S. No.	Position	Minimum Qualification
1	Customer Service executive (CSEs)	<ul style="list-style-type: none"> • Minimum 12th passed and pursuing graduation, preferably graduate or equivalent • Able to speak, read and write in English. • Able to communicate confidently and politely, with good speaking skills • Experience of at least 6 months in a Contact Centre, or in direct selling/telemarketing in the service
2	Team Leaders	<ul style="list-style-type: none"> • Must be a Graduate or equivalent • Able to speak, read and write in English • Able to communicate confidently and politely, with good speaking skills • Experience of at least 3 years in a Contact Centre, or in direct selling/telemarketing in the service industry (Fresh candidates cannot be considered) • Experience in coaching and developing skills of people • Effective problem-solving and decision-making skills

- c. Manpower profiles could be audited by SWAYAM on an adhoc basis.
- d. Bidder shall submit an undertaking with the invoice declaring the compliance to minimum manpower profile.

2.3.3.3 Training

- a. Considering the nature of the services, training is an important aspect of SWAYAM Call Center. The Bidder should make arrangements for imparting proper training in soft skills; call handling, exposure to related application so as to prepare the customer service executives to answer different types of queries, and on other aspects of Call Center services.
- b. The bidder should ensure that all the Customer service executives are put on actual duty only after providing them proper training on at least the following areas:

S. No.	Training Area	Responsibility
1	Soft Skills	Bidder
2	Application (s)	Bidder
3	Call Handling procedures	Bidder
4	SWAYAM business process related/scripts	Bidder (with support from SWAYAM team) Note: For such training sessions, arrangement of logistics, travel, etc. for the Bidder's resources shall be the responsibility of the bidder.

- c. The Bidder shall include the cost of training the resources for any new process/script/FAQ in the per seat cost quoted in the price bid.
- d. SWAYAM shall assist bidder in preparing training material (which can be further customized) for business related trainings.

2.3.3.4 Set up IT Infrastructure for Contact Centre Operations

Bidder shall arrange for Dialler and related hardware and network components for running the Contact Centre operations.

a. Call center application:

- i. The software would maintain complete call history of all calls received at the call center.
- ii. The customer service executive would be capturing all the relevant caller information in this for recording customer communication and should be integrated with required SWAYAM applications etc.
- iii. The bidder shall provide SWAYAM with all the data of this application at the time of end of contract period.

b. Toll Free Number:

- i. Bidder shall purchase the two toll free number, from two different operators.
- ii. The toll free numbers shall be property of MHRD
- iii. Numbers should be accessible from anywhere in India and from other network operators also. Customer should be able to dial this toll free number from mobile as well as landline.
- iv. Bidder shall provide the PRI line(s) to route the toll free number(s)
- v. As required in the Commercial Forms, the Bidder shall provide the cost of setting & running the Contact Centre on a “per seat” basis only.

c. Automatic Call Distributor (ACD):

ACD distributes incoming calls to agents as they are received. It should have at least the following features:

- i. System should be able to intelligently route the callers to agents based on their availability to take calls on first come first serve basis.
- ii. Standard features like Call Transfer, Conference, Barge in, Dialed Number Identification Sequence (DNIS), Automatic Number Identification (ANI), Caller Line Identification (CLI) etc.
- iii. System should announce the queue waiting time for the caller before getting attended by an agent
- iv. System shall support the ability to play customized announcements per queue as defined by the administration.

d. Other Infrastructure, but not limited to, to be provided by bidder are:

- i. Call barging and recording software
- ii. Call center executives' computers, phone sets and head sets.
- iii. Connectivity between Contact Centre & DC and Contact Centre & DR.

- e. Bidder shall ensure application required at helpdesk is implemented and working successfully.
- f. Bidder shall ensure all other infrastructure requirement for IT helpdesk personnel is complete which include but not limited to:
 - i. Desktop/laptop
 - ii. Headsets for helpdesk personnel
 - iii. Extension/telephone no. for helpdesk
 - iv. Telephone equipments
- g. Bidder shall be responsible for all communication to user in terms of IT helpdesk features/call no. for helpdesk etc. through emails, notices, posters etc.

2.3.3.5 Contact Centre Operations

Major requirements with respect to the call center operations are as follows:

- a. Call center shall service SWAYAM stakeholders in different geographical regions in India
- b. Call center services would be required for - Inbound Calls & Outbound Calls
 - i. Inbound calls

The types of inbound calls received will include but not limited to:

 - IT Related services
 - Technical issues related to SWAYAM
 - Network Connectivity
 - Account locked
 - ii. Outbound calls
 - Calls to ticket requesters
 - Calls to other stakeholders as specified by MHRD
 - Resolution, status, & updates of complaints, feedback, & IT related calls
- c. Every call received/done from the call center would be recorded in the call center application against the respective id.
- d. Each call would have a unique identifier and in case there is any query/grievance/any other request, stakeholder shall be intimated about the call id for future tracking purpose.
- e. The bidder shall render Contact Centre services in English, Hindi, & all regional languages
- f. To ensure Customer Service Quality, SWAYAM shall conduct Regular audits, Random audits and call barging

- i. SWAYAM will do a random sample survey of calls on Call Quality as well as be involved into calls without prior notification. For this purpose administration level permissions to access all sub-systems/servers to monitor and generate reports including those required for cross-verification of SLAs and related payments will be provided by the bidder.
- ii. All calls (both inbound and outbound) should be recorded. The call data from the tapes/voice logger should be archived on to hard disk every 15 days. The data on the hard disk should be stored in using such naming conventions that support easy retrieval. These records shall be retained on hard disk for another 30 days. SWAYAM might require the records to be kept for longer period of time. Commercials for the same shall be provided by the bidder along with the proposal.
- g. If it is observed by SWAYAM that an Customer service executive/team leader has misbehaved with a caller on telephone, or if complaint is received against any of the Customer service executive/team leader or if his/her performance is found to be lacking in the opinion of MHRDSWAYAM may instruct the bidder to remove such person from SWAYAM Call Center.
- h. All the issues on logging shall be assigned severity of issue. Basic guideline for assigning severity is as follows:

Severity	Definition
Severity 1	<ul style="list-style-type: none"> • More than 10 users being impacted • Security Incidents • There is a problem with entire or part of IT service which cannot be used for normal business activities impacting external users or internal users • There is a direct or indirect impact on customer satisfaction. • No work-around or manual process available
Severity 2	<ul style="list-style-type: none"> • More than 5 internal users being impacted • The efficiency of users is being impacted • Has a viable workaround
Severity 3	<ul style="list-style-type: none"> • Less than 5 internal users being impacted • No impact on processing of normal business activities. • A low impact on the efficiency of users but has a simple workaround. • Enhancement requests

- i. Bidder shall provide both on-call and on-site support to the users
- j. Helpdesk shall be responsible for coordinating with concerned vendor in case issues are pertaining to any external entity product/support like:
- i. Respective OEM team
 - ii. DC/DR support team
 - iii. Network Provider
 - iv. End User Devices support provider

- k. Helpdesk shall keep the user informed on various stages of resolution
- l. Even if the call is forwarded to external entity, coordination between user and external entity would be maintained by helpdesk along with informing the user on call status
- m. Incidents which are not meeting SLAs and which are exceptional in nature (highly critical, wider spread etc.) shall be escalated as per defined escalation matrix.
- n. Helpdesk should comply with SLAs applicable to them as mentioned in this RFP. The issue should be resolved within the defined TAT of the issue. TAT would depend upon severity assigned to the issue. Non-adherence to SLAs shall lead to imposition of penalties.
- o. Bidder shall analyse all the incidents and provide a root cause analysis report on a periodic basis for all the recurring incidents. Bidder shall ensure that resolution is provided for these problems by respective technical teams/vendors so as to prevent further issues due to the same cause. The report for the same should be submitted to SWAYAM management.
- p. Bidder shall conduct periodic employee satisfaction survey on helpdesk and ongoing support. Results of the same shall be shared with MHRD
- q. During the ongoing support provided by the bidder, SWAYAM may conduct periodic employee satisfaction survey. Based on the outcome of survey SWAYAM may request the bidder to modify or improvise the processes
- r. Bidder shall prepare and submit reports to SWAYAM team as per the mutually agreed reporting structure. These reports shall include but not limited to the following:
 - i. Incident logs (category, severity and status of call etc.)
 - ii. Incidents escalated
 - iii. SLA compliance/non-compliance report
 - iv. Problem Management

In response to the RFP bidder needs to provide its capability of managing the IT helpdesk as a part of approach & methodology. Other key factors to be addressed will be as follows:

- Bidders processes for IT helpdesk management
 - Key learning from similar previous experience
 - Escalation procedure for handling significant issues
 - Helpdesk staffing
 - Citations of managing IT helpdesk for application, infrastructure and other IT services.
- s. Disaster Recovery and Business Continuity: The bidder shall establish policies and procedures to be used for Call Center systems the event of a disaster to protect and ensure continuation of Call Center services. An alternate facility has to be provided by the

bidder that has the equipment and/or resources to recover the Call Center business functions affected by the occurrence of a disaster as per the following:

- i. At least 25% of the Normal operational status has to be restored within first 24 hours of the disaster.
- ii. Within 2 days from the day of disaster, the SWAYAM call center should be operational with 50% operational status.

2.3.3.6 Reporting

- a. Suitable reporting software should be available to generate standard report formats to measure/verify various SLAs, for monitoring the performance of agents, etc. Bidder has to provide access for report viewing by the designated officers of MHRD
- b. Reports should also be available as “On-Screen Reports” with the capability of exporting it to any user defined format such as word, excel pdf, etc. & print and email feature.
- c. The Bidder and SWAYAM will mutually agree on the format of the reports to be submitted by the Bidder to MHRD If SWAYAM requests the Bidder to provide customized reports, the Bidder will provide customized reports at no cost to MHRD The following trending reports but not limited to the following must be provided by the Bidder:
 - i. Reports based on time period
 - ii. Type of grievances/queries/demand/analysis
 - iii. Repeat request or complaints analysis
 - iv. Call waiting time
 - v. Lost calls
 - vi. Call time (Average Talk Time/Hold Time/Handle Time)
 - vii. Hourly call details
 - viii. Outbound report (Outbound Call Volume & durations)
 - ix. Complaints pending for more than defined time period
 - x. Calls Handled
 - xi. Abandoned Call Rate
 - xii. Delay Before Abandon (Average/Longest)
 - xiii. Staffing related Report
 - xiv. Other monthly MIS, SLA reports, number of agents logged in
 - xv. Any other report as requested by MHRD

2.3.3.7 Monitoring

- a. A facility should be available for MHRD's monitoring team, external & internal auditors to periodically inspect the functioning of Call Center.
- b. The monitoring team should be able to access all sub systems and records.
- c. Additionally, it should be possible to remotely monitor performance on all SLAs/KPIs and also of all the applications provided by the system i.e. calls in queue, number of agents logged in, number of agents abandoned answered calls, query of the call logs of a particular customer etc. by designated Call Center Coordinator or Call Center in-charge.

As a part of the proposal for this track, the Bidder needs to provide following:

1. Detailed approach for the Contact Centre Operation

2.3.4 TRACK IV – Capacity Building

2.3.4.1 Training

The Bidder will prepare a training portal as part of the SWAYAM Solution to provide training to the Portal users.

The bidder is required to train a set of Master Trainers as part of 'Training of Master Trainers (ToMT)' programme at the national level. Under ToMT programme, a total of 10 trainings will be conducted by the bidder for a batch size or approx. 30 people each. These 300 Master Trainers after completing the ToMT programme are expected to go back to their respective regions/institutions and provide further training to various entities and stakeholders, who are going to directly or indirectly use the SWAYAM.

The addition to training the Master trainers under the ToMT programme, the bidder is required to assist these Master Trainers while they are organizing and providing first time training at their level, by personally travelling to the training location, and assess the quality of training provided. They should record their feedback in the SWAYAM for further analysis and assessment by SWAYAM and Government officials, as required. After the first training is completed by the Master trainer, requirement for any further assistance to these Master Trainers would be decided by MHRD

The bidder is required to provide financial quotation for a per unit training cost as a part of their commercial bid. The total training cost for conducting training at the national level would be calculated as per number of training conducted i.e. 10 * per unit cost.

If however, apart from the above training requirement at the national level and assistance to Master Trainers at the regional level, one time, is not adequate and SWAYAM feels the need to conduct more number of trainings, then the same unit cost would be considered for additional payment against the training cost, on pro-rata basis. The decision to exceed the number of trainings apart from the ones stated above will solely remain with MHRD

The Scope of Work that needs to be undertaken by the Bidder for imparting training is given below. The proposed training module is expected to help the Course takers and other stakeholders, including SWAYAM officials, to undertake their revised roles and responsibilities with ease and without any apprehensions.

The Bidder must assume the following responsibilities:

1. The Bidder shall provide training to all the stakeholders in one batch per day (one day training). However, the training days can be revised by MHRD based on requirement.
2. It is proposed that the Users and Administrators would be divided in the following groups:

Band	Users*
Group 1	Entity created by MHRD.
Group 2	MHRD internal Users
Group 3	Operators, System Administrators, Other IT support staff, application and database management teams, etc.

