Module 6 of this course focuses on practical recommendations for TOD corridor implementation, regarding sequencing steps to get the project on the ground. Having reviewed the building blocks for implementation such as institutions, financing and design, participants will now learn to take the concepts reviewed to a more practical level.

The sequencing discussed in this module is not intended to be thought of strictly as a linear process. Instead, many of the steps/sub-steps must be revisited at different stages. For example, even though we touch on M&E at the end of the sequencing process, M&E should be planned for early on in the process to ensure clear targets/indicators. Stakeholder engagement must also be an ongoing process throughout implementation. The same is true for other steps of the process, which in many cases are iterative and adjusted after successive renegotiations/consultations.
The objective of Module 6 is to understand the series and order of steps to undertake the planning and implementation of a TOD corridor project. The module is structured around logical and chronological steps: regional master planning, preparation, infrastructure/operational design, physical design, corridor integration, business model and implementation. Each of these steps in turn includes a series of sub-steps, which will be described in the slides.
In a simplified and idealized overview, a TOD project could be thought of as having a linear pathway from initial planning to implementation. The first step is the regional master planning process (1), which identifies growth areas and infrastructure needs to accommodate forecasted demand, and prioritizes the most important investments.

Following from that, the consultation/preparation stage (2) starts, where planners and stakeholders go into more detail about transit investment possibilities, including what technologies to consider. At the end of that stage, the corridor is selected.

The next stage (3) is where the transit infrastructure is planned and designed, and the kind of operational model to be used decided. During this stage, transit planners will assess how the new corridor will fit within other regional transport systems, allowing them to estimate ridership. The technology is finalized at this stage, given projected demand for services, allowing a cost estimate to be determined. At this stage, the physical design of the transit infrastructure (stations, bridges, etc.) can be finalized. Transit design can be optimized based on adjacent urban form and the availability of new development opportunities.

Once cost estimates are established, a financing package can be prepared and a business model for delivery can be formulated as part of stage (4) (see Module 5 for more on this).
Following that, as part of stage (5), technical designs are finalized, urban planners and designers prioritize investments and sequencing between the various station areas. The 3 Value (or 3V) Framework can be used to help differentiate the opportunities offered by the diverse stations, analyzing transit node value, place value and market value of each station area. After the business model and corridor strategy have been firmed up, urban planners can work to finalize station-area TOD plans, translating TOD design principles to detailed designs for the neighborhoods around the upcoming transit stations (see Module 4 for more).

With more specific designs and planning frameworks, the public and private sector can work on land assembly for right of way and real-estate development and how transit stations will be integrated into the city and made accessible for users, including how passengers can transfer from other transport modes (Stage 6).

Finally, the transit infrastructure is constructed together with adjacent mixed-use TOD neighborhoods (Stage 7).
However, in reality the method and process for implementing a TOD corridor depends greatly on local circumstances. In most of the cases, many steps happen concurrently, rather than in a linear manner and they require the active involvement of both the public sector and private sector, throughout the planning and implementation process.

In this diagram, the public sector is involved up front by starting the regional and integrated transport planning process, which may include policy updates and budgetary planning to prepare for infrastructure spending. These transportation and land-use master plans are the basis for TOD corridor planning, and ideally, TOD corridors are the physical manifestation of a city’s growth plan, which consider population and economic growth; and land areas for expansion and densification. (However, the reality of implementation is that, in many cases, objective, rational assessment of alternatives is not the norm. Planning documents are sometimes powerful guidelines to follow, yet in some other cases, just a compilation of projects executed by different agencies.)

When planning gets more specific in local areas, specific transit corridors are proposed. Frequently, a pre-feasibility study acts as an advocacy tool to give the public and decision-makers the general idea of what the project might look like in their city, as they consider various options. A feasibility study is analysis of the viability of a TOD corridor project once a preliminary decision has been made, and involves both public and private sector players.
The next stage is identifying financing needs, which both the public and private sectors do concurrently. Some cities and financial institutions may require full-fledged “cost—benefit analyses” before public funds can be expended. Others may have ad-hoc financing mechanisms.

As public planners engage with stakeholders and local residents, private sector developers conduct market research and start acquiring land. The public sector starts to acquire land as well for transit corridor and station construction, and finalizes the design. At this stage, financing is clearer with better cost estimates, and financing mechanisms can be negotiated as the developer finalizes their financing package.

Finally, land permissions are given, and construction goes ahead. The public sector can cross-subsidize its transit investment with land value capture, either up front or on an ongoing basis.
To explore how both the public and private sectors are involved, it is helpful to drill down to the specific groups of officials and actors that deliver transit corridors and TOD districts, in close collaboration.

In the public sector, below the mayor and senior-level management, who are largely responsible for visioning and policy decision making, there are 3 main groups of officials:

- **Transport/transportation planners** are responsible for forecasting future travel demand, given economic and development projections for the city region. They are in charge of advising leaders on what new infrastructure and services are needed to meet expected changes in demand. They usually prioritize the highest impact projects that can be feasibly be done given available financial resources. In a TOD corridor project, they are focused with ensuring good access to transit services in order to have a financially viable operations.

- **Urban planners** are responsible for how land is used in the city, and where new real-estate projects should be located. They try to balance market demand with available/expected transport infrastructure in deciding which areas should accommodate additional growth – for new/redeveloped residential/commercial/industrial sites. Urban planners are often responsible for the

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**Key Players & Roles in Public/Private Sectors for TOD Planning & Implementation**

- **Government (Public-sector)**
  - **Transit Development:** Transport planners who forecast and plan infrastructure and transit services for expected travel demand, and transport engineers who deliver the infrastructure.
  - **Urban Development:** Urban planners who coordinate zoning and the overall vision for the city and region.
  - **Economic Development:** Economic development officials who promote the city and region to businesses and coordinate incentives.

