

Railway Stations

Boosting the City



INTERNATIONAL UNION
OF RAILWAYS

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UIC next station
TEHRAN 2019

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Toledo metro station interior



FOREWORD BY UIC DIRECTOR GENERAL

FRANÇOIS DAVENNE



UIC nextstation usually gives the opportunity every two years to bring together all the actors involved in this complex object that a station is. This year, the theme is “Railway stations boosting the city”, that is to say that we will gather actors from all horizons to understand what stations bring to the urban life, taking into account all the possible angles.

Indeed, a station is the entry point to the backbone of the railways. It is now well understood, as transport and structural functions to the city, railway stations must be adapted to the new characteristics of the city, and because the city is changing, the station must follow the same model. Which means that if cities turn into smart cities, stations have to become smart stations. This is one of the main strategic axes which form the station sector activity.

We are living in an increasingly digital world, and what we will explore is the capacity of the stations of the future to play their role of smart interfaces. Stations should interface smoothly with the complex ecosystem of the local transports, whether they

are public or private, on one hand, and with the rail system, on the other hand, that ensure both regional and long-distance transport. We have here a huge technical challenge, in particular for dealing with big data management in order to offer the best services possible, but also privacy and a high level of cyber security.

Beyond those technical aspects, we have above all a common purpose. We all know that whatever will happen, urban mobility will increase, and there is a very simple reason for that: we will live increasingly in cities, not only in Europe or Asia, but also in Africa. If we want our cities to offer healthy, safe and sustainable public space we need to transform the stations of today into the smart connecting nodes of the polycentric cities of tomorrow.

From our collective thinking during the UIC nextstation event in Tehran in November 2019 will emerge concrete and shared solutions. Particularly the role of the station in generating the cities. Arak, in Iran, is a new city generated by the building of a railway station.

As a key stakeholder in advancing the railway sector, UIC has always sought to work with local authorities to promote sustainable mobility and improve commuting routes for passengers.

Thanks to a deep understanding of the power of collaboration and the role of rail infrastructure in urban mobility strategies, UIC is leading the way when it comes to boosting the city of the future: sustainable, smart and inclusive.

RAILWAY STATIONS: A CITY WITHIN A CITY

This booklet, “The Station Boosting the City”, delves into the station’s position as an integral part of a city’s growth and vice versa. It covers the different aspects that define the role of the station in an urban setting. Moreover, this booklet presents a road map to help stations boost their cities. Focusing on the connection between the station and the city, it covers the different approaches taken around the world to integrate stations into their urban area. Ranging from the heritage and architecture of station structures to the latest smart technologies used in station management, this booklet explores the different roles that railway stations can play within a city¹.

Railway stations play an important role for sustainability strategies within cities². They instigate the development of social, economic and environmental territory around their location. By reinforcing the transport network, stations bring communities together while promoting sustainable mobility. Nowadays, stations face the challenge of providing a pleasant passenger experience, top-notch safety measures and economic profit, while becoming an integrated entity within the community to ensure its growth and prosperity. As a result, their own development as efficient and sustainable centres will in turn influence the development of the city in which they are located and this is why the idea of a railway station as a city within a city is introduced.

1. <https://devanruiten.com/the-city-within-the-city>

2. http://news.bbc.co.uk/local/london/hi/people_and_places/news-id_9093000/9093688.stm



Aerial view of Leeds City centre with main train station



Charing Cross train station in London, United Kingdom

Sydney Central train station



The growth loop

Most people going in or out of a city centre will pass through a station. In 2017, over 1 million travellers arrived in London per day through the main railway stations³. The station is an active place where we can always expect some level of passenger movement; this has its advantages as well as its challenges. Moreover, its connectivity with multiple modes of transport makes it a point of access and a centre of attraction.

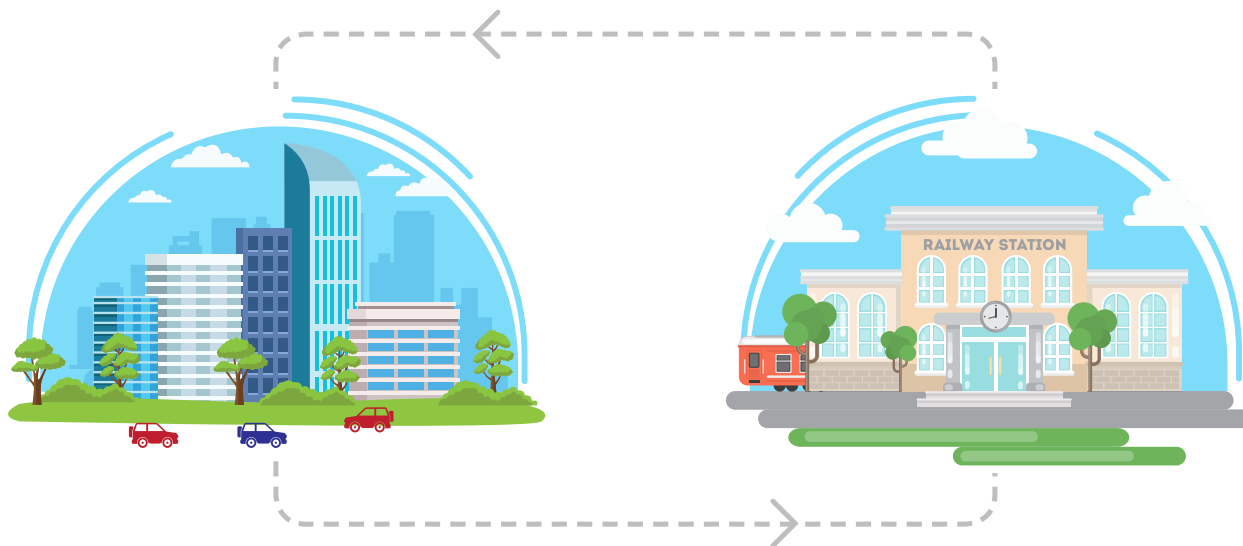
More than a simple gateway, the station assumes its position as an urban hub where residents and passengers alike spend time. As a mobility centre, the station is taking on a more prominent role in city development. It diffuses urban growth through its surroundings.

As cities face new challenges, it is important to ensure that mobility and urban planning goals are met to achieve economic, social and environmental sustainability. Consequently, a station has the potential to kickstart development in urban areas.

On the other hand, a sustainable, prosperous city will also prove beneficial for a station's growth and management. A prosperous city seeks to implement amenities around the station to meet the needs of the travellers and the people working there. City development benefits the station because planners incorporate the station and its surroundings into urban strategies; they reinforce its role as a mobility hub and a community place for people to meet and work.

By connecting the station to the city centre through the transport network, the city provides access to the facility. Furthermore, it promotes the construction of residential and commercial centres around it. This increases the number of passengers and locals using and visiting the station.

Ultimately, the concept of a reciprocal beneficial relationship between the station and the city is established through collaboration between the station management and the local authorities. In this case, the economic, social and environmental growth cycle is guaranteed to positively affect both the city and the station.



3. Chorus, P., & Bertolini, L. (2011). An application of the node-place model to explore the spatial development dynamics of station areas in Tokyo. *Journal of Transport and Land Use*, 4(1), 45-58.

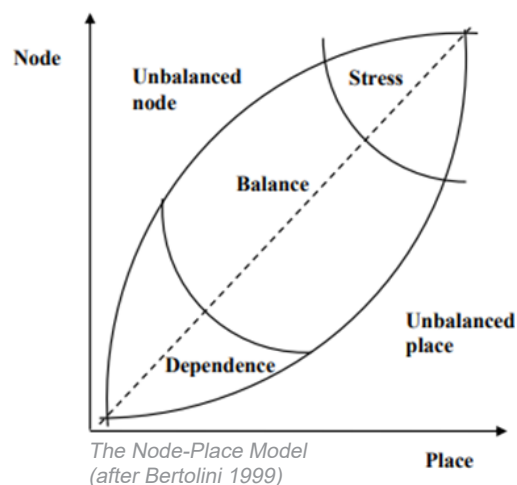
Peluffo, N. (24 July 2018). *Rail passenger numbers and crowding on weekdays in major cities in England and Wales: 2017*. Department for Transport.

