Design, Development and Hosting of National Urban Learning Platform

Development along with Application Screenshots
Administrator & User Dashboard Screenshots
System Installation Manual

NATIONAL URBAN LEARNING PLATFORM (NULP)
An Ecosystems Approach to Capacity Building
Design, Development and Hosting of National Urban Learning Platform

Development along with application screenshots
Administrator & User dashboard screenshots
System installation manual

Anchor Institute
National Institute of Urban Affairs (NIUA)

Nodal Ministry
Ministry of Housing and Urban Affairs (MoHUA)

Supported by
Department for International Development (DFID)
This document has been written for the NULP (National Urban Learning Platform) Program as a medium to showcase the design, development and hosting of National Urban Learning Platform.
Foreword

The Ministry of Housing and Urban Affairs (MoHUA), in collaboration with the National Institute of Urban Affairs (NIUA), and support from the Department for International Development (DFID) of the UK Government is operationalising the National Urban Learning Platform (NULP) component of the National Urban Innovation Stack (NUIS).

NULP is envisioned as a means of digitally consolidating key knowledge and skills required by urban stakeholders and making these available to all actors on the digital channel of their choice.

The platform is proposed to primarily empower India’s urban functionaries, administrators, elected representatives, civil society, industry actors and other ecosystem players to build smart, inclusive, sustainable and resilient cities.

The principles of public participation which forms the cornerstones of the Smart Cities Mission has been adopted in the National Urban Learning Platform. The NULP program will oversee the selection of a few pilot and early adoptive cities to ignite long-term adoption of the program. Feedback received through its users would help determine platform efficacy and enable continuous improvement.

Embedding innovation and collaboration in city-level functioning forms the core elements of the program and remains the primary objective of NULP. Thus, NULP, is expected to be a watershed initiative for capacity building in urban development in India, one that will pioneer training and upskilling into a new era.

This document, part of a series of knowledge products showcased through the program, intends to present a summary of features pertaining to the program and platform functionalities. While some will be available in the initial stages of program deployment, the documents are intended to be iterative and will undergo revisions at different stages of program maturity. Hence, these knowledge products are purposed to document the various stages of platform and program development in alignment to the vision of NULP.

I congratulate and thank all partner agencies working hard to envision and develop NULP for its intended mission in Urban India.

I sincerely hope that this document will serve as a valuable source of reference for other cities/prospective users looking to develop similar platforms.

We look forward to receiving your inputs to continually enhance platform and program design.

Hitesh Vaidya
Director, NIUA
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Executive Summary

The NULP platform is currently in its final stages of development before the launch. Currently, the platform is undergoing a rigorous user testing to ensure that we have designed and executed on the user centric approach for building the platform. The table below shows the completed (in blue) and ongoing (in grey) deliverables of the development process.

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This document contains the following reports as a part of the Design, Development and Hosting of NULP:
1. Development along with application screenshots
2. Administrator & User dashboard screenshots
3. System installation manual
NULP DEVELOPMENT WITH SCREENSHOTS

This document summarizes the progress in the development of the platform and demonstrates the user journeys within the platform along with screenshots. The NULP functionally has three elements-

1. **Homepage:** The landing page for NULP that can be accessed directly using the web link or redirected from NUIS. This page allows the user to navigate to the various features within the platform and it can be accessed without logging into the platform.

2. **Learning Management System:** The end users can access the LMS to enroll in courses, allocate courses to batches and complete them for certifications. This element allows the user to view different file formats including pdfs and videos. This platform is also open for non-registered user to view and browse through open content as shared by NULP.

3. **Content Management System:** The admin users within the platform can upload content, create collections and organise them into modules. This allows the uploaded files to be later used by the end users.

There will be three types of users using the above elements-

1. **Admin User:** The admin user will do the overall maintenance of the contents added to the platform. They will administer the contents and courses added by contributor and also determine user roles within the platform.

2. **Contributor User:** The contributor user will add relevant courses and content to the platform. They will also be able to upload content.

3. **Consumer User:** The consumer user will be able to view and enroll in content and courses.

4. **Public User:** Any user who has not signed in and can access publically available data.

