Ministry of Housing and Urban Affairs
Government of India

National Institute of Urban Affairs

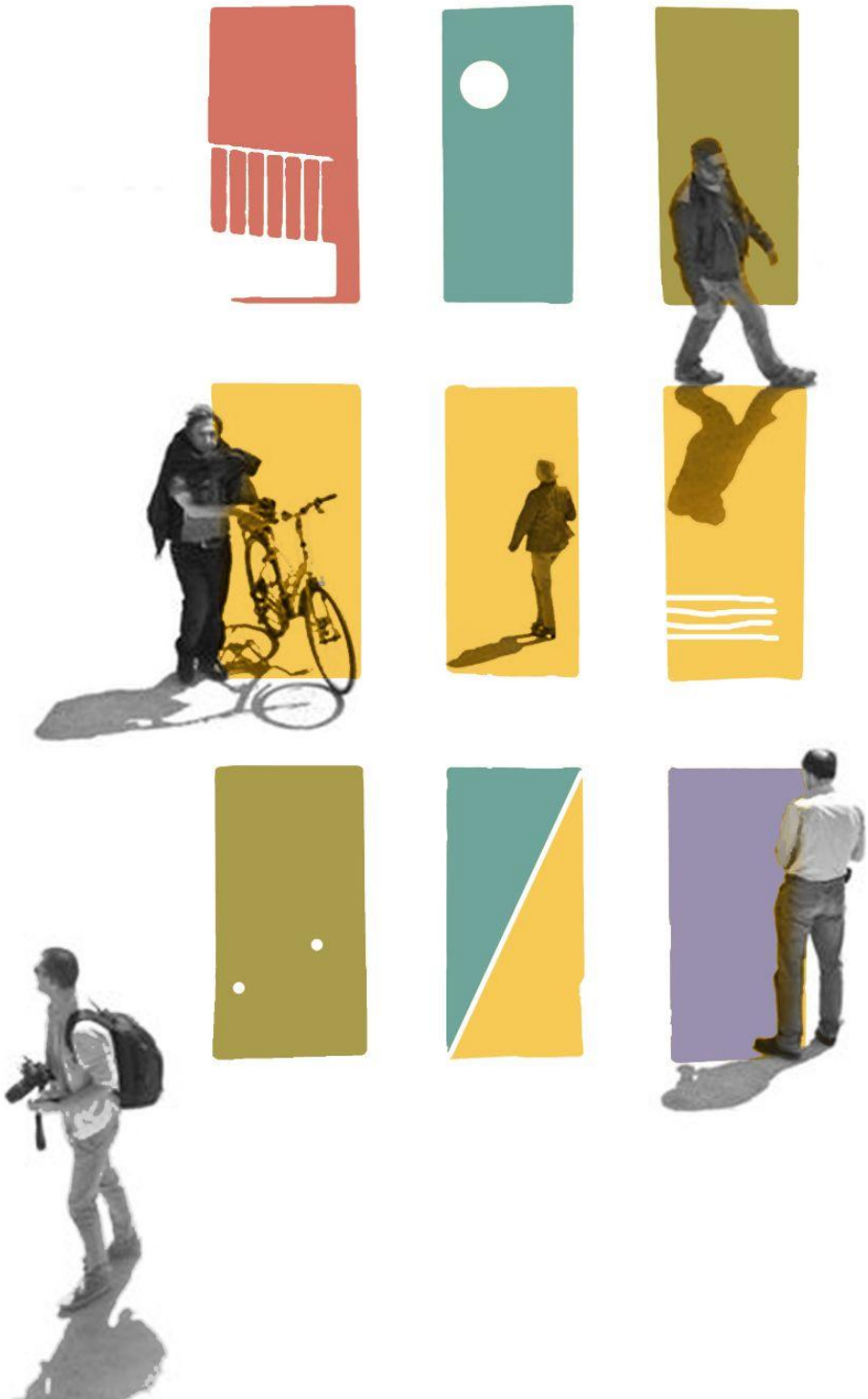
Smart City
MISSION TRANSFORM NATION

iscf
Ministry of Housing and Urban Affairs

COMPENDIUM
OF PROJECTS

India Smart Cities Fellowship Program

Cohort of 2020-21



INTRODUCTION

Exploding population and shrinking resources are adversely impacting cities across our country. To help solve the increasing urban inconsistencies, the **Government of India** launched the **Smart Cities Mission** in 2015, to drive economic growth and cultivate equitable urban ecosystems. To this extent, the **India Smart Cities Fellowship Programme** was initiated by the **Ministry of Housing and Urban Affairs** (**MoHUA**) under the Smart City Mission to promote youth leadership and usher vibrancy in the design of India's urban future.

The 2020-21 fellowship cohort comprises 46 young interdisciplinary and multidisciplinary thinkers from across the country. Despite the pandemic, the fellows developed a keen understanding of the Smart Cities Mission by reviewing the 100 smart cities, and their current progress, and evolved a database identifying key areas/sectors of interest of each of the smart cities. Soon after, a 'Design Thinking' approach was adopted for project ideation based on issues identified in various sectors according to the developed database and 13 projects were finalised.

The 46 fellows were then divided into 13 teams, each of which was mentored by subject matter experts, throughout the fellowship. ISCF fellows coming from diverse academic backgrounds have worked tirelessly to evolve context-specific digital products that not only help cities in taking stock of their current realities but also highlight strategic ways to streamline development according to the focus of the product and the city. Technology here was utilized as a means to achieving an outcome as opposed to being the outcome itself, making the 13 projects and the fellowship, a unique endeavor.

This compendium of projects in the 2020-2021 cohort is the culmination of a year-long attempt by fellows at problem-solving and innovation in 13 Smart Cities of India.

QUOTES

"Urban governance requires a trained body of professionals for effective service delivery, and the India Smart Cities Fellowship Program is a constructive step towards involving the youth to co-create and drive sustainable responses to urban India's issues. Yuva Shakti, as the Hon'ble Prime Minister calls it, will power the vision of Aatma Nirbhar Bharat."

-Hardeep S. Puri

Minister, Housing and Urban Affairs

"The India Smart Cities Fellowship Program has taken significant strides by involving the youth to develop ideas that are easily adaptable, replicable and implementable across all Indian cities."

-Durga Shanker Mishra

Secretary, Ministry of Housing and Urban Affairs

"The India Smart Cities Fellowship provides promising urbanists with a platform to imagine, create, and implement out-of-box solutions for complex problems facing India's cities. An ISCF Fellow's journey never has a dull moment!"

-Kunal Kumar

Joint Secretary, Ministry of Housing and Urban Affairs

"As the Smart Cities Mission is being implemented to improve the quality of life in Indian cities using technology to drive data-driven governance, the India Smart Cities Fellowship Program gives the youth a chance to be involved in these processes at the ground level and to brainstorm, develop and test solutions in Smart Cities."

-Rahul Kapoor

Mission Director, Smart Cities Mission

"By nurturing the India Smart Cities Fellows as they co-create innovative solutions to pressing urban issues in Indian cities, NIUA becomes a laboratory to develop practitioner skills in young professionals".

- Hitesh Vaidya

Director, National Institute of Urban Affairs

"A batch of bright and driven professionals from intersectional urban domains, the cohort of 2020-21 exhibited exceptional teamwork and determination in the face of multiple challenges brought about by the ongoing global pandemic. The Compendium of Projects 2020-21 is a testament to a year of relentless perseverance by the Fellows".

-Nabamalika Joardar

Fellowship Manager, National Institute of Urban Affairs

THE TEAM

EDITORIAL

Sai Varsha Akavarapu

DESIGN

Subarna Sadhu

CONTENT

Aarsi Desai

Abhisikha Das

Aman Singh Rajput

Ananta Kukreja

Ankur Negi

Joydip Datta

Juhi Sah

Manuel Diego

Monica Thakur

Priya Upadhyay

Radha Karmarkar

Rohitaash Debsharma

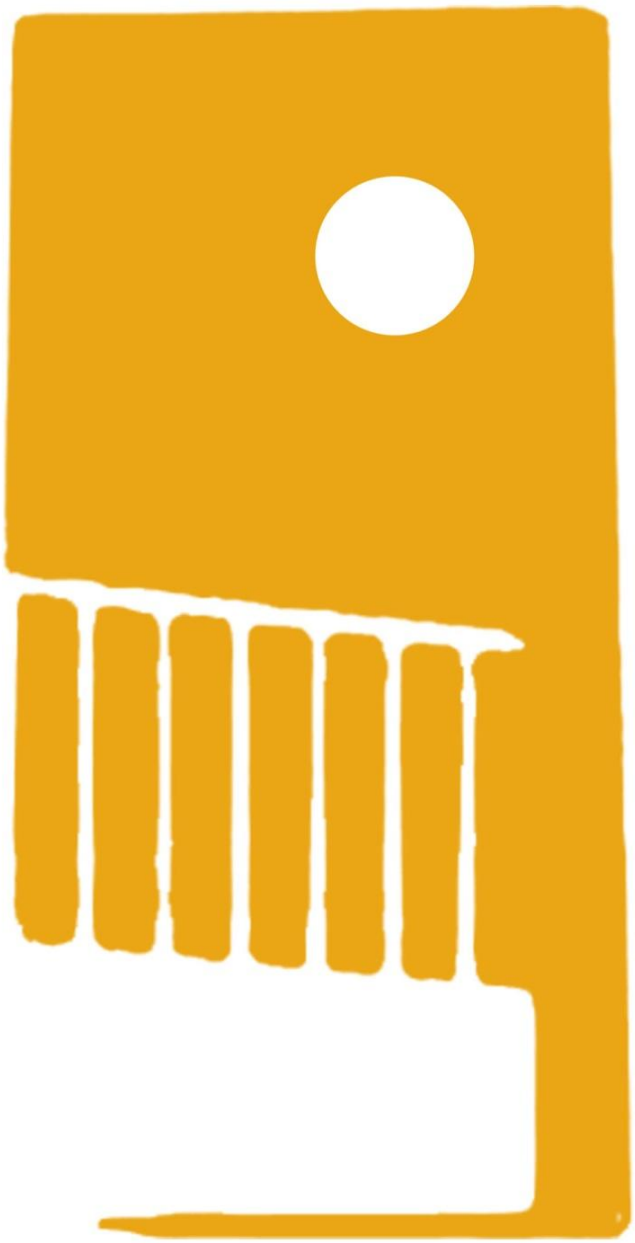
Shilpa Shashidharan

Srinidhi Ravishankar

Syed Mohammad Hamza Abdullah

Vaibhav Sharma

Yogada Joshi



PROJECTS

BUILD

Building Urban Integrated Land Use Dynamics

01. CONTEXT

Preliminary assessment of the problems associated with the urban realm is often displayed in the form of problem tree diagrams, where problems are further bifurcated into the aspect of effects and root-causes based on severity, impact, and interdependence. It is observed that most of the initiatives/programs address the effects of the problems due to their visibility, but only deliver a marginal utility. Initiatives that target the core of the problem are expected to deliver the most sustainable, efficient and smart solutions. With regards to this, the project aims to address some of the predominant challenges associated with the Master Planning approach (i.e., core problem) in the Indian context.

The static master planning approach followed by the Indian cities fails to address the complex challenges posed by rapid urbanization. Today, the cities are not only expanding in size but are also turning to be more complex in terms of their socio-economic, environmental and infrastructural composition. Elite cities globally have adopted a dynamic master planning approach, advocating the power of data for enabling evidence-based planning. Even the Draft National Urban Policy Framework developed by Niti Ayog mentions that Indian cities must have a "NOT Static Master Plan but must consider planning along the lines of evolving ecosystems". The foremost component of the dynamic master plan is to have a land-use database or base map that is complete and updated in real-time. In this context, the project proposes to develop a 'Dynamic, Interactive and evidence-based land-use database'.

02. PROBLEM STATEMENT

The static land use planning approach fails to address the complex challenges posed by rapid urbanization in which cities not only expand in size but are emerging in complex ways with issues ranging from infrastructure availability and a deficit in natural resources. Additionally, sudden impact drivers such as climate change along with local, social and economic tensions further increase the complexity in the urban arena. This makes urban land use planning processes subjective and outdated, often following a top-down approach where community participation is ineffective and happens at a tokenism level.

Due to urbanization, the pressure over the cities is not just limited to changes in urban land cover/land use but also on infrastructure needs to cater to the growing urban population. The rigidness of the traditional tools in the planning process also creates a barrier for the development of the city and these restrictions do not allow authorities to think beyond the limits. The lack of knowledge about the interdependency and intricacies of various infrastructure with the growth of cities also creates a major problem for urban planners and administrators to plan for the cities in an efficient and productive manner. This points out the need to develop a digital tool for indigenous planning and thereby the project aims to lay the foundation stone to a culture of data-driven urban planning in the country's finest smart cities.

03. OBJECTIVE

The objective of the project is to create a dashboard by capturing and integrating multiple datasets from various organizations to produce a dynamic, interactive and evidence-based land use model. Cities periodically collect a wide spectrum of data from day-to-day operations, but the dataset collected is either used only for a specific task/purpose or not used at all. Multiple departments of ULB and parastatal bodies collect data related to built use for collecting service delivery charges and taxes. It is even observed that there is a mismatch in the dataset available with different agencies and there is no interoperability. For example, a particular building is charged electric bills based on commercial use and other state departments charge their service bills based on residential use. Integration of dataset possesses the potential to help departments in eliminating financial leakage and augmenting revenue. The project focuses on integrating the built use data from five services predominantly, namely: building plan approval system, property assessment, trade license, water supply connection and electricity connections. The dataset from the respective system will be integrated through Application Programming Interfaces (API) which will be displayed on an open-source web-based GIS map. The portal will also emphasize fetching crowdsourced data to reduce information mismatch errors. Additionally, citizens can voluntarily request a change of their personal property or can register a complaint mentioning deviation. The information collected from crowdsourcing will be verified physically by the official and post-verification it will be updated on an open-source web-based GIS map.

04. PROJECT STRATEGY

4.1. Pilot City Identification

An assessment was undertaken to finalize the pilot city based on the dataset of the Assessment and Monitoring Platform for Liveable, Inclusive and Future-ready urban India (AMPLIFI) Portal. It is a repository of data procured by various cities defined by different data points. The methodology comprised of the following stages described below was undertaken in all the cities. The first stage comprised of shortlisting the data points relevant to the project such as; the availability of data, parameters such as periodical satellite imagery and land use maps, availability of GIS master plan. Further, based on parameters related to the number of properties based on GIS of multiple numeric values, the nominal data set was evaluated.

The second stage involved the calculation of 'mapping efficiency weightage' of cities for the shortlisted parameters, based on which the cities were shortlisted. The assessment strategy identified potential cities such as Surat, Bhubaneshwar, Ahmedabad, and Bhopal. The third stage involved extensive secondary research and primary telephonic or video conferencing-based interviews with the respective smart city officials through which, the availability and quality of the dataset on the domain of land use and infrastructure was collected. In this stage, the cities posing a higher Covid-19 threat were discarded even though they had a good dataset. Based on all the above stages, Bhubaneshwar Smart city was shortlisted, which eventually got finalized after the approval of the leadership of Smart Cities Mission (i.e., Shri Kunal Kumar, Mission Director and Joint Secretary, MoHUA and Shri Rahul Kapoor, Director).

4.2. Project Development and Implementation

Project Development :

Pre Pilot

- Understood aspects of Land use and land cover.
- Studied the National Urban Information System (NUIS)
- Documented the methods of capturing land use data and how they are updated periodically.
- Reviewed the Amrut Master Plan guidelines (Land use).
- Conducted Interview with the experts working on GIS based Master Plans.

Pilot stage

- Identification of city specific problem.
- Understanding the data handling mechanism in the city.
- Understanding the utility of project w.r.t Bhubaneswar city.
- Streamlining the project idea in conjunction to city specific needs.
- Checking of data availability and data collection.
- Preparation of FR-TR for the project & meeting CEO for product development.

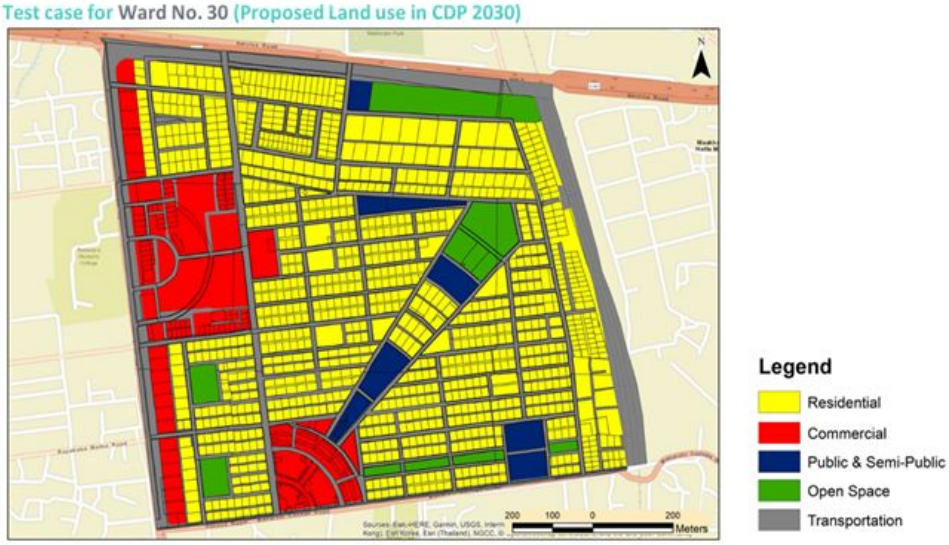
Deployment Stage

- Identifying the adaptive land use change in the city for the Pilot ward.
- Conducting engagement meetings with stakeholders to use the product during pilot.
- Identifying the gray areas in city through heatmap for enabling better revenue collection.

Post Pilot

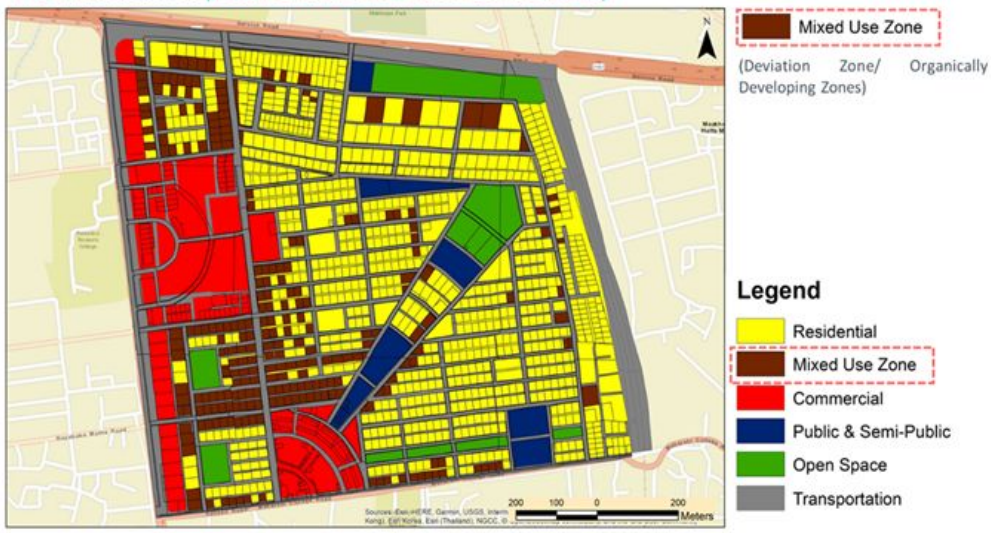
- Taking the reviews of pilot from city officials, NIUA, other stakeholders and polishing the product.
- Create SOP for the final modified product.
- Hosting the Product in city platform and branding through MoHUA platform.

Test case for Ward No. 30 (Proposed Land use in CDP 2030)



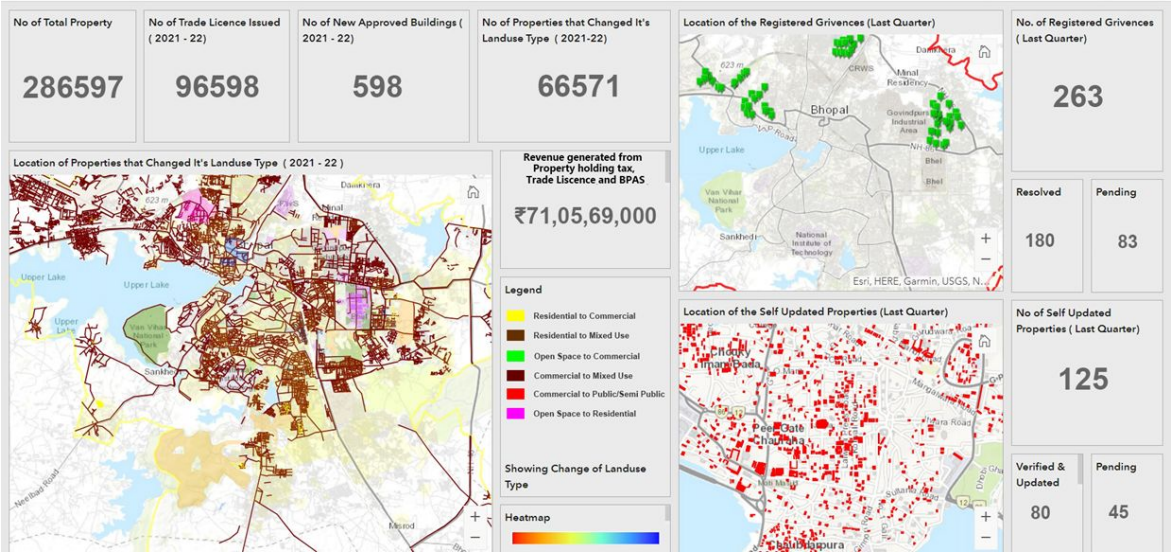
Test case for Ward No. 30 (Plots with Trade license)

Pilot for Ward No. 30 (Present land use from Trade license & BPAS)



The output results from the overlapping of the datasets are displayed above. It clearly shows the property which has changed the use from either residential or commercial to mixed-use. It points that city is not growing in line with the proposed development plan and there is an urgent need to strictly enforce the development plan that is practically very difficult or either to make the development plan flexible and resilient enough to adapt and address such sudden changes. Additionally, this changes to mixed-use in simple words.

4.3. Expected Outcomes



Once developed, the product will have the following characteristics/features:

ULB will get an updated land use base map which is preliminary to any physical planning process/project. This will enable decision-makers to identify grey areas in the city in terms of trade license issued and other revenues that are based on land use, and thereby possess the potential to boost the municipal revenue. Land use change will enable WATCO and other stakeholders to identify plots with changing land use. It will enable ULB's to identify the rapidly expanding areas within a city for various planning interventions. The tool will be a single platform for data sharing between multiple departments which will enable them to maintain the dataset in a uniform format. Since the dataset is of a granular scale and collected regularly, there is a significant potential for data trading with private entities, research organizations and funding agencies dealing with urban sector projects.

4.4. Actual Result

A test case was undertaken by the team for Ward 30 in the Bhubaneswar Smart City. The aim of the test case was to guide the likely outcome to subsequent wards in the city regarding land-use changes and updating that in real-time. Ward number 30 was chosen for the test case after expert and non-expert consultation and it was identified that the ward has undergone a drastic change in the last decade. A portion of the area was ground truth physically by the team to validate the data set that will act as an input to the BUILD Tool. The team found a sizable deviation during the physical survey, bringing into question the dataset envisaged to be used for the project. A demo result for Ward 30 shows that the land use data set from the proposed city development plan and trade license overlap. Further, the land use dataset of BPAS and the datasets that require crowdsourced information are integrated. This tool delivers an opportunity to decision-makers or officials to utilize resources judiciously and effectively.

05. CONCLUSION

The BUILD tool has meticulously attempted to develop a mechanism wherein the land-use datasets are registered and maintained at plot level in real-time. This tool has initiated a culture of data-driven evidence-based urban planning in the Indian context. It possesses a sizable potential for horizontal (i.e., adapted to different cities) and vertical scale-up (i.e., adding more layers to the proposed tool). The product displays granular plot level land use information which is envisaged to be augmented to ward, zonal and city level and thereby derive holistic information to accredit informed decision making. The tool possesses the potential to value added by integrating the dataset from the system of various service providers such as WATCO (i.e. parastatal agency for providing water) and electricity board. It is envisaged that scaling of the project will offer two-fold benefits as follows; it will deliver an opportunity to practice stimulations and anticipate impacts of various proposed projects to facilitate an informed decision and enable the city to act more sustainably and strategically along with augmenting the inclusion aspect and secondly testing and prototyping can improve a city's resilience dramatically of lower costs and reduce the possibility of falling in the real world

TEAM

Archit Nishant

Jash Goswami

Joydip Datta

Pritam Patnaik

MENTORS

Dr.Saswat Bandyopadhyay
Professor - CEPT University

Nilesh Rajadhyaksha & Kanak Tiwari
Project Coordinator, MPD 2041,
National Institute of Urban Affairs

ENGAGE

A marketplace to integrate the existing ecosystem of volunteering with an intent to nudge citizens towards responsible behavior through gamification.

01. CONTEXT

People make multiple choices every single day, knowingly or unknowingly based on criteria ranging from convenience, minimum hindrance, financial feasibility, time taken, etc. Now, these choices are generally very personal and while making these choices many people hardly think about the bigger picture of climate change, environment, etc. Currently, there is rarely has an alternative, and even if there is, it has issues related to accessibility, where the user often needs to put an extra conscious effort to avail these alternate choices. While there is no extra institutionalised acknowledgement of the conscious efforts taken, there are penalisation mechanisms which are targeted towards paying fines rather than behaviour change. With India being the second-most populous country in the world, the impact of practices focusing on behavioral change may increase manifold.

Since cities are recipients of migrants from all over the country, people tend to have a reduced sense of ownership with one's surroundings. The sense of anonymity often alienates them, resulting in a decreased sense of responsibility. The idea is to inculcate a sense of belonging and promote a bottom-up approach to governance, therefore increasing citizen participation.

Internationally, there is 30-50% citizen participation in the top ten developed countries through volunteering. India fares at 1.5%. As a country with 1.3 billion citizens, there is a significant young demographic dividend willing to participate and be the change. Globally, 970 million people volunteer every year, which is equivalent to 125 million full-time workers and 2.4% of the global economy. 377 million people reside in urban India, considering a modest conversion rate of 10%, there is a huge untapped potential waiting to be explored. The numbers are compelling, it is indeed time to invest in our people, our strength, and our collective future.

02. PROBLEM STATEMENT

The administrative systems in India mostly depend upon penalizing mechanisms to monitor citizen behaviour while there are hardly any appreciation mechanisms to reinforce citizen participation. Lack of appreciation often acts as a disincentive, particularly when there is no accountability for the action taken whether good or bad to the mostly anonymous citizen. As citizens hustle towards financial stability and day-to-day activities, their quality time towards giving back to society constantly diminishes. With time constraints questions arise on how to contribute positively, all the while, to producing positive results for the community.

The project began with the question, "What can we do to increase citizen participation in urban India?". Volunteering could be an answer, however, volunteers face hurdles in form of awareness and (in)convenience. There is a general willingness to be a part of something that is for the greater good provided there is no extra effort or cost (must follow the path of least resistance). On the other hand, volunteering organisations face the issue of discoverability, scalability and visibility.

Through extensive primary and secondary research, we identified that the issue lies in matchmaking, therefore, the team has come up with an engagement program that would create an integrator platform to bridge city administrators, volunteering organisations and citizens to nudge behavioural change in the functioning of city ecosystem.

03. OBJECTIVE

Our vision is to make volunteering a way of life, a social norm; therefore, effortless, accessible, and gratifying for all Indians. Our mission is to empower every Indian to be a changemaker that will drive a positive change in their communities, then their cities and eventually in the country. It is imperative to have achievable objectives that lead to an overall nationwide vision:

- To facilitate a volunteer to access opportunities based on their interest, skill, time, location and reduce the functional hurdles.
- Connect organizations with enthusiastic volunteers, increase the probability of discoverability and scale their activities.
- To create a nationwide database for volunteering, represent it in quantifiable & relatable statistics and support decision making.
- To establish a rewarding mechanism in collaboration with private and government organisations to sustain citizen participation.

The idea is to create an ecosystem, a one-stop-shop for all stakeholders to collaborate and magnify the potential of existing initiatives. This platform can be accessed by any passionate individual committed to providing their enthusiastic service, and eventually progressing their community. It diminishes the hurdle of identifying volunteering opportunities while providing a wide spectrum of choices as per their interest, skill, time and location. The platform, a marketplace therefore aims to increase citizen participation in urban India.

04. PROJECT STRATEGY

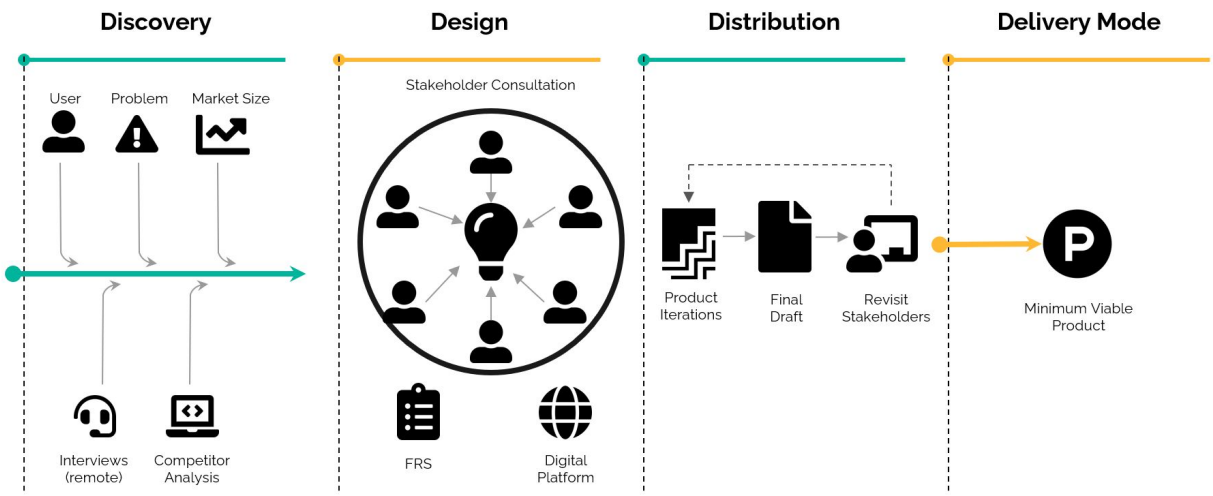
4.1. Pilot City Identification

The team's idea does not essentially depend on specific datasets and is city agnostic. The goal is to engage citizens through an integrator platform. Although the project is a multi-stakeholder marketplace, the primary goal is to scale up "good behaviour". The team has a crisp inventory of prerequisites to gauge the non-negotiables for city selection:

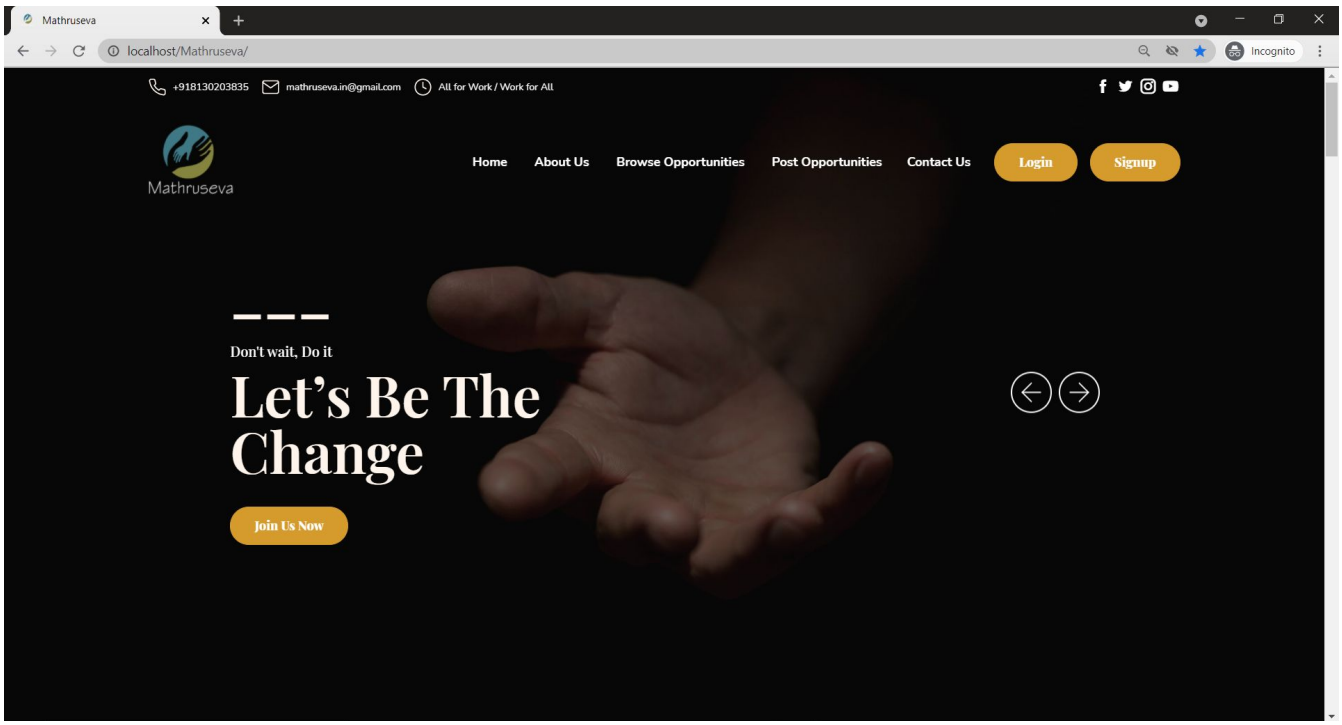
- Presence of a culture of volunteering,
- Awareness in citizens,
- Active NGOs/ NPOs/ government organisations,
- Willingness to solve city-level issues in collaboration with the government,
- Accessibility and adaptability to new technology, and
- Citizen participation at Ward Committee level.

The team started with a multiple criteria decision-making framework. However, choices remained limited when cities were shortlisted given the pandemic situation. Knowing the vibrant ecosystem of citizen participation and growth of the smart city, Mr. Kunal Kumar, the Joint Secretary of MoHUA selected the city of Bengaluru. Bengaluru has many volunteering organisations such as 'Make a Difference', 'Team Hasiru', 'Heritage Beku', 'Janaagraha', 'United Way', 'Say Trees' and many more which are actively engaged with volunteers for the development of the city.

4.2. Project Development and Implementation



4.3. Expected Outcomes



Integrator Platform: A multi-stakeholder marketplace for volunteers, NGOs/ NPOs, and Government Organizations to engage in volunteering, by reducing the efforts and hurdles of discoverability, accessibility and scalability.

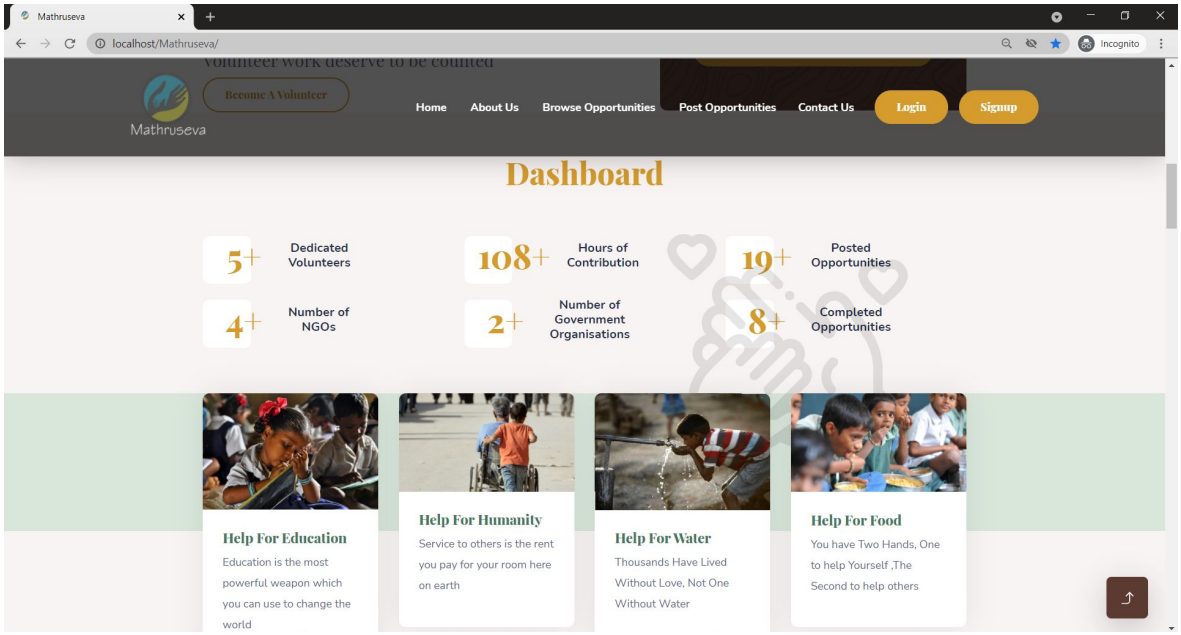
Dashboard: Data visualisation in the form of a dashboard (at the national level, city level) helps monitor the overall activities taking place across the organisations and facilitates impact assessment.

Programme: To make Mathruseva a nationwide volunteering platform, it is necessary to support it with a toolkit, a rewarding framework (incentivization) and linking it with other national and state initiatives. The programme will encompass all the dimensions required to scale the platform.

4.4. Actual Result

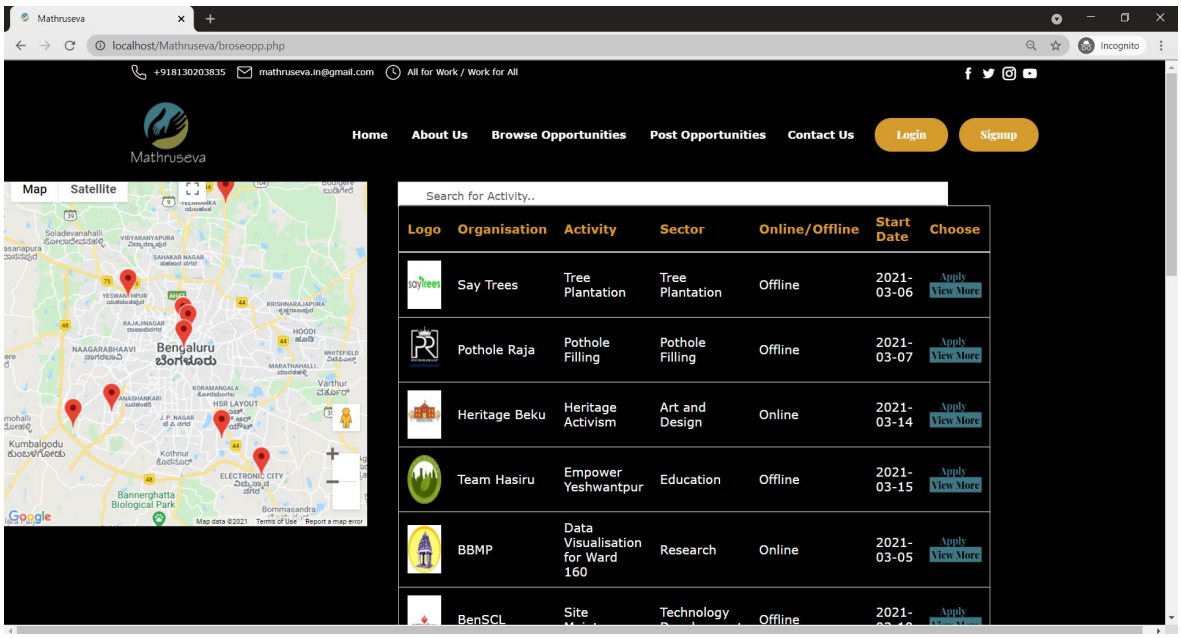
Our product/ platform is called "Mathruseva", which means serving one's motherland. This resonates with the idea we want to propagate through the platform. Mathruseva is an aggregator platform, which resolves the hurdles on both volunteer and organisation end. Hence, the platform has an interactive user interface to facilitate the multiple stakeholders.

Social media integration will overcome the problem of awareness, whereas the rewarding mechanism will ensure the interest and motivation of volunteers. The flexibility in the timings and availability of online opportunities will ease the scheduling issue for volunteers and NGOs alike. Similarly, the catalogue of opportunities will make it easier for NGOs to be discovered for the activities. The hyperlocal solution of searching for an opportunity in your neighborhood would resolve the accessibility issue of volunteering opportunities.

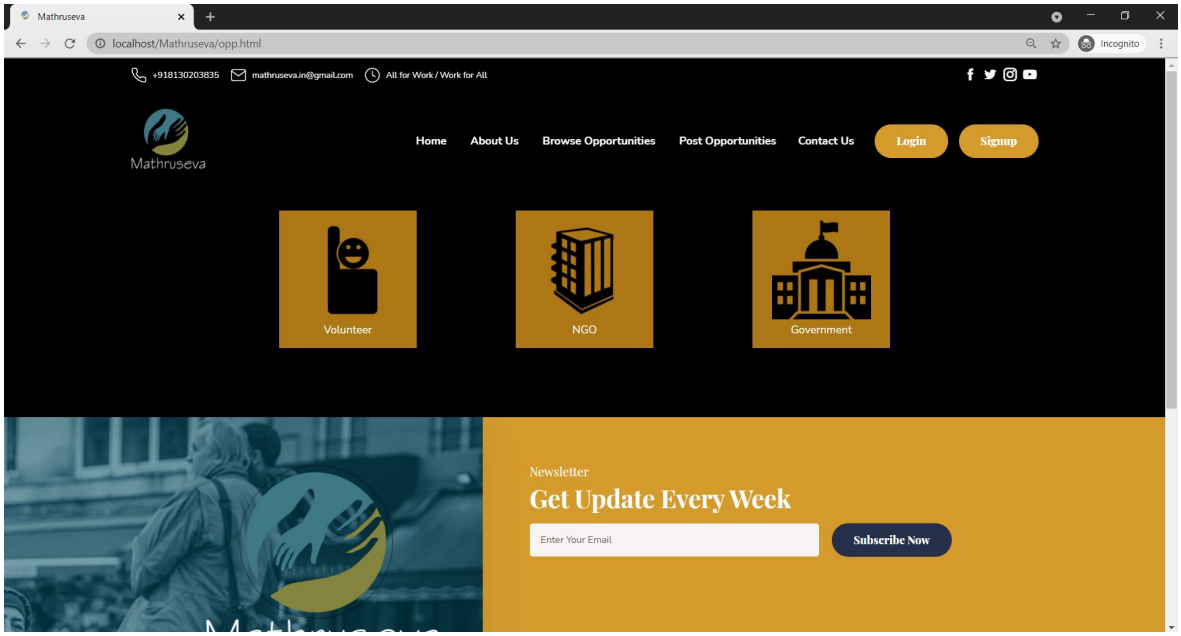


A live dashboard shows volunteer statistics such as the number of active participants, ongoing activities, registered NGOs, hours of contribution, and many more.

Mathruseva is a sector agnostic platform, which allows interactions between all stakeholders who want to be engaged with volunteering. This flexibility gives volunteers a wide array of activities to choose from.

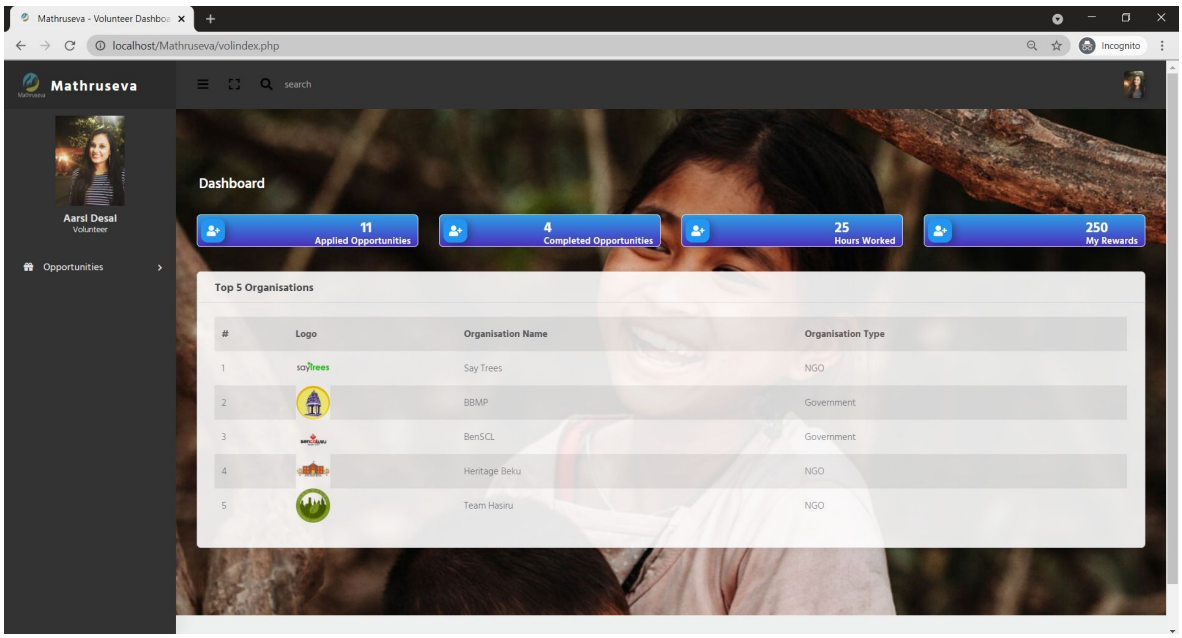


When a volunteer is curious and interested in discovering the opportunities available in the vicinity for them, they can open the “Browse Opportunities” tab which shows a catalogue of available opportunities vis a vis a location, proximity to the location, and other filters. This makes it simpler for the volunteer to choose the activity they are interested in. The solution would be hyperlocal with a possibility of selecting a Ward or radius of distance to volunteer within.



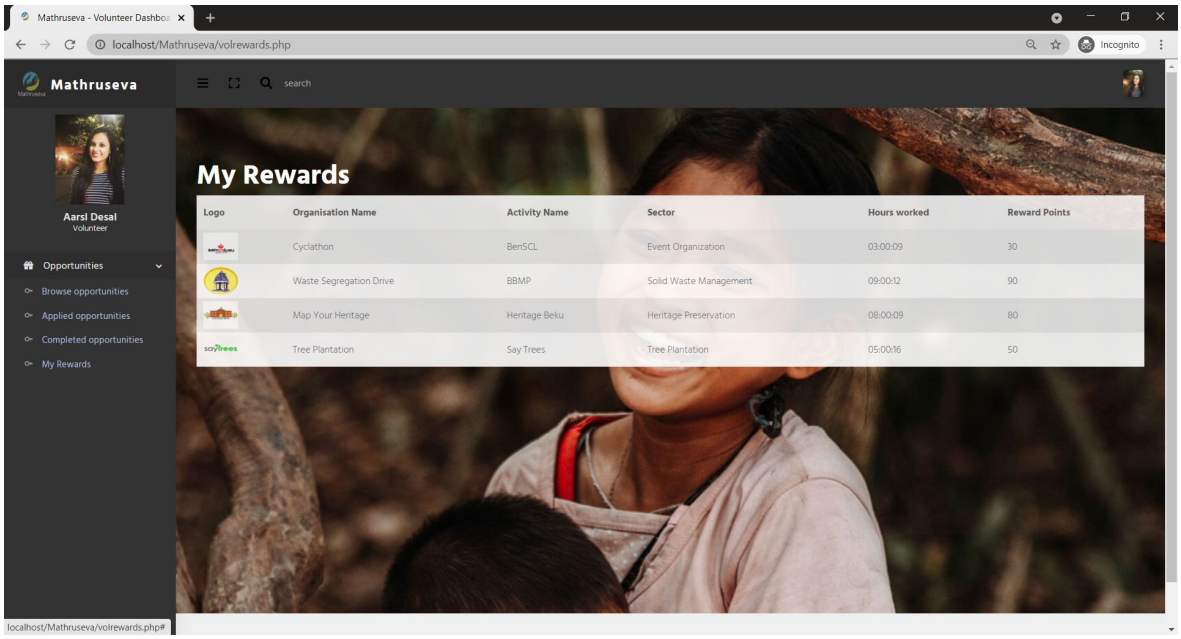
Mathruseva allows interactions between volunteers, NGOs/NPOs, and Government organisations in the phase I, however, additional stakeholders like institutions and CSRs for a wholesome ecosystem of volunteering will be added in phase II.

