



dialogue and production, and to inspire each other with success stories of what they find actually works. Ultimately, it will be this sharing and dissemination of good practice that helps promote change and improve the built environment for all its occupants.

The Architecture-InsideOut team can be contacted at architectureinsideout@gmail.com

Further information

Architecture InsideOut – exploring the relationship between disability and architecture
 www.architecture-insideout.co.uk

Making Discursive Spaces – a collaboration between disabled artists and interior architecture students
 www.discursive-spaces.co.uk

So What is Normal? – the implications of thinking (dis)abilities for design education
 www.sowhatishnormal.co.uk

– Advertising feature –

Tower Hamlets Council empowers disabled people to choose accessible social housing



The choice-based letting initiative pioneered by Communities and Local Government aims to give social housing tenants more choice and control over where they live.

However, some properties suited to the requirements of disabled people have often been let to other people. The Accessible Housing Register aims to tackle this, requiring councils to assess social properties by category, thereby enabling disabled people to identify appropriate housing.

A key challenge was to collect vast amounts of information via surveys, in a format that could be immediately uploaded to databases and websites without having to input the data again. The recording process also needed to automatically classify the property in question into a meaningful category.

Tower Hamlets' Housing Occupational Therapy team found conventional manual recording systems unmanageable. 'Filling in ordinary forms and transferring the information to spreadsheets was taking far too much time, and leading to errors in categorisation,' said Mandy Ruddock, Housing Occupational Therapist.

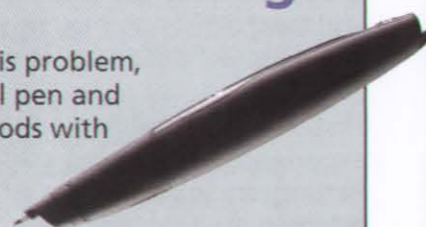
They turned to Destiny's digital pen, based on Anoto technology, for a simple and cost-

effective answer to this problem, integrating traditional pen and paper reporting methods with digital technology. Destiny worked with Tower Hamlets' OT team to design a four-page accessible housing register form, making use of tick boxes for speed and simplicity.

Once a form is completed, the pen strokes are instantly converted into a graphical image of the handwritten notes. This can be sent to Destiny's secure servers via a Bluetooth mobile device, or docked to a computer and sent over the internet. The graphical image of the form and the data file are then transmitted to the council, either by email or via an FTP site. The whole process takes less than a minute, therefore information on the properties can be uploaded to public websites the same day. By typing in the address of any property, web administrators can automatically pull accessibility details from the housing database to include on their websites.

'The Destiny digital pen has given us a swift, automatic and consistent method of categorisation that anyone can use,' says Mandy Ruddock.

Contact Destiny for more information:
08458 558 855
www.destinyplc.com



Designing in more passengers – light rail in Stuttgart

Stephen Shaw presents a case study of the light rail system in Stuttgart, Germany. He illustrates the importance of a long-term strategy for the small-scale improvements that help to make the journey environment more accessible, safe and welcoming.

Significant improvements can be delivered to public transport systems where opportunities arise to rebuild and start afresh. In general, all-new interchanges and routes offer considerable prestige for urban authorities. Less glamorous, and attracting far less political capital, is small-scale incremental change that enhances accessibility and inclusion. In some areas of the UK, transport authorities, operators and other agencies work together to upgrade the journey environment in this way. Unfortunately, in many others, collaboration to reduce the barriers is 'patchy'. Retrofitting is carried out in a piecemeal fashion, and seldom wins design awards. As a consequence, far too many stops and stations remain inaccessible and forbidding places. Would-be travellers have understandable anxieties, and some are deterred from going anywhere after dark.

Consideration of policy and practice in other countries may highlight design technologies that can be adapted to reduce these critical barriers to people's mobility. International comparisons may also suggest alternative approaches and strategies. These may help us reflect upon and perhaps question the ways in which we operate – in this case, the way in which to upgrade and retrofit an established transport system.

This article reviews a programme to upgrade and extend the light rail system in Stuttgart, capital of Baden-Württemberg in Southwest Germany. In particular, it focuses on the planning, design and operation of the entry points and related public spaces. It explores the strategy and rationale of Stuttgarter Straßenbahnen (SSB) – Stuttgart's main public transport operating company – over the past 50 years, and then discusses the outcomes with respect to:

- accessibility and inclusion
- information and legibility
- safety and security

Unlike its UK counterparts, SSB is owned and operated by a municipality, the City of Stuttgart. Furthermore, very few aspects of service delivery are contracted out. In-house expertise includes designers of passenger facilities, as well as planners, engineers and operators. As in the UK, new buses are of the low-floor design. However, SSB's light rail vehicles are high-floor, hence the importance of careful consideration at stops and stations. Teams of specialists work together with a user group that represents disabled passengers, all helping to make light rail more accessible, safe and welcoming. This joined-up approach also helps to connect light rail more effectively with other modes of transport, including mainline and suburban rail (linking with the airport), feeder buses, taxis, park-and-ride and bike-and-ride. And, very importantly, there is an ongoing programme to improve access from the street.

