Tomorrow's CITIES
Urban Risk in Transition

Tomorrow's Cities Decision Support Environment (TCDSE) Course

September 2023

Preface

This is a booklet on the **"Tomorrow's Cities Decision Support Environment (TCDSE) Course"** developed under the Capacity Strengthening program of the Tomorrow's Cities (TC) project.

This course aims to enhance the capacity of professionals from the Tomorrow's Cities and urban areas in utilizing the TCDSE and expand its reach. The cities or urban areas can then adapt the framework based on scenarios specific to them and ultimately self-sustain.

The course has been developed to train the city professionals from various disciplines and/ or institutions that are working together in City development and planning and Disaster Risk Reduction (DRR) sectors. The course will also help to institutionalize the TCDSE process.

This booklet presents the outline of the TCDSE course and its objectives, modules and approaches. It also gives an overview of each module of the course. Capacity Strengthening leads and experts have prepared this booklet with the support from Senior Management Team (SMT) and major contribution from Work Package leads, Module leads and work package teams.

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1 Introduction

Tomorrow's Cities (TC) is the UK Research and Innovation (UKRI) Global Challenges Research Fund (GCRF) Urban Disaster Risk Hub - a global interdisciplinary research hub. The hub aims to support the delivery of the United Nation's Sustainable Development Goals and priorities 1 to 3 of the Sendai Framework for Disaster Risk Reduction (DRR) 2015-2030. It is a fully-functioning, fully funded consortium of communities, government organizations, researchers and risk professionals at local, national and global level formed to reinforce disaster risk governance. It undertakes integrated, multi-scale and multi-disciplinary research to better understand natural multi hazard risks and their drivers.

Multi hazards such as earthquakes, landslides, floods, volcanoes and fires combined with socio-economic factors and the vulnerability of existing building stock, housing and infrastructure, impose various cyclical risks and consequences in the lives and livelihoods of people living in cities of low-to-middle income countries. With the current rapid expansion of urban areas potentially condemning hundreds of millions to a future dominated by repeated disasters, there is a global challenge – and also opportunity - to improve the resilience of the urban poor and reduce disaster risk in tomorrow's cities. The goal of the TC hub is to take this opportunity and catalyze a transition from crisis management to multi hazard risk-informed planning and decision-making that strengthens the voice and capacity of the urban poor in tomorrow's cities. The TCDSE has been developed to achieve this goal.

The TCDSE is based on detailed multi hazard scenarios co-produced with stakeholders to provide a transparent and rigorous assessment of potential risk inherent in urban design, housing and infrastructure planning. It uses the power of interdisciplinary science in decision-making. The TCDSE builds on established social impact and risk assessment methodologies, intertwining multi hazard analysis with assessments of social-economic factors of vulnerability and exposure through co-produced, participatory community-level research.

To successfully utilise this novel Decision Support Environment (DSE) and expand its reach within cities and urban areas, there is a need to institutionalize the developed TCDSE through standardized training and awareness programs. These programs will provide cities/ urban areas with the capacity to adapt the framework and create their own versions based on the scenarios specific to their particular context and, ultimately, ensure cities/ urban areas are self-sustaining. With this aim, the TCDSE course has been developed to together train the city professionals from various disciplines and/ or institutions, and to help standardize the inputs, processes and outcomes of the TCDSE.

2 Tomorrow's Cities Decision Support Environment (TCDSE)

The training course is based on and modelled around the TCDSE and the work packages that have been developed under the project.

As the name suggests, the TCDSE is a sociotechnical space that creates favourable conditions to support risk-informed decision-making in a pro-poor, inclusive and pedagogical way. It connects stakeholders from different backgrounds and helps to grant legitimacy to voices that are usually not part of disaster risk reduction conversations. It further helps to democratize knowledge and tools related to disaster risk, usually concentrated in the hands of few. As disaster risk affects all urban residents – albeit in different ways - the DSE considers all stakeholders to be experts in some way (albeit with different levels of knowledge about disasters), who can all contribute to conversations towards risk-informed planning. In Tomorrow's Cities, such planning focuses on urban areas that are less developed i.e., prone to expansion and growth.

The TCDSE is comprised of the following **6** components or stages that, from a research perspective, are known as 'work packages':

i. **WP0: City Scoping and Set-up**

   Before the kick-off of the TCDSE in a new city, there is a preparatory work package stage that conducts an assessment of existing data, a critical mapping exercise and identifies and brings together the key stakeholder groups (on the basis of power imbalances in planning), alongside other technical and logistical arrangements that allow the TCDSE to function. This process builds a foundation for an effective partnership between the Tomorrow's Cities 'International' Team and the 'Local' Team, and focusses on establishing familiarisation with the TCDSE framework, building the team and a collective commitment, and preliminary data collection.

ii. **WP1: Future Visioning**

   This stage encompasses a series of participatory engagements that explore desired urban futures with different city stakeholders, incorporating expectations for land uses and critical urban assets, as well as expected policies to tackle the negative impacts of future natural hazards.

iii. **WP2: Visioning Scenarios**

   This stage renders those desired futures into detailed virtual representations that make Future Visions more realistic and connected to data-driven trends. Expected land uses are adjusted to meet planning standards and a modelling of future exposure is incorporated. The latter means forecasting who the future urban residents will be, and where they will live and work. Further, Visioning Scenarios include a detailed refinement of policies discussed during Future Visioning workshops.

iv. **WP3: Multi Hazard Physical and Social Impact Assessment**

   This stage subjects Visioning Scenarios to earthquake, flood and landslide events. This leads to an understanding of the consequences of the decisions made during future visioning and scenario building before a brick is laid. Maps of damage states, combined with different impact metrics (number of casualties, of displaced households, etc.), enable a clear visualisation of the spatial distribution of impact and help diagnose risk drivers back through complex causal chains in urban decision-making.

v. **WP4: Risk Agreement and Scenario Assessment**

   This stage opens up a collective definition of risk that accounts for the objective impact of hazards and the subjective priorities of key community and institutional groups that engaged with the TCDSE. Using digital tools, stakeholders unpack the consequences of spatial and policy decisions and how they increase or decrease disaster risk. They also assess the equity of the distribution of risk across

space and the impacts of planning decisions on poor and disadvantaged communities in the event of natural hazard events, earthquakes, landslides or floods. Critical learning about risk, which results from our decisions, leads to an opportunity to modify our plans based on a clear understanding of the risk they imply.

Iteration (stages 1 to 4 are repeated) is one of the key innovations of the TCDSE. Having developed a vision, translated this into a detailed visioning scenario and exposed its risk consequences, stakeholders now revisit problematic aspects of their vision that have led to the risk uncovered by this analysis. The city team then repeat stage 1, modifying some aspects of the future vision. These modifications lead to changes in the visioning scenarios. The new visioning scenarios are now exposed to the same hazard events and the impacts metrics are recalculated. This leads to both a refined understanding of critical decisions leading to risk, and to discussions about how to transfer that learning into the actual decision environment of cities. This helps to promote policy uptake by institutions. The process can be repeated as often as required so that these new insights into decisions and their consequences lead to safer development planning and better decision-making.

vi. WP5: Institutionalization

At this final stage, learning from the iteration process informs discussions with partners, on the implications of the TCDSE for policy and planning. This includes action planning the uptake of Tomorrows Cities tools and processes by partner organisations, to enable a process of pro-poor risk reduction that is effective and long-lasting.