This document contains

For all Users
1. NULP home page features

For Consumer User and Public Users
1. Learning and Content Management portal
   - Landing Page
2. Access Content
3. Accessing and Completing Courses

For Contributor Users
1. Workspace
   - Adding Content and Collections
     1. Add Content
     2. Create Collections
   - Creating a Course

For Admin Users
1. Approving Content and Courses
NULP Home Page Features

This homepage is where all users will be directed to when they access the `nulp.nuis.in` link on their browsers. This page is publicly accessible and will be linked from the NUIS website (`nuis.in`). While the page contains gateways to other NUIS components this home page will focus on the learning component of NUIS.

In the landing page the user can:
1. Search for contents and courses in the learning platform
2. Navigate to the courses in the learning platform
3. Sign-in to the platform
4. Browse the popular courses in the platform
While scrolling down the microsite showcase capacity building vision of NULP and how NULP will help the users. The user can:

1. Access a filtered view of contents and courses based on their interest
2. Get a snapshot of the platform
3. View the different contributing partner organisations
4. Access additional details about NULP
5. View the logos of the primary stakeholders for NULP and also other important links within and outside NULP.
Learning and Content Management Portal

From the microsite all users can access the portal. The learning and content management portal is where -

1. Public users can access open content and courses.

2. Consumer user can access content and enroll in courses.

3. Contributor user can upload and create content and courses.

4. Admin user can administer the content and courses.

These users can also view their respective dashboards within the portal

Landing Page

The landing page defaults to the Contents tab. They can:

1. Access content
2. Access courses
3. Access the Workspace- Only for contributor and admin users
4. View their profile
5. View relevant dashboards
Accessing Content

The 'Contents' tab allows users to access the content uploaded to the platform. The content uploaded may or may not be part of a larger courses available within the platform. This page is intended for the Public User and Consumer User but can be accessed by Admin and Contributor users too. Within this page the user can:

1. Search for content using a QR code
2. Search for content using the search bar
3. Switch the language of the page
4. Filter the content
5. Browse through the content
On clicking into an individual content the user can see the uploaded document or video file.

The user can:
1. Download the content
2. Browse through the different pages
3. View the description
Accessing and Completing Courses

The 'Courses' tab allows users to access the courses uploaded to the platform. This page is intended for the Public User and Consumer User but can be accessed by Admin and Contributor users too.

The course can be open to all or closed. The closed courses can only be accessed by Consumer Users that is assigned to a batch by the Contributor User. This cannot be accessed by Public Users.

Within this page the user can:
1. Search for courses using a QR code
2. Search for courses using the search bar
3. Switch the language of the page
4. Filter the courses
5. Browse through the courses
The Consumer User has to access the course and complete it to receive the certificate. On clicking into an individual course the user can see the relevant content ordered and bucketed to fulfill the course requirements.

In this page the user can:
1. Share the course
2. View their course progress
3. View the content and it’s order within the module
4. See batch details
5. Take Notes
6. See the overall content details within the module

When the user clicks into the content they will be able to see the content like shown in the 'Accessing Content' section.
Contributor Users can create batches for the different courses and assign Consumer Users to complete the course within a stipulated time period to get a certificate.

The user can:
1. Click ‘Create Batch’
2. Add batch details
3. Add mentors to the batch
4. Add Consumer Users as member in the batch

![Create New Batch form]

The certificate issued after the Consumer user completes the course within a batch.
Workspace

The workspace is the page with the content management features within the platform. Before any content is made live on the platform, it must be uploaded by the Contributor User and approved by the Admin User.

After the user logs in the system navigates to the Landing Page. On clicking the 'Workspace' tab on the top right corner the system navigates to the Workspace Page. Here the Contributor user can:
1. Create content
2. View all content - Drafts, Uploads, Submitted for Review and Published
3. View the course batches
4. View and add collaborators

The Admin Users can view the same and additionally see content and courses that are up for their review.
**Adding Content and Collections**

Contributor Users can create batches for the different courses and assign Consumer Users to complete the course.

Every Content that is present on the NULP portal can be uploaded as a PDF file or a video file or an audio file is treated as a Resource.