Signing up/in on the website is only required when the user wants to perform a transaction through the website.

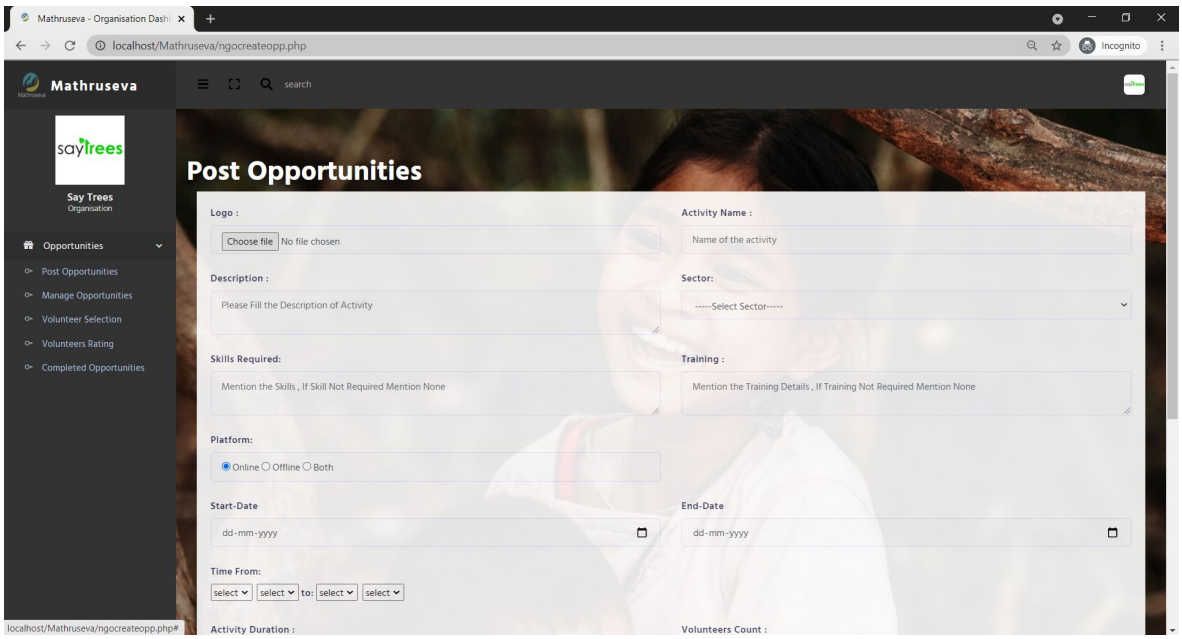


Volunteers are vetted based on their credentials and then they can log in to the platform. On the volunteer interface, the dashboard will show the individual footprint, and the top 5 volunteering organisations based on volunteer feedback.

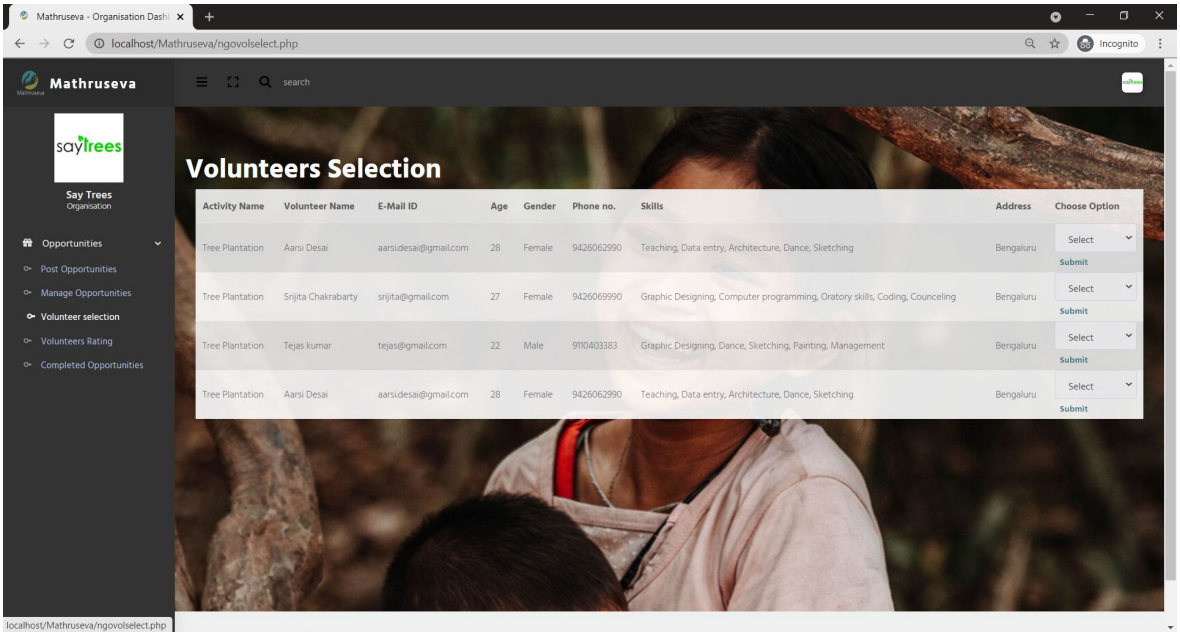
The volunteer will be able apply for the opportunity once they have completed the user profile with preferences and other social media handles for seamless sharing.



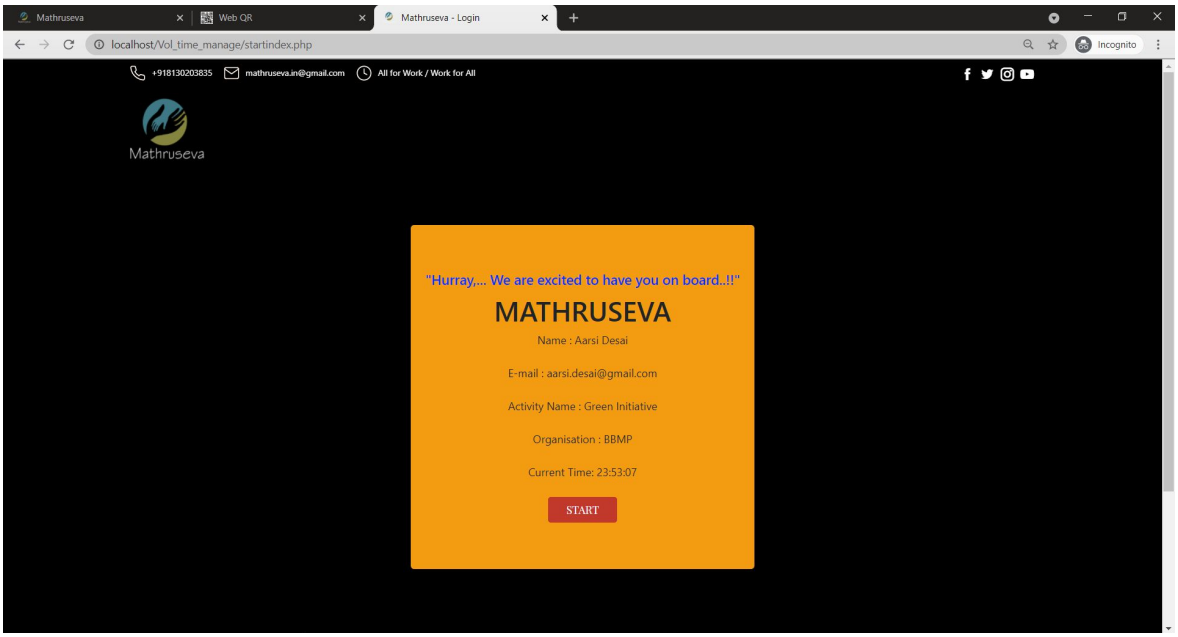
The volunteer interface has multiple tabs on the navigation bar through which they can browse opportunities, apply for them, get updates on the applied opportunities, view the feedback & rating received from hosting the organisation and rewards earned based on the hours of contribution. The platform uses gamification in terms of social media integration and rewarding mechanism to scale good behaviour. The rewards would act as social currency and could be redeemed against an array of benefits.



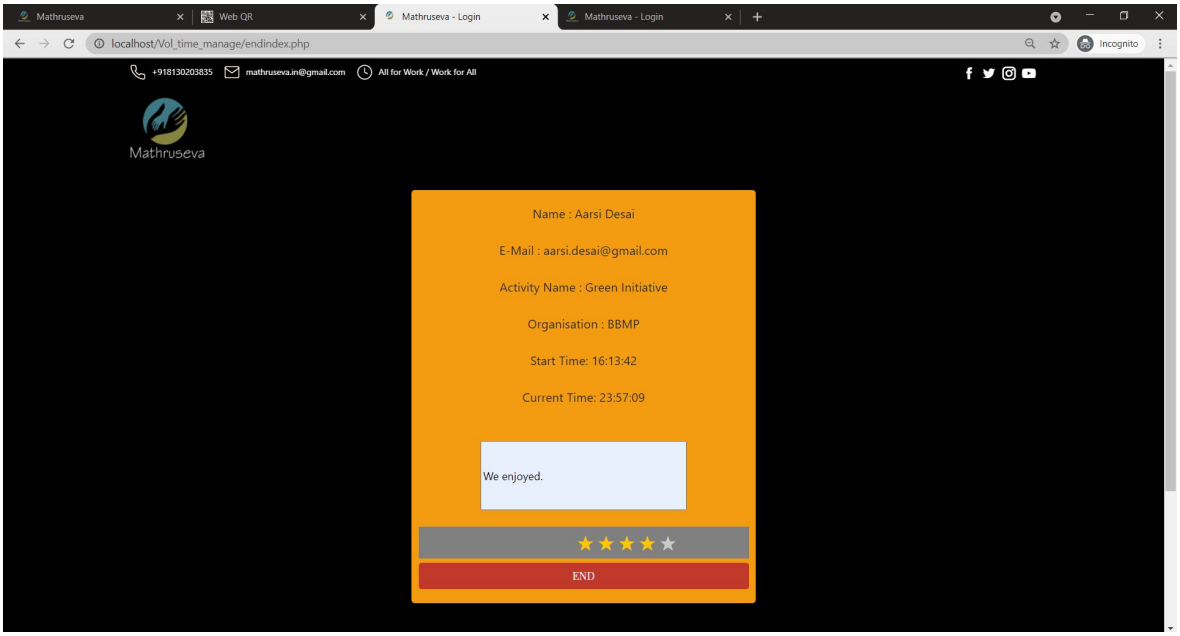
An organisation can post opportunities through the platform which will be visible to volunteers in real time. The organisations can specify various details on the page including the skills they desire in volunteering candidate and if they require to get trained to be a part of activity. Some of the social and educational sector organisations prefer long term volunteers as they are going to interact with sensitive section of society. The organisation even choose to offer online opportunities for fixed rewards.



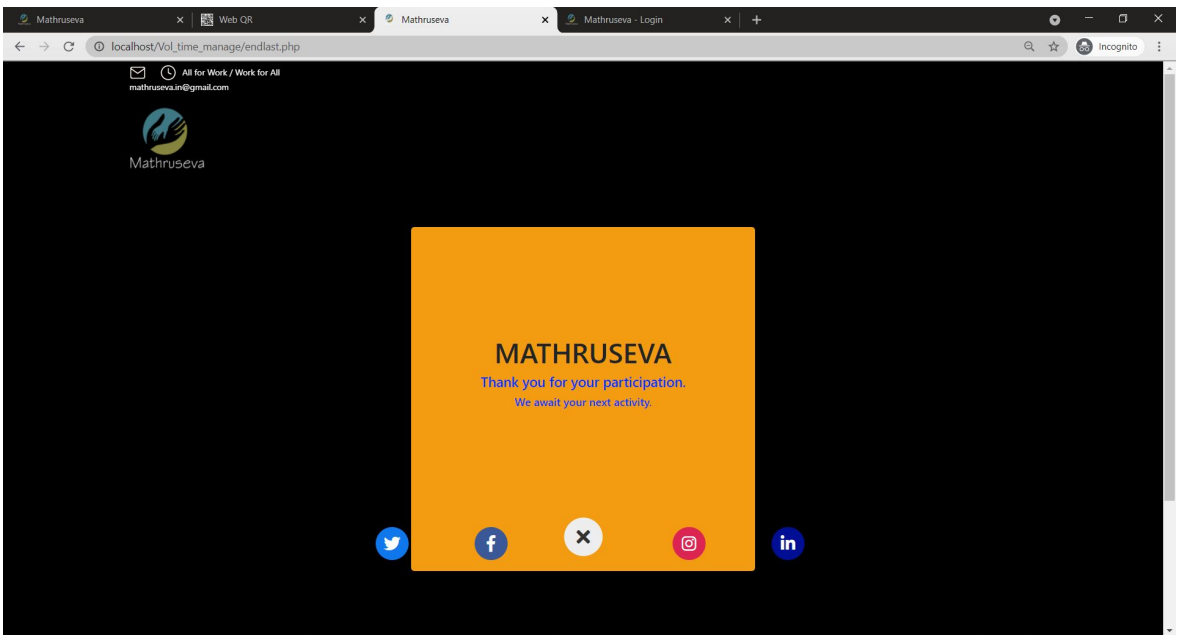
The navigation bar in the organisation interface will help maneuver through Managing opportunities, volunteer selection, volunteer rating and completed opportunities. The organisation would be able to select volunteers based on their skills and other credentials. As soon as the volunteer is selected, they would be notified about the same. The two-way rating ensures ethical practice and conduct on both end and help other users to make a decision based on the same.



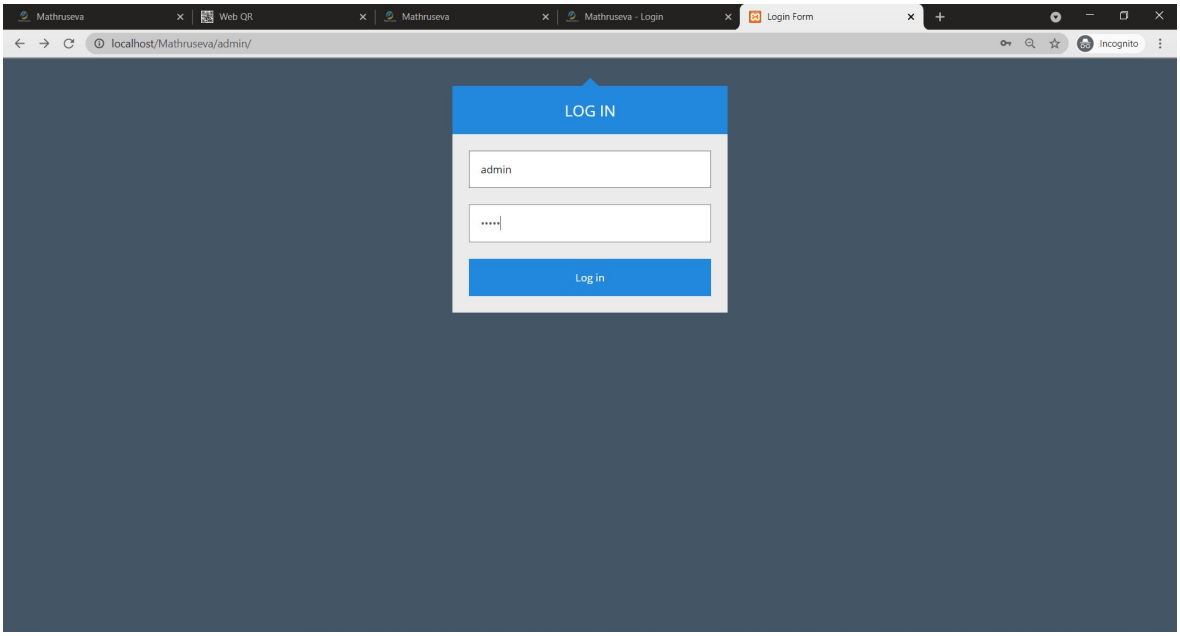
Once the volunteer reaches the activity location, they would have to scan a QR code to start the activity, this would send time & location stamp to Mathruseva as well as the hosting organisation for calculating time of participation. The rewarding mechanism is time based i.e., each hour of volunteering will equal to 10 reward points, this essentially is social currency that helps gamify the experience of user. This eliminates bias, if any..



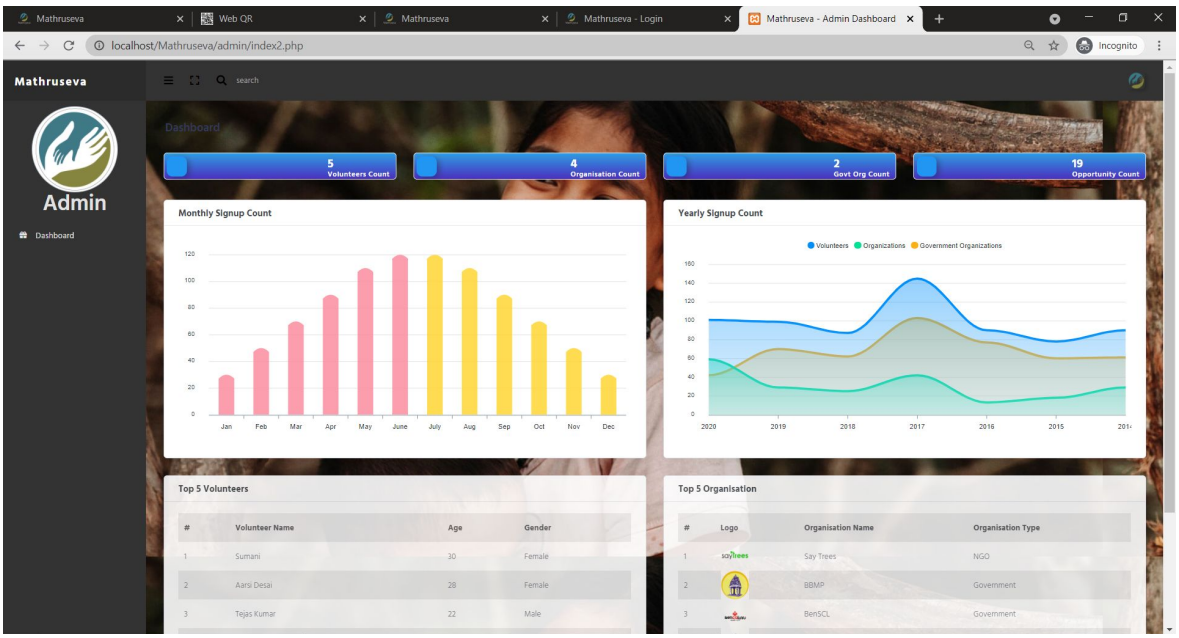
Once the volunteer has finished the activity on site, they will scan an ending QR code which will then allow them to give feedback to the hosting organisation. This will again share the time & location stamp to the concerned organisations. This acts as feedback loop for the platform as well as the hosting organisation.



Once the activity is over, the volunteer can share the activity through their social media handles. This will help garner interest for the platform itself and the activity through peer-to-peer sharing and word of mouth.
This is a gamifying element. Gamification is the application of game-design elements and game principles to non-game contexts.



The platform will have an additional interface for website administrator. This could be monitored by the owner of website which is MoHUA, NIUA or BBMP.



From the owner or super administrator's perspective, the overall statistics, trends and patterns of practice becomes very important. A quick dashboard could share information such as top five sectors, top five organisations, peak days of activity, seasons of volunteering and many more as required. This will help the administrator to mobilize resources in a more efficient manner and support informed decision making. This interface will have a dynamic dashboard for decision makers as well as detailed inventory of all activities.

05. CONCLUSION

Mathruseva is a simple, city agnostic marketplace, to bridge the gap between volunteers and volunteer organisations. The product has been designed to have a hyperlocal outlook which can be replicated and scaled up anywhere in the country much like Swiggy, LinkedIn, and many other aggregating platforms. The product enables users to access the volunteering opportunities in their neighbourhood to minimize their efforts in searching opportunities and maximize the volunteering output.

The way forward is stakeholder onboarding for hand holding first few transactions; establishing a mature rewarding mechanism with acceptance from private and government organisations; Government-to-Business solutions for facilitating two-way transactions between the stakeholders; adding new stakeholders such as Corporate Social Repsonsibility, colleges and educational institutes who have shown promise on the platform; and raising awareness in form of podcasts, interviews and workshops to support the platform.

TEAM

Aarsi Desai

Srijita Chakrabarty

Sumani

MENTORS

Mr. Gautham Ravichander
Head-Policy Initiatives, eGovernments Foundation

Mrs. Kakul Misra Upadhyay
National Program Head-Centre for Digital Governance,
National Institute of Urban Affairs (NIUA)

Mr. Naim Keruwala
Program Coordinator & Team Lead - CITIIS,
National Institute of Urban Affairs (NIUA)

ENHANCE

Enhancing Authentic Cultural Encounter and strengthening local economy through cultural mapping

01. CONTEXT

The onset of the pandemic has shaken the country's economy in the worst possible manner. By nature, the tourism sector is linked to various other industries and provides livelihood opportunities to millions of people. In the face of the pandemic, an estimate was made that 2 crore to 5.5 crore people employed directly or indirectly in the tourism sector in India have lost their jobs. Therefore, there is an urgent need to revive the tourism sector.

Team Enhance, inspired by the concept of celebrating culture within the city's fabric and sewing integrity to the heritage values, aims at reviving the local economy of tourist-centric cities by ENHANCING authentic cultural encounters and empowering host communities.

As this pandemic has brought a halt in all our lives, it is time to rethink smart tourism. Team Enhance proposed a digital tourist application integrated with smart features such as a city-specific curated digital cultural map, AI-based itinerary planner, a chat section for tourists and locals and many more. It is integrated with a 'Rewards and Penalties Programme' to make the application engaging for both tourists/locals and vendors. This application will act as a digital hub for connecting people to places, through various unexplored sectors, places and activities. Citizens and tourists will be enabled to have access to all the information about the city. The objective of the exercise is to attract more people to these tourist destinations for more and longer visits. As a result, this will boost the local tourist economy of the city.

02. PROBLEM STATEMENT

Tourism can play a major role in reviving an economy hit by COVID-19 and an opportunity as the post-COVID period will be a new normal with trepidation of individuals not leaving their native places. Tourism, which is the hardest-hit industry due to the pandemic needs to be resilient enough to play a major role in reviving the economy. As the local economy is already being wrenched because of this, it will eventually increase unemployment. Related sectors such as hospitality, transport, food or agro-based setups, entertainment and fast-moving consumer goods will also face repercussions.

To strategize on how to improve tourism, we identified five primary issues that need to be addressed, which are:

- Lack of availability and/or visibility of tourism-related information, online for tourist-centric cities
- Lack of authentic tourism experience
- The data present with the government authorities are not gathered on any digital platform
- Lack of empathy towards tourist destinations
- Each department working in silos

03. OBJECTIVE

One of the main objectives of the proposed digital platform in the form of a smart tourist application to enhance the cultural aspects of the city along with the themes of spiritual, performing arts & crafts and alternate tourism, combined with smart technology. The following are the objectives of the product:

- Understand the concepts related to tourism, analyze the condition of tourism and define the problem statement in the context of the selected city.
- Carry out the process of cultural mapping to empower local communities, their arts, crafts and businesses, provide travellers with an experience of spiritual and authentic encounters, while promoting the city's culture.
- Gather crowdsourced tourist/user feedback on the backend, based on certain parameters through this application for the major tourist attractions and their ecosystem, which will help the ULB to identify strengths, weaknesses and resources of the local communities and organizations.
- To attract more people to the tourist destinations and provide a seamless experience.

This will result in enhancing the "authentic cultural encounter" and strengthening the local economy of the city.

04. PROJECT STRATEGY

4.1. Pilot City Identification

For the selection of the city, a survey was conducted to understand what tourist preferences are concerning the kind of experiences they would like to have while travelling. It was found that tourists preferred authentic tourists experiences in terms of food and cultural encounter. Therefore, after much deliberation, the themes chosen for cultural mapping were Spiritual, Cultural and Recreational tourism. The team not only referred to the perception survey but also tried to shortlist cities based on whose economy is majorly dependent on tourism. This was to assess which cities have been worst hit by the pandemic and required intervention to revive the tourism economy.

Varanasi, known as the world's oldest living city, is one of the most preferred destinations for cultural and spiritual experience. It also has a rich textile and craft industry. According to the tourist/visitors statistics of Varanasi city, the number of tourists at around 32 lakh tourists in March came down to 5025 in September 2020. This indicated that Varanasi in large is a tourist-centric city and because of the pandemic, the city's tourist rates had drastically decreased. Furthermore, Varanasi city recently had been carrying out a project on heritage conservation and signages for the Ghats. Therefore having taken into consideration these factors, Varanasi Smart City was finalised to pilot this project.

4.2. Project Development and Implementation

Pre-Pilot

Stakeholder Identification

Coordinating with Nodal Officer for contact information

Post-Pilot

Collating and sorting data

Pilot

Liaising with city officials for data on tourism

Creating UI/UX for the application

Carrying out on-site cultural mapping

4.3. Expected Outcomes

Cultural Mapping Toolkit: The culture mapping exercise conducted and its documentation, serves as a resource for researchers, community workers and non-governmental organisations, etc. on how to conduct cultural mapping. The questionnaires formulated for the survey can also be used in other cities for cultural mapping. Furthermore, the detailed documentation of the project progress would be helpful to understand how to conduct a similar exercise

Digitisation of cultural mapping: Despite the team having initiated on-site cultural mapping through the application and the community of users, this process can be digitised through crowd-sourcing data and information; following set guidelines (Schemas are made for each sector and themes) it would be easier to identify which information is useful for tourist consumption. Similarly, vendor onboarding in the next phase would also be digitised through the 'vendor-on boarding' section

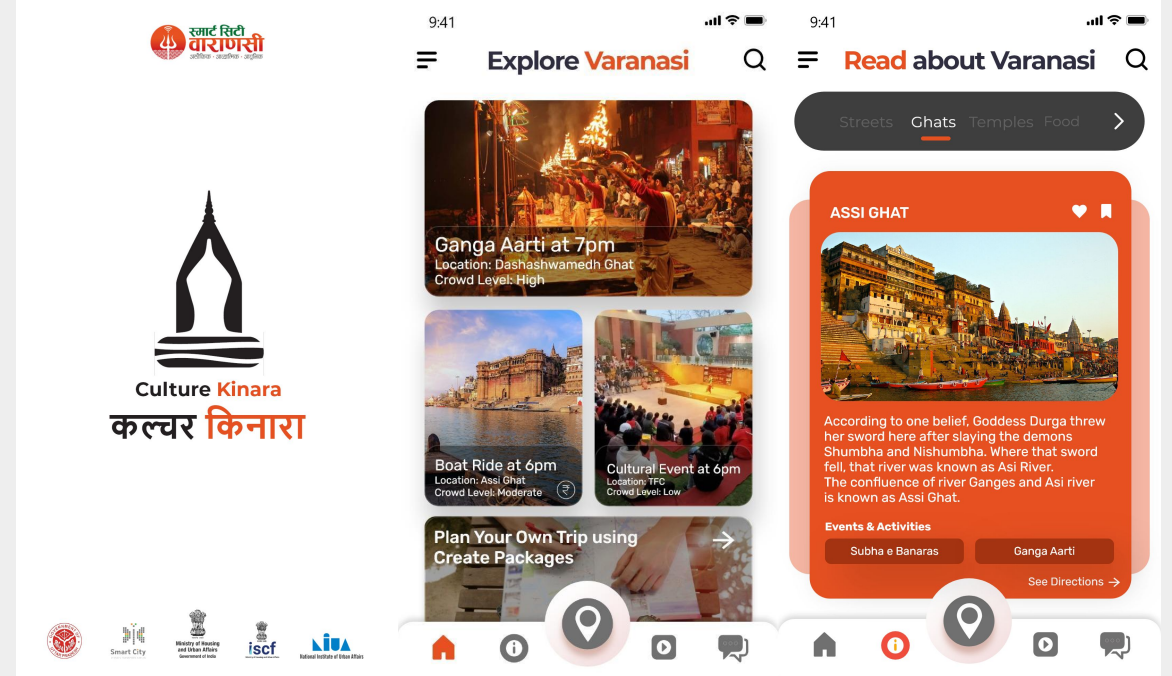
Authentic and diverse information: To this extent, through the application, tourists would be able to connect with fellow travellers, get access to itinerary planners, read about the place and browse photos and videos before actually visiting the place. To sum it up, this would improve the tourist experience in the city

Strategic Intervention: A tourist having access to diverse information would not only increase the footfall in the least explored places but also reduce the burden of over-tourism in mainstream tourist places. Additionally, local businesses would have a boost as tourists through the platform get directed to the local stores and businesses. Last but not the least, through the ULB dashboard, ULBs would also have insights into what improvements can be made in the city and monitor and evaluate the city's progress with regards to safety, accessibility, cleanliness, etc.

4.4. Actual Result

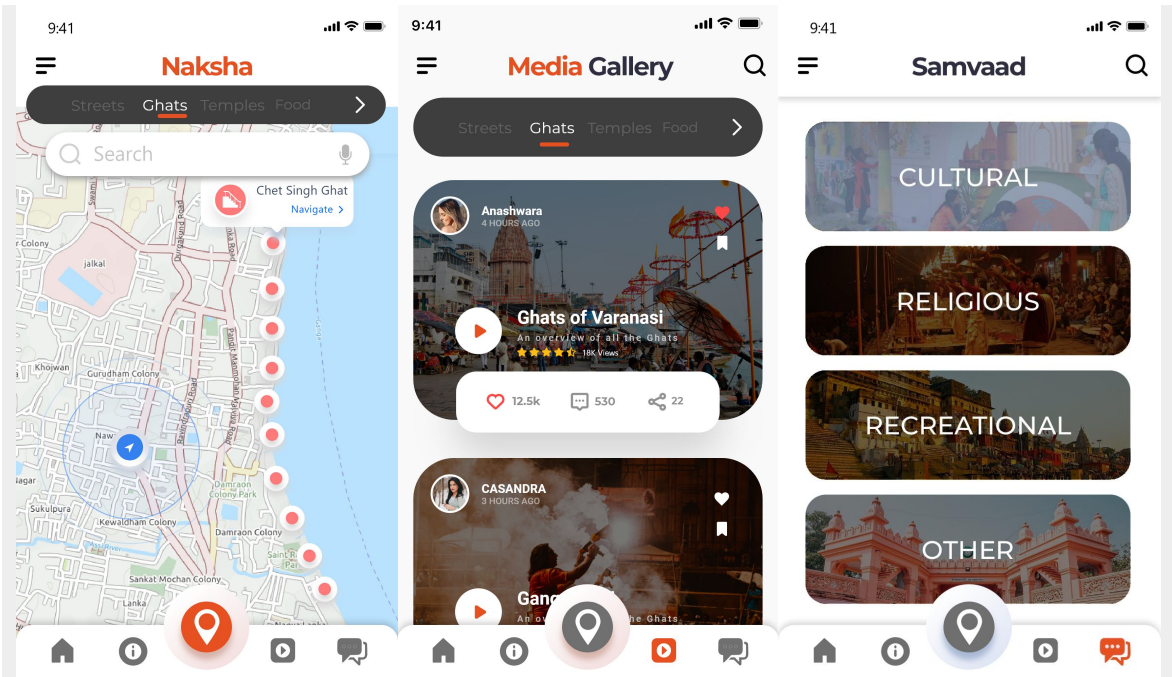
Cultural Mapping: The team carried out cultural mapping of eight handloom societies, thirteen handicraft artisans (6 GI Crafts), two museums, ten streets of Varanasi, ten local events and festivals, videos and photos of 84 Ghats and nine religious sites.





This is a smart tourist application that helps you navigate through Kashi seamlessly. A digital platform where the smallest of unexplored/unlisted nuances of a tourist destination is listed, the data/information is extracted. The platform will not only provide information about unexplored places and programmes but also will give the tourists an alternative to highly populated and famous tourist destinations because of the pandemic.

Development of the proposed mobile application called **Culture Kinara** a smart tourist application that will help not only tourists but also the locals seamlessly experience authentic Kashi, is in process. The application mainly consists of five key sections: Explore, Read, Travel, Watch & Chat That's how one indulges all your senses in experiencing the essence of Kashi.



Explore Section: The explore section or the landing screen lets the user explore the city with a unique experience covering all the activities happening in and around the city consists of:

- Live and upcoming events and festivals happening around in the city
- News updates and announcements by the ULB and other parastatal bodies for the welfare of its citizens and tourists
- Favoured recommendations about places to visit, things to do etc. in the city
- Weather forecast of the city
- Pop up feedback screen to crowdsource tourist experience for the analysis by the ULB, and further improve tourist experience in the city.

Read Section: The reading section consists of snippets of generic information in Card Style to read on:

- Ghats
- Religious Sites
- Streets
- Marketplaces
- Events & Festivals
- Types of Handicraft & Handloom products
- Places to eat
- Museums
- Dance & Music Gharanas
- Parks & Gardens
- Malls and many more

Travel Section: To make travelling interesting and seamless, the Map interface will consist:

- Curated Cultural Map of Varanasi known as Naksha
- Navigation Feature
- Location Sharing Feature (1+ users)
- Itinerary Planner - Chalo Chalein can be used to create custom itineraries and navigate around the city.

Watch Section: Watch section named as Media Gallery, proposed with the intention of providing a virtual tour of Varanasi city, when a person wants to visit a particular city sitting at his comfortable corner consisting of curated:

- Videos
- Pictures
- 360-degree media

Chat Section: A unique chat section, lets you connect with locals and tourists all over the globe across the following chat rooms:

- Cultural
- Religious
- Recreational
- Others

Tourism Dashboard

The proposed dashboard is to gather the tourism data regarding user stats, Tourist Inflow, Origin Destination tracer, Themes Preferred by Tourists, Tourist Footfall within the City across different timings of the day, Average Tourist Stay/Duration.

The Map view on the dashboard aggregates the tourist footfall spatially, all the places mapped spatially through the application and agglomeration of diverse tourist-centric activities across different wards of the city

The Feedback section denoted how was the tourist experience in the city, the number of positive and negative feedbacks, spatially as well as across different categories, based on parameters developed for big/open spaces, small/enclosed spaces and other basic amenities and essential services. When the tourist footfall is connected with the feedback section, insights will be generated. For example, Assi Ghat has been receiving less footfall lately due to the issue of lack of restrooms or cleanliness or accessibility.

Contribution analytic will show the contributions that have been made to the by adding/editing a place on the platform. It will display how many places have been added in total across all categories, as well as spatially, how many rewards and penalties have been used on tourists, locals and vendors in the city.

05. CONCLUSION

For phase two, the plan is to formalise the e-rickshaw public transportation system in Varanasi by augmenting the transportation nodes through the identification of major tourist spots and rerouting them to underrated destinations in the city.

Skill training programs for guides will also be organised which will be inducted into the application. The aim is to authenticate and regulate the quality of tour guides. Further, more layers of themes such as responsible, eco-tourism and accessible tourism will be added to the present three themes. In phase one, the team had initiated the process of mapping on-site which in phase two would be digitised by the process of vendor onboarding section provided in the application.

The objective is to structuralize the procedure of populating the application with integration for sustainable up-gradation of cultural data on the platform.

Using the same framework, an exercise to map all-inclusive public spaces in the city can be carried out. Also, potential transportation routes can be mapped to achieve the last mile connectivity. The product can include the aspect of transactional facilities. This would increase the ease of business and benefit the economy of both locals and the urban local body.

TEAM

Roopal Chopra

Rohitaash Debsharma

Veronica Wijunamai

MENTORS

Ms Padmapriya Janakiraman

Head, Urban heritage documentation project, Sahapedia

Ms Mayura Gadkari

Conservation Specialist, National Institute of Urban Affairs

LED

To develop a systematic data-led approach for local economic development and capacitating cities for economic planning

01. CONTEXT

The world is moving towards rapid urbanization. Cities in India that contribute to a significant portion of economic growth in a city, yet have little power in making decisions for economic planning, growth and development for themselves. As a result, one cannot assess if cities are harnessing their economic potential for their benefit. Economic planning and development has its own advantages - it impacts employment and poverty in a city and service delivery to its citizens. This project is building a Local Economic Intelligence Platform (LEIP) that will provide economic intelligence to cities aiding them to make decisions for economic development. It will also help investors who wish to invest in a city make informed decisions. Additionally, it serves as a data aggregation platform where one will find datasets and visualizations of economic indicators on a single platform.

LEIP conducts a Rapid Economic Assessment of the city to identify the gaps in its economy. It does cluster mapping and analysis and also finds out the comparative and competitive advantage of the city. With the help of the analysis given it has a Decision Support System that provides an intervention direction to the city officials and gives a city economic resilience score. Overall LEIP gives a direction to the city administrators, investors and other stakeholders involved in making economic decisions in a city and also provide a single platform for aggregation of data.

02. PROBLEM STATEMENT

Metropolitan cities contribute to more than half of India's GDP yet the majority of them are ill-equipped to enhance their competitiveness, trace gaps within the local ecosystem or enable themselves to attract FDI that are required to aid the process of local economic development (LED). With resource constraints and lack of information, the process of planning for local economic development is found to be strenuous yet it is one of the mandatory functions of the local body. Cities are engines of economic growth in a country. In 2016, 300 of the largest metropolitan cities in the world contributed to 50% of global GDP. After the economic reforms of 1991, the Infrastructure Development in Mega Cities Project was launched by the then Ministry of Urban Affairs and Employment in 1992. Under this, a number of metropolitan cities were chosen to speed up infrastructure development aided by the Ministry alongside the industrial development carried out under the economic reforms. Subsequently the 74th Constitutional Amendment Act was passed in 1992. This Act recommended 18 functions that should be devolved to the city governments. One of these functions is 'Planning for social and economic development'. City governments however, have not formulated economic plans. Largely, economic plans are made at the state and central level and cities bear little decision making power in terms of harnessing their economic potential. Economic planning has not yet been decentralised and localised. Another problem faced by cities is the lack of aggregation of data on a single platform that can be accessed by local body authorities.

03. OBJECTIVE

The overarching objective of this project is to develop an economic intelligence platform at the local level that is backed by robust data analysis, visualisation and intervention direction for the city. It would assist in unveiling development strategies in order to leverage the existing yet unidentified comparative advantages. The platform will have the following objectives:

I. **Rapid Economic Assessment (REA)**: REA uses the Local Economic Development Framework to analyse the economic ecosystem to know for which of the four pillars of the economy intervention is required in the city. The four pillars of the economy are human capital, investment, infrastructure and policy variables.
II. **Cluster Analysis**: This will include geographical mapping of clusters in the city and an analysis of the forward backward linkages of different clusters in the city. Data on taxation, import export and pin codes is used to make a cluster profile for the city so as to help investors make investment decisions.
III. **Economic Competency**: Under this section, the comparative and competitive advantage of a city is analysed using the location quotient and shift share analysis using employment data. This section shows the economic competency and viability of the different sectors. It can also help authorities decide upon a viable economic sector which they can focus upon for growth.
IV. **Decision Support System**: This section uses the research conducted to identify

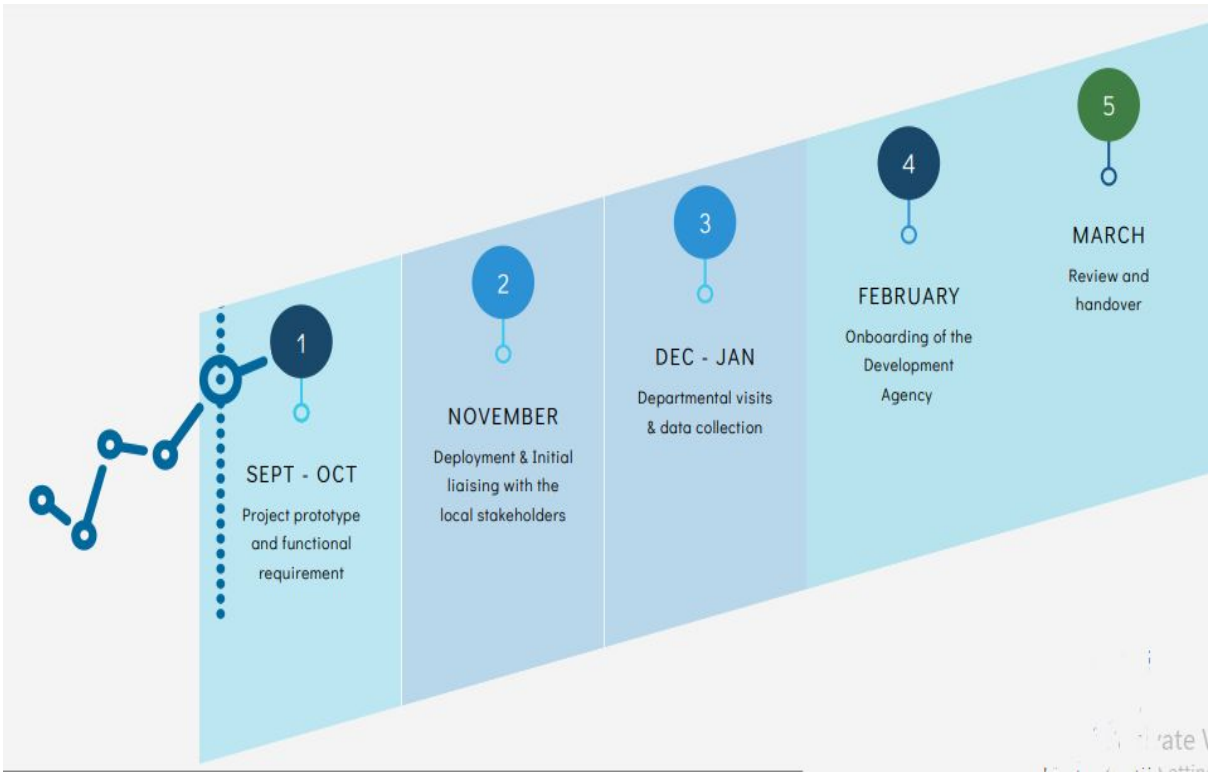
gaps and provide intervention direction for an aspirational sector in an economy. It uses the LED framework to give an economic assessment of the sector against the four pillars of the economy and helps the city understand which pillar needs which level of intervention. Additionally it also gives a city economic resilience calculation that shows the level of dependency of the city on one or more sectors. Thus, this will give a direction to the city authorities to diversify investment for the productivity of a larger number of sectors.

04. PROJECT STRATEGY

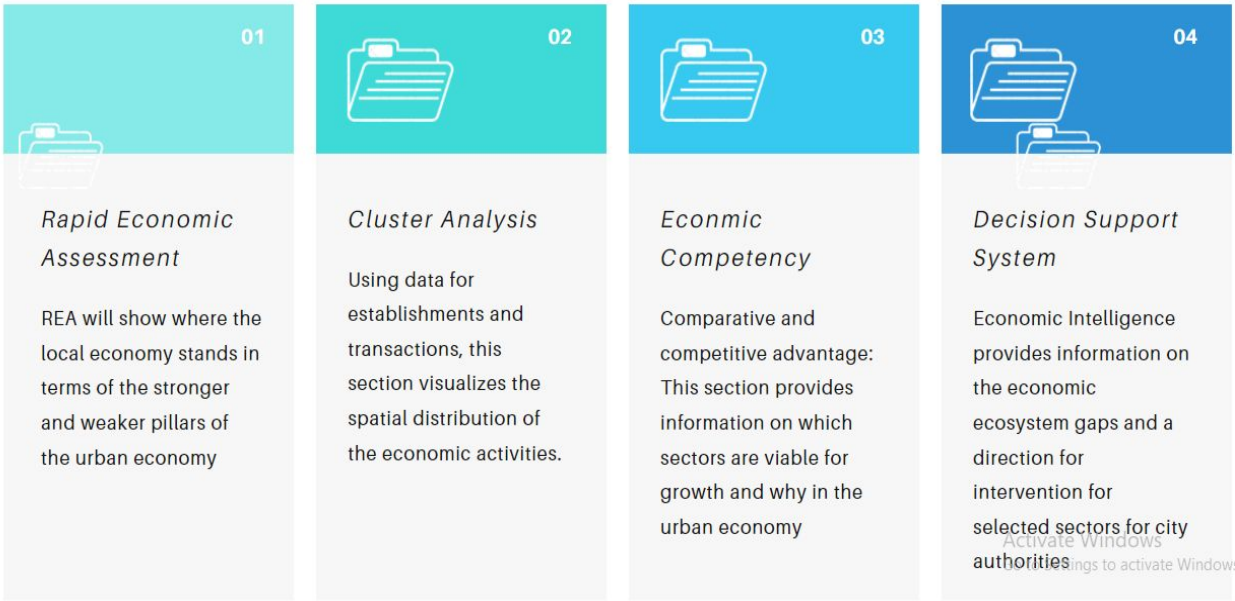
4.1. Pilot City Identification

The pilot city was identified in four stages. A number of cities were shortlisted from the SWOT analysis conducted by the cohort that required interventions in economic opportunities and employment. Further, they were divided into administrative capitals of the respective state, commercial capitals of the respective state and cities left behind. As part of the process, ecosystem variables like human capital, investment, infrastructure and policy variables and their indicators like education lead, employment, migration, foreign direct investment, building permissions, etc. were identified. Each of the shortlisted cities was checked for availability of data for these indicators. Through this exercise, it was found that Thiruvanathapuram has relatively more recent data documented and easily available for public use.

4.2. Project Development and Implementation



4.3. Expected Outcomes



This platform provides economic intelligence to city authorities and other stakeholders in a city like state departments, investors to make informed decisions for economic development. This platform will also serve as an aggregation of economic data. It will also give an insight into the existing gaps in the economy and provide an intervention direction to the city through a rapid economic assessment of the city. The city can choose an aspirational sector that it wishes to develop in the economy. The platform will assess the economic competency of that sector. Further, it will also provide the areas of intervention for the sector against the four pillars of the economy.