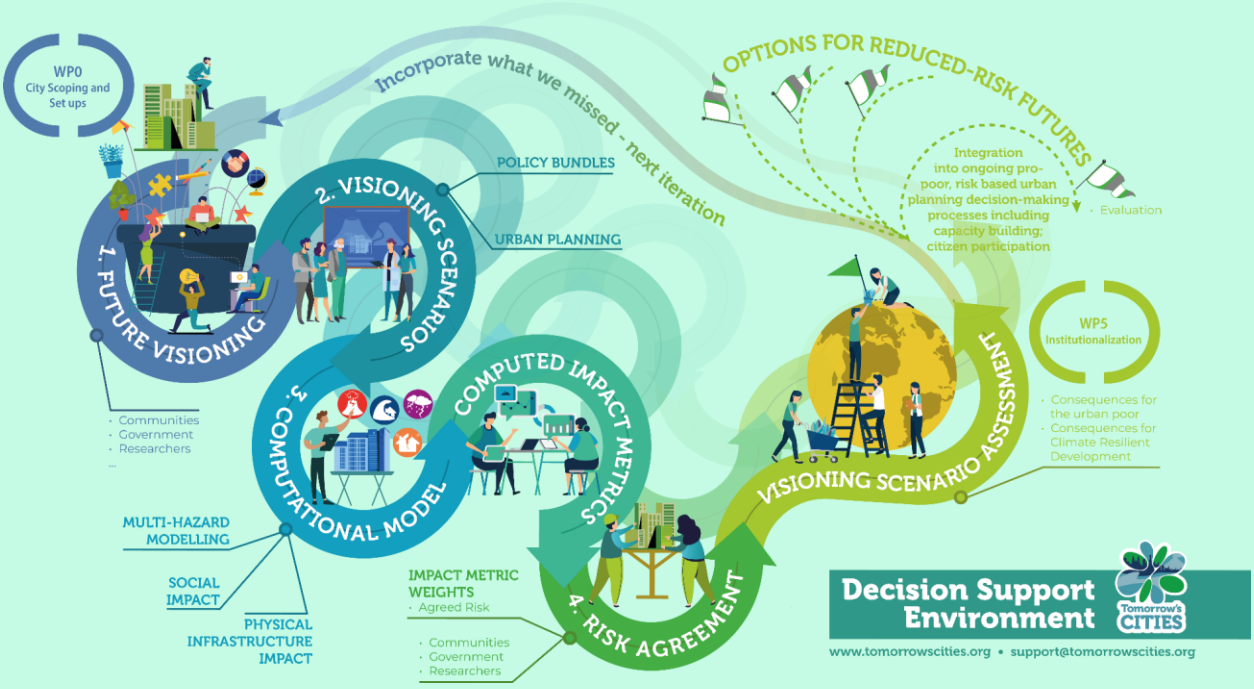

Figure 1: Tomorrow's Cities Decision Support Environment (TCDSE)

3 TCDSE COURSE

Based on the TCDSE work packages, the TCDSE training course has been categorized into the following modules:

Module 0 (M0) - City scoping and set-up based on WP0.

Module 1 (M1) - Future Visioning based on WP1.

Module 2 (M2) - Visioning scenarios based on WP2.

Module 3 (M3) - Multi Hazard Physical and Social Impact Assessment based on WP3.

Module 4 (M4) - Risk agreement based on WP4.

Module 5 (M5) - Institutionalization based on WP5.

4 Target Participants

This training course is primarily developed for those concerned with reduction of multi hazard risk in urban areas. The targeted participants of the course are:

Figure 2: Target participants of the training course

5 Objectives

The main objective of the training course is to enhance the capacity of city professionals on risk based urban planning and development using the TCDSE model and to sustain this legacy.

The objectives of the course are as follows:

- The peoples' representatives, policy makers and decision makers will be able to recognize the importance of risk-informed urban/ development planning to minimize future disaster risk through the TCDSE model with special consideration for urban poor.
- They, along with City DRR officials, will be able to create development visioning for agreed risks from future disaster through a participatory approach and by engaging local communities.
- City DRR officials will be able to engage themselves and guide/ communicate with other experts in: creating detailed scenarios on future urban/ development planning (physical, socio-economic, cultural, historical, political, environmental aspects); conducting hazard, vulnerability and risk assessments using different computational models; and facilitating risk agreement process with city stakeholders.
- The trained new city partners will be able to facilitate the TCDSE process and implement different components of the TCDSE in new cities.

6 Scope and Limitations

- The course does not intend to enable the participants to independently conduct specialized computations such as hazard, vulnerability and risk assessments using different computational models. However, the course will enable them to explain/ communicate with the experts on the requirement of such computations for planning their city.
- The TCDSE is one method to conduct risk-informed city planning. It is not mandatory to follow the same method in all cities, and the method can be modified as per the requirement of the city and also updated/ upgraded as more innovative ideas emerge.

7 Approaches

7.1 Focus on Overall TCDSE System and Processes

The training course covers all components and processes of the TCDSE model with learnings and experiences gained in cities studied engaged with TC. The main aim of capacity strengthening is to enhance the capacity of city professionals to utilize the TCDSE so that they can adapt the model in their own city.

7.2 Modular Structure

Training curricula will consist of modules based on the themes of each work packages. The modules consist of various sessions that are inter-linked to each other, and together the modules form a complete training package covering the breadth of the TCDSE. The training has been classified into different parts and, as detailed below, there are required participants and a specific mode of training (workshop, online, physical, specialized online) for each part.