URBAN DEVELOPMENT FRAMEWORKS

Node-place model

The node-place model was created to define the relationship between land-use policies and transportation centres, specifically railway stations

A railway station is considered a node as it is a connection of intramodality but at the same time, it is also a place from an urban planning point of view. The framework describes a balance between the place and the node; where the station's place value (real-estate value, urban development, etc.) is comparable to its node value (quality of transport activities and passengers flow). The balance is estimated by indicators: the node indicators are accessibility and intramodality, and the place indicators are demographic, mixed land-use functionalities, etc.⁴

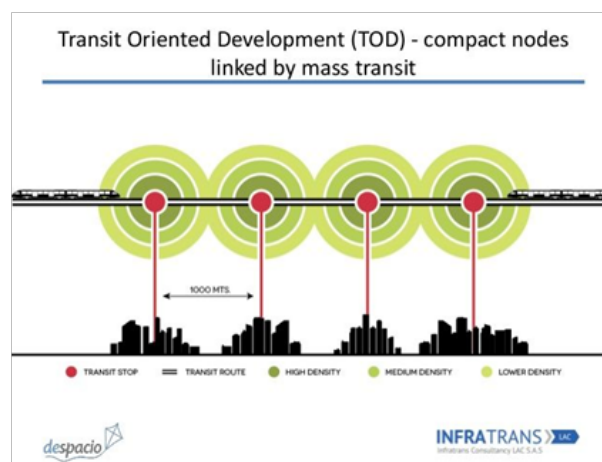


4. Chorus, P., & Bertolini, L. (2011). An application of the node-place model to explore the spatial development dynamics of station areas in Tokyo. *Journal of Transport and Land Use*, 4(1), 45-58.

A city around the station: Transit Oriented Development

Transit Oriented Development (TOD) refers to integrated planning that aims to connect people and public spaces through accessible walking and cycling, combined with efficient transport. However, the primary focus is on transport efficiency and accessibility. It seeks to provide inclusive access for all through a resilient, seamless and connected mobility network while keeping the impacts on the economy and the environment low.

Inclusive TOD is regarded as the key to achieving sustainability, social equity and economic growth.



Land-use planning

Land-use planning controls land-use purposes in order to generate more liveable and desirable cities. Land-use planning leads to the efficient use of resources. In urban planning, the regulations produce a more compact centre by increasing the density around mobility hubs. Land-use regulation is a concern for local and national government. There are five types of land use: transport, residential, recreational, commercial and agriculture⁵. Zoning laws must predict future development patterns to better adapt to the needs of citizens and should be used to prevent decentralised development and long commuting distances, or in other words, urban sprawl.



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5. www.oecd.org/gov/governance-of-land-use.htm

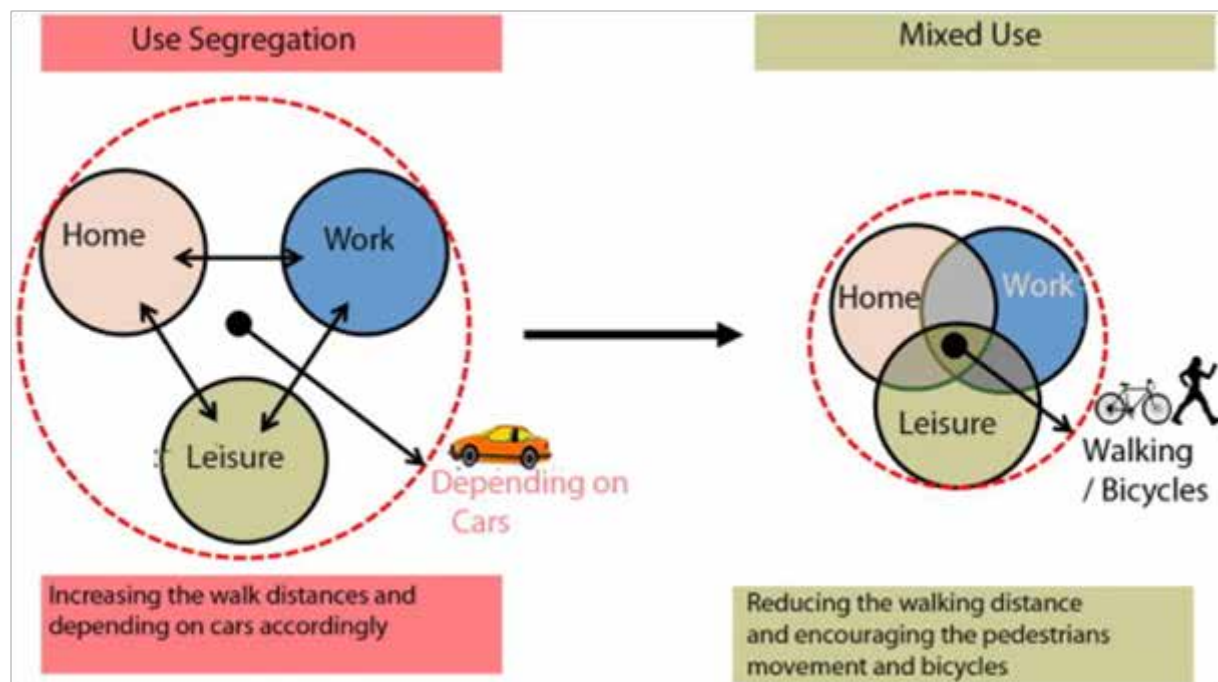
6. Lawlor, K., & Swan, S. (2014). Mainstreaming multiple benefits in subnational land-use planning: Sourcebook for REDD+ and sustainable landscapes.

Compact cities, integrated mobility: mixed land use

Mixed land use describes land-use planning that manages to create a balanced mix of land purposes. Mixed land use refers to the existence of housing areas, commercial centres, green and open spaces, and employment, all within the same lot.

This has numerous advantages as it increases accessibility, reduces the need for cars and promotes sustainable modes of transport. Moreover, the method leads to increased safety and security in cities as well as to economic growth⁷.

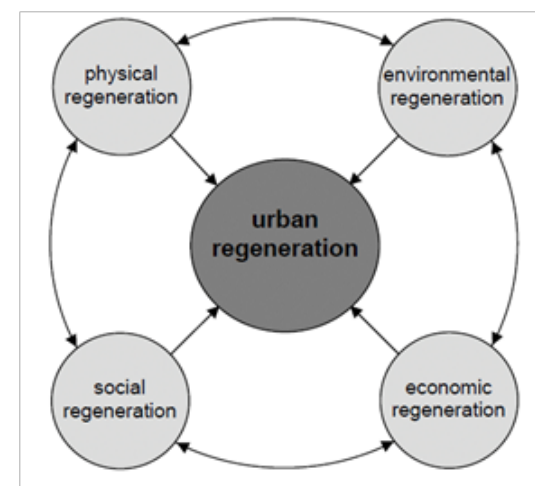
However, the scheme also puts pressure on these areas in terms of transportation management and freight regulations⁸.



Reviving the city: urban regeneration

Urban regeneration is a strategy for land redevelopment. It is implemented to combat urban deterioration and is also known as urban renewal. This strategy focuses on fixing afflicted parts of inner cities, for example, urban renewal addresses the issue of slums in order to develop better housing and businesses.

Urban regeneration schemes seek to bring economic, social and environmental development to inner-city areas that are plagued by unemployment, crime and isolation. The policies of urban regeneration are usually enforced by governmental bodies which entails a top-down approach to stimulate these districts. The plan usually faces numerous challenges: long duration, lack of funds, and the potential displacement of problems to other neighbouring districts¹⁰.