* Grouping subject to change based on MHRD decision

3. The Bidder needs to conduct a 'Training Needs Analysis' (TNA) and impart Training to the Users as per Groups defined above, according to their individual needs and requirements. The indicative Training Modules and Training plan are enlisted below:

#	Training Module	Indicative number of Days	Group			Frequency/year
			1	2	3	
1.	Sensitization/Orientation	1 day	Y	Y	Y	Once
2.	Technical Training	1 day	N	N	Y	Twice
3.	Process Training	1 day	Y	Y	N	Twice

4. The schedule/training calendar and the training material for imparting training shall be developed by the Bidder in consultation with MHRD. The Bidder shall submit a softcopy (CD) and hardcopy of the training material to SWAYAM Team before every training session.
5. In case of modifications either in the Training Plans or substitutions of the regular trainers, proper correspondence with SWAYAM Team shall be made.
6. Training program shall be continuously monitored by SWAYAM so as to ensure quality standards of the Training. It is the responsibility of the Bidder to prepare a feedback mechanism (i.e., printed feedback forms) and get it filled by the participating batch and submits the same on a regular basis to SWAYAM Team, along with assessment of the trainers themselves.
7. The Bidder shall install and train the application users using the audio-video content based multimedia software. It is the responsibility of the Bidder to prepare documents including User manuals, technical manuals, and administration manuals, and provide the same to the SWAYAM Management team. The team will provide the necessary inputs for preparing the training material.

A detailed training schedule, including the dates, areas to be covered, time and the training literature (to be supplied by Bidder) at various stages of the project cycle and feedback for effectiveness will be agreed to by all parties during the performance evaluation of the Bidder as per the Contract.

Trainings shall be provided as per the training schedule provided by the Bidder in consultation with MHRD. The key training modules provided are indicative for reference of the Bidder and detailed training plan has to be proposed by the Bidder.

2.3.4.2 Audio Visual Training system

It is envisaged that from time to time the users will need assistance in operating/navigating through the Portal. Though a periodic training for system usage is proposed for various types of Users, however any user may find it difficult to memorize the entire system functioning and its finer details of operational capability. Hence for better user experience, it is proposed that modules/section wise training material, especially in form of Audio-Visual content or animation, apart from PDF version, may be uploaded in each module/sub-module/section of the Portal which can be played at any given point of time through the browser. The users will find it easy to understand the process and functionality better by seeing the audio-visual training content for that specific module/sub-module/section and work accordingly as required.

These Audio Visual clips will have the functionality to start, stop, pause, back and forward options, so that User can play the training content as per his own free will and requirement. All these specific module/sub-module/section wise audio-visual training content should be integrated to form a complete training of the Portal, and uploaded on the portal for free access, download and ready reference.

2.3.4.3 Online Help/Reference with Search option

It is also proposed that the training contents/User Manuals be made available to Users in downloadable (PDF) format so that the Users may refer/download it for their own personal reference as and when needed. It is required that the Downloadable training content should have proper indexing and internal references, mapped with key words, in order to allow any User to search and reach the desired content with the help of those key words. It envisaged that any User will be able to search and read the directions/information for only the part required by him/her rather than looking through the entire PDF document and manually searching for the right content.

On entering the key words for search criteria, the system should pull out and display the links to the content as mapped. This feature should be dynamic with real time search availability, i.e. as soon as the key words are changed; a new set of content links with page/chapter references within the document should appear for selection. Once the selection is made by the User, the system should display the PDF content.

2.3.5 Operations and Maintenance

This Portal would also function as the “Intranet Portal” for SWAYAM which would be used for monitoring of the operations at MHRD. The Portal shall allow the designated officer to enter the data such as “number of courses conducted”, “number of students enrolled for courses”, “number of students who completed a course”, “project plan”, “monthly plan”, “business directory”, “MIS updates”, etc. The Portal would aggregate/segregate the information received from different stakeholders and provide flexibility to aggregate/segregate the information at various levels, irrespective of geographical boundaries.

The Bidder will provide ongoing support for a span of 3 years from the date of go-live.

2.3.5.1 Application Support

Application support includes, but not limited to, production monitoring, troubleshooting and addressing the functionality, availability and performance issues, implementing the system change requests etc. The bidder shall keep the application software in good working order;

perform changes and upgrades to applications as requested by the SWAYAM team. Key activities to be performed by bidder in the application support phase are as follows:

a. Compliance to SLA

The bidder shall ensure compliance to SLAs as indicated in this RFP and any upgrades/major changes to the software shall be accordingly planned by bidder ensuring the SLA requirements are met at no additional cost to the MHRD

b. Annual Technology Support

The bidder shall be responsible for arranging for annual technology support for the products to SWAYAM provided by respective OEMs. SWAYAM would require ATS for a period of 3 years from the date of go-live of all the applications.

c. Application Software Maintenance

- i. Bidder shall provide unlimited support through telephone/Fax/E-mail/Video Conferencing/installation visit as required as per the service window defined in the RFP
- ii. The bidder shall address all the errors/bugs/gaps in the functionality in the solution implemented by the bidder (vis-à-vis the FRS and SRS signed off) at no additional cost during the support phase.
- iii. For performing any functional changes to system, which are deviating from the signed-off Functional Requirements/System Requirements, the Bidder shall provide the following resources at MHRD's premises for One year (extendable on pro-rata basis on Man-month rate) after the go-live of the portal for getting the requisite changes done in the system:
 - Project Manager
 - Deputy Project Manager (to also act as Business Analyst)
 - 2 Programmers
 - Analytics Expert
 - Database Expert
 - Solution Architect

Note:

1. The Project Manager & Deputy Project Manager are expected to be deployed at MHRD's premises from the date of commencement of the project. The other resources mentioned above are expected to be deployed after beta go-live.
2. The Bidder should set-up the necessary environment, including full access to their own Development environment, for the above team to work out of SWAYAM premises.

- iv. All patches and upgrades from OEMs shall be implemented by the bidder ensuring customization done in the solution as per the requirements are applied. Technical upgrade of the installation to the new version, as and when required, shall be done by the bidder.
 - v. Any changes/upgrades to the software performed during the support phase shall subject to the comprehensive and integrated testing by the bidder to ensure that the changes implemented in the system meets the specified requirements and doesn't impact any other function of the system.
 - vi. Tuning of products/applications, databases, third party software's and any other components provided as part of the solution software including reconfiguration of the system in the event of any hardware/network failures/if any hardware/network components have to be replaced, shall be the responsibility of the bidder.
 - vii. Issue log for the errors and bugs identified in the solution and any change done in the solution shall be maintained by the bidder and periodically submitted to the SWAYAM team.
- d. Problem identification and Resolution
- i. Errors and bugs that persist for a long time, impact a wider range of users and is difficult to resolve becomes a problem. Bidder shall identify and resolve all the application problems in the identified solution (e.g. system malfunctions, performance problems and data corruption etc.).
 - ii. Monthly report on problem identified and resolved would be submitted to SWAYAM team along with the recommended resolution.
- e. Change and Version Control
- All planned changes to application systems and hardware shall be coordinated within established Change control processes to ensure that:
- i. Appropriate communication on change required has taken place
 - ii. Proper approvals have been received
 - iii. Schedules have been adjusted to minimize impact on the production environment
- The bidder shall define the Software Change Management and Version control process. For any changes to the solution, bidder has to prepare detailed documentation including proposed changes, impact to the system in terms of functional outcomes/additional features added to the system etc.
- f. Maintain configuration information
- Bidder shall maintain version control and configuration information for application software and any system documentation.
- g. Maintain System documentation
- Bidder shall maintain and update documentation of the software system ensuring that:

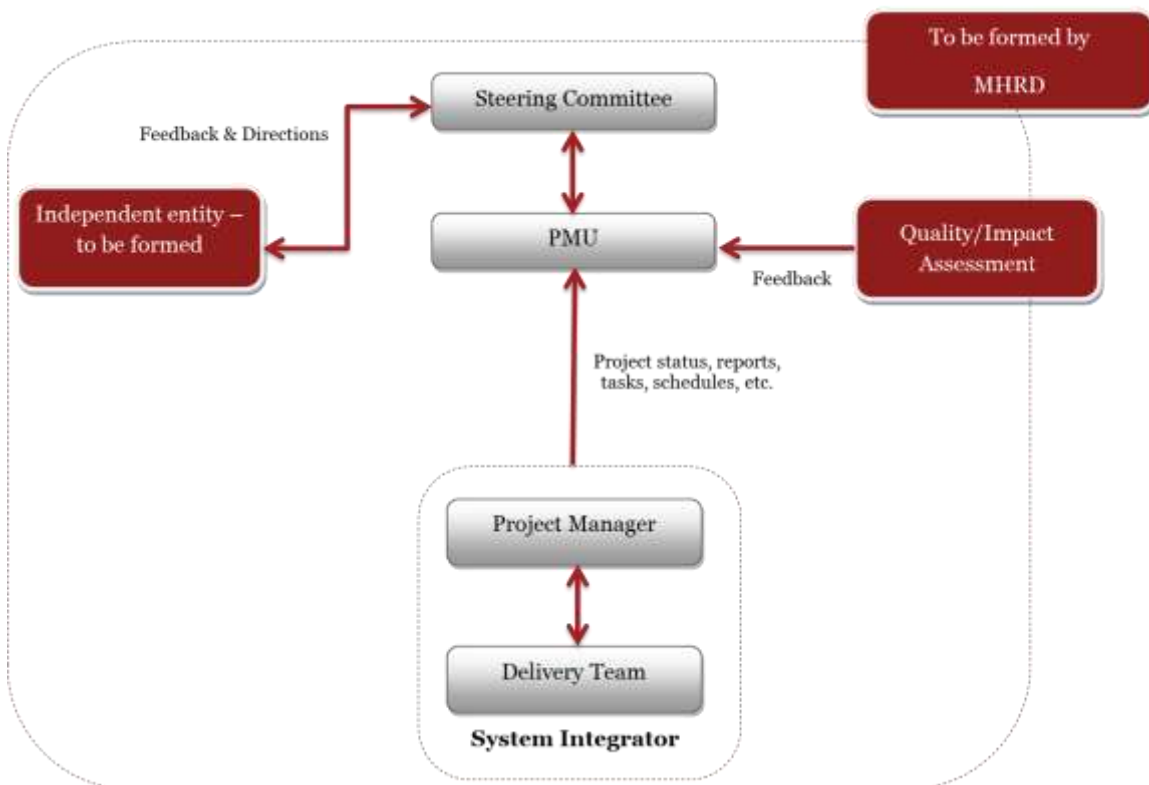
- i. Source code is documented
- ii. Functional specifications are documented
- iii. Application documentation is updated to reflect on-going maintenance and enhancements including FRS and SRS, in accordance with the defined standards
- iv. User manuals and training manuals are updated to reflect on-going changes/enhancements
- v. Standard practices are adopted and followed in respect of version control and management.

2.4 Project Management and Governance

2.4.1 Project Governance

The project would require a close supervision and appropriate project control for successfully meeting the objectives and its timely completion.

The proposed institutional mechanism for the Project Review and Monitoring is shown below for reference:



Indicated below are some of the key functions and roles for different components of the proposed governance structure:

1. **Steering Committee:** This committee would provide a required level of advocacy for the project and also set directions which are acceptable to all stakeholders. The role of this steering committee would be to provide strategic direction to the project.

2. **PMU:** Project Management Unit would comprise of a team of a consultants who would be responsible for monitoring all the project implementation, operations and maintenance activities, on behalf of MHRD and provide status reports, Action Taken reports, Risks, etc. PMU would also be responsible for guiding and managing the project activities between MHRD, SI and any other stakeholders.
3. **Project Manager:** PM will serve as a single-point contact within the institutional framework for the purpose of project monitoring/reporting purposes and should be deployed by the selected bidder. The PM will be responsible for day to day coordination between PMU and all implementation teams. PM will be responsible for all the activities within the project scope and will report to Project Management Unit/Team. They will be directly responsible for providing periodic project statuses, tasks schedule and Action Taken Reports (ATRs).
4. **Delivery Team:** They will be the actual delivery team deployed by the SI and will work on all areas of the implementation phases. They may also constitute of various other teams as required for successful implementation

Mid Term Review and Final Review: The Steering Committee may identify a suitable third party for Mid Term Review of the project so as to identify any midcourse corrections. They may also appoint a third party for Final Review of the quality of the work done and deliverables achieved.

2.4.2 Transition Management

- a. Transition and exit management plan to be prepared by SI for approval by MHRD
- b. Bidder to ensure no end of life and end of support products are proposed as part of the solution
- c. At the end of the contract period or during the contract period, if any other agency is identified or selected for providing services related to bidder's scope of work, the bidder shall be responsible to deliver services defined in scope and also maintain SLA requirements.
- d. SI to assist MHRD (or designated parties) in complete audit of the system including assets and licenses.
- e. All risks during transition stage shall be properly documented by bidder and mitigation measures are planned in advance so as to ensure smooth transition without any service disruption.
- f. Bidder shall provide necessary handholding and transition support, which shall include but not limited to, conducting detailed walk-through of the solution, handing over the entire software (including source code, program files, configuration files, setup files, project documentation etc.), addressing the queries/clarifications of the new agency, conducting training sessions etc.
- g. Shadow support for at least 3 months and secondary support for another 3 months. These 6 months would start before the end of O&M period or termination of contract, as applicable.
- h. The transition plan along with period shall be mutually agreed between bidder and SWAYAM when the situation occurs. Bidder shall be released from the project once successful transition is done meeting the parameters defined for successful transition.

- i. Transition and exit management plan will be revisited at end of each year of the contract period.

2.5 Roles & Responsibilities

2.5.1 Roles and Responsibilities of Bidder

- a. With respect to the SWAYAM, the SI will need to put in place all the systems and processes, to ensure that courses are made available to course seekers based on their preferences .
- b. Procure, install, commission, operate and maintain:
 - i. Requisite Portal solution as per the requirements mentioned in this RFP
 - ii. Meet the defined SLAs for the performance of the system.
- c. Provide necessary support for the resolution of bugs, patches & upgrades of the software solution.
- d. Provide necessary manpower for managing the Change Requests.
- e. Design various manuals like User manual, Trouble Shooting manual etc. for the system.
- f. Deploy the required manpower to manage the operations.
- g. Ensuring the SLAs for downtime of system, software development/customization, as defined in this RFP are met.
- h. Management and quality control of all services and infrastructure.
- i. Any other services which is required for the successful execution of the project.
- j. Generation of MIS reports as per the requirements of MHRD
- k. Generation of the report for the monitoring of SLAs.

