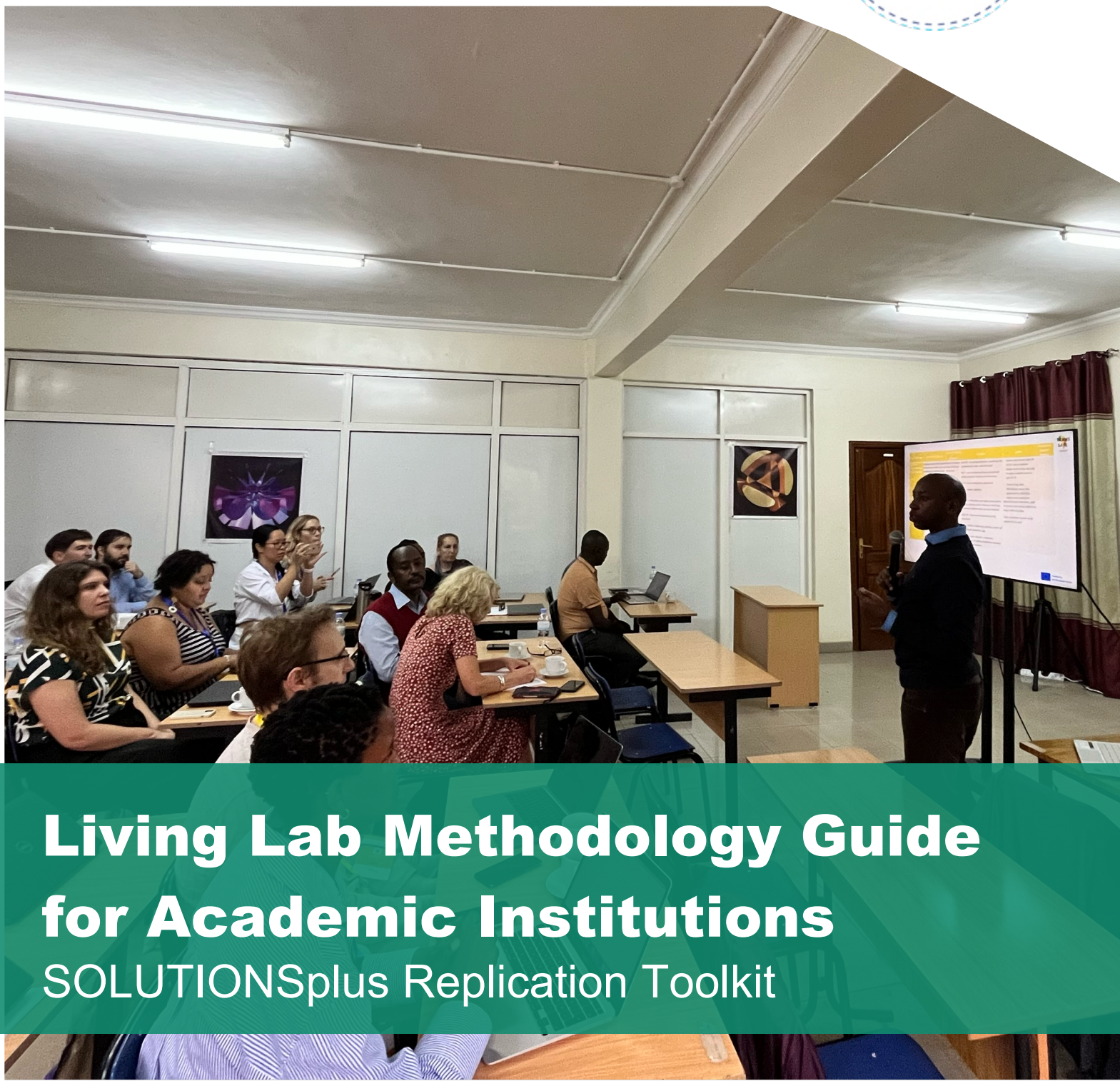


Living Lab Methodology Guide for Academic Institutions

SOLUTIONSplus Replication Toolkit

This project has received funding from the European Union Horizon 2020 research and innovation Programme under grant agreement no. 875041

PROJECT PARTNERS

ABOUT

This report has been prepared for the project SOLUTIONSplus. The project has received funding from the European Union's Horizon 2020 research and innovation programme under the grant agreement no. 875041

TITLE

Living Lab Methodology Guide for Academic Institutions

AUTHORS

Oliver Lah

DISCLAIMER

Review

Subash Dhar (UNEP)

PICTURES

All the pictures are provided by the SOL+ partners

Table of Contents

Introduction

This paper is part of a series of Replication Guides that aim to take further the learnings from the SOLUTIONSplus project. This guide will share ideas on the role of academic institutions in facilitating Urban Living Labs, which will focus on the role of academic institutions in the co-development processes. This will also include concepts for course and curriculum development to interlink teaching and Living Lab activities.

The **D4.9 Living Lab Methodology Guide for Academic Institutions** is part of a series of Replication Guides derived from the SOLUTIONSplus project, aimed at transforming urban environments into sustainable, inclusive spaces through electric mobility solutions. This guide emphasizes the integral role of academic institutions in facilitating Urban Living Labs, focusing on the co-development processes involving various stakeholders. It also offers concepts for integrating Living Lab activities into academic curricula, fostering a dynamic link between teaching and practical urban sustainability projects. Education is a crucial driver for transformative change, equipping future change-makers with the knowledge and tools necessary for effective climate action. Universities are pivotal in integrating urban climate action into their curricula, emphasizing sustainable mobility and energy transitions. Global partnerships among universities create robust networks for knowledge exchange and capacity building, ensuring the dissemination and adoption of best practices and innovative approaches. Living Labs provide dynamic environments for the co-development of urban climate projects, promoting hands-on learning and bridging the gap between theoretical knowledge and real-world applications. Educators play a critical role in this integration, with training programs designed to enhance their knowledge and skills in climate science, sustainable mobility, and participatory Living Labs. SOLUTIONSplus has established the Urban Living Lab Center, comprising regional hubs and virtual platforms for knowledge-sharing and collaboration, facilitating the widespread adoption of innovative teaching methods. This initiative promotes regional replication and fosters a transformative network for collaborative solutions to global challenges. The Living Lab methodology integrates mobility as a socio-technical system, considering technologies, regulations, institutional settings, economic factors, and social norms, ensuring that innovations are tailored to local contexts and scalable across regions. The expected outcomes include empowered educators, engaged students, innovative teaching materials, and collaborative networks, all contributing significantly to sustainable and resilient urban futures. By integrating the Living Lab approach into their teaching, educators can inspire and equip the next generation of change-makers, playing a vital role in the global effort to create liveable and accessible cities for all.

Education as Driver for Transformative Change

The SOLUTIONSplus project has been developed to support the transformation of cities towards sustainable and inclusive development, through fit-for-purpose electric mobility solutions. Central to achieving this goal is the integration of key sectors and actors to decarbonize urban systems, delivering liveable and accessible cities for all. Urban living labs serve as vital steppingstones for testing innovative solutions, which can then be scaled up to drive transformative change. In this context, education plays a crucial role, equipping the next generation of change makers with the tools and knowledge to contribute to local and global climate action. This chapter explores how university lecturers can harness the Living Lab approach in their teaching to foster transformative change in urban mobility.

The Role of Education in Urban Climate Action

As the world grapples with the unprecedented challenges posed by climate change, the importance of education in driving local and global climate action cannot be overstated. Educators are uniquely positioned to shape the minds of future leaders and change makers. Universities around the globe are collaborating to integrate urban climate action into their curricula, focusing on sustainable mobility and energy transitions.

International Collaboration for Knowledge Exchange

Universities worldwide are forming partnerships to foster an international network of experts, educators, and urban planners. These collaborations offer a unique opportunity for knowledge exchange and capacity building, ensuring that best practices and innovative approaches are disseminated and implemented across various regions. Such partnerships also provide exposure to co-development processes in urban living labs, promoting innovation, creativity, and problem-solving among participants.

Living Labs: A Hands-On Approach to Learning

Living labs are environments that promote the co-development of urban climate projects in areas such as sustainable transportation and energy efficiency. By involving both teaching professionals and students in these labs, educators can foster a sense of ownership and responsibility, encouraging active participation in climate action within their local communities. The hands-on development of projects within living labs helps students and teachers alike to understand the practical implications of theoretical knowledge, thereby bridging the gap between academia and real-world applications.

Training the Trainers: Empowering Educators

The success of integrating climate education into university curricula relies heavily on the capacity of educators to teach these subjects effectively. Training programs for educators focus on enhancing their knowledge and skills in climate science, energy transitions, sustainable mobility, and participatory

living labs. Workshops and training sessions provide educators with innovative teaching methods and materials, empowering them to inspire their students to take meaningful climate action.

Scaling Up Through Peer Exchange and Regional Hubs

To ensure the widespread adoption of these innovative teaching methods, SOLUTIONSplus helped establishing the Urban Living Lab Center, which includes regional hubs and virtual platforms for knowledge-sharing and collaboration. These hubs are open to all interested universities and facilitate the exchange of best practices and lessons learned, supporting the development of a robust network of universities committed to advancing climate education. Regional replication is encouraged through the dissemination of teaching materials and regular training programs, making these resources accessible to a broader audience. The Urban Living Lab Center leverages interconnected networks to foster consensus and dialogue among diverse stakeholders. Interested universities can receive trainings to create a transformative network that promotes collaborative solutions to global challenges. Multipliers, such as university lecturers, once trained, engage their respective university, fostering education, co-design and promoting innovative solutions.

Capacity Building in Transformative Living Labs

Transformative change in urban mobility requires a systemic approach that goes beyond technical solutions. The Living Lab approach integrates mobility as a socio-technical system, considering technologies, regulations, institutional settings, economic factors, and social norms. By co-developing solutions within these labs, stakeholders can ensure that innovations are tailored to local contexts and scalable across different regions.

Expected Outcomes and Impact

The integration of the Living Lab approach into university teaching is expected to yield several outcomes:

1. **Empowered Educators:** Teachers equipped with the knowledge and skills to integrate climate change and energy transitions into their teaching practices.
2. **Engaged Students:** Students actively participating in the co-development of urban climate projects, fostering a sense of ownership and responsibility.
3. **Innovative Teaching Materials:** Development and dissemination of innovative teaching methods and materials that can be widely adopted.
4. **Collaborative Networks:** A network of universities and stakeholders committed to advancing climate education and fostering transformative change.