Strategy 1959-2009

As a report by the Commission for Integrated Transport (2005) observes, Stuttgart's population (city 590,000, city-region 900,000) is roughly comparable in size and density to Bristol, Edinburgh or Leeds. However, its hilly terrain is challenging for public transport, especially rail; its gradients and harsh winters create a number of issues in terms of access and mobility.

In the late 1950s, Stuttgart considered scrapping its tramways. Unlike its UK counterparts, however, the city decided to extend and convert them to higher-capacity, higher-speed light rail. In the first phase of development in the 1970s, tunnels were built for the trams to separate them from car traffic in the city centre. Between 1983 and 2007, the whole tram network was upgraded to light rail standard and extended, producing an average growth of around 20 per cent in terms of passenger kilometres. Since 1973, SSB has successfully secured grants from the Federal Government to fund 80 per cent of this major infrastructure programme.



◀ **Figure 1: Raised platforms constructed along one section of route U4**

Figure 2: The large step that passengers previously had to negotiate ▼



The city aims to offer services that are attractive and comfortable as well as accessible; public transport must not be perceived as a last resort for those without cars. Furthermore, since 2002, under the Federal legislation that deals with the equal treatment of disabled people, planning permission cannot be given for a new passenger transport facility unless it has been agreed with a state-approved user body. Since that time, SSB has developed mutual understanding with its user representatives in Dachverband Integratives Planen und Bauen (DIPB), a broad organisation of disabled people that is based in Stuttgart, but offers advice and consultancy across Germany.

DIPB provides valuable local knowledge and insight from users with diverse needs including wheelchair users, blind and visually impaired people, and people with learning disabilities. DIPB have regular working meetings with SSB every 6-8 weeks. Proposals such as stops and stations are discussed at an early stage, and solutions are worked out with reference to the opportunities and constraints of each site. Joachim Krauss, a senior manager at SSB, observed that 'this process results in far more satisfactory outcomes than would be possible through a "tick-the-box" approach' (personal interview, 24 November 2008).

Conversion to light rail on reservations that are segregated from road traffic means that boarding

high-floor trams from the street – an impossibility for many would-be passengers – has largely been replaced by stations with raised platforms and steps. Lifts and escalators are required to access stations below ground and interchanges that involve changes of level. Nevertheless, there are still improvements to be made: some street-level boarding remains, and there is also a rack railway with gradients that exceed 1:5! In 2008, people using wheelchairs could not board the trams at 15 of the 189 light rail stops/stations (eight per cent). SSB's objective is to make the whole system wheelchair-accessible by 2010. In general, the most difficult schemes and sites have been left until last.

Access and inclusion

The input of the DIPB advisory group on access for disabled people is particularly useful for these more complex projects in the current phase of upgrades. During the winter of 2008-2009, raised platforms were constructed along one section of route U4 near Untertürkheim, as shown in Figure 1. In the past, a certain amount of agility was

required to board high-floor light rail vehicles from this street (see Figure 2). More recent conversions, such as route U15 (upgraded in 2007), incorporate a full range of inclusive design features. Everyone benefits from platforms and steps with colour-contrasting edges, non-slip decking and ramps (minimum width 1.5m, maximum gradient 1:17, with landings minimum length 1.5m).

Lifts are sited in prominent locations, as shown in Figure 3; they are also attractive architectural features in their own right. All have transparent walls, and controls accompanied by Braille. Push buttons are situated on posts at a suitable height for wheelchair users, as well as higher up (catering for taller people, too).

From a passenger's point of view, consistency is needed across the system. Nevertheless, a standard 'kit' is not always appropriate, so there is flexibility for SSB to negotiate design solutions that fit the local context. Local circumstances may influence what can be achieved on a particular scheme, such as awkwardly shaped sites, steep slopes or utilities such as sewers and gas mains below the ground. The beauty of a forest park or a distinctive streetscape may demand sympathetic designs, colours and materials within the overarching guidelines for the system. For example, in some cases a shallow cutting to lower the tracks allows level-boarding from the street without the need for raised platforms.

Information and legibility

Without reliable passenger information for the whole trip, disabled people may have little confidence in public transport, especially for

Figure 3: Lifts at Ruhbank station



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non-routine journeys on routes that involve changes. In *Access by Design* issue 115, I discussed the potential of personalised journey planners. Taking account of individual needs and preferences, these could help people choose their best travel option. However, this technology is at an early stage of development.