2.5.2 Roles and Responsibilities of MHRD

- a. Coordination between all the stakeholders for providing necessary information for the study and development/customization of the necessary solution.
- b. Coordinate with Bidder for conducting workshops for the Stakeholders.
- c. Provide hardware infrastructure for hosting the SWAYAM solution
- d. Monitoring of overall timelines, SLAs and calculation of penalties accordingly.
- e. Conducting UAT for the application solution deployed.
- f. Issuing the Acceptance Certificate on successful deployment of the software application, and for other components of the Scope of Work (wherever required).
- g. Any other requirements that could arise during operations for effective governance and to meet any administrative requirement.

- h. Ensuring the staff members and other stakeholders attend the training programs as per the schedule defined by the bidder and agreed upon by MHRD
- i. Provide sign off on the deliverables of the project.

2.6 Acceptance Criteria

Bidder shall demonstrate the following mentioned acceptance criteria prior to acceptance of the solution in respect of scalability and performance. Bidder shall properly define all the envisaged requirement parameters for acceptance. In case required, parameters might be revised by SWAYAM in mutual agreement with bidder and the revised parameters shall be considered for acceptance criteria.

2.6.1 Hardware Environment Acceptance Criteria

2.6.1.1 Performance

- a. The recommended infrastructure including servers and storage should be able to meet the performance requirements at 60% usage level. This should be substantiated through published benchmarks including detailed calculations being used to interpolate, as required.

2.6.1.2 Scalability

- a. The systems and the architecture design should be scalable to take the load as stated. The database servers should have vertical and horizontal scalability to provide for meeting the requirements.

2.6.2 Solution Acceptance Criteria

2.6.2.1 User Acceptance Test

- a. The solution must pass User Acceptance Test and all the issues raised during UAT are closed with proper sign-off
- b. The solution should meet the entire functional requirement as finalised between the Bidder & MHRD
- c. The solution should meet integration requirement with all the external stakeholders as envisaged in Section 1.

2.6.2.2 Security Acceptance Test

- a. The solution shall demonstrate single sign on for all the applications provided in the solution.
- b. The solution shall demonstrate SSL based transaction in the application software.
- c. The solution shall demonstrate two-factor authentication.
- d. The solution shall demonstrate role based access.
- e. The solution shall pass penetration testing for rollout of each phase. SWAYAM may engage an independent third party agency at its discretion for carrying out the penetration testing.

2.6.2.3 SLA compliance Test

Bidder shall demonstrate compliance to baseline metrics of each SLA mentioned in the RFP, with implemented solution having twice the load as envisaged at the end of the corresponding period.

- For Phase 1 go-live acceptance – twice the 1st year load
- For Phase 2 go-live acceptance – twice the 3rd year load

2.6.2.4 Benchmark Test

It is expected that the bidder shall provide the hardware, network, security and other such requirements to MHRD . This will be passed on to NIC for provisioning. Bidder has to assess the installed infrastructure provided by NIC to ensure that the expected performance levels are met by the system. Should the infrastructure provided by NIC, be found to be underperforming, the bidder will have to provide the recommendations for necessary performance tuning.

2.7 Change Request Procedure

Change Request Process and Evaluation Framework

The SWAYAM will operate in multiple complex technology environments. The environments include development, test, production and other specialized instances. In order to provide better and efficient services to the stakeholders and other Users, SWAYAM has planned to implement an ambitious project to achieve full automation and integration with its various operations and systems. SWAYAM recognizes that frequent change is an inevitable part of development and implementation of SWAYAM application and its rollout, as well as during the course of the contract period. SWAYAM also recognizes that these changes may require modification in the systems and re-organizing processes and therefore may have a financial impact. SI is required to work with SWAYAM and PMU to ensure that all changes are discussed, managed, and implemented in a constructive manner.

One of the key requirements is that the SI will be responsible for providing system availability according to defined service levels. This responsibility includes responsibility to implement upgrades, enhancements, extensions and other changes to the software application in order to maintain and extend reliable information systems, services and service delivery mechanism. It is important that changes to the computing environment are executed in a standardized and controlled manner in order to mitigate the risk of interruptions to the services during prime access hours, and to maintain a repository of knowledge about the current as well changed configurations as well as status of the computing environment at all times.

This section describes the procedure to be followed in the event of any proposed change to the Agreement, scope of work and SLAs. Such change shall include, but may not be limited to, changes in the scope of services as mentioned under various sections of the RFP, from time to time.

Purpose and Objective

The purpose of the Change Request procedure is to control changes to the computing environment throughout the SWAYAM solution.

The Change request procedure has the following objectives:

- To protect the computing environment from uncontrolled changes.
- To minimize the occurrence of unintended affects during the implementation of necessary changes.
- To avoid implementation of any changes which is not reviewed, approved or analyzed.
- To control the impact of changes and minimize the effect on effective as well as efficient service delivery.

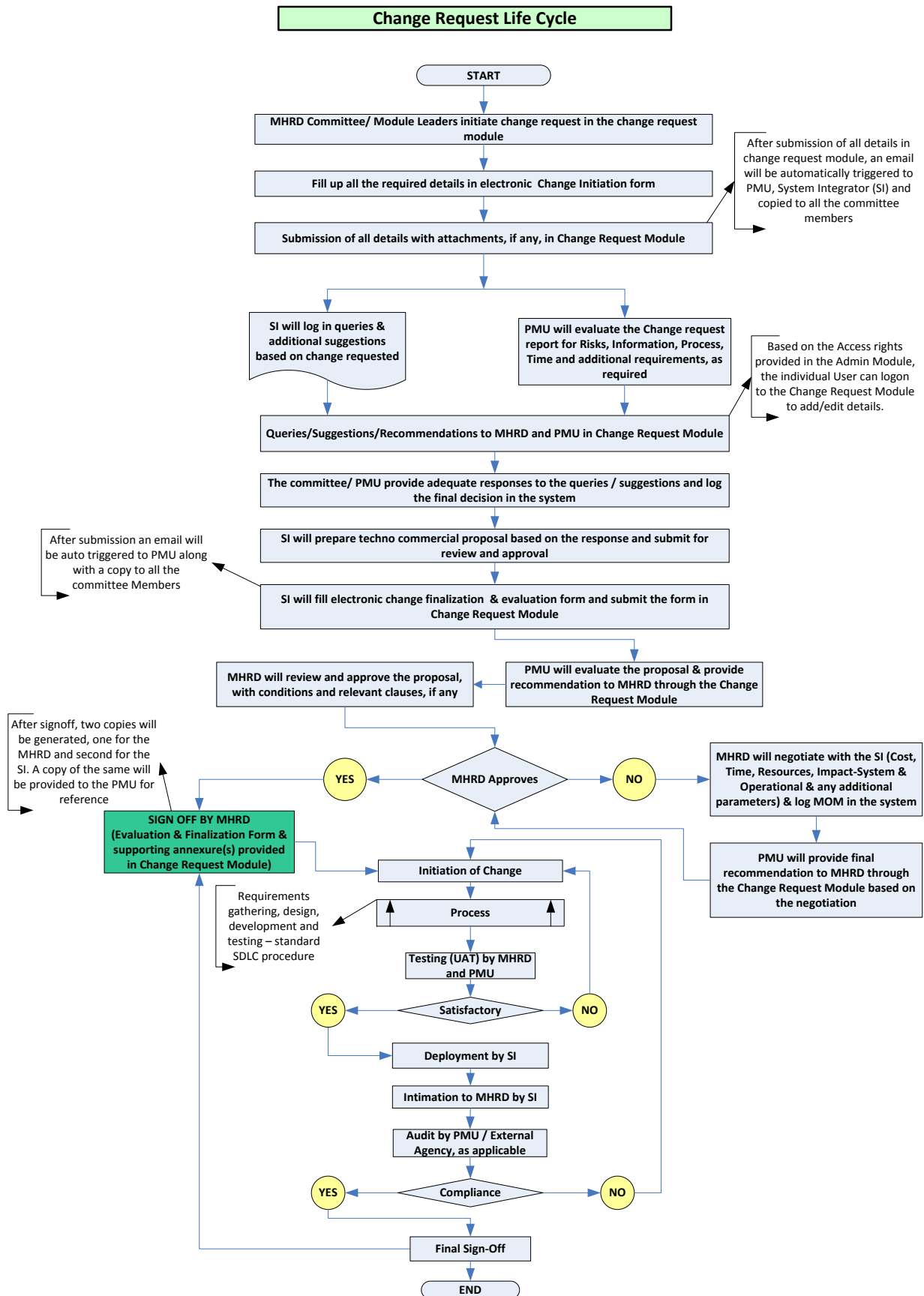
Change Advisory Board (CAB)

CAB will be responsible for ensuring that the Change Management guidelines is implemented and maintained.

1. The SWAYAM will create a committee in consultation with all the module leaders which will act as a CAB, may also involve PMU as advisors, to oversee the administration of the Change Request Policy.
2. The CAB will be authorized to review, approve and schedule all changes to the computing environment. All decisions of the CAB will be final and binding on all parties involved.

Change Management Life Cycle

The life cycle of all changes initiated during the contract period of the SI is shown below:



Process, Timelines & Responsibility Center

The entire change request process will be implemented as mentioned below. The proposed timelines for each steps/activity and the corresponding responsibility center is also shown in the table below:

S.No.	Process	Timelines (Weeks)	Responsibility Center
1.	Authorized official from the CAB requesting a change will initiate a request by filling up the electronic 'Change Initiation Form' after logging in with their own credentials.	Immediate	CAB
2.	Once the Change request is submitted in the system, an email will automatically be triggered to: a) the PMU b) the SI and c) Copy to the SWAYAM committee members.	Immediate	System
3.	PMU will evaluate the change request report for risks, process of evaluating & implementing change, time required for completing the change(s) and any other additional requirement/information needed to clarify the Change requested; and will provide the recommendations in the change request module by logging with their credentials.	1 week	PMU
4.	SI will be required to study the Change requested and log in their queries/suggestions on the requested change. This will be done by the authorized representative if the SI in the Change Request Module.		SI
5.	The SWAYAM committee/PMU will discuss and provide adequate responses to the queries/suggestions from the SI on the requested change. The committee will further decide on the responses to the queries/suggestions and log the final decision in the system.	1 week	CAB/PMU
6.	Based on the responses provided by CAB, SI will prepare and submit a techno commercial proposal.	3 weeks	SI
7.	a) The SI can submit their Techno Commercial proposal either in hard copy or upload soft copy through the Change Request Module in the system. However SI must submit the details of the proposal in the electronic 'change evaluation and finalization' form in the change management module. b) After submission, an email will be auto triggered to PMU along with a copy to all the CAB committee members. In case hard copy is submitted by the SI, CAB will officially handover the proposal to PMU		SI

S.No.	Process	Timelines (Weeks)	Responsibility Center
	for evaluation.		
8.	<p>a) PMU will evaluate the techno commercial proposal submitted by SI and provide the recommendations to CAB.</p> <p>b) CAB will review the evaluation and comments provided by the PMU and decide on the final status. This will be logged in the change request module by authorized representatives.</p>		CAB/PMU
9.	<p>c) If CAB does not approve the proposal in its entirety, then CAB will initiate negotiation with the SI based on any of the aspects like cost, time, resources, impact on systems and/or operations and additional parameters, whichever applicable.</p> <p>d) Based on the negotiation, the PMU will submit the final recommendation to CAB and log the decisions in the change request module.</p> <p>e) If CAB approves the proposal in its entirety the Change request sign-off between CAB and SI will be initiated.</p>	2 weeks	CAB/PMU
10.	During Sign-off, the form will be printed, with all supporting annexure as logged in the system. The authorized signatory from CAB as well as the SI will sign the Change request Evaluation and Finalization form (at first place) and accordingly a formal go-Ahead will be provided by CAB. This form will be signed in two copies; one for the SI and other for CAB. Also a copy will be provided to the PMU for reference.	Immediate	CAB/SI
11.	SI will then initiate the change following a standard SDLC procedure like requirements gathering, design, development and testing, etc., as required, along with proper documentation at each stage.	As required/agreed	SI
12.	Once the Change is completed as per agreed timelines and specifications, CAB representatives and the PMU will do the User acceptance testing and auditing respectively to provide comments/recommendations to the committee members.	1 weeks	CAB/PMU
13.	If any further activities need to be carried out as per the recommendations during UAT and Audit, it will be done by the SI. After that an Acceptance Certificate will be issued to SI by CAB and instructions for deployment/implementation, again as per standard deployment plan. This will follow a second sign-off on the 'Change Request Evaluation & Finalization' Form.	1 week (as required)	CAB/SI

S.No.	Process	Timelines (Weeks)	Responsibility Center
14.	SI will deploy the changed solution and notify CAB and PMU.	1 week	SI
15.	The PMU will finally review and confirm the deployed solution as per agreed standard, specifications and requirements, and provide status to CAB.		PMU
16.	A final sign off will be done on the 'Change Request Evaluation & Finalization' Form and completion Certificate will be issued to the SI by CAB along with a copy to the PMU. A copy of this completion certificate will have to be submitted to CAB along with the invoices for this change implementation.	Immediate	CAB

Proposed Categories of Change

1. Application Software

a. Description*

Change request for any new module/change in module/functionality/Process re-engineering etc., any new services and any new forms, etc.

b. Method of Evaluation

Man-months

c. Documents Required*

- i. Detailed Project Plan
- ii. Effort Estimates (Module wise/Process wise/Screen wise, as applicable)
- iii. Resource Deployment Plan/Types of Resources
- iv. Resource Plotting Sheet
- v. CVs/Profiles of Resources (if required)
- vi. Techno-Commercial Proposal

2. Infrastructure/Facility Management

a. Description*

Additional computing resources with Cloud service provider, as per SWAYAM application scalability requirements

b. Method of Evaluation

Actual Cost (Prevailing Rate contract)