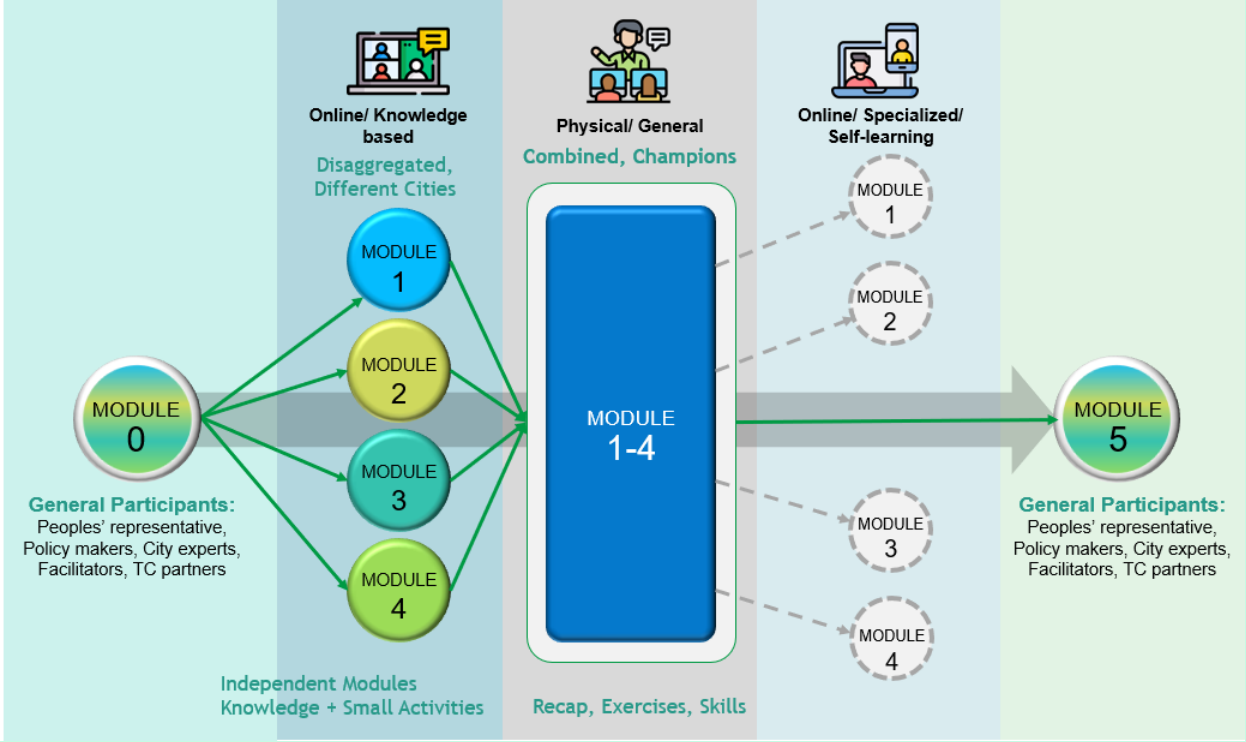

Figure 3: Modular structure of the training course

Part 1:

Module0 (M0): City scoping and set-up focuses on sensitization and provides an overview of the whole TCDSE framework to the city partners. It is the first training component of the Capacity Strengthening Course and it is conducted in the form of online training, followed by an in-person Project Launching Workshop in the city.

SMT members, along with Programme Working Group (PWG) who are made up from the TC technical team and operations team, deliver the online training. The participants are the 'Local' Team (a city-based team comprised of the City Delivery Team (CDT) and a Senior Leadership Team (SLT)) which include government officials from provincial and city level and the development and planning authorities, who will be involved in deploying the TCDSE in the city. This module provides a space for understanding each other (project team and city team), understanding the work ahead, building a mutual commitment and discussing the city program in detail.

After online training, a workshop on City Scoping and Set-Up is held in the city which launches the project to the wider stakeholder community. The participants of this workshop are the peoples' representatives, policy makers, city experts, facilitators, and the TC partners. This workshop introduces Tomorrow's Cities, the TCDSE, the different work packages, the proposal of work and the work plans to the city. It will facilitate both stakeholder interaction and data collection. The formal contracting between the city and TC will also take place in the M0 workshop.

Part 2:

The detailed major sessions - **Module1 (M1): Future visioning, Module2 (M2): Visioning scenarios, Module3 (M3): Multi Hazard Physical and Social Impact Assessment** and **Module4 (M4): Risk Agreement and Scenario Assessment)** - are conducted online in a series of separate modules. The participants of those modules are the professionals working in DRR and city planning and development, and also those working in the TC project such as city experts, facilitators, and the TC partners from different cities who have attended the M0 workshop. Participants can attend the

respective modules corresponding to their background or attend all modules as per their interest. Though conducted independently, each module will have connecting sessions at its start and end linking the previous module and the upcoming module respectively and maintaining the flow of the TCDSE process. These online trainings are conducted a few weeks before the commencement of respective work packages in the city.

Part 3:

This part of training takes place after completion on the online trainings and is conducted face-to-face at a Residential School at a common venue. It combines all the modules (M1, 2, 3, 4) into a single training and provides a recap of the online training, with detailed-out exercises to be conducted in person. The participants are those who have been selected from the online training modules (the Champions), and they will be from different cities that are all active and involved in deploying the TCDSE. Participants, as Champions, will have the option to become instructors in future trainings. All participants are required to participate in the in-person exercises across the four modules, with each module being led by a participant who specializes in the respective module. Fostering inter-city and international cooperation is key within this component of the training.

Part 4:

Part 4 of the training is optional, and it covers the specialized long-term computational courses that have not been covered in the course to date. Participants who wish to take part in the long-term computational courses will be provided a link and associated references that will be shared in previous trainings.

Part 5:

All stakeholders who participated in M0 are invited to a workshop with the aim of sharing learning and reflections and institutionalizing the TCDSE process. The workshop is focused on tracking the learnings and outputs and facilitating follow-up actions.

7.3 Balance of Knowledge and Skills

The training curricula has been developed with the aim of creating an environment where considerable emphasis is given to both knowledge-based and skill-based learning. Alongside theoretical sessions, the training includes practical exercises, group discussions, demonstrations, site visits/ case-studies, process-mapping, learning and experience sessions from all work packages, and learnings from Tomorrowville to facilitate skill development. There is almost equal balance of the theory (knowledge-based) and the practical (skill-based) learnings in the training.

7.4 Built on Co-produced Knowledge and Processes

The wide range of expertise from city and international professionals such as social science experts, hazard and exposure modellers, vulnerability and risk modellers, urban planners, and GIS experts have contributed to the development of this comprehensive training course. The scenarios, visions, database, hazard models, exposure models, vulnerabilities, risk scenarios, and risk assessment techniques that are used or developed in the hub cities have been included in the training curricula. Learnings and experiences from Tomorrowville have also been incorporated for process-learning.

7.5 Adheres to Adult Teaching and Learning Principles

Adult teaching and learning principles emphasize that the participants are motivated to actively engage through two-way communication during the teaching-learning process. These principles have been embedded in the design of this course, with each training session having clearly defined performance and instructional objectives and well-shaped methodologies for engaging participants.

7.6 Standardized Course Materials

The training uses standardised course materials consisting of Instructor's Workbook, Participant's Workbook, presentation slides/ visuals, lesson plans and training evaluation forms such as pre/ post-tests, session evaluation, overall training evaluation and certification. The participants are provided with a Participant's Workbook and supporting reference materials such as process guidelines, reports, maps and papers.

7.7 Course Evaluation

As mentioned above, the course is evaluated at different stages to collect feedback and, in turn, update the course to foster its effectiveness for future training. The following course evaluations will be conducted:

Pre-/ Post-Test:

The pre/post- test is an evaluation of participant's knowledge before and after the training in order to evaluate knowledge improvement.

Session Evaluation:

The evaluation of each session by the participants in terms of its relevance, content, delivery and duration.

Daily Feedback:

Feedback on course content and management aspects collected from participants at the end of each training day.

Overall Training Evaluation

The evaluation of the training done by the participants in terms of the overall training course. This entails an evaluation of the following: facilitators, in terms of subject matter knowledge, ability to facilitate, etc.; handouts and references; relevance and usefulness of the content; pedagogical methods; and comments on future improvements.

