Multimodal Transport Hubs

AFD
AGENCE FRANÇAISE
DE DÉVELOPPEMENT

FOREWORD

People and goods must be mobile to ensure access to employment and basic services, for the productive economy to run smoothly and for cities to be efficient and liveable. The Agence française de développement (AFD), France's development agency, supports mobility systems that combine infrastructure, services and regulation to provide fair, efficient and sustainable travel solutions for all.

So far the AFD has funded mainly mass linear public transport infrastructures in urban settings, such as underground railways, streetcars and buses with dedicated lanes. It has widened its scope and is now working more and more often on projects such as multimodal transport hubs (MTHs - also referred to throughout this document as intechange hubs). MTHs are not just about transport – their purpose is threefold: they offer transport, thus managing flows of travellers between different means of transport and associated services; they offer services, provided by shops and other conveniences including offices; they play an urban role, the hub being a heart around which the neighbourhood is organised.

The purpose of this guide is to provide a list – not necessarily exhaustive – of good practices drawn from projects either existing or under development, in order to help design, fund and execute multimodal transport hub projects in countries in which the AFD finances transport infrastructures. It is the result of an iterative, collective work, and draws on the experience gained by the AFD and its partners.

The guidelines are organised into four parts and 38 good practice factsheets:

1 – Interchange hub functions and services

2 – Governance, contractual arrangements and financing of Interchange hubs

3 – Digital tools for Interchange hubs

4 – Inclusion and gender issues: interchange hubs for all

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INTRODUCTION

1. WHAT IS A MULTIMODAL TRANSPORT HUB?

Over the past five decades the population has increasingly concentrated in urban areas. According to a 2015 study by Oxford University, more than 80% of the world's population lives within an hour of a city – the figure exceeds 90% in Europe. As people move to cities, car traffic and urban transport increase fast too. During rush hour, commuters[1] fill transport infrastructures, which results in saturation of arterial thoroughfares and ring roads.

In this context, access to transport nodes is crucial for urban resilience and the economic vitality of large cities. To reorganise cities and ensure regional unity it is therefore necessary to adopt a comprehensive approach, taking in transport and urban planning.

Actors in the field of mobility are now familiar with the term "interchange hub" ("transport hub" is also widely used, sometimes with the adjective "multimodal" to reinforce the idea of various modes of transport connecting there). The expression refers to a building and a space; its meaning encompasses various realities, functions and practices.

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1. People moving between their homes and workplaces on a daily basis.

The efficiency of public transport depends on network effects and on the connectedness between transport modes or between the different lines of a mode. Multimodal transport hubs (MTHs), as both meeting places between modes and points of interconnection, play a crucial role in ensuring the good use of public transport. Interchange hubs help organise urban mobility systems. Their role is to facilitate transfers between different means of transport, and as part of the urban environment, act as interfaces between cities and transport networks. Offering mobility, accessibility and attractiveness, multi-modal transport hubs differ vastly from one country or city to another, depending on the structuring modes of transport and on the maturity of the urban fabric.

In France and other European countries, the concept brings to mind urban train stations, but it can't always be transposed as such to countries in the Global South, where structuring networks are less advanced, and urban development is sometimes chaotic. In cities in the Global South, MTHs usually take the shape of underground stations and urban bus terminals connected with other transport networks (buses, taxis, other vehicles…). One specific feature of these cities is the substantial share of paratransit transport (often minibuses run by small private operators, with little regulation), the multitude of bikes and motorbikes in some cities (especially in Asia) and the number of informal street vendors. In addition, social and planning constraints create a complex web of exchanges that is difficult to manage.

SCALE

OBJECT

MTH RELATION OBJECT/SPACE
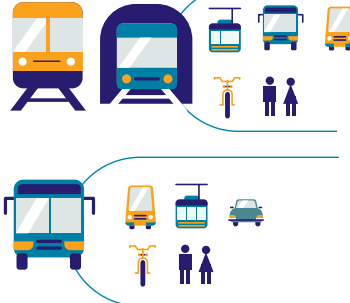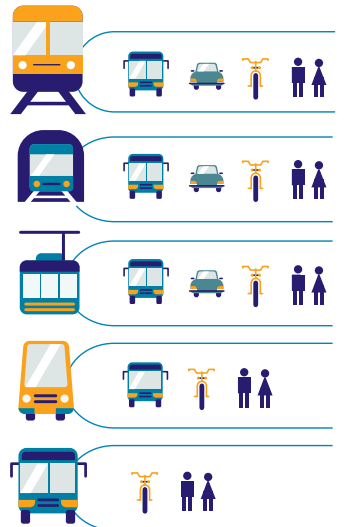
NATIONAL — MAJOR CENTRAL STATION

REGIONAL — REGIONAL STATION

MATURITY OF THE URBAN FABRIC

OBJECT   SPACE

METROPOLITAN — MAJOR CITY STATION

BUS TERMINAL

FLOW

MATURITY OF THE URBAN FABRIC

OBJECT   SPACE

CITY — TRAIN STATION

UNDERGROUND STATION

CABLE CAR STATION

STREETCAR STATION

BUS STATION

FLOW

MATURITY OF THE URBAN FABRIC

OBJECT   SPACE

Typology of multimodal transport hubs

Nairobi, Manila, Tunis, Algiers:
four examples of interchange hubs and their specific issues

Nairobi: organising numerous unregulated private operators

Nairobi bus terminal.
© Chris 73, Wikimedia Commons.

Kenya's capital city, home to more than 3 million people and growing fast, is struggling with the typical problems caused by dysfunctional urban mobility: congestion, air pollution, a high rate of accidents. The main mode of public transport is *matatus*, minibuses run by a large number of unregulated private operators.

Kenyan interchange hubs are bus terminals located in and outside cities. The question is how to organise them in such way that transport flows and commercial activities (street vendors and small informal shops) can occupy the same structured area.

Manila: improving safety in a saturated, dangerous interchange hub

Aerial view of Bicutan station with passengers boarding and alighting.
© Joshua Lim.

The offer of public transport available for the 12 millions inhabitants of the Filipino capital consists of a light rail transit system (three lines with a cumulated length of 46km), classic buses on main arterial roads, and a multitude of *jeepneys* – 40% of trips are made in these minibuses.

All three of these means of transport come together at Bicutan station. Pedestrians can access bus lines and *jeepneys* by taking a footbridge over a high-traffic avenue, then crossing the railway. Street vendors are active on the roads.

Tunis: aiming for seamless transfers and better urban integration of a square choked with traffic

Barcelona Square.
© Tunis Webdoa.

Barcelona Square is a major interchange hub in the heart of Tunis, where train, light rail, bus and collective taxis network connect.

The garden in the middle of the square used to be a symbol and a meeting place, but it is now drowning in the throngs of passengers and vehicles flowing through.

Work is underway to enhance the fit of the square in its urban surroundings and to improve intermodal connections[2].

2. See **GOOD PRACTICE 4**, page 32.

Algiers: reconciling questions of accessibility and transfer

A fine example of train station architecture in Algeria.
© SNTF Algérie.

Concerning Agha railway station, questions of different nature must be answered since it serves as a link between the historical centre of Algiers and the sea on the one hand, and must enable transfers to the nearby underground station, bus terminal and carpark on the other hand.

2. WHICH PURPOSES DO INTERCHANGE HUBS SERVE?

Literature assigns multimodal transport hubs three functions: its role as part of an urban area, the provision of transport, and the provision of services.

Regarding transport, the purpose of a hub is to organise flows of passengers. The goal is to offer a good connection between transport networks, so that interchanges are safe and transfers reliable.

Its urban purpose is to keep discontinuities at a minimal level and improve the legibility of the interchange hub as well as its integration in the urban setting, and to maximise the potential for urban regeneration in areas that might be assigned other uses.

In terms of services (other than transport) provided, the hub is meant to make spaces more practical and pleasant, and serve both users and neighbourhood residents.

Depending on the MTH being discussed, these three parameters – belonging respectively to the field of transport engineers, urban architects and service managers – are weighted differently.

Interchange hub

TRANSPORT FUNCTION

TRANSPORT SERVICES

> Signage
> Ticketing
> Fares
> Travel information

FACILITATING INTERMODALITY

+
> Accessibility
> Transport offer
> Network coordination

X
> Offloading and inconvenience in the trip chain
> Longer, more uncertain travel times

URBAN FUNCTION

URBAN SERVICES

> Shops
> Activities
> City information

CREATING CITIES AROUND MTHS

+
> Urban planning
> Neighbourhood fit

X
> Urban discontinuity
> Noise and air pollution from traffic

SERVICE FUNCTION

TRANSVERSAL SERVICES

> Communication
> Safety
> Amenities

CREATING LIVELY MTHS

+
> Offering services for daily life

X
> Feeling of waste of time in areas without basic comfort

Services and actions related to the three functions of interchange hubs

Shall we go ? Lagos, Nigeria. 80x60 cm.

PART 1

MTH FUNCTIONS AND SERVICES
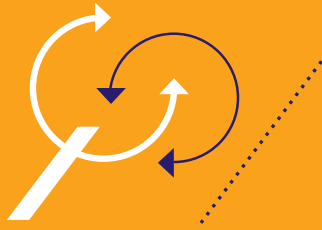
1. INTERMODALITY

2. URBAN FIT

3. SERVICES AND SHOPS

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1. INTERMODALITY: ORGANISING FLOWS IN A MULTIMODAL SPACE

A primary objective of a multimodal transport hub is to deliver efficient intermodality for users.

Intermodality is sometimes perceived as adding difficulty or lessening comfort in public transport. This perception is not helped when passenger paths are unclear, waiting times uncertain and connecting areas unwelcoming – all of which are discouraging factors. These sources of discomfort require specific solutions, but they must not be addressed separately, because they all affect the intermodality experience.

1. Encouraging "virtuous" modes through functional design

The primary purpose of an interchange hub is to improve intermodality, i.e. the connection between the various transport modes used to complete a journey.

An interchange hub (in its various aspects) must be designed with this ultimate goal in mind.

1. Designing an interchange hub: basic principles

1. Take into consideration current and future uses to choose appropriate dimensions for the interchange hub. The goal is to avoid ending up with oversized infrastructures at the expense of available urban space, or with undersized infrastructures, which will become congested and saturated. To calculate an adequate size for the hub, the current and future urban environment must be analysed, and quantitative as well as qualitative surveys must be carried out to better estimate the characteristics and volume of the expected flows.

2. Make transfers from one transport mode to another fast and comfortable. Generally speaking, transfers increase difficulty for users and may decrease the attractiveness of public transport. Connections are all the more tiring when they take time, are made in an unwelcoming place and an unfamiliar environment. One key objective when designing an interchange hub is to keep passenger routes from one transport mode to another short, comfortable and self-evident.

3. Bring transport modes closer. The hub should be designed to connect and bring closer the various access points to different transport modes so as to make interchanges more efficient: bus stops, platforms, car parks, bicycle parking racks, drop-off areas, etc. The idea, in all these cases, is to make transfers as self-evident as possible thus decreasing the "cognitive distance". This can be achieved via the relevant design of physical spaces (using covisibility, dealing with differences in elevation, keeping crossings to a minimum…) and appropriate services (information, signage, guidance).

4. Prioritise transport modes. The interchange hub should encourage the most "virtuous" transport modes, meaning public transport, cycling and walking, which cause fewer negative externalities (greenhouse gas emissions, local pollution, congestion…), and discourage individual vehicles, which cause more negative externalities. The hierarchy should be defined at the design stage: first active transport modes around the mode(s) of highest structural importance, then other public transport modes (buses), then pick-up and drop-off points, and last of all parked individual vehicles.

1. Intermodality: organising flows in a multimodal space

GOOD PRACTICE

1

Adapting the parking policy outside MTHs, the case of Geneva

As part of Geneva's unified parking policy, the pricing of park-and-ride facilities was devised so as to discourage local use. The facilities are accessible to registered commuters and to visitors on an hourly basis.

Registration is valid for a single park-and-ride facility. It is open to people who live and work more than two kilometres away and have no public transport facilities nearby. Another condition is that the carpark must be on the simplest route between the home and workplace.

In addition to its parking offer for cars, the Fondation des parkings (Car Park Foundation) has set up a service to combine car and bike rides. With the "P+B" (park & bike) offer, cyclists may safely leave their bikes in a park-and-ride facility. The eligibility requirements for this service are the same as for the park-and-ride scheme[3].

P + B: quality lighting at Montbrillant bicycle park.
Source: Office cantonal des transports (2014). *Guide genevois du stationnement vélo à l'attention des communes, des entreprises et des propriétaires immobiliers.*

LESSONS LEARNED

The management policy of this park-and-ride is an example of how to make sure the facilities are used by the "right" people, i.e. those who have no option other than driving their own cars all the way to the interchange hub (persons with reduced mobility or living in areas without public transport).

Yet devising a parking policy at the level of an interchange hub makes little sense without a global policy at the level of the entire neighbourhood; failing this, uncontrolled parking will completely undermine any efforts made around the hub.

It is therefore necessary that parking policies in the vicinity of interchange hubs be pursued at the most appropriate level to avoid "edge effects" and be consistent at the metropolitan level.

3. From *Organisation des déplacements et pôles d'échange en région lyonnaise : état des lieux et réflexions.* Mobilité et transports, Agence d'urbanisme pour le développement de l'agglomération lyonnaise, décembre 2010.

1. Intermodality: organising flows in a multimodal space

GOOD
PRACTICE

2

Improving access to MTHs for cyclists,
the case of Brussels

To encourage users to cycle to interchange hubs, Brussels-Capital Region implemented a strong intermodal[4] policy. Its main features are the following:

> bicycles can be carried for free in easily accessible transit systems such as the underground and low-floor streetcars;

> when underground stations were renovated, features for bicycles such as elevators or channels on stairways were added;

> when the STIB (Brussels Intercommunal Transport Company) purchased new rolling stock, one selection criterion was the possibility of carrying bikes;

> a sufficient number of seats on regional express trains are reserved for passengers with bicycles by agreement with the SNCB (National Railway Company of Belgium);

> access routes to train stations and underground stops, including footbridges for pedestrians and cyclists, have been created and clearly marked so that streets form less of an obstacle.

4. Summary of the *Plan vélo 2010-2015* produced by the ministry for the Brussels-Capital Region, department of infrastructure and transportation (Administration de l'équipement et des déplacements).

5. Plan the interchange hub on a horizontal level. Since intermodal changes will mostly be done walking, building on several levels will translate into additional complexity in the users' perception. If the urban environment allows it, the interchange hub will be planned horizontally, so as to create pathways on a single level and thus facilitate pedestrianisation.

6. Seek architectural unity. In a majority of cases, building an interchange hub involves several contracting authorities, each operating in their own separate fields. Users' perceptions will depend heavily on the consistency of decisions regarding the indoor layout, street furniture, lighting, signage, travel information and markings equipment. If the contracting authorities agree on shared architectural guidelines, it will contribute to the unity of the interchange hub and improve the efficiency of the various intermodality equipments.

GOOD PRACTICE

3 ✓

Introducing a hierarchy between transport modes and giving priority to the more environmentally friendly ones: the example of the Kochi metro, India

From the onset, Kochi Metro Rail Limited (KMRL) acting as the contracting authority approached the metro project with an integrated and multimodal vision for transport on a city-wide scale. How was this implemented? At the institutional level, a multimodal transport authority was created; at the technical level, an intermodal ticketing system and a multimodal travel information system were set up; at the physical level the accesses to metro stations for different modes of transport were designed in an exemplary way, and Vytilla Mobility Hub was designed to facilitate transfers between bus, metro and boat transport networks.

An intermodal layout for metro stations

Having noted that journey times to reach the metro are short (1.2 km on average) but that infrastructures for green transport modes are lacking (only 19% of roads around metro stations have sidewalks) KMRL launched an ambitious plan to improve access to metro stations for pedestrians and cyclists. Bike paths and sidewalks are currently being built on the access roads to 22 metro stations. To make them more user-friendly, KMRL is building a drainage system adequate enough for the heavy seasonal rainfall, installing street lights for improved safety, and signage to direct users towards metro stations. In addition, it has created bus stops and connected them to metro stations by paths that follow the shortest possible route. Drop-off areas for rickshaws[5] have also been delineated. Thus, each station serves as a mini interchange hub facilitating access to the metro. The overall cost of these facilities is 13 million euros and is being financed by the AFD.

Developing Vytilla Mobility Hub

Vytilla is the area where all of Kochi's transit networks – city and intercity buses, metro and riverboats – intersect. KMRL used the metro project as an opportunity to find ways to improve the operation of the hub and boost its economic activity. The hub was developed in accordance with the following principles:

5. Light three-wheeled vehicle used for the transport of people or goods.

1. Intermodality: organising flows in a multimodal space

GOOD PRACTICE ❸

Vytilla Mobility Hub.
© EGIS.

> Safe, quick and obvious access for pedestrians: traffic lanes within the hub are narrow to slow down motor vehicles and facilitate pedestrian crossings, pedestrian paths are level and lined with trees and vending stalls, signage is set up in relevant places to guide pedestrians in and around the interchange hub.

> Smooth access for local and intercity buses that serve the hub: the nearby intersection is accordingly upgraded, traffic is optimised and stops for city buses are transferred to the immediate vicinity of the metro station.

> Access for all transport modes: areas are reserved for rickshaw drop-offs near the metro station and city bus stops, an underground carpark is built farther away from the metro.

By encouraging environmentally friendly transport modes, walking in particular, Vytilla Mobility Hub, with its unobstructed access to the river, is also becoming a place for travellers and local residents to relax.

GOOD PRACTICE

4 ✓

Organising intermodality around a "structuring" mass transit system: the example of Dakar

Dakar's Urban mobility plan for greater Dakar (PDUD), written in 2007, calls for the deployment of structuring mass transit systems – in particular Bus Rapid Transit systems (BRT) and the regional express train (train express régional, TER) with other bus lines acting as feeders towards the main stations of the two corridors currently being developed.

The purpose of feeder services is to carry users from neighbourhood lines towards larger stations, from local lines to faster, longer-distance lines, the goal being to optimise the transit network and make city trips easier. Whether BRT and TER services meet their targets depends essentially on the efficiency of the feeder network and on tariff integration. These two factors are among the main objectives assigned to the Transport Authority, Dakar's Executive council for urban transport (CETUD). Feeder services bring in 60% of BRT traffic and 90% of TER traffic. The success of the entire system hinges on the organisation of informal transport ("cars rapides" minibuses).

In this context, stations must be designed to meet the objectives of MTHs: (physically) easy, obvious connections, comfort, accessibility and safety.

2. Working on an existing interchange hub

MTHs change over time and grow larger to evolve and adapt to new offers and infrastructures.

This implies working on a site in operation. To ensure uninterrupted service while work is underway, preliminary studies and preparatory work are required over a significant time period. For a project on an existing interchange hub to be successful, travellers need to continue to enjoy smooth transfers while the remodelling work is being done.

Ensuring traveller comfort and safety

Depending on the specificities of the MTH and the transport offer that still needs to be provided during the remodelling work, decisions need to be made regarding comfort and services for passengers.

Studying the flows during the different stages of the work will help identify difficulties in passenger routes and allow for any adjustments that will keep operations running smoothly. Specific communication and temporary signage will keep travellers informed and guarantee their safety. It is often neces-

1. Intermodality: organising flows in a multimodal space

Sao Paulo bus terminal.
© Arnaud Dauphin.

sary to move travel services (reception area, ticketing, waiting rooms), shops and operations offices.

Separating the work site from the existing transport offer

Undertaking work on a site in operation implies a number of constraints which must be taken into consideration at an early stage, during the feasibility studies: planning and phasing must take in both the constraints of the work site and those of the hub's daily operations. The distinction between the areas offering transport and those undergoing renovation work must be clear so as to minimise inconvenience for users and ensure the project is successful.

1. Intermodality: organising flows in a multimodal space

GOOD PRACTICE

5

Working on an MTH already in operation:
the "Central loop" project in Tunis, towards urban and functional renewal

Model of Barcelona Square (Tunis) after redevelopment.
© TRANSTU.

1. Intermodality: organising flows in a multimodal space

Barcelona Square across the street from Tunis central station is a historic landmark of the downtown area; its pleasant garden surrounded by magnificent facades used to be a popular meeting place. But it has gradually become a crucial node in the city's transportation network, at the intersection of train, streetcar, bus and collective taxi networks, and the square is now choked with ceaseless streams of passengers and vehicles. Urban quality has evaporated, and few people visit the garden, which has been hemmed in by carparks, rails and street vendors. The area is simply too small to comfortably accommodate the 300,000 travellers who are expected to pass through daily once the suburban train begins operating.

The refurbishment of the Barcelona interchange hub and the development of the Tunis light rail central loop (a.k.a. "Central loop") are being carried out by the Tunis transport company (TRANSTU) and are funded by the AFD with a 75-million-euro sovereign loan and a European Union grant delegated to the AFD. The purpose of the project is twofold: to create an attractive multimodal transport hub whose layout is optimised for smooth foot, streetcar, bus and car traffic; to redesign the public space to create a pleasant downtown square that will be at the heart of city life again, with services and shops.

The key challenge for this project is that the renovation will be done while the hub is in operation, meaning that streetcars and buses will be running (stops will be moved underground). For each stage of the work, the track plan for the downtown part of the light rail network will also be adjusted in successive stages – a complex undertaking which will see new stops created, platforms lowered and intersections reorganised – while streetcars are running. Close attention will be given to pedestrian flows, to ensure smooth transfers and adequate passenger safety at each stage.

Communicating before and during refurbishment work is crucial, and a large-scale communications plan will be deployed to inform users about the work in progress. For agile, collaborative decision-making, the numerous stakeholders (railroad operator, city council, TRANSTU, etc.) will be involved in the governance of the project. In addition, a campaign will be launched to combat violence against women on public transport – a relevant concern considering the large volume of traffic and high human density observed at Barcelona Square.

The project is scheduled to begin mid-2021 and to be completed by the end of the year 2025.

1. Intermodality: organising flows in a multimodal space

2. Providing clear, reliable, consistent, prioritised passenger information

To facilitate intermodality, passenger information is crucial. It must be comprehensive, legible, reliable, prioritised and standardised across the entire interchange hub, to make it easy for users to find out about available transportation.

When examining the redevelopment of an interchange hub in a multimodal, multi-operator perspective, it is necessary to consider information in all its forms, namely static information (maps, timetables, etc.), dynamic (real time) information and − a more recent addition − personalised information. The first stage in the process is to review the existing information.

Static information includes:

> a map of the entire transport network, detailed by type, and with the specific location of the interchange hub;

> a neighbourhood map indicating nearby public facilities;

> signs, arrows and floor markings guiding users towards the various transport modes serving the hub;

> internal rules and regulations, for example those pertaining to cleanliness or the code of conduct;

> fares for all transport modes and available payment solutions.

Inventory and locate information desks and reception areas (type and number).

Inventory and locate fixed displays and information screens, list types of information provided.

Analyse and assess the quality and relevance of signage in the hub:

> nature and comprehensiveness of the information;

> location with regard to flows;

> legibility with regard to signage and sources of fixed and dynamic information;

> legibility in particular for the disabled;

> condition of the displays.

Reviewing available information

1. Intermodality: organising flows in a multimodal space

Real-time **dynamic information** provided on digital displays lets users know about traffic disturbance on the network, waiting times and possible change in destination for various transport modes. This additional information helps users better manage their time.

Personalised information accessed via mobile applications provides real-time schedules as well as notifications in the event of last-minute changes on the network.

1. Choosing a clear strategy for accessible, systemic information

A blueprint for the deployment of information will help coordinate different channels in order to avoid redundancies and the multiplication of isolated information which would only confuse passengers.

The blueprint will define a clear strategy and will identify the person(s) in charge of collecting and circulating information, the type of information to be circulated, and the different media to be used.

Digital displays: addressing technical and organisational issues

Before setting up a digital information display, proper thought must be given to technical and organisational issues[6], particularly the question of how to update information in case of disturbances.

On a technical level, setting up a dynamic information system requires the carrier to be equipped with a passenger information system (PIS).

6. In terms of organisation for bus terminals for example, Île-de-France Mobilités recommends that if several operators serve the same bus stop, the one that runs most frequently, or the first one to install a passenger information system, be responsible for sharing information from other operators at connecting stops. The idea is to avoid installing multiple passenger information terminals, each managed by a different operator, at the same stop.

GOOD PRACTICE

6

Defining travel service targets in urban planning reference documents:
the case of MTHs in the Ile-de-France region

The urban master plan for Ile-de-France (Plan directeur d'urbanisme d'Île-de-France, PDUIF) lists service quality targets for all the interchange hubs in the region, as well as specific targets for different types of hubs. The document includes concrete examples of adjustments that can be made to reach the targets.

To improve intermodality in the region's interchange hubs, Île-de-France Mobilités (the regional transport syndicate) in 2006 produced blueprints covering the different aspects of interchange hubs. The blueprints set the levels of service to be provided to passengers as well as the conditions of execution and financing for projects of park-and-ride facilities, bus terminals, bicycle parking facilities, bus stop designs and passenger information systems onboard public transport.

