Station designers get a new toolbox

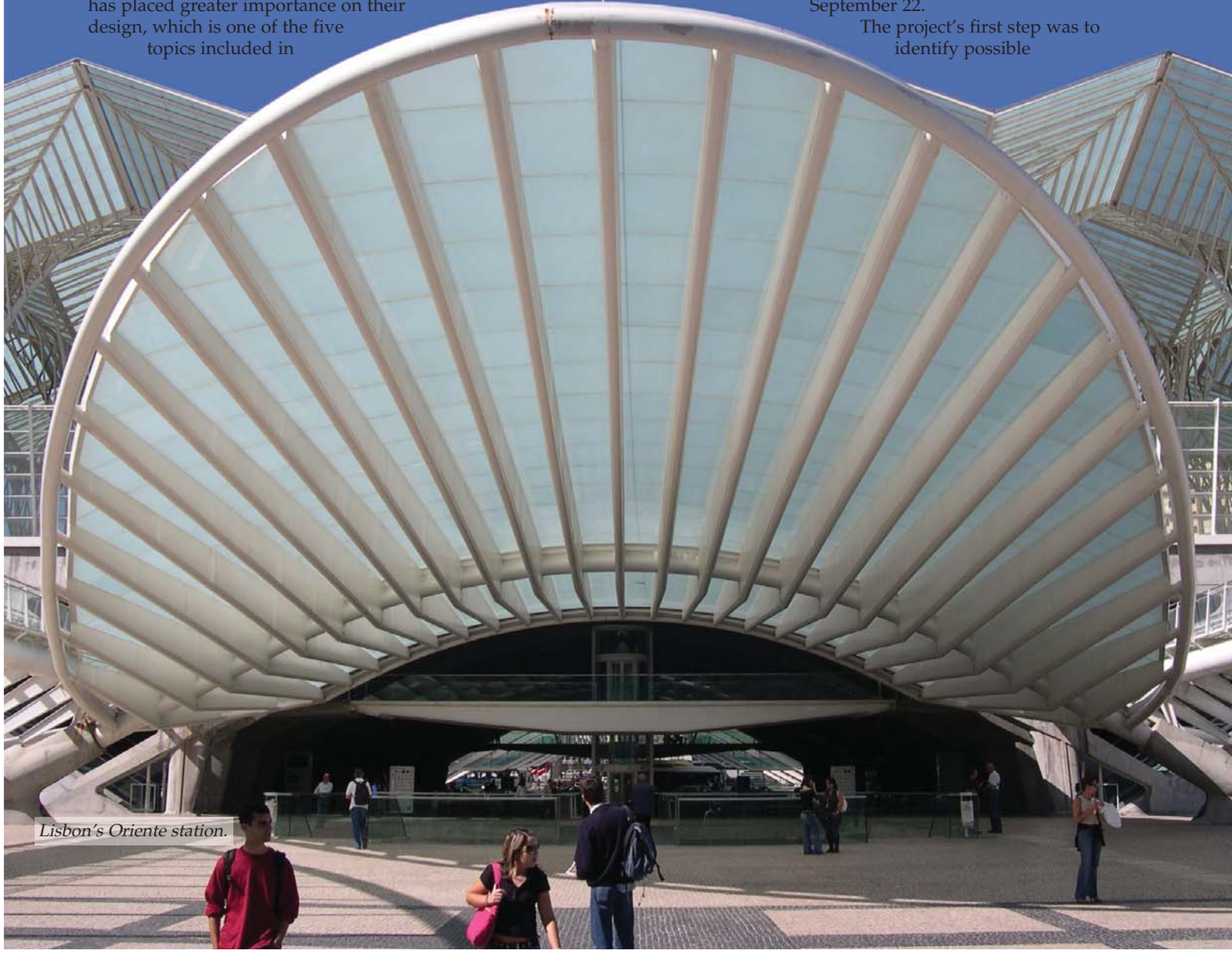
Station design is one of five core elements of the Nodes research project. **Richard Booth**, scheme development manager at Britain's West Midlands transport authority Centro, who led the design element of the project, and **Caroline Hoogendoorn**, the International Public Transport Association's (UITP) Nodes coordinator, reflect on Nodes achievements at improving interchange design.

A PUBLIC transport interchange, or station, is no longer just an integral component in a public transport network but a gateway to a city or destination, which can play a key part in economic growth and the regeneration of a certain area of a city or town.

Redefining the role of an interchange has placed greater importance on their design, which is one of the five topics included in the New Tools for Design and Operation of Urban Transport Interchanges (Nodes) research project.