- c. Documents Required*
 - i. Quantity (BoM)
 - ii. Specifications
 - iii. Software Licenses, if any
 - iv. Warranty & Support services details
 - v. Bandwidth Requirements, as applicable
 - vi. Any other details as applicable

3. Contact Center Facility

- a. Description*

Additional manpower/seating capacity, based on call volume
- b. Method of Evaluation

Per seat Cost (Prevailing Rate contract)
- c. Documents Required*
 - i. Call Volume analysis/report
 - ii. Resource Deployment Plan/Types of Resources
 - iii. CVs/Profiles of Resources (if required)
 - iv. Techno-Commercial Proposal

***Note:** The description and the documents required provided above are only indicative and these may be changed as per directions from MHRD

Change Control Notice (Initiation)

Change Control Note	CCN Number:	Request Date:
Title of the request for change		
Party Requesting change		
Party Expected to Implement the change		
Details of Proposed Change		
(To include reason for change and appropriate details/specifications)		
Signature of the Party Proposing the change		

Change Control Notice (Evaluation and Finalization)

Reference CCN Number: Date on which change request initiated: Title: Date:	
Brief Description of Solution/Procedure for implementation of change)	
Impact: a) Operational Impact b) Systems Impact	
Deliverables: (to be provided by the party implementing the change)	
Charges for the proposed change (as applicable) a) One-Time Cost b) Recurring Cost	
Implementation Schedule along with roles and responsibilities: (to be agreed mutually by parties initiating and implementing the change)	
Other Relevant Information: (including acceptance criteria, if any during/after implementation)	
Signature of CAB (as an acceptance of the change - Initiator) *First Acceptance as stated in the Change Request Life Cycle	
Signature of SI (as an acceptance of the change - Implementer) *First Acceptance as stated in the Change Management Life Cycle	
Signature of CAB (as an acceptance of the change - Initiator) *Final Acceptance as stated in the Change Management Life Cycle	
Signature of SI (as an acceptance of the change - Implementer) *Final Acceptance as stated in the Change Management Life Cycle	

Change Control Procedure Guidelines

1. Change requests in respect of the Agreement, the Project Implementation, or the SLA will emanate from the Parties' respective Project Management Unit (PMU), who will be responsible for obtaining approval for the change and will initiate the Part A: CCN (Initiation).
2. Parties, while evaluating and finalizing CCN, shall consider the change in the context of the following parameter, namely whether the change is beyond the scope of Services including ancillary and concomitant services required and as detailed in the sign-off version of all required documents.
3. Change requests and CCNs will be reported monthly to SWAYAM who will prioritize and review progress. SI shall be required to implement any proposed changes once approved in

accordance of Part B: CCN (Evaluation and Finalization) with effect from the date agreed for implementation.

4. On evaluation of the financial impact, the charges for such a change will be decided between CAB and the SI and will be a part of the Change Control Notice (Evaluation and Finalization). The payment for such changes will be as per the Terms of Payment to be decided by MHRD
5. On receiving any Change Request from CAB, the SI must submit its proposal with all the required information in the prescribed format for CAB's perusal within 21 working days. The following will be the responsibilities of the PMU with respect to the change request.
 - a) Suggest the impact on the system/functionality/application.
 - b) Propose overall timelines for implementation of the change based on complexity.
 - c) Vet the SI's proposal (response to the change request)

The SI may also submit any queries/clarifications that it may have with respect to implementation of Change requested. If the SI fails to submit any proposal within the prescribed time duration, appropriate SLA and penalty will be levied on the SI. SI must not deny the implementation of any Change requested by CAB under any circumstances, unless technical feasibility is in question. In all such matters, MHRD's decision will be final and binding on all parties.

6. The change request should be categorized as simple, medium and complex change. The SI must provide the list of deliverables within timelines as defined by the PMU.
7. The acceptance criteria for any such 'Change' will remain the same as described in the RFP with respect to the performance and quality parameters.
8. The final sign-off and "Acceptance Certificate" would be provided by CAB. CAB will in all such cases revert within 30 working days after final implementation of the change and provide satisfactory completion certificate or the reasons for non-acceptance. Till that certificate is issued, all such changes will be deemed unaccepted and all the necessary SLAs and penalties will apply on the SI. In case there is no response from CAB within the prescribed time duration the said implementation will automatically be deemed accepted.
9. The SI must take all necessary steps to implement the change as per the project plan submitted without compromising on quality and performance standards. If the SI fails to comply with the acceptable standards & requirements of implementing of the requested change, or denies implementation of the requested change at any stage during the contract period, CAB will have complete authority to get the change implemented from any of the third party/nominated government agency independently. In all such cases the entire cost of change implementation will be recovered completely from the SI, along with applicable interest. Also, CAB reserves the right to impose any other financial or legal penalties depending upon the gravity of impact on the Service Delivery due to non-implementation of the requested Change. In all such matters the decision of CAB will be final and binding on all parties.
10. If CAB gives any new requirement or change request, the SI should follow the change management procedure to implement the change on additional payment basis. The requirements for required infrastructure to implement the change should be specified by the

SI so that CAB can make necessary provisions. The change request procedure would be considered complete only when the training is imparted to the target users for whom the change is being done and the feedback is evaluated by both CAB and the PMU.

11. It is proposed that the prevailing rates for all kinds of change, as and when initiated by CAB will be taken into consideration and the proposals accordingly evaluated. In all such matters the decision of the CAB will be final and binding on all parties.

Note: The Man-Month rates provided by SI for any Change Request should be the same as the rates provided by the SI in their Commercial proposal during the proposed contract.

2.8 Service window

Bidder shall provide services to SWAYAM in line with the applicable service window as provided in following table:

#	Services	Service Window
1	Contact Centre	8.00AM to 12Midnight 7 Days a week

Section 3:

Project Deliverables

SLA compliance test and benchmark tests will establish that the SLAs and benchmark criteria are met by the installed system, failing which an appropriate upgrade will have to be carried out by the bidder at his cost.

3 Project Deliverables and Payment Schedule

3.1 Activity Schedule and Deliverables

The deliverable associated with each milestone is as follows. The schedule is developed while considering the "D date" as the date of acceptance of the Purchase Order (PO)/Letter of Intent (LOI).

Milestone	Activity	Deliverables	Timelines
Phase 1			
M1	Planning	Inception Report including Detailed Project Plan, Detailed Resource Profile, Resource allocation and Deployment plan	D+10
M2	Requirements assessment & Design of the Solution	Functional Requirements Report, Technical Design Document, User Experience Design, Software Requirement Specifications Report	D + 28
M3	Development of Business Critical Services	Architecture and DB design Report, Deployment Plan Signed-off Unit test report Signed-off Integration test report Signed-off any other test report	D + 60
M4	Operationalization of Call Centre	Call center commissioning report	D+80
M5	Solution Acceptance of Business Critical Services	Signed-off Issue log closure report Security acceptance report Signed-off SLA compliance report	D+86
M6	Go Live of Business Critical Services	Certificate of successful commissioning	D+90
Phase 2			
M7	Requirements & Design of remaining Business services Solution	System Design Report, Technical Design Document, Software Requirement Specifications Report	D+101
M8	Development of remaining Business services Solution	Architecture and DB design Report, Deployment Plan Signed-off Unit test report Signed-off Integration test report Signed-off any other test report	D + 121

Milestone	Activity	Deliverables	Timelines
M9	Design, Development & Implementation of advanced analytics & BI	Certificate of successful commissioning	D+128
M10	Solution Acceptance of Integrated Solution	Signed-off Issue log closure report Security acceptance report Signed-off SLA compliance report	D+133
M11	Go Live of Integrated Solution	Certificate of successful commissioning	D+135

3.2 Payment Schedule for Capital Cost

The payment for cost as mention in RFP Vol 1 Section 8.3 Capital Cost will be as per below mentioned schedule.

Milestone	Activity	Payments
M2	Requirements assessment & Design of the Solution	10% of Capital Cost
M3	Development of Business Critical Services	5% of Capital Cost
M4	Operationalization of Call Centre	10% of Capital Cost
M6	Go Live of Business Critical Services	20% of Capital Cost
M7	Requirements & Design of remaining Business services Solution	5% of Capital Cost
M8	Development of remaining Business services Solution	15% of Capital Cost
M9	Design, Development & Implementation of advanced analytics & BI	15% of Capital Cost
M11	Go Live of Integrated Solution	20% of Capital Cost

3.3 Operating Cost

3.3.1 Payment Schedule for Annual Support Cost for Applications

The payment for the ATS shall be done progressively as per the licenses being acquired by the MHRD.

3.3.2 Payment Schedule for Annual Support Cost for System Software

The payment shall be done progressively as per the System Software being acquired by the MHRD.

3.3.3 Payment Schedule for Operations & Maintenance Cost

The payments towards this component will be paid on Quarterly basis as per Cost given by bidder as per format provided in RFP Vol 1. Below table indicates the Milestone payments for 1st Year. Similarly, payments will be made for subsequent years of operations.

Milestone	Activity	Deliverable	Payment
G1	End of 1st Quarter after final Go-Live	End of period	25% of Cost for Year-1
G2	End of 2nd Quarter after final Go-Live	End of period	25% of Cost for Year-1
G3	End of 3rd Quarter after final Go-Live	End of period	25% of Cost for Year-1
G4	End of 4th Quarter after final Go-Live	End of period	25% of Cost for Year-1

Bidder shall submit the reports periodically as mutually agreed between SWAYAM team and bidder at the start of project, prior to release of respective period payment. These reports will include but not limited to:

- SLA Compliance Report
- Project Status Report
- Change Control Note and Report
- Server monitoring Report
- Issue/Incident logs (category, severity and status of call etc.)
- Incidents escalated
- Problem Management Report
- Any other report as requested by MHRD

3.3.4 Payment Schedule for Contact Centre Cost

The Contact Centre payments will be paid on Quarterly basis after adjusting for penalty (if any) as per Contact Centre Cost given by bidder as per format provided in RFP Vol 1. The Cost will be computed by multiplying the number of persons deployed every month with that of cost of per person per month rate.

Bidder shall submit all the reports as mutually agreed between SWAYAM team and bidder at the start of project, prior to release of respective period payment. These reports will include but not limited to:

- SLA Compliance Reports
- Inbound call details
- Outbound call details
- Staffing related Report
- Any other report as requested by MHRD

3.3.5 *Payment Schedule for Capacity Building Cost*

Payments for this component will be made on a quarterly basis as per actual usage, The bidder shall submit all reports as mutually agreed between SWAYAM team and bidder at the start of the project, prior to release of respective period payment. These reports will include but not limited to:

- Training feedback
- Training post assessment
- Participant details

Section 4:

Service Level Agreement (SLA) & Penalties

4 Service Level Agreement (SLA) & Penalties

SWAYAM portal is service-oriented and the operational portion of the Agreement between SWAYAM and the selected Bidder will be in the form of a Service Level Agreement (SLA). The SLA specifies the expected levels of service to be provided by the Bidder to MHRD. This expected level is also called the baseline. Any degradation in the performance of the solution and services is subject to levying penalties as specified in the following sections.

This Section indicates the suggested SLA between SWAYAM team and the Bidder for the project. A set of parameters has been identified as key to the successful implementation of the Project. If the performance of the bidder in respect of any parameter falls below the prescribed tolerance limit, a penalty is imposed for the breach. All the payments to the Bidder are linked to the compliance with the SLA metrics specified down in this section. During the contract period, it is envisaged that there could be changes to the SLAs, in terms of addition, alteration or deletion of certain parameters, based on mutual consent of both the parties i.e. SWAYAM team and Bidder.

This section describes the service levels to be established for the Services offered by the Bidder. The Bidder shall monitor and maintain the stated service levels to provide quality service.

Definitions

1. "Scheduled Maintenance Time" shall mean the time that the System is not in service due to a scheduled activity as defined in this SLA. The scheduled maintenance time would not be during 16X6 timeframe. Further, scheduled maintenance time is planned downtime with the prior permission of MHRD
2. "Scheduled operation time" means the scheduled operating hours of the System for the month. All scheduled maintenance time on the system would be deducted from the total operation time for the month to give the scheduled operation time. The total operation time for the systems and applications within the Primary DC, DR and client site locations will be 24X7X365. The total operation time for the client site systems shall be the business hours of MHRD
3. "System or Application downtime" means accumulated time during which the System is totally inoperable within the Scheduled Operation Time but outside the scheduled maintenance time and measured from the time SWAYAM and/or its employees log a call with the Bidder of the failure or the failure is known to the Bidder from the availability measurement tools to the time when the System is returned to proper operation.
4. "Availability" means the time for which the services and facilities are available for conducting operations on the SWAYAM system including application and associated infrastructure. Availability is defined as: $\frac{\{(Scheduled\ Operation\ Time - System\ Downtime)\}}{(Scheduled\ Operation\ Time)} * 100\%$
5. "Helpdesk Support" shall mean the support center which shall handle Fault reporting, Trouble Ticketing and related enquiries during this contract. Helpdesk support is to be provided as per service window defined in this RFP.
6. "Incident" refers to any event/abnormalities in the functioning of the any of IT Equipment/Services that may lead to disruption in normal operations of the Data Centre, System or Application services.