Île-de-France Mobilités has also produced technical reference handbooks to provide contracting authorities with the information they need to design their projects starting with preliminary studies. In particular, they list the elements to consider when designing infrastructures and developing a project: which features and services to offer travellers, technical recommendations, operation of the equipment, funding, grant applications.

1. Intermodality: organising flows in a multimodal space

GOOD PRACTICE 6

PASSENGER SERVICE TARGET	EQUIPMENT
Receive real-time information about waiting times, connections and disturbances.	Multi-operator, multimodal information display screens.
Easily understand the layout of the hub and the offer provided by all transport modes serving the hub.	Schematic plan of the hub and network plan featuring all carriers. Neighbourhood and platform access maps, wayfinding signage.
Move about and feel safe in a quality, non saturated space	Refurbishment of indoors interchange areas, transfer hallways and platforms Improvement of in-station waiting conditions (platform furniture, wifi and seats in interchange areas)
Walk and ride a bike to and from the hub easily and safely, and safely park the bike there for the day.	Pedestrian forecourt in front of the main access, large-capacity, secure bike parking facilities. Isochrone maps displaying walk times to access the hub.
Prepare ad obtain information remotely about transportation and associated services.	Web site and smartphone applications with schematic maps of the hub.
Have a dedicated, safe drop-off area	Dedicated short-term parking for drop-offs with safe pedestrian links Parking spots reserved for ride-sharing, close to the hub and with PRM parking spaces

2. Designing a user-friendly, long-term evolving information system

For the information chain to be user-friendly, it must be as clear and logical as possible. It must be designed to address both spatial and cognitive issues, so that users rapidly understand the information being given to them.

The maturity of passenger information differs vastly from one geographical area to the other. To improve it, the following aspects must be given careful thought:

> ways and means to employ depending on the route, the nature of the information (anticipating disturbances) and of the audience (inclusiveness): human presence, physical signs, mobile applications, etc.

> a shift towards a flexible, unique system to integrate all transport modes including new forms of mobility: chauffeured cars, regular lines, informal transport, etc.

> the relation between spatial organisation, management modes and signage (for example: road markings for taxis and buses, digital displays and apps in the case of a digitally managed unique platform).

3. Creating shared ticketing systems and areas

A major challenge for developing cities is to create systems integrating the various existing public transport modes. One way to make intermodality easier in interchange hubs is to harmonise fares, vending channels and ticketing systems.

The goal is to make it easier to successively use different transport modes – train, metro, bus, streetcar or public bike-share systems for instance – run by different operators. This makes the multimodal transport system more efficient; tariff integration and/or combined tickets increase the number of journeys and the income thus generated contributes to the financial viability of the overall transit system.

Pricing policies are however a broad issue, beyond the strict scope of an interchange hub project.

Interchange hubs can be instrumental in making the ticketing system more efficient, if the help desks and ticket-vending areas are of appropriate size and well located. For instance, sales offices, ticket-vending machines and top-up terminals can all be located in **a single welcome area,** where travellers will also find network maps, and information regarding fare prices, sales points and available payment methods.

Public transit systems have traditionally been equipped with ticketing systems supplied by industrial actors who try to keep their customers captive of proprietary solutions. In this context, two major obstacles stand in the way of an integrated ticketing system:

> operators are under the obligation to use the same supplier when lines are extended or services changed;

> suppliers are reluctant to interface with equipment which is not their own, thus narrowing the possibility of opening network or service extension work to competitive procurement.

To avoid these twin problems, it is best to include an open ticketing system in the project from the outset; the interchange hub thus serves as a starting point for a comprehensive ticketing strategy.

1. Intermodality: organising flows in a multimodal space

Open ticketing

Industrial suppliers often impose proprietary solutions for information systems, over which the contracting authority has little control. Having often caused problems in Europe, such products should be avoided at any cost.

Our reference here is the *Manifeste pour des systèmes billettiques ouverts (Manifesto for open ticketing systems*, Ticketing to support Mobility as a Service, or MaaS[7]) . It lists the technical and contractual items that should be included in specifications so that transport authorities and their operators retain independence from their ticketing solution suppliers. Some of their recommendations are:

• use standard, normalised ticket formats;
• retain ownership of the security keys;
• prefer a modular, scalable architecture;
• prefer openness to third-party systems.

7.https://www.calypsonet-asso.org/sites/default/files/CNA%20White%20Paper%2C%20La%20Billettique%20au%20service%20du%20MaaS.pdf

Example of dematerialised ticketing system.
Source : https://www.leparisien.fr/info-paris-ile-de-france-oise/transports/le-smartphone-va-remplacer-le-ticket-de-metro-et-de-train-25-05-2018-7735632.php

1. Intermodality: organising flows in a multimodal space

GOOD
PRACTICE

7 ✓

Integrating ticketing and fares to better integrate transport modes within an MTH: the cases of Sao Paulo and Istanbul

In Sao Paulo, the transport authority in charge of intercity transport in the metropolitan area is the Sao Paulo State Secretariat for Metropolitan Transports (STM). Three companies operate the metro, railway and fast bus networks under its authority. The city of Sao Paulo and the neighbouring towns are the transport authorities for all urban transport within their city limits. Each network used to have its own fares and ticketing, so the addition of the separate costs discouraged users from taking several transport modes.

In 2004, the STM decided to integrate fares between its three operators. It negotiated with the Sao Paulo transport authority to set up a "single fare ticket" which allows users to combine up to four different trips on different transport modes over three hours. This policy was so successful that it led to the creation in 2013 of the "monthly single ticket" which allows an unlimited number of trips on partner networks[8].

The city of Istanbul set up a "Travel Card" system with integrated ticketing, but not integrated fares. Public transport fares are paid by means of the "Istanbulkart", a contactless smart card. It is a solution that makes transfers within one transport mode, and from one to another, smoother.

The card is valid onboard buses, funiculars, metros, suburban trains, ferries and streetcars run by the city and private operators. Payment in cash is not available. Fares are reduced on other vehicles of the transit network for up to five transfers in two hours. The system is a success, with a 98.5% utilisation rate in public transport and more than 18 million active users in 2016[9].

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8. From CODATU – Cooperation for Urban Mobility in the Developing World (2014), *Who Pays What for Urban Transport? Handbook of Good Practices.*

9. Istanbul Metropolitan Municipality. *Istanbul Transport Annual Report 2016.*

1. Intermodality: organising flows in a multimodal space

KEY POINTS

A multimodal transport hub is a spatial arrangement whose nature is to make intermodality simple. The space is designed to bring different transport modes physically closer to facilitate connections, or when the latter are not possible, to create legible, intuitive and pleasant paths between them.

Among the ways to bring them closer are legible, reliable and standardised signage and a shared area for selling tickets.

Intermodality should be treated as a global process that includes not only physical design and adjustments, but also improved multimodal information, consistent fare and ticketing policies and coordinating the transport offer at network level. All the examples presented in this chapter support this idea.
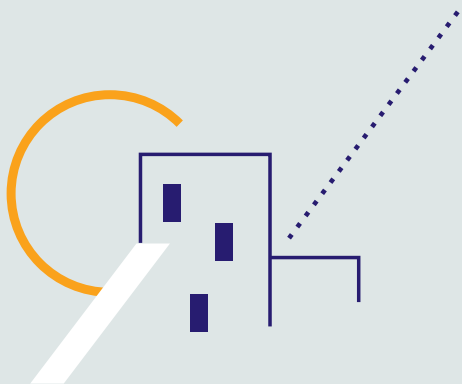
2. URBAN FIT:
MTHS AS INTEGRAL PARTS OF MULTIMODAL CITIES

1. Fitting MTHs into their settings

Creating a multimodal transport hub necessarily leads to thinking about how it will fit into its surroundings. As an interface between transport networks and territories, the infrastructure can become a shaping force for the city's morphology and its functional organisation.

Architectural quality is one aspect that potentially contributes to the urban quality of an interchange hub[10].

In cities MTHs are implanted in existing, often historic, urban fabric.

Several goals may be pursued:

> improved, attractive housing in historic downtown areas;

> keeping facilities in historic downtown areas;

> an economic boost;

> organising mobility and public space;

> curbing urban sprawl, slowing down or accelerating urban densification;

> urban regeneration;

> tourist attractiveness (geared towards profitability)

> improved living conditions.

To design MTHs in such way that they address priority objectives, the goals specifically pertaining to the mobility hub itself first need to be questioned, identified and prioritised.

1. Clarifying objectives

Architectural choices reflect the project's ambition in the city and the goal pursued:

> strengthen the existing centrality of an area or create a new one?

> redevelop an area in line with its current function or support the transformation of a new type of urban fabric?

Clarifying the purpose of the project will make architectural choices easier.

Factors to consider

Depending on how an interchange hub fits into the urban fabric, its presence may have two opposite effects:

> The centrality of the hub and the ease of access it induces may increase property value and boost local activity.

> The nuisances caused by a poorly functioning hub (noise, air pollution, lessened safety, congestion around access roads, etc.) may tarnish the image of the neighbourhood and send it into decline.

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10. Augé M. (1992). *Les non-lieux, introduction à une anthropologie de la surmodernité,* Paris, Seuil.

To ensure the hub does not negatively impact its environment, several factors must be taken into consideration when working on the urban fit and defining related objectives.

> **The site's physical constraints**, i.e. the neighbourhood density, topography, built heritage, etc.

> **The transport modes** serving the interchange hub.

> **The shape of the hub**, which may be predominantly vertical or horizontal[11]:

- a hub structured along vertical lines, where modal functions occupy several levels, can easily confuse users;

- in a hub structured along horizontal lines the different activities are immediately apparent, but in certain parts of the hub conflicts may arise over the use of space;

- with a hybrid hub based on a vertical structure, a coherent form of organisation may be worked out with nearby urban spaces to create a three-dimensional zone integrating surface transport modes and underground or elevated modes.

> • **The location,** as a hub at the heart of a city may reinforce the polarising effect of the centre and influence existing density and business.

Fitting an MTH into existing urban fabric

Many urban issues, in addition to those pertaining to transport networks, may be addressed by developing an interchange hub in existing urban fabric. In this perspective, MTHs can be viewed as tools for the development of a higher-density, mixed-use neighbourhood within walking distance of a public transport station.

The advantage of combining mixed developments with existing public transport infrastructure is that it creates a community of users with solid experience using public transportation. Having public transportation facilities nearby plus being able to get around the neighbourhood on foot and use services in the immediate vicinity means users can enjoy a multimodal lifestyle, so to speak.

Urban development of this kind – dense, multimodal, mixed-use – can achieve several goals and benefits users, local inhabitants and local authorities. Advantages can include increased interactions between neighbours and neighbourhoods within the area, higher foot traffic and lower car traffic, which helps reduce pollution.

11.   Bajard M. (1999). *Atlas des pôles d'échanges. Appréhender l'organisation spatiale des lieux de la mobilité*, Paris, AREP.

Intensifying an urban area

It is possible to take advantage of the interchange hub and incorporate defining urban functions into it to create a neighbourhood in its own right, woven into the urban fabric, and thus combat urban sprawl.

The North-American concept of *Transit Oriented Developement* (TOD)[12] originally applied to the development of housing or retail areas. Area designed according to these principles are typically organised around a local train station or other transport station (bus, metro, streetcar), and the density of the surrounding buildings decreases as you move towards the outlying areas. The radius of areas so developed is a very walkable distance, usually between 400 and 800 metres.

The concept of TOD aims to organise urbanisation and public transport in a coherent way when creating housing and retail areas. Such interlinked places – akin to village centres in the old days – is undeniably an improvement on the current situation of many isolated areas that remain stuck with their original purpose.

This diversifying action, and the density it brings, facilitates the birth of neighbourhood centres that are fully integrated into the metropolitan area.

2. Conducting an assessment

The successful urban fit of an interchange hub hinges on the project developers' ability to sketch out likely scenarios regarding the area's evolution, the transport offer and the surrounding urban fabric.

Several aspects determine the role the interchange hub plays, and will play in the future, within the transport system and its possible influence on the area.

> **The density** of the neighbourhood in which the hub will be located compared to that of other neighbourhoods: does implementing the project increase the density of any of its features?

> **Existing central places** and their nature (local or metropolitan). How is the hub located with respect to other central places? Will the hub create a new centre or will it strengthen the pull of the existing ones? The lack of physical and functional links between the newly developed area around the hub and the other central places may generate competition or indifference, either situation being detrimental to the workings of the city. Complementarity must therefore be a goal throughout the entire project, from the design stage to implementation.

> **The urban and landscape setting.** What are the current features of the neighbourhoods, the urban shapes, the ways the areas are lived in, how much room is occupied by vegetation…? Will they change gradually or be fundamentally altered?

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12. Concept developed by Peter Calthorpe in *The Next American Metropolis*, Princeton Architectural Press, 1995.

> **The social and demographic changes,** family-friendliness. Who are the people living in the neighbourhood today? And in the future? Might the area gentrify?

> **Mobility** and changes in the way people move about in the vicinity of hubs. How do people get around today and how are mobility practices changing: share of local users, do passengers use feeder buses or do they reach the hub by bicycle, on foot, by car, what parking facilities are available...?

> **The land**: is it publicly or privately owned? What are its weak points and strong points in terms of potential development? Is it railway property, in which case it is of utmost importance to be aware of its current and future uses?

> **Dynamics** of past constructions and upcoming urban projects. Can the MTH stimulate construction projects? How do transportation projects tie in with urban projects? Are the areas surrounding the hub residential, business or industrial areas?

All these pieces of information must be summarised in the relevant urban planning documents, since their point is to clearly outline the integration project tying the interchange hub to its urban framework.

2. Reducing urban discontinuities

Access problems are first and foremost the result of discontinuities in the urban travel chain. Such breaks fall into three categories:

> **Discontinuities caused by the multiplicity of contracting authorities**: each contracting authority potentially deals with accessibility in a different way, thus creating involuntary obstacles or limitations in transport (differences in flooring heights, changes in wayfinding signs).

> **Discontinuities caused by intersecting flows**: pedestrian routes may be interrupted by flows generated by other transport modes and their pathways, which may lengthen routes, disorient pedestrians or even threaten their safety.

> **Discontinuities caused by the presence of urban features that are difficult to cross**: infrastructures or landscape features that cannot be crossed directly (railway tracks, rivers...) impede smooth pedestrian traffic.

2. Urban fit: MTHs as integral parts of multimodal cities

Discontinuity type: size of the crossing
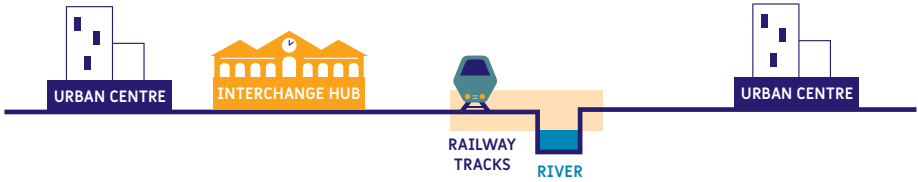
Discontinuity type: location of the crossing in relation to the route
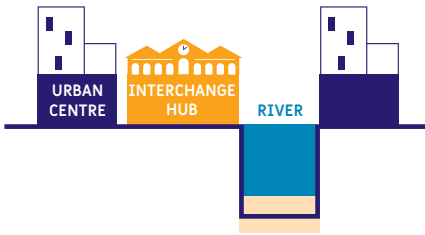
Discontinuity type: steep incline
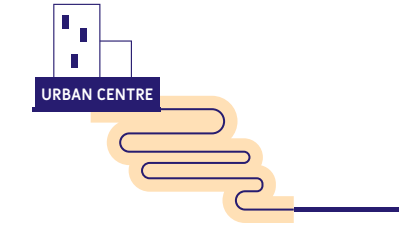
Typology of urban discontinuities

These urban "breaks" may cause[13]:

> immediate effects on trips: longer crossing times, longer and less safe routes;

> indirect effects at neighbourhood level: adverse effect on social relations, increased isolation of deprived areas;

> long-term effects at city level: specialisation of certain spaces, lesser legibility of the cityscape.

13 Heran F. (1999). *Évaluation de l'effet des coupures urbaines sur les déplacements des piétons et des cyclistes*, Paris, ministère de l'Équipement, du Logement, des Transports et du Tourisme.

2. Urban fit: MTHs as integral parts of multimodal cities

DISCONTINUITIES
Linear/surface discontinuities
Uncrossable, impassable roads

Car traffic concentrated at crossing points

Physical obstacles, road safety problems, noise, pollution, landscape damage

Worsened discontinuities

Nearby business activites of lower value

Increased crossing times, longer routes, increased risk of accident, less pleasant routes

Fewer short trips taken on foot or by bicycle

Modal shift towards motor vehicles

Higher crime rates, lack of safety

Fewer neighbourhood ties

Increased car traffic

More separate communities

More highways and express ways, higher traffic on arterial roads

Neighbourhoods developing in isolation, segregated land use

DISCONTINUITIES
Linear/surface discontinuities
Uncrossable, impassable roads

Effects of urban discontinuities
Source : Heran F., 2000.

2. Urban fit: MTHs as integral parts of multimodal cities

An MTH project must therefore be developed in such way as to avoid or mitigate urban discontinuities and breaks in pedestrian routes.

Defining pedestrian routes inside and outside MTH and interfaces
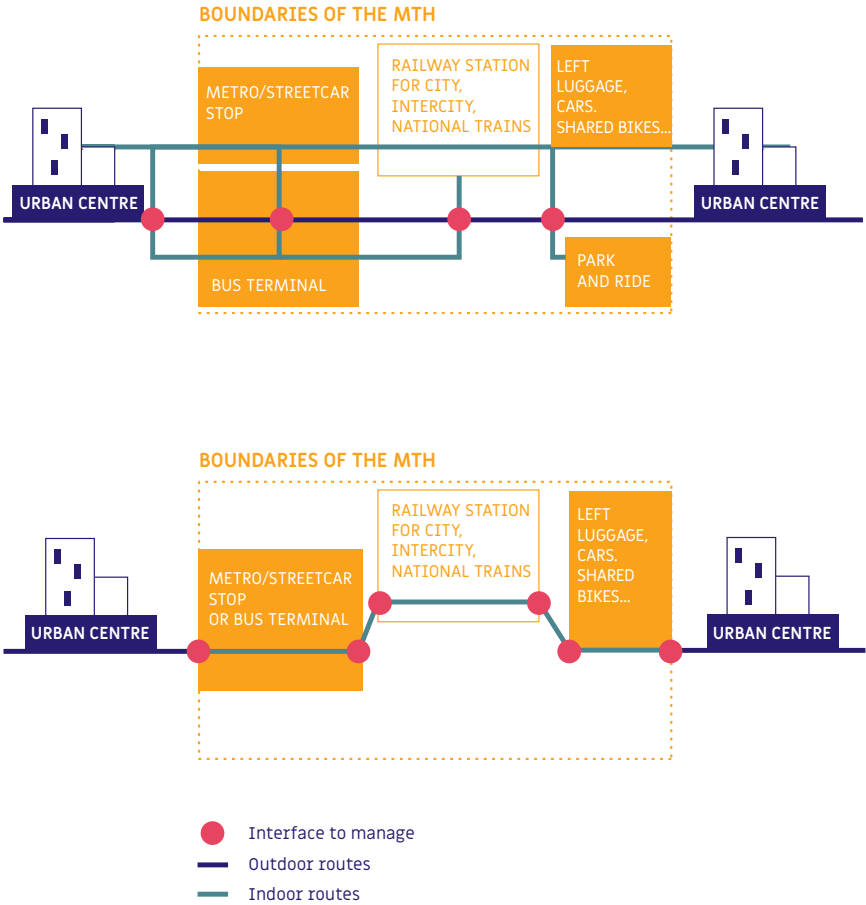
3. Promoting greener transport modes and pedestrian-friendliness

1. Defining the scope of accessibility studies

A study of journeys made with environmentally friendly transport modes, particularly on foot, should extend its scope beyond the boundaries of the interchange hub to include the immediate vicinity or even the entire neighbourhood.

The Centre for Technical Infrastructure Studies in Lyon, France, (Centre d'études techniques de l'équipement, CETE)[14] defines three possible study areas depending on the transport modes serving the MTH.

The physical infrastructure (public building): its boundaries are those of the land area of the infrastructure open to the public (train station, terminal...). It is at the centre of the two other possible study areas, namely the interchange hub and its area of influence.

The interchange hub: this wider area covers all the spaces relevant to the hub's transport function. At this level, specific attention must be given to the way the public space is organised and to the access paths.

The urban perimeter: it is defined as the hub's local area of influence. Its surface depends on the length (measured in distance or time) of pedestrian paths leading to the

Physical infrastructure
Interchange hub
Local area of influence
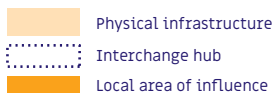
Areas of accessibility studies of a hub

hub. Ideally, it is a circle with a radius of 700 metres and with the public building at its centre. The built environment is an important component.

2. Promoting a culture of walking

Walking is a key feature of intermodal change, and the hub must be organised accordingly, both indoors and outdoors. But it is not just a question of physically arranging pathways; the goal should be to encourage walking and create a culture of "soft mobility" – walking in particular.

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14. CETE de Lyon (2014). *Gares du Grand Paris et accessibilité : éléments clés et enjeux*, version simplifiée, janvier 2014.

2. Urban fit: MTHs as integral parts of multimodal cities
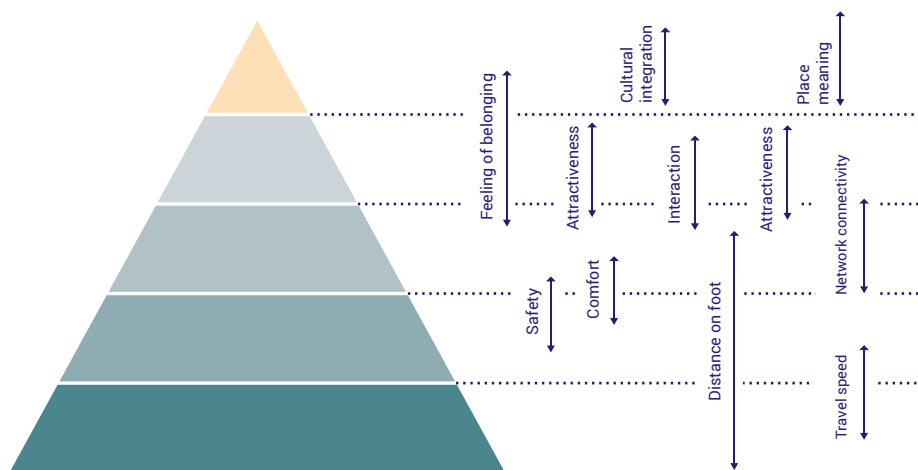
Hierarchy of needs for pedestrian mobility

A number of factors influence user perception[15]: safety, comfort, pleasantness of surroundings and place meaning to name but a few. Below are the key requirements for a pedestrian environment, ranked by relative importance[16].

3. Using green transport modes to improve urban fit

When travel chains for "soft" mobility are good quality and continuous, they improve the local fit of transport infrastructures. Hence, making an interchange hub and its immediate surroundings accessible directly contributes to its urban fit[17].

Making an interchange hub accessible will be achieved by :

> identifying and enabling different forms of soft mobility for arrival to, departure from, and within the interchange hub;

> predefining the most relevant routes depending on flows and departure and arrival points;

> marking these routes and providing information for users to find their way and be able to choose or modify their arrival point directly;

> placing facilities and services in such way that they appear as positive parts of the route rather than obstacles.

15. Margail F. (1996). *Les parcs relais, outils clés de politiques intermodales de déplacement*. Thèse de doctorat, Paris, ENPC, ITDP.

16. Alfonzo M. (2005). *To walk or not to walk.* Environment and behavior 161(18).

17. CERTU (2005). *La prise en compte du piéton dans l'insertion urbaine des pôles d'échanges,* coll. Aménagement des pôles d'échanges, fiche n° 2.

GOOD PRACTICE

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Encouraging walking for transfers within MTHs: the case of Tours, France

An example of spatial layouts for smooth urban integration, Place du Général Leclerc, Tours.
© S. Andrei.

In the French city of Tours, intermodal changes are organised around Place du Général Leclerc. From the train station forecourt, transfers are smooth and safe, because buses are the only vehicles allowed there.

The architecture of the intercity bus terminal is not particularly striking, but it enables safe transfers on foot.

The pedestrian space's organisation makes for fast crossings, improves the visibility of the train station and of other transport modes.

Identifying and reviewing itineraries

An itinerary links a departure point and an arrival point. Following an itinerary can be done via multiple routes: a pedestrian can choose to walk down one street rather than another depending on the situation, or choose one side of the street or another simply by crossing. Many different itineraries are possible, which is why the first step is to identify the most relevant ones, before reviewing the paths. The most suitable itineraries can be identified by:

> getting a first overview from a map and calculating one or several itineraries between the interchange hub and a traffic-generating centre;

> taking a field trip to the site to ascertain the reality of said itineraries;

> surveying users to determine which pedestrian paths they use most.

It is also useful to assess the greatest difficulties users face, in order to identify the breaking points that can alter the accessibility of pathways.

Decreasing travel times

An interchange hub is best integrated into its surroundings when obstacles or differences between road levels are removed and pedestrian access is made easy. Simple, direct routes are most legible for passengers.