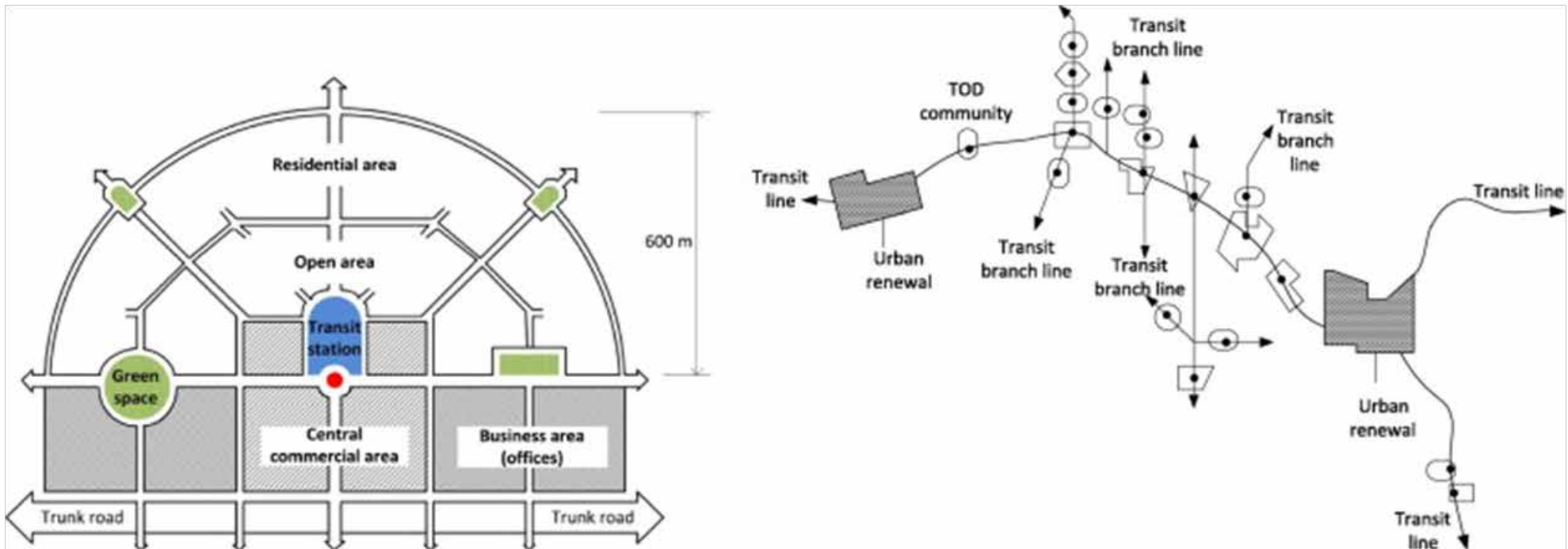
7. https://www.healthylives.org.au/site/mixed_land_use.php

8. www.plan4sustainabletravel.org/key_themes/mix_of_uses

9. Nabil, N. A., & Eldayem, G. E. A. (2015). Influence of mixed land-use on realizing the social capital. *HBRC Journal*, 11(2), 285-298.

10. <https://www.theguardian.com/society/2001/mar/19/regeneration.urbanregeneration1>

11. Lang, T., Sonntag, M., & Tenz, E. (2005). Small and medium-sized cities in the Baltic Sea Region: socio-economic and cultural approaches to urban development. Edition Kirchhof und Franke, Leipzig.





Strasbourg station

BOOSTING THE CITY 101

Cities are growing. The United Nations has posited the expansion of urban settlements. In fact, the population within cities is anticipated to grow from 55% in 2018 to 68% by 2050.

Thus, the implementation of sustainable urban strategies is a pressing matter. Urban growth is defined by economic, social and environmental development.

As the focus is shifting towards making cities attractive places to live and prosper, local authorities are competing to enhance liveability for residents and attractiveness for tourists and new businesses. Numerous urban strategies focus on rendering the city more compact, by supporting dense and mixed land use. This model offers a variety of activities and leads to economic growth.

By making urban areas more accessible and easier to navigate, it becomes easier to commute to jobs and start new businesses.

Building suitable infrastructure is also an efficient solution to develop mobility planning to sustain the needs of residents and passengers alike.

A participatory approach: working with stakeholders

A sustainable development strategy is very complex and requires the support of all stakeholders. Strong support from governmental institutions is needed to implement new policies that are on a par with new technologies and green infrastructure schemes. In order to boost a city, institutions should adopt sustainable strategies that also focus on the wellbeing



Hua Lamphong train station, Bangkok, Thailand

of its citizens. In addition, urban planners are reinventing public and green spaces as agents of urban rejuvenation. By focusing on mobility, heritage and urban planning, cities can prosper to accommodate state-of-the-art innovations and foster entrepreneurship which will create new jobs and stimulate the inner parts of the city.

However, it is also crucial to seek out citizens' engagement in the decision-making process. Participatory approaches lead to the involvement of all key stakeholders and wholesome collaboration means more rapid implementation of an integrated sustainable development strategy to achieve economic development and social equity.



Panoramic view of Singapore

Sustainability: a key city booster

One of the main goals of developing cities is to meet sustainability goals. Urban strategies incorporate the Sustainable Development Goals (SDGs) or the Global Goals into methods to boost urban development¹³.

A green city means less pollution, less congestion and more efficient use of its natural resources. By adopting green and blue infrastructure, the city will make its structure green and energy efficient. It will also develop green parks, which have been proven to improve the wellbeing of urban dwellers, reduce

13. https://www.dsd.gov.hk/Documents/SustainabilityReports/1415/en/managing_the_environment.html

the change of the character of neighbourhoods to suit affluent residents and business gentrification, and make the city more agreeable and attractive.

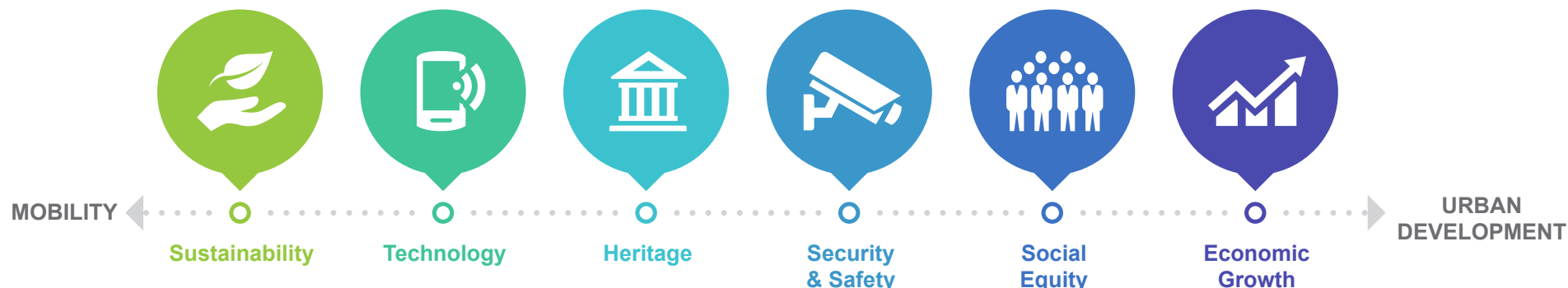
Furthermore, it will support shared mobility schemes and public transport, and these actions will boost the city and generate growth. This is why urban planners have sought to localise growth in “centres of development” where these plans will have higher rates of success. The theory of Transit Oriented Development considers the railway station as a centre to propagate development within the city. The question then becomes: how can the station boost a city?

Blue-Green Infrastructure

- Blue refers to rivers and water bodies, whereas green refers to greening landscapes.
- Build a drainage layout in urban areas that interweaves the natural environment with community characteristics and contemporary functions.

SIX AXES FOR A STATION TO BOOST THE CITY

“It is our firm belief that inter-modally connected, mixed-use developments at centrally located rail hubs represent a crucial element in the challenge to develop more sustainable human settlements” (Peters & Novy, 2012)