This three-year EU-supported programme aims to develop a toolbox which practitioners can use to assess and benchmark their interchange in order to improve performance in five key areas: land use and infrastructure, design, intermodality and ICT, management and business models, and energy and environment. In total 17 organisations, including public transport operators and local government administrations, have contributed to the project, the complete results of which will be unveiled at the Nodes final conference in Brussels on September 22.

The project's first step was to identify possible



Lisbon's Oriente station.

interchange criteria and performance indicators, which was achieved by recognising future user needs and system requirements. In particular the project considered the ideal setting for passenger intermodality in 2020 and what role intermodal interchanges will play. In addition, analyses of 18 EU co-financed research projects, 10 policy frameworks and design guidelines, and over 30 best practices took place to inform the work carried out during the project.

For example, when considering station design, one of the guidelines included is the Sustainable Design Guide developed by Centro in 2011, which covers nine topic areas:

- energy management
- water
- materials
- waste
- landscape and townscape
- biodiversity
- social and community
- local economy, and
- climate change.

The guide aims to assist primarily with design phase activities but also references elements of the construction and operational phases to raise awareness of sustainability considerations throughout a project's lifecycle. In addition it assists with evaluating and selecting design features that will improve a project's sustainability performance and includes an evaluation method backed by good practice research while outlining how each design initiative aligns with the Breeam and Ceequal assessment schemes.

To measure the performance of an interchange's design, a number of indicators were identified. Many of these relate to customer needs under themes like speed including the accessibility of interchange, ease of movement from the availability and quality of information available, and customer experience and comfort.

These indicators were subsequently clustered into key performance indicators to help practitioners better understand the performance of their transport interchange. This was initially in the format of an MS Excel table before further development into an online Nodes Benchmark tool, which is now part of the Nodes Toolbox, and will be available at the end of the project.

Arriving at an interchange and enjoying a stress-free journey is only achievable if users are clearly informed of the travel options available to reach their final destination or to connect with other modes.

Once an interchange practitioner has received the evaluation, they are directed towards a list of tools which can improve the interchange's performance. These tools are based on the most advanced practices in urban transport and relate to software, methods, techniques, models, regulations, and materials and have all been grouped together in the Nodes Toolbox. Each tool is described in a standard way and was classified according to the type of interchange to which it applies, the type of practitioner using it, and its objective.

In order to validate the efficiency of the tools, testing took place at nine reference sites across Europe all of which were engaged in substantial station development and upgrading programmes: Reading and Birmingham in Britain; Rouen and Toulouse in France; Osnabrück, Germany; Budapest, Rome; Thessaloniki, Greece; and stations in Rotterdam, Utrecht and 's-Hertogenbosch, The Netherlands.

Among the tests carried out in Reading was the use of a micro-simulation tool called Vissum during the design phase, which according to Mr Stephen Wise, Reading Borough Council, identified and rectified any issues with the flow of buses, other road traffic and pedestrians prior to the start of construction at the station.

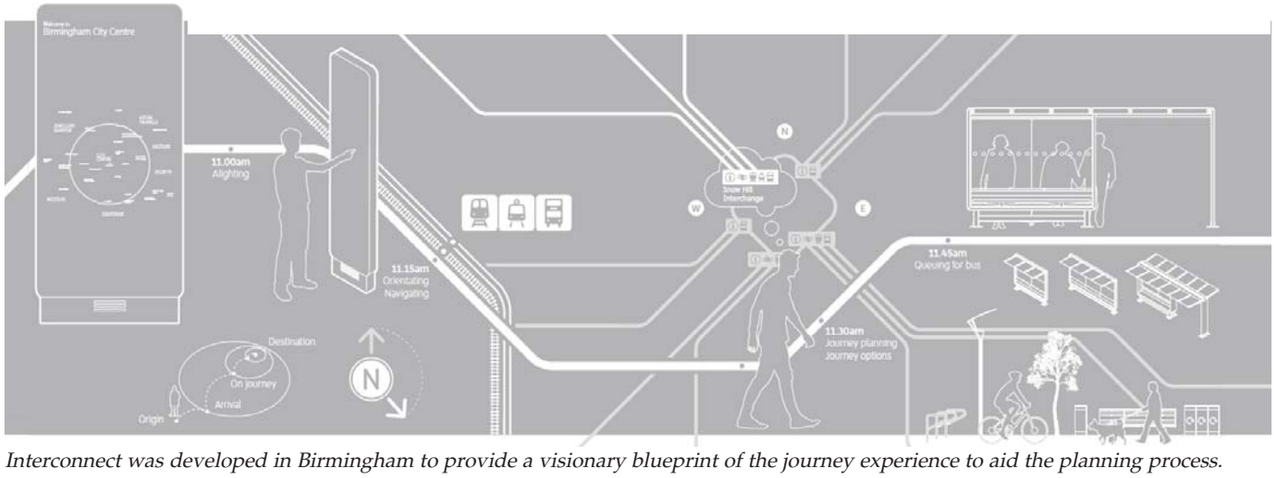
"This represents a substantial saving in by eliminating rectifying works and other time and costs such as re-registering buses and bus stops," Wise says. "Similarly in the future any changes proposed to respond to further increases in passenger numbers can be tested whilst they are at the design stage thus minimising disruption and avoiding any work to carry out further adjustments."