2. Urban fit: MTHs as integral parts of multimodal cities

The applicable design principles should:

> encourage direct links between neighbourhoods and single-story MTHs and give priority to walking over other transport modes;

> place pedestrian crossings so as to encourage pedestrian to cross in the areas chosen;

> define a wide pedestrian zone around the hub, if the site is in a high-density area;

> build works that directly link the hub and its environment (footpaths, bridges, underpasses) if there is an urban break which cannot be passed there (railway tracks for example).

Deciding on the dimensions of public spaces and managing flows

Interchange hubs are designed to fulfil two objectives. The first one is to ensure the smooth flow of increasingly large crowds and facilitate transfers between transport modes, both public and individual. The second one is to adapt to all users' expectations and offer them an attractive, pleasant and comfortable place. The point is to both organise flows and answer the needs of individual users.

To achieve these goals and determine the best size for public spaces within an MTH, the design work must be based on digital methods, tools and models. Dynamic simulation software can be used to create 3D digital models to measure and visualise the number of people using public spaces, and how easily and which way they circulate.

Creating intuitive accesses

Access points depend on the specific features and urban location of the hubs. Ideally, there should be multiple accesses, so that users may access transport areas simply and directly wherever they are coming from. The advantage of creating multiple accesses is that they distribute flows more evenly across the neighbourhood: the more permeable the hub is, the easier it is for users to enter and exit.

Ensuring access to infrastructure for all

Interchange hubs usually comprise one or more buildings open to the public such as railway station buildings, underground stations, park-and-ride facilities, shops, etc. These buildings may be owned by different entities but should all be accessible to persons with reduced mobility.

Each country has its own rules on this matter, so specific attention must be given to legal requirements.

Providing signage that enhances the legibility of paths

The visual features associated with a hub's accessibility must become a mental reference for users when they are figuring out how to move about the zone[18]. Likewise, making the interchange hub easy to identify, visible and accessible will increase its attractiveness and number of users[19].

18. Stathopoulos N. (1993). *Quand ville et transport se rencontrent,* RATP Savoir-faire, n° 8.

19. Sahaban M, Mosnat A. (2002). *Bibliographie commentée sur l'intégration urbaine des pôles d'échanges.* Lyon, CERTU.

Providing users with directions and walking times for nearby infrastructures, services and shops not only facilitates access to the above, it also provides information about available resources near transfer and waiting places.

It is also important to signpost transfers within interchange hubs. It is imperative not only because of the spatial complexity, but also to point users in the right direction and regulate flows.

The semantics of the signage system may be based on language and/or icons (pictograms, logos, colours...). The information must be easy to process, as our eyes do not literally "read" the message printed on the sign, they try to "match" it with a pattern drawn from our memory[20].

France's CEREMA (Centre for Studies and Expertise on Risks, Environment, Mobility, and Urban and Country Planning)[21] has identified three guiding principles:

> the information provided must be prioritised according to the passenger pathway;

> to ensure guidance until the final destination, information must be continuous and the media consistent (no mid-way change in "language");

> signage must be adapted for the disabled, with legible, understandable and accessible directions. Digital tools may assist physical signage, since it cannot answer all needs.

4. Designing a sustainable multimodal space

1. Integrating qualitative aspects in order to enhance function

The identity of an interchange hub is often materialised by a very recognisable building which plays a structuring role and symbolises urban transport. Even if it there is no actual passenger building the hub must be designed as a feature that interacts with the rest of the city, and sometimes structures the urban environment.

From the outset, an interchange hub must be designed in such way that its qualitative aspects will enhance the functional aspects of the project, contribute to its success and facilitate integration in its environment. Four main aspects must be taken into consideration.

Consistency between the programme and the project

Are the size and proportions of the hub in line with the flows of passengers: are the size of the hub itself and the size of the waiting and circulation areas appropriate for passenger flows? How do the flows vary over the course of a day? How is rush hour

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20. Meissonnier J. (2015). *Les transports quotidiens vus de l'intérieur : paroles d'acteurs, guide méthodologique à l'intention des chargés d'études 'mobilités' souhaitant explorer les comportements de déplacement par une investigation qualitative.*

21. CEREMA (2017). *Les pôles d'échanges au service de l'intermodalité et de la ville durable.*

managed? Are the spaces undersized, generating feelings of discomfort or insecurity? Or are they oversized, creating empty spaces which are difficult to maintain and feel like "non-places"?

Urban fit

Does the hub form an obstacle or discontinuity point in the neighbourhood? Does it obstruct the view of other buildings and/or neighbourhood landmarks? Is it of disproportionate size compared to neighbouring buildings? Are there any architectural links between the interchange hub and the city's or the neighbourhood's natural and historical heritage?

Indoors spatial organisation

Can users easily identify pathways inside and outside the hub? Do the routes cause flows to intersect? Is there a logical, intuitive connection between the transportation offer and the offer of other services? Are there any visual or physical obstacles on the pathways (furniture, poorly placed services, walls…)?

Interior design

Are the colours, lighting and material suited to the place and the urban environment? Are the hub itself and the neighbouring public areas properly lit? Is there a harmonious balance between the various materials used? Are the surfaces easy to maintain and clean? Is the perception of colour codes positive (signalling cleanliness, warmth, modernity…)?

Taking into account the architectural dimension

Passenger terminals are urban landmarks. They fall into two categories:

- the first one includes iconic buildings such as the central stations in Dakar, Senegal, and in Rio de Janeiro, Brazil, both listed historic buildings. Once refurbished and promoted, they contribute to revitalising the urban fabric and nearby activities. Any architectural preservation works will cover the entire urban space and benefit all users as well as the ancillary buildings of the railway infrastructure;

- the second category includes new passenger terminals, if identifying them and upgrading them is the starting point of a process to preserve the urban fabric in a wide area around the hub.

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Promoting architectural design to better fit MTHs into the city:
the case of Casa-Port station, Morocco

Casa-Port multimodal transport hub.
© AREP.

The light in the narrow streets of Morocco's medinas and souks is very special: it is revealed in the shadows cast by the overhead latticeworks. When the architectural firm AREP designed the new Casa-Port station in Casablanca, it used the idea to place the project in a wider perspective of urban regeneration.

The interchange hub comprises the passenger terminal, the two-story underground carpark and the building which houses the operations offices of the national railway operator (Office national des chemins de fer, ONCF).

The passenger building comprises a 2,500 square meter hall which runs parallel to the platform for easier management of flows and which houses all services. Light pours in through the multiple skylights in the roof. On the western side, latticeworks inspired by traditional window screens (*mashrabiyas*) dim the harsh daylight coming in through the glass facades. The work on matter and light was based on the use of contemporary materials such as light-coloured high-performance concrete and steel frames.

Casa-Port received a prize for architectural quality at the 2017 African Property Awards[22].

22. News dated 2 July 2018 on AREP website: **http://www.arep.fr/projets/3-15/cat_transport/casa-port**. Référence du 2 juillet 2018.

2. Urban fit: MTHs as integral parts of multimodal cities

GOOD PRACTICE 10 ✓

Preserving the historical heritage when building transport hubs:
the case of the Fort interchange hub in Colombo, Sri Lanka
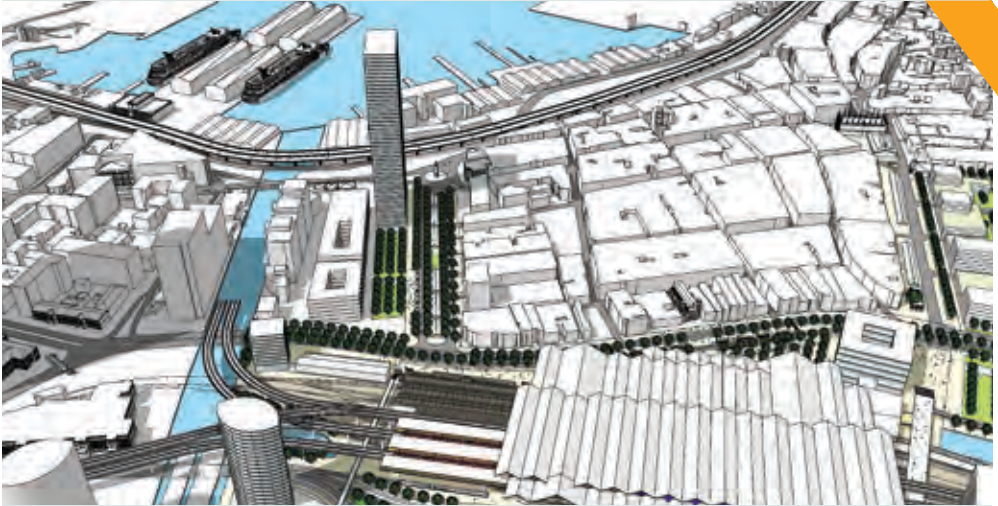
The future Fort Pettah interchange hub, with the green link connecting Khan Clock Tower to the north with the historic train station to the south.
© AREP.

In 2016, the ministry in charge of urban development for the Greater Colombo area produced a mobility scheme which aimed to adapt the city's transport systems to the expected population growth and limit the negative effects of the increase in individual transportation (cars, two-wheeled vehicles). The scheme included plans to upgrade the urban rail network, build seven light-rail lines (Light Rail Transit, LRT), reorganise bus services, develop river transport, and create a multimodal transport hub around the historical Fort train station as the heart of this new network.

Feasibility studies were carried out by AREP with financial support from the French Ministry of Economy and technical support from the AFD. Based on these studies, design principles were outlined for the new hub, which is expected to become a driving force in urban renewal of the neighbourhood. Indeed, its central location near Beira lake endows it with strong potential urban value. But at the moment, the zone is completely fragmented, criss-crossed by transport lines.

2. Urban fit: MTHs as integral parts of multimodal cities

GOOD PRACTICE 10

Facade of Colombo's historic train station.
© AREP.

The goal of the project is to preserve Colombo's historical heritage and promote social diversity while avoiding gentrification. The feasibility studies recommend safeguarding and promoting the constructions which have been identified as major historic buildings. The main historical site and landmark building featured in the project will be Colombo Fort train station.

Fort station, which was built in 1917, is a fine example of Victorian architecture, having been modelled on Victoria station in Manchester, England. Preserving this heritage will be achieved by integrating the historic building as the new train station's main entrance / exit to and from the Fort neighbourhood. It will be renovated, modernised and reinvented with new spaces and will offer passenger services, in particular tourism-related services.

Modern train station design often uses a key feature of historic stations, namely the shed[23]. Whereas a century and a half ago, sheds covered only the tracks and platforms, nowadays they roof the entire station, covering not only train and passenger traffic but also shops and passenger services. The Fort interchange hub project thus turns the roof into a metaphoric

23. Roof formed by successive two-sloped roofs; one of the slopes is usually a glass pane.

2. Urban fit: MTHs as integral parts of multimodal cities

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and physical bridge between the late-19th- and early-20th-century heydays of railroad travel and the needs of modern commuters in the current era of mass public transit. It symbolises both a shared, open area offering protection for all, and the renewal of the downtown area in the 21st century. The design of the new building's roof is inspired by, and similar to, the roof of the historic train station, which incidentally will be the adjacent building.

Finally, there is another historic landmark in the neighbourhood: the Khan Clock Tower, which was built at the beginning of the 20th century and marks the entrance to Pettah market, also a local landmark. The project connects it to Fort station visually and physically by transforming and embellishing Malwatta Road, an arterial road, into a large lane for non-motorised transport. Thus the Fort station building is integrated not only into the project of new station, but also in a wider plan to promote the neighbourhood's heritage.

The shed of Colombo's historic train station.
© AREP.

2. Following principles of eco-design

Interchange hubs are structuring elements in urban organisation. They are places where transport networks but also electric and digital networks meet. Because they are very busy places, they also must be showcases for energy efficiency and urban resilience.

Giving priority to energy-efficient systems

Energy systems must be selected for technical efficiency and operational simplicity.

Technical choices: due to their strategic positions, interchange hubs can become centrepieces of lean, efficient energy systems, using renewable sources of energy as much as possible. For instance, they can be charging stations offering locally produced green electricity.

Operation and maintenance: starting at the design stage, the following considerations must guide choices: operation costs, ease of access in zones open to the public, the nature and frequency of maintenance operations and the energy and water consumption.

Comfort and wellbeing: energy efficiency must also be sought in managing indoor comfort, temperature, humidity and brightness. Preference must be given to passive systems and the number of temperature-controlled areas should be limited. Natural lighting should be favoured over artificial lighting as much as possible, since the latter represents up to 70% of the final energy consumption of interchange hubs.

Supporting urban resilience

For logistical and accessibility reasons, interchange hubs tend to be highly "mineralised". Design practices should evolve to green certain areas and incorporate exemplary measures in the following domains: rainwater and water infiltration management, the fight against urban heat islands, improvement of biodiversity, visual pleasantness, air quality...

5. Ensuring consistency between architecture and landscape

Architectural quality is not the only factor that improves the urban fit of interchange hubs. Another one is the harmony between the infrastructure and the surrounding landscape, which can be analysed through four prisms: development, perception, representation and experience of the space[24].

The way the hub is perceived will depend on the inherent quality of the architectural project, its fit with the environment, and the way users take ownership of the infrastructure. What significantly contributes to users' perception is the consistency of the choices whose results are most visible to them, namely choices regarding street furniture, floor materials, lighting, green spaces and signage.

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24. Stransky V. (2006). *Les espaces des pôles d'échanges : de multiples composantes et des conceptions variées.*

2. Urban fit: MTHs as integral parts of multimodal cities

GOOD PRACTICE

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Using harmonious landscaping to integrate an MTH into a quality urban area:
the case of Antibes, France

View of the interchange hub in Antibes.
© Gautier + Conquet.

The renovation project for Antibes' interchange hub based the layout of the bus terminal on the view over the Alps and the Mediterranean. The terminal was kept open and permeable so as to give the view centre stage.

The canopy brings unity to the space, as it helps integrate multiple functions and increases the visibility of the hub from adjoining areas. Diverse waiting areas, other than the platforms, have been created. The existing palm trees have been preserved or transplanted to add value to the spaces.

Passenger information is integrated in the infrastructure and the furniture was made to measure.

Finally, the public spaces near the hub have been developed to create a wider green framework that guides the user to the bus terminal and anchors it to the rest of the city.

1. Differentiating and integrating surfacings in interchange hubs[25]

Choices regarding surfacing are governed by the need to distinguish places according to their purpose. The idea is to symbolically mark spaces and so to speak "condition" user behaviour there. Surfacing must therefore be chosen for the way it contributes to the overall coherence of the hub and helps clarify the specific function of each place.

2. Enhancing the legibility of urban and landscape developments

Designing the accesses to the hub must take into account the urban environment, how passengers use the accesses and for how long. The difficulty resides in the fact that many uses interface in these spaces.

Street furniture: seeking rationality and unity

Street furniture plays an important part in shaping the character and image of public spaces. Interchange hubs are often located at the nexus of different places with strong identities, so the arrangement of various kinds of street furniture need to be coherent to avoid redundancies and create harmony between the hubs and their immediate surroundings.

In addition to its role regarding the identity of the place, street furniture also provides information. In particular, it helps identify paths leading to junctions between the hubs and the urban fabric around them.

Planning the spatial organisation

The spatial organisation of an interchange hub, with its specific topology, geometry and dimensions, shapes its urban image. It allows for creativity in marking the pathways in the interchange areas. Preference will be given to elements that visually open onto urban thoroughfares, for example floor markings, architectural items forming regular patterns, and extending outside the building into tree-lined alleys.

As users move closer to the hub, they should be guided by an increasing number of increasingly distinctive signs:

> in the immediate vicinity of the passenger building, users will gather the best directions from clear signage based on signs and arrows;

> farther away from the hub, a tree-lined avenue or street furniture will naturally guide travellers towards the interchange hub. Signage need not be more precise.

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25. Adapted from CERTU (2005). *Le traitement du sol, vecteur de continuité urbaine,* coll. Aménagement des pôles d'échanges, fiche n° 1.

2. Urban fit: MTHs as integral parts of multimodal cities

Considerations for spatial organisation[26]

- Adjust the need for signage depending on the distance to the hub, and avoid overabundant signage and information.
- Use the environment (buildings, lines of trees and other noticeable features of the urban space) to mark out quality paths.
- Pay particular attention to maintenance: a signpost that shows premature signs of age can alter the continuity of direction markings.

26. CEREMA (2017). *Les pôles d'échanges au service de l'intermodalité et de la ville durable.*

View of the interchange hub in Antibes.
© Gautier + Conquet.

GOOD
PRACTICE

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Turning a major intersection into an attractive MTH: the case of Casablanca's United Nations Square

View of Casa-Port station multimodal hub.
© AREP.

Casablanca inaugurated its new streetcar in 2012, along with a new addition to city life in the form of the redeveloped United Nations Square.

The project, funded by AFD, changed a more than 40,000 square meter area into a true interchange hub (bus, tourist buses, streetcar) and pedestrian area. Sidewalks and streets were upgraded, as were several public squares. Quality street furniture and lines of palm trees and green islands focusing attention on existing trees were used to create new public spaces and slow traffic.

The square went from being an enormous traffic intersection to 80% pedestrian area. The development of the interchange hub brought legibility, vegetation, continuity to the space, and created an oasis of peace for pedestrians and public transport users[27].

27. Richez associés. *Le tramway de Casablanca.*

2. Urban fit: MTHs as integral parts of multimodal cities

KEY POINTS

To integrate an MTH into the city, planning must take into consideration the physical constraints of the site, its location compared to other urban centres, and existing transport modes. It is also necessary to study the social and economic context of the site as well as the changes the hub will possibly bring about.

The project must also ensure the interchange hub is accessible by offering solutions to avoid or mitigate discontinuities in pedestrian paths and in the urban fabric. Design must also encourage walking in an area encompassing at least the immediate surroundings of the hub, if not the entire neighbourhood.

The urban fit of the hub is improved by architectural quality as well as by landscape harmony between the infrastructure and its environment.

Last but not least, the hub should be designed as a sustainable, energy-efficient place.

3. SERVICES AND SHOPS: CREATING LIVELY PLACES AND GENERATING INCOME

The tendency is to develop services and shops within interchange hubs both to generate income (in addition to fares) and to better integrate into the urban environment. This requires new management rules.

The services which will be set up must be chosen carefully. Profitability will be covered in the chapter "financing the hub with business activities". Another goal is to strike a balance between transport services, local services pertaining to transport or to the users' daily needs, and purely commercial services, while also taking into account the existing offer in the neighbourhood. In such way, it will be not just a place for users of the hub to pass through, but truly a pleasant and income-generating place with a life of its own.

3. Services and shops: creating lively places and generating income

1. Identifying and describing the types of services and their layout

1. Identifying which services to offer

The services available in an interchange hub fall into three broad categories[28]:

> transport services (also referred to as principal, primary or direct services) are pivotal[29] to the passenger trip. They are tied in with the transfer function of the hub and are directly related to volumes of traffic (ticketing, schedule information, fares and reservations, waiting areas, porter services, car rentals);

> secondary (or complementary or transversal) travel services are those that facilitate passengers' journeys by adding value to waiting times (food and drink, business lounges, newsstands);

> related or ancillary services have to do neither with transport nor with the passengers themselves. They can be seen as daily services and serve as links between transport and urban fabric (daycare facilities, coworking spaces, general stores).

Transport services are inherent to interchange hubs; the two others are not standard, they must be adapted to the place and neighbourhood for each project.

2. Defining a suitable layout

Within the transport hub, services must be organised according to the nature of the hub, the existing infrastructures and the transport functions; services and pathways must be mapped out beforehand.

The topology will take into account passenger flows so as to not increase transfer times nor visual or noise pollution. If services must be placed near passenger flows, no street vendors or disorderly activities should force passengers to cover longer distances.

Two principles should guide decision-making about the location of services:

> transport services must be placed near the main entrances/exits in the transport zone;

> ancillary services that merely "enrich" the functions of an MTH should not be a hindrance for users entering and exiting the hub[30].

28. Stathopoulos N., Amar G. & Peny A. *Formes et fonctions des points-de-réseaux*, Régie autonome des transports parisiens, Paris : RATP, 1991.

29. Kaminagai Y., Smolar M., Joseph I., SNCF & RATP. *Villes en gares. Pôles d'échanges relais et ressources de la ville*. Colloque Maison de la RATP - 14 et 15 mai 1997, Paris : RATP, 1998, pp.19-21.

30. Kaminagai Y. *et al.*, op. cit.

3. Services and shops: creating lively places and generating income

Typology of station-specific services[31]

TYPOLOGY OF SERVICES	CLASSIC SERVICE PACKAGE	INNOVATIVE SERVICE PACKAGE
SERVICES RELATED TO TRANSPORT **> Target:** passengers **> Goal:** keep traffic flowing, give access to ticketing, facilitate access to and circulation from the hub	• Noticeboards for travel information • Quick drop-off • Parking • Meeting point • Information and welcome desks • Car and bike rental	• Real-time multimodal information, integration of digital services • Sales areas integrated between different operators • Outside areas for ridesharing (meeting and pick-up areas like on highways) • Safe lockers for personal bicycles • Charging points for electric vehicles (taxis)
SERVICES RELATED TO WAITING OR TRANSFERS **> Target:** passengers **> Goal:** use waiting and transfer times to offer services that will save users time	• Waiting areas • *ATMs, bureau de change, mailboxes* • *Traditional food court (for longer waiting times)* • *Toilets/showers* • *Fast-food outlets, newsstands, pharmacies*	• *Waiting lounges with wi-fi, power outlets, perhaps computers with free internet access, tea and coffee facilities* • *Comfortable lounges for business travellers* • *Interactive area with games for children* • *Massages on platforms or in waiting lounges (Japanese train stations)* • *Hair salons for express haircuts*
SERVICES NOT DIRECTLY RELATED TO TRANSPORT OR WAITING **> Target:** passengers and local residents **> Goal:** use the centrality of the hub to offer services	• *Small businesses: photo booth, shoemaker* • *Franchises, shopping centres in or very near MTHs*	• *Public services: job-hunting services, applications for welfare applications or utility accounts, tourist office…* • *Day care facilities* • *Parcel collection points and self-service lockers* • *Cultural activities: exhibits, concerts…* • *Coworking spaces* • *Temporary shops*

* in italics: local shops associated with services.

31. From Capo C. & Chanut O. La gare moderne, vers un espace de production de service global. Économies et Sociétés. Série EGS, Économie et gestion des services, ISMEA, 2015, 16 (3), pp. 385-416.

3. Services and shops: creating lively places and generating income

3. Incorporating existing services and ensuring complementarity

An analysis of existing services and needs (housing and services near the hub) is a prerequisite for any implantation of services in an interchange hub newly woven into the local urban fabric. One aspect to bear in mind is the accessibility of the different infrastructures by "soft" transport modes (walking).

The offer of services and shops must be conceived in a comprehensive way, at the scale of the area within a ten-minute walking radius (800 metres) and must be tailored to the needs of current and future users. The idea is to provide an offer than complements the existing one, by supporting a mix of functions and in certain cases help bring new life into the neighbourhood.

2. Innovating and mutualising: development strategies for services within MTHs

1. Offering users new services

Multimodal transport hubs offer travellers more and more diverse services. Municipal-ities tend to encourage the implantation of local services such as post offices, day care facilities, tourist offices, coworking spaces or even leisure facilities such as libraries, cultural venues or sports clubs.

Such initiatives are more and more frequent. They are advantageous for everyone :

> **users** can make the most of their waiting time or transfers for time-saving activities: they can either work a few minutes in dedicated areas, while keeping an eye on departure schedules, or avoid a future journey by dropping off or picking up parcels in delivery points or clothes at the dry cleaner's, by stopping by a convenience store or a laboratory, dealing with administrative formalities, and so on.

> **Local authorities** and operators make the most of under-utilised areas or buildings, bring human presence and liveliness to the place by setting up public services, shared working places, offices for associations or by organising temporary festive events.

It is necessary to closely monitor such experiments in order to assess the level of appropriation by users and the economic conditions in which they can be set up.

It is very well to offer users new services and ways to optimise their time, but let us not forget that an interchange hub can simply allow for areas where to rest and relax for a moment.

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32. Adapted from CEREMA (2017). *Les pôles d'échanges au service de l'intermodalité et de la ville durable.*

3. Services and shops: creating lively places and generating income

Offering coworking spaces in an MTH:
the case of the Gare de Lyon, Paris

Coworking space.
© Winterroth.

Multiburo, a real estate group, has partnered with France's state-owned railway operator SNCF to offer workspaces in the Gare de Lyon train station in Paris[33]. Nomad workers will find various flexible, affordable solutions for shared offices (tariffs by the hour, day, month or year).

The group offers business services for passenger of the high-speed train (TGV) but also for companies that need flexible workplace solutions.

33. Multiburo, [online]: https://www.multiburo.com/en/center/business-center-paris-gare-de-lyon/?displayreturn=true Retrieved 12 June 2018.

2. Mutualising services

Mutualising culture and leisure

As places that are open to the public, accessible and free, MTHs can serve to promote arts and culture (musical stage, exhibition venue, museum). The architecture of some areas of hubs, formerly industrial buildings, is conducive to certain leisure activities (gyms or recreational facilities).