Education is a powerful driver for transformative change, particularly in the context of urban mobility and climate action. By integrating the Living Lab approach into their teaching, university lecturers can inspire and equip the next generation of change makers. Through international collaboration, hands-on learning experiences, and the development of innovative teaching methods, educators can contribute significantly to the global effort to create sustainable and resilient urban futures.

Applying the Living Lab Concept in University Education

The transformation of urban mobility systems towards sustainability requires the involvement and capacity-building of local public and private sector actors. Integrating the Safe System Approach with the Living Lab methodology offers a powerful framework for achieving systemic change. This chapter aims to guide educators on how to utilize and apply the Living Lab approach in urban transformation education, translating theoretical concepts into practical advice.

Basics of Living Lab Approaches

The basic approach to Living Labs is relatively simple. Living Labs can be considered as dynamic environments for testing and co-creating innovations in real-life settings, involving diverse stakeholders in the process. They are particularly effective in addressing urban sustainability challenges due to their participatory and experimental nature. The following principles characterize Urban Living Labs (see Voytenko et al. 2016):

1. **Geographical Embeddedness**: Urban Living Labs are situated within a specific physical environment, which can range from a single building to an entire city. This geographical focus allows for contextualized experimentation and learning.
2. **Experimentation and Learning**: Innovations are tested in real-world conditions, allowing for iterative learning and adaptation. This process includes capacity-building activities to equip stakeholders with the necessary knowledge and skills.
3. **Participation**: Involves diverse stakeholders, including citizens, public entities, private actors, and knowledge institutes, ensuring a holistic approach to urban challenges.
4. **Leadership and Ownership**: Effective coordination and local champions are essential for driving the project forward while ensuring that all participants retain decision-making power.
5. **Evaluation and Refinement**: Continuous assessment and iteration of solutions are critical for adapting to local contexts and achieving long-term sustainability.

Urban Living Labs offer numerous benefits, including:

- **Collaboration**: Facilitates cooperation among diverse stakeholders.
- **Flexibility**: Allows for temporary interventions to test innovations.
- **Contextual Adaptation**: Enables the testing of existing solutions in new contexts or the creation of new, locally adapted innovations.
- **Impact Assessment**: Integrates robust monitoring and evaluation to support scaling and replication of successful initiatives.

Despite their advantages, Urban Living Labs face challenges such as:

- **Sustaining Commitment**: Maintaining engagement from all partners over time can be difficult.
- **Resource Allocation**: Securing consistent financial and human resources is crucial.
- **Communication**: Managing communication among heterogeneous partners with potentially conflicting views requires careful facilitation.

The 5 I's Framework for Urban Living Labs

To integrate all elements discussed, SOLUTIONSplus adopted the 5 I's Framework: Inform, Inspire, Initiate, Implement, and Impact (Lah 2020). This framework provides a structured process for developing and co-creating Urban Living Labs.

Inform: Capacity Building and Awareness Raising

The first stage focuses on building stakeholder capacities and raising awareness about the innovation and its potential benefits.

Conducting Training Workshops and Seminars

- **Objective**: Equip decision-makers, students, and community stakeholders with knowledge on participatory approaches, inclusive governance, and collaborative processes.
- **Example**: SOLUTIONSplus organized workshops for city officials in Africa on e-mobility solutions and participatory planning methods.

Developing Educational Materials and Resources

- **Objective**: Create accessible materials that explain methodologies and best practices related to the lab's focus.
- **Example**: Manuals on e-mobility solutions and sustainability strategies were developed and disseminated among stakeholders.

Organizing Public Events and Campaigns

- **Objective**: Raise public awareness and engage the community in the Urban Living Lab's activities.
- **Example**: Public campaigns in partner cities highlighted the benefits of sustainable urban mobility, engaging the community through interactive events.

Inspire: Stakeholder Motivation

This stage aims to inspire and motivate participants by showcasing successful case studies and providing opportunities for peer learning.

Showcasing Success Stories

- **Objective**: Demonstrate the potential of collaborative approaches and innovations.
- **Example**: Case studies from successful Urban Living Labs in Europe were shared with participants in Latin America, illustrating tangible benefits and motivating local stakeholders.

Hosting Inspirational Speakers and Thought Leaders

- **Objective**: Boost participant motivation through insights from influential speakers.
- **Example**: Experts from academia and industry shared their experiences at SOLUTIONSplus conferences, inspiring participants with their knowledge and vision.

Providing Visitation Opportunities

- **Objective**: Facilitate peer learning by allowing participants to visit successful Urban Living Labs.
- **Example**: Participants from Asian cities visited European Living Labs to observe best practices in sustainable mobility.

Initiate: Co-development

This stage focuses on bringing participants together to jointly identify challenges and opportunities and develop potential solutions.

Organizing Workshops and Charrettes

- **Objective**: Facilitate the co-development process through interactive sessions.
- **Example**: Workshops in African cities involved local stakeholders in brainstorming sessions to address urban mobility challenges.

Establishing Working Groups

- **Objective**: Ensure a holistic approach by involving diverse stakeholders.
- **Example**: Working groups in partner cities were established to co-develop pilot projects, bringing together city officials, community representatives, and industry experts.

Designing Pilot Projects

- **Objective**: Test proposed solutions through small-scale experiments.
- **Example**: Pilot projects on electric bus services were launched in selected cities to gather feedback and refine the implementation approach.

Implement: Co-creation

This stage involves the practical application of co-developed solutions, emphasizing collaboration and real-world implementation.

Collaboratively Designing and Implementing the Urban Living Lab

- **Objective**: Incorporate diverse perspectives and ensure comprehensive solutions.
- **Example**: In Latin America, stakeholders collaborated to design and implement a bike-sharing system tailored to local needs.

Establishing Monitoring and Evaluation Processes

- **Objective**: Track progress and assess the impact of implemented solutions.
- **Example**: Monitoring systems were set up to evaluate the performance of e-mobility solutions in partner cities, providing data for continuous improvement.

Providing Ongoing Support and Resources

- **Objective**: Sustain the implementation through continuous engagement and support.
- **Example**: Continuous training and resources were provided to local governments and communities to support sustainable mobility projects.

Impact: Assessing and Scaling Impact

The final stage focuses on evaluating the outcomes and identifying opportunities for replication and scaling up.

Conducting Robust Evaluations

- **Objective**: Assess the impact on urban sustainability and inclusivity.
- **Example**: Evaluations of pilot projects in Asia measured reductions in emissions and improvements in public transportation usage.

Identifying Initiatives for Replication or Scaling-Up

- **Objective**: Transfer successful initiatives to other contexts.
- **Example**: Successful electric bus projects in Europe were identified for replication in African partner cities.

Developing Strategies and Partnerships

- **Objective**: Support replication or scaling-up through collaborations and networks.
- **Example**: Partnerships were formed with international organizations to provide resources and expertise for scaling up e-mobility solutions.

Securing Funding and Financing Solutions

- **Objective**: Ensure resources for expansion through innovative financing models.
- **Example**: Funding from international donors and private investors was secured to support the scaling up of successful projects.

Sharing Best Practices and Case Studies

- **Objective**: Promote the adoption of successful approaches through knowledge dissemination.
- **Example**: Case studies and best practices from SOLUTIONSplus were published and shared through online platforms and conferences.

Practical Advice for Educators

To effectively integrate the Living Lab approach into urban transformation education, educators should:

1. **Start with the Basics**: Begin by introducing students to the fundamental concepts of Living Labs and their role in urban sustainability. Use real-world examples to illustrate these concepts.
2. **Engage Stakeholders Early**: Involve students, faculty, local government, businesses, and community members from the start. Facilitate workshops and discussions to identify local challenges and opportunities.
3. **Incorporate Thematic Inputs**: Ensure that the curriculum covers relevant themes such as sustainable mobility, energy efficiency, circular economy, and inclusive governance. Use case studies and practical examples to enrich the learning experience.
4. **Facilitate Co-creation**: Organize co-creation workshops where participants can collaboratively develop solutions. Encourage iterative testing and refinement through pilot projects.
5. **Provide Continuous Support**: Offer ongoing training, resources, and technical assistance to students and stakeholders. Create a support network to address challenges and share successes.
6. **Emphasize Evaluation and Learning**: Establish robust monitoring and evaluation processes to assess the impact of projects. Use these insights to inform future initiatives and improve the effectiveness of the Living Lab approach.
7. **Promote Replication and Scaling**: Encourage students to think about how successful projects can be scaled up or replicated in other contexts. Facilitate partnerships and secure funding to support these efforts.

Adopting a Systemic Approach in Living Lab Education

The implementation of transformative interventions to decarbonize urban mobility systems critically depends on the capacities of local public and private sector actors. The Safe System Approach offers a transformative model that shifts focus from individual behavioral change to systemic transformation, creating an enabling environment that inherently guides individuals and communities towards sustainable actions. By integrating this approach with the Living Lab methodology, educators can cultivate a rich environment for societal consensus and transformative urban solutions.

The Safe System Approach, rooted in the principles of sustainability, aims to deliver low-carbon services across essential sectors, including electricity, mobility, industry, buildings, human settlements, and agriculture (Lah 2024). This approach advocates for creating an environment where sustainable actions become the default choice, facilitated by the system's design. Drawing parallels with successful models in road safety, the Safe System Approach emphasizes the need for broad coalitions and integrated approaches in managing shared resources.

Integrating the Safe System Approach into Living Lab education provides a comprehensive framework for addressing urban sustainability challenges. By combining thematic inputs with participatory approaches, inclusive governance, and collaborative processes, educators can create a dynamic learning environment that equips students to become change-makers in urban sustainability. This holistic approach ensures that sustainability becomes the default choice, facilitated by the system's design, and promotes a more resilient and sustainable urban future. Through active involvement in Living Labs, students not only gain valuable skills and experience but also contribute significantly to the co-development of transformative urban solutions.

Key Elements of the Safe System Approach in Living Lab Education

A systemic perspective is essential in the Safe System Approach, requiring the integration of multiple urban sectors such as transportation, energy, and public health into a cohesive framework. Educators should design curricula that reflect this interconnectedness, highlighting how changes in one sector can impact others. Students should engage with real-world scenarios to see how systemic changes are implemented, through case studies, fieldwork, or simulations that demonstrate the interdependencies within urban systems.