- **Business / Private-sector**
  - **Real-estate developers** who conceptualize, finance, and construct new buildings and building complexes.
  - **Local businesses** who locate within a city based on accessibility to target market and other amenities.
design of street infrastructure and design guidelines for seamless integration of new buildings within the urban landscape. In a TOD corridor project, urban planners are focused on improving accessibility to jobs and amenities, as well as improving the physical condition of districts oriented to the corridor’s stations.

- **Economic development officials** are responsible for growing the city/region’s economy, and are focused intensely on the needs of businesses for space and what real-estate developers need to complete projects. They often work closely with the mayor and senior-level management to manage the branding and promotion of new or redeveloping urban districts. In a TOD corridor project, economic development officials can manage relationships with real-estate developers and other private-sector players who may wish to develop new buildings and/or expand once the transit investment is completed, and can encourage more activity with coordinated corridor branding.

In the private sector, there are 2 main groups:

- **Real-estate developers** conceptualize, finance, and construct new buildings and building complexes. This occurs within the land use plans that urban planners have issued, which may shape the kinds of buildings that are profitable/feasible in a given area. In a TOD corridor project, they are key partners to deliver the transit-oriented types of commercial/residential construction near new transit stations and along transit corridors.

- **Local businesses** are choosing where to locate in a city, based on market demand, accessibility, amenities, and availability of space required. Their desires to locate or not locate in a certain area of the city is crucial for whether real-estate developers can be profitable when building a new development. Economic development officials work closely with these businesses, to ascertain their requirements and see how they can expand in the city. In a TOD corridor project, they are valuable as anchor tenants and drivers of demand. They don’t play a direct role in delivering a TOD project, but their willingness to locate in a specific corridor has a large role to play in whether it is successful.

We will revisit their respective roles and interaction in the following slides.
Given all of these parties involved, they should be involved in a pre-consultation on the vision and the purpose of the new TOD corridor. That visioning and evaluation period ends when a corridor is decided upon.

After this stage, the transport planners can finalize a cost estimate and therefore determine financing gaps and a feasible business plan for investment. At that stage, transport planners should be talking with the urban planners and economic development officials to determine the potential value uplift and to what degree there could be land value capture (LVC) and/or cross-subsidy.

This decision on a financing and funding model provides clarity, as it helps to determine how much development needs to happen when, and which sites need to be prioritized first. This also helps focus the work on land use strategy and urban design for the TOD neighborhood.

As the transport infrastructure plans get more settled and the urban design and public space vision gets finalized, parties can come together again to discuss specific implementation logistics and phasing of developments. This allows the stakeholders to be on the same page as construction proceeds.
This is a more detailed version of how these concurrent actions work, and describes how the 4 main groups in TOD development can talk to each other through the process and learn sequentially as each stream moves forward. At certain important decision points, these actors must discuss together how to proceed, especially when discussing how to finance the infrastructure investments.
From the past few slides, it is clear that a TOD corridor project is often complex, and many things run concurrently.

In many cases, officials are arriving at a TOD corridor project midway through. There are many opportunities to intervene at intermediate points, if stations have not been chosen and/or a financing plan has not been settled, for example.

This diagram allows you to ask key questions to determine where you may be in the process, and what steps can be to ensure that the project is on track. Each of these interventions requires officials to talk to one another to let each other know about major concerns and opportunities that were not highlighted before (e.g. proximity of stations to major transformative projects). Increasing coordination helps both on the upstream planning as well as effective implementation.
In this part of the course we will look at a stylized sequence of TOD corridor project planning and implementation. This sequence can be used as a blueprint that gives broad guidance on the successive steps used to implement a TOD corridor project. The steps are presented in roughly chronological order, but some may be conducted simultaneously, or with the order slightly changed. Implementation is also an iterative process in which successive reviews and negotiations take place on each of the steps for implementation. That being said, we have divided the sequence into seven steps: regional planning, consultation and preparation, transit infrastructure & operational design, financing/business model development, detailed physical design, land assembly & integration, and implementation.

So let’s take a look at each of these steps, each of which involve many actions.
The pre-condition for an effective TOD corridor project is to ensure that it is aligned with the overall vision for the city and metropolitan region. This vision should be translated into a regional master plan. That is why Step 1 is necessary – a regional planning process that defines the city’s vision of growth, including the overall structure of employment and residential areas, and which places can accommodate new development. Importantly, this regional plan will have identified the key corridors for transport investment in the long-term, including where new transit lines should be prioritized.

This regional master plan should be reviewed on a regular basis, and updated with new information.
Once the decision has been made to go ahead with a TOD corridor, forming an interdisciplinary and multi-sectorial project team will be amongst the first activities. The project team will likely consist of local government officials and technical consultants and will include a range of specialists: administrators, financial specialists, engineers, designers, marketing and communications professionals, can all be invited to join the project team.

Key for successful implementation of a TOD corridor is the integration between transportation and land use planning. The project team will also need to include representation of the different departments in charge of the different aspects of TOD, such as housing, environment, and economic development. In the best case scenario, representatives of the private sector and civil society will also be active members of the project team.

Funding for planning activities must be funded by city’s budget. In some cases, it can be provided through grants and/or loans from federal governments, bilateral aid agencies, multilateral banks, or environmental funds like the Global Environmental Facility. A TOD corridor project will likely encompass a multi-phase process since it is unrealistic to build a complete network (or even a complete corridor in some cases) in a single brief period.
The project area analysis is the first comprehensive examination of the project area completed by the project team. It includes gathering, organizing and mapping from secondary sources key demographic, infrastructure, economic and land use data. When relevant data is unavailable, primary data must be collected and supplemented by field visits to visualize the context.