Mutualising mobility services

Any interchange hub is destined to serve all forms of mobility, regardless of which entity operates them. It can support and promote new solutions, particularly initiatives launched by associations, citizens' groups, cooperatives or start-ups: ride sharing, car sharing, organised hitch-hiking, bicycle workshops, walking bus, collaborative mapping...

The hub's central role in multimodal management can be expressed in different ways:

> shared waiting areas (for trains, city and intercity buses, ride shares) where relevant, real-time travel information is provided;

> an integrated information and reservation system covering all mobility solutions, which would embody the concept of Mobility as as Service (MaaS): multimodal toposcope, mobility centre, etc.

3. Services and shops: creating lively places and generating income

Offering day care facilities in an MTH:
the case of Parisian train stations

The Gares & Connexions project, which has set up day care facilities in train stations, answers a pressing social need regarding childcare. The idea is to offer clients day care near their homes or on their way to work[34].

The first train station to welcome a small-scale day care facility was in Roanne near Lyon, in 2010. Paris-Nord train station houses a day care centre managed by Babilou[35] in an unoccupied SNCF building. A second Parisian train station, Gare Saint-Lazare, opened its doors to a day care centre. In all the examples mentioned here, families pay the same fee as in municipal day care facilities, i.e. the tariffs set by French social security.

Daycare facilities in train stations.
© Jerry Wang.

34. Gares & Connexions news item, [online]: **https://www.gares-sncf.com/fr/actualites/creche-aux-abords-gare-paris-nord-ouvre-ses-portes**. Retrieved 12 June 2018.
35. A company that manages private day care facilities

Mutualising sales

Ticket-sales offices will undergo profound transformations in the coming years, because infrastructure operators are launching ticketing dematerialisation and interoperability policies, and rationalising budgets. This also means that players other than traditional mobility players will come into the picture. To ensure continued human presence in these areas, conversion projects are on the rise, the idea being to implant local businesses (travel agencies, doctors or pharmacies to name but a few) and state and/or parastatal agencies that will sell/offer their services and sell travel tickets.

3. Services and shops: creating lively places and generating income

Interchange area in a Sao Paulo metro station.
© Arnaud Dauphin.

3. Services and shops: creating lively places and generating income

KEY POINTS

A number of factors limit the implantation of services and shops in interchange hubs, among which passenger flows, customer profiles, available space, ties with existing shopping centres, and coordination between operators.

Visitors' needs and expectations must be analysed in order to tailor the offer. It can be organised either through a simple segmentation of the space, or by completely reorganising the offer of services. In any case, it is important that the public space be organised in such way that it does not hinder transport flows.

MRT exit Shaw boulevard, Manila, Philippines. 80x60 cm.

GOVERNANCE, CONTRACTUAL ARRANGEMENTS AND FINANCING OF MTH'S

1. GOOD GOVERNANCE

2. LAND VALUE CAPTURE

3. CONTRACTUAL ARRANGEMENTS AND GETTING THE PRIVATE SECTOR ON BOARD

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1. GOOD GOVERNANCE: THE KEY TO LONG-TERM SUCCESS

Multimodal interchange hubs are connection points between transport modes that sometimes operate on different geographical scales. Creating and managing such infrastructure, and fitting it into a territory involves both private and public stakeholders with different roles and sometimes diverging interests in terms of transport, urban planning and economic progress.

Particular care must be taken with governance both during the design stage and the operational stage, in order to guarantee the hub's coherence and the project's long-term success. This chapter details good practices to be considered by partners and contracting authorities involved in similar projects. Of course, these good practices must be tailored to fit the institutional context and the typology of the planned interchange hub and organise collective project management.

1. Building an interchange hub together: the different steps

1. Identifying stakeholders

A specific feature of interchange hubs is the multiplicity of institutional and private stakeholders involved. Among them are:

> local authorities (cities, regions) or the central government, which usually have responsibility – depending on the local context – for the roads and urban spaces serving MTHs;

> the transport authority (TA) tasked with defining and implementing transport policies;

> urban transport operators;

> railway and intercity transport operators;

> the entity managing railway infrastructures;

> the entity managing the railway passenger terminal, which is potentially different from the operator and the infrastructure manager;

> real estate and commercial developers;

> land owners;

> local planning authorities, when the project includes real estate or urban development;

> users/travellers.

All the above stakeholders have different competences and mandates and their interests may diverge, so it is a major challenge to get them to agree on shared goals and a coherent common strategy.

It is essential that a transport authority act as coordinator.

When multiple transport modes and entities are involved, transportation management can be fragmentary. Poor coordination then generates problems for intermodality: connection times do not match, information is missing or network maps are incomplete.

Such problems cannot be addressed on an ad hoc basis, just for the interchange hub project; an institutional framework is needed to improve transport services altogether. Transport authorities (TA) with overall responsibility for intermodal policy are powerful driving forces to ensure coordination between various operators. The guide *Institutional labyrinth*[36] gives examples of cities having created efficient TAs to set up and manage infrastructures.

Such entities are crucial to coordinate the various players in the transport system, for example laying the basis for fare and ticketing integration and ensuring it works smoothly, or uniting all stakeholders around a coherent interchange hub project.

36. Available on line: https://collaboration.worldbank.org/content/sites/collaboration-for-development/en/groups/urban-transport-community-of-practice/documents.entry.html/2015/11/10/institutional_labyri-ZgcX.html

2. Assessing the situation

A hub project raises questions of intermodality, urban fit and service offers. The first step should be to bring together all the parties involved to understand the context of the site with the three above perspectives in mind. The point is to garner an understanding of the physical and economic constraints, as well as the stakeholders' external influences, that will shape the creation of the hub.

The existence of property rights in particular implies negotiating with many parties at each stage of the project. All these factors constrain renovation work, service relocation, make development more complex and reduce the potential to set up services in an MTH.

For example, platforms can be difficult to manage as they form a border between the competency domain of the railway infrastructure manager and that of the operator. To set up ticket-vending machines on platforms for instance, the two entities would have to reach an agreement on how they would divide costs and revenues.

Land: a structuring element for the creation and operation of interchange hubs

Solid knowledge of the land and proper land use designation are important to avoid ending up with infrastructures and equipment that are difficult to manage. Below are the main questions to ask and actions to take accordingly.

1. How much public land is available?

To check how much land can be used and its condition, identify the landowners and boundaries of the proposed site in the operational perimeter. Once detailed information has been obtained from local land registry offices, establish a list of partners to involve in the project.

2. What opportunities does the site offer?

Survey the site and decide, along with the partners, on shared ambitions for the site. In a number of cases, the hub project is just one aspect of a broader plan to develop the entire neighbourhood, so its design and size must be thought out to accommodate possible future changes.

3. Who will be the contracting authorities and future operators?

Decide on the areas of competence, distribute relevant project-management prerogatives and name the future operators.

1. Good governance: the key to long-term success

3. Setting up a hub committee

To keep it moving forward, the project needs a steering group, in the form of a hub committee, that will make decisions and arbitrate. The committee usually includes relevant local authorities, the transport authority, landowners and potential contracting authorities for the construction work, the railway and road operators serving the hub as well as the potential financial backers of the project.

The hub committee is made up of two bodies:

> the steering committee, which comprises representatives from each entity, has decision-making authority and must approve the different stages of the project;

> the technical committee brings together technicians from the various committee entities.

For the hub to be designed with operating constraints in mind, it is necessary that its future operators, often multiple managing companies, be included in these committees and be involved from the start in decisions regarding design and dimensions.

4. Drawing up a governance protocol

A governance protocol is useful to guarantee management continuity between the different partners involved in the project and deep interlinking between the different operations. The protocol defines the principles governing the implementation of the project. It lays out in detail:

> planning guidelines;

> planned areas of competence and coordination between the various contracting authorities involved in construction work;

> expected service levels when the MTH opens;

> the provisional timetable for completion;

> event programme;

> land use aspects.

This "schematic layout" provides partners with a coherent short- and medium-term action plan in the initial stages of the project. It also guarantees the long-term durability of the partnership dynamics after the hub starts operating.

Of course, governance rules have to be tailored to each situation for the partners to agree on the preliminary studies and their steering arrangements. For complex projects, the parties may want to lay down their financial and/or land-use commitments in *ad hoc* agreements.

5. Proposing suitable financing arrangements

Projects for MTHs are mainly shaped by the way the multiple stakeholders, public and private, collaborate and by the financing arrangements. Agreeing on the economics of the project beforehand will:

> ensure that the budget of the operation is balanced, i.e. guarantee a balance between revenue and expenditure in the short, medium and long term;

> decide on the exact backing of the project by defining how risks and profits are shared between the various players and institutions.

For economic balance to be maintained throughout the project, the operational phases of the operation must be defined in relation to the financial flows. Expenditures tend to be greater towards the beginning of the project and revenues towards the end. Development sometimes needs to be divided into several phases, each being funded with revenue from the previous one. This constraint is proportionate to the size of the project, its scope and development time scale. It is therefore necessary to decide on several aspects simultaneously:

> operational phasing

> financial phasing

> land release, depending on operational needs and income from building rights

> successive construction stages, by programming the driving elements (most important to make the neighbourhood attractive while the project is carried out) and the activities that will generate substantial financial resources.

Such phasing seemingly makes the project complex, but in fact it helps reduce risks. In particular, it helps avoid simultaneously putting on the market large surface areas and leaves open the possibility of adjustments, particularly regarding planning, to adapt to market fluctuations during the operation.

6. Communicating on a regular basis

Regular communication between contracting authorities throughout the project makes for smoother design and follow-up are as well as better coordination between the actors involved, reducing the likelihood of nasty surprises. Communicating regularly helps:

> explain and share the goals of the MTH project;

> integrate local constraints into the detailed design, in the event that some individual or operational constraints had not been precisely identified during preliminary studies;

> know the planned duration of the different construction works and inform users about temporary changes in traffic flows.

Several discussion and communication arrangements can be defined and set up at the different design and execution stages of the project.

> An overall communication plan, prepared in common with the financial backers and contracting authorities, will help users accept and take ownership of the project over the long term.

> Giving a single person or entity – for example the main contracting authority – responsibility for the communication plan will ensure it is efficient and consistent.

> A "multimodal culture" can be promoted among site staff with tools such as:

- a "logbook"-type periodical about multimodal management, an internal communication document that will circulate information among staff;

- a guidebook or handbook to facilitate the information work of employees who are in contact with users;

- an internal memorandum with useful information for the daily management of the site.

7. Setting up an assessment system after construction

After construction work is completed, it is a good idea for contracting authorities and operators to carry out an assessment of the hub project. This first return on experience will improve the overall process and provide useful feedback for similar projects in the future. The following aspects can be analysed:

> the overall implementation process (duration, adherence to anticipated timelines, analysis of particular difficulties, solutions...);

> the way the redesigned hub functions with respect to the preliminary assessment and the way it is perceived by users, contracting authorities, operators, elected officials, etc.;

> annual reports produced by intermodality infrastructure managers, covering passenger numbers, income, servicing and maintenance costs.

2. Organising work between contracting authorities

When the hub project is carried out by several contracting authorities at once, it can be strategic to simplify work by transferring project management. It is particularly appropriate when the scope of a particular construction does not exactly match the ownership perimeter of a particular contracting authority, especially if one authority is recognised as being most competent for the said work.

1. Formalising arrangements between public stakeholders

A useful tool to simplify the steering of the project, especially in cases where the land is divided into separate plots, is a transfer contract to delegate project management to a single entity. This enables a coherent overall perspective on all the pieces of land as well as economies of scale for the actual work. The entity that holds ownership of the project still functions under the supervision of the steering committee, meaning important decisions are still made collectively. In other words, the contracting authority retains significant decision-making power even after having delegated part of its responsibilities.

2. Formalising arrangements between private and public stakeholders

Urban projects require public contracting authorities to invest substantial amounts of money in the early stages for land development and equipment, public services and infrastructures (for dividing land, setting up networks and transports, etc.), whereas revenues and profits from land appreciation tend to be reaped by private operators towards the end of the project. Public authorities can get private actors to contribute to the public investments needed for their projects in several ways:

> the private sector can build, then sell back equipment to the public sector; this is often the case when building schools or medical facilities;

> private actors can support the construction of public facilities with fixed financial contributions;

> they can also contribute to the creation of local amenities via a development tax, whose revenues are not attributed to any facility in particular.

These contributions can be organised either in a systematic way, or negotiated on an ad hoc basis between contracting authorities and project leaders.

Blueprints and architectural and landscaping guidelines

To improve the legibility of public space by different categories of users, it can be useful to introduce guidelines for architecture and landscaping, and a blueprint for travel information. These guidelines should be shared between the different parties involved in the management and financing of the project. These documents can cover the following aspects:

- the consistency of signage and marking systems in the various areas;
- the ways suitable lighting, continuity in floor surfacings and/or street furniture channel passenger flows;
- the types of street surfacing used to slow down vehicles at intersections;
- choices regarding the general atmosphere of the site, its safety or unused spaces, for example specific fittings for ambient lighting.

3. Operating an MTH: possible forms of organisation

Improvements to service quality brought on by interchange hub projects need to be maintained over the long term. How? Management responsibilities for the different parts of the interchange hub need to be clarified between the landowners, infrastructure owners, and the transport line managers and operators. What must be clearly established regarding all the stakeholder's activities is their scope, periodicity, practicalities, and how the costs of the different types of activities are shared.

1. What are the management options?

To choose the arrangement best suited to all the partners regarding governance and sharing operating costs, the various options need to be examined from both a legal and a financial perspective. The objective is to offer consistent quality services throughout the interchange hub while optimising expenditure for the different partners. The various operators need to agree on procedures to assign roles and responsibilities, or even pool services for example by contracting them out to a third party who is active throughout the entire hub.

Services suitable to pooling are those associated with the intermodal functions inherent to an interchange hub. They include passenger information, servicing and maintenance, follow-up and coordination, back office, promotion, communication, events.

The simplest and most suitable way to lay down conditions for running and operating a hub on a daily basis is for the partners to sign an **operation agreement** (see box next page). An interchange hub may also be operated by a dedicated entity, which will then call for tenders to purchase pooled services on behalf of all the partners. This will ensure consistent levels of service throughout the site.

There are four ways to manage intermodal functions.

> **Side-by-side management, without a formal agreement**. Each function is managed separately. Each transport authority and its designated carrier manage their area independently, without consulting the other players.

> **Coordinated management, without a formal agreement.** The different players, operators or transport authorities consult each other to coordinate their actions in the hub, for example:

- to define specifications together when tendering and thus be certain to find suppliers offering a consistent level of service;

- to choose the same supplier for certain functions (servicing, maintenance, etc.) and achieve economies of scale while offering customers consistent levels of service;

- to supply information about other transport modes available at the hub;

- to supply information about the neighbourhood, city, tourist attractions, etc.

> **Integrated management with formal agreement.** A function or service is run by a single operator on behalf of the other operators who use the hub. In this form of management, a single service is set up for each function such as passenger information, support for persons with reduced mobilities, maintenance of static and dynamic information boards, shared ticket sales and so on.

> **Management by a single operator. The actors** of the interchange hub task a single entity, for example an economic interest grouping, with the management of all the functions and services of the different areas. This can mean that a single company manages contracts for servicing, maintenance and safety in all the other areas of responsibility. In return, the partners contribute to the hub's operating budget, which can be high.

Operating agreements

It can be necessary to formalise operating agreements for facilities owned by more than one entity, such as:

- lifts and escalators linking streets to railway areas;
- features like shelters, canopies, user information maps, wayfinding signage, lighting, drainage systems;
- dynamic information screens;
- public underpasses or footbridges and secondary entrances;
- structures with different functions on several levels, whose divisions by volume and whose differing levels of responsibility for their long-term management are not always clearly defined;

Operating agreements must cover several activities:

- **routine maintenance** of passenger areas by cleaning companies, of shelters, developed street areas, railway embankments and access points, with clearly defined perimeters, types and periodicities of interventions;
- **curative maintenance**, fixing breakdowns and responding to damages with maximum response times predetermined by contract;
- **preventive maintenance**, renewal of parts at the end of their average lifetime according to a maintenance schedule and performed by a maintenance service, with for example daily reports on the working order of each machine, follow-up on maintenance companies interventions on the site, etc.;
- **heavy maintenance**, which requires more substantial financial investments, part of the preventive maintenance concerning for instance the renewal of obsolete heavy technical equipment or upgrading to comply with regulations, technical monitoring of machinery and operating systems.

Legally defined roles notwithstanding, the different players in charge of hub maintenance and management are well advised to meet periodically to identify elements requiring particular attention and thus increased coordination so as to keep on delivering high levels of service.

2. Covering MTH operating costs

The most frequent contributors to the financing of operation costs for an interchange hub are the local transport authorities, cities, inter-city structures or regional councils, and/or carriers who use the hub.

Cost-sharing arrangements are usually made on a case-by-case basis, as negotiated by the partners. Arrangements must take into account the size of the interchange hub, the institutional context, the contribution of each partner to the construction or development work, and their expectations in terms of services. When an operating agreement is in place, or a dedicated entity (economic interest grouping) is in charge of management, operating costs can be allocated in different ways.

> **In proportion to surfaces occupied.** The advantage is that each player's area is clearly delineated so the cost allocation is indisputable and can be long-lasting. The owner of the space and its occupier are not to be confused during negotiations as their expenses differ.

> **In proportion to flows**, as measured by a preliminary study of passenger traffic for each carrier operating in the transport hub. With this solution, the allocation can be adjusted as the hub develops. But flow studies are expensive, so it is unlikely they will be done on a regular basis.

> **On a flat-fee basis**. Each service supplied is billed at an annual flat rate. In the case of an operating agreement, certain spaces used by all users and that only generate costs can be defined as "of common interest". The costs are then billed to the various partners on a flat-fee basis, according to the agreement. For example, the cost of cleaning a concourse considered of common interest can be invoiced to all the partners on that basis.

1. Good governance: the key to long-term success

GOOD PRACTICE

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Setting up contractual arrangements,
the example of MTH operating agreements in France

In interchange hubs in France, the spaces belonging to SNCF Réseaux (and to SNCF Mobilités until the end of 2019, now SNCF Voyageurs, also a daughter company of the French railway company) are managed by an SNCF subsidiary called Gares & Connexions. This entity manages spaces in train stations via a national contract for in-station services called "*Convention de service en gare*".

Having considered what issues need to be addressed for each project, each party brings their expertise to draw up a document that covers expected operating conditions for the site. It specifies individual obligations as well as service ambitions for the interchange hub (they may be broader than travel services). Operating agreements must go into the detail of all technical aspects and include review clauses for financial aspects.

Operating agreements should detail:

> the subject and goal of the agreement

> the operators and their legal ties with the transport authority

> the partners' ambitions regarding intermodality

> the boundaries and owners of the land areas that the MTH comprises

> the existing entrances and exits, access points to the train station, platforms, underground passages, footbridges, etc.

> facilities and equipments

> management terms for the hub, detailed by facility

> shared services as well as individual services required by the carriers

> the scope of each service as well as relevant financial contributions

> the governance system and the rules applicable to the work of the steering committee, the technical committee, and their make-up and role

> the terms under which accounting records are shared with partners

> the duration of the agreement and review and cancellation terms.

1. Good governance: the key to long-term success

Lorient Bretagne Sud interchange hub, southern forecourt photographed by a drone.
© SNCF Gares & Connexions - AREP / Photographer : Mathieu Lee Vigneau

KEY POINTS

By nature, a multimodal transport hub brings together several players. A key issue is to establish a governance method for the design stage and the operating stage, so as to organise the economic and financial set-ups of the project and ensure consistency in the urban fit, intermodality and services offered.

Partnership agreements need to be formalised between the actors involved, for instance through governance protocols, operating agreements and/or blueprints and/or architectural and landscaping guidelines.

There are various ways of managing services, but the best way to ensure a consistent level of service throughout the entire hub is to share services and clarify partners' responsibilities. This facilitates quality monitoring and helps decrease maintenance and operating costs over the long term.

2. LAND VALUE CAPTURE: TOOLS TO FINANCE INTERCHANGE HUBS

Increasing mobility needs require developed transport networks as well as transport hubs that are more efficient, accessible to the greatest number of people and use up less space. Yet fare revenue and public subsidies alone are far from sufficient to finance the cost (investment plus operating) of such infrastructures.

The question of real estate value in and around interchange hubs is at the intersection of transport infrastructure financing and urban development. It's a crucial question, especially in emerging economies. To leverage financial resources from real estate and develop efficient hubs adapted to urban growth, specific contractual set-ups need to be arranged, associating public institutions and private players.

1. Managing land

Land management in and near an MTH must be thought out well ahead of time so as to have control over the land in the planned construction area. The creation of the hub will change the existing balance in the local property market. In particular it could be upset by "opportunistic" secondary operations being launched with the construction of the hub, to the point that the real estate situation could be out of control. To avoid this, it is necessary to prepare tools, methods and means to retain durable control over land and if possible keep some land reserves for future developments.

So before launching the development of an MTH, it is preferable to carry out prospective studies and if need be to include protective measures and/or building techniques that allow for adaptable, modular or even reversible architecture so as to facilitate future adjustments. This will translate into substantial savings in the long term.

2. Financing hubs with real estate development

Land value capture around MTHs is a key issue in the wider context of sustainable development goals, the point being to enhance the value of a zone located in derelict or neglected areas. Financing MTHs in old urban fabric is one way to fulfil social and economic development objectives.

When analysing the area beforehand, it is necessary to get experts to examine the features of the land on which the hub will be developed. This will give a precise picture of the land reserves and their heritage value.

What most constrains the development of an existing interchange hub, be it a historic train station or a mere traffic circle with bus stops, is land scarcity. In particular, the spatial organisation of roads and transport stations is not optimal for the implantation of services. One way to increase user numbers of an interchange hub – and therefore fare revenue – is to encourage urban development around the hub, which also increases the value of land around the hub.

This approach to urban planning, also known as "Transit-Oriented Development" (TOD), promotes densification along transport lines and around stations. Thus TOD is a useful tool to coordinate urban planning and transport. Encouraging mixed-use development in the immediate vicinity of interchange hubs provides public authorities with new sources of financing.

2. Land Value Capture: Tools to Finance Interchange Hubs
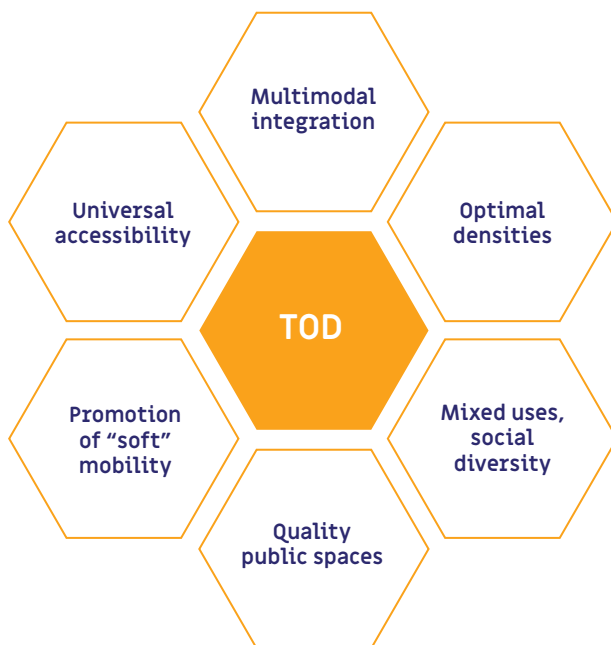
Transit-Oriented Development: main principles

Value-capture projects are by definition complex, large-scale, long-term projects. They require long-term strategies on the part of public actors, a clear definition of the stakeholders' respective roles and precise contractual arrangements to guarantee that all parties fulfil their obligations.

This approach can be carried out in a variety of ways, from selling public land to forming public-private partnerships (PPPs).

1. Selling public land holdings

Selling publicly owned land is a common way of capturing land added value and encouraging urban development around interchange hubs. This financing model supposes that public authorities have the capacity to buy land, or already own it, and understand movements in the real estate market in order to define the best resale strategy and optimise land use.

2. Land Value Capture: Tools to Finance Interchange Hubs

Public authorities may sell to developers and include part of the estimated future added value, or carry out developments themselves and later resell at market prices with capital gains. The disadvantage of this strategy is that it is difficult to estimate how much added value will be captured in real terms. Market prices do not reflect benefits offered by interchange hubs as soon as they start operating, which is why it is preferable to have other temporary financial resources and be able to postpone any land sale.

2. Selling building rights

Another option open to public authorities to finance interchange hubs, other than using land reserves, is to seek an optimal use of lands.

One way of proceeding is to sell Certificates of Potential Additional Construction known in Brazil as "Certificados de Potencial Adicional de Construção" (CEPAC, see **GOOD PRACTICE no. 16**) The idea is for municipalities to sell additional building rights (higher floor area ratios for example) to finance interchange hubs or other infrastructures in urban renewal operations. CEPACs are in fact bonds issued by municipalities; they can be traded on a secondary market similar to a stock exchange. CEPACs can be auctioned or sold directly to pay for construction work or expropriations[37]. CEPACs all have the same face value but correspond to different amounts of square meters depending on the location (inside the perimeter) and destination of the plot where they are going to be used. So bearers need a larger amount of CEPACs to build in higher-value zones, for instance near an MTH. But once the maximum quota has been reached in one area, CEPAC bearers have to find another operation in which to "spend" them. With this strategy, municipalities are able to stimulate local residential density and capture financial resources before launching the project. The funds are used exclusively for the joint urban operation[38].