8 Certification

A 'Certificate of Completion' is provided to participants at the end of the training to confirming attendance and completion. Absence in any sessions of the course results in incompletion of the course.

9 Course Overview

9.1 Module 0 (M0): City Scoping and Set-ups

9.1.1 M0 Training:

The training is conducted via an online platform and takes a meeting format. It consists of five interactive sessions aimed at forging a solid two-way commitment to the deployment of the TCDSE in each city and is delivered by the SMT with support from the PWG. The format of M0 is as follows:

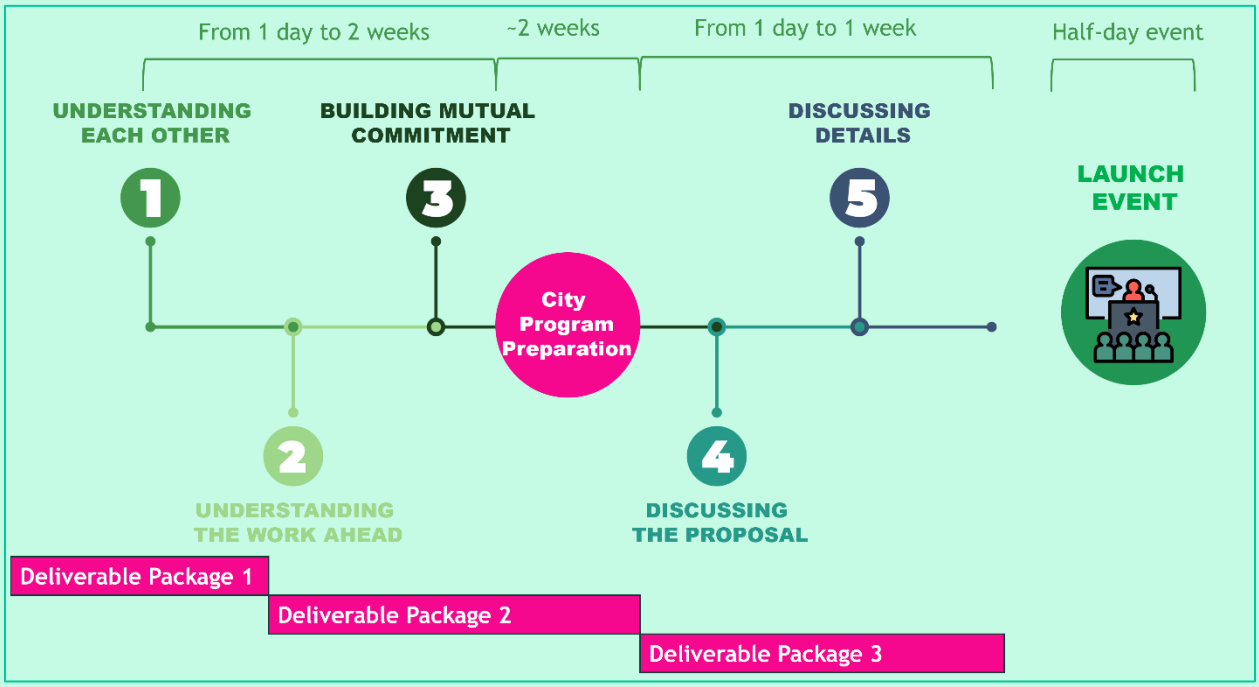

Figure 4: Timeline of M0 sessions.

Objectives

The main objective of the M0 training is to provide the local team with a foundation from which the TCDSE can be effectively deployed in the city.

The objectives are:

- To understand each other (the TC International Team and the Local Team).
- To understand the work ahead in the project.
- To build a mutual commitment towards the project.
- To provide guidance as the local team prepares and finalizes the City Proposal.
- To provide support with drafting the budget to enable a contract between the city and TC.

Target Participants

Module 0 is aimed at the CDT who are the main delivery group for the city and are comprised of government officials from provincial and city level and from development and planning authorities, alongside local academics, local community groups and representatives of the local private sector agencies. The local SLT and the City Coordinators are also expected to be present.

Course Overview

Table 1: M0-City Scoping and Set-ups Training Programme Schedule

S.N.	Sessions	Contents	Duration
1	Understanding Each Other	• Tomorrow's Cities offer and requirements • Agreeing key concepts • Understanding the City • Clarifying issues arising • Wrap up and next steps	90 minutes
2	Understanding the Work Ahead	• Tomorrow's Cities Decision Support Environment • Comments & questions • Capacity Strengthening course, and Monitoring, Evaluation and Learning (MEL) and communication strategies • Comments & questions	120 minutes
3	Building Mutual Commitment	• Urban development opportunities leading to adoption of the TCDSE • Comments & questions • Wrap up and reflection on next steps	120 minutes
4	Discussing the City Program	• Core points from the City Proposal • Comments & questions • Wrap up and next steps	90 minutes
5	Discussing Program Details	• City presentation with further details (whatever was flagged as missing or unclear) • Reaction, discussion • Final reflections (key aspects to be revised in Proposal and incorporated into the MoU)	90 minutes

9.1.2 M0 Workshop:

A few weeks after completion of the M0 course, a one-day, in-person launching workshop is conducted in the city. This workshop is conducted by the SMT, the WP0 team and the city representatives.

Objectives

The main objective of this workshop is to introduce the project, the TCDSE, the work ahead, city programs, and the contractual process to the wider stakeholder group.

The objectives are:

- To introduce the TC project and the TCDSE and its activities to the city.
- To understand and collate the expectations from the city towards the TCDSE.
- To identify the stakeholders from the city required to implement the TCDSE.
- To examine the available datasets and identify the gaps.
- To share the work plan with the city.
- To sign a Memorandum of Understanding (MoU) between the project and the city.

Target Participants

This module is aimed at all stakeholders concerned with the reduction of multi hazard risk in urban areas as listed below:

- People's representatives from cities.
- Policy makers: government officials from provincial and city level and from development and planning authorities.
- City officials: associated with urban planning, public works utilities, services and development planning, local building officials, and local infrastructure experts.
- May include other Cities' stakeholders such as:
  - Officials from ministries, departments, and institutions (Cities' stakeholders).
  - TC hub members, academia, I/NGOs members, and private sectors participants including designers, urban planners, builders, and infrastructure developers (Cities' stakeholders).

Figure 5: Glimpses of Launching Workshop in Rapti, Nepal.