4.4. Actual Result

The team has developed the five tabs mentioned above: city profile, rapid economic assessment, cluster mapping, comparative and competitive advantage and economic advantage. The following are the results for Thiruvananthapuram city:

1) Rapid Economic Assessment:

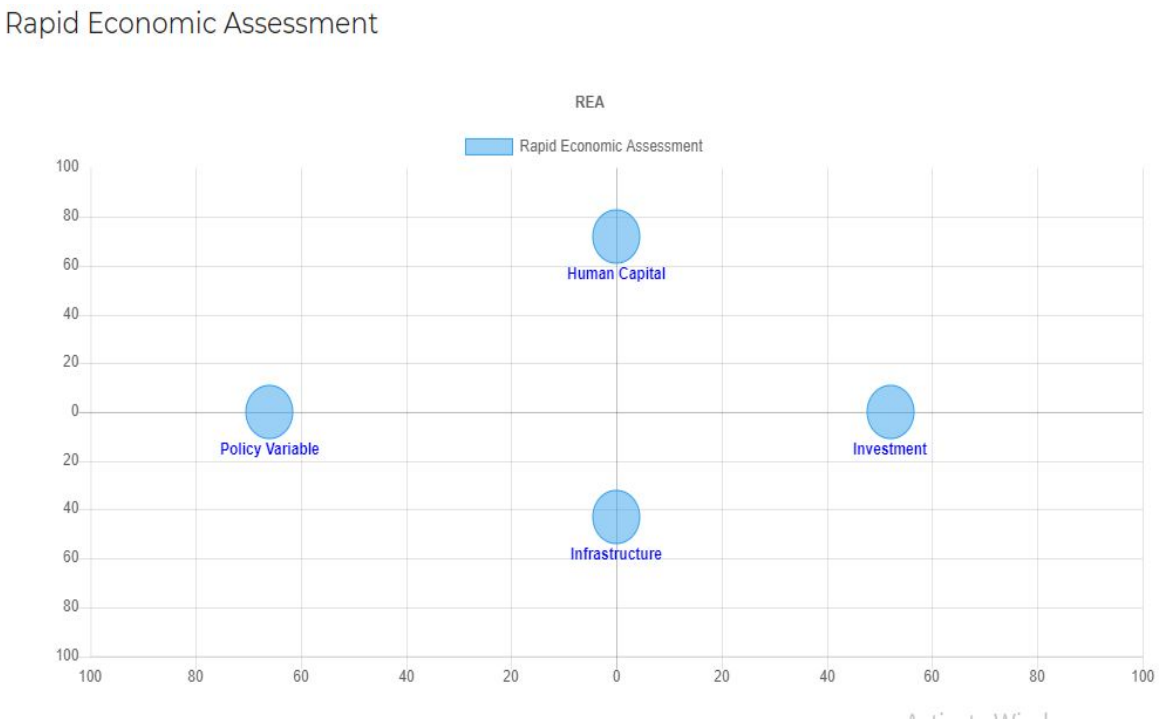
The REA tab gives an assessment of the city against the four pillars of the economy. The following are the results of REA:

Pillar	Value
Human Capital	72
Infrastructure	43
Investment	52
Policy Variables	66

The representative graph of the same on the website is given below.

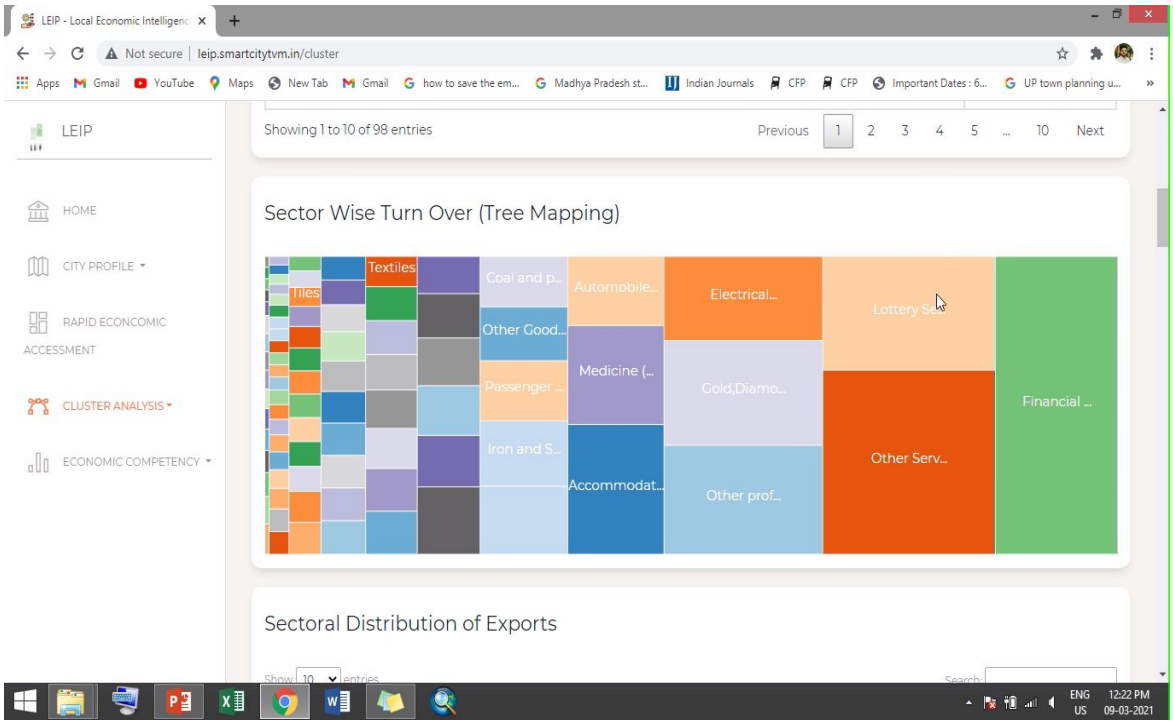
This graph and the table show that Thiruvananthapuram is the strongest in Human Capital and weakest in infrastructure. It shows that the city has to take steps to improve its infrastructure in order to make the economic ecosystem conducive for growth. Similarly, investment also needs to be acquired from different sources for economic development of the city.

Additionally, the tab also includes visualizations for different datasets, thus making data easily readable to the users.

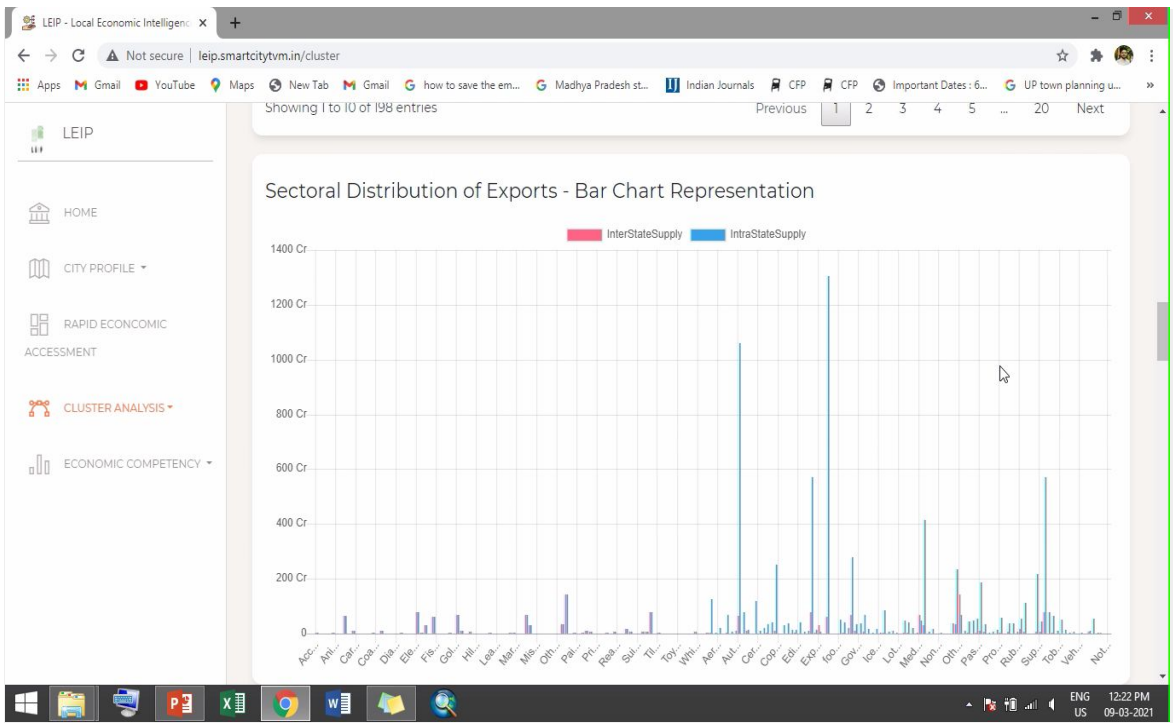


2) Cluster Analysis

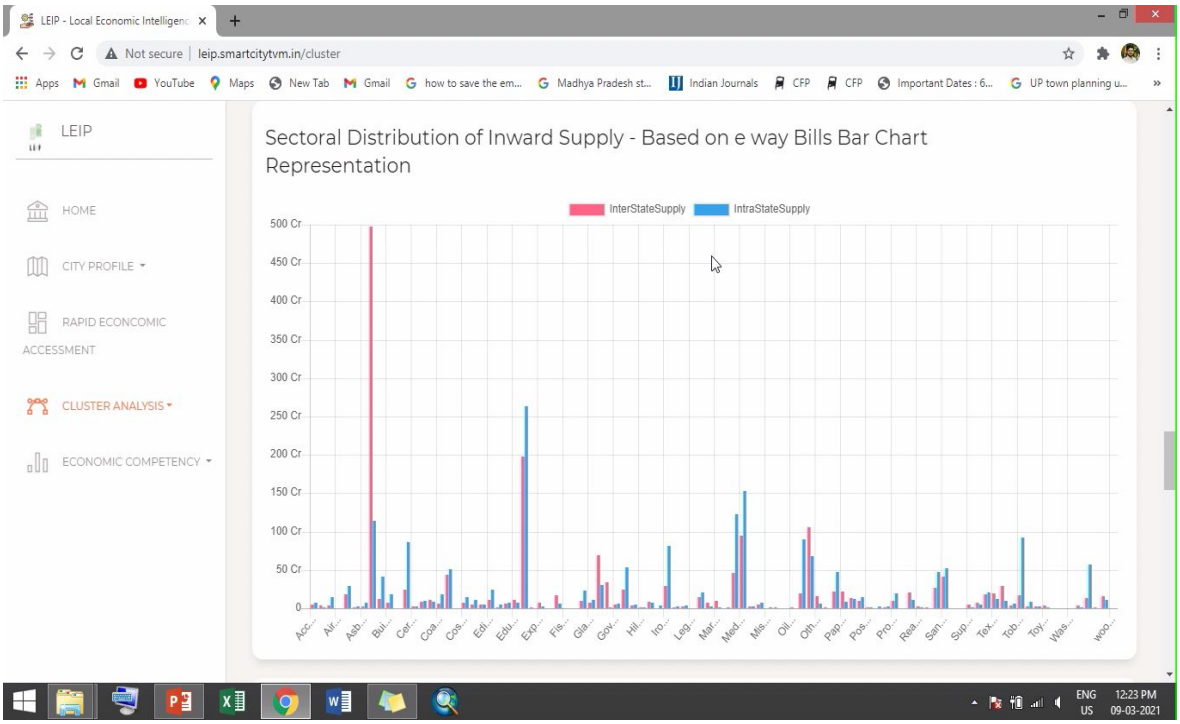
The cluster analysis tab uses the data of the number of establishments and their related business to business transactions along with the goods movement from the Goods and Service Tax department of the city.



The cluster analysis provides information on the import and export potential of the city economic sectors and the forward and backward linkages of the city economy. It has 4 sub tabs: 1)) Sector wise turnover - The table and the visualized graph under this sub tab provides information on the prominent sectors of the economy based on the turnover. It was observed that Thiruvananthapuram has financial services and lottery as major economic activities based on the sectoral share.

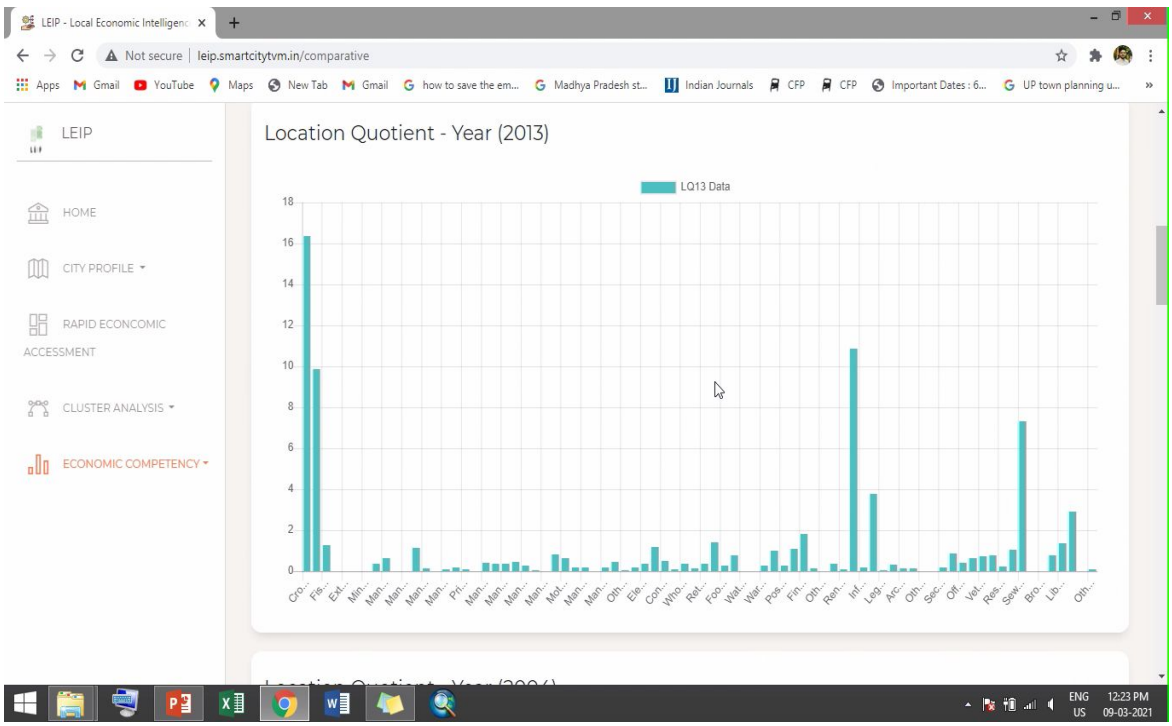


ii) Sectoral distribution of exports - This sub tab provides information on the market outreach of the economic sectors that are distributing goods from outside the city - state and the nation. The sub tab has a visualised stacked bar graph showing the sectoral share of goods and services exported - within the state and outside the state based on CGST, SGST and IGST dataset. It can be inferred that financial services have the highest intrastate export followed by automobile spare parts.



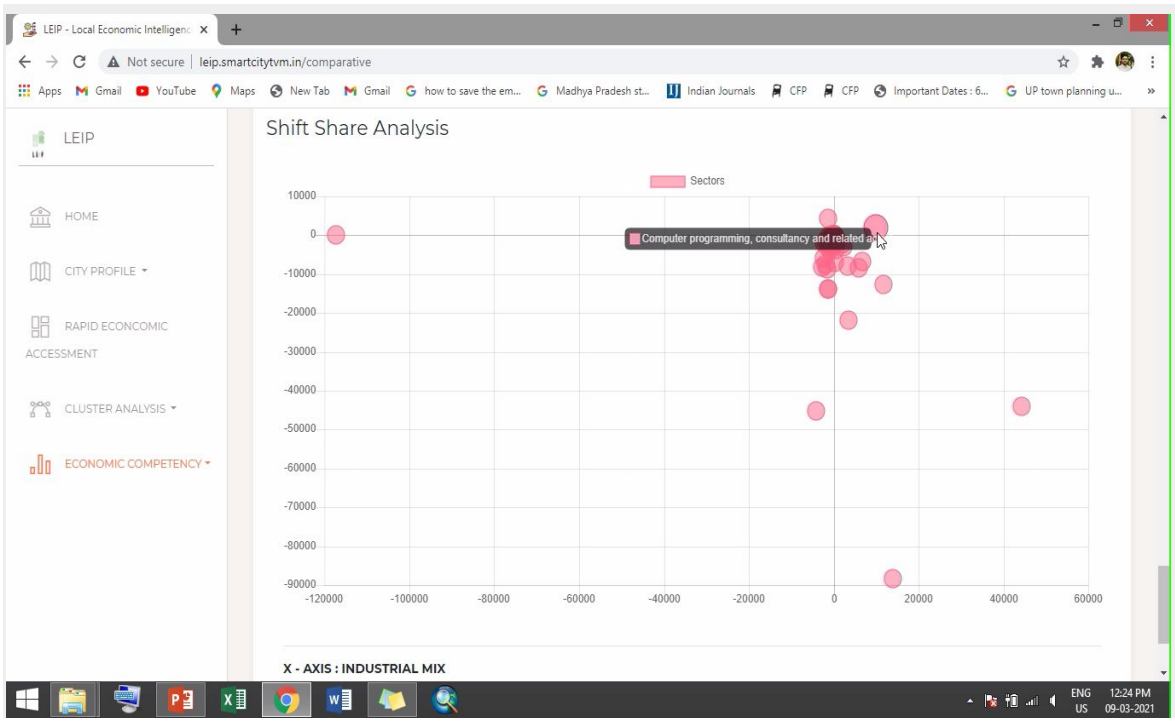
iii) Sectoral distribution of Inward supply - This visualization uses the data from the e way bills issued for the goods movement within India and their associated assessed value. This sub tab provides information on the market extent of goods that are being procured by the city of Thiruvananthapuram. The visualization associated is a stacked bar graph showing interstate and intrastate supply. It was observed that the food and pharma produce sector has the highest interstate import and support services, electronic goods and services intra-state supply.

iv) Sectoral distribution of Imports and Exports - This sub tab gives a holistic information on the sectoral distribution of goods and services imported and exported from/by the city of Thiruvananthapuram. It was observed that Medical and Pharmaceutical products have comparatively both higher import and export in Thiruvananthapuram.

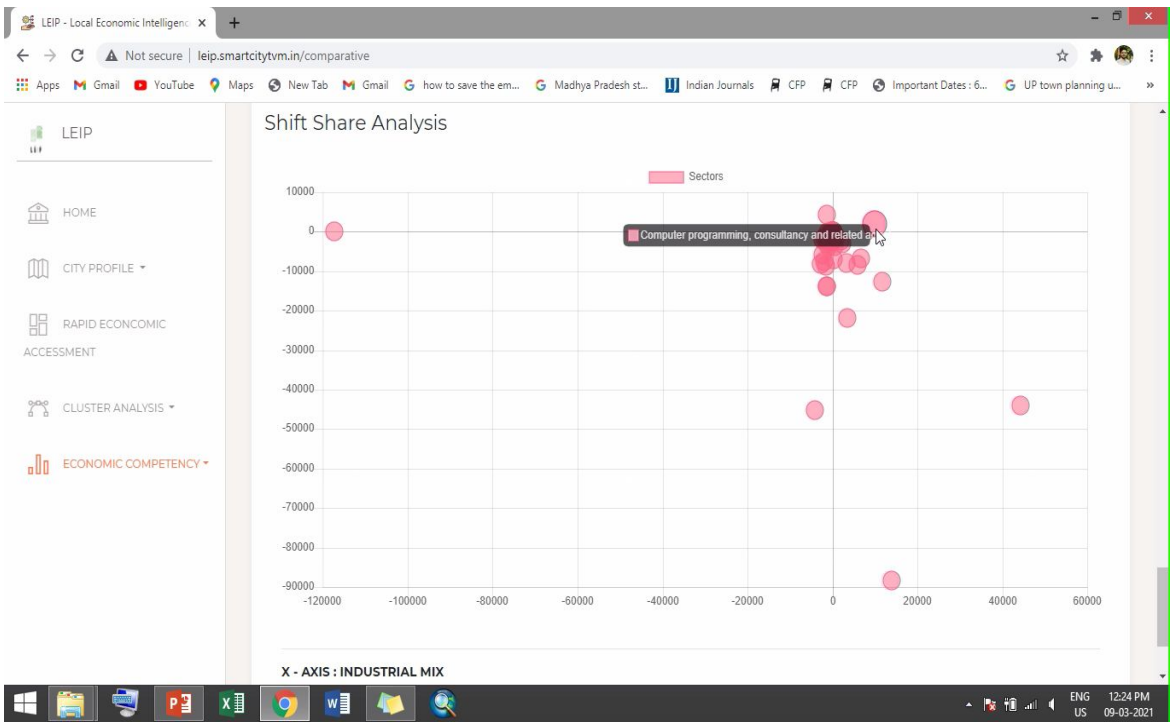


3) City Competency

City Competency is the page that analyses the economic sectors according to the location quotient and shift share analysis. Taking the employment data from the economic census of India from 2005 and 2013, 73 divisional sectors of the economy are analysed for their comparative and competitive advantage. This has 2 sub tabs

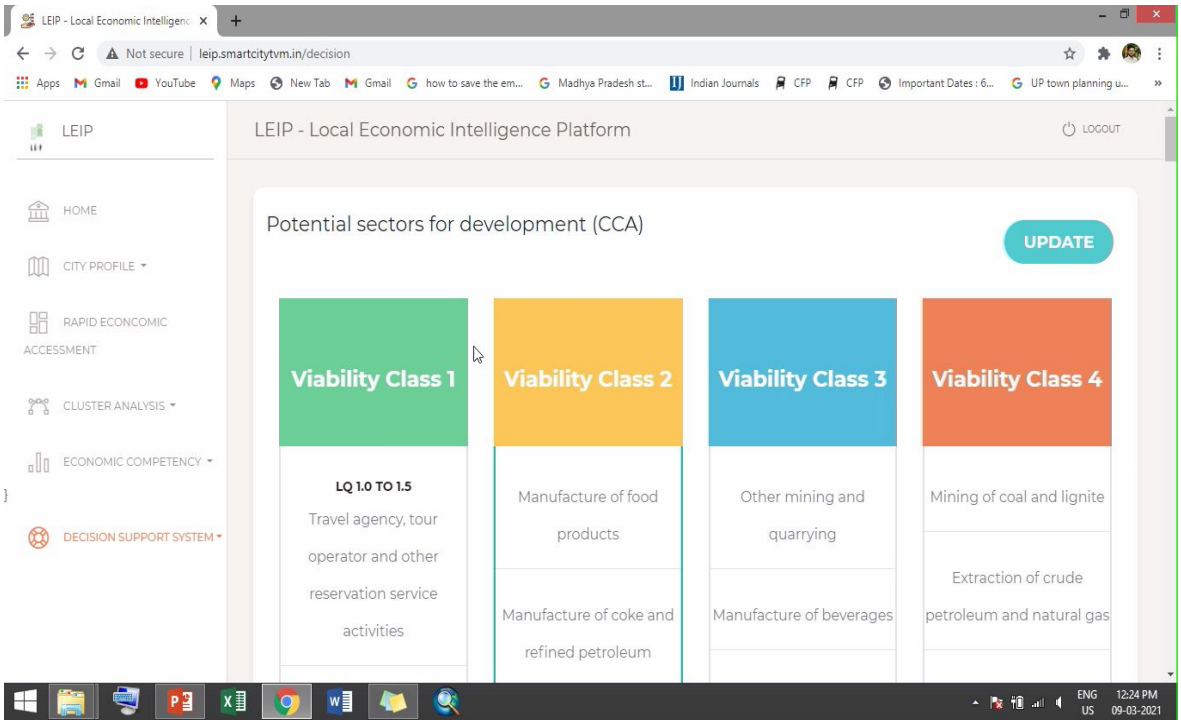


i) Location Quotient - This tab provides information on the specialized sectors of the economy using the proportion of sectoral economic share of the city to that of the sectoral economic share of the state. It was observed that Computer Programming, Consultancy and related activities have a prominent share of employment with a LQ value of 10.08.
ii) Shift share analysis - This sub tab provides information on the proportional growth share of the economic sectors.



The tab uses two subcomponents of the analysis - Industrial mix and regional share. The industrial mix analyzes the difference in the economic sector growth of the region to that of the state. The regional share analysis the difference in the economic sector growth of the region to that of the overall economic growth of the state. This tab uses the visualization based on these two values and places the economic sectors in four quadrants.

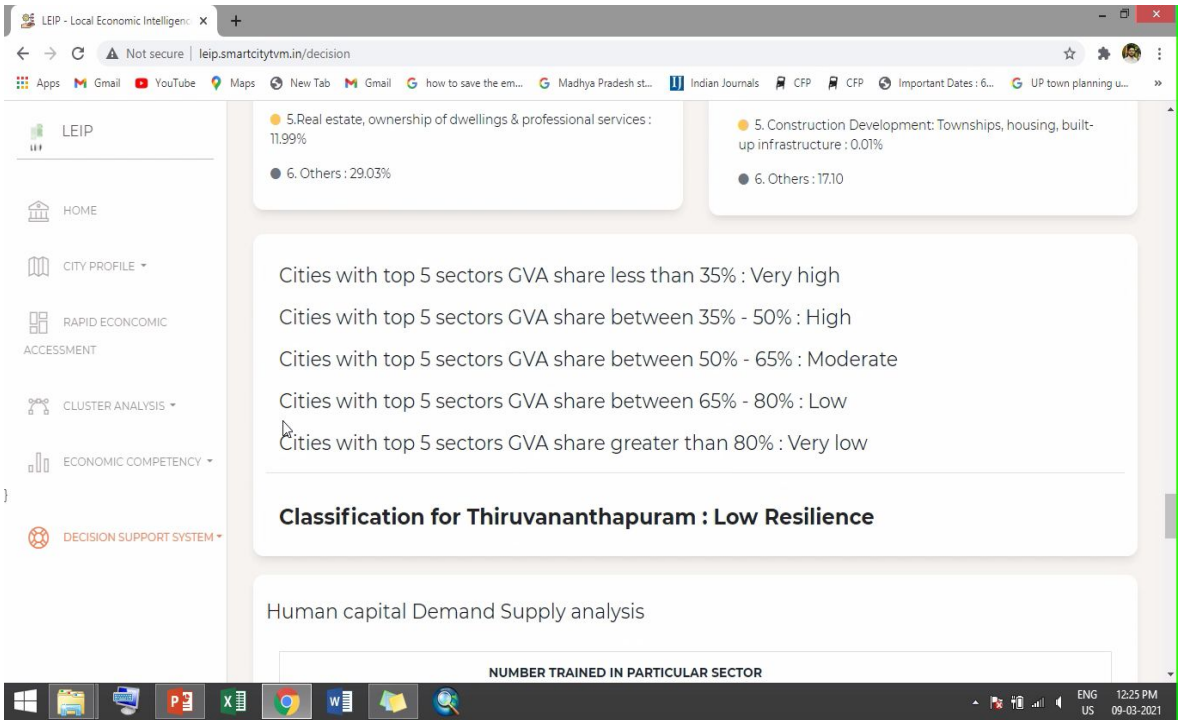
The sectors in Q1 like computer programming, consultancy and related activities have both the values positive and represent a sustainable viable sector of the economy. Similarly, values in Q2 and Q4 represent those economic activities which have either regional importance or sectoral importance such as Crop and animal production, wholesale and retail trade



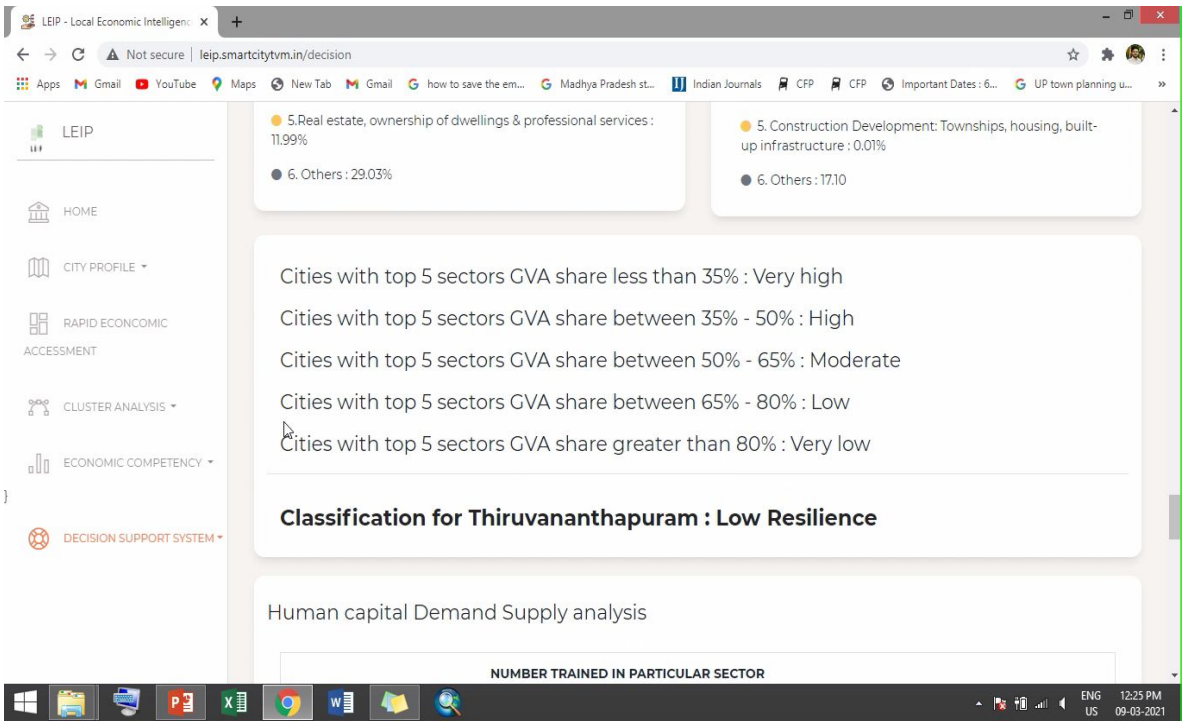
4) Decision Support System

The decision support system tab provides information on the potential sectors of development to the administrator along with the intervention direction for improvement in the economic ecosystem of the city. The administrator would use a login id to enter this page and would be able to seek information from the 3 sub tabs

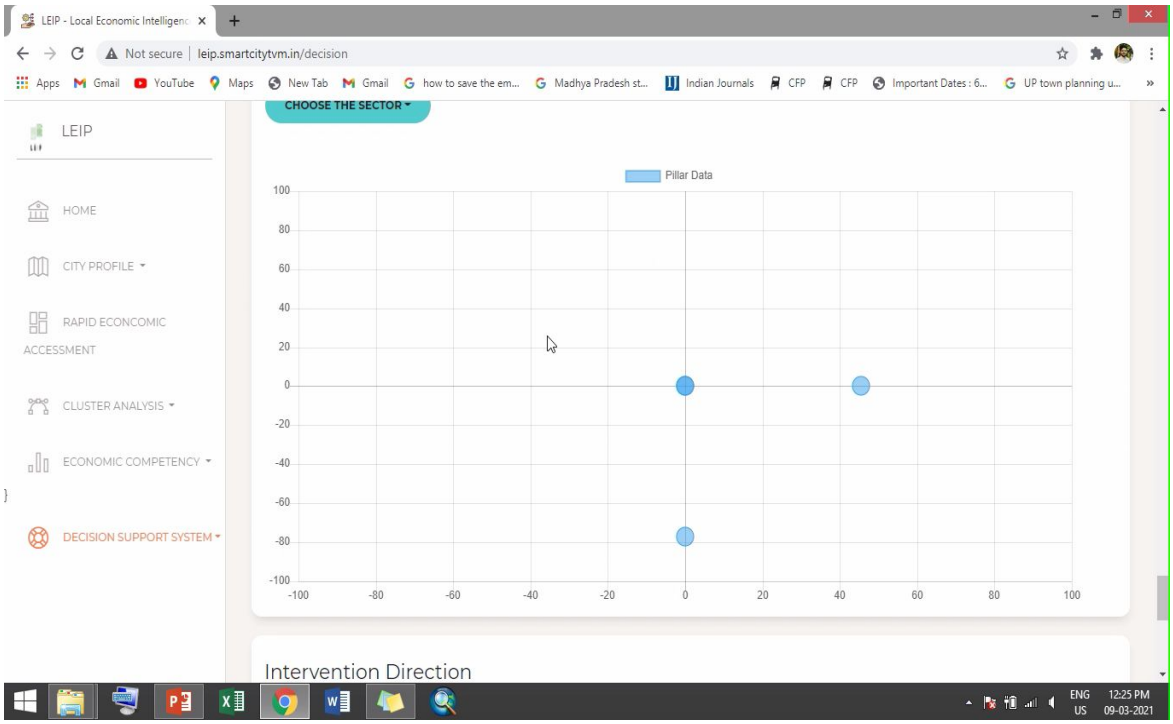
i) Viability class analysis - Based on the economic competency analysis and the share of employment in the region this sub tab provides information on the viability classes of the economic sectors. Viability class 1 such as Computer Programming, Consultancy and related activities, travel agency, tour operators are those sectors which have a specialized economy in the city of Thiruvananthapuram. Similarly, the tab lists various economic activities in these four classes based on conditional rules that can be defined by the administrator.



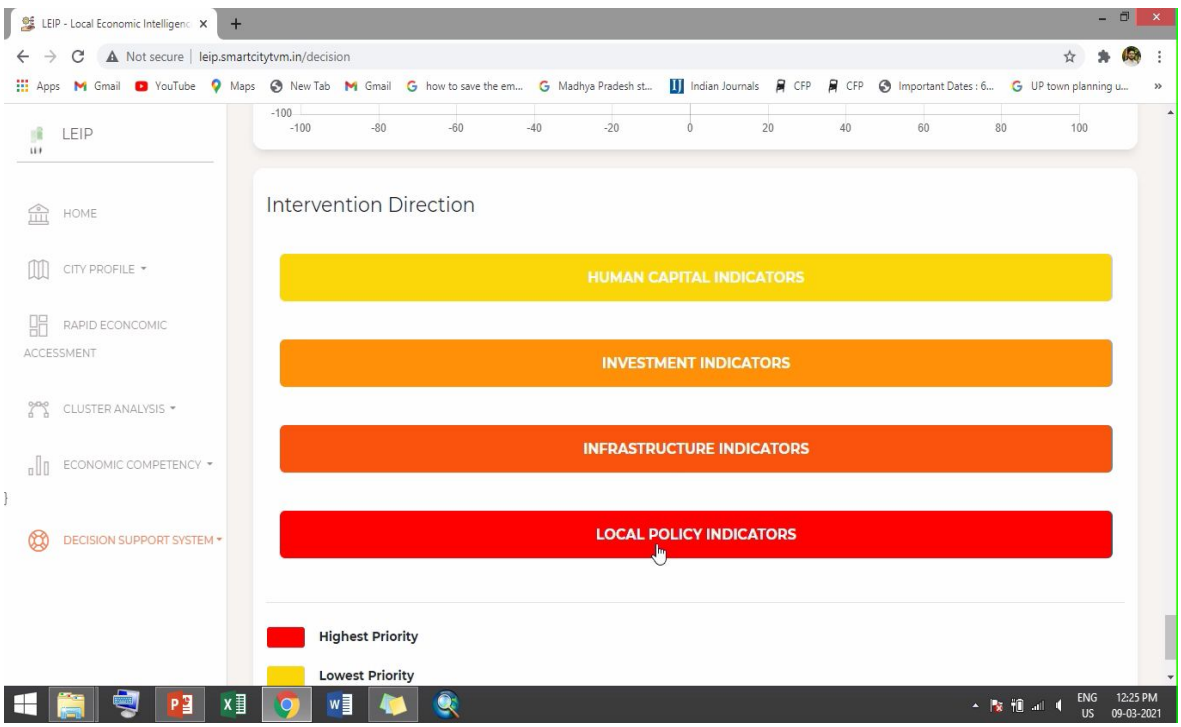
ii) City Economic Resilience Calculation - This sub tab uses the data on the GVA share of the economy and the FDI inflow to understand the resiliency of the economic ecosystem. The GVA share of top 5 sectors of the economy are added and based on its value in 5 classes over a scale of 0 to 100, resiliency of the city economy is studied from very low to very high. The city of Thiruvananthapuram has low resilience with a value of top 5 sectors GVA share as 70.97%.

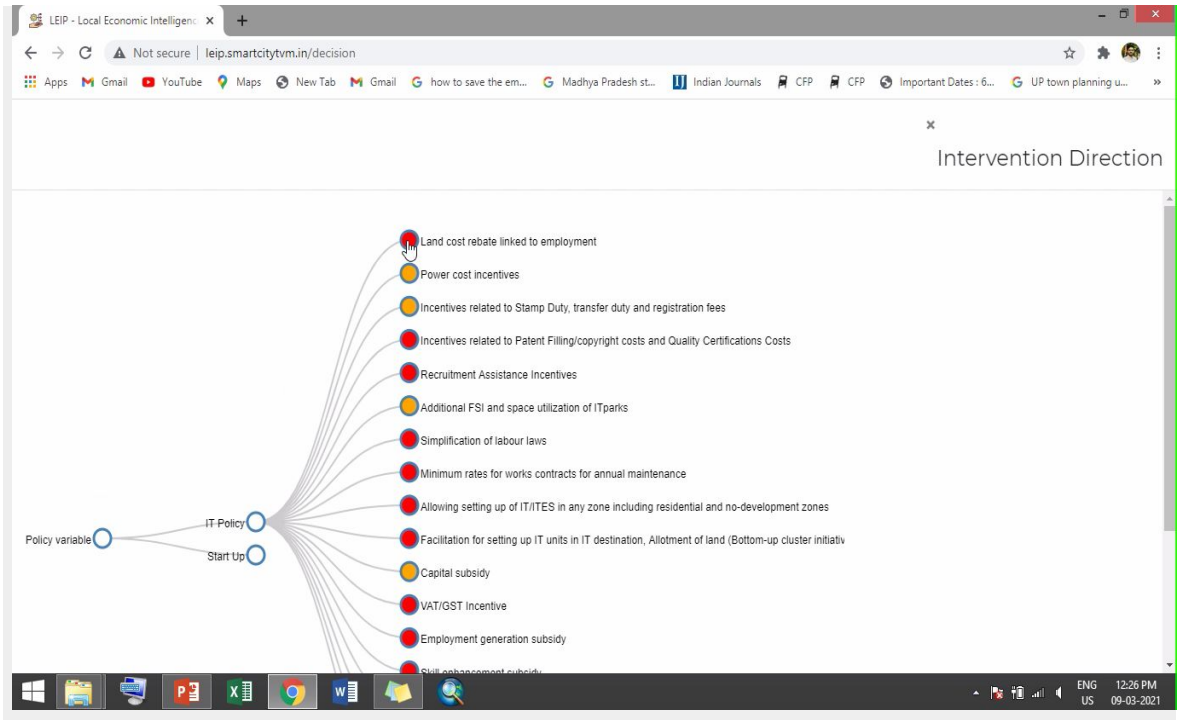


iii) Human Capital Demand Supply Analysis - This tab visualises and provides information on the brain drain of the city economy using the data from demand in the economy for people and number of people trained in the particular sector. It was observed in the case of Thiruvananthapuram that industry demand for people with skills are higher in Advanced IT, services and rubber products but the training programmes were low. Whereas the Marketing and Basic IT have more people trained but less demanded by the industry.



Furthermore, the tab provides information on the individual economic sector performance on the four axis pillar of rapid economic assessment as well as the intervention direction required under each. For the city of Thiruvananthapuram - the score value of Local policy is 72.36 and intervention direction shows missing policy lines such as land cost rebate linked to employment, recruitment assistance incentives etc. Whereas, the tab also provides information on those sections of the policy that are area specific such as power cost incentive, capital subsidy etc.

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Power cost incentives
Incentives related to Stamp Duty, transfer duty and registration fees
Incentives related to Patent Filling/copyright costs and Quality Certifications Costs
Recruitment Assistance Incentives
Additional FSI and space utilization of ITparks
Simplification of labour laws
Minimum rates for works contracts for annual maintenance
Allowing setting up of IT/ITES in any zone including residential and no-development zones
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05. CONCLUSION

The components of LEIP are designed to aid policymakers, administrators, and elected representatives at the local and state level, and investors make informed decisions regarding economic development of the city. It is also a platform for data aggregation. LEIP can be further scaled up to other cities and a viable sector can be found for DSS. LEIP being a dynamic tool can be modified to suit the local context of the city. Depending on the data available in the city, indicators can be added or removed as per the city's convenience. The tool is also being developed with an inbuilt reader that will read data from different data sources to input it automatically into the platform. Additionally, statistical analysis is being built-into LEIP so that it can automatically give results once data is read by the tool. This is being done to increase the scalability and replicability of LEIP.

The scope of LEIP can also be increased in numerous sectors to make the platform more holistic. Currently DSS is considering only sector - Information Technology for Thiruvananthapuram. Similarly, the scope will be increased to conduct DSS for more sectors in the city (here, Thiruvananthapuram) which will enrich the indicators used, research for them and the relationships existing between these indicators.

By increasing the sectoral scope of the tool along with scaling to other cities, LEIP will develop better economic complexities in a local economy. This will enrich the analysis and increase the data pool of the platform leading to accurate results. Hence, LEIP has a potential for scaling. In Phase II of the project, the team aims to collaborate with other organisations and replicate the tool for other cities and increase the scope by adding more sectors to the decision support system.

TEAM

Aman Singh Rajput

Radha Karmarkar

Vivin R Nair

MENTORS

Dr. Amit Kapoor
Honourary Chairman, Institute of Competitiveness

Dr. Debjani Ghosh
Senior Research Associate, National Institute of Urban Affairs

MOBILIZE

Sectoral Data Management Tech. Stack at city-level enabling democratic sharing of standardized, high quality urban data among the quadruple helix.

01. CONTEXT

With the deployment of IoT (internet of things) devices, sensors, and other methods to 'sense' the city, the sources and size of the data generated in a city is increasing every day. Further, data and data analytics are slowly but surely becoming the backbone for problem-solving and decision-making in cities. Data is no longer considered as mere raw material for future application development but an integral ingredient needed to encourage entrepreneurship, enable innovation, and drive economic growth.

In this context, the Government of India and its various ministries have released policy documents and white papers on data governance. The Smart Cities Mission recognizes the importance of data in its 'DataSmart Cities' policy document (MoHUA 2019). This landmark document sounds like a clarion call to build an enabling ecosystem for innovation around data and recognizes the need to enhance engagement with stakeholders of the quadruple helix model - Government, Citizens, Academia, and Industry

Further, the domain of urban mobility in Indian cities presents numerous opportunities to pilot data-driven initiatives. Cities, as well as private companies, are in search of high-quality, standardized urban mobility data that can act as a driver for innovation, improve efficiency and increase customer satisfaction. Therefore, this project is focused on bridging the gap between supply and demand for standardized, high-quality urban-mobility-related datasets.

02. PROBLEM STATEMENT

While the Ministry of Housing and Urban Affairs (MoHUA) has made noteworthy efforts to develop national-level data sharing portals and data exchange mechanisms, like Smart Cities Open Data Portal, India Urban Observatory, AMPLIFI, and India Urban Data Exchange (IUDX), cities continue to lag in their data management capabilities.

At the city-level, data from various systems is stored in silos and often lacks harmonization that can make it interoperable across systems. Further, cities are constrained by their limited financial capacity to invest in the necessary compute and storage infrastructure to effectively handle large volumes of data.

This lack of a robust data culture in India's urban sector acts as a constraint to the development of sound government policies, efficient service delivery, and innovation from the private sector. Therefore, this project aims to build a unified city-level DataSpace that enables democratic sharing of standardized, high-quality data among various stakeholders in the quadruple helix model. Further, through sustained dialogue and collaboration with these stakeholders, the project hopes to incentivize a "culture of data" within the urban sector.

To effectively implement a pilot DataSpace in the short duration of the Fellowship Programme as well as comprehensively delve into a single domain, the project scope was narrowed down to one specific sector - urban mobility. Such a sector-specific approach ensures appropriate and consistent treatment of data by taking into consideration the needs of the specific sector and the types of systems generating the data.

03. OBJECTIVE

Inspired by the DataSmart Cities Strategy and MeitY's framework for National Open Digital Ecosystems, DataSpace rests on three key pillars - Data Delivery Platform, Governance, and Community. Together these three pillars make up the DataSpace Ecosystem, which is a set of tools that can be used to develop sector-specific and city-specific DataSpaces in the future. As a result, the project is envisioned in a manner that is modular, decentralized, replicable, and scalable.

Based on the initial ideation of the project, the following objectives were proposed:

- Develop a public digital infrastructure that acts as a data delivery platform as well as provide additional services based on the available data
- Adopt comprehensive domain-specific data standards for urban mobility in line with national guidelines and international best practices
- Identify a suitable governance framework for the platform with clearly defined rules and accountable institutions.
- Engage with various stakeholders from the government, public and private sector to develop a vibrant community that adds value to the digital platform and its services
- Build a self-sustaining financial model to fund the development of the platform over the long term.

04. PROJECT STRATEGY

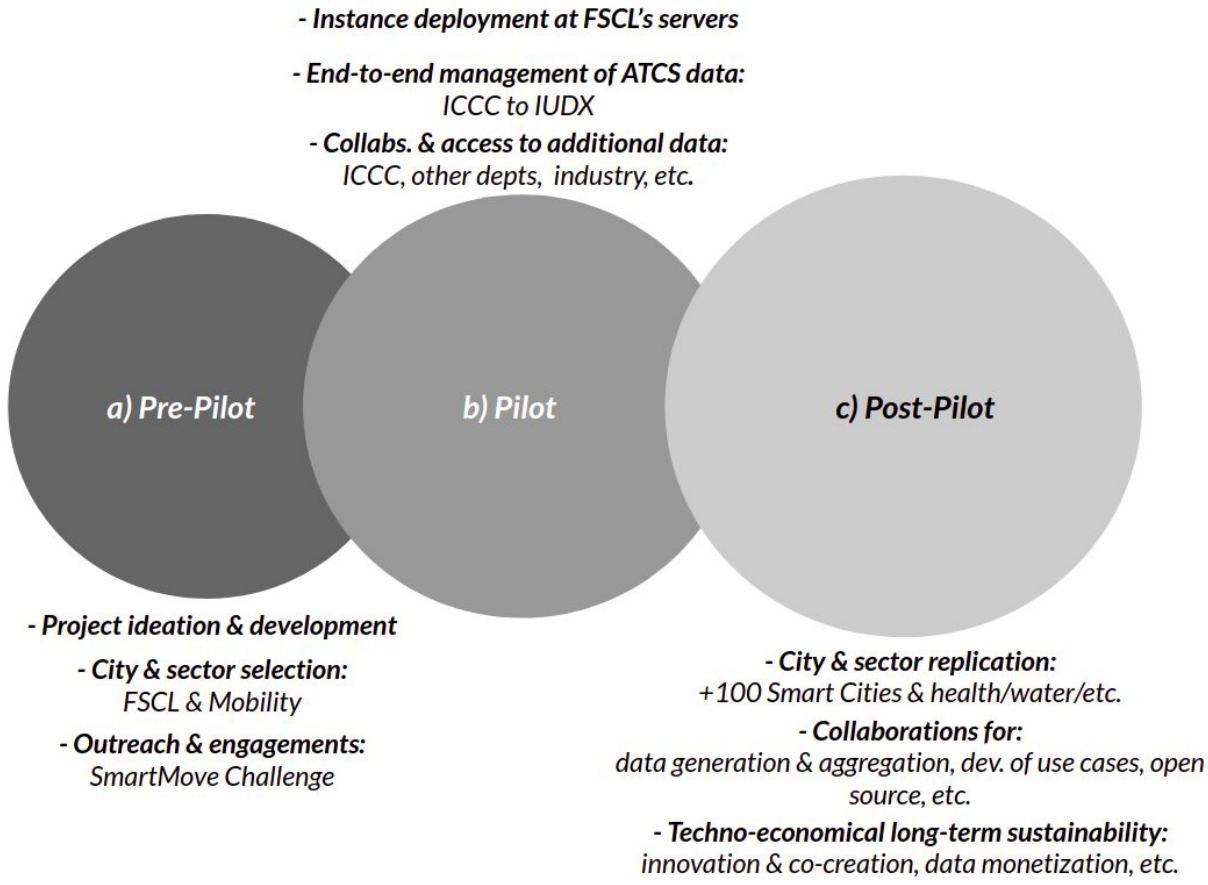
4.1. Pilot City Identification

As a part of the pilot city identification strategy, the following essential criteria were utilized and various smart cities were analyzed to select a suitable Smart City for the project.

- Presence of a large and diverse mobility ecosystem
- Availability of data and high level of data maturity
- Vibrant startup community interested in urban mobility
- Based on these critical parameters, Faridabad Smart City Ltd. (FSCL) was approached to pilot the project.