Participatory approaches are crucial for effective implementation, relying on broad coalitions. Educators should involve students in stakeholder mapping exercises, workshops, and discussions to understand diverse interests and power dynamics. Living Labs should facilitate community engagement sessions where students can interact with local residents, gather input, and understand the social dimensions of urban sustainability projects.

Inclusive governance is another key element, with courses covering the role of policy frameworks in supporting systemic change. Students should learn about local, national, and international regulations that drive sustainable practices, and inclusive decision-making processes that ensure all voices, especially marginalized communities, are heard and considered in urban planning.

Collaborative processes are fundamental, promoting interdisciplinary collaboration across different academic disciplines. This need for diverse expertise can be facilitated through group projects and interdisciplinary workshops. By connecting with international networks of universities and research institutions, students can learn from global best practices and adapt these to local contexts.

Continuous evaluation and adaptation are vital, with the Safe System Approach requiring ongoing monitoring and feedback. Students should be trained in designing and using monitoring and evaluation frameworks to assess the impact of sustainability initiatives. An iterative approach, where projects are continuously refined based on feedback, ensures that solutions remain relevant and effective.

Practical Applications in Living Lab Education

In course design, it's important to develop curricula that integrate theoretical knowledge with practical applications of the Safe System Approach. This includes modules on systems thinking, stakeholder engagement, policy analysis, and project management. Fieldwork and experimental projects should be incorporated, allowing students to apply Safe System principles to real-world challenges, such as designing low-carbon transportation systems or energy-efficient buildings.

Student involvement in data collection and analysis is crucial. Engaging students in collecting and analyzing data on urban mobility patterns, energy consumption, and community needs provides hands-on experience that helps them understand the complexities of urban systems. Facilitating workshops where students can present their findings and proposed solutions to stakeholders allows for valuable feedback and refinement of their approaches.

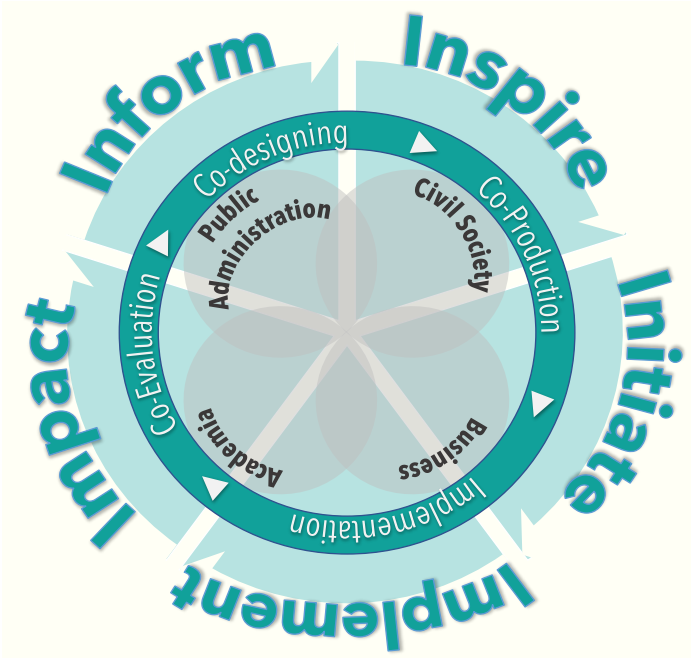
Collaborative projects should include co-design sessions with local communities, businesses, and government officials. Students can develop prototypes and test them within the Living Lab framework. Promoting international exchanges enables students to visit successful Living Labs in other countries, learn best practices, and apply these insights to their local projects.

In terms of evaluation and scaling, students should be trained to conduct robust impact assessments of their projects, focusing on sustainability metrics such as carbon footprint reduction, energy efficiency, and social inclusion. Developing strategies for scaling successful initiatives involves identifying potential funding sources, forming partnerships, and creating detailed implementation plans, ensuring that effective solutions can be replicated and expanded.

By adopting the Safe System Approach within Living Lab education, educators can create a dynamic and impactful learning environment that prepares students to become leaders in urban sustainability. This approach not only equips them with the technical skills needed for systemic change but also fosters a deep understanding of the social, economic, and environmental dimensions of urban development.

Insights from the SOLUTIONSplus Experience

To effectively integrate the various elements discussed in this chapter, we propose a systematic approach to developing and co-creating Urban Living Labs through the 5 I's Framework: Inform, Inspire, Initiate, Implement, and Impact. This framework provides a structured process for Urban Living Labs, ensuring all aspects are addressed and integrated coherently. The following sections detail how educators can use the 5 I's Framework to structure Living Lab courses, drawing from the SOLUTIONSplus experience and incorporating further examples.



Inform: Capacity Building and Awareness Raising

The first stage of the 5 I's Framework focuses on building participant capacity and raising awareness of the innovations addressed within the Urban Living Lab. This stage is crucial for laying the foundation of knowledge and understanding necessary for successful collaboration and project development.

Conducting Training Workshops and Seminars

Educators should organize specialized training workshops and seminars for decision-makers, students, and community stakeholders. These sessions can cover topics such as participatory approaches, inclusive governance, and collaborative processes. By providing in-depth knowledge and practical skills, these workshops prepare participants to effectively engage in Urban Living Lab activities.

Example from SOLUTIONSplus:
In Africa, SOLUTIONSplus conducted workshops for city officials, providing training on e-mobility solutions and participatory planning methods. These sessions equipped officials with the knowledge needed to develop and implement sustainable urban mobility projects.

Developing Educational Materials and Resources

Creating educational materials and resources is essential for supporting continuous learning. These materials can include manuals, case studies, online courses, and multimedia content that explain methodologies and best practices related to the lab's focus. Accessible and comprehensive resources ensure that all participants have a clear understanding of the concepts, processes, and benefits associated with the Urban Living Lab.

Example from SOLUTIONSplus:
Educational resources such as manuals on e-mobility solutions and sustainability strategies were developed and disseminated among stakeholders. These materials served as valuable references throughout the project lifecycle.

Organizing Public Events and Campaigns

Public events and campaigns play a significant role in raising awareness and engaging the broader community. By organizing exhibitions, open houses, and public lectures, educators can showcase the potential of Urban Living Labs to address urban challenges. These events foster community involvement and support, creating a sense of ownership and commitment to sustainable urban development.

Example from SOLUTIONSplus:
Public campaigns in partner cities highlighted the benefits of sustainable urban mobility, engaging the community through interactive events. These campaigns helped raise awareness and generate public interest in the project.

Inspire: Stakeholder Motivation

The second stage of the 5 I's Framework focuses on inspiring and motivating participants by showcasing successful case studies, hosting influential speakers, and providing opportunities for peer learning. This stage emphasizes the value of collaborative approaches and the transformative potential of Urban Living Labs.

Showcasing Success Stories

Sharing success stories from existing Urban Living Labs can demonstrate the potential of collaborative approaches and innovations. Educators can present case studies that highlight the achievements and lessons learned from similar projects. These stories serve as powerful examples that inspire participants to envision and pursue impactful solutions.

Example from SOLUTIONSplus:
Case studies from successful Urban Living Labs in Europe were shared with participants in Latin America. These stories illustrated the tangible benefits of sustainable mobility solutions and motivated local stakeholders to adopt similar approaches.

Hosting Inspirational Speakers and Thought Leaders

Inviting influential speakers and thought leaders to share their insights and experiences can significantly boost participant motivation. These experts can provide valuable perspectives on the role of Urban Living Labs and the benefits of participatory approaches. Their stories of success and innovation can inspire participants to actively engage and contribute to the project.

Example from SOLUTIONSplus:
Influential speakers from academia and industry shared their experiences at SOLUTIONSplus conferences, inspiring participants with their knowledge and vision for sustainable urban development.

Providing Visitation Opportunities

Providing opportunities for participants to visit successful Urban Living Labs allows them to observe best practices and interact with stakeholders who have implemented similar projects. These visits facilitate peer learning and exchange of ideas, helping participants understand how to overcome challenges and achieve success in their own contexts.

Example from SOLUTIONSplus:
Participants from Asian cities visited European Living Labs to observe best practices in sustainable mobility. These visits enabled them to learn from their peers and gather insights on how to implement similar solutions in their own cities.

Initiate: Co-development

The third stage, Initiate, focuses on bringing participants together to jointly identify challenges and opportunities and develop potential solutions. This stage involves collaborative activities that lay the groundwork for co-creating and testing innovative solutions.

Organizing Workshops and Charrettes

Workshops and charrettes are essential for facilitating the co-development process. These interactive sessions bring together participants from diverse backgrounds to brainstorm and identify challenges and opportunities. Through structured activities and discussions, stakeholders can generate ideas and explore potential solutions collaboratively.

Example from SOLUTIONSplus:
In African cities, workshops involved local stakeholders in brainstorming sessions to address urban mobility challenges. These sessions helped identify key issues and opportunities for innovation.

Establishing Working Groups

Forming working groups composed of representatives from various stakeholder groups ensures a holistic and inclusive approach to the project. These groups can include city officials, community representatives, industry experts, and academia. The diverse perspectives within these groups enhance the co-development process, leading to more comprehensive and effective solutions.

Example from SOLUTIONSplus:
Working groups in partner cities were established to co-develop pilot projects. These groups brought together stakeholders from different sectors to collaboratively design and implement solutions.

Designing Pilot Projects

Developing pilot projects allows for the practical testing of proposed solutions. These small-scale experiments provide valuable feedback on the feasibility and effectiveness of the solutions, enabling iterative refinement and improvement. Pilot projects serve as a crucial step in transitioning from conceptual ideas to real-world applications.

Example from SOLUTIONSplus:
Pilot projects on electric bus services were launched in selected cities to gather feedback and refine the implementation approach. These projects provided insights into operational challengesand user acceptance, informing the scaling-up process and ensuring the solutions were tailored to local needs.

Implement: Co-creation

The fourth stage, Implement, focuses on the co-creation of the Urban Living Lab, where participants work together to refine, develop, and implement sustainable urban solutions. This stage emphasizes collaboration and the practical application of co-developed solutions.

Collaboratively Designing and Implementing the Urban Living Lab

Participants work together to design and implement the Urban Living Lab, incorporating diverse perspectives and expertise. Collaborative decision-making processes ensure that the solutions are comprehensive and inclusive. This stage involves setting goals, developing strategies, and refining the design to meet the needs of the community.