Each & every Resource on NULP follows the below mentioned Life Cycle:
1. Resource Upload - Content is uploaded onto the platform
2. Resource Approval - Content is sent for Review to the Approver
3. Resource Publishing - Content is published & made live on the platform

The below sections explains the Resource Life Cycle for Contents and Collections.

**Add Content**

In the workspace by default, the 'Create' option (from the left side-menu) is selected. The user can upload content by clicking ‘Upload Content’ icon to begin uploading the Resource. After clicking on the ‘Upload Content’ icon, system opens the file upload page as shown below:

User can either drag & drop the file which they intend to upload or simply click on 'Browse' button & select the file & upload it. The screen has a placeholder where user may enter the URL of a YouTube video & click on 'Upload'.
Furthermore, the below section of the screen tells which file types are allowed & what is the maximum file size allowed that can be uploaded. Please note that for YouTube links, there is no maximum file size. Upon uploading any content, the system shows the relevant content.

On clicking the ‘Edit Details’ the below shown screen should come up. The user can enter the all the values in the Textboxes & select the appropriate values from all the dropdowns & click on ‘Save’.

The ‘Send for Review’ sends the Resource for review to the Admin User in the system. The status can be seen in the ‘All My Content’ section.
Create Collections

The platform offers the feature of Collection. Collection is nothing but an umbrella which houses 1 or multiple resources. The end user can directly access the Collection & view all the individual materials within it. Before a Collection can be created, the individual resources within that Collection must be made Live on the system.

Post Login the user can navigate to ‘Workspace’ page. Click on the ‘Collection’. Enter the name of the collection and click in ‘Start Creating’ button. Upon clicking on the ‘Start Creating’ link, system navigates to Collection Editor page as shown below:

The user can fill up the necessary details in the screen & click on ‘New Child’. A new item is created under the Root node in the collection. The user fills up the required fields & add a pre-existing resource in it by clicking on ‘Add RESOURCE’ button on the bottom right corner.
The user can select any & all relevant resources that you want in the collection & click on ‘PROCEED’ button at the bottom right. Upon clicking on ‘PROCEED’ the below screen is shown where the content selected in previous step is listed below:

The user can scroll up & provide all details in the textboxes for the child entry in the collection. They can also add more ‘CHILD’ entries or ‘SIBLING’ entries under the collection or skip this step.

On clicking on the ‘Send for Review’, the collection is sent for review to the Admin User.
Creating a Module
A Course Creator can create courses by compiling content to it. They can create each unit of course content and then compile a course using the newly created content and the already existing content as well.

Post Login the user can navigate to ‘Workspace’ page. Click on the ‘Courses’. Enter the name of the collection and click in ‘Start Creating’ button. Upon clicking on the ‘Start Creating’ link, system navigates to Course Creator page. On clicking ‘Edit details’ the screen allows you to edit the course details and attributes.
To add content to a course, click New Child node on the left navigation pane. On clicking child node, a heading is added to the Table of Contents pane and then click Add Resource to add content.

The user can add and view the collaborators to the course by Created with Contributions From button or Add Collaborator button.

The Table of Contents tree seen in the left pane is used to navigate content compiled for a collection, textbook, course or lesson plan. You can manipulate the tree using either:

a) The burger menu associated with a tree node
b) Right-click options associated with a tree node

Before the Course is published, it must be reviewed. You can send it for reviewing and publishing. The "Send for Review" sends the Course for review to the Admin User in the system. The status can be seen in the "All My Content" section.
Approve Content or Courses

After any content, collection or course is submitted for review on the platform, it must be approved by the Admin User. The steps are given below:

The Approver user can login using their credentials to complete this process of the life cycle. Post Login, system navigates to the Landing Page. The ‘Workspace’ link on the top right corner navigates to the Workspace Page. In the Workspace page, ‘Up for Review’ link in the left-hand side menu to view all pending Resources which are submitted for review.

The Content that was submitted for review can be review by clicking on it. Upon clicking on the corresponding Content, system navigates to Review Page where the Approver can view the Content, through the player & view its metadata & tags. The below screenshot depicts the same:
The Publish button allows the user to publish the resource. System shows a pop-up window with certain disclaimers related to the Content or Resource that is about to be published. The below screenshot shows the same.