The project areas analysis should also include a city’s transit demand analysis that will be used to design the TOD corridor system. This is complemented with an in-depth analysis of land use around the mass transportation corridor.

A transit demand analysis, allows the project team to determine the size of the customer demand along the corridors and the geographical location of origins and destinations, and to closely match system characteristics to customer needs. This includes the needs of different sets of users, like women, the elderly, the differently abled, and children. There are two options for estimating customer demand: the quick assessment method allows cities to roughly estimate demand in a relatively short period of time using a modest budget. Basic traffic counts are combined with boarding and alighting surveys of existing public transport services. The idea is that the demand for the new corridor will be equal to existing public transport ridership, plus a percentage of new passengers from private vehicles, taking into consideration population growth. If a city possesses the ability to
document trips through a **full transportation demand model**, typically a four-step model, then such a model can provide a level of detail that will produce a more precise demand prediction. This second method requires more time and resources to complete.
In the pre-planning process, each part of government should start asking questions about how they can deliver a good project when investing in a specific corridor of the city. Some examples are provided here, and they should spark an evaluation of whether they have the tools and resources needed to implement successfully.

Importantly, planners should ensure that enabling legislation is enacted for the strategies they are considering (e.g. Land Value Capture techniques, overlay zoning, housing subsidies, parking regulations, etc.) – any change in required law may take a long time, and should be completed as soon as possible.

**List of Potential Questions**

**Transport planners**

- Basic questions before capital expenditure - what are the current travel patterns and projections for the next 30-50 years?
- What is the public transit ridership along the existing corridor?
- What are the projections with new infrastructure and services? Will the proposed services be adequate to handle this demand?
- *(especially in developing country cities)* What kinds of informal transit (jitneys, rickshaws, minibuses, etc.) exist along the corridor? Given projected fare levels, how many people...
would switch to the new mode?

- How can informal transit serve the first mile-last mile effectively and fill in transit coverage gaps? Can convenient drop-off/pick-up locations be integrated into the design up front?
- What kind of parking regulations exist currently?
- Can parking regulations be adjusted along the new TOD corridor? (i.e. lower parking provided can incentivize people to use transit)
- If the average income level increases in the TOD corridor, car use may go up. How can you plan for additional traffic carefully? (so that the pedestrian realm closer to the station is protected as a very walkable environment)
- What kind of alternative transit services (e.g. ride-sharing or express services) can cater to a different clientele?
List of Potential Questions

**Urban/land-use planners**

- When is the master plan being revised? Can zoning be adjusted in this area specifically?
- Are there procedures for creating special overlay districts and/or land value capture? Enabling legislation needed?
- What is the current spatial structure of the city? Where is most growth occurring? How does the proposed TOD/transit corridor match up?
- Design: Are there good examples? Should a best practice guidebook be published?

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**2.3 Corridor Assessment: Urban Development**

**Preliminary questions for Urban planners**

- When will the master plan be revised? Can zoning be adjusted in this area specifically?
- Are there procedures for creating special overlay districts and/or land value capture? Enabling legislation needed?
- What is the current spatial structure of the city? Where is most growth occurring? How does the proposed TOD/transit corridor match up?
- Design: Are there good examples? Should a best practice guidebook be published?
List of Potential Questions

Economic development specialists
• What is the overall economic climate in the city and the country?
• Which areas are experiencing job growth and residential growth?
• What new growth needs to be accommodated and where?
• How does the corridor fit in the economic development strategy?
• What are real-estate vacancy rates?
• Can the new transit/TOD corridor have a coherent public identity for marketing?
• What high-visibility sites/government-owned sites are available for redevelopment? How can a compelling vision be communicated to developers?
• What are the financing gaps in supporting TOD?
they expecting real estate value capture to recap the construction cost of the new transit infrastructure? In strong markets, could real-estate developers cover the cost of street improvements and other investments in the public realm. In weaker markets, do developers need public subsidy to improve design and/or start construction?
Let’s look at some of the factors typically considered when evaluating corridors. Corridors are usually selected based on a range of factors, including customer demand, network advantages, roadway characteristics, ease of implementation, land availability and zoning, costs, political considerations, and social equity.

In a project’s first phase, a corridor will probably serve popular origins and destinations. There is always tension between a denser area of a city [which has more transit demand and opportunities for mixed-use and intense development] and cost for implementation. Building a mass transport corridor in existing core/dense areas always carries political and technical risks.

Market readiness, density, and physical infrastructure for non-motorized transit are just some of the criteria that should be considered when planning for a TOD corridor. Identifying areas where existing and projected conditions are most conducive for TOD can help bolster broader and faster success. However, balancing these ideals with other barriers, including higher costs, must be recognized. Through public participation, these difficult tradeoffs can be addressed and perhaps even diminished through public consultation.
Selecting a transit corridor, mode of public transit, and route is a complex process that can take years. Furthermore, the exact process relies heavily on local context, including laws and policies stemming from a combination of national, provincial and local levels. Here, we lay out a simplified and general process for corridor evaluation and selection, presenting a scenario in which stakeholder engagement and public participation are fundamental.

Before a corridor is selected, it is important to take a step back and understand the vision for the region. Where is growth happening and/or preferred? What do stakeholders care about? Public input and review of long range plans for transportation and land use are key here. The next step is identifying the goals of local communities, especially in areas where corridors are initially being considered, such as areas with existing high density, congested roads, and high demand for public transit. Public participation and engagement of stakeholders at this stage is important; it can reaffirm or update visions presented in older long-range plans; can highlight potential concerns early on, and can produce initial buy-in for the process. Furthermore, identification of goals inherent within the vision for the region as well as individual corridors provides a framework from which to establish criteria for effective evaluation.