Example from SOLUTIONSplus:
In Latin America, stakeholders collaborated to design and implement a bike-sharing system. The project was tailored to local needs, ensuring it was accessible and effective for the community. The collaborative design process included community workshops and stakeholder meetings to gather input and refine the project plan.

Establishing Monitoring and Evaluation Processes

Monitoring and evaluation are critical for tracking the progress and impact of the Urban Living Lab. Establishing robust processes for data collection, analysis, and reporting helps assess the effectiveness of the implemented solutions. Continuous monitoring enables stakeholders to make informed adjustments and improvements.

Example from SOLUTIONSplus:
Monitoring systems were set up to evaluate the performance of e-mobility solutions in partner cities. Data collected on usage patterns, emissions reductions, and user satisfaction informed ongoing project adjustments. Regular reports and feedback sessions were held to ensure transparency and accountability.

Providing Ongoing Support and Resources

Ongoing support and resources are essential for sustaining the implementation of the Urban Living Lab. This includes providing training, capacity-building initiatives, and access to necessary tools and knowledge. Continuous engagement and collaboration ensure that stakeholders have the support they need to overcome challenges and achieve sustainable solutions.

Example from SOLUTIONSplus:
Continuous training and resources were provided to local governments and communities to support the implementation of sustainable mobility projects. This ongoing support helped maintain momentum and address emerging issues. Resources included technical assistance, funding support, and access to a network of experts.

Impact: Replication and Scaling-Up

The final stage of the 5 I's Framework centers on assessing the impact of the Urban Living Lab and identifying opportunities for replication and scaling up. This stage involves evaluating the outcomes, sharing best practices, and developing strategies for broader implementation.

Conducting Robust Evaluations

Evaluations are conducted to assess the impact of the Urban Living Lab on urban sustainability and inclusivity. These evaluations involve measuring the outcomes and effects of the implemented solutions, gathering data, and analyzing the results. The findings help determine the effectiveness and success of the Lab and provide insights for future improvements.

Example from SOLUTIONSplus:
Evaluations of pilot projects in Asia measured reductions in emissions and improvements in public transportation usage. The results demonstrated the positive impact of the solutions and informed future initiatives. Comprehensive reports were published to document the findings and recommendations.

Identifying Initiatives for Replication or Scaling-Up

Successful initiatives within the Urban Living Lab that have demonstrated positive impact and potential for replication or scaling-up are identified. These initiatives can serve as models for similar projects in other urban contexts. Identification of such initiatives allows for the transfer of knowledge, strategies, and approaches to address urban challenges in different locations.

Example from SOLUTIONSplus:
Successful demonstrations provide the basis for replication in other partner cities. These projects provided a blueprint for similar initiatives, ensuring that lessons learned were applied in new contexts. Detailed case studies and implementation guides were developed to support replication efforts.

Developing Strategies and Partnerships

Strategies and partnerships are developed to support the replication or scaling-up of successful initiatives. This involves identifying key stakeholders, forming collaborations, and establishing networks to provide resources, expertise, and support for expansion. The aim is to create a sustainable framework for implementing similar initiatives on a larger scale.

Example from SOLUTIONSplus:
Partnerships were formed with international organizations to provide resources and expertise for scaling up e-mobility solutions. These collaborations facilitated the transfer of knowledge and supported the expansion of successful projects. Partnership agreements were established to formalize these collaborations.

Securing Funding and Financing Solutions

Adequate funding and financing solutions are identified to support the replication and scaling-up efforts. This may involve seeking public or private funding, exploring grants, partnerships with financial institutions, or developing innovative financing models to ensure the availability of resources required for expansion.

Example from SOLUTIONSplus:
Funding from international donors and private investors was secured to support the scaling up of successful projects. Innovative financing models, such as public-private partnerships, were explored to ensure long-term sustainability. Financial workshops and advisory sessions were conducted to help stakeholders navigate funding opportunities.

Sharing Best Practices and Case Studies

Sharing best practices and lessons learned is essential for promoting the adoption of successful approaches. Educators can document the experiences and outcomes of Urban Living Labs and disseminate this information through reports, conferences, workshops, and online platforms. This fosters a community of practice and encourages the replication of effective solutions.

Example from SOLUTIONSplus:
Case studies and best practices from SOLUTIONSplus were published and shared through online platforms and conferences. A comprehensive knowledge-sharing platform was developed to facilitate access to resources, tools, and experiences. Regular webinars and workshops were organized to discuss lessons learned and showcase successful projects.

Implementing the 5 I's Framework in Living Lab courses provides a structured approach for educators to guide students through the co-creation of sustainable urban solutions. By integrating thematic inputs, fostering stakeholder engagement, and promoting continuous learning and collaboration, the 5 I's Framework ensures that Urban Living Labs are effective, inclusive, and impactful. Drawing from the SOLUTIONSplus experience, educators can inspire and equip the next generation of urban planners, policymakers, and innovators to create more sustainable and inclusive urban environments.

Through active involvement in Living Labs, students not only gain valuable skills and experience but also contribute significantly to the co-development of transformative urban solutions.

Example: SOLUTIONSplus Living Lab Dar es Salaam

- *Geographical embeddedness:* Dar es Salaam pilot as part of the global project, implemented in 10 cities and 11 replication countries.

Experimentation and learning: the topic of low-carbon mobility; innovation tested: development of locally adapted electric vehicle prototypes, business models and policies. Multiple capacity-building activities targeting various scales (global, regional, city) under various modalities (online, in-person); peer-to-peer exchange.

Participation and end-user involvement: in Dar es Salaam, 11 organisations representing local public institutions (Dar es Salaam Rapid Transit Agency), research and knowledge partners (Dar es Salaam Institute of Technology, German Aerospace DLR, Wuppertal Institute, TUB Berlin, UEMI, ITDP Africa), industry partners (IDIADA, FIER Automotive, IDIADA, PluService), together with citizens (transport providers, i.e. drivers of three-wheeled vehicles and cycling cooperative, passengers).

Partners from the Dar es Salaam Lab is supported by 46 consortium partners providing cross-cutting support to cities, e.g., for capacity-building or policy advice (e.g., UN-Habitat, UN Environment, CODATU, POLIS).

- *Leadership and ownership*: coordination at the global level through UEMI; lead at the local level through DART; partners leading in thematic subgroups (e.g., data collection, capacity building, policy, etc.)

- *Evaluation and refinement:* identification of the needs and preferences of transport operators (drivers), consequently adjusting the vehicle technical specifications. Scaling-up and replication is ensured via a programme to scale-up e-feeder services to the BRT; replication of the three-wheeler component to a rural context in Kenya
- *Duration:* four years
- *Budget*: financial support to local innovators of approximately 330.000 euros; circa 20 million euros at consortium level for all ten pilot cities, 11 replication countries, and 46 partners.

Engaging Students as Facilitators in Living Labs

Students can play a pivotal role in facilitating exchanges with co-development partners in participatory Living Labs. Their involvement in various formats such as courses, surveys, stakeholder engagement, co-design, and case studies for Masters or PhD theses can shape transformative Living Labs by connecting sectors and actors effectively.

1. **Living Labs Course:**
• **Course Design:** Develop courses that integrate theoretical knowledge with practical applications. Include modules on stakeholder engagement, sustainable urban planning, and project management.
• **Fieldwork:** Encourage students to participate in real-world Living Lab projects, providing them with hands-on experience in co-developing solutions.
2. **Student Involvement in Surveys:**
• **Data Collection:** Engage students in conducting surveys to gather data on urban mobility patterns, energy usage, and community needs.
• **Analysis and Reporting:** Train students to analyze survey data and present findings to stakeholders, facilitating informed decision-making.
3. **Stakeholder Engagement:**
• **Workshops and Meetings:** Involve students in organizing and facilitating workshops and meetings with stakeholders, enhancing their skills in communication and negotiation.
• **Feedback Mechanisms:** Establish channels for students to gather and incorporate stakeholder feedback into project designs, ensuring that solutions are relevant and accepted by the community.

4.	**Co-design Projects:**
•	**Collaborative Design Sessions:** Encourage students to participate in co-design sessions with community members, local businesses, and government officials.
•	**Prototype Development:** Guide students in developing prototypes of their solutions and testing them within the Living Lab framework.
5.	**Case Studies for Masters or PhD Theses:**
•	**Research Focus:** Support students in selecting case study topics that align with the objectives of the Living Lab, such as sustainable transportation, energy efficiency, or inclusive governance.
•	**Field Research:** Facilitate opportunities for students to conduct field research, engaging with stakeholders and gathering real-world data to inform their theses.

Practical Applications and Case Studies

Case Study 1: Sustainable Mobility Urban Design Studios
Students at the Urban Living Lab Center at TU Berlin were involved in several design studio projects to develop sustainable mobility concepts for the SOLUTIONSplus cities. They worked with Living Lab teams to understand mobility patterns and co-designed a pilot site for multi-modal hubs link different use-cases and services for electric passenger and freight mobility services (see example on studio course outline in the next chapter).

Case Study 2: Systems Design Solutions
A group of Bachelors students at the Technical University of Denmark (DTU) collaborated with the Living Lab team in Nepal to develop electric mobility business concepts. They participated in co-creation exchanges, engaged partners and stakeholders, and analyzed the impact on local mobility, energy consumption and economic development.

Case Study 3: Circular Economy Practices in Kigali and Kathmandu
Master and PhD candidates at the University of Rwanda and the University of Kathmandu worked on specific components their respective Living Labs, which included urban and transportation planning and engineering aspects. They conducted extensive field research, engaged stakeholders in co-design sessions, and developed a comprehensive technical, planning and policy recommendations.