After checking all the checkboxes & clicking 'Publish' the selected collection or content will be Live in the platform.
ADMINISTRATOR AND USER DASHBOARDS

The platform includes the dashboard feature to ensure the admin users, contributor user and end users have their data represented in a dashboard format.

1. **Admin dashboards** - Admins and Contributor users can view the performance data of the content they have added like enrollment, engagement of participants and reach of modules.
   - Content Creation Dashboard
   - Content Creation Dashboard – CityWise
   - Content Creation Dashboard – Departmentwise
   - Content Creation Dashboard – ContentType

2. **User dashboards** - The end user can view their progress in each module and view pending modules.

3. **System dashboards** - The Admins can see telemetric data of the platform and overall platform usage and reach. It helps to understand which contents are most viewed or most accessed.
   - API Manager
   - Availability Report
   - Load Metrics report
   - Container Report
   - NginX report
   - Prometheus report
   - Telemetry Data Report
Admin Dashboard

This dashboard provides the user a unified view of the content created on the platform. This data will allow them to know the utility and relevance of their content and courses. The data collected from multiple components is integrated and represented. They can also download the data as a .csv file.

Content Creation Dashboard

This dashboard provides details of all the contents uploaded on the platform irrespective of the city by which it is uploaded.

### Content Creation Dashboard – City Wise

This dashboard provides details of all the contents uploaded on the platform based on the city selected.

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**Admin Dashboard**

This dashboard provides the user a unified view of the content created on the platform. This data will allow them to know the utility and relevance of their content and courses. The data collected from multiple components is integrated and represented. They can also download the data as a .csv file.

**Content Creation Dashboard**

This dashboard provides details of all the contents uploaded on the platform irrespective of the city by which it is uploaded.

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**Content Creation Dashboard – City Wise**

This dashboard provides details of all the contents uploaded on the platform based on the city selected.
Content Creation Dashboard – Department wise
This dashboard provides details of all the contents uploaded on the platform based on the department selected.

Content Creation Dashboard – Content Type
This dashboard provides details of all the contents uploaded on the platform based on the content type selected.
User Dashboards

The Consumer User dashboard provides the user a unified view of their progress of learning within the platform. The data collected from multiple components is integrated and represented. They can also download the data as a .csv file.

The user can view
• Course details
• Batch enrolment details
• Progress status

![User Dashboard](image-url)
System Dashboards

This dashboard provides the system administrator a unified view of the organization’s content creation and consumption patterns. The data collected from multiple components is integrated and graphically represented. This helps to gauge and assess the value, popularity and acceptance of content created and used on the portal. The dashboard shows views of content created, reviewed, published, consumed etc. Administrators can also download the data as a .csv file.

API Manager
This Dashboard depicts the API call details and health.
Availability Report
This dashboard report depicts the Service availability.

Load Metrics report
This Dashboard report depicts the load on the Virtual machine.
Container Report
This Dashboard report depicts the container health.
**NginX report**
This dashboard report shows the metrics for web server.

![NginX dashboard](image)

**Prometheus report**
This dashboard shows metrics from monitored targets by scraping metrics from HTTP endpoints on these targets.

![Prometheus dashboard](image)
Telemetry Data Report

Kibana is used to visualize telemetry data. It captures telemetry data and the required report can be built based on the requirement and the data available.
SYSTEM INSTALLATION SUMMARY

NULP is built on the Sunbird open source repository of learning management microservices architected for scale and designed to support diverse teaching and learning solutions. Sunbird is the open source contribution of the EkStep Foundation and is licensed under the MIT license.

The system installation documents are meant for its adopters, developers and contributors. This helps the user to get familiar with the bare necessities, giving you a quick and clean approach to setup the platform and get it running. This document is to support and summarise the System Installation Manual and does not detail out the installation steps.

Sunbird software is containerized. The installation script uses the docker swarm orchestration engine to run the Sunbird docker images. The Docker swarm consists of manager and agent nodes. The containers run on the agent nodes and the manager nodes manage the container lifecycle.