At present, the SSB website offers a system-wide journey planner, and large font information is available for those that need it. As on other systems, real-time information for the trip itself includes screens on the platforms that indicate route number, destination and estimated waiting time. SSB are planning to enhance this with an in-vehicle information system that they are currently developing in house. This will, for example, update passengers on any delays in connecting services.

'Legibility' – the ease with which people find their way around stations, as well as to and from them – has important implications for visually impaired people. Another design innovation developed by SSB is the use of special hollow-bodied floor indicators that are acoustically recognisable as well as tactile. Hollow-bodied polymer concrete tiles enable blind people using canes to navigate their way around more easily and locate elements such as lifts and exits. These have been a feature of new and refurbished stations since 2002. Tactile maps of areas surrounding stations have been trialled at one station. Cast in bronze, they are attractive sculptural features. However, they proved expensive to produce, and inflexible when redevelopment brings change. Alternative solutions are therefore being discussed.

Safety and security

In *Access by Design* issue 115, John Evernden demonstrated that everyone can benefit from

comprehensive tactile wayfinding systems that guide people safely around streets and public places. For most urban authorities, this may be something that takes many years to achieve. In the meantime, some authorities – including Stuttgart – have produced design guides that promote clear, well-positioned and uncluttered signage to public transport.

Getting across the tracks safely is an issue that

highlights the significance of legibility for all users. On the SSB light rail system, crossing points have a zigzag design so that passengers always face oncoming trains. These Z-crossings are equipped with vibrating push-buttons at signals, flashing lights and tactile attention lines, as shown in Figure 4 below.

Crime and anti-social behaviour around stops and stations can also reduce people's confidence in using public transport, presenting significant barriers for many people. Good design cannot 'solve' the problem, but it can help reduce risks associated with poor design. The key principles that have guided SSB's architects and designers throughout include:

- open layout, with no hidden niches or dark corners
- broad entry/exit routes for passengers
- transparency
- appropriate lighting inside and around stops/stations
- signage and information that is easily understood
- protection from elements, but half-open design
- CCTV cameras must be visible
- information/help facilities centrally located and easy to reach

Transparent construction of waiting areas and lifts provides a light and airy environment with good sightlines, even in complex multi-level interchanges, as can be seen in Figure 5. Occasionally, this design principle is compromised by advertising panels, but wherever possible, it extends to other features of the journey environment, such as transparent bicycle sheds. Where the light railway goes underground, tunnels are cut-and-cover, so the trains run only just below street level. Where possible, new stations along these sections of route are built 'open-top', allowing natural light to infiltrate and providing a more secure environment. Figure 6 opposite demonstrates this at the station serving the Gazi sport stadium and community leisure centre at Waldau, where waiting areas are weather-protected with an attractive cover and enhanced with public art.



Conclusions

Throughout the world, operators respond to legislation, regulations and directives to improve accessibility and other critical aspects of public transport. Transnational industry and professional bodies – notably the International Association of Public Transport – play an important role in disseminating good practice, helping operators and professionals to learn from one another. Some systems demonstrate a markedly proactive approach to accommodating the diverse requirements of existing and potential users. SSB has benefited from supportive local authority policies, and by UK standards, generous grant from regional and national government. Over 50 years, this has contributed the lion's share of €2,700 million investment that has helped Stuttgart to develop a light rail system that is more accessible, safe and welcoming than in former times.

Light rail plays a critical role in Stuttgart's public transport system, with its horizontal integration of modes and services. Vertical integration of infrastructure, operations and customer services also seems to have been a positive feature, producing synergies between in-house specialists, and a culture that has encouraged innovation to create a more inclusive journey environment. Furthermore, a productive dialogue has developed between the public transport operator and an active and broad-based local organisation representing disabled people with diverse requirements. Thus, a considerable body of expertise and experience can be drawn upon

Figure 4: Pedestrian crossing point on the SSB light rail systems



Figure 5: The design allows for good sightlines throughout the station

to develop solutions that take realistic account of real-world constraints at 'street level'. Above all, this transport operator seems to have a long-term vision: a consistent strategy for small-scale improvements, the sum of which can make a considerable difference to accessibility and inclusion.



Figure 6: This station makes the most of natural light while still protecting against the elements

This article is based on research carried out by the author for the VISIT project – Visualising Safe and Inclusive Transport Environments – on station design within the AUNT-SUE research programme. AUNT-SUE is funded by the Engineering and Physical Sciences Research Council. For more information, refer to Access by Design issue 115, or visit the AUNT-SUE website. www.aunt-sue.info

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