Co-design Studios as Tool for Living Lab Education

This chapter presents the key components of a design/planning studio as a teaching format. Design and planning studios are central features of teaching in bachelor's and master's courses in architecture, urban planning, spatial planning, development, and management. It is a teaching format that goes beyond traditional lectures and is characterized by a strong practical orientation. This approach involves simulating professional working conditions through active engagement with real-life problems in an urban context. In alignment with the Urban Living Lab Centre's approach, the presented format aims to support living lab activities across the partner network. The objective is to build upon a range of research, innovation, and development cooperation projects and provide a platform for

actors and projects in the field to enhance and sustain urban transformation actions. The network of Labs and Hubs supports the implementation of action-oriented urban development projects in Asia, Africa, and Latin America, fostering synergies and minimizing duplications. The founding group serves as the initial driver of the partnership and will provide resources for the development and coordination of the partnership. A core element of the collaboration with partner universities is the integration of living lab case studies into ongoing academic and capacity-building work. Alternatively, the designs studio may support local actors and act as a pre-feasibility study or a research activity helping to conceptualise future living lab activities. The presented outline of the design studio as a teaching format facilitates such approaches and provides a flexible framework adaptable to local contexts.
Depending on the level of pre-existing design skills, design studios may integrate various methods and visual outputs corresponding to the participants' capacities. This document focuses on the context in which the engaged team has existing design skills, particularly in the usage of main design software such as Adobe Illustrator, InDesign, SketchUp, and ArchiCAD. However, the presented approach goes beyond the sole design aspect and aims to address integrated planning issues through the incorporation of socio-spatial and economic analyses and project planning approaches
Format and structure

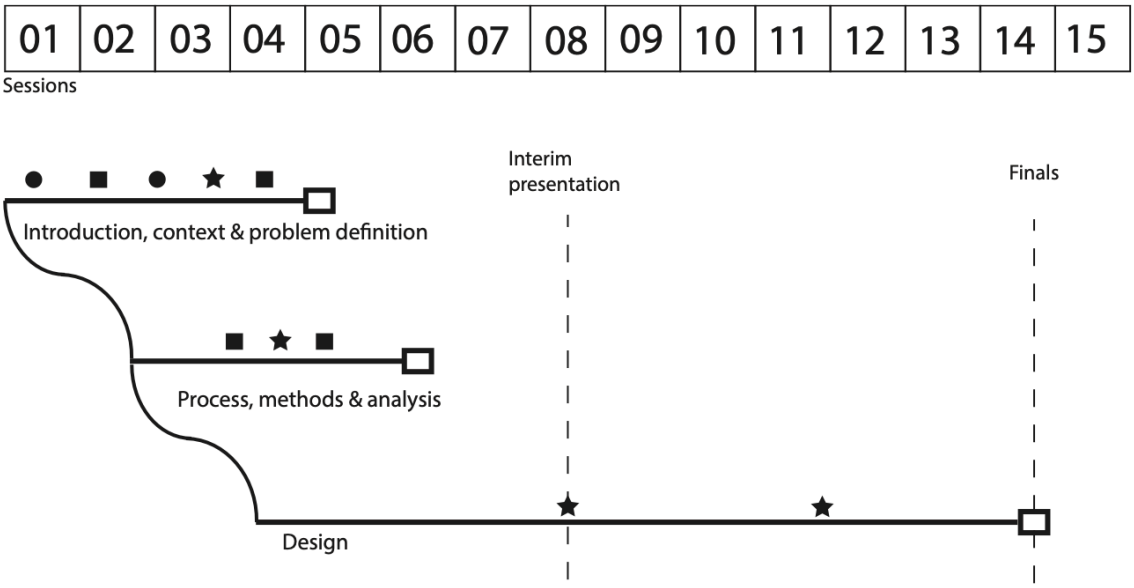
The presented format focuses on a classical semester-long course, typically spanning 4 to a maximum of 5 months of engagement. While flexible in terms of duration, it incorporates three permanent components:

1. **Introduction, Context, and Problem Definition**: This component includes an introductory session that presents the project's context, teaching objectives, and desired outcomes. It integrates initial inputs from external stakeholders relevant to the project and, when possible, includes site visits to the study area. Additionally, the introductory sessions can feature thematic inputs from the instructor(s), student presentations, and feedback sessions on pre-assigned literature covering relevant theoretical aspects of the studio's subject and integrated planning matters

2. **Process, Methods, and Analysis**: This segment encompasses the definition of the main steps for the studio projects, the elaboration of methods, and the commencement of the analysis of pertinent materials. This material may include project documents, master plans, socio-economic data, stakeholder information, and GIS/remote sensing data. It may also involve student training in specific methods to be used during the analysis phase.

3. **Design Phase**: The design phase may begin concurrently with other project components. It is a creative and loosely structured process in which student groups collaborate with each other and consult with supervisors on a systematic basis. If the studio focuses on an location where students have direct access, the design phase should involve systematic site visits to help them understand the local context, spatial qualities, and the uses of spaces by the local population. The network of Labs and Hubs also enables cooperation across different contexts, even when student groups work from a distant locations. In such cases, establishing direct links with local labs and universities is highly recommended. In an ideal scenario, this approach can lead to a collaborative studio involving students from two educational institutions based in different countries. If this isn't feasible, collaboration should aim to provide access to local data, videos,

and contact with local populations. While direct cooperation between groups with similar skill sets (architects/urban designers/planners) is common, cross-disciplinary collaboration, such as across architecture/design and road engineering/waste management/infrastructure planning/resource efficiency etc., can also be beneficial. Such cooperation exposes students Specifics of interdisciplinary work typical in a living lab setting.



● TUTORIALS

■ RESEARCH/ STUDENTS INPUTS

★ EXTERNAL INPUTS/STAKEHOLDER CONSULTATION

Overall, there is flexibility in arranging the time and determining group sizes, which depends on the local academic culture and course requirements. Typical setting involves a group of 10-16 students divided into sub-groups of 3-4 individuals, with each group focusing on specific projects or a component of a larger task. The time commitment includes a substantial amount of individual and group work within a workshop setting, totaling approximately two days a week. This involves dedicated weekly sessions during which groups consult their progress with the course supervisor(s). There is a significant emphasis on peer learning, collaboration, and feedback sessions among the sub-groups working in the studio.

Elaborating studio's contents

The planning of the studio's content by the lead(s) may incorporate various components relevant to local contexts. However, the following elements are typically predefined to facilitate the implementation of the sessions:

1. **Thematic Contexts and Project Goals**: This involves defining the spatial setting of the living lab, its primary objectives, and crucial socio-economic and contextual information.

2. **Defining Target Audiences and Teaching Goals**: This step specifies what course participants will learn, which methods they will master, and what kind of interdisciplinary competencies and interactions will be achieved during the project course.

3. **Developing Training Contents and Materials**: This includes creating a list of lectures relevant to the specific context, recommended literature for students to become familiar with, and key documents providing insights into local realities.

4. **Methods Applied in the Studio**: A portfolio of methods relevant to the course should be prepared in advance. This may include design methods as well as other tools pertinent to the integrated planning process, such as project management tools like stakeholder analysis, socio-economic analysis, SWOT analysis, and similar approaches.

5. **Local Partners**: Involves defining a list of key stakeholders who may have a direct or indirect interest in the studio's outcomes. The former are crucial for the smooth implementation of the course, especially in a remote setting from the students' perspective. Securing a permanent local contact ensures access to data, alignment with living lab tasks, and the leverage of additional feedback from local actors. In the case of a remote studio, additional contacts with local universities, who may engage their students in the process, are highly desirable.

6. **Site Visits**: Whenever possible, consider planning site visits in the initial phase of the studio. If direct visits are not possible, feedback from local contacts is essential. In addition to data, this includes potential interactions with community representatives, video materials, and recordings that shed light on the local spatial contexts and the livability of the area in question.

7. **Workspace and Materials**: Design studios should be allocated their own dedicated space where students can meet independently at any time. This space should enable students to work with plans, maps, and large-scale models. While much of the work is done using dedicated software, the opportunity to work with physical materials and models is often considered crucial in architectural education. Additionally, the outcomes of the studio may sometimes be presented in the form of a small exhibition involving posters, models, and similar displays.

8. **Evaluation of the Studio**: This involves the elaboration of grading criteria for students' work and the evaluation of the course itself. The former includes the definition of a clear grading system to be shared with course participants. The latter entails evaluating the course, where students can provide feedback on the content, instructors' work, and their overall impressions of the course in an anonymized format.

Methods/tools glossary

Depending on the precise task of the design studio different methods may be relevant. The following list presents the key methods and tools applied in a context of urban planning interventions. They are categorised into design methods and socio-economic, project planning tools.

Design Methods:

- **Site analysis** - concentrating on analysis of physical features (such as topography), environmental factors (such as urban greenery, natural habitats, protected areas, climate conditions), local regulations and plans (such as zoning, land use), accessibility and connectivity (including public transportation networks, circulation patterns), infrastructural configurations, historical features (such as heritage conservation, monuments).

- **Morphological and Typological Analysis**: Morphological analysis involves the study of urban spatial forms, including their primary physical elements such as buildings, public spaces, and streets, along with the changes these spaces undergo over time. Specific elements of this process may include the analysis of building footprints, heights, densities, grain size, and blocks, as well as the relationships between assemblies of buildings and spaces. The definition of typologies of urban space helps classify specific elements of urban built forms and systems by highlighting specific characteristics of spatial appearance.

- **Diagrammatic Sketching/Drawing**: This is a tool applied in the early phases of the design process, aiming to generalize initial concepts through the abstraction and simplification of complex problems and facilitating the communication of ideas. It can help develop the graphic language of the project and aid in creating initial conceptual designs.

- **Mapping Spatial Systems**: This method goes beyond representing physical objects and includes visualizing interrelationships between social, political, and natural processes. It deciphers the functionality and common purposes of the analyzed systems, distinguishing them from surrounding areas. It can also help identify points for intervention. Examples of its application include the analysis of urban landscapes and complex socio-environmental dependencies or mapping infrastructures and material flows.

- **Viewshed Analysis**: Viewshed analysis represents an urban space with clear visual acuity. Analyzing viewsheds can visualize the impact of introducing additional structures into a specific urban site or help identify the most attractive pathways for human mobility. This analysis is often conducted using dedicated software, such as GIS, which enables determining the 3D view from a specific viewpoint.

- **Participatory Design**: Participatory design is a common approach to engaging with local communities. Although it may not always be feasible in a classroom context, it allows for gaining local insights and involving people in co-designing urban solutions. It can be facilitated through various means, including public meetings and workshops (charrettes), creating local maps and models, virtual reality exercises, and games leading to design outputs or the prioritization of specific interventions.

- **Social Science Tools / Rapid Urban Appraisal**: This represents a set of approaches that can support the design process through data collection on the use of spaces and local priorities in real-life urban contexts. These techniques may range from disguised or participant observation to semi-structured interviews, focus group discussions, transect walks in the community.

Socio-economic analysis and project planning tools

- **Socio-economic analysis**: focuses on analyzing the main economic, social, and demographic factors that shape the development of local sites. When reliable local data sources are available, this analysis becomes a necessary step in diagnosing how spatial solutions may either alleviate or exacerbate issues such as social exclusion, unemployment, and the marginalization of low-income groups. Its objective is to provide background information on the current status and policies related to the issues mentioned above and reinforcing a strategic orientation towards inclusive solutions in the area of intervention.