Establishing and prioritizing criteria for corridor evaluation is an important step to get right. Goals identified in the previous step are translated into a set of criteria which are then
ranked and weighted to establish prioritization and a scoring system from which to evaluate corridors. Once again, public participation is important as it gives the public power to incorporate missing criteria, understand and consider tradeoffs, and seek compromise. Criteria selection for corridor evaluation are often subject to political realities, land availability and physical, logistical, technical, and budgetary constraints. While these realities are important to keep in mind, all projects should attempt to evaluate corridors based on an ideal vision and the components which are conducive to achieving thriving transit-oriented development.

Once criteria are established, the next step is evaluation of all corridors being considered – this may be a long list at this stage. Corridor evaluation is done through a mixture of data collection and analysis and often with the assistance of software such as transport modeling or multi-criteria analysis. Again, given availability of data, and capacities of the relevant stakeholders, this phase may play out differently. Nevertheless, the overarching goal is to apply the set of criteria to each corridor, without bias, and generate a ranking of corridors.

From here the list of corridors is refined to a manageable number in order to advance the process of evaluating different modes of transport, conducting necessary impact assessments (such as environmental or economic). Once the corridor is selected, details surrounding the route, stations and placement ensue.
The first decision regarding implementation of a TOD corridor is the selection of the type of mass rapid transit technology that will act as the spine of the corridor. Cities have many options that can be considered: metro rail, light rapid transit, monorail, suburban rail, standard bus systems, and bus rapid transit. There is no single right or wrong technology, since selection depends on the local circumstances. In fact, a city should strive to provide multiple forms of public transit that complement one another and serve varying ridership and trip demand needs.

The factors affecting the technology choice include capital costs, operational costs, design and implementation, performance, and economic, social, and environmental impacts.
The current character of the corridor will influence the most effective strategy for TOD redevelopment. In corridors with substantial existing development on small parcels, TOD development must be opportunistic and evolutionary over decades. In corridors with larger parcels of land available for contiguous development, TOD development can leverage larger transformative anchor projects.

With small parcels / evolutionary design and planning, the overriding strategy is to develop a vision and plan that current landowners agree upon. Then, when each landowner feels ready, the property can be redeveloped in a vision consistent with the corridor plan, developing the TOD district progressively. This process is often quickened by increasing allowable FAR/density limits, which creates a larger financial incentive to sell land or redevelop. An example of this was the Rosslyn-Ballston corridor in Arlington, VA, USA, outside Washington, DC. After placing underground metro rail under an auto-oriented commercial strip in the 1970s, the zoning was changed to allow for dense development. The redevelopment took 20-30 years, with many buildings being developed in the late 1980s and 1990s through today.

With large transformative projects, the priority is consultation with the large landowners with holdings in the corridor, especially next to stations. If one of these projects is developed successfully, it can transform a multi-block area very quickly, and spark
additional growth. Intensive cooperation and facilitation between the developer, government, and stakeholders help to ensure a high-quality project with design that matches the overall vision for the area. In cases where the large landowner is government, the public sector can act as a master developer, investing in public infrastructure and phasing the sale/lease of each phase of development (Singapore’s Government Land Sales (GLS) program is a good example of this.).

Many corridors are not purely a small parcel or large transformation area, and have a mix of both land opportunities. In such cases, having consistent planning regulations that set the design direction for the TOD district is important, and leveraging the larger projects as anchors and catalysts to move these changes forward.
2.7 Stakeholder engagement

- Communicate project effectively from the outset to avoid NIMBY and fear of gentrification
- Stakeholder analysis
- Media strategy
- Objectives of consultation:
  - Explain significance of project to various stakeholders, gain momentum and support
  - Gather additional information about opportunities and constraints
  - Collect more granular information about the issues and needs of TOD corridor neighborhoods/station areas
  - Finalize the objectives to be achieved by the corridor

A failure to communicate the TOD corridor project to key stakeholders and the general public can greatly undermine project’s viability. Misunderstandings and misconceptions can be quite common at the onset of a project. There is also the potential problems of “not in my backyard” (NIMBY) behavior and gentrification, which tend to arise in cities that already have affordable housing shortages. The organizations and individuals who feel threatened by the new system may act to hinder or even halt the project’s progress and ultimate implementation.

A stakeholder analysis of all people and entities affected by the new system should be completed as an initial step in a communications plan. Such stakeholders might include: existing public transport operators, environmental and civic organizations, neighbors, private sector actors, and governmental agencies. Strategies should be developed to address the possible concerns that may be expressed by these groups. A strategy should also be established for communications with the news media. Finally, the planning and design process can really benefit from the direct input of citizens. A substantive public participation process in which ideas and recommendations are solicited from a range of citizens is usually an effective tool for high quality design. It helps in finalizing the objectives and performance targets to be achieved by the corridor.
The bubble map shown in this slide is an example of stakeholder mapping for TOD implementation in the US. The colors illustrate the different types of actors involved in the process: national, state, and local governments, private sector, and nonprofit and community organization. It’s important to recognize that stakeholder involvement in TOD projects will inevitably involve numerous groups.

At the outset of a project, a few basic decisions regarding operational design will have profound ramifications on the quality of the service and its overall financial sustainability. Operational design decisions will depend on the kind of mass transportation technology the system is based on (metro rail, BRT, light rail, etc.). In step 3 of the implementation process, we look at some of network and service design decisions that need to be resolved as part of the operational design of the project. Our example is based on BRT technology.