Due to its connectivity to the larger Delhi National Capital Region, Faridabad provides a diverse platter of mobility stakeholders in public transit (DMRC, DTC, e-rickshaws), shared mobility, urban freight, electric mobility, and even hi-tech ventures with drones and V2X technologies. Due to this diversity, the team believed that capturing even a small fraction of the mobility ecosystem in the pilot project would provide enormous value to potential data consumers and set the stage for future expansion. Moreover, the urban mobility data with the various stakeholders in Delhi was digitized and available in machine-readable formats. Delhi Transport Corporation is presently one of three public transit agencies in India that streams real-time open data in international transit standard-GTFS format.

4.2. Project Development and Implementation



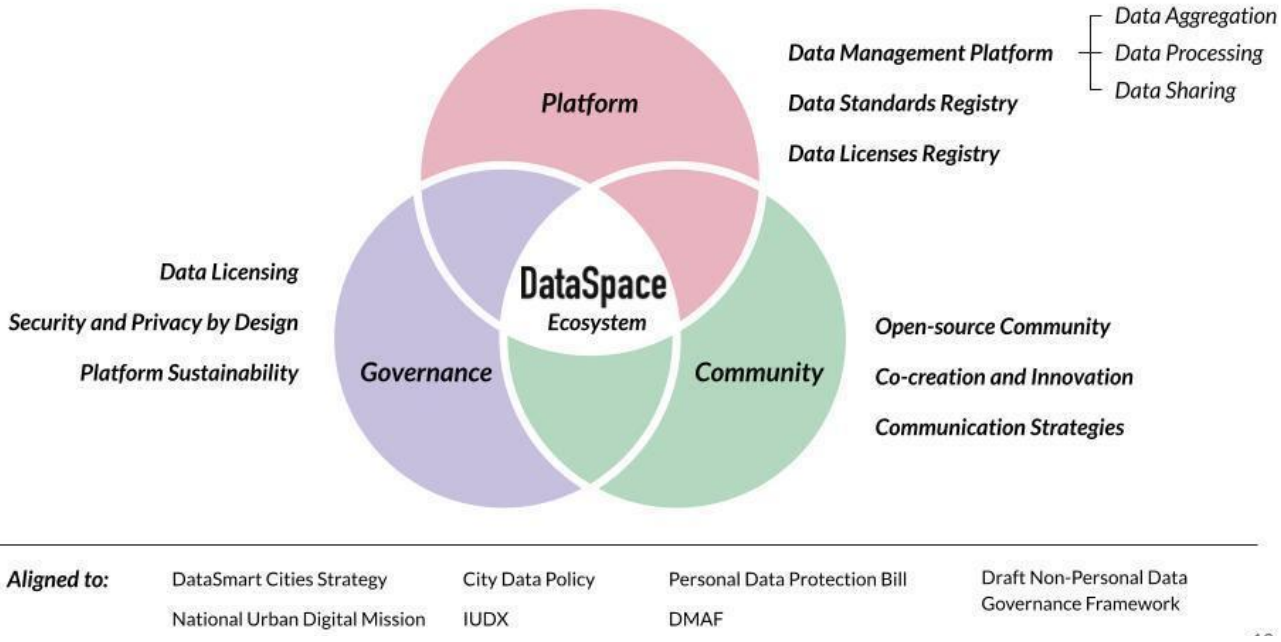
4.3. Expected Outcomes

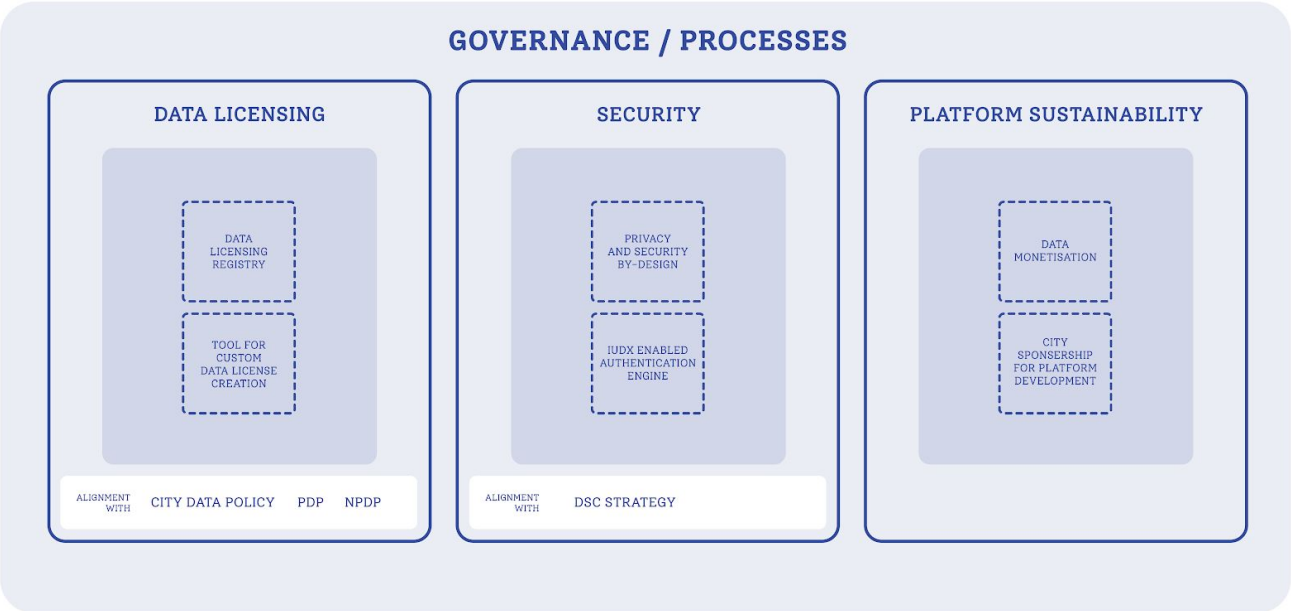
The potential of the project was immense as a consequence of its capacity for scaling up and replication. The deliverables for the project are as follows:

- A robust data delivery platform that enables democratic sharing of high-quality, standardized datasets on urban mobility.
- Assuring data privacy and security by design for all the datasets on the platform.
- Creation of a repository of domain-specific standards for urban mobility suited to the Indian context.
- Encoding a suitable governance framework within the platform that clearly defines the rules of engagement of various stakeholders, privacy, security, and data licensing.
- Formal collaborations with various private organizations, start-ups, and research organizations to share and obtain valuable datasets.
- Develop key performance metrics that can be used to effectively monitor the working of the data delivery platform, its governance, and community engagement.
- Develop a long-term, self-reliant financial model to sustain the platform post the 2020 India Smart Cities Fellowship Programme.

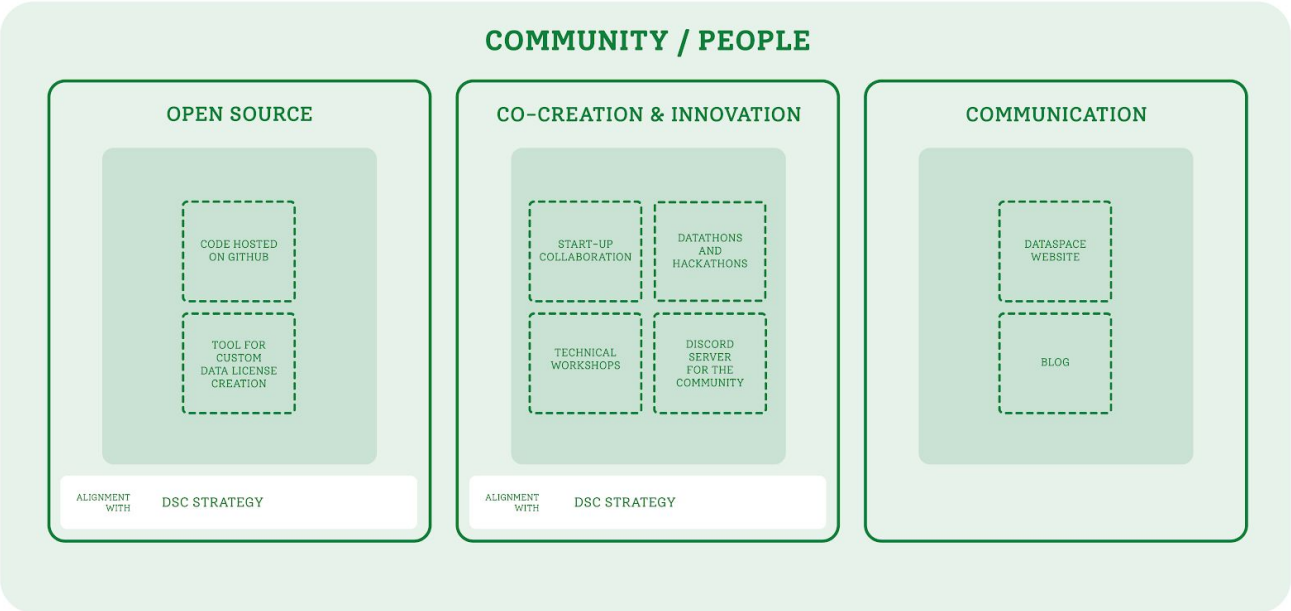
4.4. Actual Result

The achievements of the project can be noted in terms of its three foundational pillars.

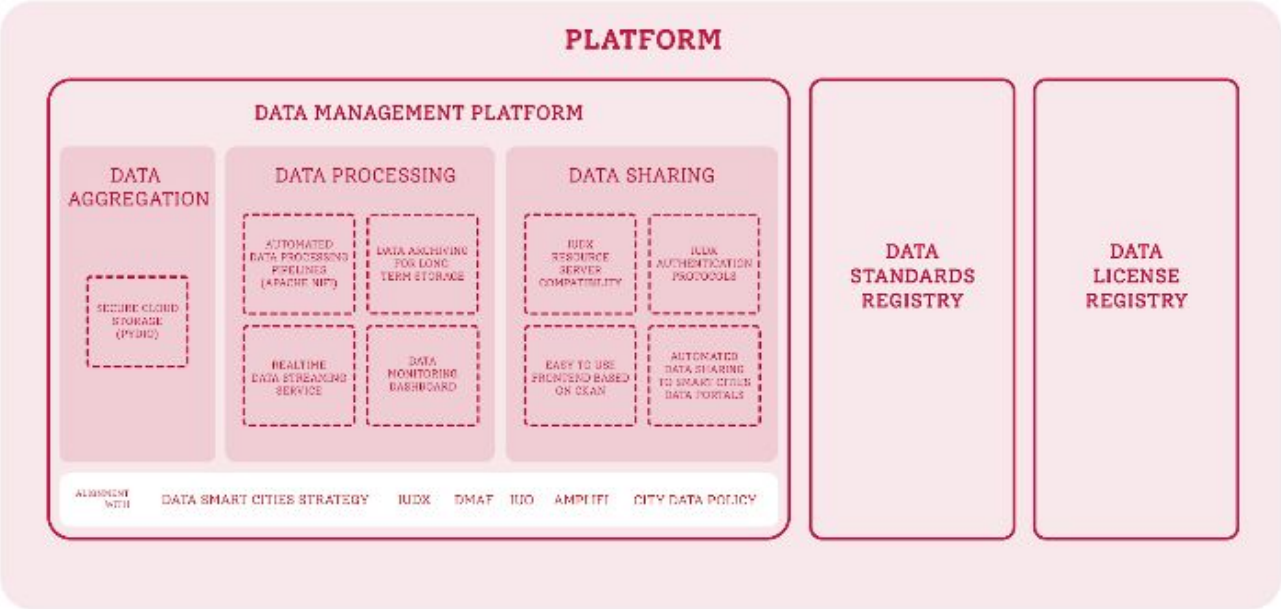




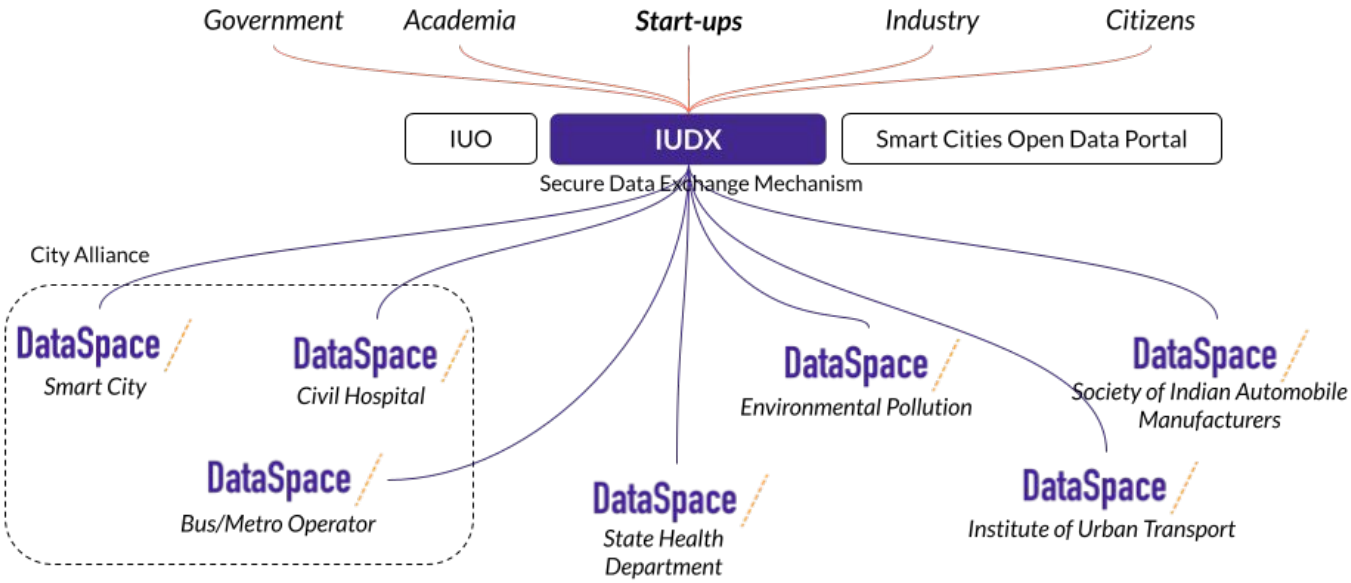
Governance: In terms of governance, the project explored diverse aspects of data licensing, security and privacy by design along with opportunities to ensure platform sustainability in the long term.



Community: The wider community was engaged throughout the project duration and in a variety of ways. The open-source software development community was engaged through the online platform, Github. Here, diverse individual contributors were able to review open issues concerning the code and voluntarily contribute to the development of DataSpace tools. Start-ups and private companies currently operating in the urban mobility domain were engaged to explore opportunities for use case development with the help of the datasets onboarded to DataSpace in Faridabad. As the technology partner for the Smart Move Challenge, the project was able to reach a wide audience of professionals, researchers, and students across the world.



Platform: DataSpace is a complete technology stack formed by a variety of sub-products and tools that are interconnected and are dependable on each other to properly function. The principal instance of the project was independently and securely deployed at the servers of FSCL located at the ICCC, assuring that the data remains at the City's premises and the city administrators have complete access and control over the data and technology stack. To test the working of the DataSpace technology stack, a pilot was carried out at FSCL using data from the Adaptive Traffic Control System (ATCS). Based on this process, four data products were made available at FSCL - GIS-based maps, static dataset, real-time data stream, and an archived dataset consisting of the first three.



The decentralized deployments of the Dataspaces will be replicated at the different sectors and departments of a city and can be seamlessly connected to IUDX due to their compatible APIs and authentication protocols. Internally, the different departments will be able to exchange data for better decision making and to improve the quality of life of the citizens. The potential for data-led innovation in India is enormous, and the start-up community and local economies will flourish by the consumption of the data made available by the various City DataSpaces.

05. CONCLUSION

As a direct result of the clear definition of three foundational pillars since the conception of the project, the DataSpace Ecosystem's future is clear and streamlined. Moreover, this allows the project to remain highly scalable, flexible, and customizable.

In short, the team proposes to further develop various sub-components of the three pillars and also replicate the DataSpace project in multiple sectors and other cities. Additionally, full integration with the Government of India's and MoHUA's data-related initiatives such as SmartCode, Amplifi, and IUDX are also proposed. In the long term, DataSpace is envisioned as a vibrant open-source project that draws resources from the community for its development while giving back manifold for the welfare of cities and citizens.

TEAM

Abhishek Upperwal

Aparna Ramesh

Manuel Diego

MENTORS

Dr. O.P. Agarwal
CEO, World Resources Institute (WRI), India

Jitender Pal
Consultant and urban specialist, National Institute of Urban Affairs (NIUA)

PRESERVE

Help create resilient and greener cities by enabling planned green cover improvements and processes to maintain the green spaces through citizen and community participation.

01. CONTEXT

Urbanization is occurring at a rapid pace targeting purely economy-centric and anthropocentric development. In such scenarios, environmental concerns usually take a backseat. At present, cities are facing several environmental issues influencing the well-being and livelihood of millions. Urbanization and densification processes have led to a loss of urban green space and biodiversity within cities.

With the increasing frequency and severity of environmental hazards due to climate change, urban design strategies and greening will play an important role in reducing disaster vulnerability, promoting health, and building resilience. To fight this climate change, India has targeted to increase its green cover to 33% of the entire geographical area compared to the present 24%.

Urban green spaces such as trees, gardens, public open spaces, play a very critical role in cooling cities, and also provide safe routes for walking and cycling. This promotes mental and physical well-being, social interaction, and increased social recreation. Since the pandemic, it has become very clear how important these are to the citizens. Along these lines, our project intends to develop a digital tool to contribute towards creating resilient and greener cities by enabling the citizens and communities to contribute in the development of green infrastructure. City planners and local bodies will be bolstered by data driven decision making for improving the green cover of a city

02. PROBLEM STATEMENT

Due to thinning green cover, loss of biodiversity in urban spaces, low carbon sink, and increasing microclimate, citizen accountability and participation is necessary to develop and maintain better green spaces to improve the quality of life. There is a lack of synergy between various stakeholders of the city which are mainly the citizens and the government. For an urban space to be sustainable the onus of the environment should be shared by all the stakeholders. City planners also need to move towards evidence-based green development which will help in the sustainable and inclusive growth of the city.

03. OBJECTIVE

The project aims to build an interactive digital tool to help in creating resilient and greener cities by enabling planned green cover improvements and processes to maintain the green spaces around us through citizen and community participation. With the proposed solution, the vision of the project is
(i) To gather data on green cover and streamline it for evidence-based decision making for creating sustainable smart cities. NMT routes, road improvements, native tree plantations can be planned based on the data.
(ii) To map green and open spaces for planning better public amenities, and sharing the responsibilities for maintaining these green spaces.

04. PROJECT STRATEGY

4.1. Pilot City Identification

Smart cities were shortlisted based on certain parameters that were developed through intensive secondary research and a preliminary understanding of the project.

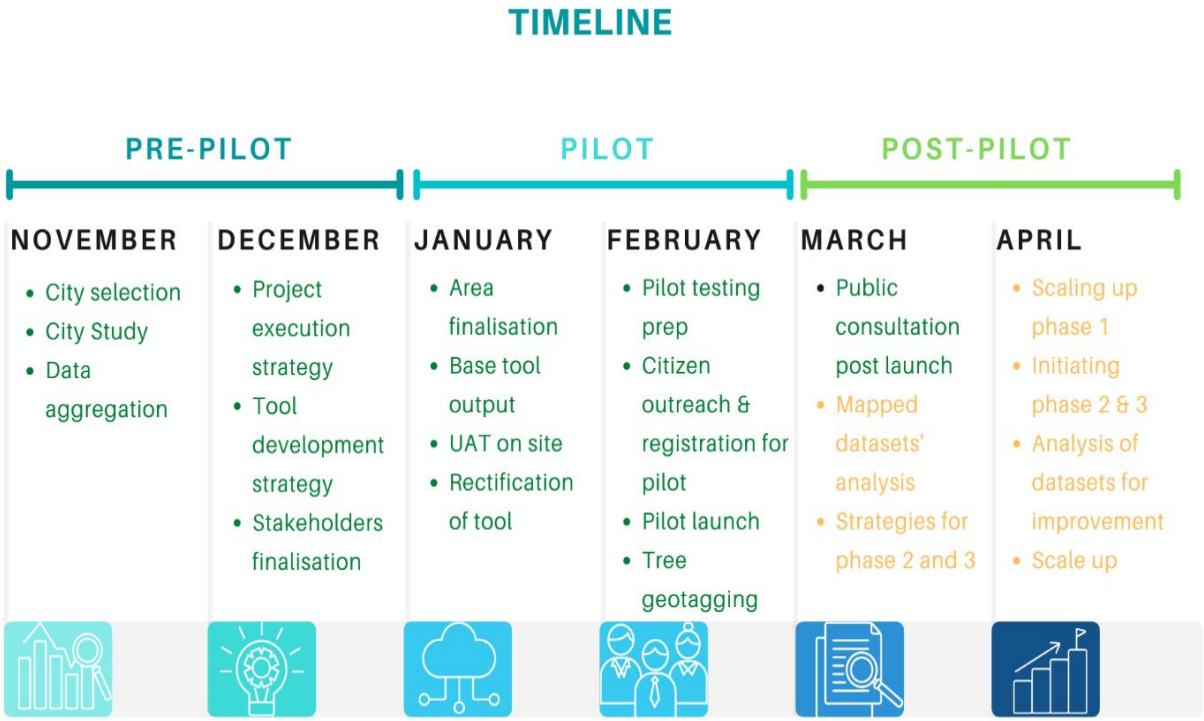
- **Data aggregation and analysis:** Through existing MIS and Climate Smart Cities data, about 40 cities that were working on green cover and environment were identified.

- **Designed indicators:** Through secondary research, few indicators such as the cities which conduct tree census, number of public and biodiversity parks, population and area of the city, existing biodiversity projects, the active presence of environmental NGOs, NPOs and research institutions, population, and active citizen participation were shortlisted for further sieving of the cities

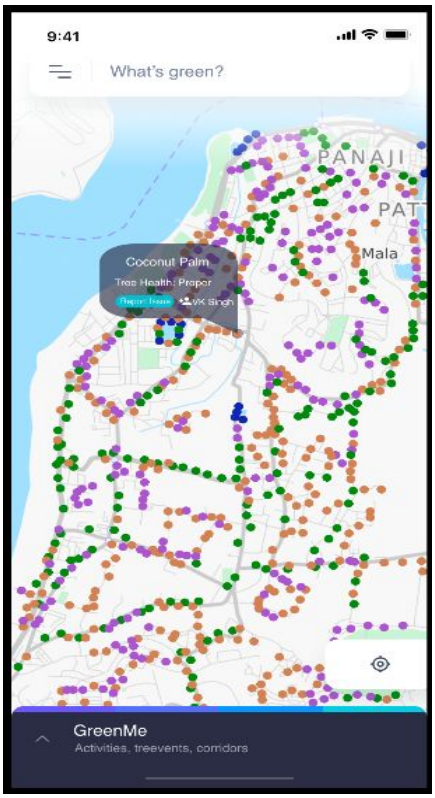
- **Stakeholder consultation:** Interaction with the city coordinators of the shortlisted cities and relevant stakeholders helped us understand the feasibility of the project. This helped us finalise the pilot city as Kochi.

Kochi faces the heat of budding infrastructural development. Therefore it is all the more important to know where the city's trees are and what can be the scope of future plantations. The total area of open/green space/park in Cochin City is only 0.65 sq km, which is less than 1% of the corporation area. When compared to many other cities in India, the present allocation for open spaces in Cochin City is far lower than what is required.

4.2. Project Development and Implementation



4.3. Expected Outcomes

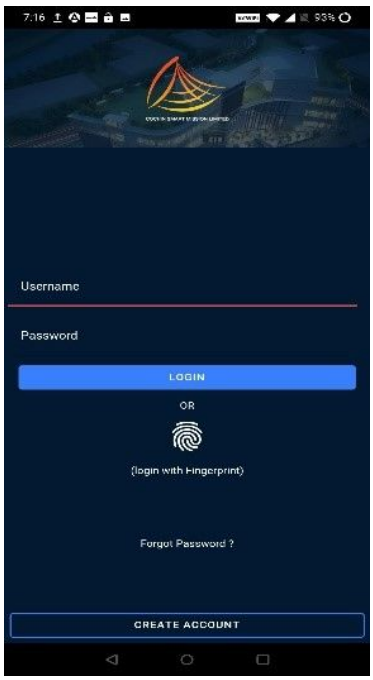


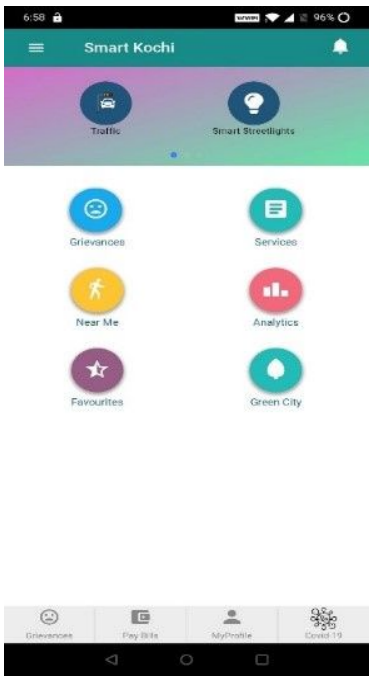
- **Tree mapping:** Data pertaining to the species of the tree, the total number of trees, the proportion of new to old trees available, and the scope for new plantations will be recorded.

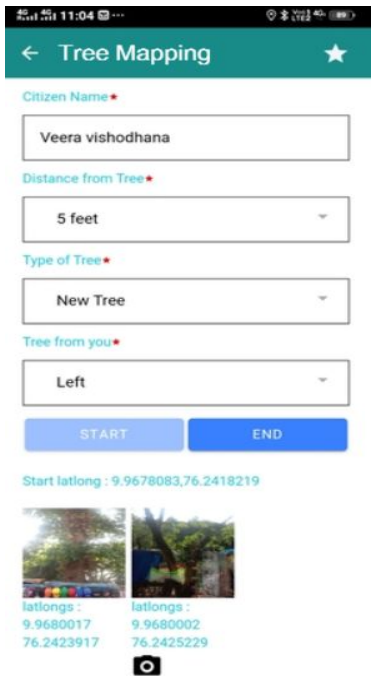
- **Identifying green routes:** Routes having tree cover as a potential NMT route
- Mapping of green/ open spaces with their amenities
- **Citizens and stakeholder interaction module:** Details on events/activities planned, registration for participants could be updated
- Calculation of carbon sink level

4.4. Actual Result

With Kochi city already having a "Smart Kochi" app, the process of tool development was simplified. Phase 1 of the application was designed to geotag trees in the city thereby providing a digitally mapped visualization of the city's tree and green cover. Once this was ready a pilot testing was conducted at Fort Kochi and Mattancherry areas using trained citizen volunteers for geotagging. Based on the output and citizen suggestions, rectification in the application were done.



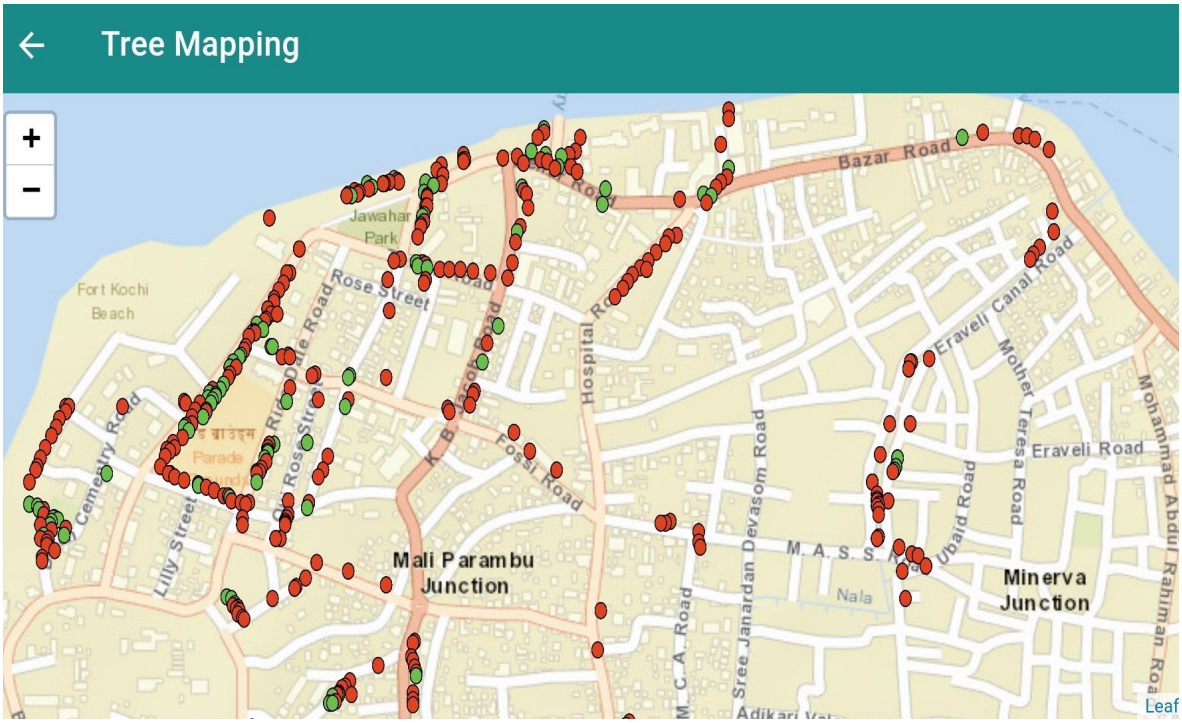




The tool allows the user to geotag trees by entering a few necessary parameters essential to capture the accuracy, like distance of the user's position from the tree, type of tree, tree's position from the user's direction (if the tree is towards the left or right), and geotagging the tree by clicking the image. The user can input Scope for plantations near the geotagged trees can also be suggested by the user.

The GIS output provides a detailed representation of the number of geo-tagged trees in a particular area along with the details of every individual tree as metadata. The metadata comprises the name of the person who mapped the tree, species of tree, the health of the tree, etc. Based on the output, the following can be identified:

1. Scope of plantations in an area
2. Ratio of native tree species planted
3. Green routes for NMT and green corridor development
4. Trees requiring maintenance



05. CONCLUSION

This digital platform would facilitate the holistic way of achieving the main components of the project with the citizens and ULBs working together. Basic city environmental KPIs like planting native tree species, the participation of communities in plantation/maintenance activities and better environmental planning would be achieved through this intervention. This will help to envision the cities' biodiversity and ecological growth in a sustainable and participative manner.

TEAM


Rupal Baid


Shilpa Shashidharan


Vaibhav Sharma


Veera Vishodhana VI

MENTORS

Mr. Emani Kumar

Executive Director, ICLEI South Asia

Internal Mentor's Name

Chair, Urban Resilience, NIUA

REACT

City Preparedness Monitoring and Emergency Response

01. CONTEXT

In the last 20 years, disasters have affected about 440 crore people in India causing over 13 lakh deaths and incurring about 6 lakh crores in loss. Despite having strong early warning systems and various disaster management plans and policies in place, it is still strenuous for the Indian Administration to minimize human, animal and infrastructural losses. Various studies also prove that globally, about 83% of cities are at high mortality risk and nearly 89% of cities are highly vulnerable to economic losses from at least one type of natural disasters (Gajjar 2013). India with its varied topography and strategic location has been witnessing a variety of disasters from earthquakes to climatic events like droughts, flash floods, cyclones, avalanches, landslides etc. brought in by torrential rains and snowstorms causing massive losses to life and property. In addition, anthropogenic events like chemical accidents, fire and disease breakouts too have been posing greatest threats. Compounded by an increasingly adverse climate change, the frequency, intensity and unpredictability of the occurrence of these hazards have risen exponentially.

Since the inception and adoption of the Hyogo framework of action in the year 2000 (UNISDR, 2005) and the more recent, Sendai framework of action in 2015, the rapid growth, unplanned urbanization, irregular planning of spaces and a growing deficit in infrastructure in cities is leading to the creation of risk, largely occurring in the context of widespread poverty. Cities are today representing the greatest concentration of people and economic activities are seen to overlap with areas of high-risk. Numerous current urban planning and development discourses drive vulnerability, including the fact that disaster risk is rarely taken into account in real-estate investment decisions. To this extent, the social segregation caused by the uneven urban development discourses of our country often result in unequal or lack of access to urban spaces, services, infrastructure and social security to the low-income groups making them vulnerable to social, economic, physical and technological risks.

02. PROBLEM STATEMENT

The approach to disaster management in India has been largely response and rehabilitation centric as opposed to being risk-reductive and resilience inducing. Additionally, it was also recognized that the most vulnerable that are the most affected and it is them who are often not accounted for when risk assessments are conducted. This finding is further substantiated by a working paper by UNDP and IIHS, which highlights the same.The present static scenario of disaster management needs to be addressed and shifted to a dynamic one, where: Data pertaining to previous disasters and its impacts are updated periodically and shared, rather than being in silos. The scale of analysis is shifted from a macro to a micro one, which could further contribute to a targeted emergency response. And above all, the enormous scope that digitisation presents to any sector, should be tapped into.Increased emphasis on disaster resilience requires emergency practitioners to shift focus from a top-down 'command and control' model to one more strategic, participatory, and dialogic with communities and stakeholders; where value is increasingly recognized in both authoritative and citizen information and practices. This has led to a focus on implementing initiatives cantered on community engagement and innovations in information and communication technologies that can empower citizens in disaster response.The theoretical and practical perspectives addressed in the premise have helped in identifying three particular gaps the current disaster management scenario of the country has, that we intend to help solve: A lack of micro-level disaster risk mapping and information dissemination platforms and planning for resilience in policy.; Non-compliance to citizen-centric disaster management methods; Non-availability of a single web-based crowdsourced platform to manage emergencies of all kind.

03. OBJECTIVE

While the intent of the project is to develop a citizen-centric digital platform for automated risk communication and resilience assessment for efficient and targeted emergency response, the project sets out the following objectives to achieve the same: To analyse Disaster Risk at a micro level within the city.

- Develop a citizen-centric, Community Resilience Index for clusters identified as lying-in high-risk zones.
- To analyse/establish correlation between Risk and Resilience Indices of the identified clusters.
- Develop Emergency Response Mechanisms based on the correlated output.

The web-based solution targets providing a holistic view of disaster risks as well as the resilience of the city. The project as well as the tool aims to integrate the indicators of risk and resilience spatially to arrive at a final correlated score. The spatiality of the product adds to its value as it lets the user take a closer look at each unit within the city not only to pre-position the city's emergency response but also to be able to identify the short-term and long-term interventions required to be taken in order to minimise the adverse impacts of the disaster. So, to conclude, the proposed research concentrates on comprehending, analysing and deciphering both the current disaster management scenario and the extent of its citizen centrism.

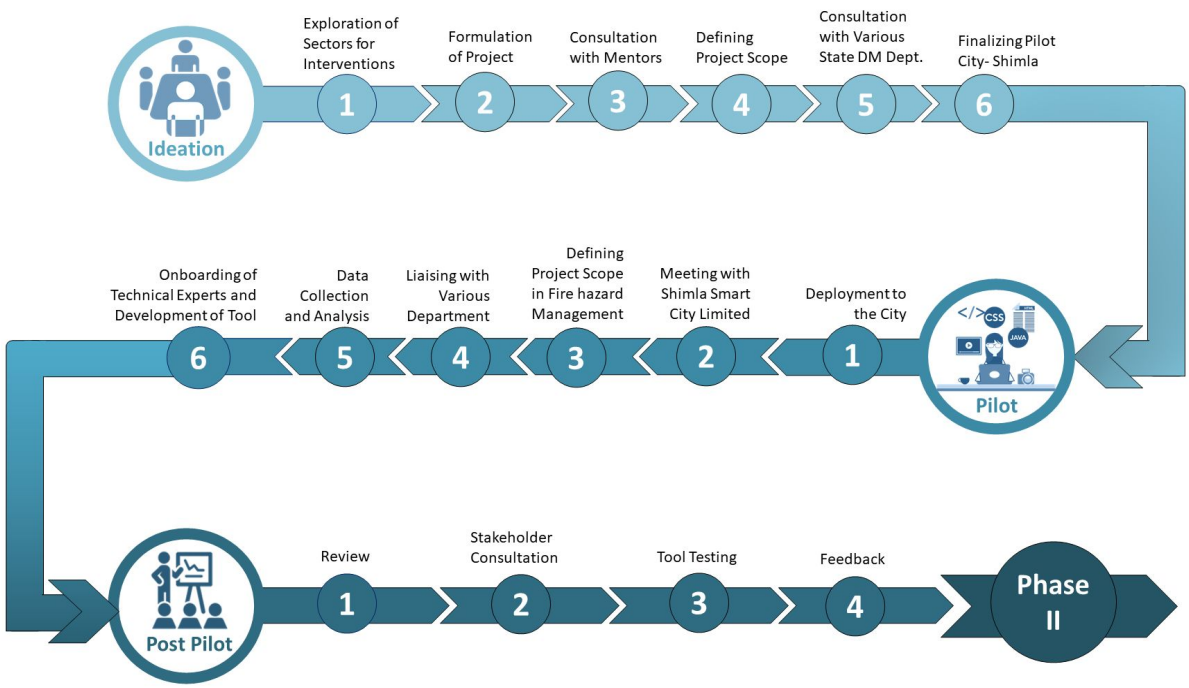
04. PROJECT STRATEGY

4.1. Pilot City Identification

During the ideation period, a number of smart cities were identified with posing potential threats of natural as well as man-made disasters. A list of 24 smart cities were identified with potential threats and scope to work on city level disaster management. To finalise the city for the pilot each city was categorised under certain parameters like AMPLIFI Portal Data (a data portal Under Ministry of Housing and Urban Affairs currently collating data of 118 cities across the country), City Disaster Profiles, the Pandemic Scenario, Ease of Access from New Delhi, Presence of Integrated Command & Control Centre (ICCC) etc. Each city was given a score by using the Analytical Hierarchy Process (AHP) and initially 15 cities scored more than 0.6 using the AHP and Shimla had the highest score. Hence Shimla was chosen to pilot the project.

Shimla city is highly prone to disasters. The city falls in the earthquake zone 4 and is highly susceptible to earthquakes. The city is also highly vulnerable to landslides which originate due to tectonic movement or heavy rainfall during monsoons followed by mudflow. Additionally, the city is also prone to land sinking, flash flooding, hail storms, storms, accidents, and both forest and urban household fires as well.

4.2. Project Development and Implementation



4.3. Expected Outcomes

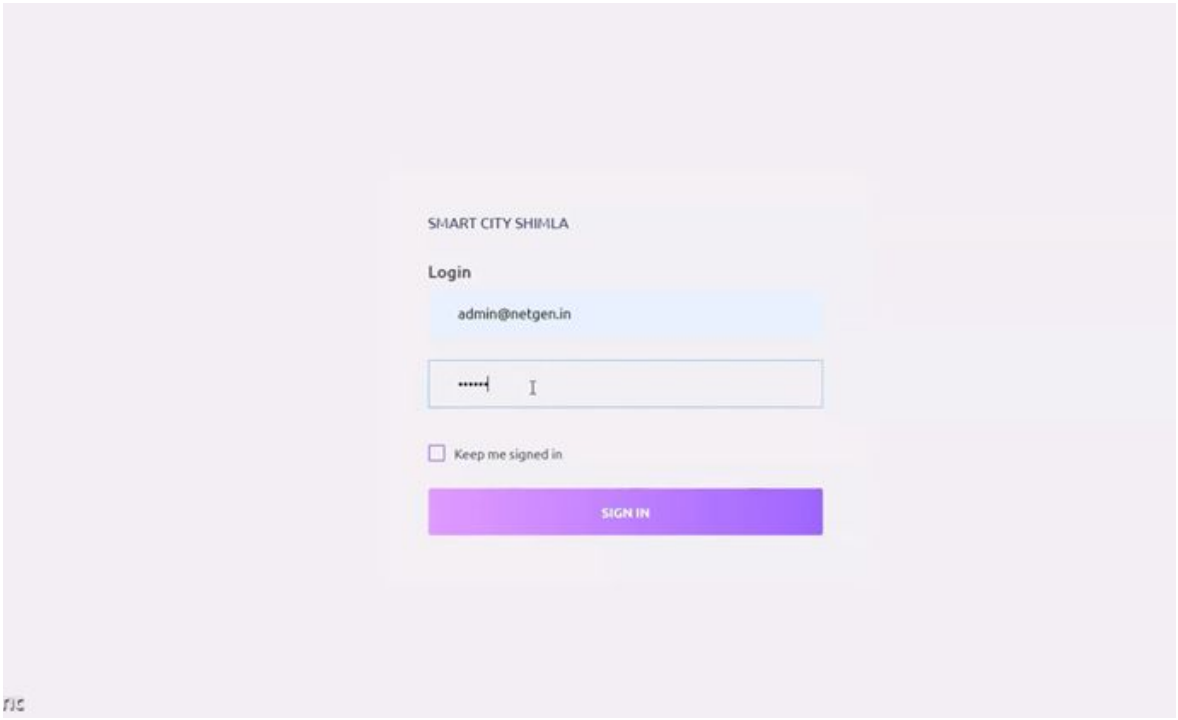
With the project aiming to provide digital and information technology-based solutions to pressing citizen-centric inclusion-based issues, the outcome of the project will be two-fold.

• A digital (web) based platform containing mapping-based information pertaining to risk and community resilience assessment at a micro level for information dissemination to the various stakeholders involved in disaster management and especially to the citizens of the city.

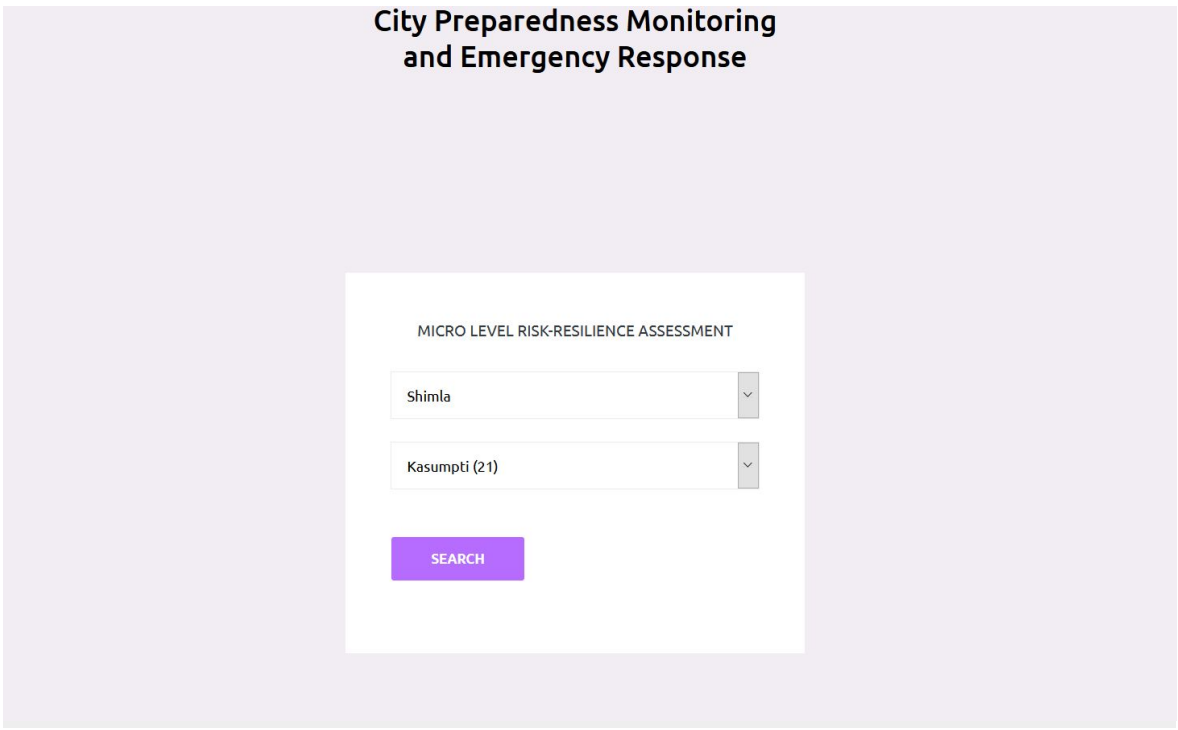
• This platform would also include information pertaining to evacuation shelters and routes, contacts of resource personnel, health centres etc based on accessibility patterns. This could be used by the administration to address daily shocks or plan long-term disaster mitigation strategies.

4.4. Actual Result

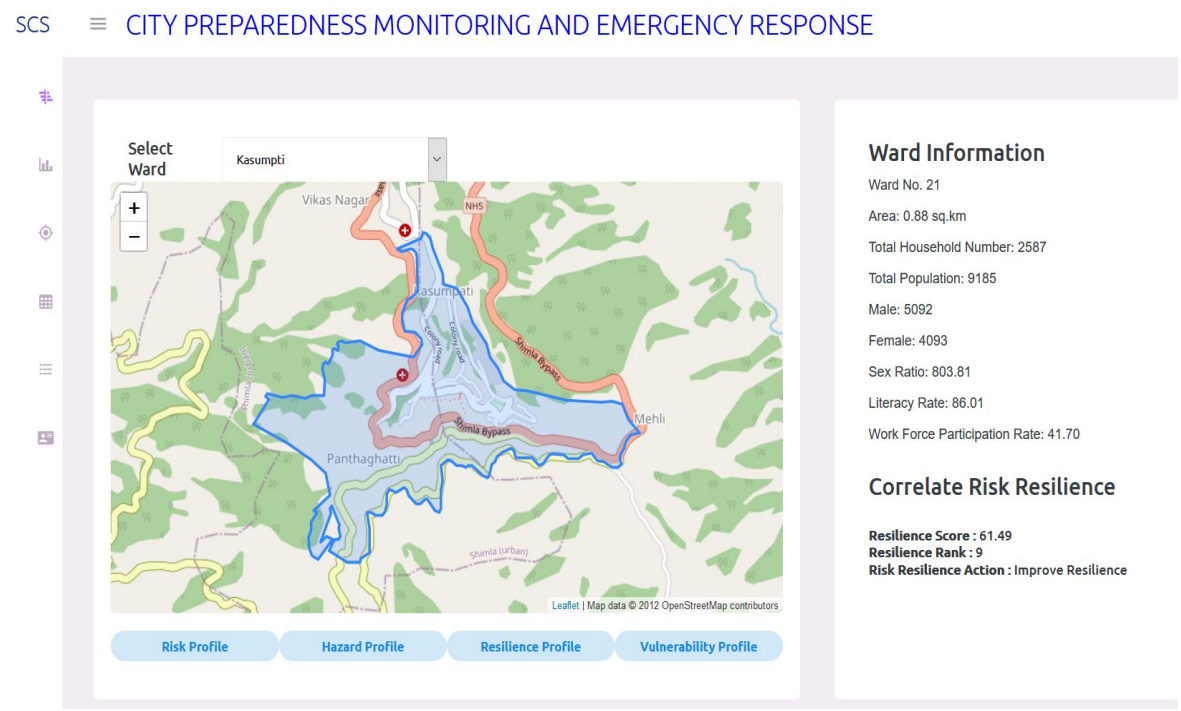
While the initial idea behind the project was to conduct the analysis at a micro-level, due to temporal challenges, duration of data collection and lack-of interdepartmental coordination, micro-zonation could not be taken up in this phase and will be taken up in phase 2 of the project where it will be combined with the ongoing micro-mapping project of the city. Due to the unavailability of the updated 34 word map of Shimla, we have used the map that was made available to us by the administration consisting of 25 words. Also, due to the lack of opportunity for us to officially pilot on the ground and present the project to the stakeholders, the weights - subject to the perception of the team and the subsequent scores derived - have not been validated as yet with the stakeholders. Additionally, due to the non-availability of a benchmarking/standardised system to categorise low medium and high risk, we have referred to available literature to derive our methodology for analysis and thereby the scores and the division/categorisation of risk. The aspect of community engagement with those living in the bottle-neck regions has been pushed to phase 2 of the project due to temporal issues.