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37. Smoka, M. O. (2013). *Implementing Value Capture in Latin America: Policies and Tools for Urban Development.* Lincoln Institute of Land Policy.

38. Adapted from CODATU (2014). *Who Pays What for Urban Transport? Handbook of Good Practices.*

GOOD PRACTICE

16 ✓

Using the attractiveness potential of MTHs to finance urban renewal:
the case of Sao Paulo, Brazil

In Sao Paulo, Água Espraiada was the first joint urban operation approved after the law creating city statutes was passed in 2001. It concerned the improvement of an area that included several *favelas* (slums) as well as old one-story and two-story residential buildings. The project included plans for new roads, parks, lanes for rapid buses and part of the work on line 7 of the metro, as well as the densification of mixed-use neighbourhoods.

In 2001 the overall cost of the urban projects was estimated at 375 million euros over a 15-year period. Of these, 105 million euros were allocated to renovation work on the underground railway and 60.6 million euros to dedicated bus lanes. The bulk of the financing came from the sale of 3,750,000 CEPACs. The CEPACs were divided into five batches and sold between 2004 and 2012; each sale financed several planned urban projects. A batch could not be put up for sale until all the CEPACs from the previous batch had been sold.

The financial objective of the operation was achieved in September 2008 and the fifth batch, representing the balance of the project, was launched in June 2012. From a financial point of view, the operation was a success. But the clause conditioning the sale of a batch on the completion of the sale of the previous batch slowed down certain projects tied to the final batches which otherwise could have been launched sooner. Still, with this method, the Sao Paulo municipality was certain that all its projects would be financed, and not only the highest-value ones in the final batches of bonds.

The second major urban operation, Faria Lima, was started in 2004 and concerns 650 hectares in the southwestern part of the city, a particularly high-value area. The main goal is to extend Faria Lima Avenue to reorganise flows of car and public-transport traffic. The total budget of the operation is 1.9 billion reais. The municipality has issued and sold 650,000 CEPACs, generating 1.05 billion reais; 120 million reais have been allocated to the construction of the underground railway.

2. Land Value Capture: Tools to Finance Interchange Hubs

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Building over bus depots to increase the value of land, the example of France's RATP

The Paris public transport operator (RATP, Régie autonome des transports parisiens) uses land value capture as part of its overall strategy to generate revenues which will be used to upgrade its facilities and service its debt. It generates land rents from two types of property.

> Wasteland: the RATP, by agreement with local authorities, conducts preliminary studies for real estate projects on its wasteland, then sells relevant building rights. Over the past ten years, it has already generated between 150 and 180 million euros in this way[39].

> Existing facilities: the RATP moves its bus depots and workshops underground to develop real estate (offices, housing and amenities such as day care centres) above ground. The development follows the same principles as for wasteland, and the value gained from the surface thus freed up covers the cost of the new underground facilities.

One illustrative example is the Jourdan-Corentin-Issoire development in central Paris (in the 14th *arrondissement*).

365 student housing units

193 social housing units

1 day care centre with capacity for 96 children

108 private housing units

1 maintenance workshop

1 depot for some 200 buses

7,300 sq.m. of green roofs including 600 sq.m. of communal gardens
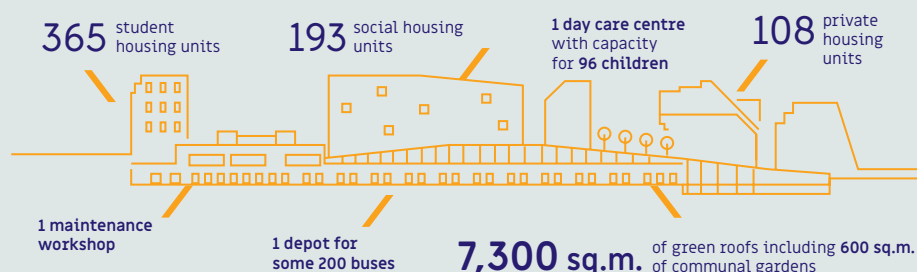
In both cases, once the RATP has obtained a building permit, it launches a consultation with real estate developers and sells the project to the highest bidder. Depending on the projects, it recovers between 30% and 100% of the added value of the area between the moment the sale is closed and the moment construction is completed.

The Jourdan-Corentin-Issoire project, which covers nearly 2 hectares, was completed in 2017. Its overall cost was 163 million euros (not counting land); 56 million euros were allocated to upgrading the bus centre. The above-ground real-estate development financed more than 80% of the renovation of the bus centre[40]. One reason the plan was successful is that the site is located in central Paris, where land is scarce and fetches high prices.

39. From an interview with Rémi Feredj, from the RATP subsidiary SEDP Société d'études et de développement patrimonial [online] available here: http://www.sedp.com/wp-content/uploads/2016/03/TP-01-03-2015.pdf.

40. Les Ateliers Jourdan-Corentin-Issoire. *Quand le centre bus devient quartier*. Journal édition n° 4, juin 2017, Paris.

GOOD PRACTICE

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Conceiving urban development projects around train stations, the examples of the Grand Paris project and the suburban train station in Issy

Grand Paris Express (GPE) is the largest transport project in Europe. With its 68 new stations and 200 km of automated train lines, the project will transform the cityscape. It is already driving urban projects and new mixed-use neighbourhoods with housing, offices, shops and facilities.

The state-owned Société du Grand Paris (SGP), created in 2010, is the contracting authority for the project of four new metro lines and the extension of two other lines, all connected with the existing transport network. Construction work began in 2015 and is scheduled to be completed in 2030.

The new Issy RER [express suburban train] station, which will be connected to the existing station, is to be built on the southern portion of line 15 of the Grand Paris Express network, in the city of Issy-les-Moulineaux. The municipality and the Société du Grand Paris tasked a consortium, formed by developers Icade and Architecture Studio, with building a mixed programme over 7,600 square metres with: 80 units under homeownership schemes, 24 social housing units, 840 sq.m. of coworking spaces, 80 parking spaces. The building which will be erected over the future railway station is part of the urban renewal programme of the Léon-Blum zone which the city of Issy-les-Moulineaux began in 2013.

Plans for the area include the construction of more than 1,000 new housing units and of public facilities. These will serve to revitalise local businesses. According to the SGP, it is important to keep land prices under control because the gentrification of the area around the station would drive out less well-off residents. To avoid this, municipalities need to set up tools to limit real estate speculation without paralysing the market. One method is to set a percentage of social housing for real estate developments.

2. Land Value Capture: Tools to Finance Interchange Hubs

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Stimulating urban development with the construction of a train station, the example of Washington, DC

Potomac Yard, in Alexandria, a northern suburb of Washington, DC, is an interesting example of joint urban development between a municipality and a private operator[41].

Since the beginning of the 2000's, the site of a former railway yard covering roughly 1.5 sq.km. was used as a retail area, but the lack of connexion with Washington's transport network hindered its development. At the joint initiative of the city of Alexandria and of a real estate developer, the occupation plan for the site was rewritten to allow the development of 750,000 sq.m. of office and retail space instead of the existing 60,000 sq.m. The project was conditional on the construction of a station on the metro line that connects Alexandria and Washington and passes under the site.

A first site (A) was considered, the advantage being that it lay on the path of the existing line and on a plot that fitted technical requirements for the construction of a station; in addition the land belonged to the city of Alexandria and could simply have been sold to the Washington Metropolitan Area Transit Authority (WMATA).

But the developer of the main part of the site, a company called CPYR, was willing to contribute 80 million dollars towards the railway station (out of an overall estimated budget of 250 million dollars) on the condition the station was not built on the site initially considered, but rather a few hundred meters north of it, right next to its own parcel of land. This second option (B) reveals a much higher property development potential in the vicinity of the station.

Comparison of railway station locations

	SITE A	SITE B
Buildable area within a radius of a quarter of a mile of the station (sq.m.)	350,000	550,000
Buildable area within a radius of half a mile of the station (sq.m.)	1,000,000	1,400,000
Impact of the construction of the statin on Metrorail traffic	High	Medium
Estimated cost (millions of $)	195	250

Source : Fabrique de la Cité, 2013.

41. From the appendix "Les potentielles contributions privées déterminent le choix du site de la gare" written by Fabrique de la Cité : *Les mécanismes de financement des gares : comparaison internationale*, 13 mars 2013, Paris.

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CPYR's contribution is crucial, although it represents only a relatively small share of the overall budget, because it is provided at the start of the project, at a moment when there are few other sources of financing.

Raising that sort of money is an ambitious undertaking for a small-size city acting without support from the state or the operator. Success was determined by several factors.

> **The private sector was involved:** a private actor was among the initiators of the project and played a significant enough role to influence the choice of the station's location.

> **The area was attractive and under-utilised:** the feasibility of the project depended on the particular circumstances of the site, with a major gap between the potential of a site located only a few kilometres away from the federal capital, and its current use as a "big-box"-type[42] commercial area.

> **Transport was incorporated into the financing plan:** the philosophy of the project is to finance investments with future revenue from real estate developments carried out by the private sector. A prerequisite for the success of the development was the construction of the railway station, to the point that the municipality was willing, if need be, to allocate any gains in tax revenue to servicing the debt incurred to build the station.

> **The capital base was sound:** the local transport authority (WMATA) did not take part in the financing, it only supervises construction work for the station. The city of Alexandria, having taken the initiative and done most of the work to structure and finance the project, is ultimately shouldering most of the financing.

> **The decision-making process was local:** after the municipality had decided not to request state or federal funding, the decision-making process remained local. Many actors had to be consulted, in accordance with legal procedures, but a small working group advanced the project and a single entity made decisions. This provided the municipality with flexibility to negotiate with a private actor.

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42. Where the main business is a superstore or shopping mall

3. Financing a hub with retail activities

One way to finance at least partly interchange hubs is to combine transport and retail, the contribution being the future revenue from shops.

The advantage of interchange hubs is that they attract regular, sometimes massive, flows of people, often more than shopping centres. In addition, their opening hours are long and, ideally from a consumerist perspective, they are nearby and save people time by enabling them to shop at any time of the day.

1. Defining profitability

The two main questions are the following:

> are there enough visitors passing through the transport hub to draw future consumers?

> is the surrounding area attractive, or can it become attractive?

In France, the break-even point for an automated vending machine is when traffic reaches at least 2,000 people per day, according to SNCF Gares & Connexions. Out of the country's 3,200 train stations, only 400 are equipped with vending points. The viability threshold for retail activity in a station-hub is around 50,000 passengers per day, according to a 2013 study by PwC[43]. But again, the local environment and consumer habits play a role. For example, the novelty of a shop opening may draw people and increase the attractiveness of a downtown hub.

The study by PwC provides typical ratios in terms of retail area and investment per passenger: between 0.10 and 0.15 sq.m. of retail area per passenger per day and 350 to 400 euros per passenger per day invested in commercial development. These figures give a rough idea of the profitability of a retail venture, but need to be adapted to each case, depending on the local context.

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43. PwC (2013). *Quels mécanismes de financement pour les gares urbaines ?* Study carried out for La Fabrique de la Cité « Les mécanismes de financement des gares : comparaison internationale » Paris.

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Leveraging financial constraints to develop a more ambitious hub,
the case of Tbilisi, Georgia
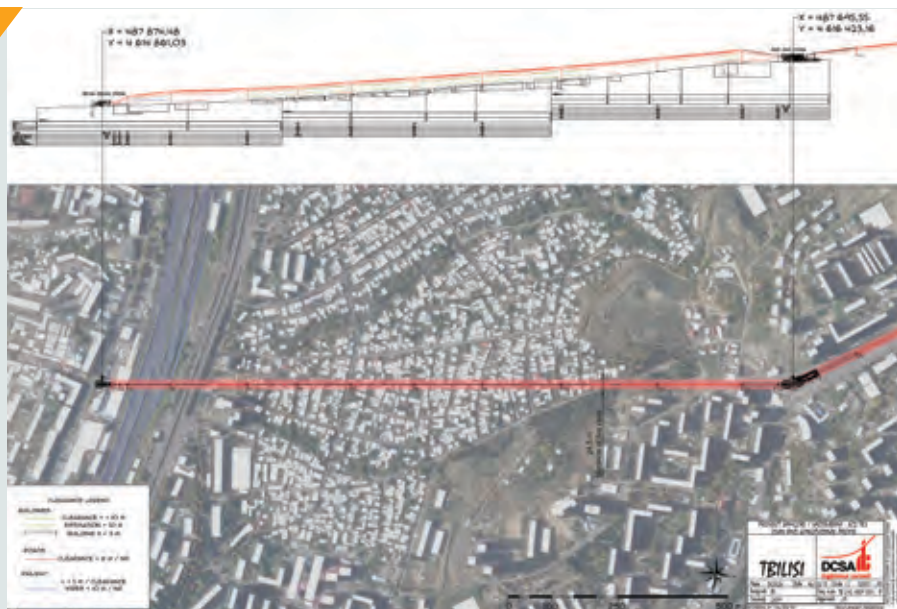
Tbilisi transit cable feasibility study.
© DCSA Ingénieur conseil

Georgia being a mountainous country, transport by cable-car has long been a feature of daily life there. The country's central government is currently reviewing its public transport policy to develop transport capacity and improve existing infrastructures.

In this context, the AFD has provided the local Land Transport Authority with technical expertise to draw up a plan to develop transportation by urban cable car. A feasibility study for an aerial tram in the Samgori-Vazisubani in Tbilisi has already been carried out.

Samgori is one of Tbilisi's main transport hubs, served by railway lines, a metro line and many bus lines as well as an intercity bus terminal. One of the options considered for Samgori is to connect it to the Vazisubani neighbourhood via an aerial tram integrated to the metro. The plan is to create a multimodal hub and a new shopping centre at Samgori.

2. Land Value Capture: Tools to Finance Interchange Hubs

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The study has identified a number of limitations which must be taken into account in order to find the best sources of financing, in particular commercial revenue[44]. But Tbilisi offers little potential in this respect[45], for several reasons: many large shopping centres already exist within a short distance of Samgori metro station and the local purchasing power is low, with a substantial share of income allocated to food. So the study, which also examined average rental prices and vacancy rates, reached the conclusion that developing modern shopping centres in Tbilisi was not economically viable.
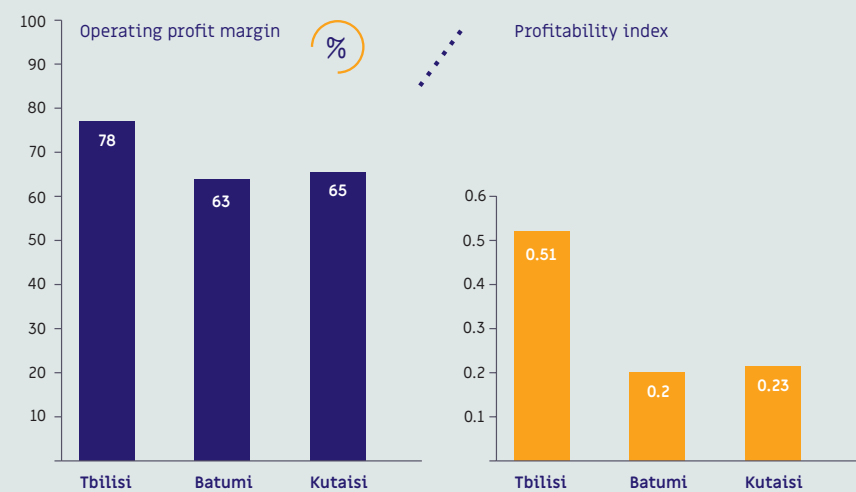
Modern shopping centre operating profit margin and profitability index in Tbilisi
Source : Colliers International, 2014.

In this case, retail development would be profitable only in the long run, so should not be viewed as an additional source of revenue in the interchange hub and cable-car corridor project's financial model.

Samgori nonetheless has development potential: its already sizeable passenger flows are projected to increase with the cable-car service, and the area, with its existing business, already is a shopping and service destination for passengers and residents alike. Therefore retail development should be thought out in this context, with a focus on services and on a limited number of mid-range shops in other retail sectors.

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44. From AFD internal documents and the Samgori-Vazisubani feasibility study.

45. Rapport de détail de Colliers International 2015.

Commercial success hinges on passenger flows

For a retail point to open in an interchange hub what counts is user flows, or to be more precise, the distance between the shop and passenger flows. The retail point's presence must not fundamentally alter existing flows. Supply does not create flows – contrary to what happens in shopping centres – but the flows invite supply[46].

Different passenger profiles, different types of demand

Contrary to airport passengers, urban transport users differ greatly in terms of needs and purchasing power. For this reason, precise customer profiling is difficult. Still, two typical profiles of interchange hub users can be distinguished according to the time they spend there[47]:

> Commuters have precise knowledge of their surroundings and optimise their travel time as much as possible. Regular, frequent traffic allows these travellers to be flexible in making use of their time spent in hubs. These consumers take advantage of passing through to make specific purchases (at the locksmith's, the parcel pick-up point, the post office or in a clothing shop), so their demand reflects a need to optimise their time.

> Conversely, long-distance travellers spend longer stretches of time in interchange hubs.

The bulk of their consumer needs is related to the journey (food and drink, newspapers and magazines). They also can be impulse buyers.

2. Defining the content of commercial offers

The quality and choice of commercial offers and available services vary vastly depending on the cities and types of interchange hubs. In Tokyo for instance, it is very common for residents to go to the station neighbourhood for very diverse reasons: to travel, work, seek novelties, shop, have a meal or go to the doctor's. But it is not yet the case for interchange hubs in Brazil, Algeria or the Philippines, to name but a few.

These differences can be explained by the local culture, users' customer profiles, urban policy or the hub organisation chosen by transport operators. Each city decides on a different commercial model suited to its economic and urban context.

Actual shopping centres are created when a mature transport infrastructure and dense urban fabric generate heavy passenger flows, but it is generally not the case. No standard model exists that can fit all cities, commercial offers must therefore be decided on a case by case basis.

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46. Adapted from Dang Vu H. & Jeaneau H. *Concevoir un espace de transit et de consommation : la gestion de site dans les gares parisiennes*. Espaces et sociétés 2008/4, n° 135.

47. *Ibid*.

3. Drawing up a strategy to set up services and plan their evolution

International comparisons can help understand the respective advantages of various financing and data-collection strategies to develop retail activities.

Collecting data to manage shops and services

A hub management company hoping to increase the turnover of shops and services must first gain knowledge about its customers. Several types of data may be used for this purpose:

> data pertaining to the use of services and collected in MTHs via customer satisfaction surveys, interactive terminals or even lasers that capture user paths;

> data from transport operators;

> exogenous data, obtained from social networks and travel information applications;

> open data supplied by national statistics institutes.

User profiles and expectations can be identified based on this data. It can also serve to obtain a fine-grained picture of the interchange hub, distinguishing the busier areas from the less busy ones so as to decide which to turn into retail areas.

This method is beneficial both for customers and, financially speaking, for interchange hubs, since it will improve the physical distribution of passengers throughout the hub; in addition users will possibly come across services and shops that match their needs.

SNCF Gares & Connexions follows a similar strategy regarding data[48]: first, the company develops travel information systems to deliver relevant information at the right time and in the right place. It then uses metering tools to collect Wi-Fi tracks (anonymous data) provided by mobile network operators to trace user paths. The raw data is synthesised, analysed and translated into so to speak "performance" charts for various spaces in the station, i.e. to identify transit points with heavy flows and places where users tend to stay longer. Based on these flow models, the company can rethink the spatial organisation of the stations it manages to better maintain facilities, facilitate pedestrian traffic and increase sales.

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48. Information supplied byGares & Connexions, 2018.

Reshaping business strategy

Once flows, user profiles, profitability, ties with urban centres, etc. have been analysed, the next step is to envision potential evolutions for a hub's business strategy. Three broad directions are possible:

Relocation/sectorisation: the idea is to divide the retail offering by sector. Retail points can be grouped in different zones based on consumer patterns, in order for the offering of services to be tailored to the various flows.

Extending/reducing retail surfaces: the idea here is to adapt spaces to flows. Some shops being more attractive than others, the shopping zone needs to be optimised so as to not overburden certain shops or further sideline others, and influence passenger flows.

Renewing the offer: the idea is to offer visitors new shops and services likely to answer their needs, based on the data collected by the hub management company. In addition to traditional outlets, experiments such as ephemeral (pop-up) shops or coffee shops on wheels are a good way of testing new concepts and catering to consumers' taste for novelty.

Financing with advertising revenue

Nowadays prime communication targets are the most mobile individuals. In this respect interchange hubs are critical city areas: the large numbers of people passing through create great potential for capturing advertising revenues which can become an additional resource to cover operating costs. Advertising spaces can be sold on fences around the building site even while the hub is being built or renovated.

A few precautions to take beforehand:

> take into consideration travellers' perceptions so as to make sure advertising is effective rather than counter-productive;

> make sure not to visually crowd the transport area so that signage remains legible. When creating advertising space, it is very important to maintain visual harmony.

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Increasing advertising revenues in MTHs,
the cases of France and Hong Kong

The French railway operator SNCF has calculated that advertising represents one fifth of commercial revenue generated by train stations, amounting to roughly 50 million euros per year[49]. Recently deployed digital systems have increased the potential for advertising revenue by opening new market perspectives: for example, digital screens can display messages tailored to different targets depending on the time of the day, the geographical location or the day of the week.

Altogether, there are more than 600 digital boards in 100 metro and RER (suburban train) stations in Paris among the busiest, reaching some 3 million passengers every day, according to Media Transport, which runs almost all the advertising devices in public transport in the Ile-de-France region. Digital screens are mainly set up in metro and RER hallways in high-value spots, they attract eyes 4.5 more times than their equivalent space in the surroundings[50], according to a study that used eye tracking to measure the movement and intensity of gazing.

In Hong Kong, the private operator Mass Transit Railway (MTR) runs a 218 km-long rail network, which comprises an underground system (ten lines), a light-rail system as well as an express line connecting the airport with downtown. In 2016, the number of advertising spots reached 22,485, and generated 115 million euros in advertising revenues, or 20% of total revenue[51].

Legend:
- Others
- Telecommunication services
- Advertising
- Station retail

MILLION OF HONG-KONG DOLLARS

	2012	2013	2014	2015	2016
Total	3,680	4,588	4,963	5,380	5,544
Others	142	155	169	183	170
Telecommunication services	396	447	479	548	561
Advertising	1,000	1,053	1,118	1,109	1,090
Station retail	2,142	2,933	3,197	3,54	3,723
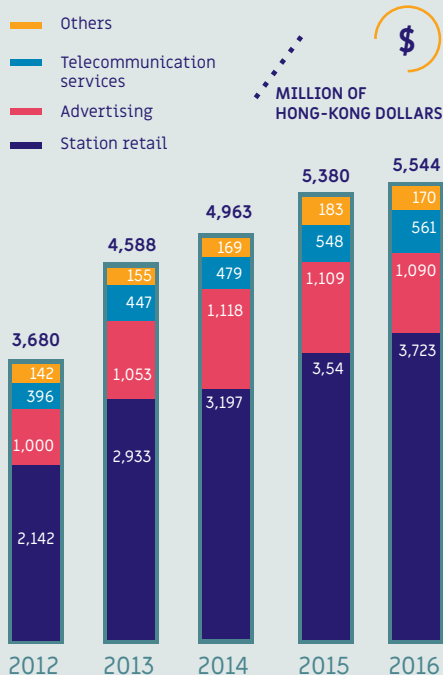
Advertising revenue generated in stations in Hong Kong
Source : MTR, 2016.

49. Information supplied by Gares & Connexions, 2018.
50. Media transports. *L'expansion du média : l'innovation digitale, quelle implantation ?* [online]: http://www.mediatransports.com/linnovation-digitale/quelle-implantation. Viewed 28 March 2018.
51. MTR Corporation, *Annual Report 2016* : Hong Kong Station Commercial Businesses.

Naming rights strategies

Another possibility for MTH projects is a "naming rights" strategy, whereby stations are named after companies who pay for the privilege.

This practice is becoming common in the sector of urban public transport. An arrangement is sealed with a public or private partnership to (re)name stations in exchange for a predefined annual fee. The naming rights over a certain time period are priced depending on the stations' location and traffic.

Naming rights: examples

In 2008 Dubai's Roads & Transport Authority (RTA) launched the "Dubai Metro Naming Rights Project" to attribute names to 23 of the 47 stations of the two metro lines (excluding landmarks and historic stations). Sponsors were picked through an open tendering process that took place before the lines were opened (respectively in 2009 and 2011). In the first phase of the project, 11 companies were selected among 120 bidders to sign ten-year agreements worth 409 million euros altogether.

In 2009 New York's Metropolitan Transportation Authority (MTA) sold naming rights to Barclays for a twenty-year period. In exchange for 200,000 dollars per year (150,000 euros) the bank saw its name attached to Atlantic Avenue station in Brooklyn, around the corner from the Barclays Center (a sports arena). The MTA decided in July 2013 to extend the scheme to all its facilities, provided the sponsors satisfy certain criteria (historical or geographical ties between their names and the stations).