In the case of a BRT, the systems' business structure will be largely defined by whether a closed system or an open system design is selected. In the case of BRT corridors, a closed system implies that the corridor access is limited to a prescribed set of operators and a restricted number of vehicles. By contrast, an open system generally permits any existing operator to utilize the busway. Another major operational decision involves whether to choose a trunk-feeder configuration or a direct services configuration. Trunk-feeder allows smaller vehicles to be utilized in lower-density areas while the main corridors can operate more efficiently with larger, trunk-like vehicles. This configuration can lead to higher system efficiencies, but it can also mean that many customers will require terminal transfers. By contrast, direct services will generally use a single vehicle to connect a residential area to the central area of the city. Direct services help reduce the number of transfers required, but can impact operational cost efficiency.
BRT provides the advantage of easily accommodating a large number of route permutations. In this way, the number of required transfers can be greatly reduced. Express services can be very popular when significant travel time services are realized.
At the outset of a metro project, a few basic decisions regarding operational design will have profound ramifications on the quality of the service and its overall financial sustainability. Metro capacity can reach 80,000 passenger per hour per direction, but can also be as low as 10,000. While capacity costs money, it is difficult to add later on, when the system reaches capacity and accordingly planning for suitable long term infrastructure capacity is essential.

As a backbone for urban mobility, the role of a metro corridor needs to be understood in its broader network context with particular focus on transfer stations. Some corridors play a connector role (circular lines), while others expand the reach of the network to suburb, as shown on the diagram above. Such function needs to be reflected in their design.

For longer corridors, express services need to be integrated in the design to offer improved travel time.
Designing a mass transport system to handle high passenger demand in a rapid manner is one of the pillars of delivering a service that can compete with cars. The capacity and speed characteristics of a system are defining features that set mass public transit apart from car use.

Achieving a high speed and high capacity system depends on a range of operational design characteristics. To illustrate, let’s use a BRT example. BRTs use multiple stopping bays at stations; they have an express and limited stop service. They use articulated vehicles with multiple wide doorways; they feature off-board fare collection and fare verification, platform-level boarding and optimum station capacity.
A system’s design and engineering depends on several key factors that will eventually dictate infrastructure form. These factors include: cost, functional attributes, climatic and topographic conditions, cultural preferences, and operational and customer service characteristics. The corridor selected, expected capacities, and service options all influence a system’s physical design.

Infrastructure design encompasses a range of system components, which depend in turn on the type of technology selected for the TOD corridor. To illustrate the idea, we have included the typical components for a BRT corridor: busways, stations, intermediate transfer stations, terminals, depots, control centers, traffic control signals, integration facilities, public utilities, and landscaping. Architectural design, complete streets and public spaces around the stations are also important components for a mass transport system that is well integrated with the city surroundings.

The actual capital cost of a transport system varies considerably from country to country and depends on a huge range of factors, including the complexity of the street environment, the need for flyovers or underpasses, the number of lanes, and the need for property acquisition. The cost of TOD projects includes many elements that are part of the mass transport infrastructure, but also of the surrounding areas. We explored the costs of TOD projects in Module 5, “Investing in TOD”. One important reminder is that any
expropriation of property should be handled in a transparent, open, and fair manner, especially if the confidence of the private sector and the finance community are to be retained.
If a system is designed around customer needs and wants, then success is much more likely to occur. From the customer perspective, small and simple measures that improve comfort, convenience, safety, and security are more important than sophisticated vehicle technologies or designs. Many people do not utilize public transport because they do not understand how it works.

Timely information, clear signage and system maps can do much to overcome information barriers to usage. Electronic displays and digital voice announcements both within vehicles and stations can also ease system understandability. Another important aspect of customer service is having professional staff, high quality illumination and presence of security personnel. Cleanliness and aesthetic appearance of system infrastructure also sends a message to users regarding system convenience and safety.

The transit operators should continuously improve their custom services, based on the feedback obtained through periodical customer survey.
Corridors cannot be designed and implemented in isolation. Instead, they are just one element in the city’s overall urban framework and set of mobility options. To be most effective, they should be fully integrated with all transit options and modes. By optimizing the corridor’s interface with other options, systems designers help maximize a system’s customer base. The corridor catchment area encompasses the entire customer capture area.

TOD users need to reach the stations comfortably and safely. Proving a safe route to transit is the first step in providing effective service. High-quality pedestrian access, a key feature of TOD neighborhoods, can be designed through factors such as directness and connectivity, aesthetics, ease of movement, legibility, safety, and security. Mapping the quality of pedestrian facilities in a TOD corridor catchment area is the first step in identifying barriers and difficulties faced by the community. Pedestrian only zones, shared space, covered walkways, and at-grade and clearly marked crossings are some of the design solutions that encourage a strong linkage between a community and the mass transport service.

Integrating the corridor with bicycle usage can also significantly increase the customer catchment area. Allowing bicycles to enter mass transport vehicles permits the customer to use the bicycle as a feeder service at both ends of the journey. Alternatively, secure bicycle
parking facilities at stations gives customers the confidence to leave their bicycle at the station during the day.

Mass transit should also be integrated with taxis and other intermediate transit options. One good strategy for modal integration is to allow for drop off areas as well as formal parking facilities close to the station, allowing for complementary set of customers. To ensure that users of all abilities and ages are included, paratransit vehicles, which transport passengers with special needs, should also be encouraged and integrated into the transit network.
Options for funding and financing have been covered on Module 5, “Investing in TOD”. Let’s reiterate some of the questions the team in charge of project implementation will have to address when developing a financing and funding plan.

What funding sources can be unlocked over the course of the investment? Can the project use investment proceeds, investment incentives, or a combination to repay financial obligations? What financial products exist to mobilize third party capital? Can the city use debt in the form of loans and bonds, or equity? Are there any guarantee instruments available?