Workshop Overview

Table 2: M0-City Scoping and Set-ups (Kick off) Workshop Schedule

S.N.	Sessions	Contents	Duration
1	Welcome and opening remarks	Welcome and opening remarks by the chair	10 minutes
2	Introduction to TC and TCDSE	Introduction to TC and the TCDSE: Objectives, work packages, modalities	10 minutes
3	Introduction to Work Packages of TCDSE	Introduction of the work packages of TCDSE: • WP 0: City Scoping and Set-Ups • WP 1: Future Visioning • WP 2: Visioning Scenario • WP 3: Multi Hazard Physical and Social Impact Assessment • WP 3: Multi Hazard Physical and Social Impact Assessment • WP 4: Risk Agreement and Scenario Assessment • WP 5 (Institutionalization) and Capacity Strengthening	55 minutes
4	Sharing of the City Proposals and City Background Checklists	• Sharing the City Proposals and City Background Checklists • Setting the expectation on the CDT from TC	60 minutes
5	Signing of MoU	Representative signing of MoU between TC and city team	15 minutes
6	Closing of MOU signing	• Remarks by signatories • Remarks by city representatives: Mayors, Chairpersons, Chief guest	45 minutes
7	Sharing and discussion on data collection: gaps and way forward	• Group division of participants based on social and physical science background. • Sharing of the data collection checklists • Discuss on its availability, accessibility, and gaps	60 minutes
8	Sharing and discussion of the work plan	• Sharing of the detailed work plan for deploying the TCDSE in the city • Collection of feedback	60 minutes
9	Way forward and closing remarks	• Way forward to the TCDSE • Closing remarks by TC	60 minutes

9.2 Online Training on TCDSE course (M1, M2, M3, M4)

9.2.1 M1: Future Visioning

M1 is a 3-day, online course with sessions spanning 3-4 hours each day. The sessions are conducted by the WP1 team.

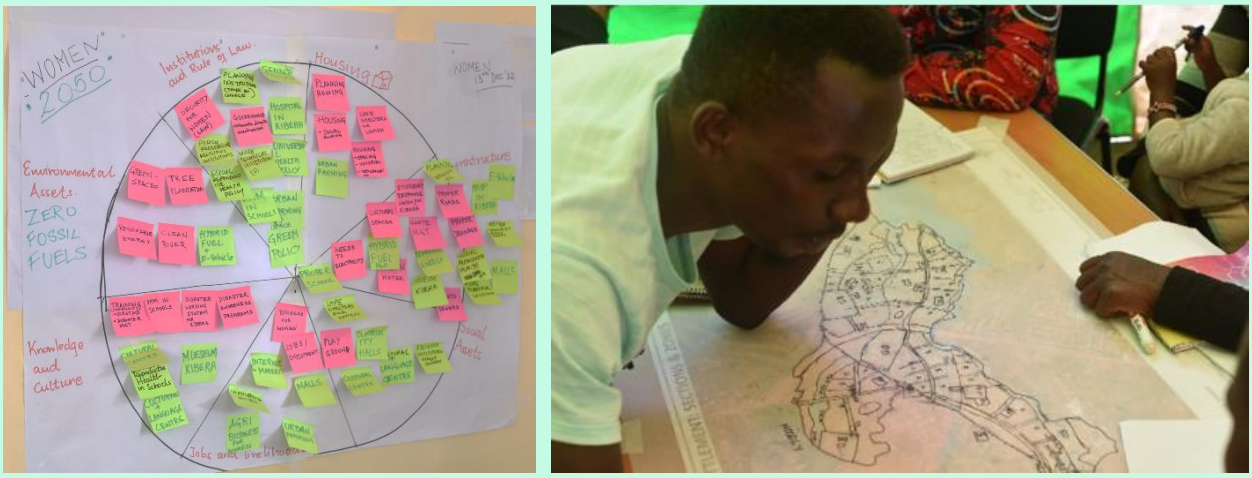

Figure 6: Future visioning in Nairobi, Kenya

Objectives

The main objective is to enable the participants to implement the TCDSE's approach and methods to deploy future visioning in their city.

The objectives are:

- To introduce the TCDSE and explain how future visioning feeds the TCDSE and contributes to risk-informed urban development planning.
- To depict the methodology to connect past and everyday life experiences to different aspirations for the future using the "Wheel of Urban Assets".
- To list out steps for translation of visions/ aspirations in spatial terms.
- To describe translation of aspirations/ visions into the policy expectations.
- To illustrate the linkage of outputs of Future Visioning into Visioning Scenarios.

Target Participants

Social mobilizers, urban planners, architects, GIS Experts, artists, DRR officials from wards and municipalities, ministries from federal government, academics, research institutions, private sector representatives, and representatives of civil society organizations (national and local non-governmental organisations).

Course Overview

Table 3: M1-Future Visioning Online Training Program Schedule

S.N.	Sessions	Contents	Duration
1	Introduction to Future Visioning	• Welcome • Introduction of instructors and participants • Pre-test, evaluation methods and certification • Introduction to the TCDSE and Future Visioning course • Objective of the module • Overview of the module • Brief of the three rationales for future-thinking, future visioning in the TCDSE, the wheel of urban assets, the trajectory of future visioning, logistical arrangements, and ethical considerations • Milestone 0: Critical stakeholder Mapping	60 minutes
2	Exercise on critical stakeholder mapping	• Group work on mapping of disaggregated social groups on the basis of powerful and marginalized voice/ group in community/city	90 minutes
3	Everyday Life and Aspirations	• Context of everyday life and aspiration in the Future Visioning • Strategies for harnessing aspirations • Future visioning outputs • Complementary methods and strategies of future visioning • Other critical concerns • Documenting & analyzing data	45 minutes
4	Exercise on Everyday Life and Aspirations	• Group work on everyday life and aspirations • Collection of individual and collective aspiration of stakeholder groups • Organizing aspiration into the seven dimensions of wheel of urban assets • Development of Visioning Statement	90 minutes
5	Spatializing and Refining Visions	• Context of spatializing and refining visions in the Future Visioning • Facilitate the translation of vision in spatial terms • Assess spatial information to be displayed for co-mapping exercises • Connect board aspirations with notion of land-use, urban form and social compositions toward visioning scenarios • Steps/ process of spatializing and refining visions	45 minutes

S.N.	Sessions	Contents	Duration
6	Exercise on Spatializing and Refining Visions	• Group work on developing community participatory map/ sketch of future city from translating the collective aspirations of stakeholder groups into the mapping	90 minutes
7	Consolidating Visions and Outlining Policies	• Context of consolidating visions and designing policies in Future Visioning • Steps/ process of consolidating visions and designing policies deploying wheels of urban assets and case study	45 minutes
8	Exercise on Consolidating Visions and Outlining Policies	• Group work on developing policy proposals by turning collective aspirations of stakeholder groups into the policy expectations	60 minutes
9	From future visioning to visioning scenarios	• Brief on the transition how Future Visioning feeds the two major components of Visioning Scenarios: (Spatial) Urban Planning & Policy Bundles • Brief on how Future Visioning outputs contribute to the TCDSE and its different stages	30 minutes
10	Closing Session	• Post-test, training evaluation, brief training report sharing, participants feedback, closing remark, certificate distribution, way forward, group picture	60 minutes

9.2.2 M2: Visioning Scenarios

The M2 training is a 3-day, online course, with sessions spanning 3-4 hours each day. The sessions are conducted by the WP2 team.

Objectives

The main objective is to impart knowledge on the development of visioning scenarios based on policies, existing trends and generated data.