In Madrid, the company managing the city's underground in 2013 signed a three-year, 3-million-euro deal with Vodafone, a telecommunications operator, to rename Sol central station (65,000 passengers per day) and line number 2 (122,000 passengers per day). The contract is expected to increase the transport operator's annual advertising revenue by 10%[52].

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52. From CODATU – Cooperation for urban mobility in the developing world (2014), *Who Pays What for Urban Transport? Handbook of Good Practices.*.

4. Defining contract models for business offers

The business models of major interchange hubs involve various partners – both institutional and business partners. This requires laying down principles for governance and coordination between stakeholders, and determining the allocation of costs and profits generated by the partnerships.

Contracts for opening shops follow a specific logic in interchange hubs. For instance, France's railway operator SNCF employs three different models[53].

> Classic lease model: a long-term (30 to 40 years) lease contract between the SNCF and a retail developer. The developer alone manages the leases of shops and services[54] and bears all the risks. The SNCF collects a rent from the developer. The amount, defined in the lease, is set and does not depend on turnover.

> Special Purpose Vehicle - SPV: an ad hoc entity associating the SNCF and a private developer. The SPV runs the retail areas and the risks are shared between the two partners in proportion to their participation. Commercial revenue is divided according to the rules laid down in the partnership contract, usually a percentage of sales revenue.

> Public tender process: the SNCF uses a competitive bidding process to manage shop and services contracts through five- or ten-year temporary concessions. Candidates pay a rent that depends on proximity with passenger flows plus a fixed percentage of sales per square metre.

Other formats can be considered. One practice becoming common in major metropolitan stations is to retain a commercial developer to finance and manage renovation work for multimodal transport hubs. In this model, the contractor operates business activities in the MTH in return for contributing (in part or in full) to investment expenses. The public partner receives interests or concession fees, depending on the agreement. The business tenants rent out the space, pay their rent and carry out their business activities.

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53. Retail & Connexions. *Les gares, une nouvelle idée de commerce,* avril 2016.
54. In train stations considered public domain, contracts are not strictly speaking commercial leases but contracts of temporary occupation.

GOOD PRACTICE

22

Financing the development of transportation through land value capture, the historical case of Japan

Historically, Japanese railway companies leveraged their land holdings to finance their development. When railways were nationalised in 1906[55], Japan's central government prevented fare hikes on the part of railway operators, still private companies. Most of them operated networks of lengths varying from a few dozens to a few hundred kilometres. They ensured their financial survival by building shops and housing near train stations on the substantial land reserves they owned. In 1920, this value-capture strategy was extended to the inside of train stations with the opening of the first department store in Hankyu Osaka-Umeda station.

Urbanisation thus advanced in large part thanks to these companies, which took over the overall design of the new neighbourhoods and pre-financed public transport infrastructures. They recouped their investments (and more) by selling urbanised land.

In 1987, the national railway company, Japanese National Railways (JNR), was privatised and divided along geographical lines into six Japan Railways (JR) companies in charge of passenger traffic. The newly formed companies tried to follow the same value capture model, but lacking land holdings near railway facilities, they heavily developed retail activities within train stations.

The share of revenue from retail activities – independent from transport activities – was between 5% and 42% in 2006, depending on the companies[56]. In comparison, the figure for property and retail activities was a mere 2 to 8% in other Asian countries and on other continents[57]. Keio, the private railway operator for Tokyo's suburbs uses an even more integrated system for in-station retail, which represents more than 30% of its revenue[58].

The Japanese state does not benefit from the windfall of value added on existing buildings as a results of such operations, but neither does it contribute much to the financing of new projects. So railway companies themselves finance a large part of investments in train stations, using revenue from their business activities.

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55. Doumas E. *Diversification des activités et privatisation des entreprises de chemin de fer : enseignements des exemples japonais.* Sciences de l'Homme et Société. École des Ponts Paris Tech, 2008.

56. From JR Companies, *Annual report 2006.*

57. Doumas E. & Oki K. *Activités de diversification des entreprises de chemin de fer : une convergence vers la gare*, 2006.

58. Keio Corporation, Fact Book 2012 [online] available on: **https://www.keio.co.jp/english/%20pdf/factbook2012.pdf**. Retrieved 25 May 2018.

GOOD
PRACTICE
23

Developing retail areas to finance the renovation of central stations, the case of Saint-Lazare in Paris

The Saint-Lazare project.
© Architectes J.-M. Duthilleul, F. Bonnefille, E. Tricaud SNCF - AREP.

Gare Saint-Lazare is a major interchange hub in Paris, with trains, suburban trains (RER), six underground lines and 20 bus lines transporting 450,000 passengers a day.

Before it was renovated, commuters followed a near-horizontal path between two points: the metro and cross platform were accessed through the shopping arcade. As a result, space wasn't occupied evenly and the main concourse was relatively isolated.

The train station was completely overhauled between 1996 and 2012[59].

The purpose of the project was twofold: to carry out a spatial reorganisation to facilitate the circulation of passengers, especially connecting passengers, and to create a new retail area tightly woven into the station. Today the total retail area covers more than 10,000 sq.m., with convenience stores as well as high-street brands.

The operation was undertaken through a public-private partnership (PPP) with retail developer Klépierre investing 160 million euros (65%) and the SNCF 90 million euros (35%).

In return, Klépierre was granted a 40-year temporary occupation authorisation to run the retail areas, and pays the SNCF part of the resulting revenue. Another commitment of the concession holder is to contribute to maintenance costs and to invest in the renewal of equipments after 10 and 20 years.

59. From the study by Dang Vu H. & Jeaneau H. *Concevoir un espace de transit et de consommation*, and information supplied by Gares & Connexions.

2. Land Value Capture: Tools to Finance Interchange Hubs

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The diagram below illustrates the partnership.
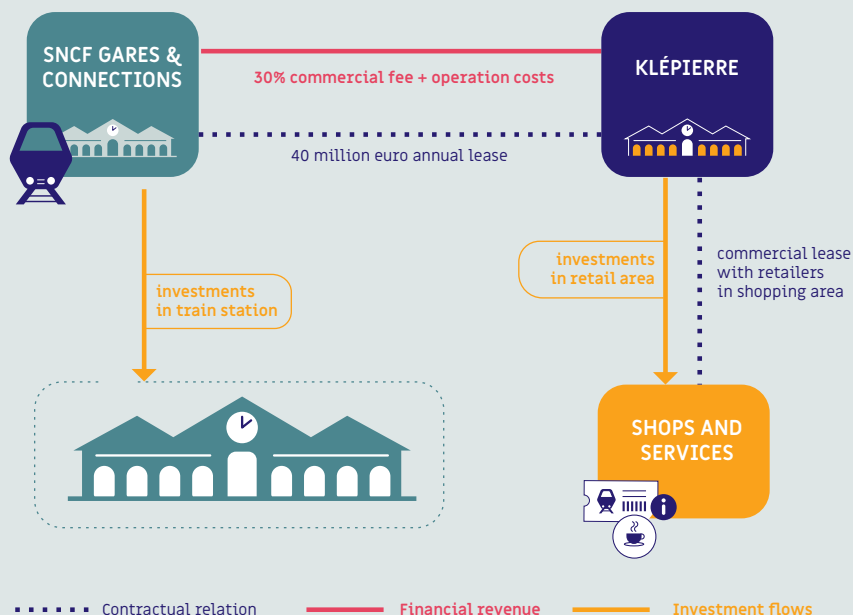
Financial diagram of the PPP set up at Gare Saint-Lazare
Source : AREP, 2018 (adaptation).

The business strategy

The bulk of the renovation work at Saint-Lazare train station consisted in redirecting flows around a central axis. The flows have been reorganised along a vertical transportation line. The axis intersects with three horizontal planes, which define the three main shopping areas. The line organising traffic cuts through the planes but is not superimposed on it, therefore the retail areas are clearly differentiated from the transfer areas.

Organised in such way, the concourse and shopping arcade form a whole that resembles a shopping centre on several levels: a very dense retail area and an uninterrupted line of shops with at each end larger outlets to draw consumers in.

2. Land Value Capture: Tools to Finance Interchange Hubs

GOOD PRACTICE 23

The diagram below illustrates the partnership.

BEFORE

Train

Train station

Shops

City

Metro

AFTER

Natural light

Train

Train station & Shops

Train station & Shops

Shops & métro

City

Carpark
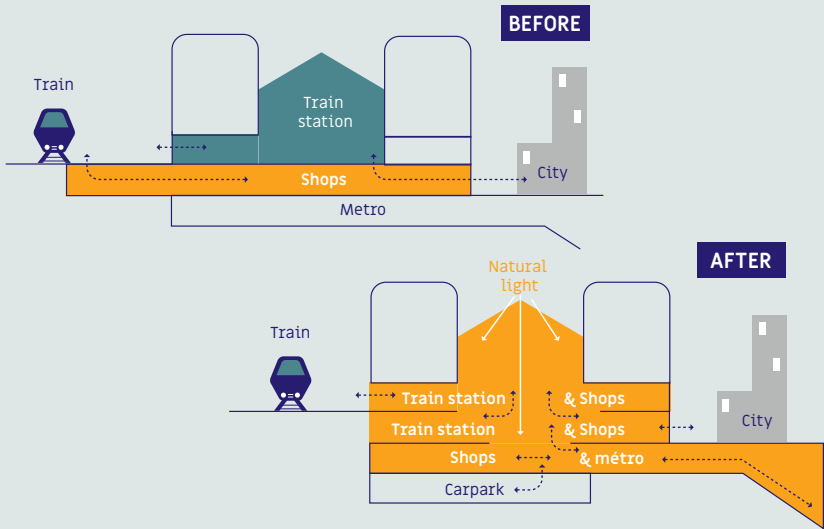
Renovation of Gare Saint Lazare

Source : SNCF (adaptation)

The complex thus blends into its environment, which happens to be one of Europe's densest retail areas. The neighbourhood itself being a shopping destination with major department stores, the whole point for the commercial developer is to attract a share of the consumers visiting it.

Positive results

The revenue generated by the train station's business activities is more than enough to cover operating costs, making Saint-Lazare one of the very few profitable stations in France. The portion recovered by the SNCF helps to finance operating costs for other railway stations in France.

During their first 12 months, the 80 shops and food outlets in Saint-Lazare's retail area reported an average turnover of 14,500 euros per sq.m., an exceptional performance that inspired new projects.

What made the project so successful was its location (a very high-value neighbourhood in Paris) and the flow of potential consumers (450,000 people pass through on a daily basis, and through a limited space). Another factor of success was the organisational alliance between shopping-centre management specialists and train station management specialists, which ensured complementarity between both types of know-how.

2. Land Value Capture: Tools to Finance Interchange Hubs

GOOD PRACTICE

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Developing retail areas to finance the renovation of central stations, the case of Prague

Prague train station's Fanta building.
© 2019 The Prague Vitruvius.

Prague's central station, located at the heart of the city, is connected to the metro and street-car and bus lines. Its two buildings, the historic so-called Fanta building and another, more recent one, are separated by a main road. The train station is one of Prague's main interchange hubs, with more than 80,000 people passing through it daily to take the underground, a regional train or intercity train[60].

In 2000, the owner of the site, Ceské Dráhy (CD), made it a priority to renovate the station, which was in poor condition and required costly maintenance. CD decided to chose a private investor that would finance and manage renovation work, then draw profit from business operations inside the hub.

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60. From PwC's study for Fabrique de la Cité « Les mécanismes de financement des gares : comparaison internationale ».

GOOD PRACTICE **24**

The renovation concept

The refurbishment plan maintained the original division between the two train station buildings in terms of functions, decided according to passenger flows: travel services (ticket sales, toilets) and most businesses are on the recent building's main level, which is busiest, food outlets in the Fanta building and on the mezzanine floor of the more recent building and offices in the Fanta building.

MTH operations

Ceské Dráhy issued a call for tenders in 2002. The main selection criteria were the business plan and the fee for operating the train station businesses. A 30-year contract was signed in 2004 with Grandi Stazioni SpA (GS, part of Italy's state railway group). The deal covered three train stations (Prague's central station as well as Marianske Lazne and Karlovy Vary stations); it also included investment commitments and timelines for the renovation of the station.

The commercial strategy

The recent building (a total surface of 30,000 sq.m.) was entirely open to the public and a 10,000 sq.m. gross leasable area was put up for subletting. The business concept, according to a market study carried out in 2005-2006, combined types of business activities (restaurants, retail, services) and quality thereof (tailored to the purchasing power of potential customers).

Positive results and controversies

When the refurbished commercial area of the recent building was inaugurated in 2010, 17 new retail units were opened. The vacancy rate went down from 20% to 12% of the gross leasable area. En 2012, Grandi Stazioni brought the shop vacancy rate down to 5% and monitored its commercial tenants' results to replace the least profitable shops.

But four years later, having repeatedly failed to meet the deadline for reconstruction of the Fanta building, Grandi Stazioni lost its 30-year lease[61]. The Czech railway infrastructure administration rejected the company's request for a two-year extension and asked it to leave the premises. The developer sought a compensation for the cancellation of its concession contract, demanding 765 million crowns to cover the amount already spent modernising the station building. The Czech administration granted it 565 million crowns.

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61. Information translated from Sprava Zeleznicni Dopravni Cesty.

2. Land Value Capture: Tools to Finance Interchange Hubs

Rennes interchange hub – Wayfinding marking (June 2019)
© SNCF Gares & Connexions - AREP / Photographer : Mathieu Lee Vigneau.

KEY POINTS

To open services and shops in interchange hubs, a whole range of conditions need to be met, in particular passenger traffic, customer profiles, availability of space, ties to existing shopping centres and coordination between managing companies.

The offer must be adapted to users, which implies that their needs and expectations need to be identified. Implementation can be done by simply dividing spaces or completely reorganising the service offering. In any case, the public space must be organised so as to not hinder transport flows.

There are several different possible formats for partnerships with the private sector, with each party's commitments clearly laid down. The hub management company plays an active role in increasing the value of the interchange hub as long as it remains under its stewardship and not just during the commercialisation stage.

3. CONTRACTUAL ARRANGEMENTS, GETTING THE PRIVATE SECTOR ON BOARD

The development of a transport hub, by nature, belongs to the public realm. Such projects are often initiated, and entirely funded, by cities through public project contracting. But some large-scale interchange hubs, often including railways, require massive investments and their renovation is technically complex. Some cities simply cannot afford to carry out such projects, or haven't got the technical expertise.

In this context, it is in the interest of public authorities to request the private sector's technical expertise and financial means in the early stages of the project – i.e. at the design stage. Public-private partnerships are also beneficial for the private sector, as they offer opportunities to use its competence and get a return on investment from shops and real estate programmes in these major interchange hubs.

Involving the private sector is a way to accelerate investment and share risks. Experience has shown that the success of such partnerships is determined by appropriate legal frameworks and supervision capacities. But the private sector is still not mobilised much in certain projects with high potential for commercial development and financial profitability.

3. Contractual arrangements, getting the private sector on board

1. Contracts: possible arrangements

Various contractual arrangements are possible, as detailed in the table below.

SET-UP	DESCRIPTION	CONDITIONS	CONSTRUCTION	FINANCING	OPERATION	BUSINESS RISKS
Public project ownership	The public sector bears the entire cost of the investment	The public sector has the financial and technical capacity to carry out the project	● PUBLIC	● PUBLIC	● PUBLIC	● PUBLIC
Operating agreement	The public sector carries out the initial investments and pays the private sector (via fares collected from users)	The public sector has the financial capacity to build/renovate the MTH. Site management is contracted out to a partner who has the technical capacity to run the MTH.	● PUBLIC	● PUBLIC	● PRIVATE	● PUBLIC
Works concession	The private sector pays for the initial investments; the private operator derives income from commercial revenue: user fares, tolls paid by trains, commercial leases, etc.	The MTH must have a high potential for commercial development, dependent on passenger traffic and the existing commercial environment	● PRIVATE	● PRIVATE	● PRIVATE	● SHARED
Service concession	The public sector pays for the initial investments; the private operator derives income from commercial revenue: user fares, tolls paid by trains, commercial leases, etc.	The public sector has the financial capacity to build/renovate the MTH. Site management is contracted out to a partner who has the technical capacity to run the MTH and is willing to take a business risk.	● PUBLIC	● PUBLIC	● PRIVATE	● SHARED
Works concession with shared investments and revenue (leasing)	Shared investments; the private operator derives income from user fares and pays a rent to the public owner	Site management is contracted out to a partner who has the technical capacity to run the MTH and is willing to take a business risk.	● PRIVATE	● SHARED	● PRIVATE	● PRIVATE
Joint development	Shared investments and risks; concession of the property (with or without a lease) to the private partner, the parties derive revenue from user fees	The MTH must have a high potential for commercial development, dependent on passenger traffic and the existing commercial environment Land availability must be low in the city to make involvement in the development of an MTH an attractive option for a private developer (as opposed to developing another site).	● SHARED	● SHARED	● SHARED	● SHARED

● **PUBLIC**   ● **PRIVATE**   ● **SHARED**

2. Financing through public-private partnerships

The purpose of a public-private partnership (PPP) is to involve the private sector in the initial investment and/or the operation of the project by handing over responsibility for part of the tasks, including financing, and sharing part of the risks. The whole scheme must be profitable enough – with some funding by the public sector if necessary – for the private partner to invest.

One of the most common forms of PPP is the BOT system, for build, operate, transfer. With this type of scheme, the concession holder receives the right to operate the interchange hub until it has recouped its investment, usually a 20- or 30-year time frame. The concession holder draws revenue either from the public sector or in the form of rent from spaces inside the hub (see **GOOD PRACTICE no. 22** about Gare Saint-Lazare).

PPPs help public authorities spread spending over longer time periods and resort less to borrowing. As some risks are shared with the private sector, the system can reassure lenders, especially international donor agencies, and facilitate loans.

3. Financing with mixed-investment companies

Real estate developments carried out by mixed-investment companies, also called joint development, are often associated with TOD approaches (see **PART 2.2**). Joint development here is defined as cooperation between a public authority and the private sector, on a limited urban perimeter, to finance transport infrastructure. It is a way to capture land value from publicly owned parcels of land in the immediate vicinity of stations (abandoned lots, former warehouses or maintenance buildings, etc.). For the private sector, it is an opportunity to contribute funds and know-how to projects – while sharing risks.

The authority in charge formalises an arrangement with a developer. The contract specifies the rules for recovering the added value created by the presence of transport infrastructure (including the MTH). The public authority has the choice of selling its land to the developer or retaining ownership and collecting an occupancy fee. Then the revenue generated by the operation is allocated to financing of new transport projects, such as interchange hubs . From the private partner's perspective, the operation is an opportunity to develop an area of mixed urban activities (housing, shops, leisure) on land whose attractiveness increases with the accessibility offered by the MTH.

62. From *Who Pays What for Urban Transport? Handbook of Good Practices*, CODATU, 2014.

But this type of financing is viable only in specific cases, namely for sites with high development potential, itself determined by traffic and the existing commercial environment, as well as the limited availability of land in the city[63].

The limits of real estate development

If the only buildable surface available to the MTH developer is the area above the hub itself (and its immediate vicinity), then the potential contribution of joint development projects is necessarily limited.

The sites that justify erecting buildings directly over MTHs are the exception rather than the norm, because of the very high construction costs, according to study by PwC[64]. Such sites would include congested downtown areas in Asian metropolises or high-value sites like Manhattan.

Such projects carried out in less dense areas seem less likely to succeed.

64. PwC (2013), *op. cit.*

4. Finding alternative sources of funding

MTH projects are increasingly eligible to alternative funding as they contribute to reducing negative externalities. Because interchange hubs are inclusive and play a key role in limiting carbon monoxide emissions, financing can be obtained from dedicated funds.

Several features of MTHs are eligible to specific funding: renewable energy and electric mobility facilities can be financed with "green bonds"; social and community services for safety, gender equality, access to health, etc. with social bonds; operators can apply for funding from funds dedicated to transport or low-carbon transport. Some local citizens' initiatives (separate waste collection for example) may use crowdfunding to give the project a strong local base.

Such opportunities are often overlooked, whereas there is in fact a shortage of investment projects with respect to the money available through these funds.

63. PwC (2013) « Quels mécanismes de financement pour les gares urbaines ? », study by PwC for la Fabrique de la Cité : *Les mécanismes de financement des gares : comparaison internationale*, 13 mars 2013, Paris.

3. Contractual arrangements, getting the private sector on board

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PRACTICE**

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Using land rent to integrate urban development and transportation planning, the example of Hong Kong

Hong Kong is renowned for its public transport network, which is not only one of the most efficient in the world, but also among the rare to be self-financed. What makes its reliable railway service possible is the "Rail + Property" model.

Hong Kong's government created the Mass Transit Railway Corporation (MTR) in 1975. It holds a majority share in the company, but does not give it subsidies to manage the network. Instead, it has granted it exclusive rights regarding land leases, with terms of 50 to 70 years, and related development rights for areas above stations and adjacent parcels of land. Lease prices are based on the value of lands before any railway infrastructure is developed.

MTR subdivides the larger plots of land rented out by the central government into small plots of land that are handed over to private developers through a competitive bidding process. Prices reflect the increase in land value that can be attributed to station proximity. MTR derives revenue from real estate developments carried out in partnership with other real estate developers.

With this system, the company makes substantial profit selling and renting housing or commercial real estate. More than half of MTR's income comes from the added value thus generated, plus various real estate activities. When a developer is selected to launch a project, MTR supervises the design, engineering and construction of the works, and often retains managed of the property.

What ensures that the initial vision is respected is MTR's continued involvement in the planning of the real estate developments, the execution of the works and the management of the properties.

MTR is in effect one of Hong Kong's largest real estate companies, with more than 104,000 residential units, 13 shopping centres and five office buildings under management[65]. All stakeholders have benefited from the integration of urban development and transport planning: public authorities, developers, MTR passengers, tenants and customers of the developments linked to MTR stations.

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65. From *MTR Corporation Annual Report 2016 : Hong Kong Station Commercial Businesses*.

3. Contractual arrangements, getting the private sector on board

KEY POINTS

There are many examples of interchange hubs that were financed with sources other than public funds. Rarely does a single solution suffice to finance a hub, but the mechanisms described in this chapter can help reduce the need for public funding.

The case studies described show that the development of real estate projects works only under very specific conditions, in dense cities and around high-traffic hubs.

Involving the private sector provides powerful leverage but it requires that the public authority have a stable strategic vision, clearly assign roles and set up precise contractual arrangements which will ensure that private partners fulfil their obligations over the long term.
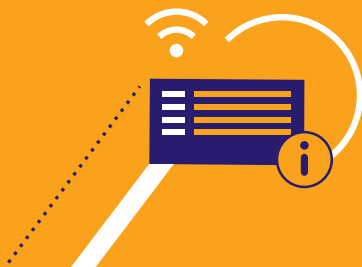
Colorful Bus driver Peshavar, Pakistan. 80x60 cm.

PART 3

DIGITAL TOOLS FOR MTH'S

1. PASSENGER SERVICES

2. DATA MANAGEMENT

3. A DIGITAL CULTURE

1. PASSENGER SERVICES
AND HUB MANAGEMENT

1. Passenger services and hub management

1. Providing services for users

Travellers are more and more demanding, and interchange hubs are no longer viewed just as places to pass through, but as places where to enjoy various services. One way to improve the travel experience is to offer services and tools that make users' daily lives easier, or ease their waiting time. Some of these tools and services are tied in with new digital solutions:

> **travel information:** interactive terminals provide real-time transport schedules, a map of the interchange hub, information about the city and rapidly available, customised services;

> **Wi-Fi:** free wireless access allows users to keep on working, learning or entertaining themselves, thus making their time in the hub a productive or enjoyable moment;

> **charging points:** users can stay connected by charging their mobile devices at free, accessible charging stations;

> **digital interactive "playing walls"** set up in some train stations allow travellers to download music, read an e-book for play games by scanning QR codes on the wall.

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Using digital tools to improve the mobility of disabled persons in interchange hubs

Tested in France's SNCF train stations under the name Beacon, there exist devices with beacons that transmit information to mobile devices. The technology aims to support wayfinding for visually impaired travellers. They download the dedicated application and thus receive real-time information about their position in the station. Information about schedules and departure platforms can be provided on demand.

2. Improving operation and maintenance

Digital technology offers powerful tools for MTH operators to improve operation and maintenance. One such tool is a Building Management System (BMS), a computer-based system installed in large buildings – such as interchange hubs – that lets the technical manager monitor the building's technical systems. The system collects three different types of data:

> alerts: breakdowns, unusual shutdowns, or signals crossing predefined thresholds;

> conditions: to monitor technical equipment such as heating plants, power generators or solar panels;

> measurements: temperatures, operating time, number of breakdowns over a certain time period, etc.

The main advantage of building management systems is that they can be configured to suit the management company's needs and help it optimise technical monitoring to avoid breakdowns. The general principle is straightforward: a control post connected to a network of concentrators connected to several automats, each connected to the equipment that needs monitoring.