An example can help illustrate the kind of financial package that can be used to finance a BRT system. The financial package can include a combination of existing transport budgets, congestion charges, parking fees, petrol/gasoline taxes and vehicle ownership fees, to name a few. In addition to transit fare, the city and its transit operator can generate revenue from property development around stations and corridors. Private sector lending and investment may also be options to consider. The city might decide to utilize a PPP structure where the private partner finances all or part of the infrastructure development in exchange for exclusive, long-term operational concessions. In some instances, cities can also access national and/or international development bank financing.
The next step in TOD corridor implementation is to develop a business plan. Successful implementation of TOD corridor projects require not only the necessary physical infrastructure investments [mass transportation, stations, neighborhood infrastructure] but a business plan for the mass transportation and land development around the corridors. We have covered this topic in Module 5, “Investing in TOD”. In this Module we will just mention a few key points to refresh some of the ideas already covered.

As discussed before, a range of options exist over the agency that will be in charge of moving the project forward. The business plan needs to clearly state the responsibilities and roles of the actors involved from the public and private sector.

The business plan also includes decisions regarding the mass transport system, including contracts. For example, if it is a BRT, will the lines be competitive tendered concessions with public sector oversight? What is the unit of measurement to pay the operator? Paying by km traveled has a different incentive structure than paying by customer.

The business plan also needs to consider how to maximize the impact of the capital investment on TOD neighborhoods, and must create the right incentives to develop mixed-use, mixed-income areas. Thinking about how to structure regulatory and tax incentives is also part of crafting the business plan for the corridor.
Understanding the cost equation for a public transport system requires looking at the various components that add up to the total cost: repayment of capital, fixed operating costs and variable operating costs and the components under these categories.

Returning again to our example of a BRT system, costs are usually analyzed for the separate parts of the system [trunk system, feeder system, fare system, depots, offices and supplies]. This course does not provide all the information necessary to perform this kind of analysis. The intent is to provide a brief introduction to the topic that can be followed up with more detailed information from other sources.

When looking at the operational costs of the system, the analysis will take into account fixed operating costs (including personnel, insurance, safety); variable operating costs, such as parts, fuel, and maintenance; and repayment of capital, for example, vehicle depreciation, principal payments, and costs of capital. The development of the system’s business model requires an initial analysis of the projected operating costs and revenues. The analysis helps to identify the conditions in which operating companies can reach profitable (and sustainable) revenue levels. The calculation of operating costs and projected revenues allows for an initial estimate of fare levels to cover operating costs.

Understanding the cost structure helps to define which elements of the system can be
funded in a sustainable manner from fare box revenue, and which elements need to be paid by government investment, and the amount and structure of subsidies, if required. Profitability is desirable in order to isolate the system from political manipulation and to ensure long term quality of service for the passengers. The cost analysis also needs to establish a formula to split the fare revenues between the various actors involved, including the different operators. Ultimately, setting up a fare for a transport system is highly political but it should be based on a technical recommendation that comes from the analysis briefly described.
There are two big areas in which the project team needs to develop a marketing strategy: the new mass-transport system and the TOD neighborhoods.

A new mass transport investment needs to develop a marketing strategy that will begin with appropriate branding of the system through the system’s name and logo. The marketing plan will also include a media strategy involving promotions and announcements. A public education plan helps to describe the mass transit concept to the public, highlighting its benefits and explaining how it works. It is also an opportunity to incorporate a public safety and awareness campaign. Information kiosks, demonstration stations, and direct community outreach can be some of the tools utilized by a city to introduce the new system.

The second piece that requires a marketing strategy is the TOD neighborhood. TOD neighborhoods and corridors emphasize the creation of a sense of place, or identity, for an urban space. Cultural heritage preservation and new branding can play a critical role in the success of a TOD. NoMa in Washington, D.C., and the Denver Design District (Colorado), are examples where branding has been purposefully used to create a sense of place. The neighborhood marketing strategy can be led by a Business Improvement District, an approach that has been used in South Africa and the US. Through this scheme, businesses approve an extra tax that can be used to provide services such as branding, security,
maintenance of parks, organization of events, and cleaning services.
Once the corridor has been established and its transit infrastructure design is decided, one of the most important decisions the project team will face is how to prioritize investments and sequence the development of various station areas. International experience has shown that while 1 km radius buffer areas around transit stations typically offer the highest level of opportunity for real estate development, not all stations are equal in terms of development potential.

There are different methodologies to prioritize and sequence investments in station areas. In the next slides we will present the 3 Value or “3V” approach developed by the World Bank. The 3V framework helps differentiate the opportunities offered by the diverse stations in a mass transit network or corridor. 3V stands for Node, Place, and Market Potential value; it’s a framework that helps decision makers to develop a coherent vision, policies and strategy to leverage the value created through enhance connectivity and accessibility considering the specific characteristics of different mass transit stations.

The tool can be used to:
- Classify and prioritize station areas into sub-groups to apply different policy strategies
- Determine the imbalances between connectivity, accessibility, place quality and market values in the same station.

5.1 Station Area Prioritization Model: The 3 Value (3V) Framework

Different station areas offer different TOD potential. Economic and social benefits of TOD, including financial gains from land value capture, can be maximized by understanding and leveraging the interplay between node, place and market potential values.

- Identify development potential (scale, type, timing) based on three values.
- Develop planning and implementation measures and prioritize limited public resources
- Develop and communicate with stakeholders a vision for the city

• Create value to break the imbalance. For example, if the analysis determines that one station area is well connected but lacks place value, cities can take action to increase place value by improving public spaces in the area.

Let’s take a closer look at what the three components of 3V approach means.

The three variables that help price station areas are:

- **Node value**, which is based on the location of the station in the network;
- **Place value**, which is based on the station’s urban qualities; and
- **Market Potential value**, which is based on a station’s economic potential.
Node value is driven by the importance of a node in a transportation network. The nodes in a network are not equal. Differences in the number of lines and modes of transport that a node offers access to, as well as differences in centrality and in accessibility within the network, create a strong hierarchy between the nodes.