The objectives are:

- To introduce the TCDSE and explain how visioning scenario feeds the TCDSE and contributes to risk-informed urban development planning.
- To introduce the policy, its relationship with aspirations and its development process.
- To describe the disaster risk-sensitive land-use plans in the context of the TCDSE.
- To introduce data generation and projection that is used to generate future urban plans.
- To list out the approaches of Visioning Scenario Development (VSD).
- To illustrate the linkage of outputs of Visioning Scenarios with Multi Hazard Impact Assessments.

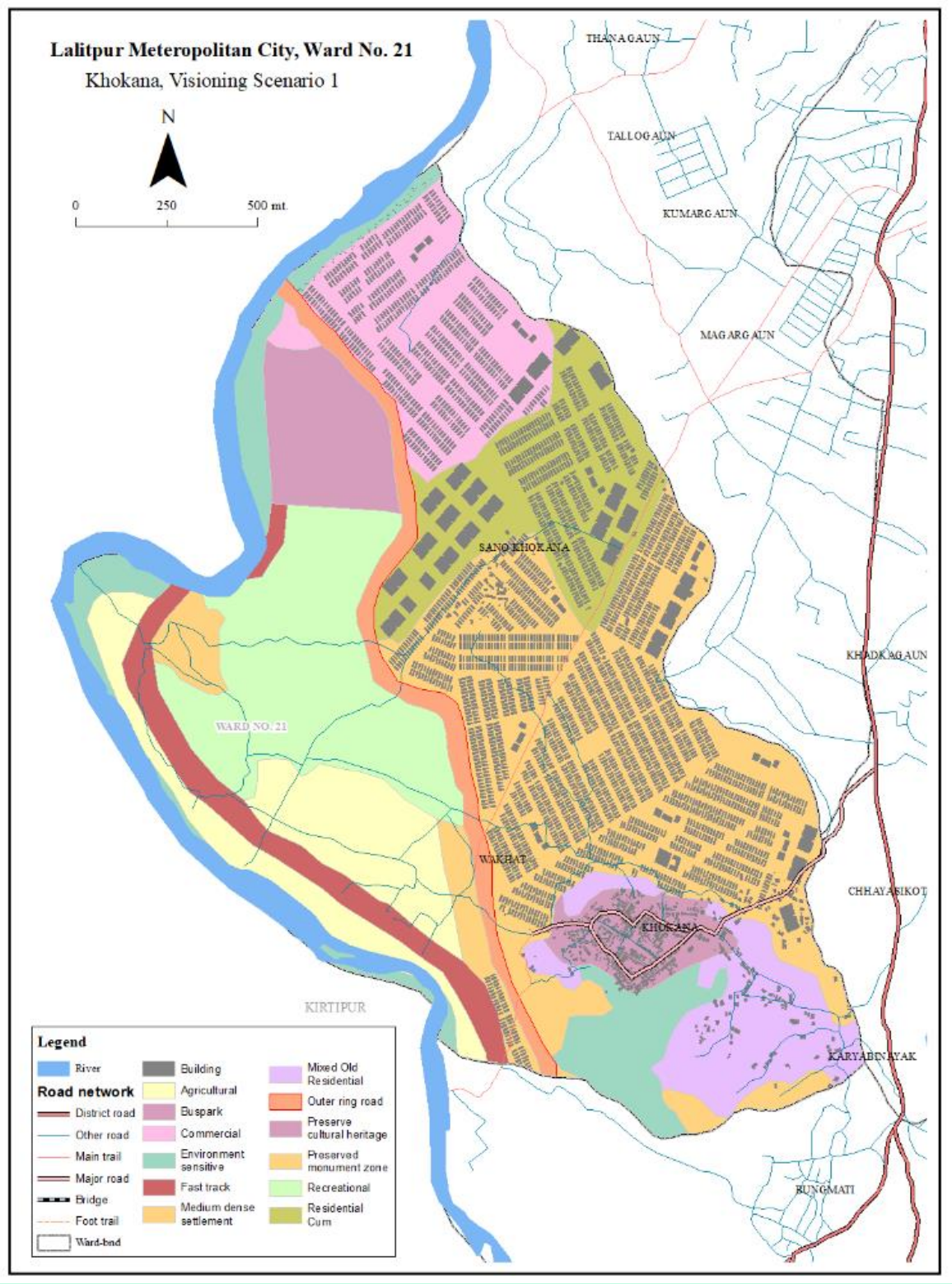

Figure 7: Visioning Scenario Map of Khokana, Nepal

Target Participants

Municipal officers, community influencers, urban planners, infrastructure planners, architects, civil engineers, social scientists, data scientists, related academicians, etc.

Course Overview

Table 4: M2-Visioning Scenario Online Training Program Schedule

S.N.	Sessions	Contents	Duration
1	Introduction to Visioning Scenario Development	• Welcome • Introduction of instructors and participants • Ground rules, evaluation methods • Introduction to the TCDSE and Visioning Scenario course • Objective of the module • Overview of the module • Brief background and approaches of Visioning Scenario development • Pre-test	60 minutes
2	Policy Development	• Background of policy development • Policy Development as a component of the TCDSE • Internal factors and external factors of policy development • Selection, adaptation and development of policies and its consideration • Challenges, consequences and influences of policy development	45 minutes
3	Exercise on Policy Development	• Group exercise on selection, adaptation and development of policies	45 minutes
4	Land Use Planning	• Basics for land-use planning: urban development trends, land-use planning models and tools • Role of land-use planning in the TCDSE framework • Development of land-use plans • City case implementations	45 minutes
5	Exercise on Land Use Planning	• Group exercise to impart land use planning concept	45 minutes
6	Exposure Data Generation	• Introduction to land use layer, household layer, individual layer and building layer • Introduction to data generation process: input, process and outputs • Assigning attributes to exposures for data generation software • Methods of exposure data generation for population, built up area, household	45 minutes

S.N.	Sessions	Contents	Duration
		• Demonstration on running the data generation code and producing building footprints • Outputs given by the data generation program (household, individual and building layer)	
7	Demo on Exposure Data Generation	• Demonstration on data generation software	45 minutes
8	Validating Visioning Scenario	• Procedure of conducting workshop on Validating Visioning Scenario	45 minutes
9	From Visioning Scenarios to Multi Hazard Impact Assessments	• Recall the role of Module 2 within the broader context of the TCDSE • Link relation of Module 2 to Module 1 • Link relation of Module 2 to Module 3	30 minutes
10	Closing Session	• Post-test, training evaluation, brief training report sharing, closing remark, certificate distribution, way forward, group picture	60 minutes

9.2.3 M3: Multi Hazard Physical and Social Impact Assessment

The M3 training is a 5-day, online course, with sessions spanning 3-4 hours each day. The sessions are conducted by the WP3 team.