The technical systems most commonly monitored in such way are the power supply (electrical boards, backup power supplies), lighting, lifts and escalators, heating, ventilation and air conditioning (HVAC), the plumbing network (pumps in particular), CCTV and various fire safety devices.

Another advantage for MTHs is that a BMS can help improve the building's energy performance, when configured to regulate heating and cooling, ventilation and air conditioning, and lighting, shutters and other electric devices based on the number of people present.

In the context of interchange hub maintenance, a QR code can be used for users to notify a malfunction in a specific place or on a specific piece of equipment. The information is passed on to technical teams. Digital tools thus serve to connect travellers and maintenance personnel.

1. Passenger services and hub management

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Managing train station works with digital tools

Bulldozair is a web and mobile application. It provides a platform through which to collect visual data on the ground to facilitate communication between teams carrying out and supervising renovation and maintenance work in France's 3,000 train stations.

Its features are intended to make workflows simpler and smoother for SNCF agents:

> features to add photographs, notes or sketches taken during site visits, either directly on the plans or through geolocation;

> tools to assign tasks to co-workers or contractors;

> traceability of all events or changes arising during renovation works.

3. Improving flow management in MTHs with open-source mapping

Wi-Fi deployment, combined with GSM data, can help interchange hub managers fine-tune their modelling of human flows. With clear mapping, they can pinpoint areas with the heaviest flows, bottlenecks and waiting areas, and identify under-utilised spaces and other malfunctions. Based on an analysis of the data thus collected, site managers can better adapt spaces to passenger and user flows, and better position services and shops inside the hub.

In the case of a new project, measuring flows is one way of confirming working hypotheses and verifying that new equipment is used properly and does not create congestion (for example a queue in the middle of a traffic node). Also, a common misconception is the idea that the most profitable shops and services should be located in areas of heavy traffic. On the contrary, it is preferable to position them next to areas with relatively long passenger waiting times, which can easily be identified using Wi-Fi tracks.

2. DATA MANAGEMENT
IN MOBILITY PROJECTS

With the digital transformation, information can now be shared direct-ly, horizontally and collaboratively instead of being circulated exclu-sively in a top-down fashion. In this context, MTHs can potentially be-come clearing houses for information, which in turn will promote data sharing among various partners and improve the overall functioning of hubs. But how is data to be shared: openly, commercially or is it to be protected[66]?

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66. By law, data collected by public transport and mobility companies in France is open (since August 2015).

1. Opening access to data

Opening data consists in making data available on a digital platform, under an open licence. Data collected by mobility actors usually concerns the behaviour, needs and expectations of individuals using transport hubs. The data can be used in various ways, including to create value, by third parties (start-ups, transport operators or local authorities), who are thus able to provide applications and services to improve service and networks in the hub.

A whole range of skills, in the fields of operational research, geomarketing, design, user-friendliness and of course analytical processing, is required to carry out such projects. To be developed, digital tools need the relevant actors to be involved, either under tight governance, or else united in a project approach.

All projects and studies financed by the Agence française de développement now include a clause providing for the open-source sharing of transport and mobility data. For instance, terms for the mapping project of Abijan's transport network in Côte d'Ivoire specify that all the data collected by the consultants involved in the project is to be made available.

Considerations for open data

Identifying and classifying the data that will be shared

From a very broad mobility perspective, a very large amount of data can potentially be shared, and it will vary greatly in terms of characteristics, legal status and value (identified, realised, perceived). What is important here is therefore to classify the different types of data and attribute priorities for opening.

Deciding on conditions

Local authorities are sometimes worried that data collected about users and user habits might be reused in ways that would contravene their urban transport and development policies. When sharing their data, they could draw up a charter defining the conditions under which the available data may be used.

Interoperability

For data to be used, it needs to be made available in a standard format to guarantee data interoperability between the different partners and transport operators of MTHs, i.e. make sure that the data can be read by the different digital systems.

Initial investments

An open data strategy requires a number of investments: the computer structure (servers, deployment), labour costs, and training for the staff to be able to update the data and manage the network of users over the long term.

2. Managing legal and financial issues related to data sharing

Data sharing poses increasingly complex problems and is strictly regulated (one example is the European Union's General Data Protection Regulation or GDPR). An essential aspect is the anonymisation of data: high standards are indispensable in this respect, as are provisions for the "right to be forgotten" and to combat tracking. Also useful are measures to anticipate regulatory changes. It is therefore necessary to encrypt data securely and to request specialised legal advice when giving access to new data.

Regarding data uses, the key issue is to determine whether the producer of the data is able to make the most of its potential. It may be tempting to "close" data in order to gain a business advantage, but for this strategy to pay off, the owner of the data must be capable to analyse it and create commercial services that will add value to it.

In the case of interchange hubs, data is usually more valuable when it is open. Data regarding flows, uses, etc. is useful for many secondary actors (shops, transport operators, etc.) and facilitates partnerships. Furthermore, MTH operators rarely have competition so it is not in their interest to invest heavily in data analysis to retain a competitive advantage.

3. Setting up and leading an ecosystem of applications and services

Given the low cost of developing digital services, MTH operators can rapidly offer more services and thus increase traffic. But it is important to carefully plan the development of these services, and to coordinate between providers to avoid overloading the services. A well-known example is that of vehicle-sharing systems, bikes or e-scooters. They truly complement urban transport, but when expanding fast, create parking or docking problems in cities and particularly near interchange hubs, which are major urban transport nodes.

To maintain a balance, it is necessary to set up and moderate an ecosystem of applications and services. Not all applications useful for hub operations and available for users are created by the operator; geolocation, transport applications, coupons for shops, etc. form a whole system – which may be driven, led or coordinated by the hub operator.

1. Associating developers of new applications

To open data and lead an application eco-system, it is necessary to open interfaces to developers: application programming interfaces (API) for real-time data, or access to digital infrastructures such as beacons or BMS systems to add sensors.

For instance, the SNCF Gares & Connexions' Open Beacon programme lets developers use train station beacons for their own applications (geopush, indoor navigation, wayfinding, etc.). The BMS system in Lyon's Part-Dieu train station will enable maintenance companies to add wireless sensors to directly connect to their third-party applications.

2. Supplying updated MTH maps

A basic expectation of interchange hub users and partners is a map of the entire place, including indoor spaces. Not only is a map useful to access the hub from the city and for wayfinding inside, it is also a way of locating shops and services. Many applications, both for customers or operators, rely on mapping.

Maps must be updated and easily accessible, not just for humans but also for applications (API). Updates will take into account changes (renovation works, closing, etc.) in real time. Some items, such as the availability of equipments, can be dynamic.

Updates may be provided by sources other than the hub operator: third-party systems like geolocation systems, shop websites, transport operators' APIs, etc. may also supply information relevant to mapping.

3. Involving third parties: crowdsourcing

With crowdsourcing, users are mobilised to supply and update data, meaning information circulation is no longer exclusively "top-down".

A first form of crowdsourcing is spontaneous, without action on the part of hub operators. The most common example is OpenStreetMap, but other formats exist, like wireless network mapping (Stumbler), real-time transport schedules (Moovit), reporting of maintenance works, citizens' initiatives (guerilla gardening permits…), on-line petitions, etc. In this case, it is up to the hub operator – specifically, the department in charge of data – to collect data from these free resources.

A second type of crowdsourcing is managed or encouraged by hub operators, in the form of satisfaction surveys or QR codes (or other means) to signal malfunctions. In both cases, the logic is similar: it is not just a matter of imparting information to users; users are surveyed and thereby take an active part in the creation of information.

Another way of enriching applications and services can be to hold so-called "hackathon" events or workshops focused on specific problems, with participants figuring out solutions in a collaborative manner. The Gare partagée and Datacity programmes (**GOOD PRACTICES no. 28** et **no. 29**), for instance resulted in several new private digital services in train stations, without the hub operators directly creating or sponsoring them.

GOOD PRACTICE

28

Detecting and supporting: the SNCF's "Gare partagée" (shared station) initiative

In 2016 the SNCF's department for Ile-de-France train stations launched "Gare partagée" ("shared train station"), a programme to detect and support individuals or groups wanting to open new services in train stations. The projects – for juice bars, collaborative service zone, new digital services... – are selected to make train stations lively places, where cities and mobility intersect.

The programme also includes an annual event. Project holders who are selected during the three-day challenge benefit from a programme to boost their project.

The "Gare partagée" community is united around two principles: synergies and collaborative work. The community belongs to all its active members, who keep it going, and various events strengthen synergies between project holders selected during the annual challenges.

2. Data management in mobility projects

GOOD PRACTICE 29

Innovating, Paris' DataCity programme

The DataCity Paris innovation programme was created in 2015 by the city of Paris and NUMA, an innovation consultancy. Its purpose is to address environmental, social and economic issues using technologies to optimise and use urban data. It does so by creating multi-disciplinary teams comprising municipal employees, large corporate partners and innovative startups.

In this way, innovative solutions can be developed and experimented, and ideally, deployed on a larger scale if proven successful. Similar programmes exist in Berlin and Barcelona.

A DataCity challenge is first and foremost a problem for which a solution has not been found yet, but for which a solution can be prototyped through the collaborative work of a big company and a startup.

3. A DIGITAL CULTURE
IN MTH WORK TEAMS

Increasing MTH quality by leveraging digital tools can be done only if managers and teams incorporate digital tools into their work habits. Digital transformation has a significant impact on the culture of transport operators, on management practices and communication both between teams and individuals.

1. Drawing up a roadmap for digital transition

While designing large-scale multimodal transport hubs, digital models can facilitate maintenance and operating processes in the long run, by providing an instant snapshot of the hub.

When considering whether or not to create a digital model, the (usually high) initial investment must be weighed in the light of its long-term advantages. A BMS may be installed for hub maintenance without resorting to a digital model beforehand[67]. With the digital transition comes a shift from a simple "consult" logic to a "request" logic which offers a solution tailored to the problem. This type of management is both technical and social, and therefore requires training and pedagogy, for if the technology is not well understood by the work teams, they will not use it optimally – or not use them at all. Therefore it is important to define problems associated with digital transition well ahead of time, and manage change appropriately.

A crucial tool is a smooth roadmap. It is helpful to conduct workshops with field workers to jointly define needs. The purpose is twofold:

> make sure that the new technology resolves problems indeed identified by teams in the field, because theoretical case studies alone are not sufficient;

> enable the teams to take ownership of the solutions and to devise new work and management methods.

At the implementation stage, a transition period will facilitate the gradual adoption of digital tools, so that they are used appropriately, and the gradual shift away from old management habits (physical visits, stock management, etc.). Physical and digital processes can be combined when they are complementary.

What is also required for a digital transition is to plan new functions such as model and software updating. Whether the updating work is done internally or contracted out, the individuals or companies doing it must be identified in the roadmap, and the responsibilities and estimated budgets specified as well.

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67. See 1.2. Improving operations and maintenance, page 134.

GOOD
PRACTICE
30

Deploying a digital transformation strategy: the SNCF's "Digital for all" policy

The SNCF's "Digital for all" programme was launched in 2016 to deploy a digital transformation across all its businesses[68]. All workers now have mobile devices and job-specific applications to be informed and reactive in their work, no matter where they are. Collaborative work is encouraged, and supported by the company's social network, as are tools that facilitate remote collaboration. For instance, the railway group has launched a digitisation project for business processes and set up digital collaborative tools. A solution called DSMAT (French acronym for structured documentation for equipment maintenance) has been used since April 2017 at SNCF maintenance centres: to verify the conformity of trains, technicians enter the data in an application on their tablets and can check procedures and write reports. This makes operations smoother, easier to trace, and faster[69].

68. From SNCF, "Digital pour tous". Retrieved 9 July 2018.
69. Based on SNCF "DSMAT, quand la maintenance matérielle passe au digital" [online] available at: **https://www.digital.sncf.com/actualites/dsmat-ou-quand-lamaintenance-materielle-passe-au-digital**. Retrieved 9 July 2018

2. Deploying digital tools in developing cities

In cities in the developing world, mobility issues, combined with an exponentially increasing smartphone ownership rate, influence travel habits and interchange hub planning. The digital revolution could boost "urban productivity" without additional heavy investments[70]: ride-sharing facilitated by dedicated applications, higher numbers of passengers in public transport with tailored digital mobility solutions, on-demand transport services optimised with specialised platforms, etc.

70. ADP Villes en développement n° 98 , février 2015 : « Les villes du Sud à l'heure du numérique ».

3. A digital culture in MTH work teams

Digital technologies open up a whole range of new services. But many questions arise regarding the nature of current evolutions, how to support them and what consequences they will have for MTH: who are the key actors and what kind of partnerships with "traditional" operators should be considered, what regulation and data protection systems should public authorities set up?

While reflecting on the above questions, let us not forget that the digital transformation and "smart" hubs cannot be reduced to information and communication technology. Technological innovation cannot exist without social and contractual innovation. In this perspective, it would be beneficial for developing cities to invest in training citizens and users for them to take ownership of innovate projects and ensure they fit the local context.

GOOD PRACTICE

31

Improving information in stations

Augmented travel information at Gare Saint-Lazare in Paris

In Gare Saint-Lazare, travel information boards of a new kind have been set up. They display departure times for the next two trains for each destination. The areas where access points are located are identified with colour codes, as trains for a same destination do not necessarily always depart from the same area. Lastly, to encourage intermodality, the main connections at the destination train station are also displayed.

Photo taken Gare Saint Lazare at 5.51 p.m.
© AFD

3. A digital culture in MTH work teams

GOOD PRACTICE **31**

Travel information sign in Sao Paulo metro.
© Arnaud Dauphin

Monitoring occupancy rates of train carriages in Sao Paulo

On line 4 of Sao Paulo's underground train, users are informed of the occupancy rate of carriages via software that monitors total passenger weight, and generates the information which is then displayed in real time on screens located on the platforms.

The information is materialised as a drawing of the vehicle and a colour code: green when the occupancy rate is low, yellow when it is medium and red when it is high. To help passengers locate the emptier carriages, their doors are identified with colours and numbers.

3. A digital culture in MTH work teams

KEY POINTS

Multimodal transport hubs are no longer just places to pass through – nowadays travellers expect high levels of service and comfort. A digital approach will not only fulfil these expectations, it will also improve management and maintenance of MTHs.

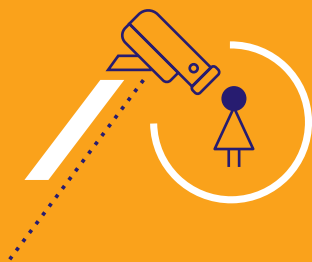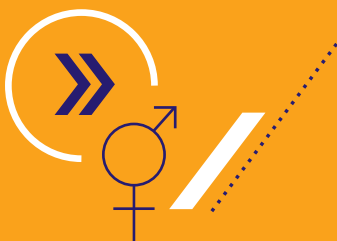Bus boarding in the sun, Addis Ababa, Ethiopia. 80x60 cm.

PART 4

INCLUSION AND GENDER EQUALITY: MTH'S FOR ALL

**1. TAKING INTO ACCOUNT
SAFETY ISSUES**

**2. ACTING IN FAVOUR
OF GENDER INCLUSION**

**3. GIVING EQUITABLE ACCESS
TO EMPLOYMENT AND INCOME**

Women's transport patterns are more complex and varied than men's. In particular in developing countries, where domestic workers still represent a significant share of the workforce, women tend to make shorter trips, both in terms of duration and distance, and tend to combine trips more. Their specific needs must be taken into account when designing interchange hubs. An obvious way to achieve this is to increase women's participation in decisions that affect them directly or indirectly.

To improve the place of women in the transport sector, but also in society at large, several issues must be considered when designing and building interchange hubs:

> **Safety:** a key issue to ensure women are mobile

> **Accessibility:** a transport hub fully accessible to women

> **Employment and income:** transport as a means to ensure women's economic independence

Signage of women-only carraiges.
© Arnaud Dauphin.

1. TAKING INTO ACCOUNT SAFETY ISSUES

1. Taking into account safety issues

1. Understanding safety and harassment issues

Violence – and the fear thereof – is part and parcel of women's day-to-day life both in developed and developing countries. Transport infrastructures are one of the main places where they feel unsafe and risk being harassed or physically abused.

This constrains their right to mobility: out of fear of violence, they alter their behaviour and habits, reducing their own capacity to travel and participate in educational, social and economic activities[71]. The fact that transport hubs are high-traffic areas creates opportunities to raise awareness about gender-based violence among passengers, and to change the norms and attitudes that perpetuate it. But to develop solutions, the first step is to better understand how women experience physical violence in hubs, transport areas and urban areas.

	VERBAL ABUSE	PHYSICAL ABUSE	SAFETY AT NIGHT
Mexico City			
New Delhi			
Bogota			
Lima			
Jakarta			
Buenos Aires			
Paris			
Kuala Lumpur			
New York			
London			
Beijing			
Bangkok			
Moscou			
Manila			
Seoul			
Tokyo			

+ Dangerous   – Dangerous
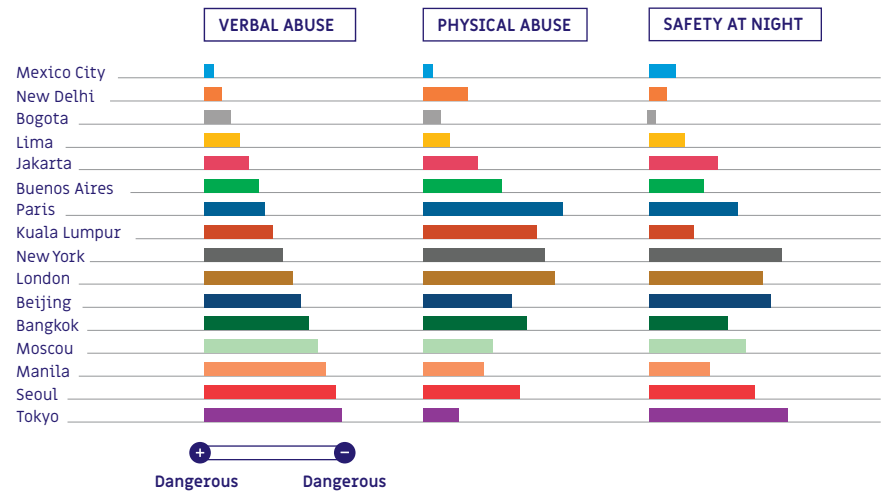
The world's most unsafe transportation systems for women
Source: Thomson Reuters Foundation (adaptation).

71. UN Women, 2014.

1. Taking into account safety issues

Developing safety audits in public areas in and around interchange hubs,
the examples of Canada and Delhi

Carrying out a women's safety audit, Belo Horizonte, Brazil, 2019.
© Letícia Rizério.

In Canada, in the wake of a series of sexual assaults and murders carried out against women in Toronto in the 1980s, local community groups and academics put pressure on the city and local police to improve women's safety.

In response, the city created the Metropolitan Toronto action committee on violence against women and children (METRAC) in 1984. Then in 1989 METRAC developed a women's safety audit process. It involved bringing together women and girls, often with a representative from the city or the police, to walk through public spaces in their neighbourhood to identify unsafe areas. Recommendations based on the results are then addressed to local authorities[72].

This participatory tool for assessing women's safety is currently being used in many communities across the world.

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72. Ville de Montréal (1993). *Guide d'enquête sur la sécurité des femmes en ville.*

1. Taking into account safety issues

GOOD PRACTICE 32

In India, safety audits were carried out by a company called SafetiPin to assess last-mile connectivity around metro stations along the Yellow Line of the Dehli Metro Rail Corporation. Areas within a radius of 500 m around metro stations were assessed, and 1,495 safety audits were carried out with the dedicated applications "My SafetiPin" and "SafetipinNite".

The audits evaluated the level of safety in the evening hours between 5 pm and 10 pm for the 17 metro stations, and identified ways to improve it. The safety scores around each station were indicated on a map, a the graph showed the average rating of the nine parameters. The parameters with the lowest ratings were visibility, number of people, safety and gender diversity[73].

**PROXIMITY
TO PUBLIC TRANSPORT**

LIGHTING

VISIBILITY

NUMBER OF PEOPLE

GENDER DIVERSITY

PEDESTRIAN ACCESS

**PUBLIC SAFETY
(eg. police station)**
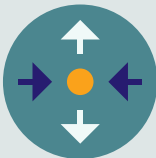
**OPENNESS
(entrances and exits)**

**PERSONAL
PERCEPTION**

Parameters analysed around Delhi metro stations

73. Shah S., Viswanath K., Vyas S. & Gadepalli S. (2017). *Women and Transport in Indian Cities.*

1. Taking into account safety issues

2. Coordinating actions against gender-based violence

For interchange hub projects to incorporate prevention of and action against gender-based violence, governments and civil society organisations must partner to lay the foundations for a clear legal, social, cultural and technical evaluation of the situation. Only then can creative, efficient solutions be developed.

Measures meant to make interchange hubs gender-sensitive need to go hand in hand with broader policies covering the entire transport system as well as the city's public areas:

> mobility planning needs to incorporate a gender-based approach so that women's safety is taken into account in urban planning and transport;

> violence against women in all its forms must be recognised legally, with uniform national and legal legislations. Unfortunately, few countries criminalise sexual harassment in public places: a World Bank study[74] revealed that only 18 out of 100 countries surveyed had passed laws in that respect;

> it is useful to hold training sessions for key actors in charge of gender-sensitive urban design projects (government agencies and agents, technical experts, community members…).

Region	Law on sexual harassment in employment	Law on sexual harassment in education	Law on sexual harassment in public spaces
OECD High income	94	53	9
South Asia	63	50	25
Latin America & Caribbean	66	38	6
Europe & Central Asia	74	26	4
East Asia & Pacific	67	22	6
Sub-Saharan Africa	61	17	12
Middle East & North Africa	21	11	21
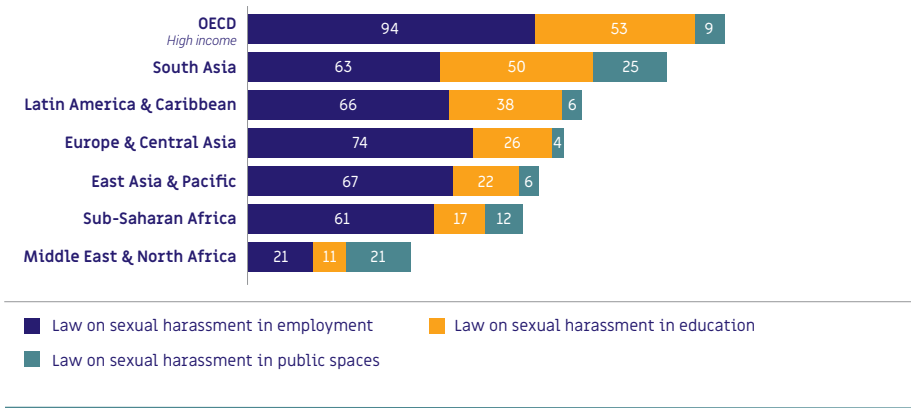
Laws on sexual harassment, in percentage of countries within a region
Source: World Bank, 2016.

74. World Bank (2015). *Women, Business and the Law 2016: Getting to Equal*. Washington, DC: World Bank.

3. Creating a safe and fully accessible interchange hub

Women's travel profiles differ from men's, both in interchange hubs and in cities in general. Their movements tend not to follow binary workplace-home patterns; instead they form loops that include all the activities related to domestic tasks – still traditionally allocated to women in many developing and emerging countries: grocery shopping, accompanying children or the elderly, dealing with administrative procedures. In addition, women's movements are sometimes hampered by specific items of clothing such as dresses, skirts, high heels or saris. These gender differences were not taken into consideration in the apparent neutrality of cities and transport infrastructures, traditionally designed to answer the needs of all.

1. Making safe routes

When designing multimodal interchange hubs, simple adjustments can significantly improve accessibility for women (cf. **PART 1.2, ABOUT URBAN FIT page 44**) :

> paying close attention to routes between hubs and nearby traffic-generating centres such as schools, hospitals or other places women travel to;

> creating wide, raised sidewalks, shielded from traffic and easily accessible for carts and strollers;

> designing lively streets, with street-level shops and services: street vendors double as "eyes on the street" – in other words, an informal neighbourhood watch system.

2. Improving infrastructures to reduce and prevent violence

The spatial perceptions of men and women are different. Women value the safety and quality of their environment more . Their perceptions depend on the time of day, the way space is used, the local culture and the group they belong to. A first step is to identify the factors that make them feel unsafe in and around hubs; they are usually related to spatial design, management and use, but also to user profiles. Workshops with representative panels of female users can be organised to help improve the design of hubs from a safety perspective. The architectural design of the hubs and nearby public spaces should be in line with principles such as those established in Montreal's study guide on women's safety in cities : "To see and be seen, to hear and be heard, to be able to escape and find help, to know where you are and where you are going."

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75. World Bank (2015). *Violence Against Women and Girls (VAWG) Resource Guide.*

The risk of attack is higher in covered areas or corners with little visibility, and at disused stops.

Therefore, to improve women's safety, routes must avoid narrow paths with few exits, place with very people passing through (carparks, parks...), covered spaces that are not watched and old, unfinished buildings or buildings in disrepair.