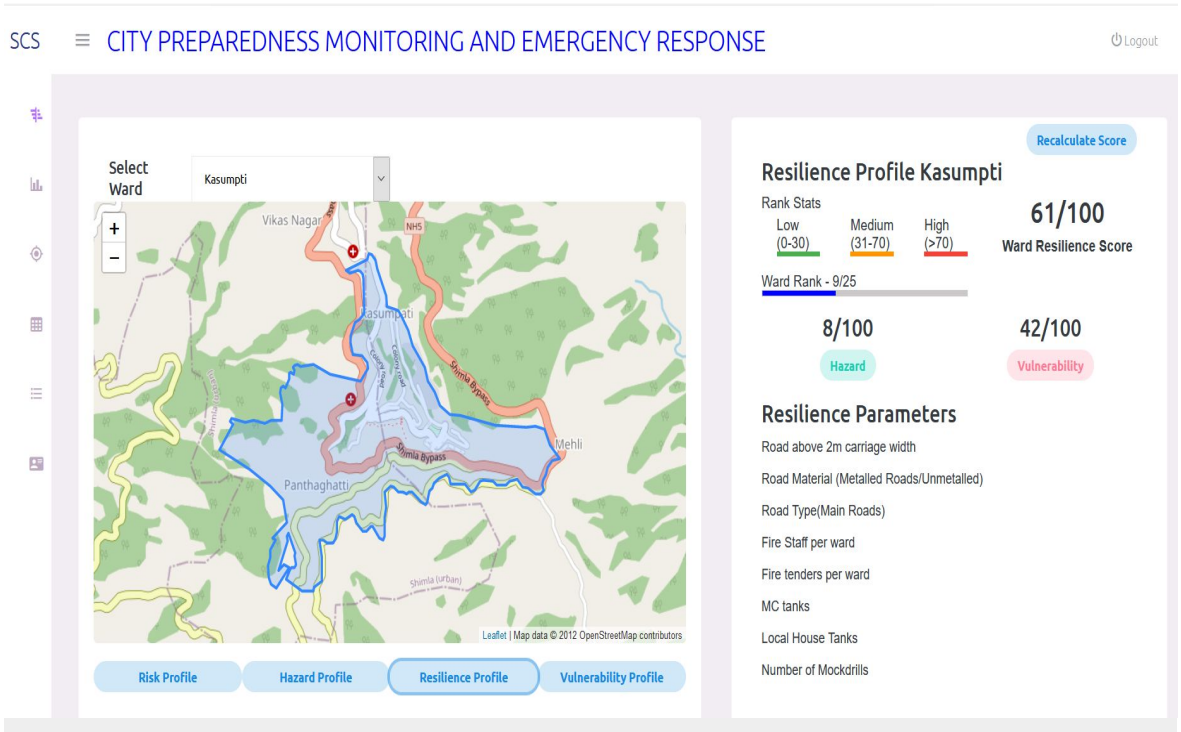
On the landing page of the dashboard, there are two options - admin login/others, where the admin option belongs to the city administrators/the decision makers and the other option belongs to the responders. Once the admin logs in using his/her credentials, one can view the select city or word option.



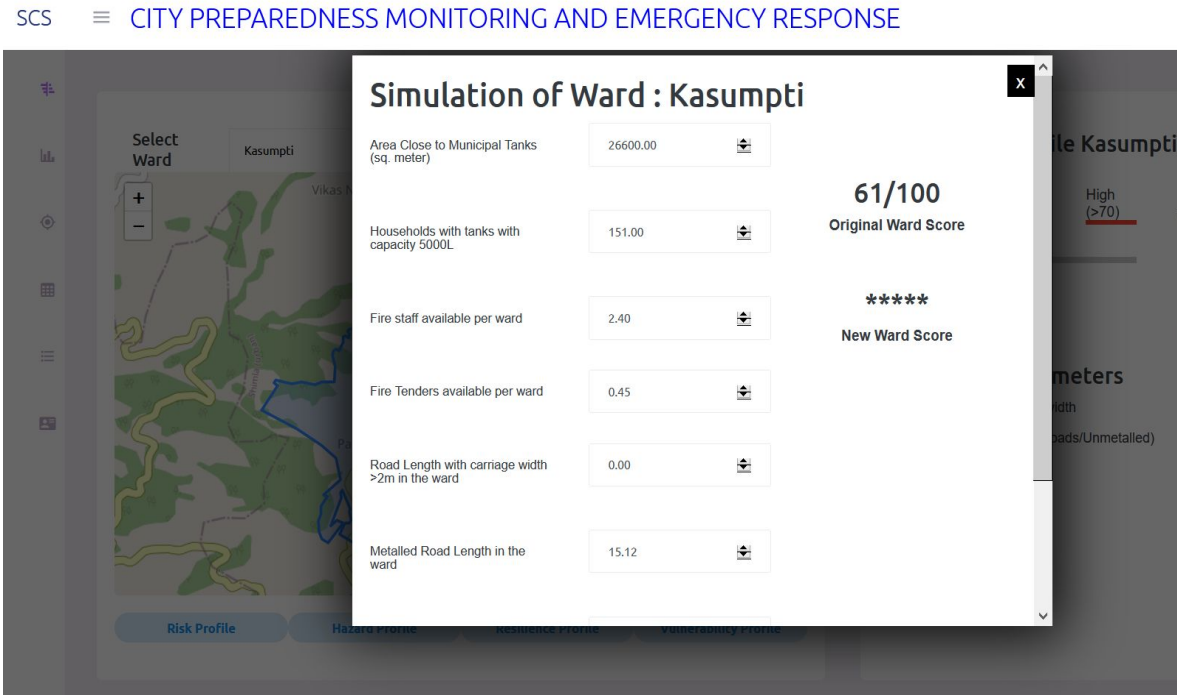
Click on search option, once the ward the admin wants to see is selected.



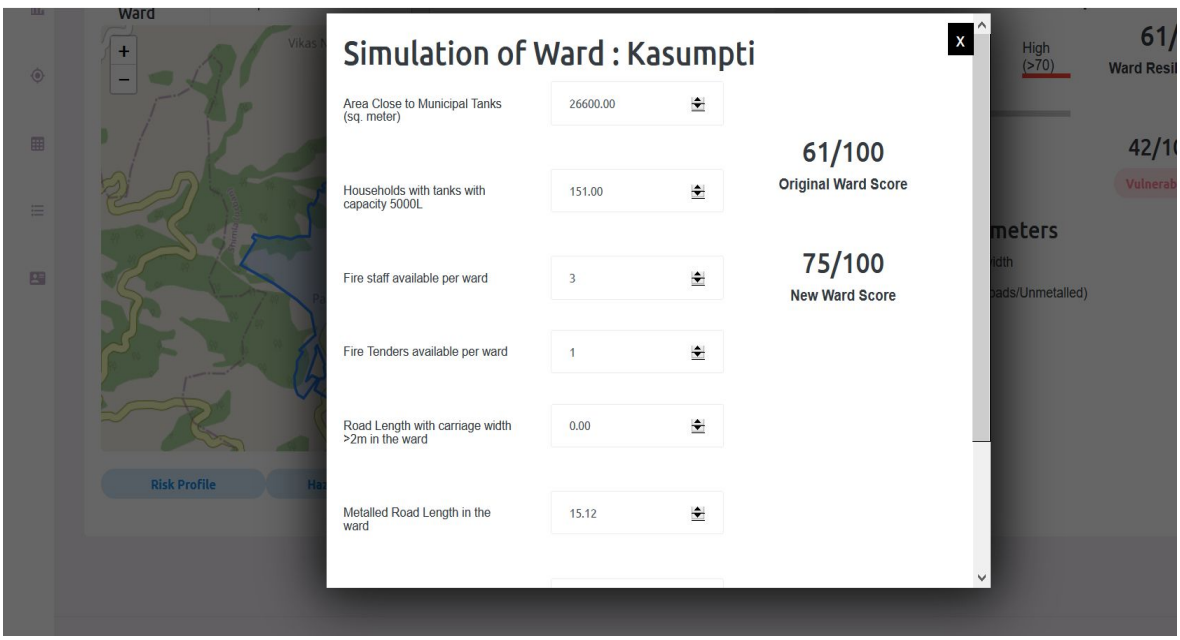
Once you click on the search option, the administrative details of the ward, along with options to view the hazard, vulnerability, risk and resilience profiles, are available. Upon choosing any of the options, a new window will appear with information pertaining to that particular choice option, w.r.t., to the selected ward.



After selecting the resilience profile, the rank of the ward in the city, and the resilience score along with, the parameters used for calculation will be shown and classified based on low, medium, and high levels. Similarly, hazard, vulnerability and risk profiles will be shown along with the parameters considered for analysis



Upon selecting any of the Recalculate Score Tabs, a second part of the portal will open up where the user can re-evaluate the score.



By increasing the values of the parameters taken into consideration for calculation of the resilience profile of the ward, the user can re-evaluate the score of the ward and understand the impact of each parameter on the profile.

05. CONCLUSION

The product, currently focusing on urban fire hazards at a ward/meso level, can be scaled down to the neighbourhood level or scaled up to the district/state level across the country. The product is now limited to city administration, which is divided into decision-makers and responders, but can further be developed into a quadruple-helix model, including citizens, their perception, and the dos and don'ts during a disaster. This product, with minor context-specific tweaks to the parameters according to the hazard, can be replicated across different communities, hazards, and across geographies. The second phase of the portal would focus on involving citizens at various levels for, crowdsourcing data, grievance redressal, and risk, and resilience information sharing in order to increase their preparedness. The team will also partner with the local NGO, DOERS, who are currently in the process of developing a Fire Hazard Plan for the city and integrating the city disaster plan and the fire plan with the product. Further In order to access the current infrastructure provisions in the identified bottleneck regions with respect to the specially-abled and chart out a plan of action with the NGOs. Also, to include citizens and their perceptions of risk and resilience, it is visioned to develop an interface for the citizens which can act as a reporting and crowdsourcing platform for urban fire hazards which are key indicators of participative, citizen-centric and Smart City planning. To scale the product to various frequently occurring hazards in the city and thereby to the state under the guidance of Mr. Rajneesh, Under-secretary, UDD, Shimla.

TEAM


Ankur Negi


Ipsita Chanda


Shikha Singh


Sai Varsha Akavarapu

MENTORS

Dr. Anshu Sharma
Co-Founder, SEEDS India

Dr. Umamaheshwaran Rajasekar
Chair-Urban Resilience, NIUA

RECON

Monitoring crime through visualization and prediction in conjunction with the crime contributing factors of urban landscape.

01. CONTEXT

Many of today's cities—especially those that are growing very quickly—experience a convergence of factors that increase the risk for destabilizing levels of violence if they are not appropriately addressed. In the present discourse of urban issues discussion, assessing cities through the lenses of safety against criminal offenses is necessary. As per the data published by the National Crime Record Bureau (NCRB), in 2019, the crime incidence per one lakh population has increased by two percent since 2018. The Indian Police Department is understaffed with a police-to-population ratio of 138 compared to the United Nations minimum standard of 222. An efficient policing using the power of data and technology can be used to derive maximum from the deficient departments.

Team Recon's project - S.A.C. (Social Analytics for Crime), focuses on making smart cities safer for children. In this, crime heat mapping of the city is envisioned with the help of historic crime data which involves crime against children, and also socio-economic parameters and demography. Accordingly, a dashboard is to be developed for the ICCC unit (Integrated Control and Command Centre) for smart cities which will predict crime with the help of data interpretation and machine learning. This future prediction will be done with respect to the location, time, and type of incidence. As machine learning is used for data analysis, on data maturity, its accuracy for prediction will improve.

Currently, this project is only focusing on crime against children and the product is being developed for New Delhi Municipal Council Smart City Limited, pilot area being limited to the New Delhi zone, South Delhi Zone, South West Delhi Zone but in the future it has the purview of having a horizontal and vertical expansion. That means more types of crime can be added and more geographical areas could be covered under this project.

02. PROBLEM STATEMENT

Non-synchronized performance: Relative rankings of metropolitan cities in India based on crime rate (number of incidences per 1 lakh population) and Ease of Living Index shows a mismatch when studied. The cities that reported high crime rates are one of the top performers in the EoF and Municipal Performance Index. This study suggested that cities in India can perform better in terms of urban service delivery but at the same time can be less efficient in providing safety and security. Administrative efficiency in silos is not constructively helping in ensuring urban crime safety.

Socio-Economic conditions on crime rate: In environmental criminology researchers mainly focus on influences of socio-economic factors and spatial factors on crime. Understanding the urban context of crime occurrence is equally important to the steps taken to put violators under law. Several established theories like Social Disorganization Theories and Subculture Theories have tried to narrow it down. Depending upon the type of crime, they have their root-cause, say, violent crimes occurring due to adverse social environments where violence can be treated as normal. These correlations are well recognized and substantiated by various qualitative empirical researches.

Absence of a tool that compares crime to Socio-economic indicators of the city: In the present context when the correlation between socio-economic factors with crime is well established, a mismatch between relative rankings of ease of living and crime rate indicates the requirement of a tool that can inform ULBs about the impact of their activities on crime rates. A quantitative assessment tool is required for the precise correlation derivation leveraging ULB and Police Department Data.

03. OBJECTIVE

Spatial Visualization of crime: The tool will provide a spatial visualization of socio-economic factors and crime rates together to generate hotspot maps based on police station areas as a unit of spatial visualization.

Identification Relations and Generate Report: The tool will highlight critical socio-economic factors based on which crime hotspots have been generated. The tool will highlight administrative boundaries considered for each socio-economic factor for better comprehensibility of the furnished information. The tool will generate Alerts to ULB based on the prediction of crime hotspots. As a way forward, when integrated with Smart City MIS data, it can also compare total monetary investments in each sector with their respective indicators.

Predictive modeling of crime: The proposed tool will be integrated with machine learning-based data mining software which will generate mathematical models to calculate values of crime rate for prediction.

04. PROJECT STRATEGY

4.1. Pilot City Identification

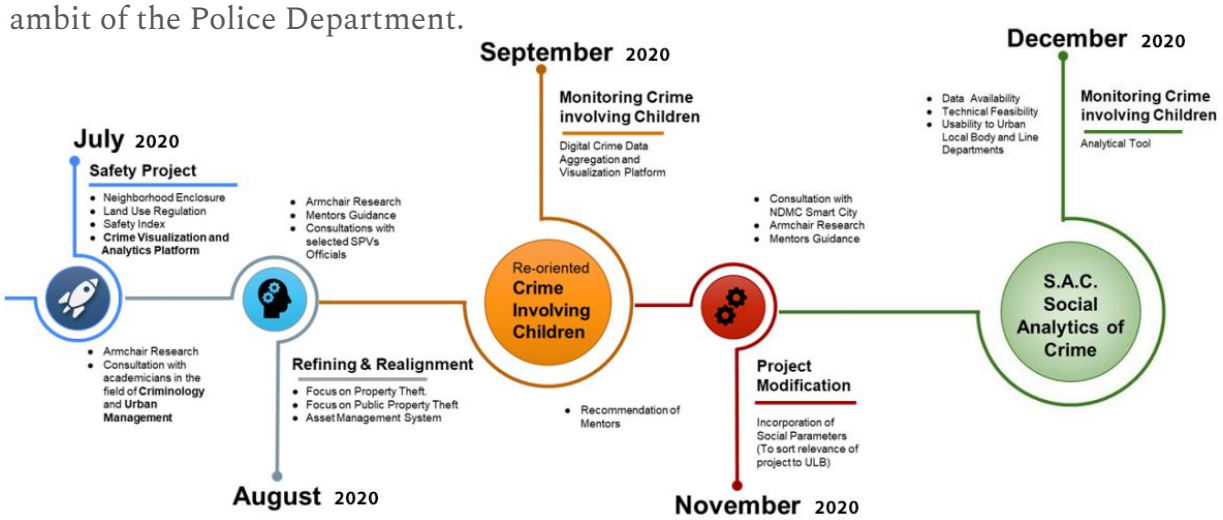
In order to cover all facets of the city dynamics and the ease of project propagation, seven indicators under 3 categories have been considered for city selection indexing. The three categories being Crime Reporting Criteria, Data Availability Criteria and Ease of Working Criteria.

Under Crime Reporting Criteria, indicators like Population, Weighted Means of Crime Rate against Children (2011-2018) and Weighted Means of Crime Rate in Juvenile Justice Act (2011-2018) were considered. Under Data Availability Criteria, indicators like Presence of Police Commissionerate and Use of CCTNS system to update data digitally, were considered. At last, under the Ease of Working Criteria, a five day moving average of COVID 19 cases reported and Presence of ICCC Unit in the smart city were considered. All the data was recorded in the Excel Sheet using secondary sources. Each of the indicator values were normalized between 0 – 1, followed by the calculation of cumulative score for each of the cities. The higher the cumulative score of the city, the more suitable the city is for the project pilot.

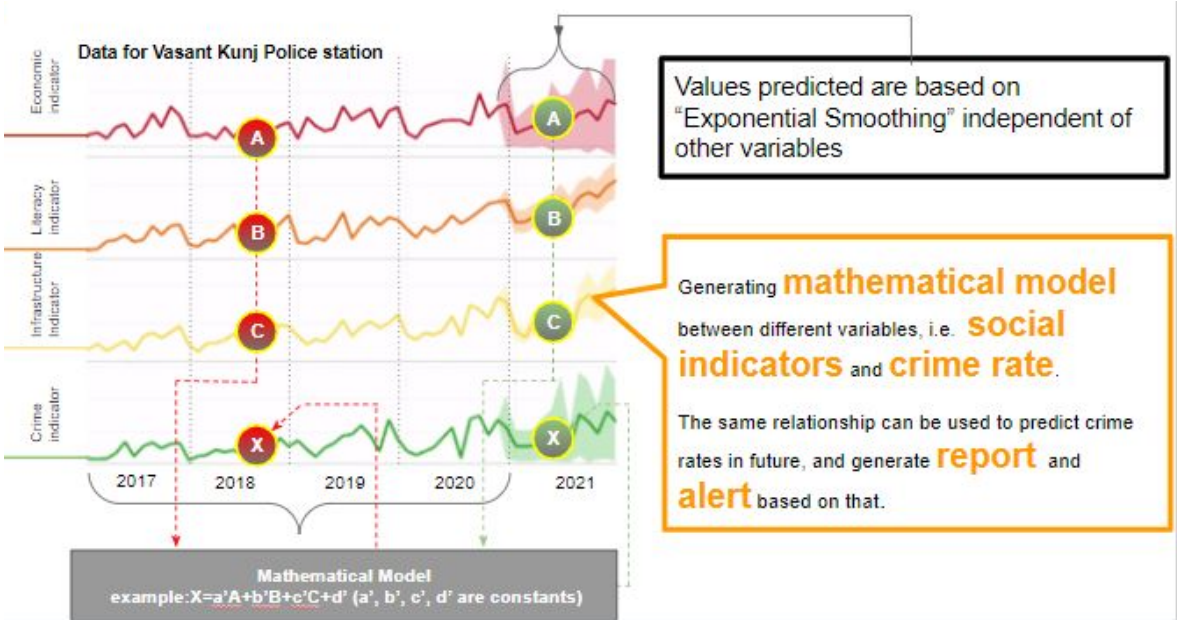
Probable Cities for Project Pilot in chronological order were Delhi, Nagpur, Chennai, Pune, Ahmedabad, Jaipur and Surat. All seven cities were contacted through City Buddy, assigned by the Ministry of Housing and Urban Affairs. Pune, Chennai and Surat did not show much interest in the project. Nagpur Smart City CEO was interested in the project idea and expressed willingness to develop on the idea more as per Nagpur city requirements. New Delhi was selected over Nagpur city considering the resource availability advantage of the city (guidance from NIUA and required push for data collection from Police Department through MoHUA).

4.2. Project Development and Implementation

Various ideas and probable project proposals related to crime, surveillance and safety were ideated upon in the course of project development. The project proposal has been modulated to sort relevance to the Urban Local body as the topic was seen to come into the ambit of the Police Department.



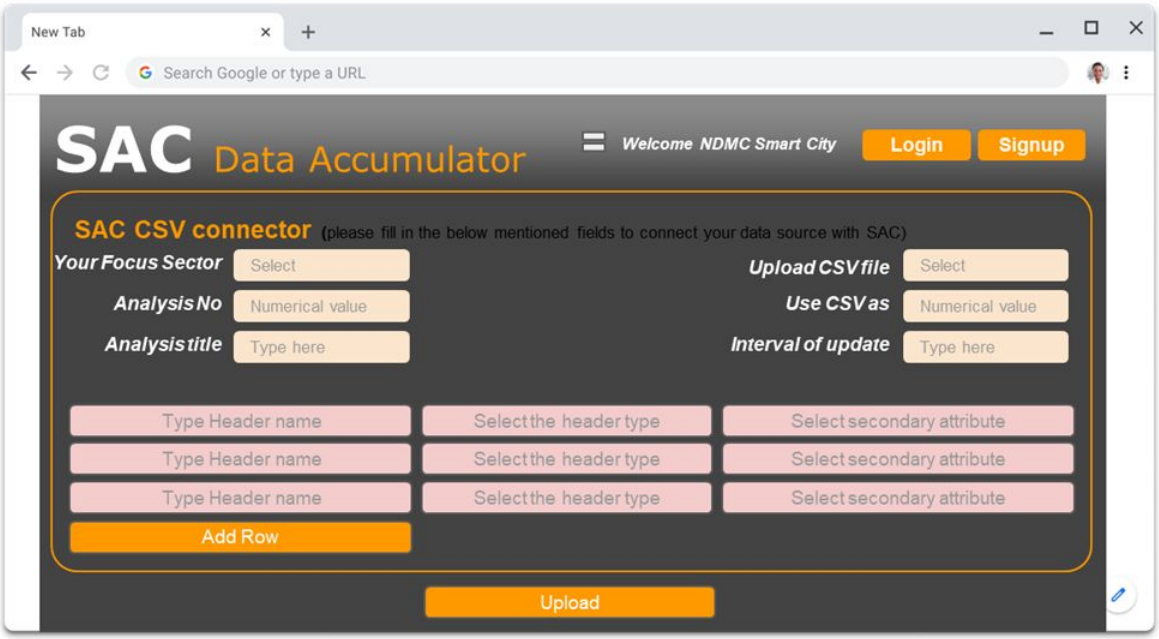
4.3. Expected Outcomes



The SAC tool is expected to aggregate and standardize data related to Crime and Socio-Economic indicators collected from the Police Department and Urban Local Bodies line department. The tool will have spatial hot spot output in the form of a dashboard. Apart from routine analytics, it will create mathematical models between different Values of Indicator provided to the tool by using Machine Learning. The mathematical model generated works on regression modelling and basically it represents a function (f(x)), which helps to find out the value of dependent variables. Mathematical models will be used to predict the probable crime rate as per the administrative boundaries selected and related data analysed. The dashboard visualization which will allow the ULB and Police Department to see the impact of their ULB services and investment in different sectors on the crime rate and make decisions on safety provisions in the urban landscape.

4.4. Actual Result

Designed the SAC dashboard and blueprint for the backend process of the tool to be completed. Front-end Graphical User Interface (GUI) has been designed for the Data Accumulator Portal, Results and Report portal and Dashboard. The data accumulator portal will also work as a data standardization portal. All the data is standardized and made co terminus to the boundary of Delhi Police Department zones, as the major data set (Crime) is collected based on its respective department boundary SAC accepts data in a predefined format containing time values, location values, and indicator values. Then a consolidated database containing all indicators is produced for the same period and geographical location using the values of all the indicators that have been provided by different agencies. The tool development part will start once an eligible developer is onboarded by the NDMC Smart City. The pilot stage team has validated the mathematical model by collating data from three departments and collected critiques on the same.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SAC Data Accumulator
Welcome NDMC Smart City
Login
Signup
SAC CSV connector (please fill in the below mentioned fields to connect your data source with SAC)
Your Focus Sector
Select
Upload CSV file
Select
Analysis No
Numerical value
Use CSV as
Numerical value
Analysis title
Type here
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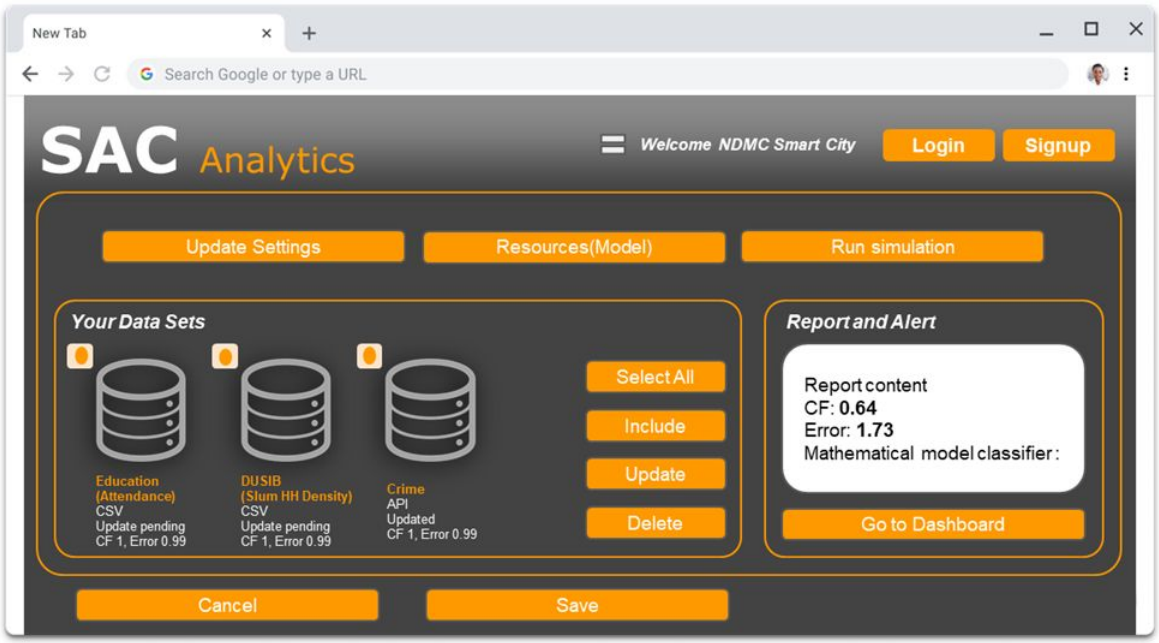
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SAC Analytics
Welcome NDMC Smart City
Login
Signup
Update Settings
Resources(Model)
Run simulation
Your Data Sets
Education (Attendance)
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CF 1, Error 0.99
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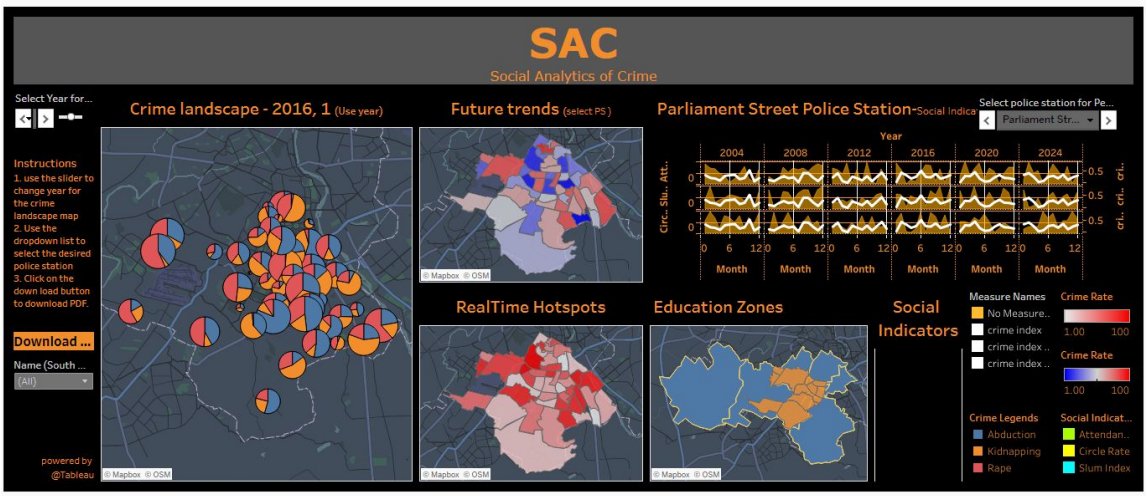
SAC
Social Analytics of Crime
Select Year for...
Crime landscape - 2016, 1 (Use year)
Future trends (select PS)
Parliament Street Police Station-Social Indica
Select police station for Pe...
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Year
2004
2008
2012
2016
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2024
Month
Instructions
1. use the slider to change year for the crime landscape map
2. Use the dropdown list to select the desired police station
3. Click on the down load button to download PDF.
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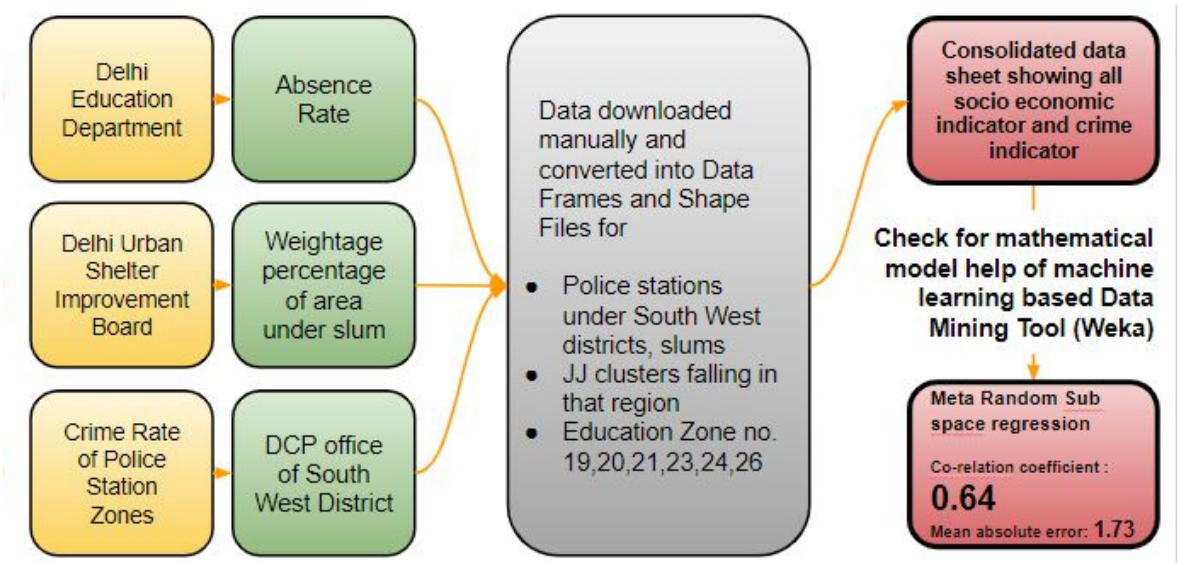
Abduction
Kidnapping
Rape
Social Indicat...
Attendan..
Circle Rate
Slum Index
powered by @Tableau
© Mapbox © OSM

The data from Delhi Urban Shelter Improvement Board (DUSIB), Delhi Police Department - Southwest District, and Education Department of NDMC were collated manually from the online published data sets. The above departments were contacted to get access to their real-time database to be used as indicators for the proposed tool, however, it could not be materialised as envisioned. The team standardized the data set with the help of MS Excel, ArcGIS and My Maps (Google Maps) and created a Master data set which can be fed to the regression modeling tool. An open source machine learning tool called WEKA was used to run regression on the dataset. A mathematical model was generated, which has a Correlation coefficient of 0.64 and a mean root error of 1.7. Team Recon used this model to predict crime rates based on police station jurisdictions and found that every 2 out 3 times the predictions were correct.



Below is the screenshot of the tool showing the predicted crime rate for two police stations of south-west Delhi for October, November, and December of 2019 with absolute error. From this chart, it is evident that the relative ranking of these police stations based on crime rate was correct 2 out of 3 times.

Month	Year	Actual Crime rate per 1 lakh population	Predicted crime rate per 1 lakh population	Absolute Error (%)
Palam village Police Station				
October	2019	11.561	9.205	-20.4
November	2019	2.312	2.2683	-1.9
December	2019	6.937	8.592	23.9
Sagarpur Police Station				
October	2019	23.942	17.645	-26.3
November	2019	14.964	17.645	17.9
December	2019	5.985	9.625	60.8

2/3 times prediction of **Relative Ranking** of **police stations** are accurate

Some major challenges faced during the project piloting phase are: Collecting crime data from Police Department was a challenge as they were not ready to share the data for city governance (Breaking the siloed approach in the given timeframe was difficult), Data standardization on a single administrative boundary was tedious, Delay due to multiple administrative approvals, Reluctance of the NDMC IT Department to assist the team in developing the proposed tool, and Appointment / Onboarding of a Digital Tool Developer.

05. CONCLUSION

Team Recon's project has a purview of vertical as well as horizontal expansion. Currently the project pilot is limited to Crime against Children and few Socio-Economic indicators and has spatial limitations in New Delhi, South Delhi and South West Delhi. This tool can be developed into a predictive modelling tool with the addition of more diverse types of crime, like property crime, crime against women etc. A greater number of socio-economic parameters can be deployed to the regression model to check its relation to crime occurrences. As the project is developed on open source, its source code can be downloaded by other smart cities and hosted on their ICCC unit and build more layers of analytics over the base source code.. This tool has the potential to help law enforcement and urban local bodies tackle the safety issues of the city and break departmental silos. SAC is the only solution to quantize the extent of relationship between socio-economic conditions of urban areas and crime occurrences, hence laying the foundation stone for predictive policing in coherence with the urban lifestyle complexity.

TEAM

Bonam Santosh Kumar

Debaditya Swarnakar

Juhi Sah

Kumar Priyam

MENTORS

Mr. Manish Thakre

Head - Urban Programme and Policy, Save the Children

Dr. Debolina Kundu

Professor, National Institute of Urban Affairs

REVIVE

Dynamic tool to support decision making for urban water management while assuring sustainability and disaster risk reduction

01. CONTEXT

The continued rate of growth in India's urban population has led to increased demand for water, particularly when compared to rural areas. In 2015, about 377 million Indians lived in urban areas and it is projected to hold 590 million by 2030. The drastic urbanisation comes at a huge cost to the fragile environment. Already, according to the National Sample Survey, only 47% of urban households have individual water connections and about 40% to 50% of water is reportedly lost in the distribution system due to various reasons. However, data such as water supply, groundwater, treated water, rainfall, etc. are scattered across various departments. This lack of an integrated urban water sector platform is addressed in our project aimed at helping ULB in making informed choices for water-related urban resilience.

This project is an effort towards driving authentic data-based decision making to avoid grave water problems in future.

02. PROBLEM STATEMENT

With the continued increase in urban water demand, it is estimated that the demand will increase by 80% by the year 2050. The urban demographic imbalance has led to increased demand for water. Apart from the increased demand, climate change has altered the natural seasonal timing and distribution of water; creating uncertainty, especially in parts of South Asia that are densely populated and highly rain-dependent. The UN's special rapporteur on human rights and extreme poverty warned of a 'climate apartheid', with climate change threatening to push more than 120 million people into poverty by 2030.

In recent years, many states in India have been facing water scarcity as well as urban flash floods during extreme rainfalls. As per NITI Aayog's Report made on the basis of CWMI, 21 major cities were predicted to hit Day Zero by the current year i.e. 2020 as a result of lack of water management. Due to COVID-19, there are no updates on the water as the current situation has forced the administration to focus its attention on healthcare.

Viewing India's history, it is indisputable that we have always faced floods and droughts, but with the rising climate change inducing uncertain rainfall patterns and more frequent cyclones; the problem has become more imminent and recurring. As per past events, it is identified that the problem of water scarcity and flooding are interrelated through the common chain being the rainfall. The major water source is rainfall, which if in excess then floods the streets during monsoon season and if not harvested then gives rise to water scarcity throughout the year.

There is an evident lack of high-resolution data sets which would enable us to take methodological actions to solve the root of the problem. Extreme climatic catastrophes of aridity, drought, flooding, cyclones and cloudburst are expected to leave an impact on human society in the long run for an unaccented period.

03. OBJECTIVE

The project's aim is to provide a phase-wise strategy where the end product i.e., the dashboard 'Revive' would function as a decision support system for ULBs in order to make informed decisions and formulate strategies by facilitating the stakeholders with both monitoring and assisting in decision making related to urban water.

The dashboard would have two interfaces, one for ULB and the other for citizens. This would enable ULBs to upload and access data to a single platform and use the reports to make informed decisions for the water sector. For citizens, it contains a segment for awareness and sensitization.

Phase 1 of the project involves;

- Aggregation of water sector data along with other relevant urban cross-sectoral datasets on a single software platform.
- Aid the city stakeholders in decision making related to urban water management by monitoring the water supply, usage, efficiency etc, and identify shortfalls in the region.

Phase 2 of the dashboard involves providing insight into future trends using predictive modelling based on the data fed in.

04. PROJECT STRATEGY

4.1. Pilot City Identification

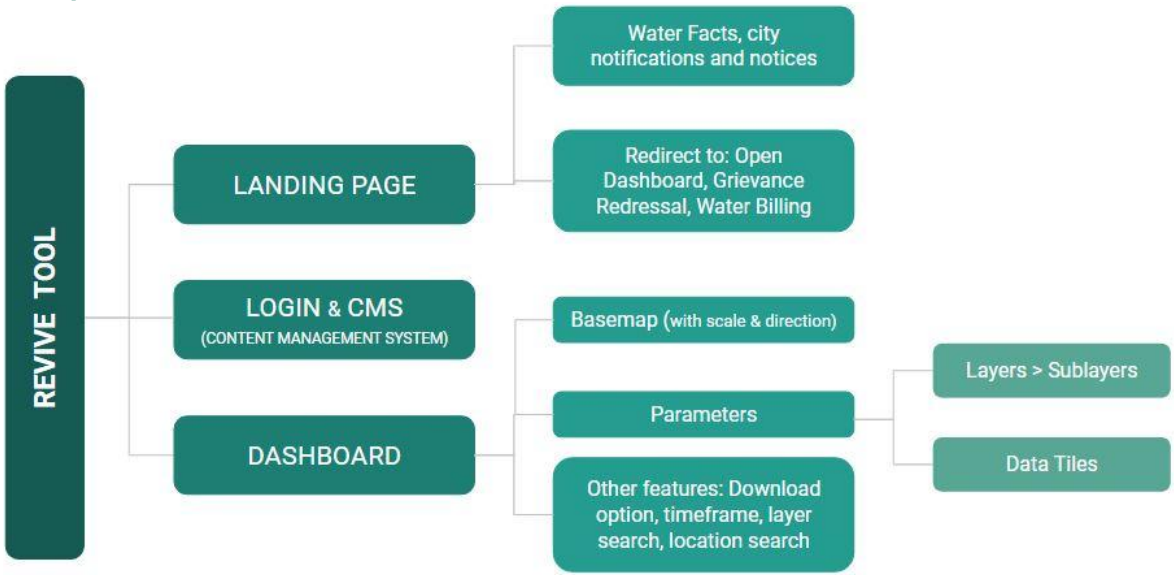
For identification of the pilot city where the project could be executed successfully, the team researched the cities that are facing a grave water crisis already. Out of 100 Smart Cities, 3 Cities i.e. Chandigarh, Pune and Jaipur were shortlisted on the basis of four parameters i.e. Water Infrastructure, Data Availability, Ease of Work and Potential Impact of the Dashboard. For the project pilot, a city that could have most of the ideal conditions for successful execution was chosen i.e. Chandigarh.

Designed on a grid-iron layout, Chandigarh is one of the early planned cities with sectoral land use patterns in post-independent India. Being a planned city it has a well-mapped water supply system, planned stormwater and sewerage network; factors that are critical for the dashboard. The city is also blessed with a rich set of archival data that would help in analysing the trends of various parameters over time. The city has also had limited expansion overtime, helping us to closely control the variables. Chandigarh is a city, district and most importantly a Union Territory enabling an administrative convenience that may not be possible in other cities. Currently, Chandigarh does not face issues such as flooding, severe groundwater depletion, drought, etc. This made it an ideal city in terms of data and variables. Thus, as a piloting project, data availability was prioritised over impact as it was to act as a lighthouse project for other cities to adapt.

4.2. Project Development and Implementation

The project development happened in three major phases such as Pre-Pilot, Pilot and Post-Pilot. The various steps and processes undertaken in each phase are mentioned below.

4.3. Expected Outcomes



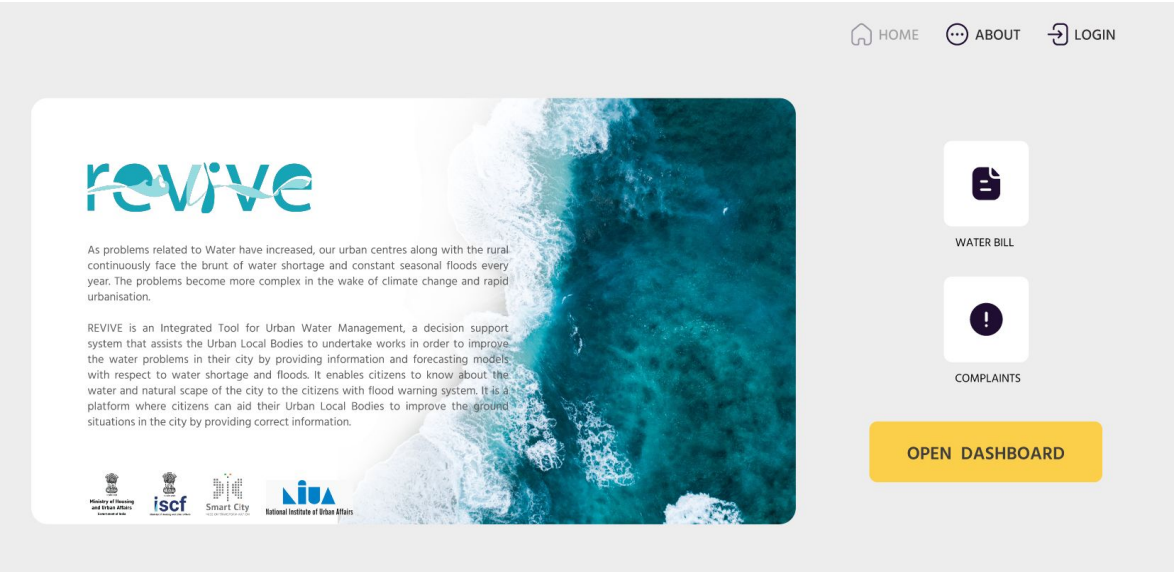
Dashboard components

'Revive' dashboard would have the following outcomes:

- All water and other related sectoral datasets will be present on a single platform
- The existence of such a dashboard will cut down the steps to procure/access data for various works and for different stages of the project.
- The dashboard being dynamic in nature will facilitate real-time updation of data for taking decisions.
- In a situation where datasets are archived manually, initiation of such a system will now encourage archiving of datasets digitally.
- If historical datasets are absent, the initiation of such a system will now encourage archiving of datasets for future use.
- These datasets could be used for more possibilities in future rendering innovations.
- The archived datasets could be used for predictive modelling in the future.

4.4. Actual Result

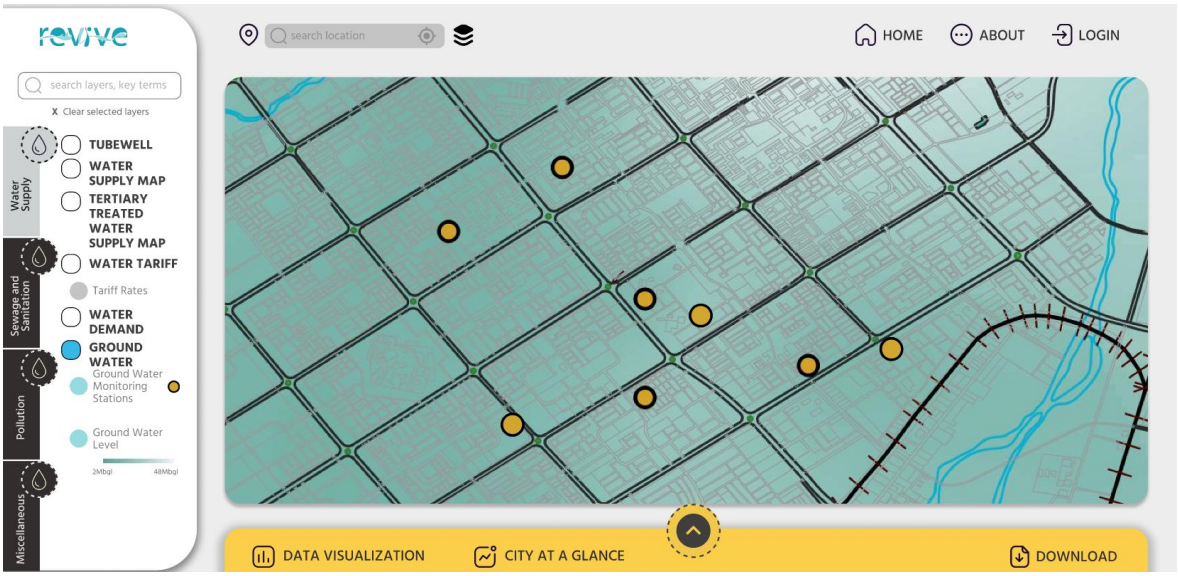
1. Landing Page



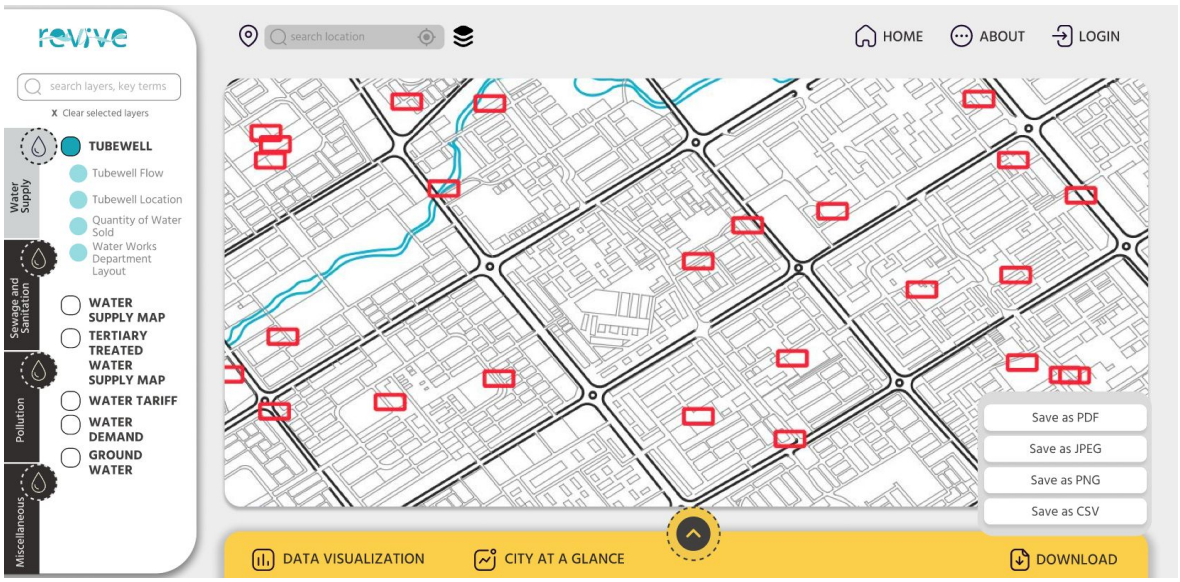
A landing page is where all the target users would start with. For citizens, it would display water-related notifications, redirects to water billing and grievance redressal portals. There is another section which, along with creating awareness regarding the water crisis, would also include DIY water-saving techniques and other practices to reduce wastage. Citizens will have access to a dashboard with limited datasets relevant to their needs. To complete the datasets, ULBs can log in using their credentials.