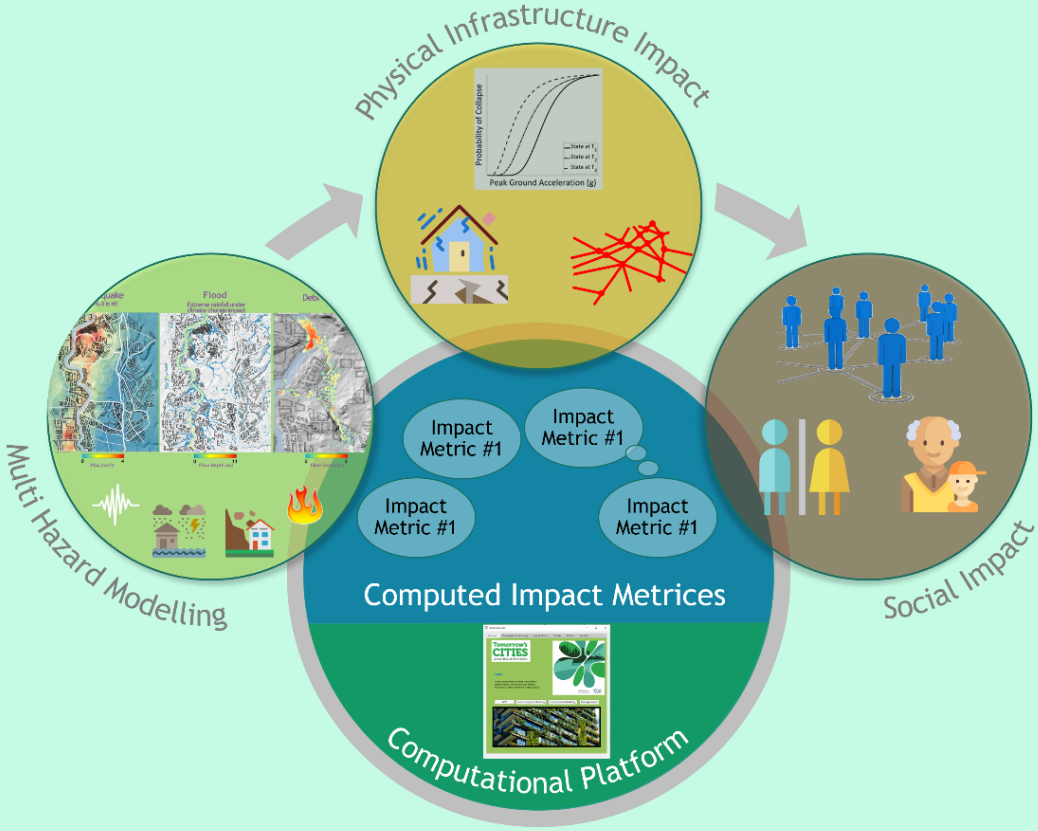

Figure 8: Multi Hazard Impact Assessment

Objectives

The main objective is to interpret the components of the computational model, which includes hazard modelling, physical and social impact assessment, and their interpretation through impact metrics, and to familiarize the participants with the developed TC Computational Platform aided by a demonstration, which is a crucial component of the module.

The objectives are:

- To introduce the TCDSE and explain how Multi Hazard Physical and Social Impact Assessments feed into the TCDSE and contribute to risk-informed urban development planning.
- To explain the context of different hazard assessments like earthquake, flood, debris flow, landslide, fire and climate change: inputs, outputs and modelling approaches.
- To introduce vulnerability assessments and interpret different types of fragility curves for several hazards, including earthquakes and floods.
- To introduce the concept of multi hazard vulnerability assessments: inputs, outputs and modelling approaches.
- To deploy the method of selection of fragility models.
- To depict the concept of network analysis: inputs, outputs and modelling approaches.
- To explain the social vulnerability context and its assessment.
- To explain the computation of impact of hazards and the list of relevant impact metrics.
- To demonstrate the TC computational platform to compute impact metrics: inputs, process and Outputs
- To illustrate the linkage of outputs of Multi Hazard Impact Assessments with the Risk Agreement.

Target Participants

City Officials, academicians, government and non-government personnel, private sector, TC members or other stakeholders associated with building and macro infrastructure, utility and service infrastructure, housing, hazard assessment, Physical Infrastructure Impact Assessment and Social Impact Assessment etc. Since it is a highly technical module, personnel from technical background like engineers and physical scientists would be given priority in participant selection.

Course Overview

Table 5: M3-Multi Hazard Physical and Social Impact Assessment Online Training Program Schedule

S.N.	Sessions	Contents	Duration
1	Introduction to Multi Hazard Physical and Social Impact Assessment	• Welcome • Introduction of instructors and participants • Ground rules, evaluation methods • Introduction to the TCDSE and Multi Hazard Physical and Social Impact Assessment course • Objective of the module • Overview of the module • Components of multi hazard physical and social assessment • Linkage of the module with other modules • Pre-test	60 minutes
2	Seismic Hazard Assessment	• Seismic hazard and seismic hazard assessment (SHA) in TC • Seismic hazard analysis, scenario-based seismic hazard analysis and physics-based approach • Brief exercise on SHA in OpenQuake Platform	60 minutes
3	Flood Hazard Assessment	• Introduction to flood hazard • Concept of flood hazard-vulnerability-risk • Approaches of flood hazard modelling • Physics-based modelling in TC • Impact of data resolution in flood modelling • Validation of flood hazard maps	60 minutes
4	Debris Flow Hazard Assessment	• Debris flow and its characteristics • Initiation of debris flow • Mathematical model for debris flow, dynamics and hazard • Components of debris flow model • Demonstration of modelling in the web-based application: Laharflow	60 minutes
5	Landslide Hazard Assessment	• Landslides and its types • Landslide hazard scales, methods, data and purposes • Examples of data collation/ collection • City-wide landslide assessment methods • Interpretation of results and its use in the TCDSE	60 minutes
6	Fire Hazard Assessment	• Fire dynamics • Compartment fire • Methods of fire modelling • Urban fire hazard modelling • Wildland-urban interface fire	60 minutes

S.N.	Sessions	Contents	Duration
		• Case study of fire hazard assessment • General provisions of fire safety	
7	Climate Change Assessment	• Background and terminologies related to climate change • Climate models • Approaches of climate change study • Case study of climate change effects on rainfall extremes • Linkage of climate change study to the TCDSE • Hands-on exercise on downloading General Circulation Models (GCM) data	60 minutes
8	Vulnerability Assessment: Singe Hazard	• Vulnerability within catastrophe risk • Fragility analysis: uncertainties, random variables, capacity and demand, reliability analysis, Monte Carlo simulations • Fragility curves, damage/ vulnerability curves • Portfolio assessment • Fragility/ vulnerability curves for earthquakes • Damage state • Analytical method of fragility analysis • Fragility curves for floods	60 minutes
9	Vulnerability Assessment: Multi Hazard	• Multi hazard interactions: type and nomenclature • Level I interactions: Mathematical modelling • Level II interactions: Mathematical modelling	60 minutes
10	Vulnerability Assessment: Model selection	• Physical impact models for different hazards • Characterization procedure for physical impact models: Defining exposure taxonomy • Selecting candidate physical impact models through interactive and non-interactive databases • Selecting the most suitable models: use of Analytical Hierarchy Process (AHP) for criteria weights and use of Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) for scoring attributes • Example application on Tomorrowville	60 minutes
11	Network Analysis	• Network representation of infrastructure • Types of infrastructure analysis: topology-based and flow-based • Infrastructure performance assessment in post-hazard conditions • Exercises on infrastructure representation and topology metrics	60 minutes
12	Social Impact	• Quantitative methodology of social data capture and input • Utilizing development proxies to inform social vulnerability and impact	60 minutes