In addition tests were carried out in Reading of an audio description guidance tool for the vision impaired developed by Guide Dogs, Microsoft and Cities Unlocked with support from Reading Borough Council. The station also utilised a tool to assess and subsequently minimise the impact of noise during all three stages of construction.

Strict framework

The tools and the results of this testing phase were subsequently evaluated following a strict framework, with the following key fields identified to achieve a comprehensive and structured view of interchange design:

- functionality covering interchange zones, movement, capacity, operations, safety and security, quality, layout and structure



Interconnect was developed in Birmingham to provide a visionary blueprint of the journey experience to aid the planning process.

• architectural and urban design covering the identity and image of the station, infrastructure, legibility (interpretation of spaces and uses), relationship to the city/place of context, and sense of place as a gateway to the city/town
• atmospheric quality, including colour and light, music, screens with infotainment, scent, visuals and art, green space, temperature, spatial and functional design, and creating a steering matrix, and
• facilities relating to the customer experience, journey process, and commercial operations.

Two approaches relating to interchange design included in the Nodes Toolbox which stand out are Design and Planning of Pedestrian Navigation and Information, and the Station Experience Monitor (SEM).

Arriving at an interchange and enjoying a stress-free journey is only achievable if users are clearly informed of the travel options available to reach their final destination or to connect with other modes. As a result, improvements in the design and planning of information and navigation products can help to improve the user's journey experience through improved legibility.

Design tools

The "Design and Planning of Pedestrian Navigation and Information" tool included in the toolbox provides references to information which enhances pedestrian wayfinding. Using this tool as a guide, designers are able to plan appropriate interventions for information and wayfinding at interchanges that will provide customers with much greater spatial awareness of the interchange and the required knowledge to connect between modes in the surrounding environment.

This tool is based on two innovative information and navigation systems which rely on the progressive disclosure of information; Legible London, a pedestrian wayfinding system developed for Transport for London (TFL) which assists people walking around Britain's capital by offering an easy-to-use signage system; and Interconnect, which was developed in Birmingham, and delivers a visionary blueprint for connecting the journey experience.

Interconnect's design approach focused on improving the interface between people, places and transport systems. The project promotes a vision of a world-class movement network with infrastructure and passenger facilities designed to create welcoming places which are supported by a legible and intuitive information system. For example, in addition to improvements to bus stop layouts and minimising street clutter, the project introduces a single system of transport signage and identification which helps to improve legibility for passengers.

While many interchanges provide basic functional design, a lack of consideration for the users' travel and waiting experiences is often clear. The Station Experience Monitor (SEM) tool helps to identify interchange performance with respect to customer experiences and provides an insight into what passengers really want.

SEM requires interchange users to complete a simple questionnaire to quantify performance across themes including ambience, access, orientation, staff, safety and cleanliness, and the identification of areas where interventions are required. The analysis is conducted by software developed by Netherlands Railways (NS), a Nodes project partner.

Users at 11 of the Nodes stations were subsequently surveyed while they waited at the platform and the test found that once a station achieves a certain level of satisfaction regarding its function to offer a reliable railway service, and that it is safe and clean, operators can achieve higher passenger opinions through working on these emotional aspects than enhancing time, safety and cleanliness standards even further.

For example, at the Dutch stations involved in the project, work was carried out to replace grey unwelcoming walls with historic images of the station and murals. This is useful for designers and promoters to steer interchange performance towards elements which are often overlooked but are important to fulfil customers' experiences and needs.

It should also be noted that while passenger experience is of primary concern when developing an interchange it is essential not to overlook the strong balance required between operational and management needs, which have been considered to an extent in some of the other Nodes research topics. **IRJ**

For more information on the complete Nodes project visit www.nodes-interchanges.eu, contact caroline.hoogendoorn@uitp.org, or register for the Nodes final conference at www.uitp.org/events/nodes-final-conference.