Interpretation & General Instructions

1. The SLA parameters shall be monitored on a monthly basis as per the individual SLA parameter requirements. The Bidder is expected to provide the following service levels. In case these service levels cannot be achieved at service levels defined in the tables below, it shall result in a breach of contract and invoke the penalty clause.
2. A Service Level violation will occur if the Bidder fails to meet Minimum Service Levels on a monthly basis for a particular Service Level.
3. Quarterly SLAs would be analyzed. However, there would be month wise SLAs and all SLA targets have to be met on a monthly basis.
4. Overall Availability and Performance Measurements will be on a quarterly basis for the purpose of Service Level reporting. Month wise “Availability and Performance Report” will be provided by the Bidder every quarter in the MHRD suggested format and a review shall be conducted based on this report. Availability and Performance Report provided to the MHRD shall contain the summary of all incidents reported and associated performance measurement for that period.
5. The primary intent of Penalties is to ensure that the system performs in accordance with the defined service levels. Penalties are not meant to be punitive or, conversely, a vehicle for cutting fees.
6. MHRD shall have the right to encash the Performance Bank Guarantee or terminate the contract or both in any of the following cases:
 - a) Overall penalty applicable on bidder for any of the Quarter exceeds 25% of the quarterly payment
 - b) Overall penalties applicable on bidder for both the consecutive Quarter is above 15% of the quarterly payment

4.1 Service Level Agreements (SLAs)

Following outlines the key performance requirements for the Project, which needs be ensured by the Bidder. These performance requirements shall be strictly imposed and a continuous monitoring would be done to ensure the performance of the Portal against the target performance metrics. The performance requirements have been logically segregated in the following categories:

1. Functional Availability
2. Operations
3. Infrastructure performance
4. Project Implementation

4.1.1 Functional Availability

#	SLA Parameter	Target Performance	Description	Penalty
Portal availability and performance				
1.	Availability of all Critical functionalities of the SWAYAM as defined below: <ul style="list-style-type: none"> ▪ Course taker registration ▪ Course provider registration ▪ Course creation ▪ Course search ▪ Registration for a course 	>=99.9%	Availability of all functionalities for at least 99.9% of time measured on monthly basis for a 24x7x365 time period.	1
2.	Availability of all remaining functionalities of the SWAYAM.	>=99.6%	Availability of all functionalities for at least 99.6% of time measured on monthly basis for a 24x7x365 time period.	2
3.	Average loading time for all pages	95% within the limit of: On LAN: 2 seconds Bandwidth of 512 kbps: 10 seconds	Page loading time measured monthly	3
4.	Response Time for Business Transactions including but not limited to: <ul style="list-style-type: none"> ▪ Course taker registration ▪ Course provider registration ▪ Course creation ▪ Course search ▪ Registration for a course 	95% of business transactions within the limit of: On LAN: 4 seconds Bandwidth of 512 kbps: 15 seconds	Response time of services measured at an interval of 30 minutes and averaged monthly	3

#	SLA Parameter	Target Performance	Description	Penalty
5.	Business Transaction Response Time involving uploading/downloading of documents (average size 0.2MB)	95% requests within the limit of: On LAN: 6 seconds Bandwidth of 512 kbps: 18 seconds	Response time of services, measured monthly	3

4.1.2 Operations

S. No.	SLA Parameter	Target Performance	Description	Penalty Ref
Contact Centre				
6.	System Availability	99% Availability of Total Period	Measured as Total down time minutes/Total minutes in a month. For example, if there were 2 hours in July when a customer's call could not have been answered, availability will be $[100 - \{120 / (31 \text{ days} \times 16 \text{ hours} \times 60 \text{ minutes})\} \times 100] = 99.59\%$	4
7.	Call Connect Rate	>99%	Measured as % of calls getting connected to the Contact Centre, averaged over the month.	4
8.	Call Response Time	90% calls	Measured as % of calls in which call queue waiting time is less than 30 seconds Call response time is the waiting time in Automatic Call Distributor (ACD) queue after pressing prescribed digit to talk to the agent but before being answered by the agent.	5
9.	Call Quality Score	Measured by scoring a random sample of calls on pre - defined parameters	To measure the quality of calls being handled by the agents and ensure that certain standards are adhered to during the calls with respect to quality of information provided diction, language, politeness etc. Note: The pre-defined parameters would be defined at the time of contracting stage.	6
10.	Problem Response time	>=95% within 15 minutes	Average Time taken to acknowledge and respond once an incident is logged through one of the agreed channels. This is calculated for all incidents reported within the reporting quarter (16x7x365)	7

S. No.	SLA Parameter	Target Performance	Description	Penalty Ref
11.	Time to Resolve	For Severity 1, 100% of the incidents should be resolved within 4 hours of problem reporting	Time taken to resolve the reported problem.	8
12.	MTTR - Time to resolve	>=95% of <ul style="list-style-type: none"> • Severity 2 within 8 hours of problem reporting • Severity 3 within 24 hours of problem reporting 	Time taken to resolve the reported problem.	9
13.	Percentage of reopened incidents	<= 2%	For all incidents which are designated resolved by the Bidder, but are re-opened by the client. This is calculated for all incidents reported within the quarter.	10
14.	Submission of Root Cause Analysis (RCA) reports	Within 5 days	For all Severity 1 & Severity 2 incidents resolved during the quarter, Bidder to submit RCA reports	11

S. No.	SLA Parameter	Target Performance	Description	Penalty Ref
Reporting and Analytics Solution				
15.	Average response time for simple query of the central data repository	< 4 sec	Measured as the response time for the output of a simple reporting query from the central server without taking into account the network latency	12
16.	Average response time for a medium complex query of the central data repository	< 7 sec	Measured as the response time for the output of a medium complex reporting query from the central server without taking into account the network latency	13
17.	Average response time for a highly complex query of the central data repository	< 10 sec	Measured as the response time for the output of a highly complex reporting query from the central server without taking into account the network latency	14
18.	Timeliness of availability for the scheduled canned reports	On time	Measured as the availability of scheduled/periodic canned reports in the system as per pre-set date/time	15

S. No.	SLA Parameter	Target Performance	Description	Penalty Ref
19.	Average generation time for any custom or analytics report	< 15 sec	Measured as the elapsed time between submitting a request for a custom or analytics report and the generation and display of the report to the user	16
20.	Rectification time for any reported violation of SLA with respect to Page Response Time	< 48 hours	Measured as the elapsed time between reporting of a SLA violation for any page response and the resolution of the issue in order to meet the SLA	17

4.1.3 Infrastructure Performance

Bidder will not be penalized for delays/breach of SLAs caused by factors not under his control, which includes performance of the infrastructure provided by MHRD.

S. No.	SLA Parameter	Target Performance	Description	Penalty Ref
21.	Average uptime of the Application on servers at the DC/DR site (this excludes hardware downtimes).	>= 99.9%	Measured as the percentage of time Application on each of the servers at DC/DR is up and running on a monthly basis. Uptime of the application will be measured on 24X7 basis	1
22.	Peak CPU Utilization of App and DB Servers at DC/DR site	<= 70%	Measured as the occurrence of peak CPU utilization of > 70% for a sustained period of more than 2 hours. This will be measured on 24X7 basis	19

S. No.	SLA Parameter	Target Performance	Description	Penalty Ref
23.	Peak Memory Utilization of App and DB Servers at DC/DR site	<= 60%	Measured as the occurrence of peak Memory utilization of > 60% for a sustained period of more than 2 hours. This will be measured on 24X7 basis	19
24.	Peak Memory Utilization of other servers at DC/DR site	<= 50%	Measured as the occurrence of peak Memory utilization of > 50% for a sustained period of more than 2 hours. This will be measured on 24X7 basis	19
25.	Peak I/O Utilization of App and DB Servers at DC/DR site	<= 50%	Measured as the occurrence of peak I/O utilization of > 50% for a sustained period of more than 2 hours. This will be measured on 24X7 basis	19
26.	Adherence to Backup Window	6 Hours	Measured as the time from the start of backup to the completion of activity. The backup window starting time would be decided during the contracting/implementation stage.	20
27.	Adherence to RPO (Critical functions)	15 Min	This is applicable for both production environment and during DR Drills	21
28.	Adherence to RPO (Other functions)	2 Hours	This is applicable for both production environment and during DR Drills.	22
29.	Adherence to RTO (Critical functions)	30 Min	This is applicable for both production environment and during DR Drills	23
30.	Adherence to RTO (Other functions)	4 Hours	This is applicable for both production environment and during DR Drills	24

4.1.4 Project Implementation

S. No.	SLA Parameter	Target Performance	Description	Penalty Ref
31.	Delay in any of the project milestone	< 15 days	Measured as the difference between the agreed planned date for the milestone and the actual date of its completion	25
32.	Delay in overall project duration (Individually for Business critical functionalities & rest of the functionalities)	<1 month	Measured as the difference between the agreed planned date for the milestone and the actual date of its completion	26

4.2 Penalties

A Penalty no. is mentioned in “Penalty” column of above table against each SLA. These numbers refer to S. No. in penalty table which is as follows.

- Penalty table includes penalty that would be levied on bidder on non-achievement of SLAs. Slabs have been created for each SLA and penalty would be imposed on bidder as per the SLA achievement/non-achievement for the period under consideration.
- Penalties are mentioned as a percentage of certain components of cost, for example, support cost or call center cost etc.
- For levying penalty on non-performance during sustenance support period, Equated Monthly Installment (EMI) of Operations & maintenance phase would be considered for calculation purpose. Penalty would be deducted from the next payment being made to bidder.

S. No.	Penalty Description								
1	<p>Penalty will be levied as per the following table:</p> <table border="1"> <thead> <tr> <th>% Availability</th> <th>Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications</th> </tr> </thead> <tbody> <tr> <td><99.9% & >=99%</td> <td>0.5%</td> </tr> <tr> <td>< 99% & >= 98%</td> <td>1%</td> </tr> <tr> <td>< 98% & >= 97%</td> <td>2%</td> </tr> </tbody> </table> <p>For each additional drop of 1% in performance below 97%, 2% of EMI of Support Cost for Applications will be levied as additional penalty.</p>	% Availability	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications	<99.9% & >=99%	0.5%	< 99% & >= 98%	1%	< 98% & >= 97%	2%
% Availability	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications								
<99.9% & >=99%	0.5%								
< 99% & >= 98%	1%								
< 98% & >= 97%	2%								
2	<p>Penalty will be levied as per the following table:</p> <table border="1"> <thead> <tr> <th>% Availability</th> <th>Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications</th> </tr> </thead> <tbody> <tr> <td><99.6% & >=99%</td> <td>0.5%</td> </tr> <tr> <td>< 99% & >= 98%</td> <td>1%</td> </tr> <tr> <td>< 98% & >= 97%</td> <td>2%</td> </tr> </tbody> </table> <p>For each additional drop of 1% in performance below 97%, 2% of EMI of Support Cost for Applications will be levied as additional penalty.</p>	% Availability	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications	<99.6% & >=99%	0.5%	< 99% & >= 98%	1%	< 98% & >= 97%	2%
% Availability	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications								
<99.6% & >=99%	0.5%								
< 99% & >= 98%	1%								
< 98% & >= 97%	2%								
3	<p>Penalty will be levied as per the following table:</p> <table border="1"> <thead> <tr> <th>% transactions</th> <th>Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications</th> </tr> </thead> <tbody> <tr> <td><95% & >=93%</td> <td>0.5%</td> </tr> <tr> <td>< 93% & >= 91%</td> <td>1%</td> </tr> <tr> <td>< 91% & >= 89%</td> <td>2%</td> </tr> </tbody> </table> <p>For each additional drop of 1% in performance below 89%, 2% of EMI of Support Cost for Applications will be levied as additional penalty.</p>	% transactions	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications	<95% & >=93%	0.5%	< 93% & >= 91%	1%	< 91% & >= 89%	2%
% transactions	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications								
<95% & >=93%	0.5%								
< 93% & >= 91%	1%								
< 91% & >= 89%	2%								

4	Penalty will be levied as per the following table:	
	% Availability	Penalty as % of the Monthly Payment towards Contact Centre cost
	<99% & >=98%	0.5%
	< 98% & >= 96%	1%
	< 96% & >= 94%	2%
For each additional drop of 1% in performance below 94%, 2% of Monthly payment towards Contact Centre cost will be levied as additional penalty.		
5	Penalty will be levied as per the following table:	
	% of calls attended within 30 seconds	Penalty as % of the Monthly Payment towards Contact Centre cost
	>90% calls attended	Nil
	<90% & >= 85% calls attended	5%
For each additional drop of 5% in performance below 85%, 10% of Monthly Payment towards Contact Centre cost will be levied as additional penalty.		
6	MHRD will deploy team to grade the calls processed by Contact Centre team on various Quality parameters. The parameters will be finalized at the contracting stage.	
	Penalty will be levied as per the following table:	
	% Call Quality score	Penalty as % of the Monthly Payment towards Contact Centre cost
	<99% & >=95%	0.5%
	< 95% & >= 90%	1%
	< 90% & >= 85%	2%
For each additional drop of 5% in performance below 85%, 3% of Monthly payment towards Contact Centre cost will be levied as additional penalty.		
7	Penalty will be levied as per the following table:	
	% transaction with >15 minutes response time	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications
	<95% & >=93%	0.5%
	< 93% & >= 91%	1%
	< 91% & >= 89%	2%
For each additional drop of 1% in performance below 89%, 2% of EMI of Operation & Maintenance cost will be levied as additional penalty.		

8	Penalty will be levied as per the following table:	
	% transaction with more response time as mentioned in SLA table (severity wise)	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications
	<100% & >=98%	0.5%
	< 98% & >= 96%	1%
	< 96% & >= 94%	2%
For each additional drop of 1% in performance below 94%, 2% of EMI of Support Cost for Applications will be levied as additional penalty.		
9	Penalty will be levied as per the following table:	
	% transaction with more response time as mentioned in SLA table (severity wise)	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications
	<95% & >=93%	0.5%
	< 93% & >= 91%	1%
	< 91% & >= 89%	2%
For each additional drop of 1% in performance below 89%, 2% of EMI of Support Cost for Applications will be levied as additional penalty.		
10	Penalty will be levied as per the following table:	
	% of reopened incidents	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications
	<=4% & >2%	0.5%
	<=6% & >4%	1%
	<=8% & >6%	2%
For each additional increase of 2% in reopened incidents above 8%, 2% of EMI of Support Cost for Applications will be levied as additional penalty.		
11	For delay of every 2 days in submitting Root Cause Analysis (RCA) report above 5 days, 1% of Support Cost for Applications for that month will be levied as penalty.	
12	Penalty will be levied as per the following table:	
	Average response time (In seconds)	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications
	<6 & >=4	0.5%
	< 8 & >= 6	1%
	< 10 & >= 8	2%
For each additional drop of 2 second in performance below 10 seconds, 3% of EMI of Support Cost for Applications will be levied as additional penalty.		