2. Dashboard

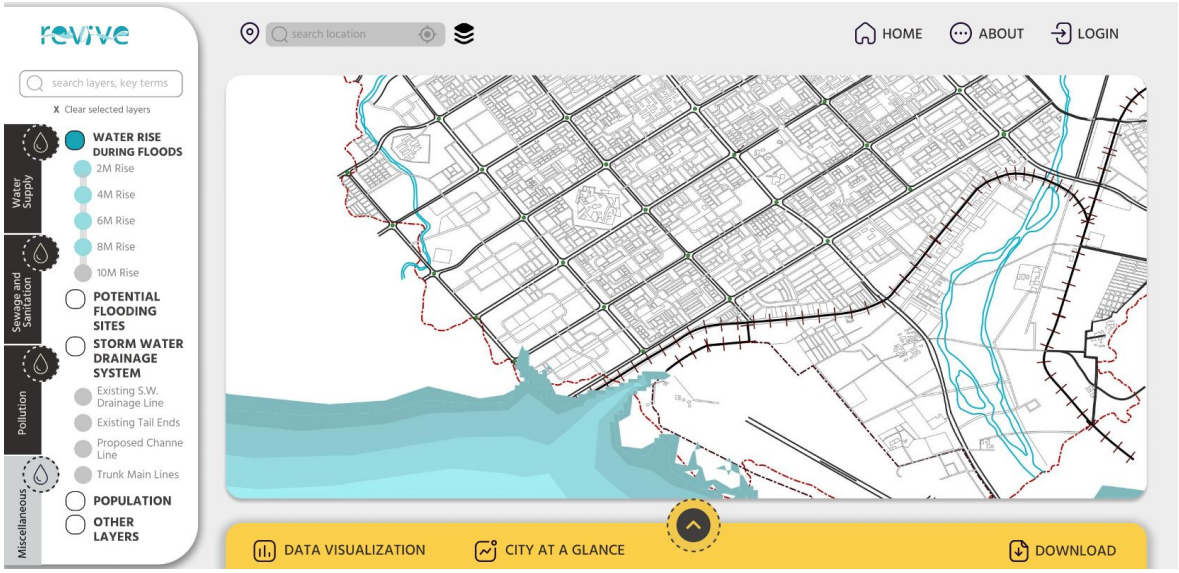
The dashboard will be an integration of all the available data layers in a WebGIS platform enabling ULB to monitor data in a spatial format, assisting in making informed choices on upgradation of infrastructure and policy, identifying shortfalls and improving water productivity



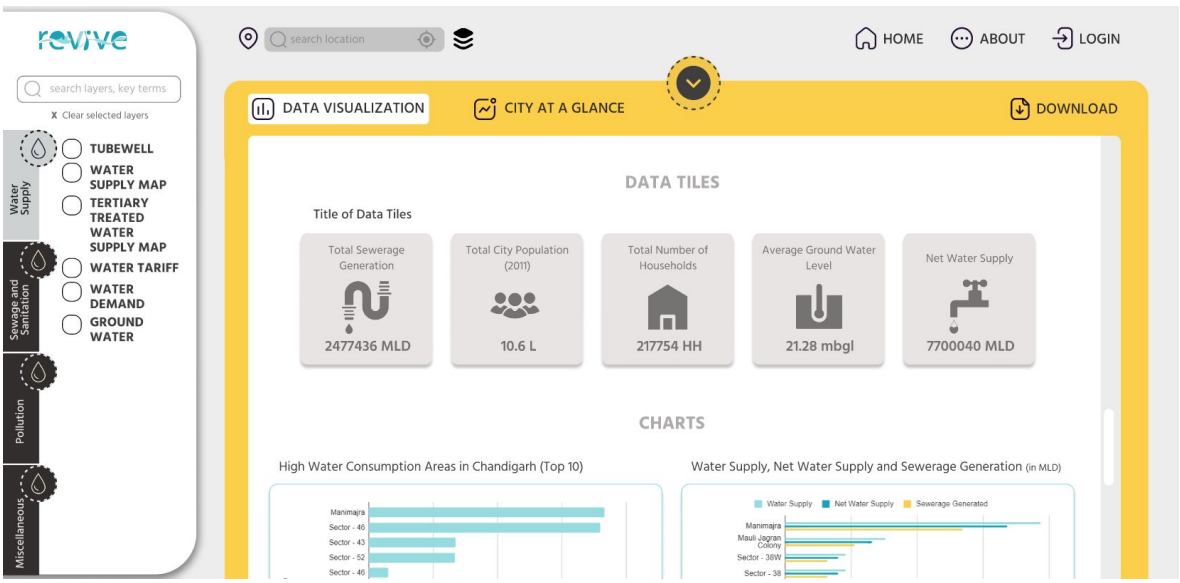
In the layer panel, the datasets are divided under four parameters: Water Supply, Sewage, Sanitation, Pollution, and Miscellaneous. Each parameter further lists multiple layers and sublayers. Users have the option to overlay multiple layers and sublayers by selecting each layer. There is also an option to download the displayed data in multiple image formats as well as pdf.



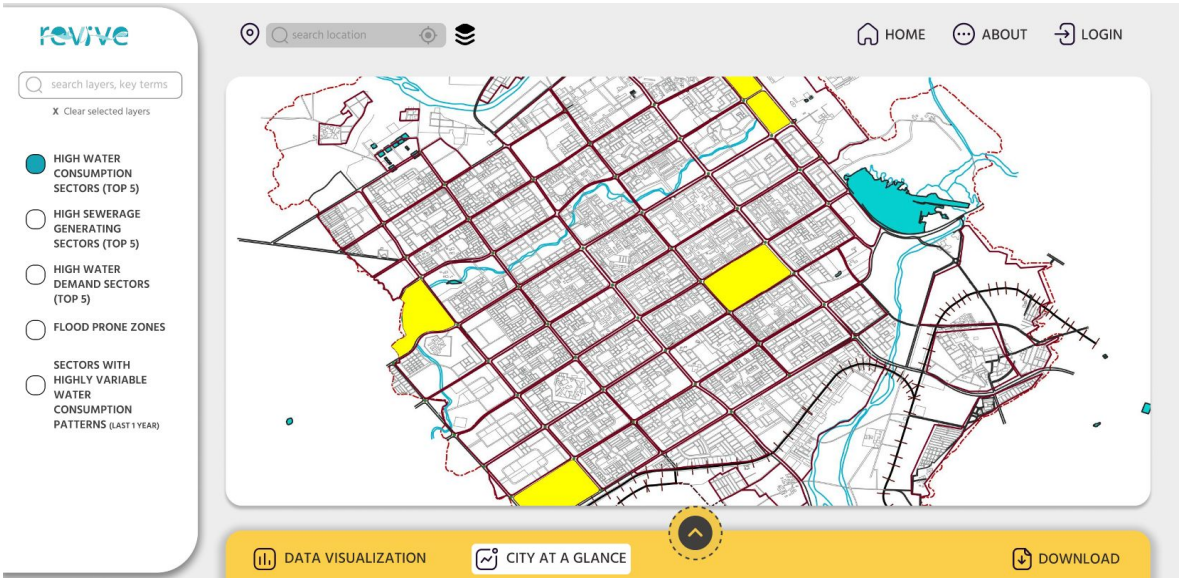
The dashboard also enables ULBs to identify the vulnerable areas of the city using flood simulation. By changing the level of water rise, the dashboard provides a visualization of areas prone to flooding and waterlogging.



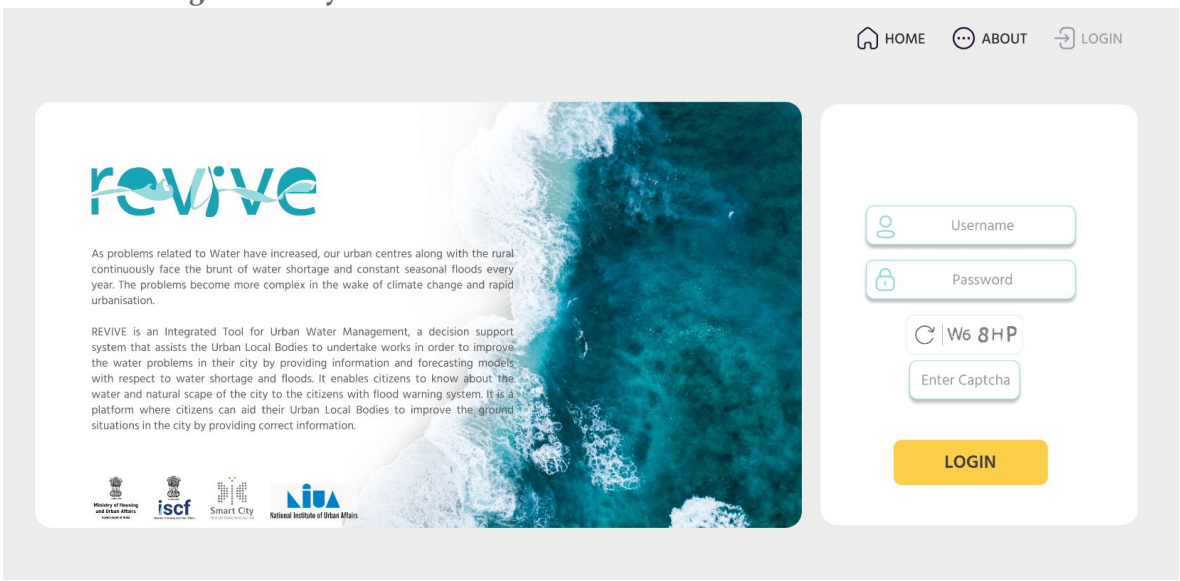
3. Dashboard reports (Data Visualization and City At A Glance):
This section of the dashboard will enable the user to deploy tools, generate reports and visualization based on the data assisting ULB to monitor and plan efficiently. Users will be able to access important statistical figures under 'Data Tiles'. Data Visualization in the form of charts would be dynamic in nature and have a customization option where users can define the timeframe of the data.



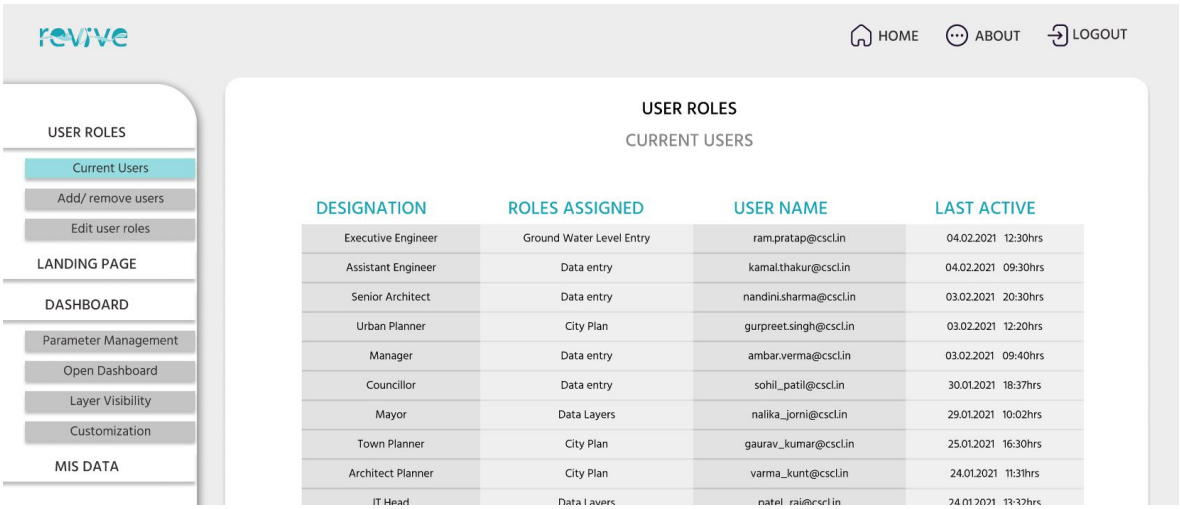
City At A Glance: This section of the dashboard provides the users with a quick report of the city; highlighting top areas or sectors within the city which might require immediate attention based on various parameters.



4. Content Management System:



Users are required to 'log in' in order to access the entire dashboard. The Content Management System (CMS) is designed for ULB to efficiently monitor and update data layers whenever required. This would also enable it to monitor and modify user roles, generate reports, add or modify parameters, approve updates from various users, etc.



05. CONCLUSION

Scalability/ Replicability: Cities rely on water-related data to improve water infrastructure and monitor efficiency. Being developed on an open-source platform, any city would be able to replicate and execute the tool with varying parameters and quality of data. Revive Tool can be implemented in pan-India with a provision to incorporate certain site-specific methodology adaptations of parameters based on regional systems, needs and aspirations. Such a tool could when implemented Pan India could help the Ministry to monitor unconventional parameters such as water productivity, water-use efficiency, crop water demand, drinking water supply rates, quality of supply, health indicators and environmental impacts that could assist in the development of improved 'Composite Water Management Index' (CWMI).
Way forward: Extensions: Flood modelling for mitigation planning, tapping alternate water resources, real-time monitoring using smart water systems, urban growth prediction, and assisting in the planning of Eco-DRR Infrastructure for the region

TEAM


Abby Varghese


Gaurang Patel


Monica Thakur


Subarna Sadhu

MENTORS

VK Chaurasia
Joint Advisor, Central Public Health and Environmental Engineering Organisation

Victor Shinde
Sector Coordinator for Water and Environment, National Institute of Urban Affairs

SAKSHAM

To map the Socio-Emotional Learning Levels of young adults and develop a City Ranking Index based on outcomes as comparatives to the rest of the educational and urban landscape.

01. CONTEXT

When we focus on improving the quality of education the primary goal is to have a student who has developed rationality, knows about his/her surroundings (knowledge), and imbibes human values which are very important for holistic development. To attain the same in the current school system we have initiatives related to improving school infrastructure, teaching pedagogy, teacher training, and curriculum. But till date, the quality of education in our country is debatable and one of the many pressing urban issues.

The National Education Policy 2020 focuses on the importance of Social Emotional Learning (SEL) by stating that, "Teachers will also focus on socio-emotional learning - a critical aspect of any student's holistic development". In the fast-changing and diverse world, social and emotional skills are becoming integral to living a happy life. The shift to urban environments and adaptation of new-norms after covid scenario means people need to engage with new ways of thinking, communicating and working. The diverse population and the suddenly imposed dismantling of traditional social networks, place additional emphasis on people's sense of trust, co-operation, and compassion.

In this context, social and emotional skills determine how well people adjust to their environment and their ability to make rational decisions. The development of these skills is important not only for the well-being of individuals but also for the society as a whole. The increasing ideological polarisation and social tensions call for the ability of citizens to adapt, respect each other and take personal and collective responsibility to attain a well-functioning society.

02. PROBLEM STATEMENT

Indian schools are over-run by standard-based testing and hence their focus on developing socio-emotional skills is limited to a teacher's self-efforts for students. Teachers generally tend to get less time to focus on imparting socio-emotional skills to students. Despite the importance of SEL as stressed by the NEP, the measures taken in India are scarce. Due to which SEL is misunderstood as only related to the identification of emotions among students whereas it is more of a skill development initiative. To validate the importance of SEL, it is important to measure the same for a period of time which will help understand "where a student is" and "where they ought to be".

This will highlight the individual needs of students and how enabling the learning environment towards developing their skills can help them. The CASEL study suggests that early identification of problems can be dealt with informed interventions, which would lead to a reduction in conduct problems, fewer outbreaks due to emotional distress, and overall enhanced academic performance (CASEL - CASEL).

Measurement of the socio-emotional learning level of students at the city level is missing as the identification or measurement done is often limited to various initiatives of NGOs such as Sattva and Child Fund India in India. This requires a city-level intervention that will help in enhancing the outcomes of students and thereby of a city in cumulation as well.

03. OBJECTIVE

The objective of the project is to develop a toolkit that can map the socio-emotional levels of the student and in the long term, outcomes can also be mapped as comparatives to the rest of the educational and urban landscape of the city.

1. SELO will help schools in identifying and mapping their performance on SEL parameters with the rest of the schools in the city, which will help them in achieving an increased demand for that school.
2. SELO will aid in improving learning outcomes and in the long term lead them towards achieving better employment opportunities for students as the required skills will be obtained from the school level itself.
3. SELO will help teachers identify each student's needs in less time and adopt informed pedagogy.
4. SELO will act as a predictive tool for the administration, as the tool will co-relate students' input with the safety and security parameters of the urban area. The education department can specifically identify schools performing best at the district level.
5. For the economy, results from SELO will create an ecosystem and market for socio-emotional learning in the city.

04. PROJECT STRATEGY

4.1. Pilot City Identification

Pune, Maharashtra has been identified as the pilot city for the project. The following are the reasons for the same:

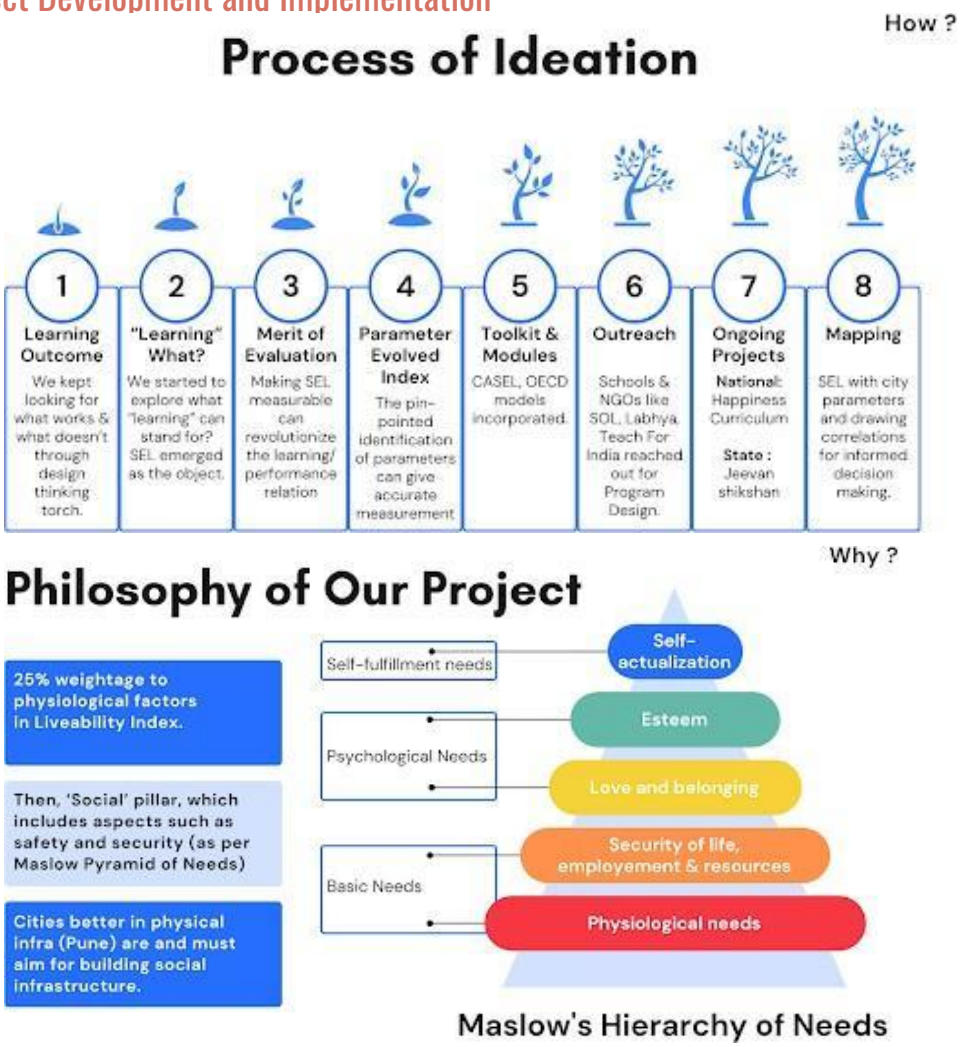
Historical Context: Pune had early reformers in education like Savitri Bai. She did eminent work in the field of education by running three schools in Pune by the end of 1851 for teaching girls. Savitri Bai along with Jyotirao opened 18 schools for teaching children from different castes.

Presence of credible non-governmental organizations: Pune City Connect (PCC) is working with Pune Municipal Corporation schools on quality education and specifically, on social and emotional learning, a program known as Jeevan Shikshan and their relentless efforts to improve quality of education as also Teach for India trying to bridge the gap of accessibility and quality of education too.

Digital Penetration: Shikshak Sahyogi worked on the creation of online content, which was a necessity during covid times.

Pune is known as "Oxford of the East": Pune has a rich legacy in education historically and through the establishment of the University of Pune (then known as the University of Poona) in 1949. Pune has many different kinds of educational institutes and colleges.

4.2. Project Development and Implementation



4.3. Expected Outcomes

The SELO website, at this point of time is ready for data collection. We have testing modules and authenticated logins fed into the system which can make the login simple for students. Secondly, a sub-domain has been created for teachers where they can register on the circulated URL (hence targeted user and no junk data), thus making the second step authentication available to the platform.

Once the website starts fetching in dynamic data system generated algorithm will start analysis and the SELO score of students and schools can be calculated. The analysis will be henceforth represented areawise and the dashboard will keep updating itself.

4.4. Actual Result

The scalability and replicability potential of the website lies in the standards followed in its development. Since OECD and CASEL frameworks have been followed, the standards set globally can be adopted for any local or regional evaluation.

The parameters defined, are city, class and culture neutral. However, the modules can be adapted as per the cognition level of students which will require a basic level of contextualization.

Thirdly, the Management Information System (MIS) developed in the process in the form of frameworks, neurological assessments and pilot structure can also be replicated at any scale, merely with quantitative variance. The qualitative variables set in place will function as they are at any scale.

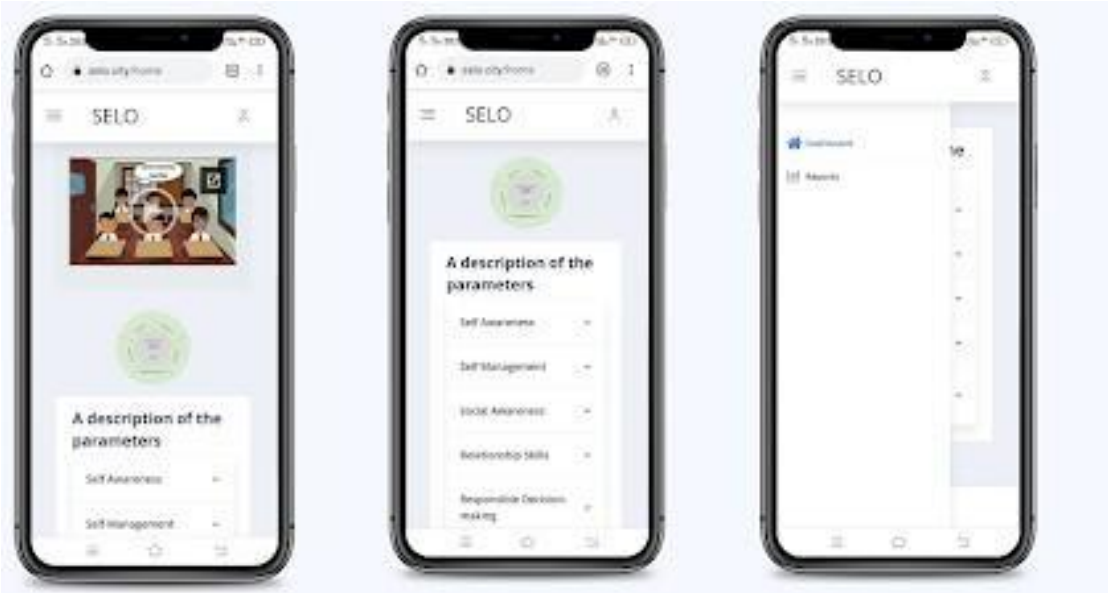


Fig 1. selo.city screenshot 1: The home page of selo city showcasing the informative video on Socio-emotional learning, description of modules, defined parameters, login for students, teachers, administration and dashboard where analysis of schools, ranking of schools, cities and finally build on of a city level index of India on Socio-Emotional Learning Outcomes displays information and inter alia.

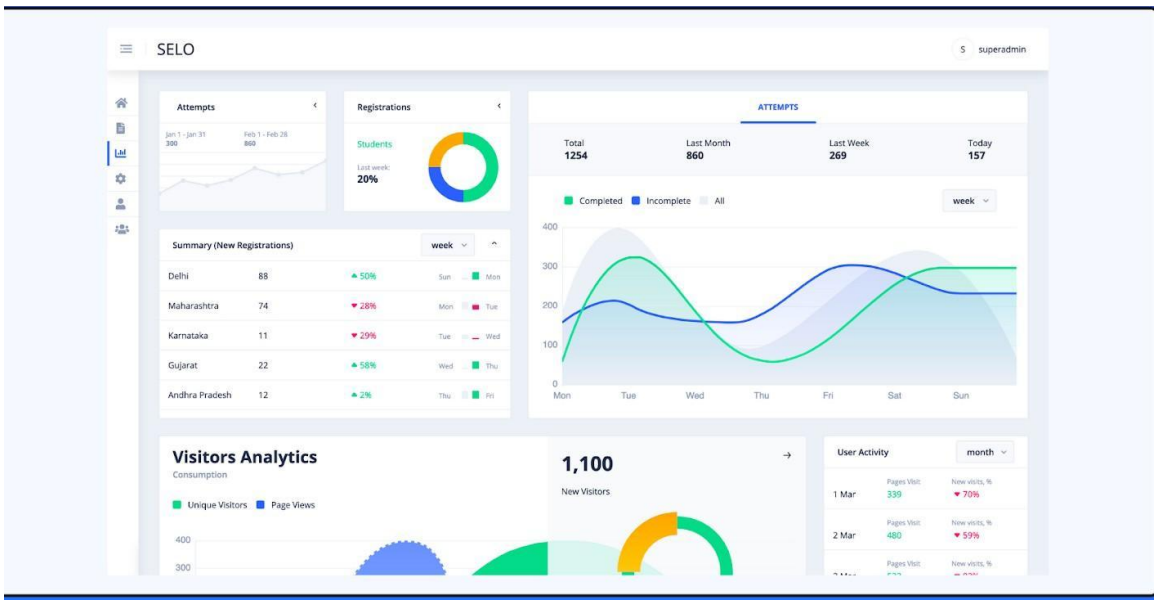
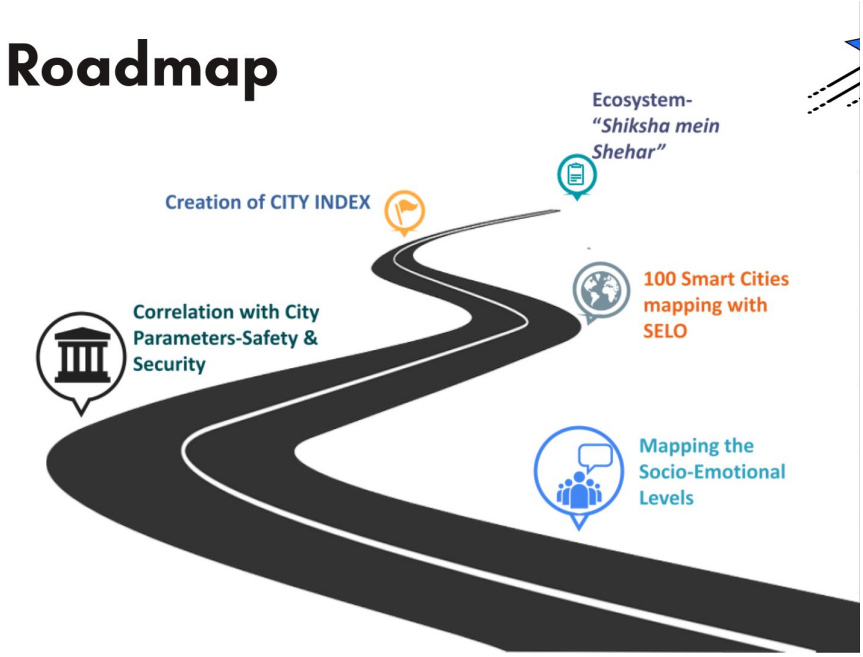


Fig 2. selo city screenshot of the bottom section of selo.city port tabs. The report tabs will further have the modules and analyzed test results, as made available publicly.

05. CONCLUSION

SELO will act as a new marker for assessing schools in cities fulfilling a data collection app on the same level. The app will assist in the dissemination of information on Socio-Emotional Learnings, creating an ecosystem, a predictive model aligning with city parameters like Safety and Security, Greenness Index, Air quality correlating with outcomes of SEL at an individual level, school level, city level and subsequently a comprehensive '**City Index**'.



TEAM


Abhisikha Das


Anupama Bhardwaj


Zara Hasnain

MENTORS

Shuvajit Payne

Head of Education Department
Barefoot College

Dr. Debolina Kundu

Professor, National Institute of Urban Affairs, New Delhi

STRIDE

Promoting Active Mobility through Evidence-based Decision-making & Participatory Design

01. CONTEXT

India's urban population is expected to grow from 410 million in 2014 to 814 million by 2050, and by 2030, half of the country will be living in cities, whose numbers will also significantly grow. The country is expected to add 4 new megacities by the end of this decade. However, the mobility infrastructure has not kept pace with the demand due to the country's growing wealth and population over the last few decades. In today's times, India's GDP per capita has seen a hike of over 5 times and the transport demand has increased by almost 8 times since 1980.

This growth and the associated transport demand are much higher than other Asian counterparts. The absence of a widespread and integrated transport system has caused a rapid spike in private car ownership in India. The number of registered motor vehicles has gone up to 40 times, from 5.4 million in 1981 to 210 million in 2015. The growing demand and the lack of sustainable mobility options are straining the existing resources and putting an additional burden on the cities, resulting in more pollution and congestion. Therefore, it is crucial to address these surmounting challenges in the Indian transport system and accentuate sustainable and green mobility options, such as the Non-Motorised Transport (NMT).

Non-motorised Transport mainly includes walking, cycling and cycle-rickshaws. All of these are green modes of transport and don't have any carbon emissions. They are also affordable and have many health benefits. However, despite being a key element in the transport system, NMT has often been neglected and taken as an afterthought while developing transport infrastructure in Indian cities.

02. PROBLEM STATEMENT

Non-motorised transport is a prime constituent of green mobility but is vastly undermined as a viable commute option, owing to lack of safety, inclusivity and accessibility. It is observed that the majority of commuters in an urban context are carried out via rapid urban transit modes. These concerns need immediate attention, especially in the post-COVID future. Due to the ongoing COVID-19 crisis, the need for personal means of mobility is expected to see a substantial rise as people invest in cars to keep themselves and their families safe. Post-lockdown, the new normal in Indian cities will demand contact-free walking and cycling to cut unnecessary travel to reduce pressure on already stressed public transport systems.

Indian cities witness the absence of a database for evidence-based and scientific analysis and management of urban transport, specifically non-motorised transport. This hampers effective and informed decision making and constrains the ability to create reliable mobility plans.

The share of walking and cycling in Indian cities was 40-60% in 1980 but now it has been reduced to 40-50%, which is still higher than just a quarter of trips made on personal motor vehicles. Overall, owing to a dearth of safety and infrastructure, pedestrians and cyclists accounted for 17.4% of the total road fatalities on Indian roads.

03. OBJECTIVE

The project intends to develop a decision support and citizen engagement system for monitoring non-motorized transport and street design scenarios and engaging citizens to promote walking and cycling in Chennai.

Piloted in Chennai Smart City, the project objectives are to:

01. **Aggregate and visualise city-wide supply and demand data** for non-motorised transport under a single platform to create a repository.
02. Leverage the data to aid the ULBs obtain updated NMT-related insights and make **informed decisions.**
03. Leverage the data to **aid the citizens access the NMT services and amenities** and provide their **feedback** to inform the decision making process.
04. Create a **communication** channel between the **government and citizens** for improved development outcomes for NMT and public space sector.

04. PROJECT STRATEGY

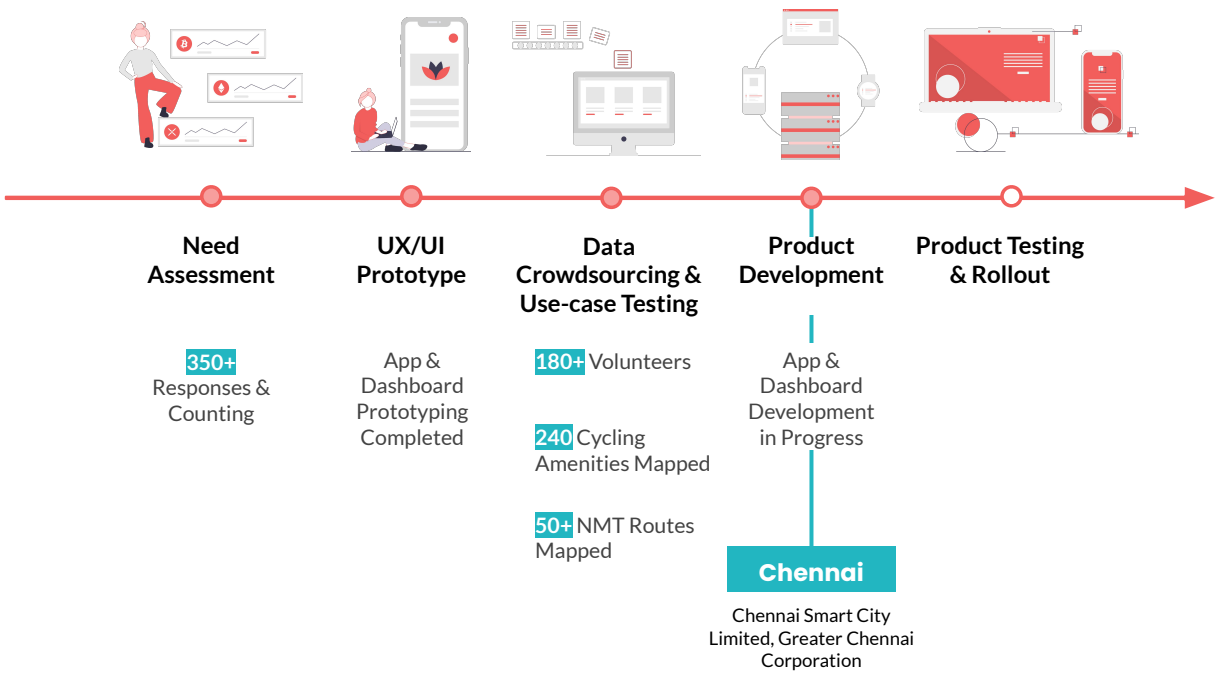
4.1. Pilot City Identification

The priority list for the pilot city has been identified based on a systematic process of city selection through various parameters, which are categorised into 0+3 stages. Each of the 100 smart cities went under a shortlisting procedure wherein the cities were assigned a score based on the parameters fulfilled in each of the stages. Stage 0 was an elimination round, within which only cities that were equipped with a comprehensive mobility plan were shortlisted. Stage I, Stage II and Stage III parameters are as follows:

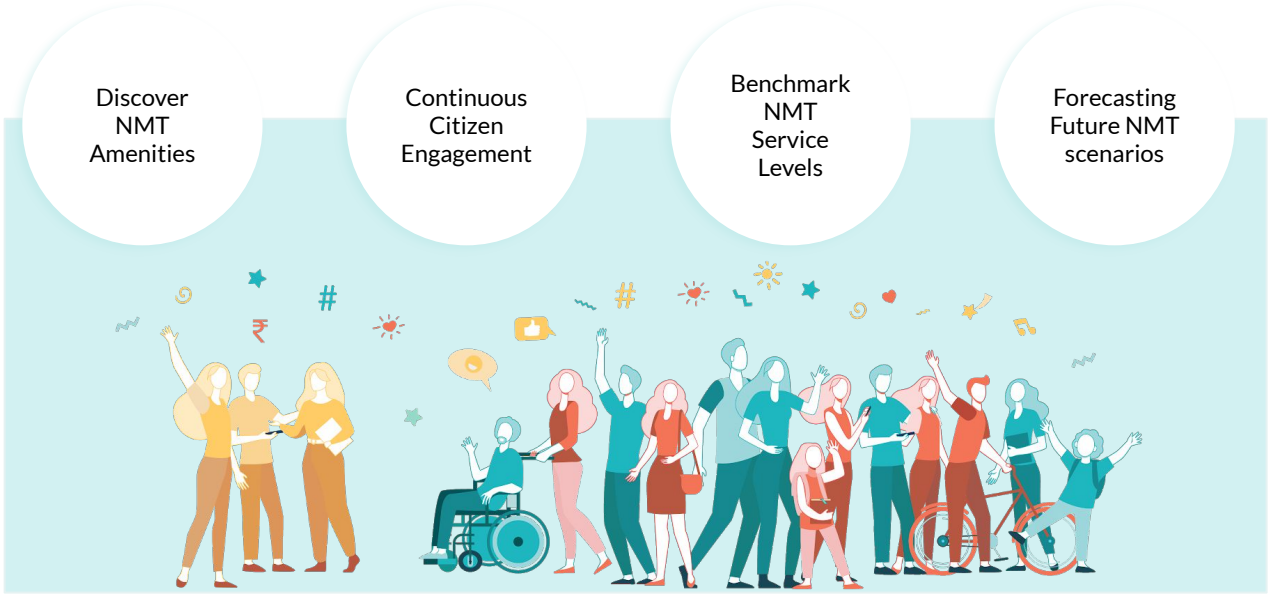
Stage I Parameters - 42 cities	Stage II Parameters - 13 cities	Stage III Parameters – 7 cities
1.Comprehensive Mobility Plan 2.NMT Plan / Policy 3.Smart City Ranking 4.City Aspirations 5.Flagship Projects 6.Bicycle Mayor	1.Mobility Data 2.Core NMT Infrastructure 3.Infrastructure Support	1.Urban Fabric and Compactness 2.Availability of Data 3.Town Vending Committee 4.Organisations/ Think Tanks 5.Cycles4Change Challenge

Based on these parameters, **Chennai** was identified as the pilot city.

4.2. Project Development and Implementation



4.3. Expected Outcomes



The Expected Project Outcomes are:

1. Higher discoverability of NMT amenities and services
The project gathers rare data on amenities, such as cycling rentals, repair and retail units, and good walking and cycling routes and displays this information on the app.

2. Continuous citizen engagement for improved outcomes
The project crowdsources rare NMT data through campaigns. Further, the app's digital public consultations feature also enables citizen engagement.

3. Ascertaining NMT service-levels and forecasting future NMT scenarios
A decision-support system is developed to aggregate, visualise and generate insights from the NMT data via various government, private and citizen sources

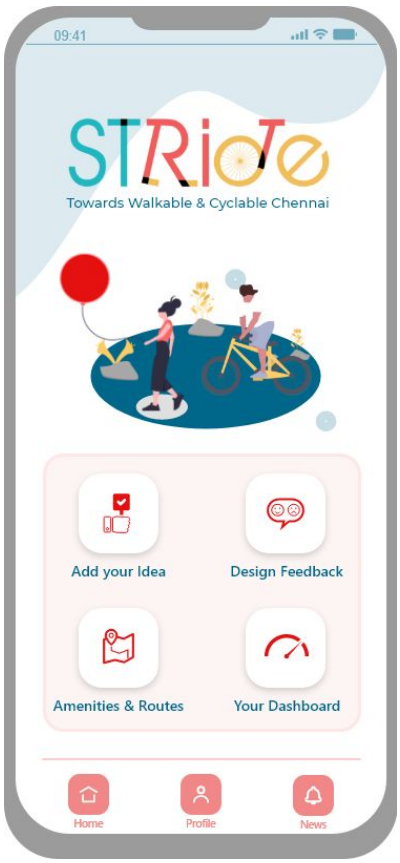
4.4. Actual Result

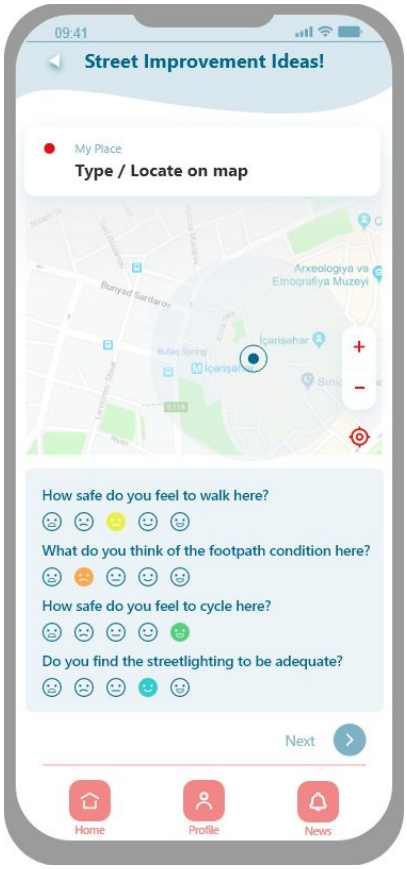
The proposed solution is in the form of:

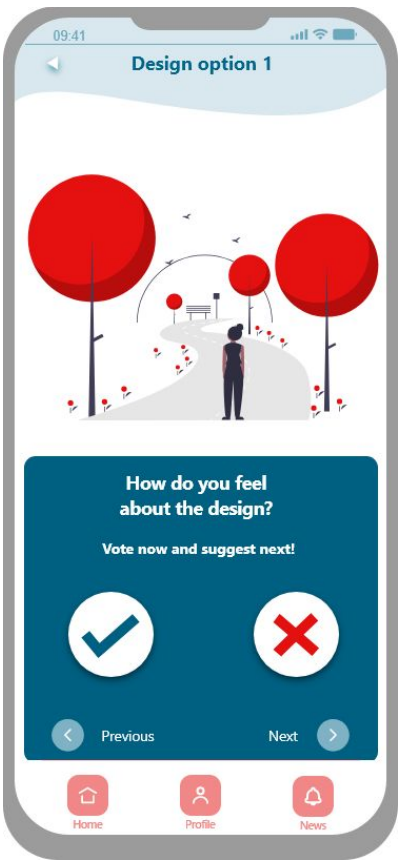
An app for citizen consultation (especially for the upcoming Mega Streets project in Chennai) and NMT services. The app will be plugged in with the city's existing Namma Chennai app. Later on, it can be scaled up as an independent app as well.

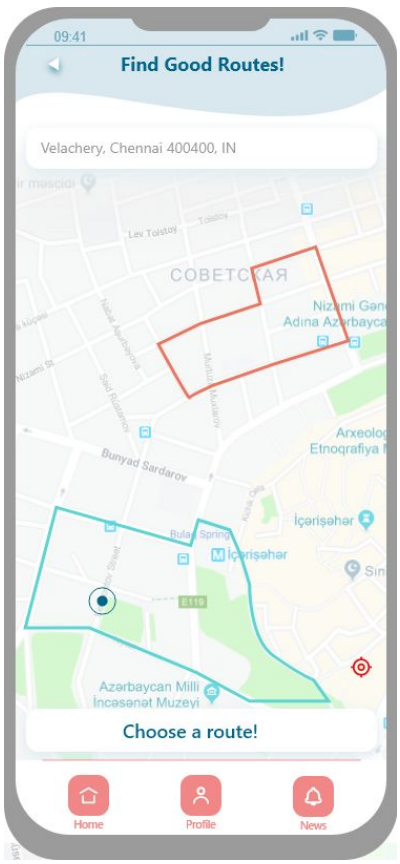
A decision-support dashboard for ULBs to benchmark NMT services and capture citizens' ideas. The dashboard will be hosted at the Integrated Command and Control Centre of Greater Chennai Corporation.