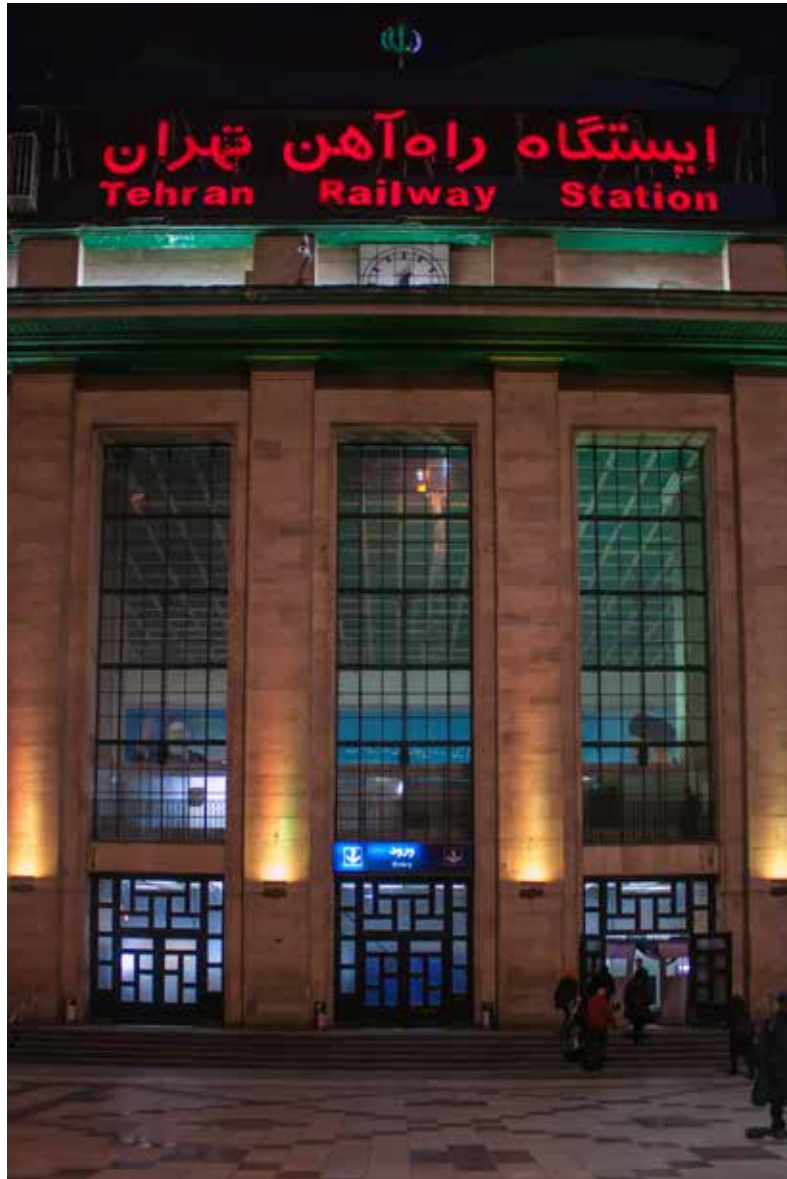


A train station can promote city growth by focusing on sustainability, technology, heritage, safety & security, social equity, and economic growth. By assuming its role as a mobility centre through its railway services and as a connection to other modes of transport, the station already occupies a strategic role in city development. An extensive rail network is a key asset in the sustainable development of territory. Even more, the central nature of the railway station is a generator of growth. Therefore, it is safe to predict that any development of a station fosters a service-oriented economy and, in consequence, boosts the liveability of the city. A holistic plan developed around a railway station will take into consideration sustainable transport and efficient intermodality as well as balanced and mixed land use.

The station as a model of a city within a city must itself rely on multiple factors to achieve growth from within that will later propagate in the city. As a smart and sustainable centre, the station management must adopt energy efficient practices and thus set the norm for green initiatives.

Indeed, the model of the ‘eco-station’ is scalable around the city. Since ‘urbanisation’ has become a synonym for the deterioration of natural resources, new urban plans now rely on schemes such as **green and blue infrastructure** to incorporate green practices and green places into the urban fabric. Consequently, railway stations around the world are adopting green designs which bring the station closer to its community.

As it becomes an attractive location in which to spend time, commercial activities within the building and its surrounding areas increase. As mentioned above, the role and the location of the station facilitate the integration of its architectural identity with the city’s landscape and its heritage harmonises with its city. In fact, it often becomes a prominent feature within the city landscape thanks to its architectural heritage. Furthermore, stations are becoming places to promote social and economic sustainability in urban settlements as, thanks to technological breakthroughs, it is becoming possible to monitor results and indicators. Employing the ‘Smart Station’ approach ensures that it is safe to rely on apps and sensors to increase security and safety, and to improve the experience of travellers and local citizens.



Panama City, Florida



The Hague, Netherlands

Mannheim, main station



STATIONS WITHIN URBAN PLANNING STRATEGIES

As a component of the city, it is crucial to integrate the station into the urban development strategy:

“A railway station forms no longer a building on its own, but [is] part of a larger complex.” (Vákár & Snijder, 2001)¹⁴

The station is an important component of any integrated urban development strategy. As an intermodality hub, where passengers have access to trains, public transportation and shared mobility schemes, it has a vital role in promoting sustainable transport. It is also a factor for mixed land use as the real estate around stations tends to be varied. Indeed, it has been proven that the attractiveness of real estate in the area around a train station will increase due to the accessibility of transport, with the result that residential complexes and offices are built in the surrounding areas. In order to meet the needs of travellers and these new residents and workers, retailers open stores around the station. In addition, local authorities develop a network of roads connecting the station and its environs to the rest of the city, not forgetting the establishment of green public spaces. Eventually, the train station will have kickstarted the regeneration of its local urban area and this growth will prove essential in attracting more economic activities and increasing the attractiveness of the city as a whole.

Thus, railway stations go beyond the norms of urban development, such as the Transit Oriented Development and the node-place model, to become a manifestation of sustainable urban development of territory. The railway network, mobility accessibility and the different commercial opportunities are all factors that influence not only the station and its environs, but also the entire city.

14. Vákár, L. I., & Snijder, H. H. (2001). Railway station structures designed for densely populated urban areas. *Structural Engineering International*, 11(2), 128-138.



Source: <https://psomas.com/services/american-fork-transit-oriented-development>

West Kowloon station





LOCATION OF THE STATION AND ITS IMPACT ON CITY DEVELOPMENT

The implication of the rail network on sustainable territorial development is closely related to the location of the station. This means that inducing urban growth varies based on the centrality of the station. Multiple studies have showcased the consequences of introducing the rail station to an urban area; if the station is peripheral, it entails a different strategy from a central one, and the same goes for small and large stations. The key factor is the connection of the station to the existing urban transportation network.

Again, building on the growth loop concept, if the station is introduced to an isolated area, the city will connect it to the transport system and this will boost the station, but will also regenerate the area around the station. Consequently, the station will thrive. To cite an example, the case of Lille station presents an ideal scenario.

Centre / peripheral

Central stations have the advantage of being well-grounded in urban and interurban transport networks. In contrast, peripheral stations have the disadvantage of an inferior connection to the public transport of their cities. Moreover, the car plays different roles in relation to a central or a peripheral station.

On one hand, in the case of central stations, the density of an urban area presents a major obstacle for car access due to congestion, yet it benefits from greater access by non-motorised modes of

transport such as biking or walking. Therefore, a central station favours intramodality and sustainable mobility. On the other, because fringe stations do not have access to the public network, people tend to rely more on individual vehicles to reach them. Plus, they are remote and far from urban centres which hinders biking and walking¹⁵.

In conclusion, the restoration of central stations could be more beneficial to the sustainable development of cities than constructing another station on the perimeter. Despite the advantages of peripheral stations, such as decreased travel journeys and no restrictions of urban density, their remoteness, the underdeveloped infrastructure and the lack of connection to public transportation limit their influence on city development. In actual fact, they can increase urban sprawl and car dependency¹⁶.

15. Facchinetti-Mannone, V. (June 2009) Location of high speed rail stations in French medium-size city and their mobility and territorial implications. *City futures 09*. Madrid, Spain.

16. Mignerey, P. (2012). *Les effets territoriaux de la grande vitesse ferroviaire en France*. La Documentation Française, Paris.



Moscow



THE DUALITY OF THE STATION

The mobility node

The future of mobility is steering more towards smart and sustainable practices. Local governments' approaches are changing as well; they are adopting new visions such as the “**Mobility as a service**” scheme (MaaS) and **Sustainable Urban Mobility Plans** (SUMPs).

SUMP

Aims to improve accessibility of urban areas and to provide high-quality and sustainable mobility through and within the urban area.

MaaS

MaaS integrates multi-modal transport services, including public transportation, rail and metro, in order to provide efficient, on-demand services, leading transportation modal shifts



Moreover, as there is always new development, whether in shared, private or public modes of transport, the boundaries between these categories are becoming more and more fluid. This has influenced the trend of switching and transitioning between the three types; not only is that becoming fluid as well, but also dynamic and effortless. To add to this picture, the rise of electric vehicles (EV) and light electric vehicles (LEV) is reshaping the urban mobility scene by providing access to multiple means. The railway station provides a mobility solution for dynamic intermodality, as it incorporates parking for private vehicles and access to shared vehicles stations and public transport, in addition to rail transport.