13	Penalty will be levied as per the following table:	
	Average response time (In seconds)	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications
	<9 & >=7	0.5%
	< 11 & >= 9	1%
	< 13 & >= 11	2%
For each additional drop of 2 second in performance below 13 seconds, 3% of EMI of Support Cost for Applications will be levied as additional penalty.		
14	Penalty will be levied as per the following table:	
	Average response time (In seconds)	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications
	<12 & >=10	0.5%
	< 14 & >= 12	1%
	< 16 & >= 14	2%
For each additional drop of 2 second in performance below 16 seconds, 3% of EMI of Support Cost for Applications will be levied as additional penalty.		
15	For each occurrence of unavailability, 1% of EMI of Support Cost for Applications will be levied as penalty	
16	Penalty will be levied as per the following table:	
	Average elapsed time (In seconds)	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications
	<17 & >=15	0.5%
	< 19 & >= 17	1%
	< 21 & >= 19	2%
For each additional drop of 2 second in performance below 21 seconds, 3% of EMI of Support Cost for Applications will be levied as additional penalty.		
17	Penalty will be levied as per the following table:	
	Average elapsed time (In hours)	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications
	< 60 & >=48	0.5%
	< 72 & >= 60	1%
	< 84 & >= 72	2%
For each additional drop of 1 hour in performance below 84 hours, 3% of EMI of Operation & Maintenance cost will be levied as additional penalty.		

18	Penalty will be levied as per the following table:	
	% Availability	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications
	<99.5% & >=99%	0.5%
	< 99% & >= 98%	1%
	< 98% & >= 97%	2%
For each additional drop of 1% in performance below 97%, 2% of EMI of Support Cost for Applications will be levied as additional penalty.		
19	For each occurrence of non-expected performance, 1% of EMI of Operations and Maintenance Cost for that period will be levied as penalty	
20	Penalty will be levied as per the following table:	
	Time (In Hours)	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications
	<7 & >=6	0.5%
	< 8 & >= 7	1%
	< 9 & >= 8	2%
For delay of each additional hour or part thereof after 9 hours, 1% of EMI of Support Cost for Applications will be levied as additional penalty.		
21	Penalty will be levied as per the following table:	
	Time (In Minutes)	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications
	<20 & >=15	0.5%
	< 25 & >= 20	1.5%
	< 30 & >= 25	2.5%
For delay of each additional 15 minutes or part thereof after 30 minutes, 1% of EMI of Support Cost for Applications will be levied as additional penalty.		
22	Penalty will be levied as per the following table:	
	Time (In Hours)	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications
	<3 & >=2	0.5%
	< 4 & >= 3	1%
	< 5 & >= 4	2%
For delay of each additional hour or part thereof after 5 hours, 1% of EMI of Support Cost for Applications will be levied as additional penalty.		

23	Penalty will be levied as per the following table:	
	Time (In Minutes)	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications
	<40 & >=30	0.5%
	< 50 & >= 40	1.5%
	< 60 & >= 50	2.5%
For delay of each additional 10 minutes or part thereof after 60 minutes, 1% of EMI of Support Cost for Applications will be levied as additional penalty.		
24	Penalty will be levied as per the following table:	
	Time (In Hours)	Penalty as % of the Equated Monthly Instalment (EMI) of Support Cost for Applications
	<5 & >=4	0.5%
	< 6 & >= 5	1%
	< 7 & >= 6	2%
For delay of each additional hour or part thereof after 7 hours, 1% of EMI of Support Cost for Applications will be levied as additional penalty.		
25	If the Bidder fails to achieve the completion of any milestone within defined duration, the payment to him will be liable for deduction @1% of the payment for that milestone for delay of 15 days or part thereof	
26	If the Bidder fails to achieve the completion of project within defined duration (Individually for Business critical functionalities & rest of the functionalities), the payment to him will be liable for deduction @1% of the Total cost of ownership without taxes for delay of each month or part thereof.	

Annexures

5 Annexure 1: Solution Requirements

5.1 Operating System

#	Description	Compliance (Y/N)	Remarks
1.	64-Bit Architecture, with unlimited Systems user license.		
2.	Independent OS images shall be run in each partition.		
3.	Support Virtual IP Address to help applications remain available if network adapter connection is lost.		
4.	Shall support IP fail over		
5.	OS shall be provided with cluster software where ever required.		
6.	OS shall be provided with Server Management Software.		
7.	OS to support online server upgrade and serviceability.		
8.	OS shall support secure shell		
9.	OS shall support IPV6		
10.	OS shall have ability to apply the patches online and should also have ability to roll back		

5.2 Database

General Requirements:

- a. All the applications implemented shall have provision for optimizing the number of static connections to the database using connection pooling. All the applications implemented shall also optimize the duration of connection to the database by using techniques like session time out.
- b. SI shall calculate for total number of RDBMS Licenses (Processor license as well as Named user) required for this tender. The number of licenses required for RDBMS database and its licensing basis i.e. processor or named user shall be explicitly mentioned by the bidder of this tender.
- c. MHRD reserves the right to procure the licenses, as per actual requirement and from time to time, through the bidder of this tender.

#	Description	Compliance (Y/N)	Remarks
1.	The database should address all the structured and un-structured data storage requirements of the proposed system		

#	Description	Compliance (Y/N)	Remarks
2.	The RDBMS database should have a high tolerance of failure		
3.	The underlying database should support 24x7 high availability		
4.	The data scalability and manageability should be integral part functionality of the database.		
5.	It should support User-defined Data Types & User-defined Functions.		
6.	It should provide Unicode support.		
7.	The database should support native automated disaster recovery capability with seamless switch over and switch back between primary and disaster recovery sites		
8.	The database should be capable to support plug and play data transfer across platforms or operating systems		
9.	The database should be able to support various types of content like Texts, Images, Multi-media, and XML content natively		
10.	The database should ensure data synchronization between database servers on near real-time basis by capturing messages at the source database, stage messages in a queue, propagate messages from one queue at the source to another queue at the target and consuming messages		
11.	The database should support both way data synchronization across database servers		
12.	The database should support database encryption, backup encryption and support for external key management.		
13.	The database should support data synchronization across database servers in heterogeneous platforms		
14.	The database should be capable to deploy fine grained access control, separation and segregation of duties and native encryption capabilities. The database should also prevent access to sensitive application data by highly privileged users.		
15.	The database should control access to the applications, databases and data with flexible security controls.		

#	Description	Compliance (Y/N)	Remarks
16.	The solution should provide options or utility to encrypt/decrypt sensitive data		
17.	The solution should support data export and import facility to variety of databases and other software packages		
18.	The solution should provide backup (hot & cold) and recovery facility		
19.	The solution should be able to schedule a backup/restore task		
20.	The solution should be compatible with 3rd party system monitoring package.		
21.	The solution should support selective encryption of the stored data		
22.	The database should support a single unified data model hosted on a single database.		
23.	The database platform should support enhanced configuration and management of audits.		
24.	The database design & architecture should be in line with the functional and non-functional requirements of the proposed system		
25.	The database should be highly available with every processing node providing full view of data. This means, in case of failure of one server, each remaining server in the cluster should provide full access to all data at any point in time		
26.	It should support clustering exploiting rapidly emerging disk storage and interconnect technologies		
27.	It should provide disaster recovery solution to maintain transaction consistency,		
28.	It should provide restrictive data access that enables different types of users to have secure, direct access to mission-critical data sharing		
29.	It should control data access down to the row-level (row-level security) so that multiple communities of users with varying access privileges can share data within the same database		
30.	It should provide Public Key Infrastructure (PKI) support		

#	Description	Compliance (Y/N)	Remarks
31.	It should provide support for comprehensive auditing for 'inserts', 'deletes', 'updates' and 'selects', and quickly spot and respond to security breaches		
32.	It should store XML content native to database		
33.	It should have the ability to index, search, and analyse text and documents stored in database		
34.	It should support different partitioning schemes to split large volumes of data into separate pieces or 'partitions' which can be managed independently		

5.3 Replication Methodology

#	Description	Compliance (Y/N)	Remarks
1.	Replication methodology should support Auto Fall back mechanism.		
2.	DC and DR shall operate in active -active mode. The connectivity between both the data centre should ensure the replication works seamless with no data loss.		
3.	The Infrastructure recommended in both DC and DR shall be capable to handle the 100% load (for Core functions) at any point in time. The replication between both the data centers would ensure that there are no data inconsistencies on both application as well as storage level		

5.4 EMS

1. Application Performance Monitoring

#	Description	Compliance (Y/N)	Remarks
1	The proposed solution must be able to perform infrastructure aware application triage, i.e. pin point network issues causing application degradation.		
2	The proposed solution must determine if the root cause of performance issues is inside the monitored application, in connected back-end systems or at the network layer from a single console view		
3	The proposed solution must proactively monitor 100%of real user transactions; detect failed transactions; gather evidence necessary for triage and diagnosis of problems that affect user experiences and prevent completion of critical business processes		
4	The proposed solution must provide deeper end-to-end transaction visibility by monitoring at a transactional level and without deploying any software at end user desktop.		

#	Description	Compliance (Y/N)	Remarks
5	The proposed solution must provide a single view that shows entire end-to-end real user transaction and breaks down times spent within the application components, SQL statements, backend systems and external systems.		
6	The proposed solution must be able to provide root-cause probability graphs for performance problems showing the most probable root-cause area within application infrastructure.		
7	The proposed solution must provide a real-time application topology map to triage and quickly pinpoint the component causing a performance bottleneck in the end-to-end transaction flow.		
8	The proposed solution must gather available performance indicator metrics from all within real-time production environments and real user transactions 24x7 with minimal overhead on monitored applications without sampling.		
9	The proposed solution must provide for easy dynamic instrumentation of application code, i.e. be able to enhance out of the box monitoring with extra monitoring definitions without having to restart application or process.		
10	The proposed solution must be able to detect production Memory Leaks and isolate exact component creating leaking Collection or Set		
11	The proposed solution must allow monitoring granularity of no more than 15 seconds for all transactions.		
12	The proposed solution must report of response times of Java/.Net methods based on simple method parameters (Strings, Integers etc.).		
13	The proposed solution must provide real-time monitoring of resource utilization like memory usage, DB connection pools and Threads.		
14	The proposed solution must be able to identify socket and file Input/Output activity from the application.		

#	Description	Compliance (Y/N)	Remarks
15	As a means of detecting poorly performing SQL, the solution must be able to proactively record all SQL calls, and report on the slow performing ones. The SQL measurements must be made from within the monitored application – not using an external database agent.		
16	The proposed solution must monitor performance of all stored procedures being executed from within the application.		
17	The solution should have provision for automatic transaction discovery.		
18	The proposed solution must provide ability to monitor performance of applications up to the method level of execution (Java/.Net method) 24x7 in production environments with negligible impact on monitored application.		
19	The proposed solution must be able to report on any application errors occurred while executing application functionalities and pinpoint exact place of error within transaction call stack.		
20	The proposed solution must provide for at least 2 levels of thresholds which can be set on alerts and provide for actions so that alerts can automatically trigger other processes when thresholds are breached. The proposed solution must not necessitate any changes to application source code.		
21	The proposed solution must proactively identify any resource usage problems within applications and identify stalled (stuck) processes.		
22	The proposed solution should allow SQL statement normalization into a single performance metric.		
23	The proposed solution must monitor individual web service and performance transaction debugging for web services. The proposed solution must also monitor web services across multiple processes (cross JVM tracing)		
24	The proposed solution should eliminate problem resolution guesswork by using its performance metrics to automatically isolate and identify performance issues, enabling triage and diagnosis.		

2. End-User Experience Management System

#	Description	Compliance (Y/N)	Remarks
1	The proposed solution should measure the end users' experiences based on transactions without the need to install agents on user desktops.		
2	The solution should act as a passive listener on the network thus inducing zero overhead on the network and application layer.		
3	The proposed system must be able to detect user impacting defects and anomalies and reports them in real-time:		
3.1	Slow Response Time		
3.2	Fast Response time		
3.3	Low Throughput		
3.4	Partial Response		
3.5	Missing component within transaction		
4	The proposed system should have the ability to create user groups based on application criteria or location and link user ids to user names and user groups.		
5	The proposed system must be able to provide user usage analysis and show how user's success rate, average time and transaction count has changed over a specific period of time such as current week versus previous week.		
6	The proposed system must be able to provide the ability to detect and alert when users experience HTTP error codes such as 404 errors or errors coming from the web application.		
7	The proposed system must be able to provide root-cause probability graphs for performance problems showing the most probable root-cause area within application infrastructure.		
8	The proposed solution should be capable of identifying the problem domain (browser, network or application) thereby it should monitor the browser side metrics and provide reports in real time for:		
8.1	DOM Construction Time (ms)		
8.2	Page Load Time (ms)		

#	Description	Compliance (Y/N)	Remarks
8.3	Previous page unload time (ms)		
8.4	Browser Render Time (ms) –		
8.5	Page Roundtrip Time (ms) -		
8.6	Responses Per Interval (browser activity)		
9	The proposed solution should be capable of collecting Browser metrics without the need to install any agents on the end user desktops, by way of dynamic java script injection.		