3. Taking into account neighbourhood practices

An important factor in safety perceptions is the way space is used, especially in the evening. Liveliness and human presence are usually good safety indicators. But it is worth paying attention to the profile of users and to main uses in a neighbourhood where an interchange hub is planned:

> office districts tend to be deserted in the evening, and empty streets discourage women from passing through;

> an area with lots of bars is very busy at night, but the presence of large numbers of people who have potentially been drinking will increase fear of attacks;

> a neighbourhood where drug pushers or users are active, or that is gang territory will obviously discourage female mobility, but also scare off all other types of travellers.

GOOD PRACTICE

33 ## Designing stations with women's safety concerns in mind, the case of Vienna

In Vienna, Austria, 58% of public transport users are female. Their needs and safety were taken into consideration in the city's mobility plan.

Among the measures implemented in the underground railway system are stations and waiting areas designed to ensure good visibility of the surroundings and user-friendliness of route information and of the overall system. Bus and tramway stops were specially chosen, with sufficient lighting. "Positive social control" is enforced through shops in underground stations and connected carriages that allow bystanders intervene in case of attack. Also contributing to women's feeling of safety are mobile brigades and CCTV[77].

77. Urban Development Vienna (2013). *Manual for Gender Mainstreaming in Urban Planning and Urban Development.*

1. Taking into account safety issues

When architectural design generates public spaces that are active, free and well lit, it is a factor of inclusion. Measures taken in the context of transport must reaffirm the legitimate right of women to be present in public spaces.

4. Doing regular maintenance

The upkeep of areas, public lighting, signage and the overall cleanliness of places improve comfort and signal safety. It helps foster safety feelings for women and other users.

4. Offering sufficient levels of service and comfort to guarantee the attractiveness of interchange hubs for all

MTH users vary in their sensitivity to discomfort, and men and women differ in their perception of comfort: female passengers value physical and psychological comfort more than their male counterparts. According to a study of public transport passengers conducted by the Ile-de-France transport authority (Île-de-France Mobilités, formerly STIF)[78], 70% of women, but only 56% of men, rate "fear of overcrowding" as the most important factor influencing the feeling of comfort. Female travellers are more likely to fear crowds, dirtiness and incidents[79].

Perceptions of comfort can be improved through simple measures, which can be adapted to local contexts. For example:

> locker systems, with a wide range of tariffs, and which can be reserved and paid for online or via mobile applications. Luggage lockers open 24 hours can help increase feelings of safety in transport hubs;

> a quiet, family-friendly area for parents to sit down and take care of their babies or small children. Why not imagine private cabins for breastfeeding mothers, or automated vending machines for diapers, wet wipes or baby food.

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78. STIF (2014). *Étude de la perception du confort et de l'image des modes dans les transports collectifs en Ile-de-France.*
79. *Ibid.*

2. ACTING IN FAVOUR OF GENDER INCLUSION

2. Acting in favour of gender inclusion

1. Understanding women's travel habits and safety perceptions

Very little data is available concerning the forms and severity of violence perpetrated against women on public transport (including in transport hubs) and concerning variations according to the time of day. There also is a lack of information about ways of reporting and denouncing violence experienced in transport infrastructures.

Collecting data broken down by gender can inform strategies to adopt to create gender-inclusive interchange hubs and transport systems. Mobile phones and other technologies can help collect data about safety perceptions and the different ways men and women use transport. Women in Cities International has developed several such tools and conducted such surveys in various cities, including Rosario (Argentina), Dar es Salaam (Tanzania), Petrozavodsk (Russia), and Delhi (India)[80]. The questionnaire that was used can be adapted and transposed for interchange hubs.

A possible complementary action is to hold meetings with women and led by women. When women work together with hub and city managers, the impact is real, and positive changes are observed.

But women are not necessarily in decision-making position on projects. That is why it is necessary to make every effort to empower women and women's organisations for them to affirm their expertise regarding transport hubs and work together with local actors.

2. Reporting harassment in MTHs

Violence against women on public transport is high because it happens during a trip, making it more difficult to report. Transport hubs can be designed to facilitate reporting or to handle complaints. Several methods are possible:

> creating an area inside the hub in which to receive victims and file complaints, in coordination with transport operators and police;

> creating mixed-gender or exclusively female teams among security staff. Thus women are certain to be listened to, and surveillance is more effective than with a CCTV system.
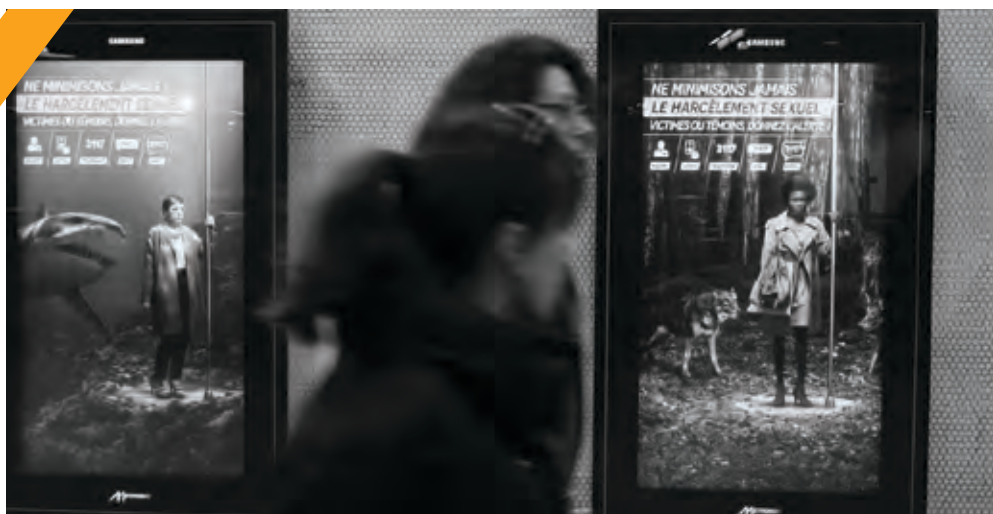
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80. Women in Cities International (2011). *Learning from Women to Create Gender Inclusive Cities: Baseline Findings from the Gender Inclusive Cities Programme.*

2. Acting in favour of gender inclusion

GOOD PRACTICE

34

Spreading information to fight harassment, the examples of Rio de Janeiro and Paris

First posters of a campaign against harassment on public transport in the Ile-de-France region.
Source : *Le Parisien. La lutte contre le harcèlement s'affiche dans les gares francilienne.* 5 mars 2018.

Some initiatives focus on the use of existing infrastructure to create safer environments for women. .

In Rio de Janeiro, kiosks set up in stations of the metropolitan train and the cable car provide information about gender-based based violence and support services. In approximately three minutes, women can find phone numbers and location details for support services[81].

In Paris, the public transport operator RATP has committed to raising awareness among passengers. Specifically, the purpose is to remind victims or witnesses that solutions are at hand to report sexual harassment: contacting a security agent directly, using an emergency phone box, and calling or texting a dedicated number.

The alert is then passed on to the RATP's security post, where agents have access to CCTV cameras. As soon as the incident is located, the nearest security team is sent over[82].

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81. World Bank (2013). Brazil - *Enhancing Public Management for Service Delivery in Rio de Janeiro Project.*
82. RATP (2018). *Harcèlement sexuel dans les transports : les moyens d'alerte à votre disposition.*

2. Acting in favour of gender inclusion

Encouraging female users to file complaints in MTHs: the cases of Quito, Vienna and Paris

The city of Quito (Ecuador), with the support of the UN Women Safe Cities Program, in 2015 installed kiosks in its busiest public transport stations[83]. In the kiosk, women can choose to report violence to trained staff and to file a complaint. In addition, drivers for the Quito transport system have been trained to help victims and provide information on how and where to report incidents of violence against women.

In Vienna, Austria, transport authorities systematically work together with local police. Their collaboration has resulted in inter-institution plans to improve user safety on public transport. Vienna's public transport operator and the police meet on a regular basis to exchange information, coordinate action plans and strengthen safety measures, especially those targeting women[84].

In Paris, concrete measures have been taken to address sexual harassment, starting with a solid human presence: 5,300 RATP agents are physically present in stations and at stops; they can directly alert the 1,000-strong Group for protection and safety on the public transport network[85]. Since 2015, the RATP has set up a specific module, as part of the initial training programme for all employees in contact with passengers, to assist victims of harassment. In addition, 5,000 emergency phone boxes are available across the transport network.

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83. Taylor, A. (2011). *Women and the City: Examining the Gender Impact of Violence and Urbanization.*

84. Urban Development Vienna (2013). *Manual for Gender Mainstreaming in Urban Planning and Urban Development.*

85. RATP (2018). *Harcèlement sexuel dans les transports : les moyens d'alerte à votre disposition.*

3. Raising awareness to change habits

Leveraging the heavy passenger traffic of interchange hubs to circulate information about support services for victims and to encourage people to change their behaviour – in the sense of dissuading potential perpetrators – is a method that deserves to be more widely known[86].

Training sessions and awareness-raising campaigns should be directed at staff from both the interchange hub and the transport companies. A code of conduct can be drawn up for employees of the transport system even while it is still under construction.

4. Using digital tools

Digital tools can also help make public spaces safer and more comfortable for women. Mobile applications against sexual harassment are one way to address this need, as evidenced by their success. Recording and mapping data offers public decision-makers solid resources to assist them when structuring their actions. Yet the potential of digital tools for supporting women is still under-utilised.

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86. Agence française de développement (2016). *Boîte à outils genre : transport et mobilité.*

2. Acting in favour of gender inclusion

Fighting harassment on public transport, Mexico.

Source: UN Women (2017). *Diagnóstico sobre la Violencia contra las Mujeres y las Niñas en el Transporte Público de la Ciudad de México : Programa Global Ciudades y Espacios Públicos Seguros para Mujeres y Niñas.*

3. GIVING EQUITABLE ACCESS TO EMPLOYMENT AND INCOME

1. Reducing inequality in access to employment in the transport sector

A gender gap still persists in terms of access to employment and to physical and financial resources. Women are often constrained to smaller commutes, it also means they have access to fewer employment opportunities – with inevitable consequences on their wage rates and related labour market outcomes[87]. In this context, an interchange hub project can drive social change if it offers better mobility and promotes women's inclusion in a new job market. The transport sector offers many employment opportunities but, traditionally, few are open to women[88]. According to the International Labor Organization, in European Union countries, just 21% of the labour force in transport services was female in 2006. In India in 2005, only 6.9% of women were employed in the sector[89].

87. Mehndiratta S. & Quiros T. (2014). *Are women 'forced' to work closer to home due to other responsibilities? Does this contribute to gender wage differentials?*

88. ILO (2013). *Women in the transport sector.*

89. Shah S., Viswanath K., Vyas S. & Gadepalli S. (2017). *Women and Transport in Indian Cities.*

3. Giving equitable access to employment and income

GOOD PRACTICE
36

Changing habits through a gender-oriented policy,
the example of Kochi, India

The government-owned company operating Kochi's metro, Kochi Metro Rail Limited (KMRL), decided to promote female employment in its operating and maintenance activities by employing women in its infrastructure management services. KMRL wanted to be the first metro company in the world to have balanced recruitment of men and women across departments; it turned to a women-empowerment organisation for janitorial duties, ticketing, customer relations and gardening in the metro stations, as well as other activities.

Out of the 1,500 positions opened, 682 are occupied by women[90]. KMRL also hired 23 transgenders as part of its ticket-selling and janitorial teams. The new recruits followed training sessions for customer service and confidence building. It is the first time in India that a government-owned transport company develops such a policy in favour of transgenders, who have trouble fitting into the traditional labour market. The purpose of the initiative is to fight prejudice by getting people to interact daily with transgenders.

However, KLMR's policy hit a major stumbling block: its transgender employees had a hard time sticking to their jobs as they could not find accommodation and faced discrimination. Some of them were forced to leave their homes after their real identities were made public through media reports and KMRL publicity[91]. Kochi's initiative can be improved upon to avoid such situations occurring again and to truly promote the inclusion of transgender women.

90. CODATU (2017). *The Kochi Metro Experience: A valuable contribution to the history of Indian metros.*

91. *Kochi Metro's transgender employees are quitting: Social stigma remains the overarching problem..*

2. Training women for the transport sector

In the developing world, few women are employed in the transport sector and some positions fall below the standard of decent work. One of the barriers to entry is access to vocational training, the cost of such programmes often being an obstacle for women with low financial resources.

Even when women possess the necessary qualifications, preconceived ideas about their abilities can limit their access to the sector[92] Additional barriers are harassment and intimidation from male co-workers.

An interchange hub project can diversify economic opportunities for women and help combat the stereotypes that constrain their career paths. The following measures can be considered:

> ensuring fair contracts, promoting female applications and reviewing selection criteria to detect possible excluding factors, or even established quotas for women;

> organising adapted work conditions, equitable salaries, and separate clean toilets for women;

> ensuring respect from co-workers and gratitude from the community;

> promoting vocational training for women, with possible hiring at the hub afterwards;

> organising awareness campaigns to attract women to transport jobs and fight prejudice in the sector;

> give commercial space to businesses created by women.

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92. Azad Foundation & University of Western Ontario (2014). *Opportunities and Constraints in Integrating Women as Employees in the Public Transport Sector in Delhi.* New Delhi. *s.*

3. Giving equitable access to employment and income

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Integrating women in the planning of small businesses at stations, the case of Dhaka, Bangladesh

The Bus Rapid Transit (BRT) project for Greater Dhaka in Bangladesh aims to improve the public transport network of Dhaka North City Corporation and Gazipur City Corporation. After gender analysis, the project was designed so as to take into account women's limited access to safe, reliable transportation.

In an area where a majority of passengers are female commuters working in the garment industry, an action plan for equality was drawn up. Its main objectives are[93]:

Allocate vendor areas near BRT stations to female street vendors;

Employ female staff in BRT construction and maintenance;

Garment workers (a majority of whom are women) receive subsidised monthly travel passes;

Ensure women's participation in the improvement of local markets and feeder roads for non-motorised transport.

Greater Dhaka BRT Project Gender Action Plan

93. ADB (2012), *Bangladesh: Greater Dhaka Sustainable Urban Transport Project 2012.*

KEY POINTS

Gender-related differences and inequality must be taken into account specifically when designing interchange hubs. Generally speaking, women have different travel habits from men and perceive comfort and safety differently.

It is therefore necessary to decide on hub architecture and set up measures to ensure good safety and mobility conditions for women. Women are not to be seen as passive victims but as key actors in the shift towards fairer cities. This can be achieved through awareness campaigns and improved access to employment for women.

APPENDICES

GLOSSARY, INITIALISMS AND ACRONYMS

AFD	French development agency (Agence française de développement)
BIM	Building Information Modeling - Modélisation des données du bâtiment
BOT	Build Operate Transfer
BRT	Bus Rapid Transit (bus line with dedicated lanes)
CEPAC	Certificados de Potential Adicional de Construçao (property bonds, Brazil)
CEREMA	French Centre for studies and expertise on risks, environment, mobility, and urban and country Planning (Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement, formerly CERTU)
CERTU	French Centre for Studies of Networks, Transport, Urban Planning and Public Works (Centre d'études sur les réseaux, les transports, l'urbanisme et les constructions publiques, now CEREMA)
CETE	French Centre for technical studies on infrastructure (Centre d'études techniques de l'équipement)
CETUD	Dakar executive council for urban transport (Conseil exécutif des transports urbains de Dakar, Senegal)
CODATU	Cooperation for Urban Mobility in the Developing World (Coopération pour le développement et l'amélioration des transports urbains et périurbains)
Commuter	Person who moves daily between home and workplace
Coworking space	Shared workspace
Crowdfunding	Practice of getting large numbers of people to contribute small amounts of money in order to finance a project
GDPR	EU General data protection regulation
Gentrification	Process by which a working-class area is changed by people from higher social classes moving in
Intermodality	Relates to a single trip made with more than one transport mode
Joint Development	Project developed jointly between a public authority and a private operator
KMRL	Kochi Metro Rail Limited (India)
LRT	Light Rapid Transit
MaaS	Mobility as a Service
MTH	Multimodal transport hub

MTR	Mass Transit Railway
Multimodal	Combining several modes of transport
Naming rights	Form of advertising whereby an entity purchases the right to name a facility
ONCF	National railway company of Morocco (Office national des chemins de fer)
OpenStreetMap	An online collaborative project to create a free editable map of the world
PDUIF	Urban master plan for Ile-de-France (Plan directeur d'urbanisme d'Île-de-France, France)
PRM	Person with reduced mobility
PPP	Public-private partnership
RATP	Paris transport operator (Régie autonome des transports parisiens, France)
RER	Regional express train (Réseau express régional, France)
SGP	Société du Grand Paris (France)
SNCB	Belgian national railway company (Société nationale des chemins de fer belges)
SNCF	French national railway company (Société nationale des chemins de fer français)
SPV	Special Purpose Vehicle
STIB	Brussels Intercommunal Transport Company (Société des transports intercommunaux de Bruxelles)
STIF	Transport authority for France's Ile-de-France region (Syndicat des transports d'Île de France, now Île-de-France Mobilités)
STM	Sao Paulo State Secretariat for Metropolitan Transports (Brazil)
TA	Transport authority
TER	Regional express train (Train express régional, France)
TOD	Transit Oriented Developement (planning housing or commercial areas to encourage the use of public transport and ride sharing)
TRANSTU	Tunis transport company (Tunisia)
WMATA	Washington Metropolitan Area Transit Authority (USA)

BIBLIOGRAPHY

1. Interviews

AFD, interview with Aurélie Ghueldre, chef de projet de du Département collectivités locales et développement urbain, April 2018.

AFD, interview with Sylvaine Bernard-Srinivasan, chef de projet de la Division appui environnemental et social, March 2018.

Île-de-France Mobilités, interview with Michèle Chevrant-Breton, coordinatrice Grand Paris Express d'Île-de-France Mobilités, May 2018.

Gares & Connexions, interview with Sylvain Jamet, délégué aux affaires publiques et développement international - SNCF Gares & Connexions, April 2018.

Société du Grand Paris, interview with Benoît Labat, directeur de la valorisation et du patrimoine de la Société du Grand Paris, May 2018.

2. Bibliographical references

ADP villes en développement n° 98, février 2015 : « Les villes du Sud à l'heure du numérique. »

Agence d'urbanisme pour le développement de l'agglomération lyonnaise (2010). *Organisation des déplacements & pôles d'échange en région lyonnaise : état des lieux et réflexions.* Mobilité et transports, décembre 2010.

Agence française de développement (2016). *Boîte à outils genre : transport et mobilité. Paris, France.*

Association des maires de France (2013). *Orientation n° 5 et 6 de la charte « Construire ensemble la gare durable de demain et son quartier ».*

Alfonzo M. (2005). "To walk or not to walk". *Environment and behavior* 161(18), pp. 30.

Auge M. (1992). *Les non-lieux, introduction à une anthropologie de la surmodernité*, Paris, Seuil.

Azad Foundation & University of Western Ontario (2014). *Opportunities and Constraints in Integrating Women as Employees in the Public Transport Sector in Delhi.* New Delhi, 2014.

Bajard M. (1999). *Atlas des pôles d'échanges. Appréhender l'organisation spatiale des lieux de la mobilité*, Paris, AREP.

Capo C. & Chanut O. *La gare moderne, vers un espace de production de service global*. Économies et sociétés. Série EGS, Économie et gestion des services, ISMEA, 2015.

CEREMA (2017). *Les pôles d'échanges au service de l'intermodalité et de la ville durable*.

CERTU (2012). *Les typologies de gares : quels enjeux ? Quelles méthodes ?*, Coll. Stratégies foncières aux abords des gares TER, fiche n° 2.

CERTU (2005). *Le traitement du sol, vecteur de continuité urbaine*, Coll. Aménagement des pôles d'échanges, fiche n° 1.

CETE DE LYON (2014). *Gares du Grand Paris et accessibilité : éléments clés et enjeux*, version simplifiée, janvier 2014.

CODATU (2017). *L'intégration tarifaire et le système unique de billettique comme pilier fondamental pour le développement d'un système de transport public intégré*. Paris, mars 2017.

CODATU (2014). *Who Pays What for Urban Transport? Handbook of Good Practices.*

CODATU, World Bank, MedCities & MEEDDM (2008). *Urban Transport in the Mediterranean Region, Guidance and Recommendations.*

Dang Vu H. & Jeaneau H. « Concevoir un espace de transit et de consommation : la gestion de site dans les gares parisiennes ». *Espaces et sociétés* 2008/4 (n° 135), p. 45-62

Godard X. (2001). « Les débats et questionnements soulevés », In : *Association Villes et territoires méditerranéens* (VTM), Séminaire permanent régional « Pôles d'échanges – Mobilités et structuration des territoires », Marseille, Cahiers VTM, n° 1.

De Feraudy T., Saujot M. (2017). *Une ville plus contributive et durable : crowdsourcing urbain et participation citoyenne numérique*, Study n° 04/17, IDDRI, Paris, France.

Héran F. (2000). *Les effets externes négligés*. Paris, Documentation française.

Héran F. (1999). *Évaluation de l'effet des coupures urbaines sur les déplacements des piétons et des cyclistes*, Paris, ministère de l'Équipement, du Logement, des Transports et du Tourisme.

Île-de-France Mobilités (2015). *Livret technique : guide pour l'aménagement des pôles d'échanges d'Île-de-France.* Paris, avril 2015.

ILO (2013). *Women in the transport sector.* Transport policy brief.

Institute For Transportation And Development Policy (2018). *Pedestrians First, Tools For a Walkable City.* 1st ed. New York: ITDP.

Kaminagai Y., Sutmolar M., Joseph I., SNCF & RATP. *Villes en gares. Pôles d'échanges relais et ressources de la ville*. Colloque Maison de la RATP - 14 et 15 mai 1997, Paris : RATP, 1998.

Kumar A. & Agarwal O. P. (2014). *Labyrinthe Institutionnel : créer un cadre institutionnel propice à l'amélioration des services de transport urbain. Leçons tirées de l'expérience internationale*. Washington DC.

Margail F. (1996). *Les parcs relais, outils clés de politiques intermodales de déplacement,* thèse de doctorat, Paris, ENPC.

Mehndiratta, S., & Quiros T. (2014). *Are women 'forced' to work closer to home due to other responsibilities? Does this contribute to gender wage differentials? Safe, Clean, Affordable Transport for Development*. Washington, DC: World Bank. Retrieved 23 March 2018.

Meissonnier J. (2015). *Les transports quotidiens vus de l'intérieur : paroles d'acteurs, guide méthodologique à l'intention des chargés d'études « mobilités » souhaitant explorer les comportements de déplacement par une investigation qualitative.*

Price Water House Coopers (2013). *Quels mécanismes de financement pour les gares urbaines ?* Study by PwC for la Fabrique de la Cité « Les mécanismes de financement des gares : comparaison internationale » Paris, 13 mars 2013.

Retail & Connexions. *Les gares, une nouvelle idée de commerce.* Paris, avril 2016.

Richer C. (2008). « L'émergence de la notion de pôle d'échanges : entre interconnexion des réseaux et structuration des territoires », in *Les Cahiers scientifiques du transport*, n° 54.

Sander A. (1991). *Les points de réseaux transport : une bibliographie*. RATP, Unité Prospective.

Sahabana M., Mosnat A. (2002). *Bibliographie commentée sur l'intégration urbaine des pôles d'échanges*. Lyon, CERTU.

Smolka, M. O. (2013). *Implementing Value Capture in Latin America: Policies and Tools for Urban Development*. Lincoln Institute of Land Policy.

SNCF. *Digital pour tous.*

SNCF. *DSMAT, quand la maintenance matérielle passe au digital.*

Stathopoulos N. (1993). *Quand ville et transport se rencontrent*, RATP Savoir-faire, n° 8.

Stathopoulos N., Amar G. & Peny A. (1991). *Formes et fonctions des points de réseaux,* Régie autonome des transports parisiens, Paris : RATP.

STIF (2014). *Étude de la perception du confort et de l'image des modes dans les transports collectifs en Ile-de-France : pour une prise en compte dans les modélisations de trafic et l'évaluation socioéconomique.* Paris, France.

Stransky V. (2006). *Les espaces des pôles d'échanges : de multiples composantes et des conceptions variées.*

Thomson Reuters Foundation (2015). "Ranking the most dangerous transport systems for women in major cities", [online] available at: https://news.trust.org/spotlight/most-dangerous-transport-systems-for-women/ . Retrieved 13 April 2018.

Women In Cities International (2011). *Learning from Women to Create Gender Inclusive Cities: Baseline Findings from the Gender Inclusive Cities Programme*. Montréal.

World Bank (2015). *Violence against Women and Girls (VAWG) Resource Guide*. Transport Brief. Washington, D.C.

Mobility actors have now fully incorporated the concept of multimodal transport hubs (MTH) into their vocabulary. The notion refers to a building and an urban space, and translates into different realities, functions and practices on the ground. In cities of the Global South, interchange hubs can take the form of railway stations, underground stations, urban bus terminals or simple stops connected to other, sometimes informal, transport networks.

The AFD produced this guidance report based on its return on experience. Through different themes and good practice factsheets, it offers keys to help understand and design such hubs as structuring elements of urban transport networks.