Intermodality is about using complementary methods of transport to form a single journey. The largest portion of the journey is usually covered by train, aeroplane or car. The first and the last mile are the most challenging to coordinate. Even in the case of the car, navigation through the traffic in and out of the city is difficult, not forgetting the issue of finding parking.

Alternatively, passengers can rely on carsharing schemes such as Uber, biking, public transport or walking. Intermodality is about seamless transport; a unified ticketing system and accurate, real-time traffic information are key factors in ensuring a seamless journey for travellers.

In the case of the railway station, its location in the fabric of the city entails greater responsibility.

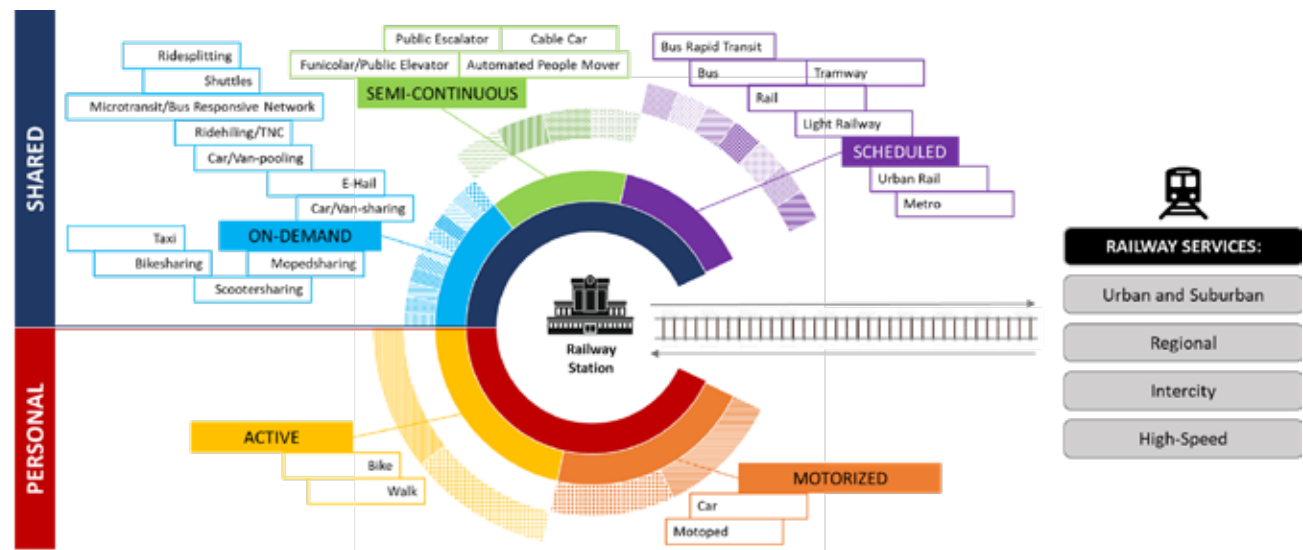
The station itself becomes a mobility centre as it usually hosts the different connections to provide door-to-door transport. Most stations are connected to public transport, they also host parking for individual vehicles, bikes/cars as well as taxis, and nowadays, they even have parking for city bikes and dedicated spaces for dockless vehicles. Train stations are stepping into their role of a mobility hub; they hold the key to ensuring a smooth journey and by assuming this role they contribute to boosting their cities.

Multimodality, on the other hand, is more about the choice and the selection to cover a portion of the journey. In this case, cars, trains and aeroplanes compete for the travel from one city to another. Carsharing, biking, walking and public transport are also multimodal competitors when it comes to covering the first and last mile. By zooming in on multimodality and the station, it is clear that the railway station still plays the same role as a mobility hub, even if the train was not the choice of preference for some travellers.

The station is still the most accessible point into and out of the city. Numerous cities, such as Florence, Italy, are promoting carparking in the station and commuting via light rail. In the case of the aeroplane, airports are connected to the city via suburban trains or buses that also use the train station.

Ultimately, the station's role as a mobility centre transcends the means of transport thanks to its deep integration within the mobility network.

However, a train station's biggest advantage remains its function as a gateway to the rail network, specifically for city development. Rail travel is sustainable, reliable and environmentally friendly. There is a strong interrelationship between railway structure development, land use and travel behaviour. Consequently, there is a dedicated movement to increase rail's modal share worldwide, spearheaded by schemes such as Horizon 2020, which has dedicated significant funds to promote rail within urban and rural development, implementing the Shift2Rail programme.



London. Train station and Tower Bridge night lights, aerial view



The station: a place for everyone

Thanks to its location, the station can provide a link connecting rail services to retail, catering, car parking and even business offices in the surrounding area. The station can be designed as a place with multiple roles and it should be envisioned as an urban centre that hosts a variety of activities to attract locals and travellers.

The station as a hub provides numerous opportunities to improve the passenger experience, boost the community, host meetings and contribute to economic growth through retail and other services.

The station design plays a crucial factor in shaping the station into an urban centre, and by developing the premises and the surrounding area the station becomes truly a city within a city.



Station design

A station manager focuses on efficiency, smooth navigation inside the building, and improving the passengers' experience. Therefore, station design plays a crucial role in the proficient management of the station.

Beyond aesthetics, the station design aims to provide a seamless trip for travellers and an enjoyable experience for everyone frequenting the station. Not only that, it also ensures the safety and security of visitors.

Nowadays, by means of new constructions or renovation work, architects seek to incorporate green and sustainable practices to ensure energy efficiency. The use of glass roofs, rainwater tanks and solar panels is becoming standard practice when designing transportation hubs.



Furthermore, stations are facing the challenge of anticipating future railway innovations as well as estimated increases in passenger capacity. One solution is to optimise walkways through and around the station, to increase profitability and efficiency while maintaining the smooth operation of the building. Another area in which the city can contribute to the development of the station is by constructing parks and child-friendly spaces around the station, which in turn affects the design of the station.

Le Train Bleu at Gare de Lyon is one of Paris' most celebrated restaurants



Retail and dining

Have a train to catch? Forgotten your charger? Arrived too early for your train and have some time to kill? Or perhaps the shopping centre is too far for today.

In all these cases, the railway station is the right destination for you – no need to go far to run errands.

As gateways to airports, stations such as Montparnasse in Paris are switching their focus to high-end

retail, providing access to anything from electronics shops to luxury cosmetics stores. Impressively, the retail space contained inside all the railway stations in France is estimated to be more than 180 000 m². And in Leipzig, Germany, the *Leipzig Hauptbahnhof station* is the largest mall in the city, hosting almost 200 brands.

Always striving to improve travellers' experience, station managers are seeing huge opportunities for commercial growth thanks to retail.

Over 25% of people frequenting train stations are not there to board trains, but to benefit from the other services on offer. In Japan, the relationship between department stores and railway stations goes all the way back to 1929 with the first terminal shopping complex.

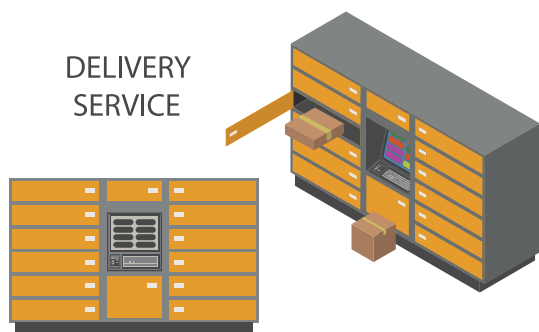
Department stores were even financing the construction of railways stations and railway companies were building their own stores.

Moreover, stations also play host to a variety of coffee shops, restaurants and bars. With options ranging from fast food outlets to gourmet restaurants, every passenger can satisfy their appetite and enjoy a trendy and sophisticated atmosphere.



Online shopping

Not only do stations provide outlets for traditional shopping, but they are also becoming involved in e-commerce, providing pick-up points, such as boxes and lockers, on their premises. In Paris, the French post has installed 120 lockers under the Collect & Station scheme. This will place railway stations in a leading position to reshape the scene of online shopping. The trend is also popular in India with collaboration with the Delhi Metro Rail Corporation.