#	Description	Compliance (Y/N)	Remarks
1	The proposed solution must be able to provide real time transaction health metrics and end user experience quality metrics anytime, anywhere for the business executives.		
2	The proposed solution must be able to provide the business executives the flexibility to select, organize and monitor real time business indicators with the help of an interactive user interface		
3	The proposed solution must be able to work consistently on a variety of mobile devices such as PDAs, tablets, mobile phones etc.		
4	The proposed solution must be able to provide flexibility by enabling addition of annotations to business indicators to enhance clarity and context around its behaviour enabling better information sharing and collaboration.		
5	The proposed solution must be able to maintain centralized control of data and security of the data that is viewed on the smart devices such as PDAs, tablets, mobile phones etc.		

3. General Monitoring Platform Requirements

#	Description	Compliance (Y/N)	Remarks
1	The Monitoring Solution should provide End to End Monitoring of Complete IT Infrastructure including		
1.1	Server Monitoring		
1.2	Database Monitoring		
1.3	Virtualization Platform Monitoring		
2	The proposed solution should be capable to provide hybrid monitoring architecture through agent/agentless approach		
4	The proposed monitoring solution should provide capability to integrate with hardware monitoring platforms.		
5	The proposed monitoring solution should possess the inherent capability to leverage API's and SDK's to enable integration and monitoring.		
6	The proposed monitoring solution should have capability to configure actions based rules for set of pre-defined alarms/alerts enabling automation of set tasks.		
7	The Platform must include an event correlation automatically fed with events originating from managed elements, monitoring tools or data sources external to the platform. This correlation must perform activities such as filtering, aggregation, masking etc.		
8	The Reporting Portal should be completely web based with ability to define Accounts and Users for Role Relevant Views		
9	The proposed solution should provide the ability to create custom dashboards with ability to aggregate metrics from all monitored devices and should provide drill down functionality to other defined dashboards within the tool.		
10	The proposed solution should provide ability to monitor and generate alarms for set threshold for pre-defined Service level agreement for monitored metrics. The proposed monitoring solution should provide functionality to sync with online library for latest updates and support for new functionalities.		

4. Server Monitoring Requirements

#	Description	Compliance (Y/N)	Remarks
1.	The Solution should monitor through Agent Based (Not SNMP) heterogeneous operating systems for both physical and virtual environments OS including but not limited to Windows 32/64 bit, All Major Flavours of Linux, Solaris, Unix etc.		
2.	The solution should offer both agent-based as well as agent-less options for monitoring server infrastructure.		
3.	The solution should be able to monitor non-SNMP devices (e.g. using WMI, Telnet, SSH etc.)		
4.	The solution should monitor all server files and directories.		
5.	The solution should monitor File System for presence/absence/functionality		
6.	The solution should generate alarms based on what is currently mounted compared with what is configured on a defined compliant system.		
7.	The solution should support monitoring log files.		
8.	The solution should support monitoring of Windows Event Logs and provide correlation of events for these.		
9.	The solution should support monitoring of performance counters in Windows.		
10.	The solution should support monitoring of services/processes in a Windows/Linux environment.		
11.	Processes monitoring should also have ability to track CPU and Memory consumption of the monitored process for alerting and reporting/trending purpose.		
12.	The solution should report on services not in the expected state and optionally start or stop them.		
13.	The solution should support the monitoring of processes & taking automated actions		
14.	The solution should support monitoring new processes that come up on a server.		
15.	The solution should support monitoring CPU performance over defined user defined time periods of time		
16.	The solution should support monitoring Availability and performance of memory, including upper and lower thresholds and types of usage		
17.	The solution should support monitoring Local and Attached Disk capacity and provide incremental change in used capacity		

#	Description	Compliance (Y/N)	Remarks
18.	The solution should support monitoring Alerts & Log Messages, including regular expression matching.		
19.	The solution should support monitoring Performance counters for IO		
20.	The solution should support monitoring Running services and in-progress jobs		
21.	The solution must monitor the availability, health, and performance of File Services namespace and replication.		
22.	The Solution should Monitor automatic reboots of servers		
23.	The Solution should support monitoring new processes that come up on a server		

5. Database Monitoring Requirements

#	Description	Compliance (Y/N)	Remarks
1	The solution should have the capability to monitor multiple database servers and multiple versions of each server such as:		
1.1	Oracle		
1.2	SQL Server		
1.3	MySQL		
1.4	DB2		
1.5	Informix		
1.6	Sybase		
2	The Solution should Provide SQL Response Time for Monitoring Custom Queries		
3	The Solution should provide response time Monitoring for custom queries through JDBC/OLEDB Mechanism to allow monitoring unsupported databases		
4	Database Space Monitoring for both file group and transaction log (Warning threshold, Critical threshold as well as file group/log full)		
5	Performance monitoring - capture of DB Engine related performance counters as well as threshold alerting		
6	The solution must support SQL Agent monitoring - failed jobs, long running jobs		
7	The solution must support Database Health and Settings - Check database status (offline, suspect), Check database options (auto grow, auto shrink, auto close etc.)		

#	Description	Compliance (Y/N)	Remarks
8	The solution must support monitoring of Replication, DB Mirroring and Log shipping if applicable		
9	The solution must be able to report & check for last recent Full database backup and last recent Transaction Log backup		
10	The solution must monitor for Blocking (exceeding duration) and Deadlocks		
11	The solution must be able to run power shell, vbscript, cmd and vbscripts to perform tests on the database and have the results put into the solution as performance data and or alarms		
12	Inclusion of SQL statements within the Solution should be a standard “easy-to-use” function.		
13	The solution should support auto-discovery of database instances.		
14	The solution should support the creation and management of reusable test templates that contain a specific pre-defined set of database checkpoints/measurements.		
15	The solution should support the use of schedules and time filters for database monitoring.		

6. Virtualization Monitoring Requirements

#	Description	Compliance (Y/N)	Remarks
1	The solution should provide support for leading virtualization platforms.		
2	The solution should support monitoring of virtualized environment through management interface like vsphere or through hypervisor		
3	The solution should provide capability to monitor events generated by the hypervisor to generate alarms and alerting functionality		
4	The solution should provide capability to create monitoring template and auto configure any newly detected virtual machine.		
5	The solution should provide a configurable interface to view performance metrics related to virtualization infrastructure		
6	The solution should provide capability to monitor the availability to Web API's of application.		
7	The proposed solution should be integrated with centralised monitoring tool to enable aggregation of alarms and alerts.		

8	The proposed solution should allow reporting through unified reporting console along with other infrastructure devices being monitored.		
---	---	--	--

7. SLA Monitoring Specifications

#	Description		Compliance (Y/N)	Remarks
	Mandatory Features	Business Justification		
1	General: The solution must support Service Level Agreements, Lifecycle Management including Version Control, Status Control and Audit Trail.	The solution needs to be tightly integrated for providing comprehensive value.		
2	General: The solution must provide a flexible framework for collecting and managing service level templates including Service Definition, Service Level Metrics, Penalties and other performance indicators.	The solution needs to be tightly integrated for providing comprehensive value		
3	Service Delivery: The solution must have the ability to define and calculate key performance indicators from an End to End Business Service delivery perspective.	For effective service delivery.		
4	Contract Management: The solution must support dependencies between supplier contracts and internal or external contracts.	To ensure visibility into the service performance vis-à-vis the promise in the contract.		
6	Alerts: The solution must support delivery mechanisms to indicate/notify whether SLA targets are being achieved or violated.	To ensure relevant stakeholders have visibility into service performance		
7	Business Impact Analysis: The solution must make it possible to find the underlying events that cause the service level contract to fail.	To ensure root cause and business impact analysis		
8	Dynamic Calculations: The solution supports dynamic service level targets to reflect	To ensure visibility into dynamic performance of service levels		

#	Description		Compliance (Y/N)	Remarks
	Mandatory Features	Business Justification		
	obligations importance and priority over time.			
9	Audit Trails: Full electronic audit trails available for both system and user transactions.	To ensure visibility and accountability in transactions		
10	Reporting: Report module and SLA Management module must be integrated to provide ease-of reports configuration and execution.	The solution needs to be tightly integrated for providing comprehensive value.		
11	ITIL: The solution supports ITIL standards.	To adopt best practice frameworks for Service Level Management.		

8. Helpdesk Management

#	Description	Compliance (Y/N)	Remarks
1	The proposed helpdesk solution must provide flexibility of logging, viewing, updating and closing incident manually via web and console interface.		
2	The web interface console would also offer power-users tips.		
3	The proposed helpdesk solution must provide seamless integration to log incident automatically via system and network management.		
4	The proposed helpdesk solution must provide classification to differentiate the incident via multiple levels/tiers of categorization, priority levels, severity levels and impact levels.		
5	The proposed helpdesk solution must be able to provide flexibility of incident assignment based on the workload, category, location etc.		
6	Each escalation policy must allow easy definition on multiple escalation levels and notification to different personnel via window GUI/console with no programming.		
7	The escalation policy would allow flexibility of associating with different criteria like device/asset/system, category of incident, priority level, organization and contact.		
8	The proposed helpdesk solution must provide web-based knowledge database to store useful history incident resolution.		
9	The proposed helpdesk solution must contain built-in		

#	Description	Compliance (Y/N)	Remarks
	knowledge tools system that can provide grouping access on different security knowledge articles for different group of users.		
10	The proposed helpdesk solution must have a strong Business Objects based reporting module built in it.		
11	The proposed helpdesk solution must integrate with EMS event management and support automatic problem registration, based on predefined policies.		
12	The proposed helpdesk solution must be able to log and escalate user interactions and requests.		
13	The proposed helpdesk solution must provide status of registered calls to end-users over email and through web.		
14	The proposed helpdesk solution must have an updateable knowledge base for technical analysis and further help end-users to search solutions for previously solved issues.		
15	The proposed helpdesk solution must have the ability to track work history of calls to facilitate troubleshooting.		
16	The proposed helpdesk solution must support tracking of SLA (service level agreements) for call requests within the help desk through service types.		
17	The proposed helpdesk solution must support request management, problem management, configuration management and change order management.		
18	The proposed helpdesk solution must be capable of assigning call requests to technical staff manually as well as automatically based on predefined rules, and should support notification and escalation over email, web etc.		
19	Knowledge tools and CMDB should be integral built-in components of Helpdesk and should be accessible from the same login window to enable seamless access.		
20	The proposed helpdesk solution must allow the IT team to see the CI relationships in pictorial format, with a specified number of relationships on single window.		
21	Workflow must provide the ability of being Non-linear workflow with decision based branching and the ability to perform parallel processing. It should also have a graphical workflow designer with drag & drop feature for workflow creation and updation		
22	The proposed helpdesk solution must have an integrated CMDB for better configuration management & change management process. CMDB should have be able to scale as per the requirements of the project for creation of CI families, CI Classes and		

#	Description	Compliance (Y/N)	Remarks
	CI Relationship Types out of the box. Both helpdesk & CMDB should have same login window for seamless access.		
23	The proposed helpdesk solution must have a top management dashboard for viewing the helpdesk KPI in graph & chart formats.		
24	The proposed helpdesk solution must support remote management for end-user & allow analysts to do the desktop sharing for any system located anywhere, just connected to internet.		
25	Remote desktop sharing/integrated Helpdesk tool should be out-of-the-box, agent-less & all activities should be automatically logged into the helpdesk ticket.		
26	The proposed helpdesk solution must allow IT teams to create solution & make them available on the end – user login window for the most common requests.		

5.5 Anti-Virus

#	Description	Compliance (Y/N)	Remarks
1	Should restrict e-mail bound Virus attacks in real time without compromising performance of the system		
2	Should be capable of providing multiple layers of defence		
3	Should be capable of installation on both the gateway as well as Mailing servers. Inbound and outbound monitoring on all data transfer mechanisms and all e-mail systems		
4	Should be capable of detecting and cleaning virus infected attachments as well		
5	Should support scanning for ZIP, RAR compressed files, and TAR archive files		
6	Should support online upgrade, where by most product upgrades and patches can be performed without bringing messaging server off-line.		
7	Should use multiple scan engines during the scanning process		
8	Should support in-memory scanning so as to minimize Disk IO Should support Multi-threaded scanning		
9	Should support scanning of a single mailbox or a one off scan.		

#	Description	Compliance (Y/N)	Remarks
10	Should support scanning by file type for attachments		
11	Should support scanning of nested compressed files		
12	Should be capable of specifying the logic with which scan engines are applied; such as the most recently updated scan engine should scan all emails etc.		
13	Updates to the scan engines should be automated and should not require manual intervention		
14	Updates should not cause queuing or rejection of email		
15	Updates should be capable of being rolled back in case required		
16	Should support content filtering based on sender or domain filtering		
17	Should provide content filtering for message body and subject line, blocking messages that contain keywords for inappropriate content		
18	File filtering should be supported by the proposed solution; file filtering should be based on true file type		
19	Common solution for anti-spyware and anti-virus infections; and anti-virus and anti-spyware solution should have a common web based management console		
20	Should support various types of reporting formats such as CSV, HTML and text files		
21	Should be capable of being managed by a central management station		
22	Should support client lockdown feature for preventing desktop users from changing real-time settings		
23	Should support insertion of disclaimers to message bodies		

5.6 Centralized AV management server

Centralized AV (Anti-Virus) management server is required for the following:

#	Description	Compliance (Y/N)	Remarks
1.	Have ability to deploy antivirus clients from centralized location		
2.	Have ability to centrally download updates for AV software and deploy updates automatically to the antivirus environment.		
3.	Have the ability to show up to the minute antivirus information		

#	Description	Compliance (Y/N)	Remarks
	across the entire network including number of infections, whether clients are properly updated and whether AV clients are running		
4.	Have ability to take action form the centralized console including issuing commands to antivirus clients and getting immediate responses		
5.	Have ability to apply appropriate settings to AV client from a centralized console		
6.	Have ability to collect logs from all AV clients and provide information through log queries or reports		
7.	Have ability to notify the administrator from a centralized location.		
8.	Ability to control network access based on a computer's compliance with organization's antivirus health policy, remediate the noncompliance to health or restrict the computer's access to network resources		
9.	Anti-virus solution will be implemented on all desktops for the project.		
10.	Anti-virus solution will be implemented on gateways at both primary and DR site		
11.	Anti-virus server will be deployed at the Data Centre.		
12.	Anti-virus solution will also be implemented on all servers at primary site and DR site as part of the overall solution		

5.7 Intrusion Prevention System

#	Description	Compliance (Y/N)	Remarks
1.	IPS (Intrusion Prevention Systems) shall be dedicated appliance based solution to detect and actively prevent attacks in real-time.		
2.	IPS system should have High availability mechanism of pass-thru to allow traffic to flow uninterrupted even during the failure, malfunction, OS corruption or Hardware issues. Pass-thru mechanism should be achievable using internal bypass or external bypass switches.		
3.	IPS system should support 802.1 Q tagged VLAN environment. IPS system should be capable to scan VLAN tagged frames bi-directionally for malicious content.		
4.	IPS device should support redundant power supply.		