- **Strategic Planning**: Strategic planning aims for the comprehensive development of project steps. It involves defining overall and specific objectives of the project; outlining the main activities to be undertaken; determining evaluation methods and indicators to verify progress. The goal is to ensure the sustainability of the chosen approach and facilitate a logical project flow that addresses pre-identified problems with appropriate solutions. The strategic planning process can be supported by additional project planning tools such as Logical Framework Matrix.

- **SWOT Analysis**: it is often applied as part of the strategic planning process. It entails an examination of Strengths, Weaknesses, Opportunities, and Threats that may either support or undermine the project's implementation.

- **PESTLE Analysis**: PESTLE analysis complements SWOT analysis and helps study key external factors influencing the implementation of a project or living lab. It considers the influence of Political, Economic, Social, Technological, Legal, and Environmental factors. This analysis aids in identifying emerging trends in the policy environment and potential co-benefits across multiple sectors that the project can stimulate.

- **Stakeholder Analysis**: Stakeholder analysis is an essential part of the project planning process, systematically identifying and assessing the influence specific stakeholder groups may have on the project. It categorizes the power and interests held by these groups and helps develop appropriate engagement strategies that can address their often conflicting agendas. This approach also assists in understanding which groups may be underprivileged in the planning process and how to facilitate co-production of living lab solutions across various sectors.

Grading and evaluation

The grading system depends on the local academic context and is detailed in dedicated module descriptors incorporated into the curriculum of the host university. These descriptors include brief information on course prerequisites, course content, objectives, learning outcomes, materials/literature, examination types, and grading methods. For design studios, examinations are typically conducted in a jury setting composed of course instructors, relevant stakeholders, and studio guests. Presentations are delivered within approximately 30-minute time slots and are evaluated based on criteria established at the beginning of the course. These criteria usually encompass clarity of delivery, identification of problems and solutions, quality of analysis and design outputs, and responses to questions from the jury. This type of evaluation typically carries a minimum weight of

60% in the final grade for the group. Other criteria may pertain to the quality of collaborative work, task preparation, materials, participation in group sessions, and individual workload. These criteria allow for the introduction of an individual component into group work and, if necessary, differentiation of grades among group members. However, work is generally evaluated on a project basis unless an individual member of the group fails to contribute to the common work. Another evaluation criterion includes the production of project brochures and materials, which may be separately graded depending on the course's structure.
In addition to evaluating students' work, the course itself should undergo evaluation to enhance the quality of future editions of the studio. These evaluations should be conducted through an anonymous survey, which includes reflections on the course's difficulty, workload, quality of teaching, instructional methods, and potential strengths and weaknesses

Follow up work, integration of studio outputs

Studio work, apart from its educational value, offers an opportunity to promote the living lab vision within the local policy and decision-making environment. In this sense, the speculative designs and visuals created by students can be used to engage in conversations about future scenarios for a city. This tool is particularly valuable when the design outputs facilitate the manifestation of alternative pathways for planning, demonstrating co-benefits across multiple sectors. This especially pertains to harnessing the potential of socio-economic inclusivity and new urban technologies, such as e-mobility, in the transition process, while aligning with the public sector's desire to create representative spaces. Such demonstrations can help counterbalance traditional planning narratives, for instance, by promoting public transportation and micro-mobility over car-oriented large-scale road infrastructure. Studios can also serve as catalysts for entirely new projects, stimulating funding opportunities from external donors. In this sense, they take the form of a pre-feasibility study or a research activity that can be subsequently transformed into a dedicated funding application.

The studio process can provide an opportunity to identify potential support for living lab activities through dedicated master projects built upon the design work or by recruiting selected students for internship positions.

Examples of studio outputs

The following links provide examples of the outputs from design studios that have supported SOLUTIONSplus partner cities. These encompass the final projects as well as project brochures that elaborate on each aspect of project planning, including analysis, design, and project mainstreaming strategies.
Project Brochures:

- Design Proposal Montevideo - Ciudadela 2.0 http://www.urban-pathways.org/uploads/4/8/9/5/48950199/ucmg_progress_report_4_appendix_1__local_stk_ws_design_proposal_montevideo.pdf
- Last Mile connectivity - Dar es Salaam http://www.urban-pathways.org/uploads/4/8/9/5/48950199/ucmg_progress_report_4_appendix_1_local_stk_ws_design_proposal_dar_es_salaam.pdf

Course Outline

The “Transformative Living Labs” course, developed with support from the SOLUTIONSplus project and MIT, is an innovative educational program designed to introduce sustainable and equitable solutions in urban mobility through the Living Labs model. This chapter provides a detailed guide for educators on how to structure and deliver this course in a hybrid format, combining online and in-person elements. The course leverages lectures, examples, and assignments to help students understand and apply the Living Labs approach to urban sustainability transitions.

This course introduces students to the Living Labs model, a method of co-development among public and private actors, researchers, and civil society. The course focuses on sustainable transitions in urban mobility as a case study to apply the model. Students will explore how multiple stakeholders can organize and investigate Living Labs to address urban issues, particularly focusing on sustainable urban mobility solutions.

Learning Outcomes:

- Understand the key principles and methodologies of Living Labs.
- Develop and implement a Living Lab, including stakeholder engagement and coalition building.
- Integrate the Living Labs model with policy, planning, and private entities to drive sustainable urban mobility solutions.

Course Structure

The course is structured around the five steps in the co-development process: Context, Inform, Inspire, Initiate, Implement, and Impact. Each step corresponds to a week of the course, providing a coherent approach for testing innovative sustainable mobility solutions in urban Living Labs.

The Transformative Living Labs course is organized around the five steps in the co-development process: Context, Inform, Inspire, Initiate, Implement, and Impact. Each week focuses on one of these steps, providing a structured and coherent approach to exploring and testing innovative sustainable mobility solutions in urban Living Labs. Below is a detailed guide on how to deliver this course effectively.

Week 1: Context

Topic: Urban Living Lab Concepts and Basics of Urban Mobility Transitions

In the first week, students are introduced to the foundational concepts of Living Labs and the basics of urban mobility transitions. The objectives are to familiarize students with the concept

of Living Labs, discuss the fundamentals of urban mobility transitions, and understand the critical role of sustainable mobility in urban development.

The lectures will cover the history, evolution, and key characteristics of Living Labs, and discuss key concepts, challenges, and opportunities in transitioning to sustainable urban mobility. Educators should use case studies to illustrate the impact of real-life experimentation in urban settings, and review successful urban mobility projects in European cities to provide insights and lessons learned.

Assignments for this week include reading articles on Living Labs and urban mobility transitions, and writing a reflection paper on the potential of Living Labs in their city, addressing how these labs could solve local mobility challenges.

Week 2: Inform

Topic: Levels of Intervention in Urban Mobility

The second week focuses on the various levels of intervention in urban mobility. Students will be provided with an overview of different intervention levels, and analyze examples of interventions and their impacts.

Lectures will discuss interventions from local to global scales in urban mobility and examine sustainable mobility solutions, including technologies and policies. Examples will include the analysis of electric bus implementation in Latin American cities, and the success factors and replication potential of bike-sharing systems in European capitals.

Assignments involve evaluating the success of a specific mobility intervention in a selected city through case study analysis and proposing a new mobility solution for a selected urban area through a group project, detailing potential impacts and implementation strategies.

Week 3: Inspire

Topic: Capacity Building and Peer-to-Peer Exchange

In the third week, the focus is on building capacities and inspiring students through peer-to-peer exchanges. This aims to foster the uptake of innovative approaches and facilitate peer exchanges among participants.

Lectures will cover strategies for effective stakeholder engagement and knowledge transfer within Living Labs, and the role of collaborative learning in sustainable urban development. Educators should highlight successful peer exchange programs between European and Asian

cities facilitated by SOLUTIONSplus, and showcase workshops that inspire local governments through targeted capacity-building initiatives.

Assignments include providing peer reviews on classmates' proposed mobility solutions and attending a virtual workshop with industry experts, documenting key takeaways and insights.

Week 4: Initiate

Topic: Strengthening Collaboration and Developing Living Lab Concepts

Week four focuses on initiating partnerships and developing Living Lab concepts tailored to specific urban challenges. The goal is to strengthen collaboration and develop actionable Living Lab concepts.

Lectures will address techniques for forming effective partnerships and engaging stakeholders, and provide steps and best practices for designing a Living Lab from concept to implementation. Educators should use case studies to discuss partnership development in African cities, highlighting challenges and successes, and review effective stakeholder engagement techniques used by SOLUTIONSplus.

Assignments include developing a partnership proposal for a Living Lab in their city, including potential stakeholders and collaboration strategies, and designing a Living Lab concept that addresses a local urban issue, outlining goals, stakeholders, and expected outcomes.

Week 5: Implement

Topic: Creating Reference Models and Demonstration Actions

In the fifth week, the focus is on implementing demonstration actions to create reference models. Students will understand the practical aspects of deploying Living Labs and how to establish robust monitoring and evaluation frameworks.

Lectures will discuss practical considerations and logistical challenges in implementing Living Labs, and the importance of establishing monitoring and evaluation frameworks. Examples will include the deployment of electric vehicle fleets in European cities and the evaluation frameworks used in SOLUTIONSplus projects.

Assignments involve developing a detailed plan for deploying a Living Lab project, including timelines, responsibilities, and resource allocation, and designing a framework to monitor and evaluate the project's impact, including key performance indicators and data collection methods.

Week 6: Impact

Topic: Scaling-Up, Replication, and Transfer

The final week addresses strategies for scaling up and replicating successful initiatives, emphasizing the importance of impact assessment and knowledge transfer.

Lectures will cover strategies and challenges in expanding successful initiatives and techniques for evaluating and sharing outcomes. Educators should provide examples of the replication of bike-sharing systems in different cities, analyzing scalability and transferability, and discuss effective scaling strategies from SOLUTIONSplus projects.

Assignments include creating a strategy for scaling up a Living Lab project, detailing steps, partnerships, and resource needs, and presenting a final project that highlights the potential impact and scalability of their Living Lab project. Students will prepare a comprehensive report summarizing their findings and recommendations.