Another approach is the Click & Reserve service from providers like *Doddle* in the UK, where it is easy to reserve an item from different online retailers such as Amazon, ASOS, M&S, etc. and then try it on in store, in the station. *Doddle* is the UK's first fully dedicated, staffed, online shopping collection service available to retailers located in railway stations and other major hubs. The idea is to provide changing rooms in stations that are accessible 7 days a week so customers can try garments and then decide whether to buy or return them, without the hassle of return policies.

Working place

In Japan, train stations are adopting a new idea of work spaces: “*The practice of working anytime, anywhere*”, and have introduced tiny offices called “Station Booths” inside the *ekinaka* (commercial areas within train stations), where passengers can work in peace. The East Japan Railway Company has installed four booths each in Shinagawa, Tokyo and Shinjuku stations for the free-of-charge pilot period that began in 2018. About 3,000 people have registered for the service to date.



JR East

Entertainment

Airports are pioneering in the field of leisure amenities. Singapore's Changi Airport, voted the best airport 7 times in a row, has a rooftop swimming pool, a cinema, a park with a mirror maze and sky nets, and even a whiskey festival. Many airports have video game consoles and libraries.

Train stations are now hopping aboard to make their stations a fun place to hang out. Each year, *Grand Central Terminal* in New York plays host to The Holiday Fair in the Vanderbilt Hall, selling local artisanal crafts. *Rumia Station* in Northern Poland has been transformed into a *Stacja Kultura* (culture station) and now functions as a public library and a railway station. The initiative has encouraged the local community to frequent the station and has improved passengers' experiences, as they can now borrow books or use the Wi-Fi while waiting for their trains.

Another station that has been completely transformed into an attraction centre is *St. Louis Union Station* in Missouri. It is now a shopping centre, hotel and an aquarium with a light rail station situated just next to the historical building. It even has its own Ferris wheel and miniature golf course.

Another airport trend that has found its way into train stations, including *Lyon Railway Station*, involves pedalling stationary bikes to charge electric gadgets. 30 minutes of pedalling provides passengers with their daily exercise and simultaneously charges their mobile phone.

Yet other stations have chosen to embrace their pop culture flare. A good example of this is *King's Cross Station* in London, which has a trolley sticking out of the wall at Platform 9 ¾ in reference to Harry Potter. Needless to say, it has proven a hotspot for passengers as well as tourists.



The station as a community place

George Simmel, the German sociologist, observed that any social activity is spatial by nature: “*Space creates social interaction*”.

The railway station grows in parallel to the city. When it is first built, the area around it develops to accommodate travellers’ needs, but as the train station itself grows, the services in the neighbouring areas vary.

Stores, hotels and offices are built at first, but then the city starts developing parks, gardens and community squares in the vicinity.

These facilities, together with the station at their centre, create a sense of community. The space is no longer there to simply meet passengers’ needs, but also to provide a social outlet for locals.

This becomes clear when weekend farmers’ markets are established in the public square in front of the station or a local fair chooses the spot as a gathering point for both passengers and residents. For example, the *Jääpuisto Ice Park* is located next to Helsinki Railway Station.

Thanks to the amenities, transportation and space it provides, the station becomes a social and cultural place. In this example, the station offers tourists and visitors a local authentic experience without even having to venture far from the station.

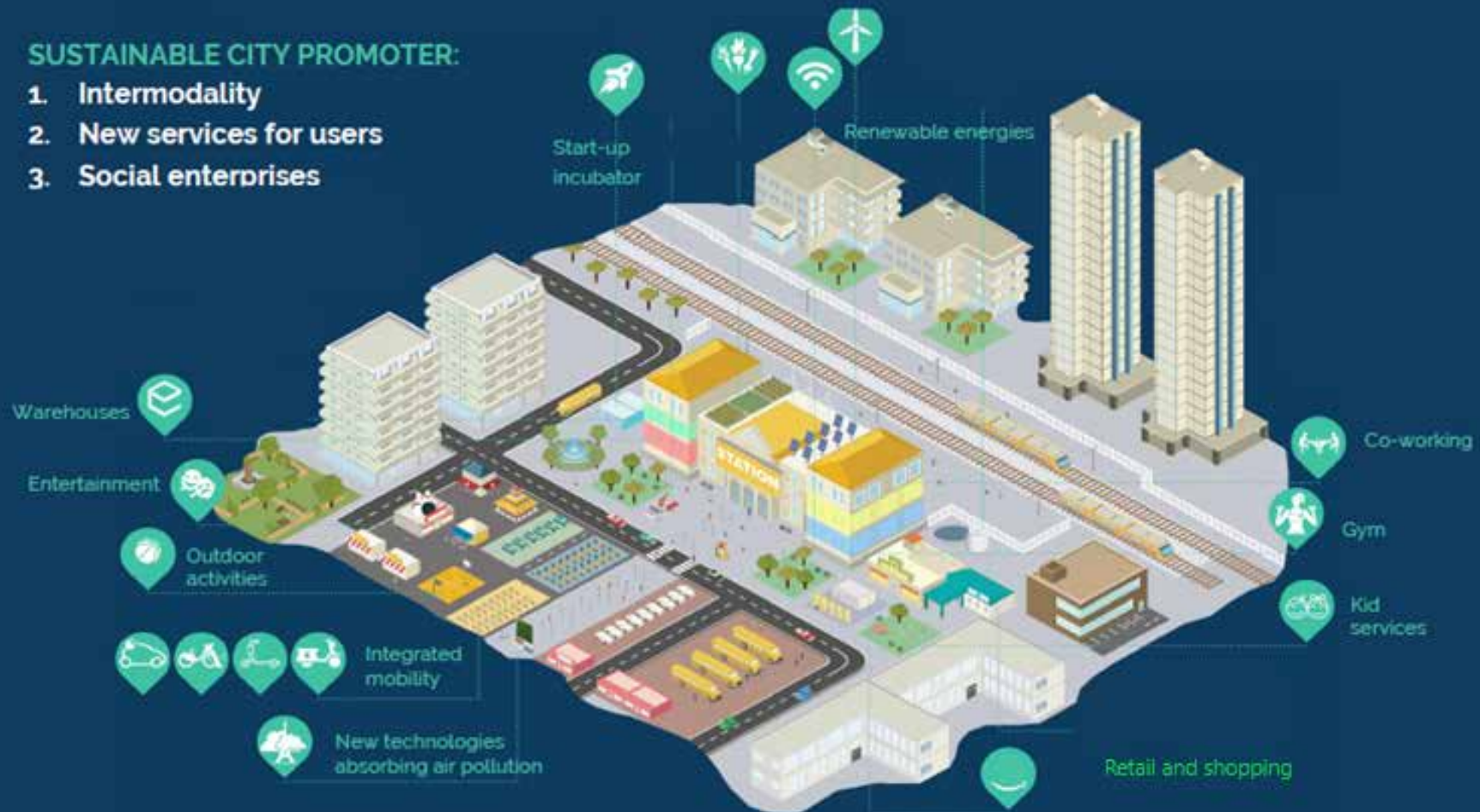


<https://edition.cnn.com/travel/article/historic-train-stations-of-paris/index.html?gallery=3>

Train Station as a hub of mobility & services for citizens

SUSTAINABLE CITY PROMOTER:

1. Intermodality
2. New services for users
3. Social enterprises



Technology is improving sectors and **Social Enterprises** are revolutionizing the way to make business producing profit while developing communities and protecting the environment.

FROM HERITAGE & IDENTITY TO THE FUTURE AND BEYOND

Originally, stations were predominantly functional structures for boarding and leaving trains. They served a practical role and they were defined by it. The station was trapped in a one-dimensional design, and even when it expanded beyond it, it was only to host offices or storage facilities for the railway operators.

As trains evolved to occupy an important role in transportation, the station also evolved to become synonymous with urban growth. It occupied a bigger role in urban development and even in the cities' heritage.

Stations developed a whimsical and romantic atmosphere that translated well into art, and particularly in the cinema. These structures have always generated their own temporal culture. Consequently, urban designers and architects began envisioning new functionalities and new boundaries for the station. It became the façade to the city.

The dedication of all involved stakeholders meant the station was no longer built to serve a single function, but was now destined to occupy bigger roles both in the railway sector and in urban development.

Its design became more elaborate and sophisticated to boost robust urban and economic growth. It was transformed from a “pier” to a hub and more thought was put into its placement and design.