S.N.	Sessions	Contents	Duration
		• Grasp of methodological toolkit to develop proxy metrics, build a composite for weighting vulnerabilities • Identification of trends to support proxy development • Identification of key proxies to enhance social impact	
13	Characterization of Impact metrics	• Determination of relevant natural hazard impacts for the city • Methods and examples • Characterization of relevant impact metrics • Use of computational platform to compute impact metrics: input and steps for computation	60 minutes
14	Demonstration exercise on the TCDSE Impact Computational Platform	• Installation, demonstration and group exercise on TC computational platform to compute Impact Metrics: inputs, process and outputs	120 minutes
15	From Multi Hazard Impact Assessments to the Risk Agreement	• Recap of the module and its components in the broader context of the TCDSE • Linkage of outcomes of Multi Hazard Impact Assessments to the Risk Agreement	60 minutes
16	Closing Session	• Post-test, training evaluation, brief training report sharing, closing remark, certificate distribution, way forward, group picture	60 minutes

9.2.4 M4: Risk Agreement

The M4 training is a 2-day, online course, with sessions spanning 2-3 hours each day. The sessions are conducted by the WP4 team.

Figure 9: Understanding the impacts from different land use options and policies, Tomorrow's Cities Exhibition in Istanbul, Turkey

Objectives

The main objective is to comprehend the risk agreement methodology, as well as define the steps to deploy the related workshop.

The objectives are:

- To introduce the TCDSE and explain how the Risk Agreement feeds the TCDSE and contributes to risk-informed urban development planning.
- To introduce the main assumptions at the basis of the TCDSE computational impact modelling.
- To introduce the TCDSE Web App dashboard for visualizing the impact modelling results.
- To introduce the methodology for visioning scenario assessment based on a common understanding of the impact modelling results.
- To introduce the details of the Risk Agreement workshop.
- To illustrate the link between the Risk Agreement and other parts of the TCDSE.

Target Participants

Social mobilizers, urban planners, DRR officials from wards and municipalities, academics, institutional and Civil Society Officers (CSOs).

Course Overview

Table 6: M4-Risk Agreement Online Training Program Schedule

S.N.	Sessions	Contents	Duration
1	Introduction to the Risk Agreement	• Welcome • Introduction of instructors and participants • Ground rules, evaluation methods • Introduction of the Risk Agreement course • Objective of the module • Overview of the module • Basic understanding of terminology • Pre-test	60 minutes
2	Unfolding Impacts	• Introduction to risk modelling results: exposure, hazard, impact • Policy-impact link • Overview of the Web App dashboard	30 minutes
3	Hands on dashboard	• Exercise on the Web App dashboard: exposure data visualisation, hazard data visualisation, impact data visualisation, interpretation of results	45 minutes
4	Visioning Scenario Assessment	• Introduction to risk modelling results • Identifying drivers of impacts • Potential policy modifications to reduce impacts	60 minutes
5	Workshop Delivery	• Brief overview of the risk agreement methodology • How do you prepare for a workshop • Format of the risk agreement workshop • Visualize the risk agreement workshop setting • Recording workshop discussions	60 minutes
6	Closing Session	• Final recap • Processing evidence generated in WP4 • What's next in the TCDSE • Post-test, training evaluation, brief training report sharing, closing remark, certificate distribution, way forward, group picture	60 minutes

9.3 Residential School Training on TCDSE course (Combined M1 to M4)

The training is conducted in a 5-day residential school (in-person). The sessions are conducted by a team combined from the WP1 team, WP2 team, WP3 team and WP4 team.

Objectives

The main objective is to bring together the selected Champions from the on-line trainings to a common platform, and to provide these Champions with additional knowledge and skills in a complete TCDSE course with detailed-out exercise sessions.

The objectives are:

- To summarize the theoretical sessions of Module1, 2, 3 and 4.
- To conduct the detail-out exercises of Module1, 2, 3 and 4 that could not be covered in the online platform.
- To foster inter-city and international cooperation.

Target Participants

The Champions from all four online modules. The Champions must participate in all the exercises (i.e. the detailed out-exercised of Module1, 2, 3, and 4), which will be delivered by members of each respective module background.

Tentative Course Overview

Table 7: 5-days Residential School Training Programme Schedule

S.N.	Sessions	Contents	Duration
1	Introduction	• Welcome • Introduction of instructors and participants • Ground rules, evaluation methods • Introduction of the course • Objective of the course • Overview of the course • Pre-test	60 minutes
2	Recap of Module 1: Future Visioning (Theory Session)-Part 1	• Recap of the major contents of Module 1: Future Visioning	45 minutes
3	Recap of Module 1: Future Visioning (Theory Session)-Part 2	• Recap of the major contents of Module 1: Future Visioning	45 minutes
4	Exercise on Future Visioning	• Group Exercise on Future Visioning	3 hrs
5	Recap of Module 2: Visioning Scenario (Theory Session)-Part 1	• Recap of the major contents of Module 2: Visioning Scenario	45 minutes
6	Recap of Module 2: Visioning Scenario (Theory Session)-Part 2	• Recap of the major contents of Module 2: Visioning Scenario	45 minutes
7	Exercise on Visioning Scenario	• Group Exercise on Visioning Scenario	3 hrs

S.N.	Sessions	Contents	Duration
8	Recap of Module 3: Multi hazard Physical and Social Impact Assessment (Theory Session)-Part 1	• Recap of the major contents of Module 3: Multi Hazard Physical and Social Impact Assessment	45 minutes
9	Recap of Module 3: Multi hazard Physical and Social Impact Assessment (Theory Session)-Part 2	• Recap of the major contents of Module 3: Multi Hazard Physical and Social Impact Assessment	45 minutes
10	Recap of Module 3: Multi hazard Physical and Social Impact Assessment (Theory Session)-Part 3	• Recap of the major contents of Module 3: Multi Hazard Physical and Social Impact Assessment	45 minutes
11	Recap of Module 3: Multi hazard Physical and Social Impact Assessment (Theory Session)-Part 4	• Recap of the major contents of Module 3: Multi Hazard Physical and Social Impact Assessment	45 minutes
12	Exercise on Multi hazard Physical and Social Impact Assessment	• Group Exercise on Multi hazard Physical and Social Impact Assessment	3 hrs
13	Recap of Module 4: Risk Agreement (Theory Session)-Part 1	• Recap of the major contents of Module 4: Risk Agreement	45 minutes
14	Recap of Module 4: Risk Agreement (Theory Session)-Part 2	• Recap of the major contents of Module 4: Risk Agreement	45 minutes
15	Exercise on Risk Agreement	• Group Exercise on Risk Agreement	3 hrs
16	Closing Session	• Post-test, training evaluation, brief training report sharing, closing remark, certificate distribution, way forward, Group picture.	60 minutes

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