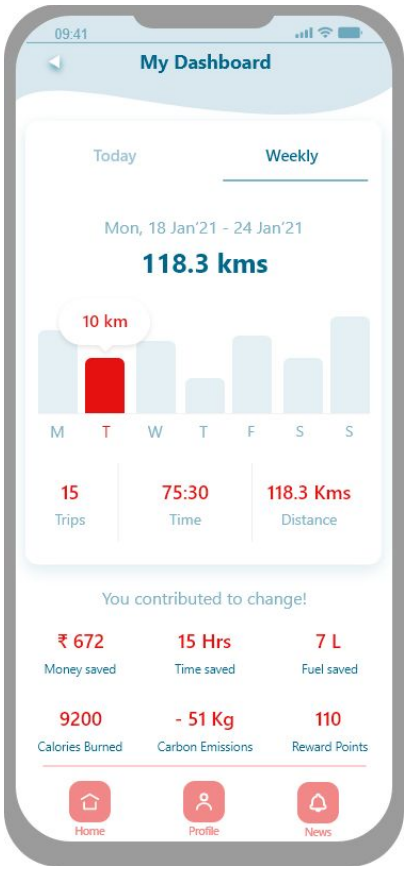
Stride Platform in Namma Chennai App



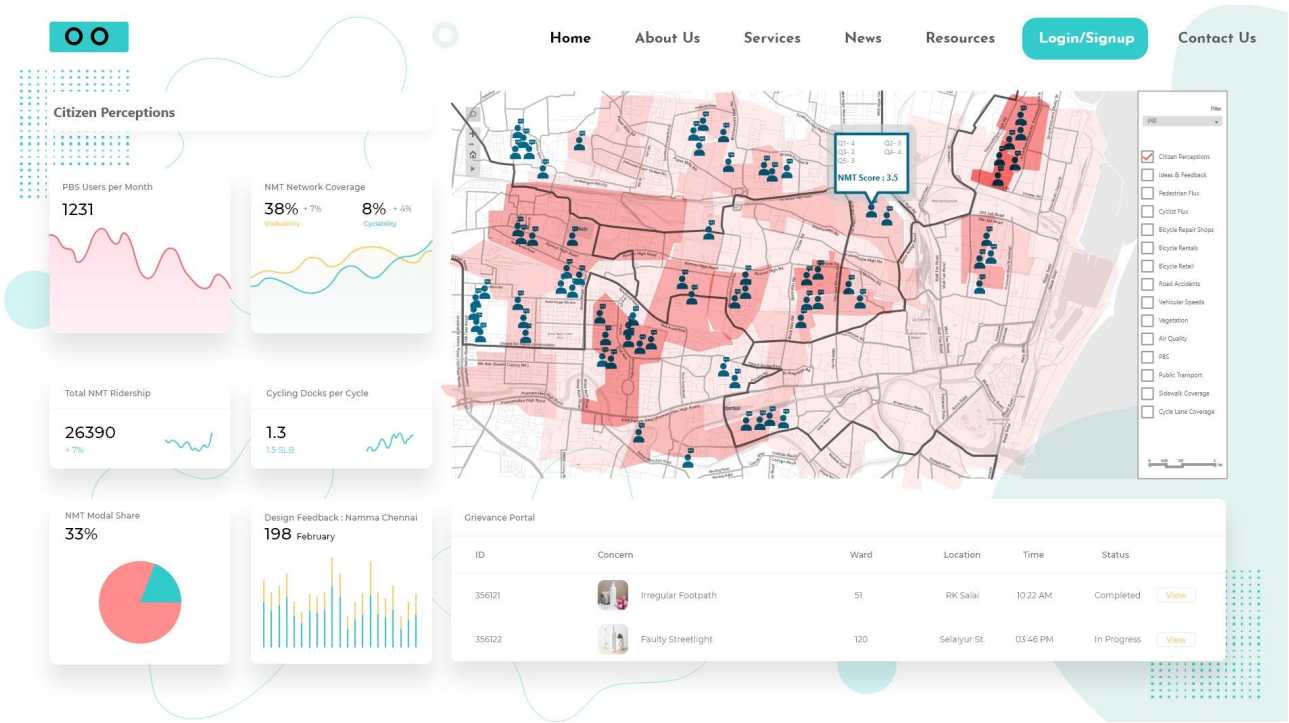




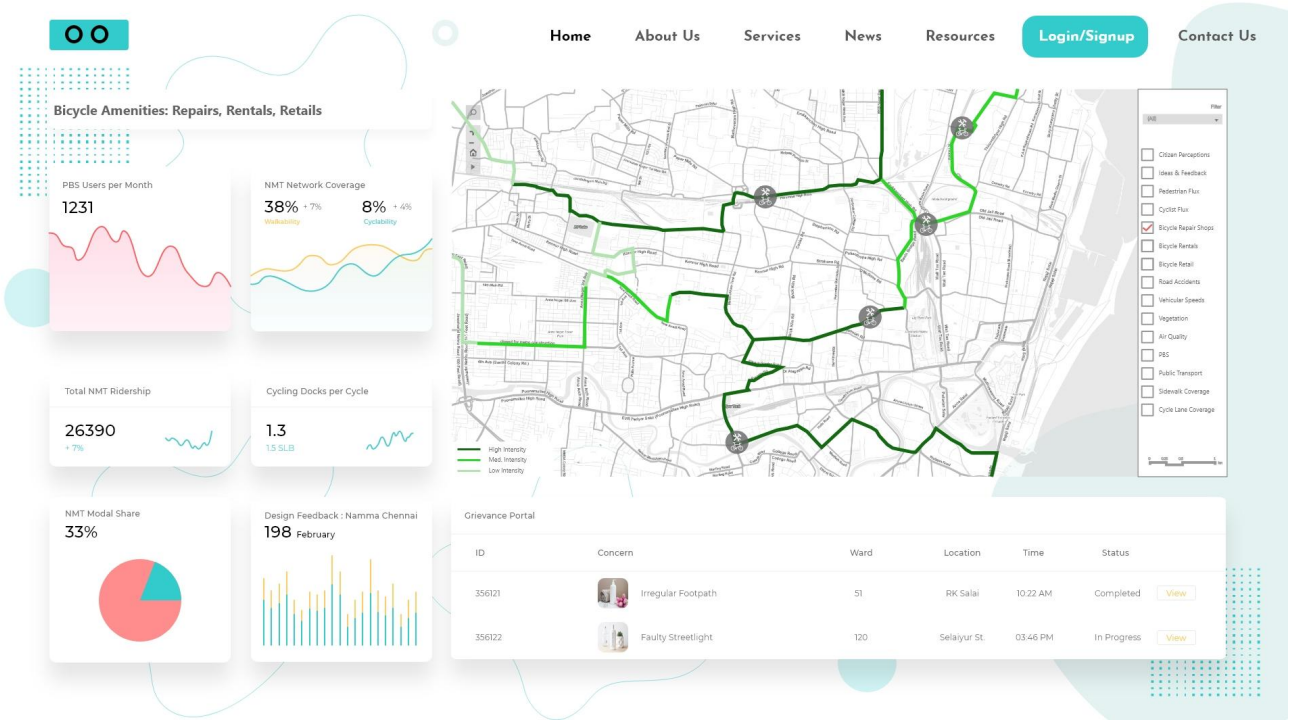




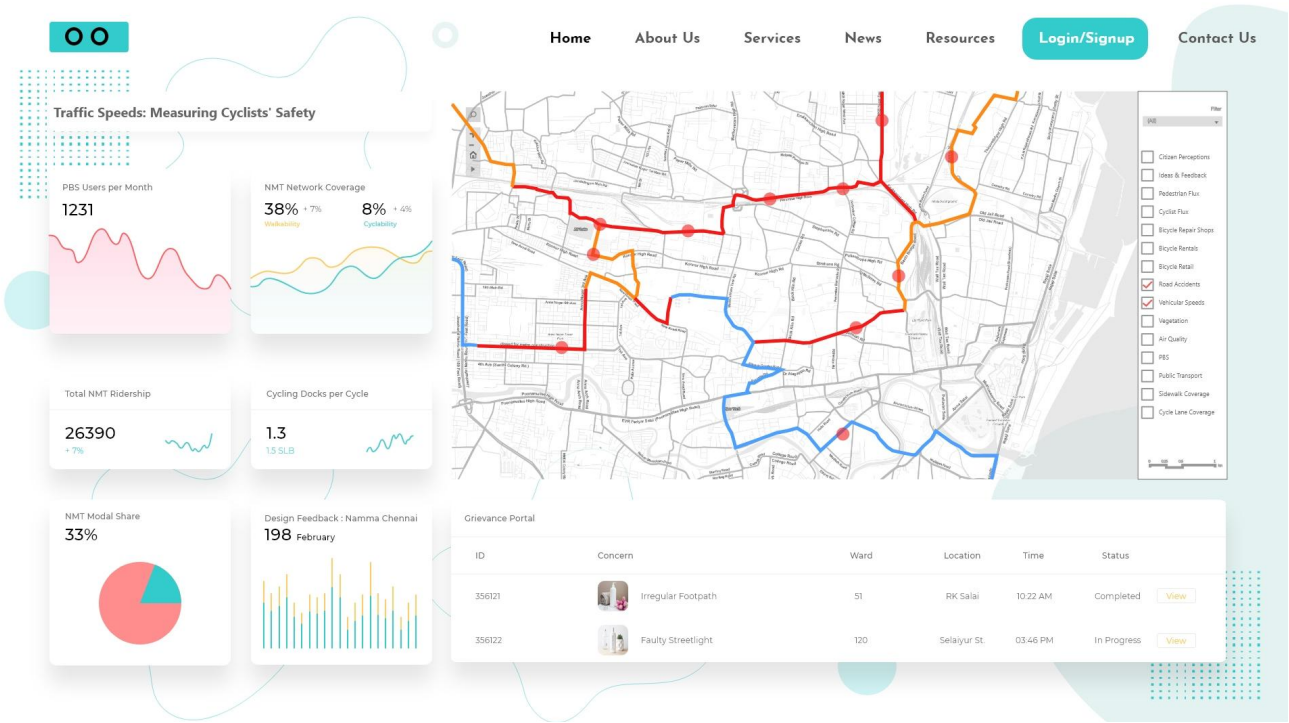
Decision-support Dashboard: Citizens' perceptions related to NMT and Streets



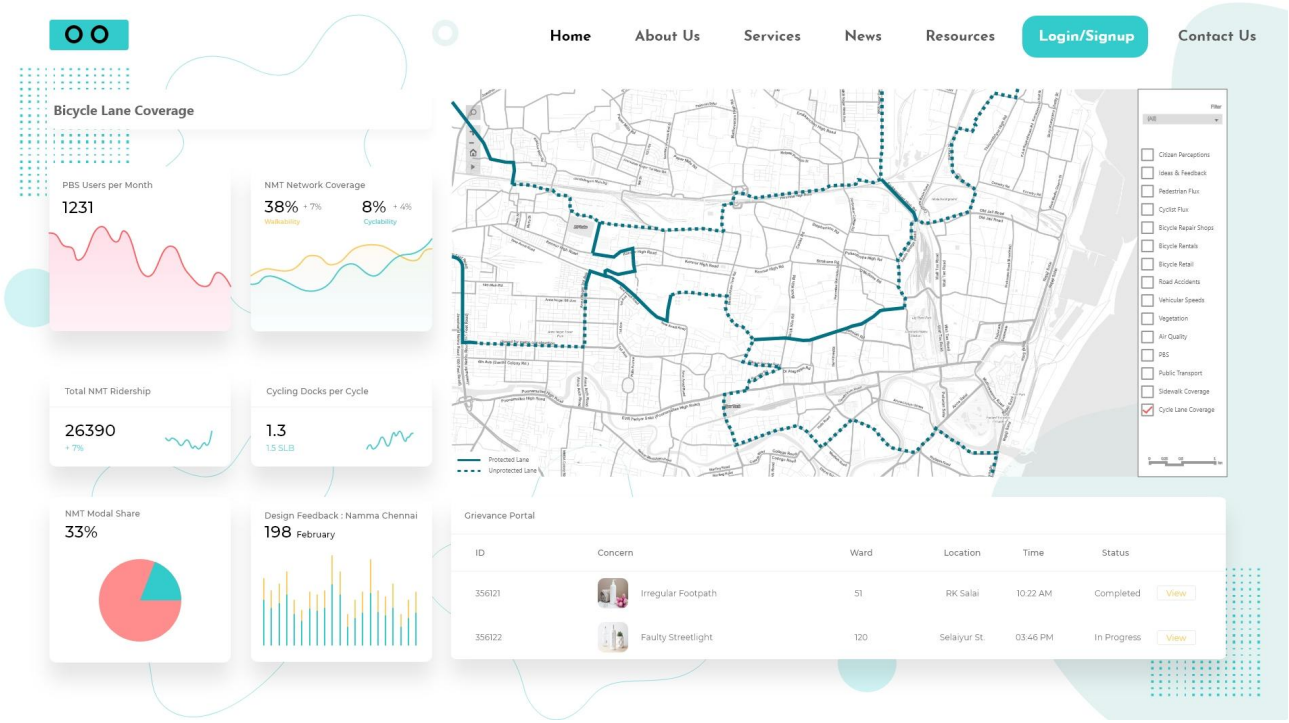
Decision-support Dashboard: Cyclists' intensity and cycling amenities



Decision-support Dashboard: Real-time traffic volume and accident points



Decision-support Dashboard: Cycle lane coverage



05. CONCLUSION

The tool was conceptualised to aid the decision making process through engaging with the citizens. The outcomes of the project in the form of the app and the dashboard will work together to close the feedback loop between the citizens and the government. The app has been developed using crowdsource data and its simple yet intuitive features are envisioned to be tested in flagship projects such as the Mega Streets project in Chennai. The app-based public consultations are a one-of-its-kind idea and can be replicated across any city and scaled-up in any other sector as well. All in all, the app and the dashboard together make a 'decision-support and engagement system' for the city of Chennai to promote and enable NMT. Stride has been well received by a number of national and international organisations. Stride had been shortlisted in Well-being Cities Awards 2021 and the World Bank Youth Summit 2021. Additionally, the team is due to represent Stride internationally in a panel discussion at the Velo-city conference 2021, Lisboa. All these accolades have helped the project in outreach and recognition, which is crucial for better outcomes.

TEAM

Akshaya Kudale

Srinidhi Ravishankar

Syed Mohammad Hamza Abdullah

MENTORS

Aswathy Dilip

Senior Programme Manager, ITDP India Programme

Sarika Chakravarty

Sector Coordinator, NIUA

UMEED

To enable registration and enumeration of migrant workers in the city of Surat for the provisioning of services and entitlements through the urban local body

01. CONTEXT

Migrants have always been perceived as a burden and threat to the host cities and communities, overlooking the developmental benefits associated with their movement. As a consequence of these negative images and the lack of inclusive governance, migrants face multiple challenges such as accessibility to affordable housing, amenities, entitlements, exploitative working conditions, labour market discriminations, to name a few. One of the biggest challenges is to reverse this hostility trend towards migrants and build a narrative based on the positive reality of migration.

These issues possibly arise due to the lack of identity in the destination cities. The right to freedom of movement is constitutionally protected, but it does not guarantee access to entitlements, voting rights in local, state, and national elections, or even access to government schemes. Lack of political will, acknowledgment, and policy gaps in the existing governance system has led to their invisibility in the cities. The existing framework for their protection is being poorly implemented and underestimates the scale of the issue.

Considering the above challenges and opportunities, team UMEED (Urban Migrant Enumeration for Equity through Data) has worked with Surat Smart City Development Limited and Surat Municipal Corporation to design an end-to-end process for registration and enumeration of migrant data in the cities while also provisioning schemes and services for the migrants thus making the city more inclusive.

02. PROBLEM STATEMENT

The COVID-19 outbreak exposed deep societal inequalities across the world. Populations bereft of their daily wage and secure tenements were forced to undertake arduous journeys back to their villages in the wake of the lockdown and the fear of the 'rich man's disease'. India saw one of the largest movements, stemming from its exclusionary policies, which emphasized the urgent need to relook at the gaps in governance of migrant workers in the country. In response, a series of economic policies were announced, and various schemes were drafted by different states to assist the return of migrants, all working, albeit in silos.

Between 2011 and 2016, 9 million people migrated annually between states in India, contributing roughly 10% to the GDP. Despite their contribution, migrant workers remain outside the purview of governance in the city. Due to lack of political will and unavailability of data on migration, migrants do not have access to even basic services including housing tenure, food and fuel, healthcare, sanitation facilities, childcare, and creches amongst others making them heavily dependent on their contractors ('Thekedaars' or Dalals').

Keeping this as the base, this project will address the problem of lack of data on migrants by incentivizing self-registration through a mobile application. This exercise of self-registration will assist the migrants to orient themselves to the new environment in the city and gain access to services while ensuring better service provisioning by the urban local bodies due to the availability of data.

03. OBJECTIVE

This project aims to facilitate the Smart Cities Mission vision of developing inclusive cities. Through a data-led approach, it hopes to enable the migrant workers and ULBs to form a mutually beneficial bond where migrants can access their right to the city and the ULBs can make informed decisions to better govern the marginalized migrant worker population. To achieve its broader vision of exercising the migrants right to the city, this project aims to achieve two types of objectives - short term (to be achieved within the tenure of the fellowship) and long term.

Short-Term

To design an end-to-end mechanism for migrant worker enumeration and build a city-specific application with the help of the framework to connect service agencies, the ULB, and migrant workers.

Long-term

Bridge the gap between local governance and the migrant workers by highlighting their importance to the city economy through data and build a centralized database for more effective outreach of migrant-centric or unorganized sector centric schemes or initiatives.

04. PROJECT STRATEGY

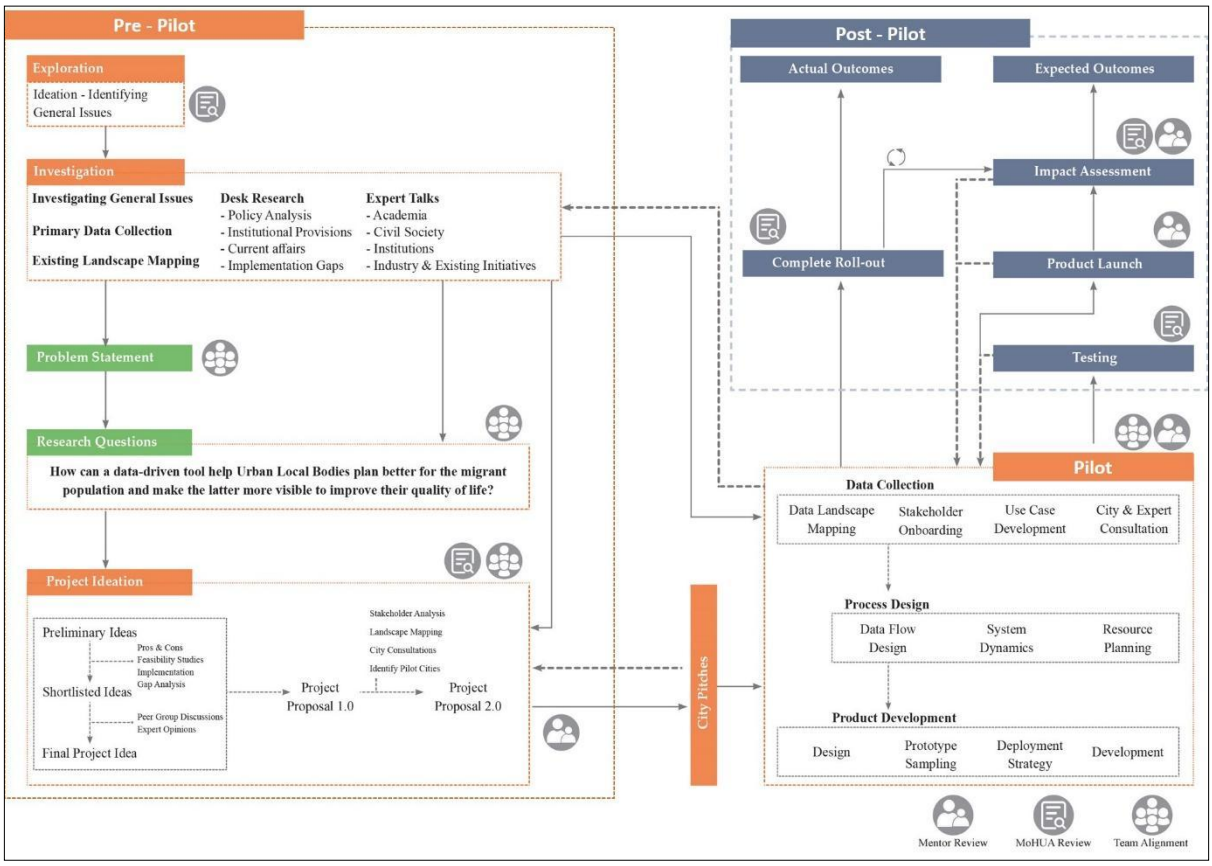
4.1. Pilot City Identification

The process to identify the city followed an unbiased methodology. The mentors suggested exploring a mid-sized city considering that 10 million+ cities would be too vast to handle for a pilot and a smaller city with less than a million population would not have enough migrant presence. Other than this, thirteen indicators/variables were considered and allotted weights to form a matrix to finally score each city on a 10-point scale. The weights were assigned subjectively based on their relevance and importance in carrying out the project successfully.

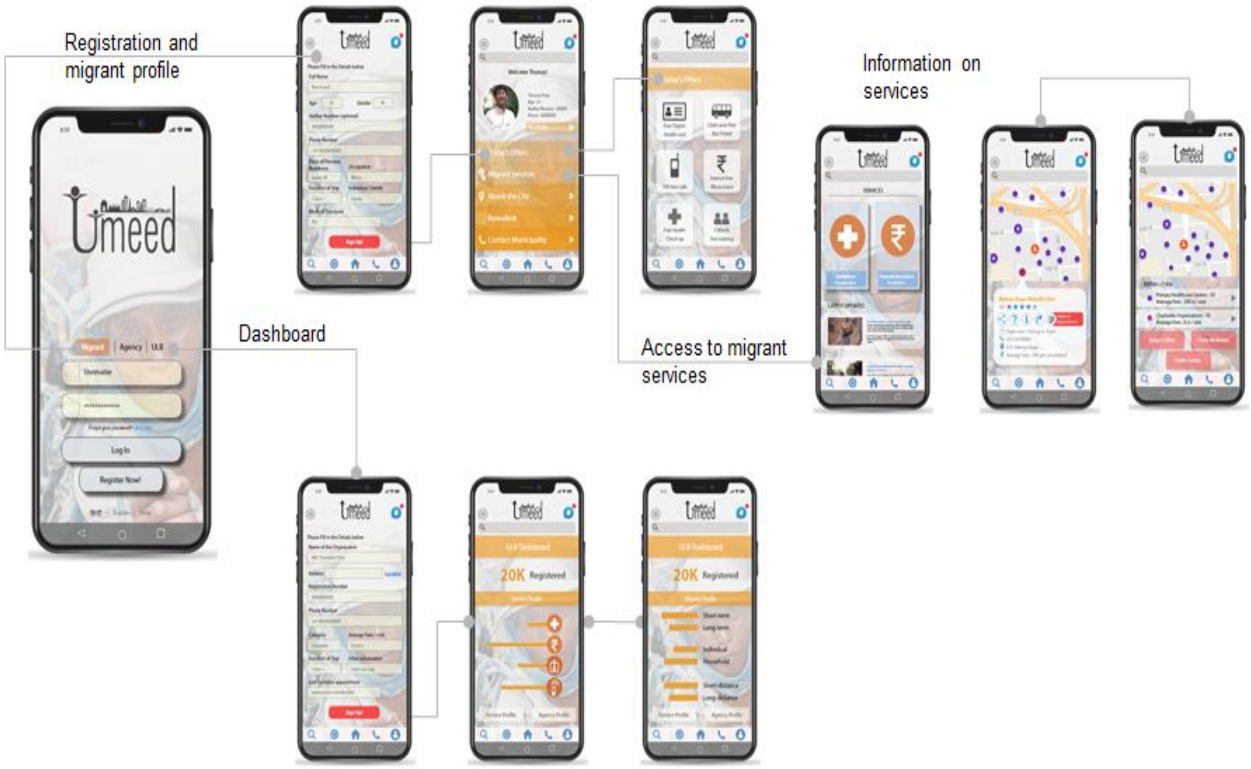
Bhopal, Jaipur, Bhubaneshwar, Surat, and Faridabad were among the top five cities that were selected based on the city selection matrix. As part of the final ideation review by the Ministry of Housing and Urban Affairs (MoHUA), it was suggested that Surat be chosen as a pilot city for the project.

The city of Surat was a good fit for the pilot as it witnesses nearly the highest migration rate vis-à-vis all cities in India due to the presence of labour-intensive employment opportunities in the entire hand-woven textile value chain, diamond, and construction sectors. As per Census 2001, data of migrant population constitutes 55.85% of the population in Surat city's agglomeration, which is remarkably high compared to other major cities. As per a UNESCO report published in 2013, migrants comprise almost 58% of the population in Surat.

4.2. Project Development and Implementation



4.3. Expected Outcomes



The expected outcomes from the project are listed below:

a) Creating a space for migrant worker data collection

b) Improving access to schemes and services of the government for the migrants

c) Giving due recognition to the migrant who has been invisible in the city

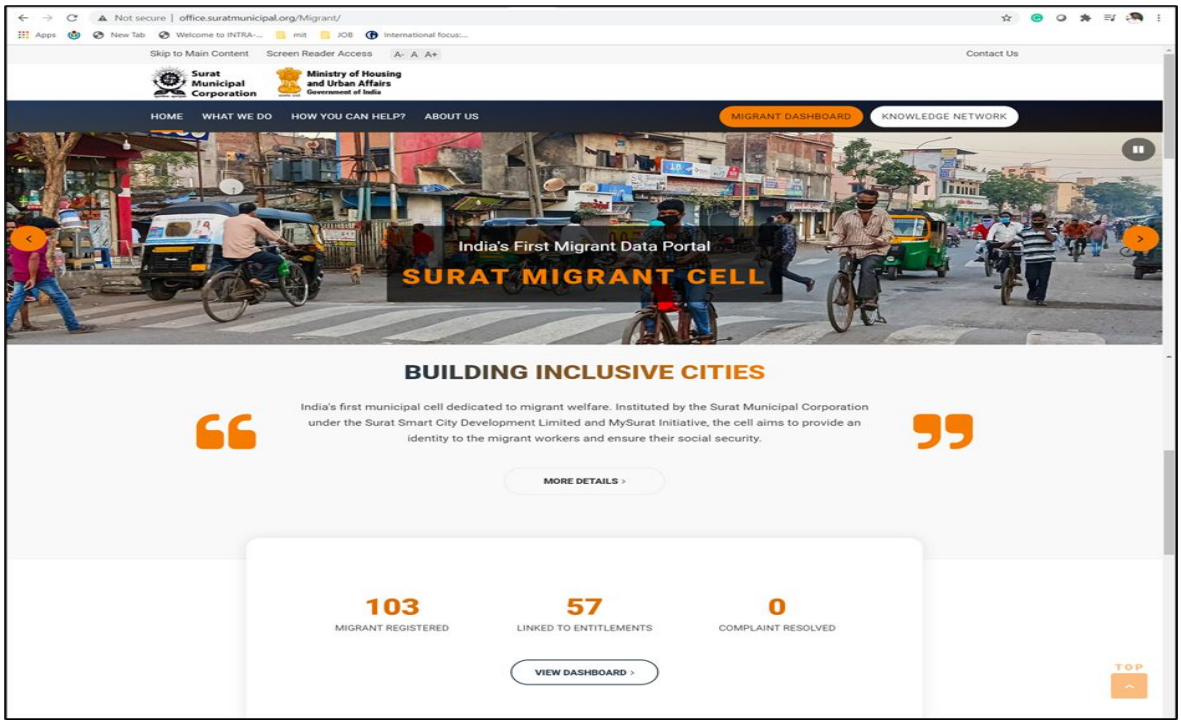
d)Providing systemic support to the migrants by becoming a one-stop shop for all information required in the city

4.4. Actual Result

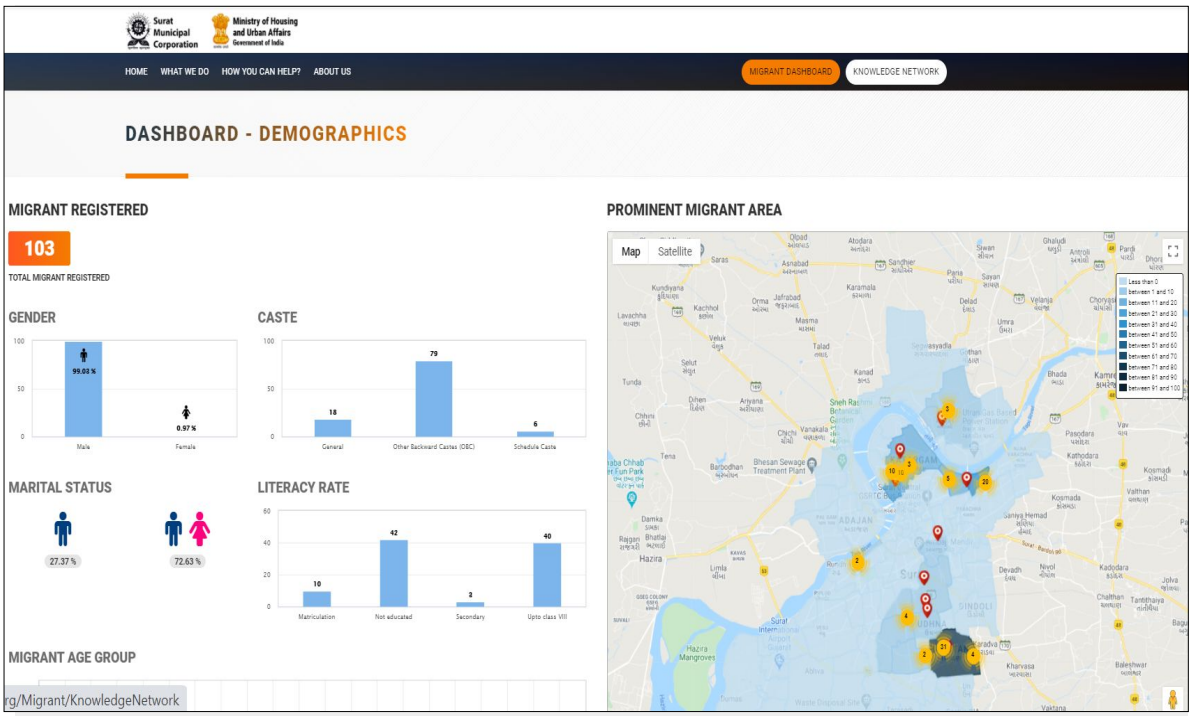
There was a revision in the product deliverable. As part of the system to register migrants, the application developed by Bandhu Urban Tech Pvt Ltd would be used, the surveys would be conducted by Aajeevika Bureau (non-profit agency) and the Surat Migrant Cell, a helpdesk for migrant workers shall be run by the Urban Management Centre 'UMC' (non-profit agency) to use this data to provide entitlements. In collaboration with Surat Smart City Development Limited and Urban Management Centre, the team worked on:

1. Creating an SOP document for the Surat Migrant Cell: The proposed policy document determines the institutional framework, proposed functions based on workshops with various stakeholders, and funding methods to run the body.

2. Design and execute the website for the Cell and create an analytical dashboard



The website contains information on the institutional set-up of the Cell and its functions along with two major components – the Migrant Dashboard and the Knowledge Network. For the Migrant Dashboard we undertook two tasks - One was to analyze the data being collected in the primary survey by UMC and understand the procedure instated for data capturing and two was the development of the web portal.



In the first task, the team suggested additional fields to create a more holistic dataset. This included inculcating a feedback system for the linkages to entitlements, mapping the occupational patterns, capturing locational data and the home state of the migrant workers.

The Knowledge Network shall facilitate stakeholders working for migrants to exchange best practices, events, and migration statistics.

05. CONCLUSION

The project can be scaled up as manufacturing and construction industries mushroom in the peripheries of the city; hence the initiative can be scaled up outside the ULB boundary and into the district jurisdiction. The project can be replicated in other cities which observe high-levels of internal migration. A city-migrant cell can be initiated by ULBs with the help of empanelled civil society actors looking after the registration of migrants for entitlement provision and other support.

In the future, an open-source application for both feature phones and smartphones can be developed for a migrant worker to self-register. An exchange portal can be developed for stakeholders responsible for registration and entitlement provisioning; this can help create a robust and updated data system of registered migrant workers.

TEAM


Ananta Kukreja


Asmeeta Das Sharma


Thomas Krishna Pegu


Yogada Joshi

MENTORS

Dr, Irudaya Rajan
Professor, Centre for Development Studies, Trivandrum, Kerala

Dr. Debolina Kundu
Professor, National Institute of Urban Affairs, New Delhi

USHA

Integrated Healthcare Accessibility and Monitoring Tool

01. CONTEXT

Since independence, the focus of public health has been on rural areas. Delivery of urban healthcare services is a complex issue considering the fact that it requires the involvement and coordination of different stakeholders and tiers of the government. This has resulted in the neglect of systematic planning for health care infrastructure, service delivery for the urban population. The negligence shown towards Primary and Community Healthcare Centers (PHCs & CHCs) has resulted in lack of infrastructure and workforce to provide preventive, promotive, and basic clinical care. Thus, the lack of a reliable and updated system in healthcare exhibits poor planning and delayed action in healthcare provisioning.

Keeping the current scenario and upcoming challenges in mind and the need for digital intervention in urban healthcare system and service; the team intends to strengthen the role of the municipality as a healthcare service provider through the provision of an integrated accessibility and monitoring platform for better and informed healthcare planning and management in an urban area.

The project involves a community participatory approach to understand and analyze various on-ground issues and problems of different stakeholders. Mapping and gap identification of healthcare infrastructure and resources, predictive analysis of diseases and areas affected by them. The project has unique features such as

(i) One-Stop-Shop - for connecting citizens, healthcare providers, and the SPV, (ii) One-City-One-Platform - for monitoring and management of healthcare services, (iii) Online Healthcare Services – diagnosis, consultation, medicines, access to reports, grievance redressal, etc.

02. PROBLEM STATEMENT

The urban population in India has increased at an annual rate of 2.7% during the last decade and it is estimated that by 2031, there would be about 600 million people living in urban India. Since independence, the focus of public health has been on rural areas. This resulted in the neglect of systematic planning for healthcare infrastructure and the delivery of comprehensive healthcare services for the urban population. The rapid increase in urban population due to migration, overburdened the urban infrastructure often, moving the poor into unhygienic settlements and risky environments making them more vulnerable to diseases and thereby increasing their need for healthcare which is neither within their reach nor affordable to them.

Due to negligence and lesser priority by healthcare providers (city administrations, district and state health departments, central government), PHCs & CHCs in urban areas, lack the infrastructure and workforce to provide preventive, promotive, and basic clinical care and provide accessible and affordable services to those who need it. The most persistent issue in healthcare service delivery is the lack of integrated primary and secondary healthcare systems in urban areas that have led to a limited resource utilization (limited infrastructure (physical and digital), human resources; for instance, pathology labs, crucial equipment, doctors, lab technicians, nurses, etc.,. There is also less outreach capacity in communities at ward and zone levels.
Although the city governments are trying to cope up with the crises in the health sector such as infrastructure, human resources, provisioning of health services within their best capacities, the problem persists due to a lack of coordination between different tiers of government and partial devolution of powers (74th Constitutional Amendment). Another major problem in healthcare provisions and response is the lack of dynamic data according to the increasing population and increasing impact of vector-borne disease outbursts.

03. OBJECTIVE

The project has three objectives as follows:

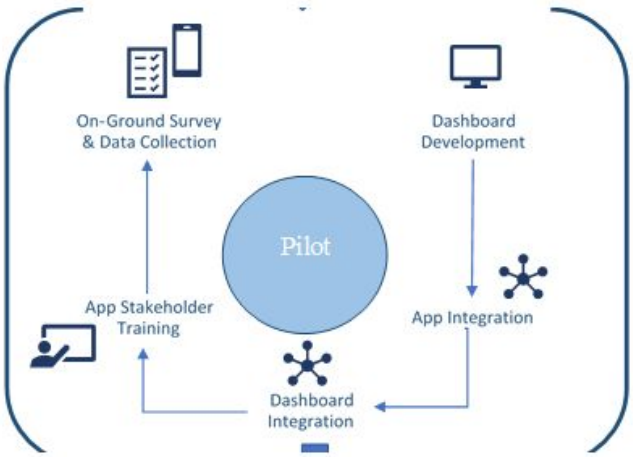
i. To integrate data with city layer mapping [health infrastructure (public & private), vulnerable communities, human resource, etc.)] using GIS/ICCC
ii. To design & develop an accessibility application for citizens and healthcare workers using technological intervention
iii. To provide an integrated platform for SPV/ULB to monitor and systematically plan for healthcare services

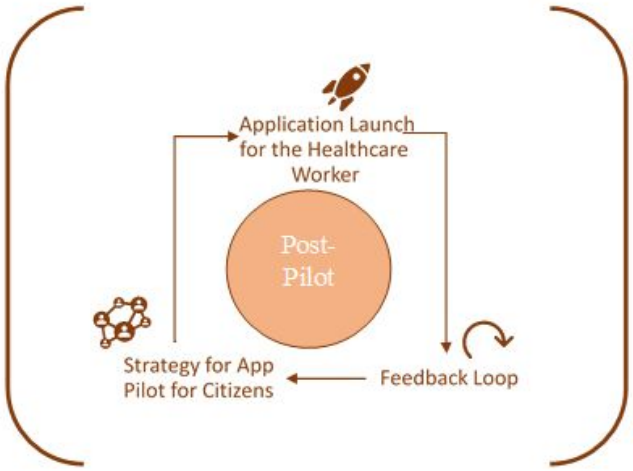
04. PROJECT STRATEGY

4.1. Pilot City Identification

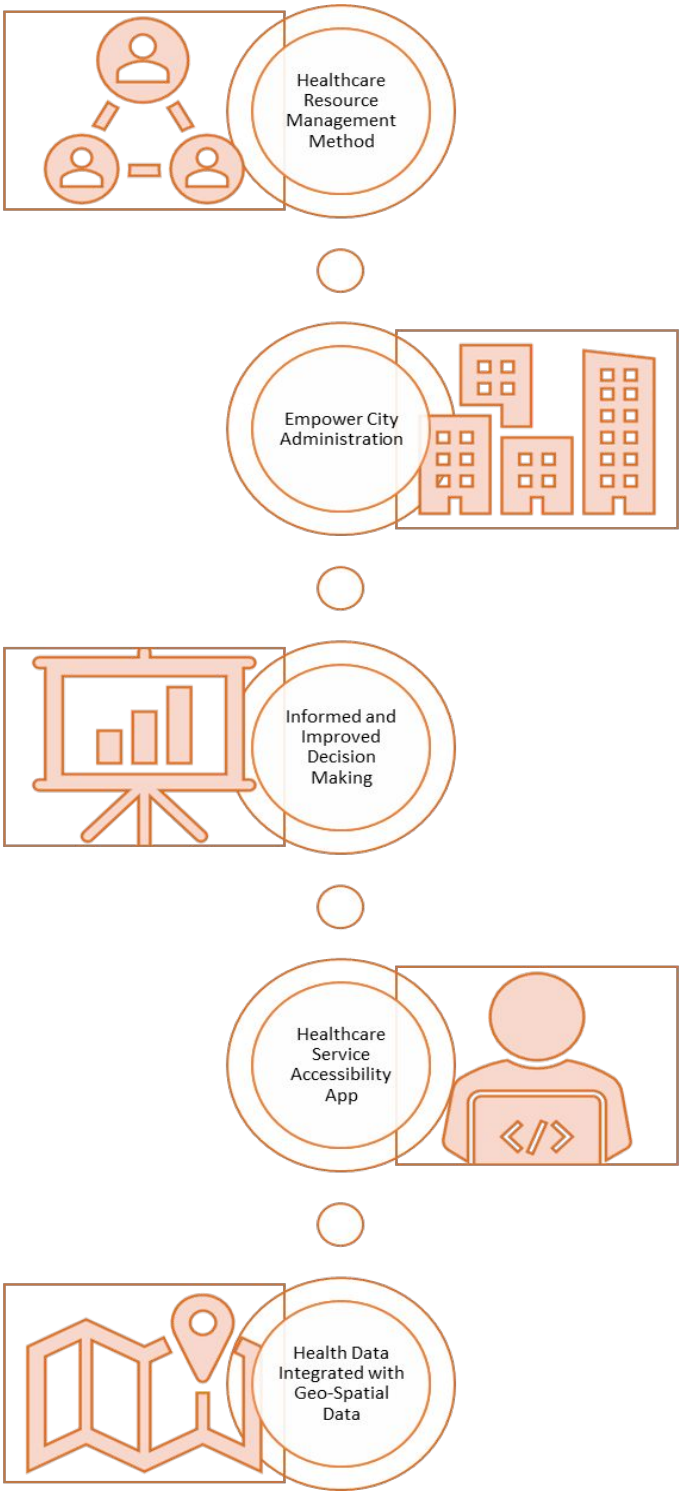
Gwalior Smart City was selected for the pilot of the project. The city was selected to be part of the Smart Cities Mission in its second round. Three main criteria were identified to choose the pilot city: a functional Integrated Command and Control Centre, a functioning and digitally equipped healthcare system. Gwalior fulfills all three criteria. Moreover, the city was interested in the project to be implemented in the city as well as at the district level. The city was also working on a COVID-19 dashboard during the commencement of the project, which created an opportunity for the pilot.

4.2. Project Development and Implementation





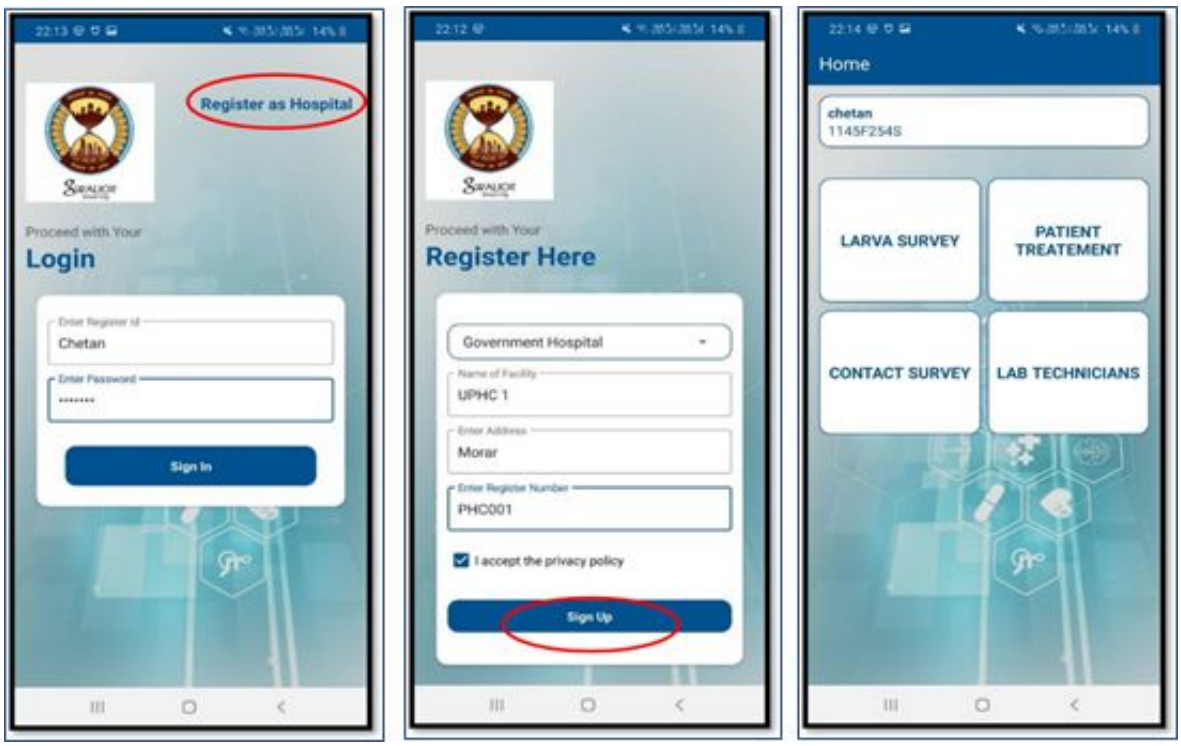
4.3. Expected Outcomes

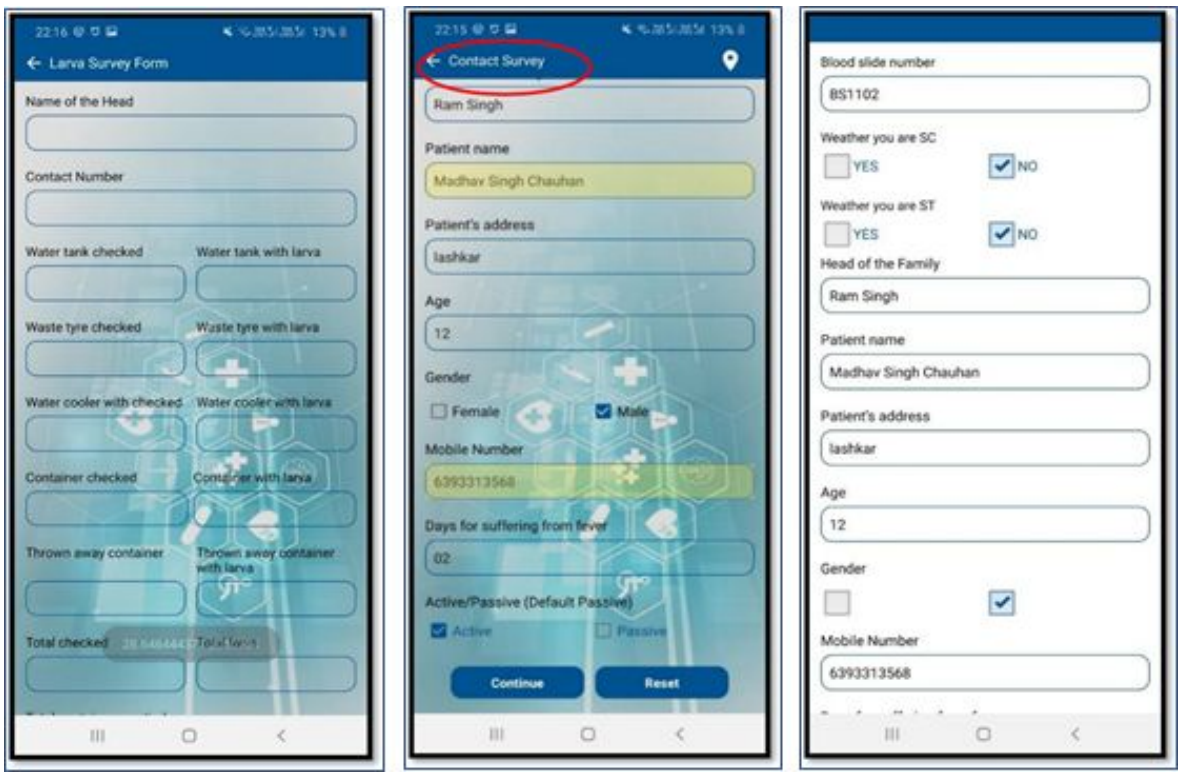


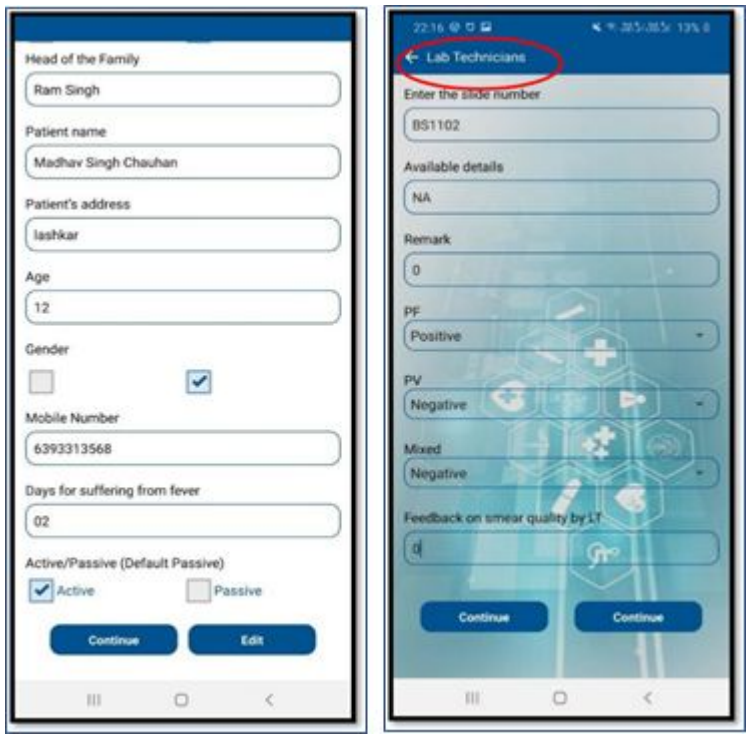
i. Enhanced accessibility for the citizens to avail various healthcare services
ii. Provision of better healthcare resource management tool to the city administration and healthcare providers
iii. Empower city administration to systematically plan for its healthcare infrastructure
iv. Improve decision-making for the deployment of preventive and curative care to city administrations
v. Facilitating the integration of health data and geospatial data with ease

4.4. Actual Result

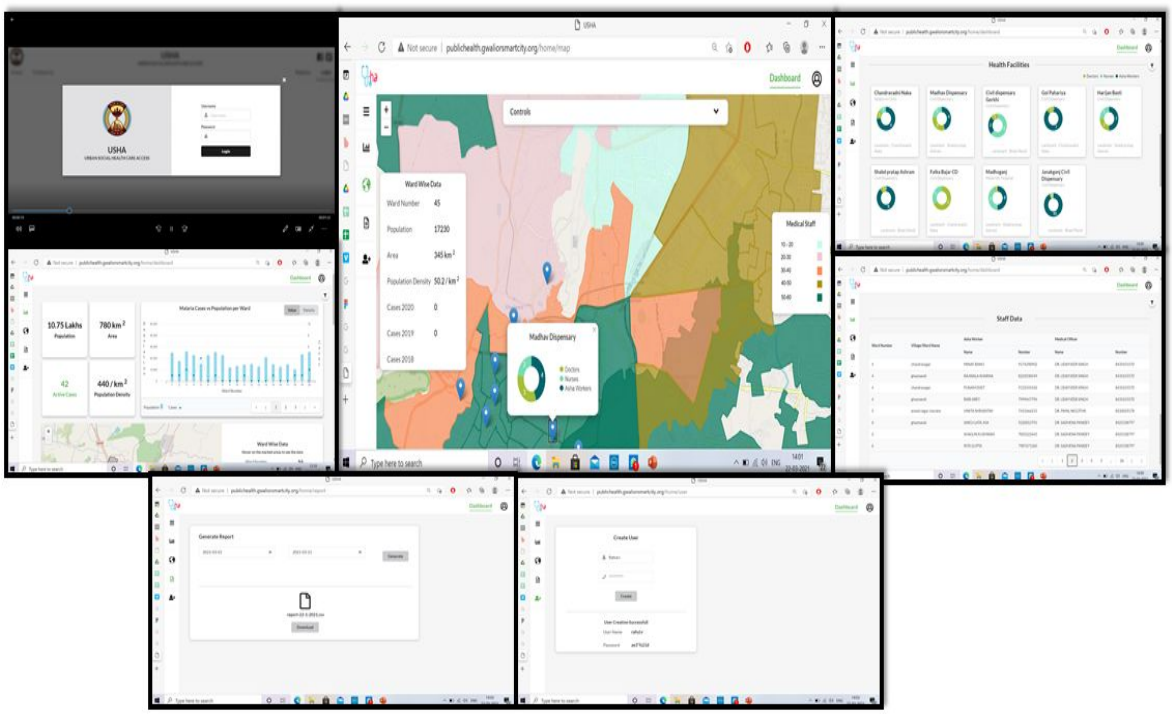
Healthcare Provider Interface: Through this product, health workers can record the geo-tagged digital data from the community and the providers can gain better outreach in the community. The app will capture the geotagged location of the survey point. The survey points with the location of the healthcare worker will be marked and shown in the dashboard as well. The app provides contact tracing opportunities through contact surveys, lab testing reports, and status as well.