Practical Advice for Educators

Designing and delivering a hybrid course on Transformative Living Labs requires a thoughtful blend of various educational strategies to maximize student engagement and learning outcomes. Here are practical steps and strategies that educators can adopt to ensure the course is effective, dynamic, and impactful.

Your students are welcome to register in the MIT course, but we can also set-up a separate e-learning environment jointly at your university in collaboration with the Urban Living Lab Center.

1. Combine Online and In-Person Sessions:

Leveraging the strengths of both online and in-person learning environments can greatly enhance the educational experience. Online platforms should be utilized for delivering lectures, providing reading materials, and facilitating discussions. This approach offers flexibility and accessibility, allowing students to engage with course content at their own pace and from different locations. However, to complement this, organizing in-person workshops, field visits, and laboratory sessions is crucial. These face-to-face interactions provide hands-on experience and enable direct engagement with stakeholders, which is essential for understanding the practical applications of Living Labs.

2. Engage Diverse Stakeholders:

Involving a wide array of participants enriches the learning experience and mirrors the real-world complexity of urban sustainability projects. Include students, faculty, local government officials, business leaders, and community members in the course activities. This diverse stakeholder engagement facilitates richer discussions and broader perspectives. Encourage collaboration through group projects, joint assignments, and interactive sessions, fostering a learning environment where ideas can be exchanged and developed collectively.

3. Use Real-World Examples:

Bringing theoretical concepts to life through real-world examples is essential for practical understanding. Incorporate case studies and examples from the SOLUTIONSplus project and other successful initiatives to provide context and practical insights. Additionally, invite guest speakers who have experience in implementing Living Labs to share their knowledge and first-hand experiences. These real-world examples help students see the tangible impacts of the concepts they are learning about and understand the challenges and successes of similar projects.

4. Foster Active Learning:

Active learning strategies are key to student engagement and knowledge retention. Encourage active participation in discussions, workshops, and peer-to-peer exchanges to create a vibrant learning community. Utilize interactive tools such as online forums, collaborative software, and virtual breakout rooms to facilitate engagement. These tools not only make the learning process more dynamic but also help students develop critical thinking and collaborative skills.

5. Emphasize Practical Application:

Theoretical knowledge needs to be complemented with practical application to fully prepare students for real-world challenges. Assign projects that require students to apply theoretical concepts to real-world problems, fostering practical problem-solving skills. Provide opportunities for students to develop and implement pilot projects, allowing them to gain hands-on experience. This approach helps students understand the complexities of urban sustainability and the practical steps required to achieve it.

6. Continuously Assess and Adapt:

Continuous assessment and adaptation are vital for maintaining the relevance and effectiveness of the course. Use formative assessments to gauge student understanding and

provide timely feedback. Regularly adapt course content and activities based on student feedback, learning outcomes, and emerging trends in urban mobility. This iterative approach ensures that the course remains current and responsive to both student needs and the evolving landscape of urban sustainability.

By integrating these practical strategies, educators can create a robust hybrid course that not only imparts essential knowledge and skills but also prepares students to become effective change makers in the field of urban sustainability.

The hybrid course format for “Transformative Living Labs” offers a comprehensive approach to teaching sustainable urban mobility solutions through the Living Labs model. By integrating lectures, examples, and assignments, educators can provide students with the knowledge and skills needed to drive urban sustainability transitions. The course’s structure around the 5 I’s Framework ensures a coherent and practical learning experience, preparing students to become effective change makers in urban development. Through this course, students will not only gain theoretical knowledge but also develop the practical skills necessary to implement and scale innovative solutions in real-world urban settings.

Conclusion

The D4.9 Living Lab Methodology Guide for Academic Institutions highlights the pivotal role of educational institutions in driving urban transformation through the integration of Living Lab methodologies into academic curricula. This guide, as part of the broader SOLUTIONSplus project, underscores the significance of collaborative efforts among stakeholders in the co-development of sustainable urban mobility solutions. By fostering hands-on learning environments and bridging theoretical knowledge with real-world applications, academic institutions can empower the next generation of change-makers to lead the charge in urban sustainability.

The Safe System Approach, when integrated into Living Lab education, provides a comprehensive framework for addressing the multifaceted challenges of urban sustainability. This approach emphasizes the need for systemic change rather than isolated interventions, ensuring that sustainable actions become the default choice through well-designed urban systems. By adopting this holistic perspective, educators can prepare students to navigate and influence the complex socio-technical landscapes of modern cities.

Through the establishment of the Urban Living Lab Center and its regional hubs, SOLUTIONSplus has facilitated a robust network for knowledge exchange and capacity building. This initiative has proven instrumental in promoting the dissemination and adoption

of innovative teaching methods and sustainable practices across diverse academic and geographical contexts. The collaboration fostered through these networks not only enhances the educational experience but also contributes to the broader goal of creating liveable, accessible, and sustainable urban environments.

The integration of Living Lab concepts into university courses offers numerous benefits, including the empowerment of educators, the engagement of students in meaningful climate action, the development of innovative teaching materials, and the formation of collaborative networks. These outcomes are essential for fostering transformative change in urban mobility and broader sustainability efforts.

As the world faces unprecedented challenges related to climate change and urbanization, the role of education in shaping sustainable futures has never been more critical. By leveraging the Living Lab methodology, academic institutions can play a crucial role in advancing urban sustainability. This guide serves as a valuable resource for educators, providing practical advice and structured approaches to integrating Living Lab concepts into their teaching. Through continued collaboration, innovation, and commitment to sustainable development, universities can inspire and equip future leaders to create resilient and inclusive urban environments for generations to come.

Literature

Gesike, U., Low M., Million, A., Misselwitz P. & Stollman J. (Eds.) (2021) Urban Design Methods. Integrated Urban Research Tools. Jovis

Davidson F., Payne G., (2000) Urban Projects Manual. University Liverpool Press. https://forbesdavidsonplanning.com/wp-content/uploads/2020/11/urban-projects-manual.pdf

Dovey, K., Pafka, E., & Ristic, M. (Eds.). (2017). Mapping urbanities: Morphologies, flows, possibilities. Routledge

Gehl, J. (2013). Cities for people. Island press / The public life diversity toolkit. Ghel Institute.

Hamdi, N. (2010). The placemaker's guide to building community. Earthscan.

Lah, O. (2020). Transformative Living Labs a Co-development Approach for Effective Sustainable Urban Development Solutions. Urban Living Lab Center, Berlin.

Lah, O. (2024). Safe system for sustainable development. Sustain Earth Reviews 7, 9. https://doi.org/10.1186/s42055-024-00072-z

Streets for walking & cycling. Design for safety, accessibility, and comfort in African cities. UN-Habitat, IDTP. https://africa.itdp.org/publication/africa-streets-walking-cycling/

Stojanovski, T. (2020). Urban design and public transportation–public spaces, visual proximity and Transit-Oriented Development (TOD). Journal of Urban Design, 25(1), 134-154. https://doi.org/10.1080/13574809.2019.1592665

UN-Habitat (2016) Urban Planning and Design Lab's: Tools for Integrated and Participatory Urban Planning (2016) https://unhabitat.org/sites/default/files/download-manager-files/lab%20publication%20v.1.0%20reviewed.pdf

Voytenko, Y., K. McCormick, J. Evans, G. Schliwa. (2016): Urban living labs for sustainability and low carbon cities in Europe: Towards a research agenda. Journal of Cleaner Production 123: 45–54

Annex I: Supplementary Course Outlines

For further insights on the practical results from Living Labs on guidance on key technical, policy and operational components, SOLUTIONSplus has develop a comprehensive education toolbox with factsheets, policy papers, Living Lab assessments, video lectures, presentations and other supporting material that lecturers are welcome to use free of change. All material is made available on the Toolbox (www.emobility.tools) , the project website (www.solutionsplus.eu) and the Urban Living Lab Center websites (www.living-lab.center). Below are three outlines of courses as example structures for supporting short courses.

Electric Mobility and Charging Infrastructure – An Overview (course components / short course)

Target Group

Current final-year students, recently graduated candidates, candidates aspiring to enter the e-mobility job sector with a background in Electrical, Mechanical or Transportation engineering/sciences.

Allocation of study and teaching hours

	Student Hours
Lectures (in-person)	12
Site visits	3
Self-Study (reading and online modules)	15
Assignments (one written assignment)	10
Other:	
Total Hours	40

Brief description of aims and content

To understand sustainable urban transport and electric mobility's role in developing sustainable urban transport.

To appreciate the various electric mobility options available for implementation and the interlinkages involved in implementing electric mobility.

To get an overview of the various charging options available in electric mobility and their implementation contexts

Duration of the course

The course is planned to be held over three (3) days. This can be three (3) consecutive working days or one working day and two (2) weekends. The weekend activity allows the participation of individuals who are currently employed.

Indicative content distributed across days

Day 1: Electric Mobility – the big picture (4 hours)

Overview of sustainable transport – Why, how and what
Role of e-mobility in advancing sustainable transport and addressing climate change
Environmental and social benefits of electric mobility
Overview of the glossary of terms in electric mobility.

Day 2: Charging infrastructure (4 hours + 4 hours)

Kinds of charging infrastructure
Planning for charging infrastructure – connectors, power levels, AC vs DC
Batteries – systems, charging standards, range and performance,

Guest lecture: A charging company or an e-mobility company explaining their business and the charging options that they use
Site visit: To a charging station (4 hours)

Day 3: EV maintenance and developing a business (4 hours)

Basics of EV maintenance
Battery management systems, factors affecting efficiency, battery charging and discharging, recycling batteries
Overview of business models in the e-mobility sector (EV manufacturing, charging infrastructure development, fleet management and mobility services)
Needs and gaps in the Rwandan market for electric vehicles.

Self-Study:

- Online courses: Sustainable Transport (2 hours), Active Mobility (2 hours), Public Transport (3 hours), Basics of Electric Mobility (4 hours)

Reading material (4 hours)

Assignment (10 hours)

Develop a **business model or an idea pitch** for the electric mobility concept in Rwanda. Explain clearly:

a. What is the problem? And why is it a problem?
b. What is the proposed solution? Why is the solution expected to work?
c. Who are the beneficiaries?
d. What form do the benefits take? E.g. economic benefits, social benefits, environmental benefits
e. What is required to implement the solution? Government support, funding (how much), commercial support?
f. How can the proposed solution be financially sustainable?

Companies and academics will review the assignments and score the ideas. The top students will be selected for the career day, also reflecting the needs of the companies.