Services like Portal, LMS Backend, API Gateway and Proxies etc., are run as docker containers. Services like learning, Search, Keycloak, Cassandra, PostgreSql, Elasticsearch etc., are run on Virtual Machines (VMs) directly.

Infrastructure Components
Sunbird consists of 3 major subsystems
• Knowledge Platform also known as Learning Platform (Taxonomy, Content and Content Management)
• Data-pipeline (Creating insights from telemetry)
• Core (User, Organization, Courses, Badges, Content Studio)
Technical Requirement

To efficiently handle the platform installation, you need to have:

- System administrator permissions on Sunbird and all servers
- Hands-on experience in administering Linux systems
- Hands-on experience using Docker to run containerized services

Other requirements:

1. Private GitHub repository to store Ansible hosts and secrets
2. Fully Qualified Domain Name (FQDN) with SSL
3. Azure Storage account
4. Docker hub account
5. A Public IP
6. Security:
   - All ports must be open in internal networks (Azure-Vnet or AWS-VPC) for internal communication between the VMs
   - External ports must be open from the Proxy or load balancer, following ports should open to public
     - 80 (0.0.0.0) inbound
     - 443 (0.0.0.0) inbound
   - By default, all the outbound ports are allowed public access from the VM

The system installation requires to configure 7 virtual machines

- Jenkins
- Database
- DockerSwarm
- KP
- DP
- Yarn-master
- Yarn-slave
Installation Summary

Here are the board steps to complete the installation:

1. Virtual Machines Setup:
   a. Resource Group: All the VM’s and other virtual resources should reside under a common resource group.
   b. Virtual Network setup: We need to create the Jenkins server first and while creating the Jenkins server we must create a virtual network. All other VM should point to the same virtual network.
   c. Virtual Machine creation: 7 VM are to be created-
      i. Jenkins
      ii. Database
      iii. Docker-swarm
      iv. KP
      v. DP
      vi. Yarn-master
      vii. Yarn-Slave
   d. Storage Account Creation: To create storage account in azure. Create the account with any name and add the two containers.
   e. SendGrid Account Creation: In order to configure SMTP, we need to have a SendGrid account under Azure.

2. Variable Configuration: You can customise the platform by making changes to the following configuration
   a. Core Module variable Configuration
   b. Data Pipeline Module Variable Configuration
   c. Learning platform Module variable Configuration
   d. Domain Name Generation
   e. Mail Server
   f. Google Developer Console
   g. Youtube

The details of the above steps to be followed by developers are added in the System Installation Manual.
Established in 1976, National Institute of Urban Affairs (NIUA) was tasked to bridge the gap between research and practice on issues related to urbanisation and suggest ways and mechanisms to address urban challenges in the country. For more than 40 years now, NIUA has been the vanguard for contributing to, and at times, building the urban narrative for a fast evolving Urban India. The Institution has been actively working on bringing forth key areas of concern for urban India in order to build the urban discourse at various urban scales.

It has utilised its competencies in research, knowledge management, policy advocacy and capacity building to address urban challenges and continuously striving to develop sustainable, inclusive, and productive urban ecosystems in the country. It has emerged as a thought leader and knowledge hub for urban development in India and is sought out by both Indian and International organisations for collaborations and partnerships in India’s urban transforming journey. NIUA is committed towards aligning its efforts towards achieving Sustainable Development Goals (SDGs) through all its initiatives and programs.
About DFID

The Department for International Development (DFID) leads the UK government’s work to improve inclusive growth needed for poverty reduction to make development sustainable in line with the International Development Act (2002), the Gender Equality Act (2014) and the Sustainable Development Goals (SDGs). The UK has expertise in a range of sectors highly relevant to the poverty reduction, inclusive growth and economic development including finance and infrastructure. Helping partner countries develop these sectors and improve their business environment will give firms and people greater opportunities to work in a stronger, more productive economy.

By 2030, India will become the most populous nation and third by GDP size (=>USD 5 billion). India’s development trajectory in the next decade presents significant opportunities and challenges for global development.

India-UK development partnership is focussed on inclusive economic development through building markets using development capital investment and technical assistance.