Smart City SPV Interface is an integrated monitoring platform for data visualization to be used by the authorities. The dashboard will provide an overview of the health provisions within the city according to the locations. The platform will also be used to track disease, contact tracing, identify the cause of the rise in diseases or cases in a specific area. Additionally, the platform will also help in, tracking and tracing the healthcare worker, monitoring their location, and rectifying the data captured by them. It will also help different departments to analyze the problems and issues that need intervention by them. It will capture health infrastructure disposed to cities. The tool will help the city administration, healthcare departments, and bureaucrats to make an informed decision to fight city-level health crises.



05. CONCLUSION

Health is a multi-dimensional sector, which is governed by multiple agencies in an urban area. It is important that the end-user of the service should be involved in the process of providing any solution to the sector. Thus, moving forward the team intends to develop an interface for the public, where a citizen can book appointments with the public health facilities, consult doctors online and also get their lab test reports while also incorporating data for different interdependent departments of public health provisioning to analyze a real-time and holistic situation at the ward level. The application has the potential to conduct a comparative analysis of various cities. The project involves all possible stakeholders of the healthcare system and hence can be replicated and scaled up to any level of governance system or for any disease surveillance.

TEAM

Aayush Kakaji

Arpit Tiwari

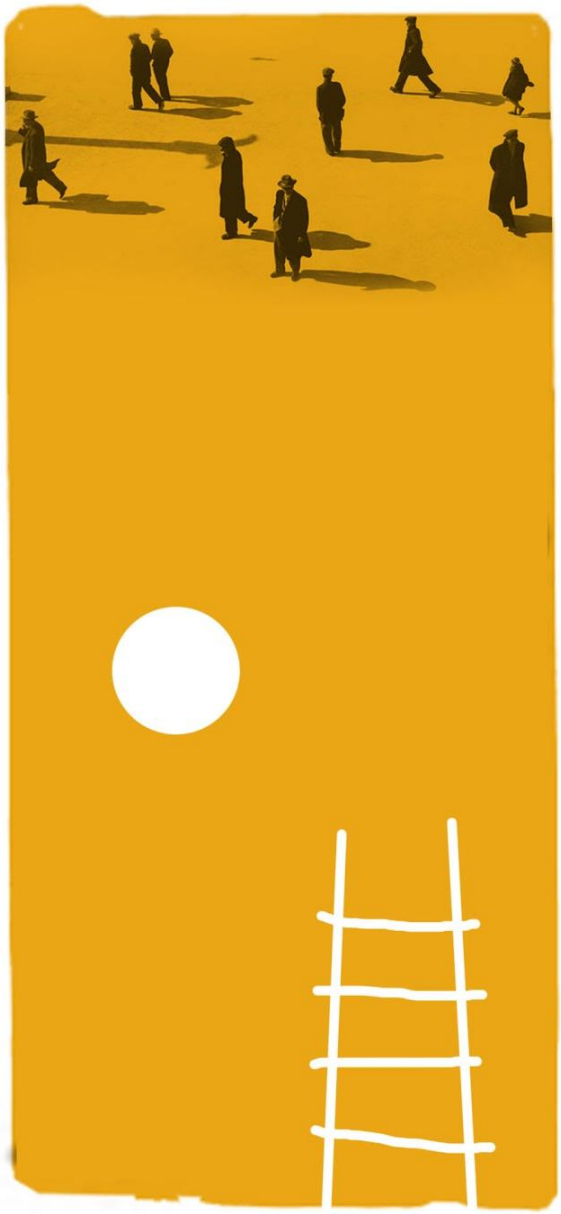
Priya Upadhyay

Zia Ul Haque

MENTORS

Dr. Benazir Patil
Chief Executive Officer, School for Development and Impact

Dr. Paramita Datta Dey
Senior Research Officer and Program lead (SCIAP), National Institute of Urban Affairs



PROFILES

Aarsi Desai is an architect and urban planner. Her interests are in the field of physical planning, urban policy, urban management, and innovation. She has over two years of experience in statutory planning sector. She was previously associated with HCP Design, Planning and Management Pvt. Ltd. as an urban planner and project manager, where she worked significantly on Development Plan and Land Pooling Schemes for two New Towns along Nagpur Mumbai Super Communication Expressway for Maharashtra State Road Development Corporation, Development Plan for Saputara Area Development Authority, and multiple business development projects. Prior to that, she was involved in a Water Urbanism project in collaboration with Columbia University, where she was chosen to represent her institute at Columbia University and the Consulate General of India, New York. She plans to work in of the field of behavioral nudges in conjunction with urban management and citizen engagement. Aarsi is an alumnus of the Indian Institute of Technology, Kharagpur holding a degree of Masters in City Planning.

In her free time, Aarsi enjoys travelling to new places, exploring new cultures, reading, photography, playing table tennis & squash and experiencing adventure sports.

Aayush Kakaji is a Product Manager. His interest is in the field of Data Analytics and Science. He has around two years of experience in the Analytics sector. He was previously associated with SmartNomad, a travel tech-startup where he worked as the Associate Product Manager requiring him to manage product development. Prior to this, Aayush has worked in Affine Analytics as a Business Analyst in gaming and F&B sector. He was involved in game analytics for Call of Duty to increase the revenue for the company. He has also interned and worked with several PSU's in designing their analytical solutions and optimizing their operational cost. He has published a paper on 'Image Processing and Facial Recognition' in the International Journal of Engineering and Technology. He is an engineer in Electronics and Communications. However, the zeal to experiment made him undertake the Young India Fellowship, giving him insights into Finance, Economics, History, Political Science, Law and other diverse subjects.

Aayush has been a professional state badminton player. In his free time, he enjoys running, discovering the undiscovered artists and singers, mentoring kids who are underprivileged and most importantly thinking about the likes and dislikes of users in making apps and products more user friendly (occupational hazard!)

Abby Varghese apart from being an India Smart Cities Fellow is simultaneously pursuing his Masters of Philosophy in Geography from the Central University of Tamil Nadu, with 'Smart Cities' as his thesis theme. His interests are in the field of disaster risk reduction, urban watershed management, wetland conservation, and environmental impact assessment. Abby has over two years of research experience in these sectors. During his studies, he represented his institutes in several international and regional seminars to present his studies across fields such as urban geography, disaster risk management, wetland conservation, tourism inter alia. Prior to that, he has worked as a trainee with Thomas Cook (India) Ltd. Abby has been the lead author for several research articles such as 'Identification of flood vulnerable zones in Thrissur district of Kerala using time series sentinel data' and 'Hydrological study of August 2018 Kerala Floods', to name a few. He plans to work in urban space, urban disaster management, and crime control research as part of the Fellowship.

He also holds a Master of Science in Geography from Central University of Tamil Nadu and a Bachelor of Science in Geography Tourism and Travel Management from Madras Christian College.
In his free time, Abby enjoys reading, baking, origami, listening to songs, and online gaming. He also has volunteered for the National Service Scheme and Friends of Police.

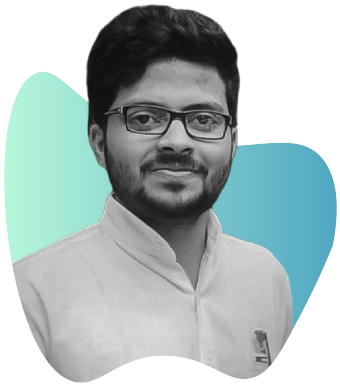
Abhishek Upperwal is a Data Scientist. His interests are in the field of High-Performance Computing along with Distributed and Decentralised Systems. He has over three years of experience in IoT, Machine Learning, Web Technologies and Blockchain domain. He is also the founder of a startup with a vision to build better cities with data. He plans to work on data-driven initiatives within the Ministry. Abhishek is an alumnus of the Indian Institute of Science, Bengaluru. He holds a Master of Technology degree in Computational and Data Sciences.

In his free time, Abhishek enjoys reading research papers and contributing to open source projects.

Abhisikha Das is a livelihoods specialist. Her interests are in the field of diversification in livelihoods, women's development and research in the fields of tea garden areas. She has over two years of experiences in the livelihoods sector. She was previously associated with the execution of NRLM in Madhya Pradesh with cluster development in Haritika Organization. Prior to that, she also worked in Uttrakhand with Agrani India Foundation in a project with Udhyam where she developed rural entrepreneurship in Nainital district. She also worked in Dehradun in the sector of education with Project FEUL, where she handled the 'Out of Syllabus' project - an initiative to collect human wisdom from teachers by students. She plans to work in the livelihoods and the education sector. Abhisikha Das is an alumna of Tata Institute of Social Sciences, Guwahati campus where she post-graduated in Social Work and specializing in Livelihoods and Social Entrepreneurship.
In her free time, Abhisikha enjoys chess, is an experiential chef, a believer in heavy dog companionship, adequate learner of craftsmanship and a habitual reader.

Akshaya Ravindrakumar Kudale is an Architect and a Town & Country planner. Her interests are in the field of Urban and Transport planning, and she has over a year of experience in the town and country planning sector. She was previously associated with Sinhgad college of Architecture as an Assistant Professor, where she was the NASA faculty coordinator. Prior to that, she also worked at the School of Planning and
Architecture, New Delhi in the consultancy cell where she worked on 'Verification audit of facilities for persons with disabilities in and around selected railway stations in India'. She also worked at Science and Technology Park, Pune, as a Junior Planner where she co-drafted 'Thane Vision Plan 2030'. She has published a paper on 'Assessment of evolutionary trends and potential softwares in the fields of Architecture and Planning', in a national-level conference in Pune. She plans to work in Urban planning and Transport sectors. Akshaya Kudale is an alumna of the College of Engineering, Pune. She holds a Masters in Technology in Town and Country Planning.

In her free time, Akshaya enjoys instructing yoga & dance fitness classes, singing, swimming and various sports activities and also volunteers as a writer for visually challenged people with Seshpath organization.



Aman Singh Rajput is an Urban and Regional Planner. His interests are in the field of regional transport planning, land use planning & linkages, and smart city-region development. He has over one year of experience in the urban and regional planning domain. He was previously associated with the School of Planning and Architecture, Vijayawada as an Assistant Professor in the Department of Planning, where he was teaching and coordinating studio exercise of Masters in Transport and Infrastructure Planning and Bachelors of Planning and was a team member of Unnat Bharat Abhiyan project. Prior to that, he has worked as an intern with IPE Global Ltd. on the Tourism Infrastructure Development Plan project and Directorate of Town and Country Planning Organization, Madhya Pradesh on the Bhopal Master Plan project. He has been a Proficiency Gold Medalist in his UG and PG studies and an awardee of Prof. N.S. Saini SPA Gold Medal for Best Thesis in Masters in Planning (Urban and Regional Planning). He has published and presented research on smart city regions and sustainable rural development. He plans to work in the field of land use and transport integration. Aman is an alumnus of the School of Planning and Architecture, Bhopal, and School of Planning and Architecture, New Delhi. He holds a degree of Bachelor of Planning and Masters in Planning with a specialization in Regional Planning.

In his free time, Aman enjoys playing chess, watching movies, and listening to songs & ghazals.

Ananta Kukreja is a Post Graduate in Economics. Her interests are in the field of urban livelihoods and the unorganized sector, capacity building and gender. She has over three years of experience in the development sector. She was previously associated with Jarvis Technology and Strategy Consulting, Mumbai as a Senior Research Associate, where she conducted primary and secondary research to understand issues faced by the citizens in their constituencies and develop actionable strategies for the client. Prior to that, Ananta also worked with a grassroots organization named Haqdarshak Empowerment Solutions as a Research and Training Associate which required liaising with the government, training and capacitating the local people with new skills to earn their livelihoods. In the future, she plans to work in the field of inclusive development, evidence-based public policy and governance. Ananta Kukreja is an alumna of Gokhale Institute of Politics and Economics, Pune and holds a Masters of Economics degree with specialization in Agribusiness.

In her free time, Ananta enjoys creating mandala art, exploring new places and learning new recipes.

Ankur Negi is a Disaster Management professional with specialization in the application of Remote Sensing and GIS in the domain. His interests are in the field of disaster risk reduction and management using GIS techniques and he has over one and half years of experience in the disaster and development sector. He was previously associated with Sustainable Environment and Ecological Development Society (SEEDS) as Program Manager (Planning and Assessment), where he was involved in ground level studies aimed at assessing the needs of disaster impacted communities. He was also the lead RS and GIS personnel. Prior to that, he has worked in the domain of Corporate Social Responsibility and has been a part of the impact assessment studies for public sector entities. He has received a meritorious student scholarship programme at IIRS. He has published a paper titled 'Landslide Susceptibility Mapping and Comparison using Frequency Ratio and Analytical Hierarchy Process in part of NH-58, Uttarakhand, India'. He plans to work in the domain of disaster risk and understand the community perspective. Ankur Negi is an alumnus of the Tata Institute of Social Sciences, Mumbai. He holds a Master of Science in Disaster Management and a Post Graduate Diploma in Remote Sensing and GIS from the Indian Institute of Remote Sensing, Dehradun.

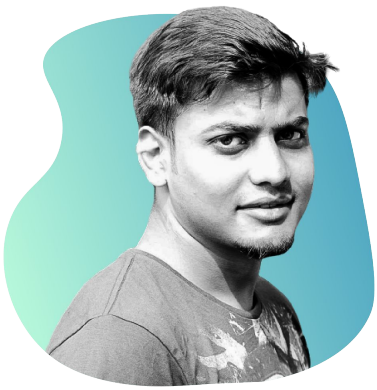
In his free time, Ankur enjoys playing table tennis, learning and doing wildlife photography and music.

Anupama Bhardwaj is an engineer turned sociologist. Her interests are in the field of Health Accessibility, Citizen Engagement and Cultural Heritage. She has over one and half years of experience in the Waste Management, Education Research and Data Analysis sectors. She was previously associated with Central Square Foundation where she worked as a Qualitative Researcher. Prior to that she worked with the Transport Corporation of India Limited for Waste Management in the South-West Delhi region. She was awarded Krishnaraj Fellowship in 2017 by EPW for conducting a field research in the flood affected riverine island of Majuli. Anupama is an alumna of Delhi School of Economics. She holds a Masters of Philosophy degree in Sociology.

In her free time, she writes stories and explores mythology .

Aparna Ramesh is an architect and urban planner. Her interests are in the field of urban governance and sustainable transport planning. She has over two years of experience in architecture and urban development. She was previously associated with GIZ Deutsche Gesellschaft für Internationale Zusammenarbeit as an urban planning intern, where she worked with the Integrated and Sustainable Urban Transport Systems for Smart Cities in India (SMART–SUT) project for Coimbatore Smart City. Aparna's research has been published in international journals and presented at national as well as international conferences. Most recently, she presented her work at the International Conference on Urban Science and Engineering at IIT Bombay. As an undergraduate, she won the Berkeley Undergraduate Prize for Architectural Design Excellence, 2014. She has also been awarded the Wipro Earthian Prize in both 2017 and 2018 by the Azim Premji Foundation. She plans to pursue her PhD in the near future and apply her education as an architect and urban planner to develop context-specific solutions for rapidly growing Indian cities. Aparna is an alumnus of CEPT University, Ahmedabad. She holds a Master of Urban and Regional Planning with a specialization in Transport planning.

In her free time, Aparna enjoys reading non-fiction, practising yoga and exploring cities.



Archit Nishant is an Architect and an Urban and Regional Planner. His interests are in the field of transport planning, housing and land use and has over two and a half years of experience in the Urban development sector. He was previously associated with UTTIPEC, Delhi Development Authority as a consultant where he worked on the implementation of Multi Modal Integration Plan of Phase 3 metro stations in Delhi and Transit Oriented Development project of Karkardooma Metro Station. Prior to that, he has worked as a freelance Architect and has done various projects in interior designing and housing. He plans to work in the field of data analytics and transport planning and implementation. Archit Nishant is an alumnus of National Institute of Technology, Patna. He holds a degree in Masters in Urban and Regional Planning.

In his free time, Archit likes playing basketball, cricket and badminton and also loves cooking , exploring new places and going on road trips.

Arpit Tiwari is an Architect and Urban Planner. His interests are in the field of walkability and urban mobility and has over six months of experience in research and teaching. He was previously associated with Babu Banarasi Das Education Group as a teaching assistant, where he was involved in research activities for child friendly cities. Prior to that, he has worked as a freelance Architect. He has also published content on the urban sprawl situation in India. He plans to work in the areas of walkable and safer cities. Arpit Tiwari is an alumnus of Indian Institute of Technology, Roorkee. He holds a Master's degree in Urban and Rural Planning.

In his free time, Arpit enjoys gardening and playing football; he also volunteers with Blood Connect.

Asmeeta Das Sharma is an Architect, Urban Designer and Planner. Her interests lie in the field of regional planning, migration and informality and she has over four years of experience in the architecture and development sector. She was previously associated with Royal Haskoning DHV in Rotterdam as an Urban Planner and Strategist, where she worked on consultancy projects for port and airport developments across the globe. Prior to that she worked on multiple architecture and urban design projects with notable offices like Urban Architecture Works (formerly Mani Chowfla Architects) and Jana Urban Space Foundation. Her master's thesis was handpicked and published in the Dutch national design magazine Blauw Kamer. Further, she was awarded for her all round excellence during her bachelor's degree for her additional work in research and competitions. Currently, she is working on publications on Environmental Migration. She plans to work in migration and inclusive development, seeking to promote design thinking to enhance society. An alumna of Delft University of Technology, The Netherlands, she holds a Masters of Architecture and the Built Environment with a specialization in Urbanism and an additional Honours degree.

In her free time, Asmeeta enjoys innovating with food, sketching and exploring new destinations and music.

Debaditya Swarnakar is an Architect and Urban Designer. His interests are in the field of ease of living, placemaking and affordable housing design. He has over a year's experience in the public transport planning sector. He was previously associated with DC school of Architecture and Design as an Assistant Professor, where he conducted studies to document spatial & cultural attributes and was engaged in cultural mapping of Melkote village in Karnataka. Prior to that, he has worked in transport planning projects as a Junior Architect in Dar Al Handshah. His proposed idea on resilient structural system for Himalayan terrains won second runner up in DIC 2018. He plans to work in local area planning and neighbourhood design for better ease of living. Debaditya is an alumna of School of Planning and Architecture, Delhi. He holds a degree in Masters of Urban Design with a specialization in Design Anthropology.

In his free time, Debaditya enjoys 3D modelling (architectural previsualization), singing and painting.

Gaurang Patel is a Geomatics Engineer with an interest in the field of energy management and has two years of experience in the renewable energy sector. He was previously associated with the SmartX City, India, as a GIS Consultant, where the focus was on how GIS can be used in the renewable energy sector for Smart Cities. Prior to that, he has worked on built-up extraction from remote sensing and applications of 3-D City model focusing on a city-wide PV System. He has been honoured with three awards as part of his Masters at CEPT University - Academic Excellence Award (2017), Best Studio Work (2017), Academic Excellence Award (2018). He has also published a paper titled "Estimation of Energy from Urban Built-Forms from Remote Sensing Imagery – A Goal of Smart City". He plans to work in the areas of different GIS applications for Smart Cities. Gaurang is an alumnus of CEPT University, Ahmedabad, from where he acquired a degree in Masters of Geomatics (2018). He is currently pursuing Ph.D. in Geoinformatics from Gujarat University, Ahmedabad.

In his free time, Gaurang enjoys playing badminton, travelling to explore new places, cooking, plantation and walking.

Ipsita Chanda is a Geographer and Urban Planner. Her interests are in the field of spatial as well social planning. She has two years of experience in the urban development sector. She was previously associated with Voyants Solutions Private Limited as an Urban Planner, where she extensively worked in Geographical Information Systems/Remote Sensing-based Master Plan projects and Multi-modal Logistic Park projects. She plans to work in the areas of social planning and infrastructural planning. Ipsita Chanda is an alumna of Delhi School of Economics and School of Planning and Architecture, Bhopal. She holds a masters degree in Planning with a specialization in Urban and Regional Planning.

In her free time, Ipsita enjoys brushing up her dance skill, reading story books and watching movies.

Jash Yogendragiri Goswami is a Civil Engineer and an Urban Planner. His interests are in the field of Spatial Planning, Infrastructure Planning, Project Management and Urban Management. He has over one year of experience in the urban and regional development sector. He was previously associated with SYSTRA Group in India as an Urban Planner, where he was part of the core team involved in preparation of the Eco-sensitive Zonal Master Plan and its tourism plan for cluster-4 in Madhya Pradesh. Prior to that, he has worked as an intern in the project " Master plan Delhi- 2041" at National Institute of Urban Affairs (NIUA), where he undertook gap analysis for the water and sanitation profile of Delhi city and an appraisal of smart technologies that possess the potential to address current challenges. Jash has recently published two research papers titled 'Digital Strategies for Indian Smart Cities' and 'Economic Feasibility of Personal Rapid Transit: A Case study of Ahmedabad' in the second edition of the international conference "Future Smart Cities (FSC)" organized by IEREK in 2019. He plans to work in the fields of Spatial Planning and Infrastructure Planning. Jash is an alumnus of CEPT University, Ahmedabad. He holds a Masters degree in Urban and Regional Planning with a specialization in Infrastructure Planning.

In his free time, Jash enjoys playing badminton, reading non-fiction books, watching movies, listening to Gazals, going on road trips, trekking, and exploring cities.

Joydip Datta is a Geographer and Geospatial Engineer. His interests are in the field of urban land & infrastructure management, disaster risk reduction, environmental impact assessment, agricultural risk assessment and socio-political analysis using geospatial analytics. He has over two years of experience in the spatial analytics sector. He was previously associated with FarmGuide as an Agricultural Risk Analyst, where he worked for crop prediction, crop health analysis and estimation of crop yield using geospatial technology and satellite images. Prior to that, he has assisted in Newtown Smart City Planning. His publications are "Smart Transportation Management Planning to Reduce Surface Vehicle Pressure for a Better Urban Design of Howrah Municipal Corporation Area" and "Recognizing Mosquito Breeding Zones Applying Machine Learning – A Comparative Study between Dense Urban Area of Khanjarpur, Roorkee & Urban Slum Area of Chingrajpara slum, Chhattisgarh Utilizing UAV Images.". He plans to work in solving problems using spatial analytics. Joydip Datta is an alumnus of NIIT University. He holds a Master of Technology in Geographic Information Systems and a Masters of Arts in Geography from the University of Delhi.

In his free time, Joydip enjoys travelling, cooking, reading, writing and listening to music.

Juhi Sah is an Architect and an Environmental Planner. Her interests are in the field of Regional Planning, Environmental Psychology, Urban Governance and Geo Informatics. She has over one and a half years of experience in Metro Station Planning & Architecture and the Rural Development sector. She was previously associated with Shyama Prasad Mukherjee Rurban Mission, Madhya Pradesh as a Young Professional where she handled infrastructure planning and assessment, implementation and cluster notification proceedings. Prior to that, she has represented SPA Bhopal in GIZ conference 'Plan OK Please', Chennai, for the Coimbatore Regional Plan, Tiruppur Sub-Region. She is the Excellence Medal holder of her institute. She plans to work in an allied field of Environment policies and Governance, to make an exploration into the subject of Political Ecology and New Age Planning Practices. Juhi Sah is an alumna of the School of Planning and Architecture, Bhopal. She holds a degree of Masters in Environmental Planning.

In her free time, Juhi enjoys painting, sketching and exploring diversity of Indian cultures via virtual media and readings.

Kumar Priyam is an Architect and Urban Planner. His interests are in the field of urban land management, land accumulation techniques and housing issues, and he has around one year of experience in the urban housing sector. He was previously associated with the Panchwati Coloniser Pvt. Ltd., Patna as an Architect Planner. Prior to that, he has worked as an intern in the land pooling cell of Delhi Development Authority, focusing on the implementation of land pooling policy in Delhi extension area. He has also been a part of the organizing team of public board meetings regarding objection and suggestion of Land Pooling Policy, 2018. He plans to work in the areas of urban land management and housing. Kumar Priyam is an alumnus of CEPT, Ahmedabad. He holds a degree in Masters of Urban and Regional Planning, with a specialization in Housing.

In his free time, Priyam enjoys cooking and reading Hindi and English literature. Apart from that, Priyam is fond of swimming and cycling.

Manuel Diego Fernandez Chaparro Plata is an Architect. His interests are in the field of renewable energy, sustainability and real estate development. He has over seven years of experience in the real estate development sector. He was previously associated with Rivero Borrell Architects as a Lead Architect, where he managed and supervised the feasibility, design, executive project, construction and commercialization of real estate developments. Post that, he researched the application of renewable energies in the built environment and sustainable architecture. Manuel has achieved a distinction in his dissertation project on 'The integration of HVAC systems with photovoltaic and solar thermal technologies'. He plans to work in the fields of Sustainability and Urbanism. Manuel Diego is an alumnus of the University of Nottingham, England. He holds a Master of Science in Renewable Energy and Architecture.

In his free time, Manuel enjoys sleeping, travelling and watching movies.

Monica Thakur is an Architect. Her interests are in the field of Architectural Design, Urban Design and Conservation, and she has over eight months of experience in the Urban Journalism sector. She was previously associated with Good Governance India Foundation and Urban News Digest as an Assistant Editor, where she was involved with writing, editing and organising content for the monthly magazine - Urban News Digest. Prior to that, she has interned at Vikas Dilawari Architects as an intern in the field of Architectural Conservation. She plans to work in the fields of Water Management and Tourism. Monica Thakur is an alumna of Kamla Raheja Vidyanidhi Institute of Architecture. She holds a degree in Bachelor of Architecture.

In her free time, she enjoys exploring digital sketching, writing, reading, listening to music along with visiting historical places.

Pritam Patnaik is an Architect and an Environmental Planner. His interests are in the field of urban land use planning, city governance, city resilience, green infrastructure, water resource management and climate change. He has two years of experience in the field of urban planning. He was previously associated with the Andhra Pradesh Capital Region Development Authority as a Planner where he was involved in the preparation of development plans and a land pooling scheme. Prior to that, he worked as an Architect Planner and was involved in the preparation of the Master Plan and conservation project of Anasakti Ashram in Uttarakhand. He was awarded with the Proficiency Gold Medal and best thesis award from his alma mater as well as from the Institute of Town Planners, India. He has published a paper titled “Climate Change through Solid Waste Sector and its Implications on Water Bodies: A Case of Satna Municipal Corporation, M.P.”. He plans to work in the domain of urban planning and governance and understand the complexities involving human social systems and the natural environment. Pritam Patnaik is an alumnus of the School of Planning and Architecture, Bhopal. He holds a Masters degree in Planning, with a specialization in Environmental Planning.

In his free time, Pritam enjoys playing cricket, travelling, doing photography and also volunteering with the Trust for Environment and Development.

Priya Upadhyay is an Urban Planner and an Urban Development Manager. Her interests are in the field of urban policy and research, road safety, urban livelihoods, inclusive cities, health, solid waste management and sustainable development. She has over two and a half years of experience in the urban and GIS sector. She was previously associated with the United Nations Global Compact Network India as a consultant in road safety and advocacy, where she coordinated research on "Impact of driver behaviour initiatives in achieving SDG 3.6" with CRRI and the implementation of activities of UNGCNI's Road Safety Task force. Prior to that, she has worked as a Programme Manager, Road Safety at Fleet Forum India. She has also received an award for her research poster on "Assessment of Public Green Spaces – Smart City New Delhi Municipal Council" and has published a research paper on 'Mitigation of Urban Heat Island'. Priya Upadhyay is an alumna of TERI School of Advanced Studies. She holds a Masters of Technology in Urban Development and Management.

In her free time, Priya enjoys dancing, cooking, working on her waste to garden, recycling of household waste and spending time with her floofy friends.

Radha Karmarkar is a professional in the urban governance and public policy sphere. Her interests are in the field of urban governance and citizen engagement. She has over three years of experience in the development sector. She was previously associated with Nagrika as a Research Associate, where she conducted a study in 25 cities and their city governments across India to evaluate the status of implementation of the 74th Constitutional Amendment Act in India. Prior to that, she has worked as an Associate at Research and Training with Haqdarshak Empowerment Solutions where she researched government schemes, conducted awareness camps and worked at the grassroots to help people apply to schemes. She plans to work in the fields of urban governance and citizen engagement. Radha is an alumna of Symbiosis International University. She holds a Master of Science in Economics.

In her free time, Radha enjoys reading, cooking, traveling and trekking.

Rohitaash Debsharma is an Urban Planner and Public Space Designer. His interests are in the fields related to the public realm such as placemaking and mobility. He was previously associated with Sensing Local as a research intern, where he worked on public space analysis of Bengaluru city. He exhibited a case contesting the heritage of Kochi at the 19th General Assembly of ICOMOS held at New Delhi in 2017. He is also an active volunteer at PlacemakingX, where he advocates to accelerate placemaking as a way to create healthy, inclusive and beloved communities. He plans to work in the areas of urban design, mobility and spatial economy-related interventions. Rohitaash Debsharma is an alumnus of Srishti Institute of Art, Design and Technology, Bengaluru. He holds a Masters in Public Space Design.

In his free time, Rohitaash likes to trace narratives so he illustrates, travels and socializes with new people!

Roopal Chopra is an Architect and Urban Designer. Her interests are in the field of shaping the cityscape through its cultural connectivity, design of public spaces, mobility and community based activities. She has over two years of experience in the Urban Infrastructure improvement sector. She was previously associated with Padeco India Pvt. Ltd., Mumbai as an Architect and Urban Designer, where she worked with Mumbai Metropolitan Region Development Authority and Mumbai Metro Rail Corporation on Multimodal Integration plans for the upcoming Mumbai metro lines and on architectural design and planning of Mumbai metro line-3 car shed. Prior to that, she has worked with Rizvi College of Architecture as Assistant Professor and Bombay61 studio, where she mainly worked on street designing and revamping projects and citizen engagement activities. She plans to work in the area of urban improvement and development. Roopal Chopra is an alumna of Mumbai University. She holds a degree in Master of Architecture with specialization in Urban design.

In her free time, Roopal enjoys cooking and travelling to places and is also associated with food entrepreneurship.

Rupal Baid is an Urban Policy Professional. Her interests are in the field of urban infrastructure development, transport, program evaluation, and strategic planning. She has about a year of experience in the urban development sector. She was previously associated with the Planning Department, Government of Andhra Pradesh (AP) as an associate, where she led the special task team for regulating the urban growth in the state by establishing urban city clusters in AP. She has designed a project on assessing the quality of life in the urban slums of AP. Apart from this she also worked on public transport where she developed a monitoring framework for measuring traffic growth in the cities. She was also responsible for conducting a study on improving urban local bodies' capacities by assessing the gaps and outlining a framework. In the future, she plans to work in the field of mobility, environment, data-driven/ evidence-based urban policy planning. Rupal is an alumna of Azim Premji University, Bangalore. She holds a Master's degree in Policy and Governance.

In her free time, Rupal enjoys reading related to politics and philosophy, exploring herself by traveling to new places and getting familiar with different cultures. Apart from that one would find her in the best cafes or eating joints in the city.

Shikha Singh is an Architect and Environmental Planner. Her interests are in the fields of water management, climate resilience, disaster risk reduction and inclusive/ participatory planning. She has over two and a half years of experience in architecture, spatial planning, urban development and environmental management sectors. She was previously associated with the School of Planning and Architecture, Delhi as a

Project Associate and was involved in developing a toolkit for local stakeholders for urban wetlands/water bodies management with the Ministry of Jal shakti. Prior to that, she has worked on different architecture and urban design projects and has also received exposure in the fields of solid waste management and applications of Internet of Things (IoT) for smart water management during her engagement with Jamshedpur Utilities and Services Company Ltd. (JUSCO). She secured the first position for her master's thesis on Zero Liquid Discharge Strategies for urban water management, in the Department of Environmental Planning, School of Planning and Architecture, Delhi. She plans to work in the domains of inclusivity and sustainable urban development. Shikha is an alumna of School of Planning and Architecture, Delhi. She holds a degree in Masters of Planning, with specialization in Environmental Planning.

In her free time, Shikha enjoys exploring places, folk music and volunteers for the underprivileged children of the Turamdih Uranium mine workers.

Sai Varsha Akavarapu is an Urban Planner. Her interests lie at the nexus of space politics, policies and people centrism in neoliberal governmental regimes. She has over 12 months of experience in researching the implications of neoliberal placemaking on the historic urban cores in India and China. She was previously associated with the Norwegian University of Science and Technology as a student assistant where she contributed to the Horizon 2020: Trans-Urban-EU-China project by conducting literature reviews and field works pertaining to placemaking and the socio-economic values of the quotidian in Drum Tower Muslim District in Xi'an, China, which resulted in a publication with the China City Planning Review. Prior to that, she has extensively worked in the field of urban policy and development focusing on participatory and multi-stakeholder involvement in building resilience in communities prone to natural disasters. Varsha is a recipient of a full semester scholarship from the Norwegian Centre for International Cooperation in Education (SIU) and Henrik Homan's memory scholarship for the research project titled "Smart Sustainable City Regions in India" conducted in 2017 in the old and historic areas of Pune. She has also received grants to participate in Wuhan Placemaking week in 2018 and VVITA - 'Sustainable and Inclusive Development Strategies to Vitalize Heritage Villages through Innovative Technologies' workshop conducted in Romania in 2019. She further plans to work in the areas of multi-hazard disaster management and community resilience. Varsha is an alumnus of School of Planning and Architecture (Vijayawada) and the Norwegian University of Science and Technology. She holds a postgraduate degree in Urban Ecological Planning.

In her free time, Varsha enjoys sketching her everyday realities, experimenting with Hyderabadi cuisine, reading to expand her horizon of knowledge, and exploring life and what it has to offer through travel.

Santosh Kumar Bonam is a Social Entrepreneur. His interests lie in the field of impact-making enterprises, Economics and International Relations. He has three years of experience in working with HCL Technologies as a Software Engineer in supporting Investment Banking clientele. He would like to work in the field of development science and create social impact by contributing through his learnings from entrepreneurship. Santosh kumar is alumnus of Tata institute of Social Sciences. He holds degree in Masters in Social Innovation and Entrepreneurship.

In his free time, Santosh loves to dance, read books and take long walks. He loves travelling to new places and exploring new cultures and cuisines.

Shilpa Shashidharan is an Engineer and a Construction Management Professional. Her interests are in the field of project management, housing, and smart, sustainable and environment-friendly construction practices. She has two years of experience in the real estate development sector. She was previously associated with Oberoi Realty Ltd., Mumbai, as an Executive, where she was involved in the Digital Transformation processes, Strategic Management and Budgeting & Costing for real estate construction projects. During her engineering, she had published a research paper in the International Journal of Applied Engineering Research. She plans to work in the areas of Environment and Sustainable Green Cities. Shilpa Shashidharan is an alumna of the National Institute of Construction Management And Research (NICMAR), Pune. She holds a Postgraduate degree in Advanced Construction Management.In her free time, Shilpa enjoys all kinds of art, music, reading and taking an early morning stroll amongst nature. She is also a passionate dancer, trained in Bharatanatyam for over 16 years and has performed in various concerts.

Srijita Chakrabarty is an Architect and Urban Manager. Her interests are in the fields of Governance, Public Administration, Behavioural Sciences, Environmental Management, cross-border policy and climate change. She has over six years of experience in urban development and allied sectors. She has been working as an independent consultant and researcher since October 2018. Prior to that, she was associated with the Indian Institute of Technology Madras (IITM) as a Project Officer, deputed at Chennai Metropolitan Development Authority (CMDA), L&T Construction as a Senior Architect, L&T Realty as Graduate Engineer Trainee, Maheswari & Associates as an Architect and Funktion Design and COSTFORD as an Intern. She has worked on various projects of scale including low-cost housing and slum rehabilitation, the first precast high rise residential building in India (Pragati, Mumbai) among others before working as the nodal point for IITM-CMDA, responsible for online planning permission approval systems and allied services under e-governance for the Government of Tamil Nadu including proposal preparation (System Requirements Specification, Request for Proposal), user interface design, stakeholder collaboration, update meetings at the Secretariat and as a part of the tender committee for developer selection. Her research, which was published as a book chapter by Springer on sacred waste and urban river contamination got her selected as a speaker at multiple international conferences, including the 6th India Water Week 2019 and got her shortlisted for the World Bank Youth Summit 2019. She plans to work in the governance and management sector. Srijita is an alumnus of the Institute for Housing and Urban Development Studies, Erasmus University Rotterdam, The Netherlands for her Master of Science in Urban Management and Development with specialization in Sustainable Urban

Infrastructure and a Bachelor in Architecture from Jadavpur University. She is currently pursuing a Master of Arts in Public Administration. In her free time, Srijita enjoys writing, cooking, stitching, learning new languages, exploring and observing new places and people.

Srinidhi Ravishankar is an Architect. Her interests are in the field of sustainable urbanism, climate-responsive action and universal accessibility. She has two years of experience in the urban design and architecture sectors. She was previously associated with IIT Hyderabad and Institute for Transportation and Development Policy (ITDP) as a Junior Research Fellow and Urban Development Intern, respectively, where she worked on road safety, vision zero and heritage research. Prior to that, she has worked on the design and improvements of streets, intersections, communal spaces and design research at Triple O Studios, a multidisciplinary design firm in Chennai. Her thesis was one of the top 10 theses in the South zone of National Awards for Excellence in Architectural Thesis. Her written narratives on temple architecture of Tamilnadu and Auroville have been published in the Design Detail Magazine. She plans to work in the areas of sustainable urban development and climate action. Srinidhi is an alumna of A.M.S. Academy of Architecture. She holds a degree in Bachelor of Architecture.

In her free time, Srinidhi enjoys reading, gardening, swimming, and volunteers with environmental organisations.

Subarna Sadhu is an Architect. Her interests are in the field of urban design, user experience, architectural design, placemaking and conservation. She was previously associated with Dharohar as a Junior Architect, where she worked on façade improvement in ABD area of Indore Smart City and heritage impact assessment for Uttar Pradesh Metro Rail Corporation in Agra. Prior to that, she did her internship at Abin Design Studio. She plans to work in the area of urban design and user experience. Subarna Sadhu is an alumna of Jamia Millia Islamia. She holds a degree in Bachelor of Architecture.

In her free time, Subarna enjoys creating illustrations/comics, reading and learning new languages. She has previously volunteered with various organizations including Make A Difference and Seher Asia.

Sumani is an Architect and Urban planner. Her interests are in the field of Urban Planning, Solid Waste Management and Mobility. She has over one and a half years of experience in architectural design and research in the urban planning sector. She was previously associated with HUDCO's HSMI as a Research Associate, where she supported in the preparation of study material for a course on 'Rethinking and Reinventing Cities'. Prior to that, she worked as an architect and prepared preliminary designs and working drawings for commercial and residential spaces. She received a Gold Medal as part of her Bachelors of Architecture degree. She plans to work in urban policy and citizen engagement domains. Sumani is an alumnus of Deenbandhu Chhotu Ram University of Science and Technology, Murthal. She holds a Masters in Urban and Rural Planning.

In her free time, Sumani plays badminton, learns to cook new recipes and does gardening.

Syed Mohammad Hamza Abdullah is an Architect. His interests are in the field of urban planning and policy, especially in the areas of mobility, informality, and rural-urban parity. He has two years of experience in the urban development sector and was previously associated with an architectural and planning firm based in Ahmedabad, where he worked in the domains of tourism planning, urban design and landscape. Before that, he interned with the Airports Authority of India and worked on the design development for air traffic control towers in multiple Indian cities. He has also co-founded a non-profit organization with an agenda to work on achieving 'Sustainable Cities and Communities' and has published research on the themes of planning and community engagement. He plans to work in the areas of urban and regional planning with a focus on informal communities. His undergraduate architectural thesis, titled, 'Occupation-based Design for Terracotta Community, Asharikandi, Assam" was awarded a "special mention" under the 'Best Thesis' category at the Zonal NASA convention (North Zone), 2019. Hamza is an alumnus of Jamia Millia Islamia, Delhi. He holds a degree in Bachelors of Architecture.

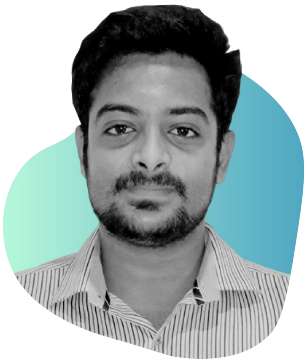
In his free time, Hamza likes to write, travel and explore good music.

Thomas Krishna Pegu is an Architect and Urban Planner. His interests are in the field of resilient infrastructure, development-induced displacement, and urban land management and has over seven months of experience in the field of disaster management. He was previously associated with the National Institute of Disaster Management, Ministry of Home Affairs, as a Young Professional, where he was involved in carrying out various tasks related to research and capacity building, especially in the field of urban risk reduction. He was one of the representatives from India to successfully participate in the Post Disaster Need Assessment & Recovery Framework conducted for the South Asian Association for Regional Cooperation member states. He plans to work in the field of migration and its impact on smart cities. Thomas is an alumnus of School of Planning and Architecture, Delhi and National Institute of Technology Hamirpur, Himachal Pradesh. He holds a Masters in Planning, with a specialization in Housing and a Bachelor of Architecture.

Thomas has a zest for his motorcycle; “hand on the throttle, one down four up, and a gravel road”. He occasionally enjoys taking out his makeshift fishing rod to catch some tasty Snakehead fish.

Vaibhav Sharma is an Engineer and a Development Strategist. His interests are in the field of social enterprise, environmental policy and data science. He has over four years of experience in the technology consulting and development sector. He was previously associated with the State Bank of India and MS Swaminathan Research Foundation as a rural development fellow where he worked on supplementing rural livelihoods and establishing a community enterprise model for tribal farmers. Prior to that, he worked as an analyst with Deloitte Consulting specializing in BigData analytics for the banking sector. He is a co-author of ‘India’s millet-based PDS system’, a research article for the Food and Agriculture Organization’s annual research publication. He plans to work in environmentally sustainable livelihood opportunities for urban India. Vaibhav is an alumnus of Thapar University. He holds a Bachelor of Engineering in Computer Science.

In his free time, Vaibhav enjoys travel photography, trekking and outdoor sports.



Veera Vishodhana VI is a Civil engineer. His interests are in the fields of solid waste management, water management and innovative building materials. He was previously associated with Blue Wave Start-ups as an intern and researcher (2016) in the project 'Aquaponics and Aqua Horse'. He has had over eight months of work experience in the building designing sector at Llollipop design shoppe Pvt Ltd, Pondicherry. He won the Best project in carbon zero challenge at IIT Madras (2017), Best research award in Chennai International Youth Fest 2.0 (2018), Best Research project from Tamil Nadu State Council for Science and Technology (2019), Best Innovator award from Rural Innovative Conclaves Start-ups, NIRD Hyderabad (2019) and was a mentor in 'I-Innovate: One million Seconds Online Hackathon' conducted by Publishsutra supported by Telangana State Innovation Cell (TSIC) and Telangana Information Technology Association (TITA) (2020). He has also published a paper on "Green Buildings''. Veera Vishodhana is an alumnus of the Centre for Rural Technology, Gandhigram Rural Institute in Tamilnadu. He holds a Bachelor of Technology in Civil Engineering.

In his free time, Veera likes to read research articles and spend time experimenting on concrete and its related works. He likes to set off on random solo trips to relax and experience new things.

Veronica Quikiumaliu Wijunamai is a young scholar. Her interests are in the field of capacity building, urban informality and grassroots engagement. She has over a year of fieldwork experience in the development and rural sector. She was previously associated with Uttarakhand Social Audit, Accountability and Transparency Agency as an intern where she worked on social auditing of government schemes, and advocacy of participatory local governance. Prior to that, she has experience in working with grassroots-centred initiatives around tribal land rights, social impact assessment, disability rights and advocacy. She plans to work in areas of urban informality and governance. Veronica is an alumna of Tata Institute of Social Sciences, Mumbai. She holds a Master of Social Work degree in Community Organisation and Development Practice.

In her free time, Veronica loves to binge eat, enjoys aesthetic photography, and exploring new cultures through travel and interactions. She volunteers for working with children in the local school and church.

Vivin R. Nair is an Economist. His interests are in the field of Economic Geography, regional development and innovation. He has over one and a half years of experience in the development and public sector. He was previously associated with the Kerala State Planning Board as a consultant intern, where he worked on a neoteric economic approach for the revival of the state economy post the Kerala floods. Prior to that, he has extensively worked on cluster-based innovation and development strategies at the city level. Currently, he is also associated with the Global Shapers Community, an initiative of the World Economic Forum. He was a merit scholar whilst in college and plans to work in the areas of urban economics and regional development. Vivin R Nair is an alumnus of the London School of Economics and Political Science. He holds a Master of Science in Local Economic Development.

In his free time, Vivin enjoys reading, exploring and expanding his taste in music. His passion for the game of cricket took him to Lord's where he played for Goodenough college cricket club.

Yogada Joshi is a graduate in Economics. Her interests are in the field of evidence-based public policy related to Environmentalism, Urban and Development Economics and decentralization of governance and development. She has over a year's experience in citizen-led action. She was previously associated with KPMG India as a risk analyst. She is a volunteer with the Bengaluru-based citizen movement 'Citizens for Bengaluru', an active resident of her RWA, and a COVID-19 relief volunteer with the Community Policing initiative of Janaagraha and the Government of Karnataka. Yogada is a recipient of the Undergraduate Social Science Talent Search Scholarship from the Institute of Social and Economic Change. She plans to work in the field of sustainable and decentralized development. Yogada is an alumnus of Christ 'Deemed to be University'. She holds a Bachelor of Arts (Honours) in Economics.

In her free time, Yogada enjoys spending time with her family. She also likes to sing and holds a Junior Grade in Carnatic Vocal.

Zara Hasnain is a public policy professional. Her interests are in the field of education and sanitation. She has over two years of experience in the development sector. She was previously associated with the Ministry of Drinking Water and Sanitation as Zila Swachh Bharat Prerak, where she was responsible for behavioural change communication, stakeholder management, capacity building and overall ODF status (rural)of the city. Prior to that, she has done her capstone project with ASER (Pratham) for six months. She has also worked in Mewat region of Haryana with Sehgal foundation on women empowerment projects. For her contribution in fieldwork she was awarded "Distinguished Alumni Award, 2019" at O.P. Jindal Global University, Sonipat. She plans to work in the areas of education, women empowerment and implementation of policies. Zara is an alumna of O.P. Jindal Global University, Sonipat and Jesus and Mary College, New Delhi. She holds a degree in Master of Arts and Bachelor of Arts (Hons.), with specialization in Public Policy and Political Science, respectively.

In her free time, Zara enjoys cooking and volunteers with non-governmental organisations.

Zia ul Haque is an Architect and an Urban & Regional Planner. His interest areas are urban planning, urban design and sustainable urbanisation of towns, and rural settlements for ecologically sensitive development and environmental sustainability. He has over five years of experience in the urban planning & development sector and was previously associated with the Regional Centre for Urban & Environmental studies in the areas of Capacity Building/Training in CBUD program and various MoHUA missions. Prior to that, he has worked on urban development missions in AMRUT, SBM and SCM programme research and implementation, focusing on sustainable urbanization in cities. He has also published & presented papers on Urban Environment, Spatial Equity and Environmental issues and challenges. Zia ul Haque is an alumnus of CEPT University, Ahmedabad (2014). He holds a degree in Masters of Urban & Regional Planning and Bachelors in Architecture with Honours from Government College of Architecture, Lucknow.

In his free time, he enjoys hiking, trekking, bird watching and exploring the indigenous Himalayan settlement's art and culture of vernacular geographies. He is also engaged in community development and participatory planning in local regions engaged in research for Kumaon and Bundelkhand region.