For node value, hubs are among the most important stations. A transport hub is a place where passengers can switch between different lines or transport modes, including non-motorized transportation. Public transport hubs include large subway stations with multiple lines, train stations, rapid transit stations, bus stations, tram stations, and airports. Some complex hubs combine in a single integrated multimodal station, or complex of stations, with several modes: for example, Hongqiao Airport in Shanghai; or Tokyo Station, which comprises a giant underground facility linking the train station to 6 subway stations. The number of lines and modes connecting in a hub defines its importance. A hierarchy of nodes usually includes:

- A few high-ranking complex hubs offering transfers between many lines and transport modes, which are clustered in the core of the network.
• Secondary interchange stations connecting 2 or 3 lines, which are also mostly in city centers
• Many single line stations in ‘spokes’ radiating far away from the core of the network

Nodes that are either strong and complex hubs, or more central, or more accessible, or combine all these qualities, have a higher value, because they tend to concentrate higher flows of passengers. Shinjuku station in Tokyo, which has the highest ridership in the world with 3.5 million passengers, is one such high-value hub.
Place value is derived from vibrant, sustainable communities where residents can access jobs, shopping and services on foot or bicycle, thus enjoying a range of benefits such as reduced transportation costs, improved access to various amenities including high-quality education, and improved public health.

As is the case for node value, place value is also unevenly distributed across an urban region. Places across cities have a wide range of intensities and mix of land uses. In a typical city, many stations areas are mainly residential in nature and with low intensity, while a few stations are more jobs oriented, mixed-use, and with high intensity. Walkability is also different and depends on the street patterns and on the design of streets as places for people. Street patterns determine not only whether residents and workers can access rail and bus transit, but also whether they can access the shopping, jobs, and services that might be located in their immediate neighborhood. Street patterns with small blocks about 100-meter in length and high connectivity enhance local accessibility, while superblocks and gated communities decrease accessibility. As place value varies widely, the types of planning, urban design, public policies, and investment strategies will be different based on local station area context.
The market potential value of a node refers to the unrealized market value of a station area.

Market potential depends on the **economic activity and attractiveness of the place for developers and businesses**. For businesses and for commercial activities, local job densities and high accessibility to other job centers across the urban area, and expected growth are crucial as they determine the agglomeration economies of locating around a specific station. For residential development, market potential depends greatly on the amount of jobs accessible in the 30 to 45 minute commute from a given location.

**Land and real estate opportunities**: Market potential depends also on overall demand for real estate development at the city level, on available land opportunities, on the ease of land redevelopment, and on the volume of construction permitted on a given plot of land.

International experience shows that when there is a high attractiveness in a given place, even where land is physically constrained such as in King’s Cross in London (26 ha) and in Hudson Yards in Manhattan (22 ha), the market develops high density programs up to 175,000 people per km² (residential + jobs) in King’s Cross and more than double this figure in Hudson Yards with mixed-use programs, provided FAR regulations are set with higher values.
Emerging areas that have some market potential, but few urban, mixed-use buildings, may be good candidates for TOD investment. Here, TOD policy can help to push a ripening market and escalate development intensity and quality. Other areas have less market potential and need strong incentives to encourage market development and the desired mix of land uses and building types.

**Market prices:** Market prices are comprised of land prices, real estate prices, and rent prices. They have an impact on the type of TOD development an area can support. High or increasing land and real estate prices call for high-density programs.

**Market activity:** Market activity is an important component of market value and derives from the intensity of market transactions during a sufficiently long period for residential and mixed-use (residential/commercial) land uses.
5.2 Finalize station area TOD plans, given corridor strategy

- Determine appropriate density levels at each station node, given 3V-based analysis and current market demand
- Incorporate stakeholder and developer input
- Codify design guidelines and eventual public space network into zoning regulations
- Finalize incentives and affordable housing goals for each area (see more on this in Module 7)

After the business model and corridor strategy have been firmed up, urban planners can work to finalize station-area TOD plans. After using a 3V-based analysis to determine the appropriate level of development that can be accommodated at each node, the local densities can be adjusted to ensure they are appropriate and fit in with surrounding contexts while creating an active and pleasant public realm. During this stage, planners incorporate stakeholder and real-estate developer input before finalizing the design guidelines and public infrastructure need for each station.

The detailed station-area plan can include the types of incentives and financing available, as well as goals for affordable housing, if applicable.
More specifically on affordable housing, its provision along the corridor is an important aspect of an inclusive corridor strategy to ensure there are a diversity of residential options and residents living within walking distance of a transport corridor - thereby increasing ridership demand and a more diverse labor pool. This can be achieved by ensuring that most of station areas offer affordable housing across the corridor. Actual distribution of affordable housing stocks should be carefully balanced between the stations in the city center with high land value and those with modest land value in the suburbs, in order to provide affordable housing to most of low income households with least fiscal costs. Module 7 explores in-depth strategies for incorporating affordable housing into TOD corridors.
6.1 Land & Feasibility Assessments

- Pre-development:
  - Detailed design
  - Land use and potentiality
  - Market analysis
  - Financial plan
- Land use strategy and acquisition
  - Leasing public land to private sector
  - Eminent domain/preemptive right/right of first refusal
  - Private sector acquisition
  - Land readjustment

The pre-construction stage of the project implementation takes the previous analysis for the corridor, and provides deeper information for the specific station area that will be developed.

The pre-development stage involves a number of activities, including: development of a more detailed design for the TOD area, and development of a financial plan that combines the various instruments and lines of financing. In order to do this, it is necessary to evaluate the potential land uses for the area, zoning and FAR, to determine the best use for the land. Another important component is to do a full-fledged market analysis to determine the project’s economic viability. Finally, the project team needs to identify specific lines of funding and financing, including government programs, loans, bonds, grants, subsidies, etc., that will be pursued for the station area, and even individual parcel developments.