Its development has to some extent been dependent on the train's development, as the smoke and noise emitted by trains in the early days of train travel meant they could not enter the building. It has also adapted to the city in which it is located, for example the design evolved to navigate the traffic from and to the station; where the building was once in a U-shape, it is now an L-shape to facilitate the movement of passengers both arriving and departing.

Nowadays, there are architectural designs for buildings in the form of γ , as will be shown later. The station structures have adopted the identity of their cities; whether the city is business-oriented or historical, the station design usually follows suit.¹⁷

17. https://uic.org/com/?page=eslider_iframe&id_article=4015



The heritage of the station in relation to the history of the city

Nordpark Railway, Innsbruck, Austria

The station was designed by Zaha Hadid's architects. Inspired by the city's Alpine scenery, it aims to reflect and complement the landscape of Innsbruck.



University of Naples subway station, Italy

The station showcases Naples' journey from a historical city to a modern city famed for technology and science. The Karim Hashid design is testament to "knowledge in the new digital world" and a nod to the international academic community that frequents the subway station.



Olympic Park Station, Sydney, Australia

The station was designed to welcome visitors to the Olympic games and to express the identity of its surroundings and provide a distinctive Australian feel. With its traditional 19th century glass and iron architecture, it aims to embody the Australian character traits of openness, directness and clarity.



Flinders Street Station, Melbourne, Australia

The building is an iconic landmark that has been altered numerous times through its history. The government wanted it to be redeveloped by restoring its heritage. A contemporary design breathed new life into it, allowing the building to maintain its historical status while embodying its role as a hub in a modern city.



Tianjin West Station, China

The city is a financial centre and its development vision is as a progressive and modern Chinese city.



Chhatrapati Shivaji Maharaj Terminus, India

The station was designed to be a revival of Indian Gothic architecture in 1887 by Fredrick William.

It is now a UNESCO World Heritage Site and one of the busiest stations in the world.



Kanazawa station, Kanazawa, Japan

The station has a *Tsuzumi-mon* or a drum gate.

This design is located at its east entrance and is a replica of the Japanese drums used in ceremonial festivities in Kanazawa.



Caminho De Ferro De Moçambique, Maputo, Mozambique

The train station is also a cultural centre in Maputo.

It hosts live performance around the year and it is located near the historic Praça dos Trabalhadores, also known as Worker's Square.

It blends harmoniously into the landscape of its location, yet stands out with its mint green paint.



Repurposed stations

In a testament to the role that a station occupies within the community, there are multiple stations that have had to shut down due to low traffic, but that still play an important role within their cities. From small stations turning into community centres or art galleries to much larger projects, stations have continued, in one way or another, to live on, surpassing their original role as a mobility hub¹⁸.

One of the biggest examples is the Musée D'Orsay in Paris, France. This was once a station developed for the 1900s World Fair, but it is now one of the most famous museums in the world.



18. <http://flavorwire.com/384627/10-incredible-repurposed-train-stations>

Another such station is Julio Prestes train station in São Paulo, Brazil. The historical building now serves as a concert hall and is the home of the São Paulo State Symphonic Orchestra.



Hamburg station ceased functioning as a station in 1884.

Today, instead becoming a railway museum, it is a contemporary art museum.



THE SMART STATION BOOSTING THE SMART CITY

At the last conference, the UIC presented the theme of the Smart Station. The handbook explained that the station is a point of overlap for the five pillars of urban planning for a smart city: public space, the common good, citizens, administration and infrastructure. If Smart City concepts revolve around repurposing infrastructure in order to promote innovation and social inclusion, then the railway station is destined to be a key factor in achieving this goal¹⁹.

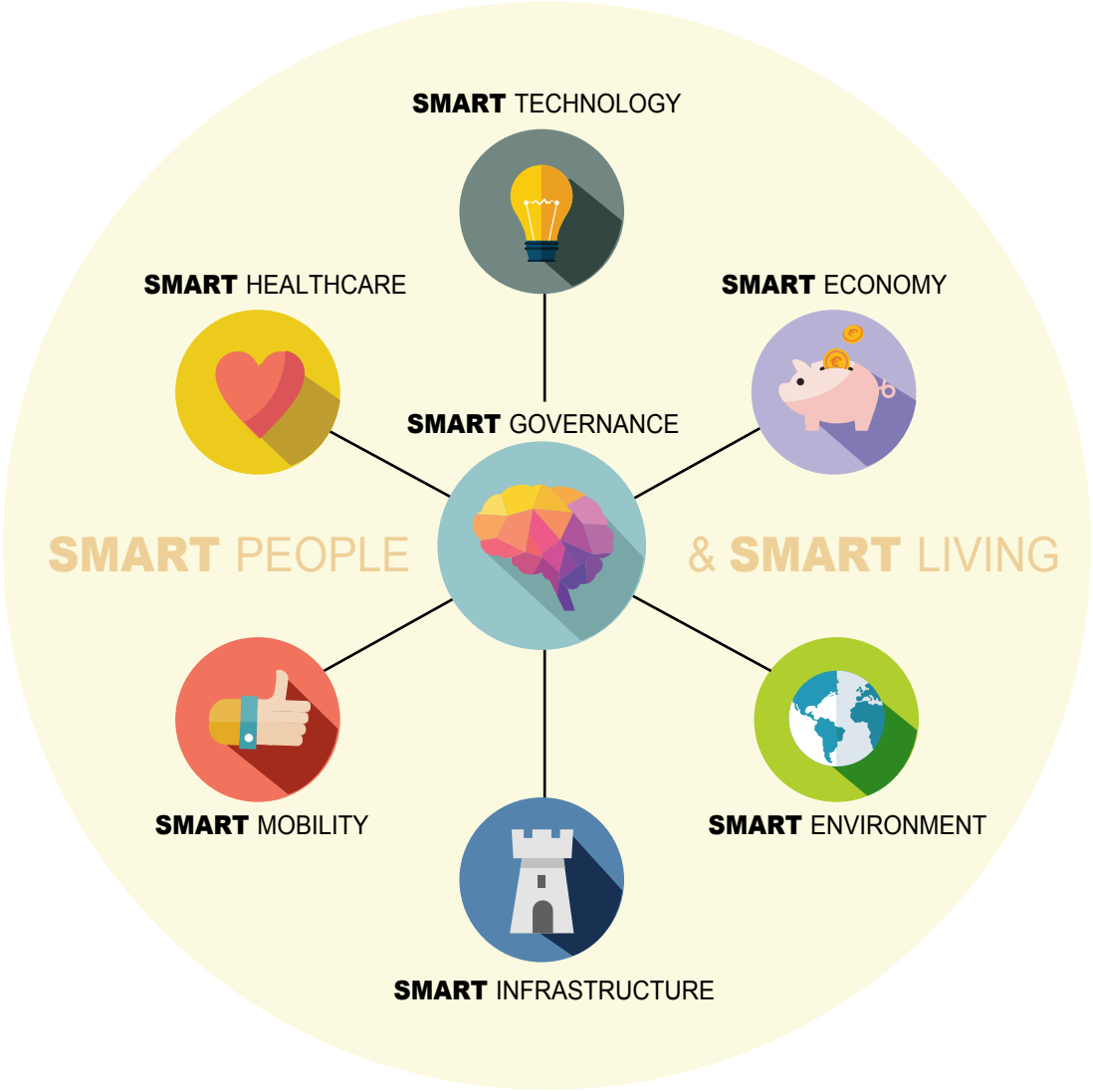
The station of the future: more than just smart

To better position the smart station within the smart city, examples of smart solutions used to address mobility, geolocation, and IoT concerns are presented.

Smart mobility is connected mobility

“Zero Emissions, Zero Accidents, Zero Ownership.” This is how the mobility of the future will address the problems of cities.

Numerous innovations are being implemented to establish a sustainable transport system. What the station can do as a mobility hub, besides providing access to trains and public transport, is promote the use of new modes of transport, such as autonomous shuttles, electric cars and shared mobility schemes.



19. Smart Stations in Smart Cities

Autonomous shuttles provide a prime example of a new form of transport that is set to tackle the problems of energy consumption, GHG emissions, mobility for people who cannot drive, and parking within urban areas.

Augmented reality for wayfinding from the city to the station platform

SJ, a train operator in Sweden, recently provided passengers with a new tool to help them navigate their way through Stockholm Central Station: an interactive smartphone app called *SJ labs*.