#	Description	Compliance (Y/N)	Remarks
5.	IPS should have provision for Real Time Updates of Signature		
6.	IPS should have inbuilt protection against DOS/DDOS attack. The IPS should use exploit based as well as volume based technique to prevent against DOS/DDOS attack.		
7.	The IPS solution should support Connection Limiting Policies to restrict the number of connection from one single host		
8.	IPS should have Protection against TCP, UDP & ICMP Flood, DHCP Flooding, DNS Flooding, Multi-layered Sync Flood Mechanism, SSL based attack etc.		
9.	Management a) Should support SNMP V1, 2C, 3 b) Should support HTTP, HTTPS c) Should support SSH d) Should support Telnet e) Should support Console		
10.	Security Maintenance and Reporting a) IPS should support 24/7 Security Update Service b) IPS should support Real Time signature update c) IPS should support Automatic signature synchronization from database server on web		
11.	The IPS solution shall provide source reputation based analysis.		

5.8 Virtualization

#	Description	Compliance (Y/N)	Remarks
1.	Virtualization software should have a capability to integrate with NAS, FC, FCoE and iSCSI SAN and infrastructure from leading vendors leveraging high performance shared storage to centralize virtual machine file storage for greater manageability, flexibility and availability.		
2.	Virtualization software should allow heterogeneous support for leading Operating systems like Windows, Linux, Solaris x86.		
3.	Virtualization software should have the provision to provide zero downtime, zero data loss and continuous availability for the applications running in virtual machines in the event of physical host failure, without the cost and complexity of traditional hardware or software clustering solutions.		

#	Description	Compliance (Y/N)	Remarks
4.	Virtualization software should have the ability to manage virtual switches at a cluster level by creating a distributed switch that can span an entire cluster and is VM (Virtual Machine) mobility aware.		
5.	Virtualization software should provide quality-of-service capabilities for storage I/O so as to ensure that the most important virtual machines get adequate I/O resources even in times of congestion		
6.	Virtualization software should have the ability to live migrate VM files from one storage array to another without any VM downtime.		

5.9 Enterprise Portal

#	Description	Compliance (Y/N)	Remarks
1.	Proposed product should have strong facilities for site design, simplifying development and integration of content from multiple sources.		
2.	The solution should be capable of role based delivery and personalization of content at individual user level.		
3.	Proposed product should support building workflows		
4.	The solution should have functionality to detect multiple concurrent logins of same user		
5.	The proposed product and solution should support all leading browsers		
6.	The solution should have functionality to expose/publish functional applications seamlessly		
7.	The solution should provide search engine with advanced full-text search capabilities. The search engine should be able to search for requests within the portal.		
8.	The solution should be compatible to mobile devices		
9.	The solution should be interoperable with industry standard databases		
10.	The solution should support multilingual capabilities and have Unicode support		
11.	The solution should have facility for user account management and segregate content for authenticated and guest users		
12.	The solution should support multiple methods of development of web components like gadgets, widgets,		

#	Description	Compliance (Y/N)	Remarks
	portlets etc.		
13.	The solution should have collaborative component/tools for collaborations services		
14.	The solution should support HTTPS protocol on Secure Socket Layer (SSL).		
15.	The solution should support Single Sign On		
16.	The solution should provide availability of APIs and web services interface and be compatible to SOA/SOAP		
17.	The solution should be capable of integrating with market leading content management systems and identity management systems		
18.	The solution should be able to address both structured and unstructured sources. Should have a search functionality capable of crawling through contents and performing search – for both structured and unstructured content		
19.	The solution should provide rich text editor for content editing		
20.	The solution should provide Administration services such as archiving and removal, configuration migration, audit trails and system reports, and backup and recovery using a web-based user interface		
21.	The solution should support LDAP		
22.	The solution should be capable of integrating with email servers, instant messaging services etc.		
23.	The solution should support general discussion among users in form of editable wikis, comments, threaded discussion forums, communities etc.		
24.	The solution should be compatible to all major web standards including but not limited to HHTP, HTTPS, HTML 5, ODBC, OpenXML, RSS, ATOM, SOAP, XHTML, XML, Web Services etc. Should be capable of integrating with any other portal products through open standards		

5.10 Customer Relationship Management

#	Description	Compliance (Y/N)	Remarks
1.	The proposed solution should provide comprehensive and easily accessible on-line help facilities to the users.		
2.	The proposed solution should support multiple communication devices such as Web, handheld computing and enable user access customer data anytime, anywhere		
3.	The proposed solution should be deployable on smart clients, portals, mobile clients and offline clients.		
4.	The solution must allow easy access to data, functionality and provide an easy user experience to help to enhance productivity.		
5.	The solution should allow users to track phone calls, letters, email messages, tasks, and other information relating to customers in one place so that the users can work more productively.		
6.	The solution should track and manage correspondences simply and seamlessly by evaluating the incoming messages and automatically matching them with appropriate conversation.		
7.	The solution should be able to create and manage cases to capture caller issues, each case getting attached to caller's profile stored in CRM data model		
8.	The solution should be able to automatically assign a case to an owner based on configurable assignment rules		
9.	The solution should be able to track the progress of a case from open till closure		
10.	The solution should be able to search for duplicate cases and link the duplicate service and also create multiple tasks under a case		
11.	The solution should be able to send notification to the Customer service representatives and other stakeholders		
12.	The solution should provide a workflow engine or work-routing capabilities.		
13.	The solution should be equipped with an embedded knowledge base to provide agents with resolutions to common issues		
14.	The knowledge base should be equipped with a search engine that can search for relevant information based on key word search.		
15.	The solution should provide a calendar management and scheduling engine for supporting service activities.		

#	Description	Compliance (Y/N)	Remarks
16.	The solution should be able to show schedule conflicts when an appointment is scheduled.		
17.	The solution should enable the feedback mechanism through survey process used to capture feedback from customers (internal and external) in order to measure the customer satisfaction index		
18.	The users should be able to personalize their dashboards further based on their own preferences.		
19.	The solution should be able to maintain accounting and authorization logs of the users accessing the application and provide Audit Trail facility to track the service representative's activities on cases logged. Should be able to track Response Time for handling Customer calls/queries		
20.	Solution should have strong mechanism for identity management of the representatives logging in the system; also with stringent measures to ensure that customer information is secure and not compromised		
21.	Solution should be capable of enforcing role based access to various users/user groups		
22.	The proposed solution should provide CRM analytic capabilities that provide complete scenario analysis to measure the effectiveness of current activities and generate performance details.		
23.	The solution should be able to create dashboards reflecting key operational metrics for service representatives		
24.	Solution should have strong intelligence and analytics capabilities to show behavioural trends in the calling pattern of various individuals/stakeholders		
25.	Should be able to seamlessly integrate with other modules proposed as part of the entire solution		
26.	Should be capable of integrating with the Analytics component of the solution and import intelligence about an individual stakeholder so as to enable more productive discussion		

5.11 Data Management

#	Description	Compliance (Y/N)	Remarks
1.	The solution should provide the profiling capabilities such as pattern analysis, distribution etc.		
2.	The solution should provide the capability to drill through to source level information in the data profiling report		
3.	The solution should have pre-built libraries for standardization of India specific data		
4.	The solution should enable parsing demographic data into atomic level		
5.	The solution should have the capability to identify duplicates using fuzzy matching		
6.	The solution should have the capability to provide fuzzy logic to induce tolerance during matching		
7.	The solution should have the ability to have options for automatic merging of clustered records		
8.	The solution should have India specific vocabulary libraries, grammar rule libraries, standardization rules and libraries, regular expression libraries etc.		
9.	The solution should have the ability for interactive customization of vocabularies, grammars, phonetics, standardization rules and algorithms		

5.12 Reporting & Visualization

#	Description	Compliance (Y/N)	Remarks
2	The tool should provide dash boarding, reporting and adhoc analysis capabilities		
3	The solution should provide capabilities to drill up and down on various hierarchies of the data		
4	The tool should provide Geographical map views to provide a quick understanding of geospatial data.		
5	The tool should be compatible with all leading operating systems		
6	The tool should provide analytical capabilities such to the end users such correlations , regression, unstructured text analysis and visualization, decision tree etc.		
7	The tool should provide enhanced forecasting on the fly capabilities with capabilities to do scenario analysis		
8	The tool should automatically choose best visualization suited for representation		
9	The tool should have the ability to use in memory analysis to enable users to conduct fast, thorough exploration and		

	analysis		
10	The tool should be capable of read and write of comments/annotations on reports and tablets to aid in collaboration		
11	The tool should allow users to Receive alerts to updated reports on mobile devices.		
12	The tool should have the ability for Interactive report viewing for information consumers using mobile devices using a native application most popular gestures and capabilities		

5.13 Analytics and Data Mining

#	Description	Compliance (Y/N)	Remarks
2	Solution should be able to build anomaly detection models to find previously unknown patterns.		
3	Should support trend analysis and forecasting for identified parameters on stakeholder-wise		
4	Should be able to discover new patterns in the dataset (unsupervised learning) and identify defined patterns in the dataset (supervised learning)		
5	Should provide facilities for accurate sampling based on variety of techniques such as random and stratified sampling etc.		
6	Solution shall be able to discover new patterns in the dataset (detect untrained patterns) and identify defined patterns in the dataset (trained patterns)		
7	Should provide a rich set of data mining algorithms that can be used for classification, regression, clustering, detection of outliers and anomalies, feature extraction, association analysis, and attribute ranking.		
8	The system should automatically suggest the best model based on a variety of assessment criteria with flexibility to change this criteria		
9	Should be able to carry out non-objective segmentation such as cluster analysis using a multitude of methods such as hierarchical, k-means clustering etc.		
10	Support binary, nominal, ordinal and interval inputs and targets		
11	Should be an integrated platform containing functionality to carry out both structured and unstructured data analytics to determine impact on skill gaps, course search and certifications etc.		
12	Solution should be able to build pre-defined anomaly univariate and multivariate models		

#	Description	Compliance (Y/N)	Remarks
13	Should support multiple algorithms for forecasting such as trend extrapolation; exponential smoothing; winters method, arima, arimax etc and should provide selection best fitting forecasting algorithm for the given data.		

5.14 Unstructured Data Analysis

#	Description	Compliance (Y/N)	Remarks
1	The proposed software must be able to accept text and should accept commonly used text sources such as ASCII text, document files, PDF files, spreadsheet files etc.		
2	Should be capable of performing sentiment analysis of unstructured data, in form of texts mainly (and other forms), and coming up with insights on customer attitude and response.		
3	The solution should include a document convertor to convert data not in ready text format (such as webpage and pdf files etc.) to a textual format		
4	Solution should also include easy abilities to read from XML files		
5	Should contain crawling capabilities which should be able to retrieve Web pages that go many layers deep originating from a specific URL. It should also be able to retrieve not only Social media content, but also related social media metadata (followers, friends, demographics, comments etc.)		
6	Documents such as certificates, handouts, assignments etc. should be capable of getting categorized and tagged with entities through a configurable near real time process that swings into action right as soon as the document is received/retrieved by the system.		
7	Should have pre-configured features to identify and extract entities such as names, persons, organisations/companies and locations from text data. It should also be able to use a customized list of entity pattern (such as PAN card , UID numbers etc.) based on rules		
8	Should make use of natural language processing (NLP) techniques to enable parsing and stemming of text data, identify of main topics of discussion and identify the correlated topics. It should also directly support the use of regular expressions (REGEX) for matching purposes.		
9	Should support both statistical and rule based classification mechanisms for categorization of text data		

#	Description	Compliance (Y/N)	Remarks
10	Should be possible to run multiple taxonomy structures and classification structures on the same document.		
11	Should support text clustering - it should identify the similar topics and elements (such as course descriptions etc.) from a large corpus of documents and graphically show the degree of association.		
12	Must not compulsorily require source documents or text segments to be retained within the solution. It should provide an option for documents to be dropped from the pipeline, in the event of incomplete, irrelevant or malicious content being uploaded.		
13	Should integrate within a Service Oriented Architecture (SOA) to achieve a loose coupling among interacting systems.		
14	Should be capable of automated parsing which breaks up entities into their parent forms and individual elements such as words elements etc.		
15	Should have ability to derive a links dataset from rule associating entities in unstructured data, not just in terms of document occurrence, but also in terms of syntax and relationship among entities contained in the textual data		
16	Should have strong classification functionality. It should support different weighting methods, numerous modelling techniques for classification, and binary, nominal, and ordinal targets.		
17	Should contain GUI based highly interactive plots for exploring the connections among concepts/terms. It should allow users to dynamic link plot that shows the connections among terms/concepts.		
18	Should be capable of capturing feeds from multiple sources (like social media), analyse them and come up with insights. The analysis should be real time so as to ensure continuous tracking and detecting shifts in sentiment		