Land is one of the most essential pieces for TOD project implementation. One common scenario for TOD projects is that land parcels are too small for financially viable developments. In order to build larger buildings within the design specifications for the area, land needs to be amalgamated. We have discussed land and different tools that can be used to leverage it as one the building blocks of TOD in Module 3.
Following are some tools that governments can use to get land ready for development.

- Government can lease the **land for development** to the private sector.
- It can also acquire the land using **eminent domain**, although this methodology is usually not recommended if there are other options available.
- The private sector can also **acquire the land** (or already own the land).
- **Land readjustment** is another option available that has been successfully used in places like Japan. It involves negotiations among land owners to pull together their land. These renegotiations are usually lengthy.
Executive projects and designs are finalized during this phase following the standards described earlier. It is key to have close collaboration between the public sector agency in charge of TOD implementation, and the developers chosen for implementation. Proper sequencing of activities and coordination of designs is in particular relevant for stations above which development will take place. Design changes, and continuous negotiations, are very common in TOD projects, and the public agency needs to oversee that implementation has really followed TOD principles.
Property commercialization can be the responsibility of the private sector [developer] or, in some cases, public transport agencies that also have real estate operations, such as Hong Kong’s MTR’s rail + property model, Japanese private railway companies, and Washington DC’s WMATA. Many times, when TOD projects are designed, they include very specific land uses to address community demand, such as access to retail (grocery store).

Maintenance of the area should also be built into the TOD contract. One strategy commonly used in the US and countries like South Africa is the creation of a Business Improvement District (BID), which taxes businesses in the area to provide services such as branding, security, maintenance of parks, organization of events, and cleaning services.
Although we have included the M&E system as the last step of project implementation, remember that the project cycle is not linear. The information provided by the M&E system should be continually used to improve project implementation and operations and maintenance extending beyond implementation. Development of an M&E plan should begin in the initial steps of the project as the goals of the project will help define how to manage trade-offs, as well as to monitor and track success. Once the project is constructed, M&E can increase impact. For example, performance feedback can help improve most of the features of a BRT system, including the mass transport itself, by adjusting fares based on user feedback and actual demand; observing and measuring how vehicle demand management is helping to curb the use of cars and change customer behavior; and encouraging positive changes in customer service such as expanding the system’s operating hours working.

M&E is an important, yet often overlooked and underfunded component of a project. In module 8 of this course we discuss the various impacts that TOD corridors can have and how to measure them. On top of the changes in transportation behavior, they include social, environmental and economic goals. A good M&E system is necessary to be able to measure how much the TOD corridor project is actually achieving its goals. Setting up the M&E system requires assigning a budget for these kinds of activities, and designing a system to collect the quantitative and qualitative information.
If a city wants to use a TOD corridor as a demonstration project to achieve multiple sustainability goals, investing in a good M&E system can help provide the evidence to be able to replicate the project later on.
Module Quiz

1. Which one of the following statements is TRUE?
   a. Common mass rapid transit options are: metro rail, light rapid transit, monorail, suburban rail, standard bus systems, bus rapid transit and taxi sharing systems.
   b. The choice of transit technologies should be consistent with local conditions, taking into account capital costs; operational costs; design and implementation; performance; and economic, social and environmental impacts.
   c. The project team consists of local government officials and technical consultants who only provide expertise on design and engineering of the project.
   d. Consumers' behavior will adjust according to what transit vehicles are available to them, so there is no need to take demand into consideration when conducting project area analysis.

2. Which one of the following statements is FALSE?
   a. The operational design decisions will depend on the kind of mass transportation technology the system is based.
   b. The comparative advantage of a mass transport system to a car competitive service is its capacity and speed.
   c. To consumers, sophisticated design and vehicle technologies are the most important considerations.
   d. Clear signage, system maps, electronic displays and digital voice announcements, professional staff, high-quality illumination, and the presence of security personnel are all important factors enhancing passengers' experience in using mass public transport systems.

3. Which one of the following is NOT a key factor in the design and engineering of infrastructure and technology?
   a. Sophistication
   b. Cost
   c. Functional attributes
   d. Climate conditions
   e. Cultural preferences
   f. Operational characteristics

1-b
2-c
3-a
Module Quiz

4. Which of the following statements is FALSE?
   a. The first step to provide an effective service is prove a safe route to transit.
   b. High quality pedestrian access is a key feature of TOD neighborhoods, which can be designed through design factors such as directness and connectivity, aesthetics, ease of movement, legibility, safety and security.
   c. Provision of affordable housing along the corridor is an important aspect of the corridor strategy to ensure there are a diversity of residential options and residents living within walking distance of the transport corridor.
   d. Corridors can be designed and implemented in isolation.

5. Which of the following statements on the business plan of TOD implementation is FALSE?
   a. A business plan includes an institutional structure, a business structure for mass transport, incentive structures, and land development along the corridor.
   b. Investment proceeds and investment incentives are funding sources over the course of the investment.
   c. A mass transport marketing scheme includes the name, logo, media strategy, information kiosks, demonstration stations and direct community outreach.
   d. The 3V framework of station area prioritization model includes time value, place value, and market value.

6. Which of the following is NOT part of the scope of the land assembly and/or implementation phases of TOD projects?
   a. Land & feasibility assessments
   b. Construction plan
   c. Regional planning exercise
   d. Real estate market positioning and maintenance
   e. Monitoring and evaluation

7. Which of the following statements is FALSE?
   a. Monitoring and evaluation is only considered during the final step of project implementation
   b. Monitoring and evaluation systems provide objective and quantifiable indication of a project’s overall performance
   c. Monitoring and evaluation provides feedback to identify strengths and weaknesses allowing practitioners to take corrective action
   d. Monitoring and evaluation of a TOD corridor should track social, environmental and economic impact

4. d  
5. d  
6. c  
7. a