Career day (optional)

Candidates can meet with the e-mobility companies in Rwanda
Understand the companies and their business.
Identify companies where there is mutual interest
Pitch business ideas to companies

Short Course – Mobility As A Service and Intelligent Transport Systems– An Overview

Target Group

Current final-year students, recently graduated candidates, candidates aspiring to enter the e-mobility job sector with a background in Electrical, Mechanical or Transportation engineering/sciences.

Allocation of study and teaching hours

	Student Hours
Lectures (in-person)	12
Site visits	3
Self-Study (reading and online modules)	15
Assignments (one written assignment)	10
Other:	
Total Hours	40

Brief description of aims and content

To understand sustainable urban transport and the role of MaaS and ITS in achieving sustainable mobility.

Explore the relationship between e-mobility and ITS solutions

Understand stakeholder needs and operator requirements

Duration of the course

The course is planned to be held over three (3) days. This can be three (3) consecutive working days or one working day and two (2) weekends. The weekend activity allows the participation of individuals who are currently employed.

Indicative content distributed across days

Day 1: Mobility As A Service (MaaS) and ITS overview (4 hours)

Overview of sustainable transport – Why, how and what

What is MaaS and its benefits

Why MaaS?

Components of a MaaS system

Role of e-mobility in MaaS

Intelligent Transport Systems

Day 2: Emobility and MaaS (4 hours + 4 hours)

eMobility components of MaaS

Data needs and introduction to Open Data systems

Batteries – systems, charging standards, range and performance

Business models in MaaS and ITS

Guest lecture: An e-mobility company explaining their MaaS business
Site visit: To a MaaS / Shared mobility operator (4 hours)

Day 3: Applying MaaS and ITS (4 hours)

Requisites for a successful MaaS and ITS implementation
Data Standards
Vehicles and ITS maintenance
Architecture and MaaS Markets

Self-Study:

- Online courses: Sustainable Transport (2 hours), Active Mobility (2 hours), Basics of Electric Mobility (4 hours)
- Global examples of MaaS and ITS implementation (2 hours)

Reading material (5 hours)

Assignment (10 hours)

Develop a **business model or an idea pitch** for the electric shared mobility/MaaS or ITS concept in Rwanda. Explain clearly:

g. What is the problem? And why is it a problem?
h. What is the proposed solution? Why is the solution expected to work?
i. Who are the beneficiaries?
j. What form do the benefits take? E.g. economic benefits, social benefits, environmental benefits
k. What is required to implement the solution? Government support, funding (how much), commercial support?
l. How can the proposed solution be financially sustainable?

Companies and academics will review the assignments and score the ideas. The top students will be selected for the career day, also reflecting the needs of the companies.

Career day (optional)

Candidates can meet with the e-mobility companies in Rwanda
Understand the companies and their business.
Identify companies where there is mutual interest
Pitch business ideas to companies

Short Course – Electrifying Public Transport– An Overview

Target Group

Current final-year students, recently graduated candidates, candidates aspiring to enter the e-mobility job sector with a background in Electrical, Mechanical or Transportation engineering/sciences.

Allocation of study and teaching hours

	Student Hours
Lectures (in-person)	12
Site visits	3
Self-Study (reading and online modules)	15
Assignments (one written assignment)	10
Other:	
Total Hours	40

Brief description of aims and content

To understand sustainable urban transport and the role of public transport.

To appreciate the various electrification options for public transport.

Introduction to public transport priority and making public transport attractive through electrification

Duration of the course

The course is planned to be held over three (3) days. This can be three (3) consecutive working days or one working day and two (2) weekends. The weekend activity allows the participation of individuals who are currently employed.

Indicative content distributed across days

Day 1: Public Transportation – The Big Picture (4 hours)

Overview of sustainable transport – Why, how and what

Role of public transportation

Essential elements for implementing quality public transportation

Benefits of public transport systems

Role of e-mobility in advancing sustainable transport and addressing climate change

Environmental and social benefits of electric mobility

Overview of the glossary of terms in electric mobility.

Day 2: Public Transport electrification (4 hours + 4 hours)

Kinds of electric public transportation systems

Different charging systems for public transportation

Introduction to smart charging systems

Batteries – systems, charging standards, range and performance,

Guest lecture: A charging company or an e-mobility company explaining their business and the charging options that they use

Site visit: To a charging station (4 hours)

Day 3: Electric bus operations (4 hours)

Depot management and specification

Battery management systems, factors affecting efficiency, battery charging and discharging, recycling batteries

Overview of business models in Public Transportation

Integrating public transport with other e-mobility (last-mile connectivity)

Self-Study:

- Online courses: Sustainable Transport (2 hours), Active Mobility (2 hours), Basics of Electric Mobility (4 hours)
- Global examples of electric mobility (2 hours)

Reading material (5 hours)

Assignment (10 hours)

Develop a **business model or an idea pitch** for the electric public transporation concept in Rwanda. Explain clearly:

m. What is the problem? And why is it a problem?
n. What is the proposed solution? Why is the solution expected to work?
o. Who are the beneficiaries?
p. What form do the benefits take? E.g. economic benefits, social benefits, environmental benefits
q. What is required to implement the solution? Government support, funding (how much), commercial support?
r. How can the proposed solution be financially sustainable?

Companies and academics will review the assignments and score the ideas. The top students will be selected for the career day, also reflecting the needs of the companies.

Career day (optional)

Candidates can meet with the e-mobility companies in Rwanda

Understand the companies and their business.

Identify companies where there is mutual interest

Pitch business ideas to companies

Course Structure – Transformative Living Labs (basic outline)

Week 1: Context

Topic: Urban Living Lab Concepts and Basics of Urban Mobility Transitions

Objectives:

- Introduce the concept of Living Labs.
- Discuss the basics of urban mobility transitions.
- Understand the role of sustainable mobility in urban development.

Lectures:

- **Introduction to Living Labs**: Explore the history, evolution, and key characteristics of Living Labs.
- **Urban Mobility Transitions**: Discuss the key concepts, challenges, and opportunities in transitioning to sustainable urban mobility.

Examples:

- **Case Study**: Understanding the impact of real-life experimentation in urban settings.
- **Overview**: Successful urban mobility projects in European cities - Insights and lessons learned.

Assignments:

- **Reading Assignment**: Articles on Living Labs and urban mobility transitions.
- **Reflection Paper**: Discuss the potential of Living Labs in your city and how they could address local mobility challenges.

Week 2: Inform

Topic: Levels of Intervention in Urban Mobility

Objectives:

- Provide an overview of different levels of intervention in urban mobility.
- Analyze examples of interventions and their impacts.

Lectures:

- **Levels of Intervention**: From local to global scales in urban mobility.
- **Sustainable Mobility Solutions**: Technologies and policies driving sustainable urban mobility.

Examples:

- **Case Study**: Electric bus implementation in Latin American cities - Analyzing impacts and challenges.
- **Overview**: Bike-sharing systems in European capitals - Success factors and replication potential.

Assignments:

- **Case Study Analysis**: Evaluate the success of a specific mobility intervention in a selected city.
- **Group Project**: Propose a new mobility solution for a selected urban area, detailing potential impacts and implementation strategies.

Week 3: Inspire

Topic: Capacity Building and Peer-to-Peer Exchange

Objectives:

- Build capacities and foster the take-up of innovative approaches.
- Facilitate peer-to-peer exchanges among participants.

Lectures:

- **Capacity Building in Living Labs**: Strategies for effective stakeholder engagement and knowledge transfer.
- **Peer-to-Peer Learning**: The role of collaborative learning in sustainable urban development.

Examples:

- **Peer Exchange Programs**: Successful exchanges between European and Asian cities facilitated by SOLUTIONSplus.

- **Workshops**: Inspiring local governments through targeted capacity-building workshops.

Assignments:

- **Peer Review**: Provide feedback on classmates' proposed mobility solutions.
- **Workshop Participation**: Attend a virtual workshop with industry experts and document key takeaways and insights.

Week 4: Initiate

Topic: Strengthening Collaboration and Developing Living Lab Concepts

Objectives:

- Strengthen collaboration by initiating partnerships.
- Develop Living Lab concepts tailored to specific urban challenges.

Lectures:

- **Stakeholder Engagement and Coalition Building**: Techniques for forming effective partnerships and engaging stakeholders.
- **Designing a Living Lab**: From concept to implementation - Steps and best practices.

Examples:

- **Case Study**: Partnership development in African cities - Challenges and successes.
- **Strategies**: Effective stakeholder engagement techniques used by SOLUTIONSplus.

Assignments:

- **Partnership Proposal**: Develop a proposal for a partnership in your city, including potential stakeholders and collaboration strategies.
- **Concept Paper**: Design a Living Lab concept addressing a local urban issue, outlining goals, stakeholders, and expected outcomes.

Week 5: Implement

Topic: Creating Reference Models and Demonstration Actions

Objectives:

- Implement demonstration actions to create reference models.
- Understand the practical aspects of deploying Living Labs.

Lectures:

- **Implementing Living Labs**: Practical considerations and logistical challenges.
- **Monitoring and Evaluation**: Establishing robust frameworks for tracking progress and impact.

Examples:

- **Implementation**: Deployment of electric vehicle fleets in European cities - Case studies and lessons learned.
- **Monitoring**: Evaluation frameworks used in SOLUTIONSplus projects.

Assignments:

- **Implementation Plan**: Develop a detailed plan for deploying a Living Lab project, including timelines, responsibilities, and resource allocation.
- **Evaluation Framework**: Design a framework to monitor and evaluate the project's impact, including key performance indicators and data collection methods.

Week 6: Impact

Topic: Scaling-Up, Replication, and Transfer

Objectives:

- Develop strategies for scaling up and replicating successful initiatives.
- Understand the importance of impact assessment and knowledge transfer.

Lectures:

- **Scaling Up and Replication**: Strategies and challenges in expanding successful initiatives.
- **Impact Assessment and Knowledge Transfer**: Techniques for evaluating and sharing outcomes.

Examples:

- **Case Study**: Replication of bike-sharing systems in different cities - Analyzing scalability and transferability.
- **Strategies**: Effective scaling strategies from SOLUTIONSplus projects.

Assignments:

- **Scale-Up Strategy**: Create a strategy for scaling up your Living Lab project, detailing steps, partnerships, and resource needs.
- **Final Project Presentation**: Present your Living Lab project, highlighting its potential impact and scalability. Prepare a comprehensive report summarizing your findings and recommendations.


solutions
plus