The app uses the phone camera, QR codes and a destination to display signs on their phone screen which lead them to their destination. Using features similar to those of *Pokémon Go*, the app engages users to find their destination.

As an added bonus, it also helps passengers unfamiliar with the local language and the layout of the train station.

This year, the Federal Swiss Railways SBB is also providing an AR app, SBB AR, for use in Zürich Hauptbahnhof. This app provides location-specific content and displays real-time public transport information.

The concept basically involves tracking within a closed environment and machine learning of an image recognition algorithm. Although the approach is innovative, it still needs to work out a few challenges: first, it is hazardous to walk with a phone in a crowded station; and second, GPS signal is usually restricted indoors or underground.



Visual signage in train stations

Signage is guaranteed to help passengers navigate their way through the station. Signs need to be clear, engaging and efficient. Beyond the barriers of language and design, it is important to consider their placement: too high and there is a risk that the passenger will miss it; too low and it could become a hazard. As another option, TransitScreen recently introduced the idea of signs located on the floor.

These are projected directly onto the platform floor and include directions. The idea is interesting, but consideration must be given to the passengers who actually walk on the floor. Perhaps by combining the latest technologies with mobile apps, custom-made signs could be projected onto the floor, wall or building to a specific traveller.



KING'S CROSS STATION, LONDON: AN EXAMPLE OF A STATION BOOSTING THE CITY

Urban regeneration around a mobility centre

Built in London in 1851 as the great northern railway station, it is named after King George IV. The station nowadays caters to over 47 million people a year. Situated on one of Britain's major railway lines, it connects London to northern cities such as Edinburgh and Newcastle.

During the 1980s, the area around the station was rife with suspicious activities and degraded buildings, which is a far cry from the King's Cross area today. King's Cross station underwent a £500 million renovation and restoration plan, which was finalised in 2012, and this major national effort has had a huge positive effect on the local area.

The development of the station was designed to ensure a seamless transition between suburban and intercity mobility, and to accommodate high passenger traffic flows not only inside but also around the premises. The development plan also considered the potential increase in travel journeys due to the 2012 Olympic Games in London.

The redevelopment of the station was accompanied by a complete redevelopment of the surrounding area. The plan to develop the King's Cross area is one of London's greatest and most successful masterplans to date. The construction work started in 2006²⁰ and the station remained open to the public throughout, to avoid disturbing transport in the city. What used to be an "underused industrial wasteland" is now host to new residential areas, office complexes, galleries, restaurants and educational institutions.

The area is also home to Google's new campus in London. The plan also led to the expansion of the road network around the station, which increased accessibility and facilitated intermodality. This is an ideal example of the relationship between city and station; the urban masterplan revealed the urgent need to develop the station, and the subsequent development of the station further pushed for a new development strategy for the city.

20. <https://www.kingscross.co.uk/the-story-so-far>



Green design

In line with the building's sustainable management, some of the platforms are off-limits for diesel trains.

Moreover, up to 2 500 m² of photovoltaic panels were installed to generate 10% of the station's energy demands.

Further renovation plans will be launched in 2020 to further optimise the station services.



© John Sturrock Solar panels on the roof of Five Pancras Square, King's Cross

A destination for everyone

The redevelopment plan not only boosted the station's position as an urban mobility hub in London; it also made it a destination to be visited and celebrated.

As a feat of architecture and engineering, the building itself embodies remarkable improvements in safety, design and transport planning.

The station has a Grade I historic listing and is protected as a heritage landmark.

The resulting challenge was to integrate cutting-edge innovation into the historical identity of the building.

This was achieved through the installation of the magnificent glass dome on top of the historical façade of the building.

The structure is hugely impressive, and visitors can enjoy both its heritage and the modern renovations in place.

The station also plays a major part in the Harry Potter franchise: both the books and the films. Its famous Platform 9 ³/₄ represents a transition point to the wizarding world and is where Harry Potter catches the Hogwarts Express.

The luggage trolley coming out of the wall is a very popular tourist attraction and people line up to have their picture taken. There is also a Harry Potter themed shop in the station.



<https://www.networkrailconsulting.com/our-capabilities/our-projects/kings-cross-station-redevelopment-programme/>





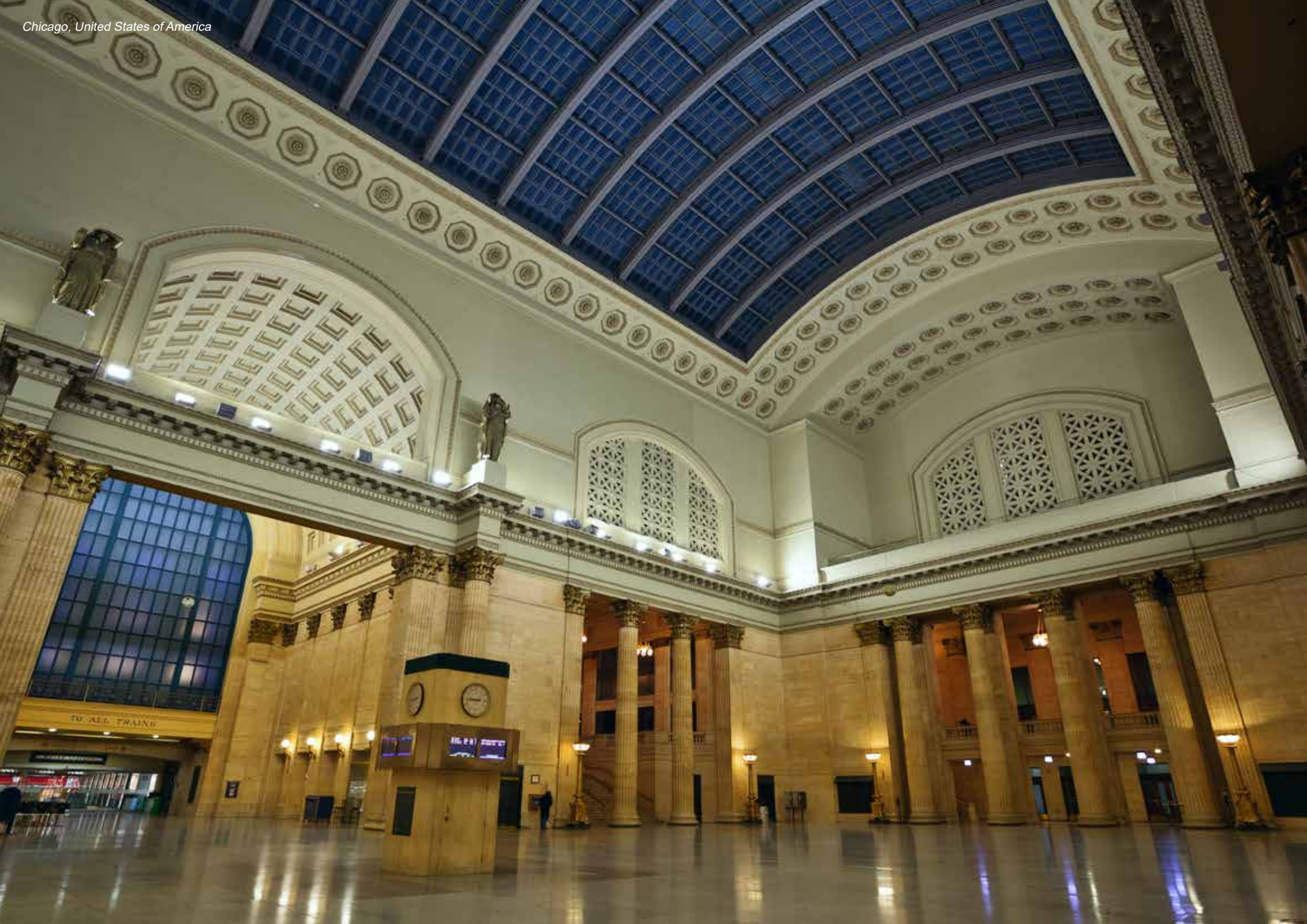
















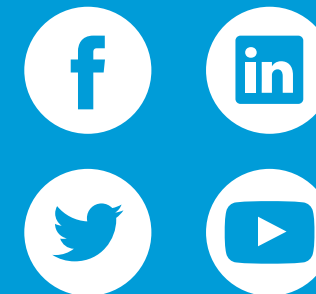




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