EBSF – ALL SYSTEMS CHANGE

With the European Bus System of the Future (EBSF)[1] project due to end this August, the question now is: what next? Will the work over the past four years pave the way for a radical change in the bus as a system, and so encourage a greater modal shift away from the car, and so help save cities from congestion and the planet from the nefarious effects of CO$_2$ emissions?

Efficient, flexible, and relatively cheap, buses are reckoned to carry around 80% of the world’s public transport riders, which equates to 33 billion bus passengers in Europe alone. Yet despite improvements over the years, the mode is still hampered by weaknesses in reliability, speeds, and design, and consequently continues to struggle along with a less-than-positive image. Enter the EBSF – 400 European experts, bus builders and equipment suppliers backed by the European Commission and led by the UITP. Eleven countries, 47 partners and €26 million of funding. Primordial, too, is the active role of five of the main bus manufacturers – Evobus/Mercedes, Irisbus Iveco, MAN, Scania, and Volvo, who between them represent around 80% of the supply market.

In addition to the figures, the EBSF’s mission statement is equally bold:
• to conceive and develop an innovative high-quality bus system which is fully integrated within the urban environment and that will demonstrate the full potential of a new generation of urban bus networks
• to make breakthrough designs for vehicles, infrastructure, and operations.

One of the overriding objectives of the EBSF has been to tackle a problem commonly posed by city authorities and bus operators: not always working together closely enough. “We want more collaboration, which will mean a more efficient bus service and transport connections,” says the project statement. “If buses and bus management improve, more people will use them.”

The four-year schedule has been divided into three phases, with the first six months spent defining the system, i.e. the needs of all the stakeholders; the second focusing on the vehicle, infrastructure, and operations; and the third on user cases.

THE BUS: HARDWARE OUTPUT

With the bus itself lying at the heart of the system, the project has focused on aspects essential to its working: accessibility/passenger flow, driver role/ergonomics, information systems, modularity/flexibility, and environment protection/energy savings. The final hardware output comprises the following four prototype vehicles that have been put to the test by partner operators in different cities across Europe:

Irisbus Iveco – Rome
Raising the comfort of passengers, even at peak travel times, improving the driver’s workplace to better address health and safety issues, and enhancing the remote maintenance system are the main objectives of the user case in Rome. On board the demonstrator developed by Irisbus Iveco, the number of seats available to passengers depends on the effective passenger flow. Several tests have allowed for the different combinations of seat arrangements to be verified, together with a limited number of passengers, to ensure correct flow during the bus services. In particular, special consideration has been given to the driver workplace, with modifications designed to improve security and safety aspects, and to encourage a simpler and more intuitive driving style.
Evobus – Bremerhaven
The new Citaro demonstrator bus has been running to highlight ways and means of reducing the existing physical and psychological constraints of using buses. Special lighting elements have been installed to show passengers the best spots to board, and so to avoid congestion at the doors. And to distinguish between occupied and unoccupied seats and reduce the time spent searching for a free place, the internal layout includes ceiling lights. In addition, the project has provided an advanced IT and communication system to achieve better reliability (which has also been retrofitted to buses already in service).

MAN – Budapest
Tested by Hungarian operator partner BKV Zrt, the Lion’s City GL type bus is an 18.75-metre articulated vehicle. Its five doors are designed to shorten dwell times at stops, while the passenger compartment is built for passenger flow, flexibility, and comfort. The design was based on scientific studies in the form of simulations carried out specifically for the EBSF by the Spanish Centre of Studies and Technical Research and the German Fraunhofer Institute.

Volvo – Gothenburg
The highlight of this entirely new vehicle is its centred driver workplace that aims to give drivers a greater feeling of security and better view of the traffic situation. This central position has been made possible by placing the front wheels in the front corners of the vehicle and locating the driver between them in the middle.

Meanwhile the interior layout is designed to boost passenger comfort, enhance accessibility, and shorten dwell times at stops.

A special focus of this trial has been the role of the driver at halts, with a curved, 17cm-high kerb stone used at all stops to reduce the gap between the platform and bus floor as far as possible. By lowering the bus at the stop, a small difference of 5cm of height still remains. The curved lower part of the kerb stone means the driver can bring the bus wheels up against the kerb without damaging them, or the tyres.

To increase accessibility, tests carried out include:
- driver training aspects
- visual guidance for drivers
- guidance for passengers (preparing for boarding)
- height and shape of curb stone
- the internal design of the bus.

Another field of research during this pilot has been assessing the impact of not allowing the driver to sell tickets, both for security and dwell time reasons. Alternative solutions explored include:
- ticket vending machines at major stops
- ticket machines for credit cards on board the bus
- mobile ticketing
- pre-ticketing at bus stops.

IT ARCHITECTURE PLATFORM
Alongside altering the vehicle environment to enhance its overall performance, the EBSF is also bringing ‘intelligence’ to the fore. As project director Umberto Guida rightly points out: Based on open technology, the IT architecture platform will give operators and transport authorities the opportunity to use public transport data anywhere in Europe through common mechanisms, standard rules, and protocols.

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To provide extra seating, the driver can release seven electrically folding seats in the forebody. A sophisticated 3D counting system, capable of distinguishing between children and adults, registers the passenger flow at the doors.

For safety purposes, the bus is equipped with conspicuous green uprights to facilitate passengers holding on, as well as vertical light barriers highlighting the entrance to avoid obstruction at the doors.

The bus is powered by a modern engine to reduce energy consumption. In terms of exhaust gases, it complies with the voluntary EEV standards (Enhanced Environmentally Friendly Vehicle), which set more demanding requirements for particulate emissions than the current Euro 5 emission standard.

In addition, the bus has a tele-diagnostic system that provides the data measured during service periods, and is available online, helping operators to reduce maintenance costs.

Irisbus Iveco hybrid bus in Rome
“Information technology lies at the heart of tomorrow’s public transport systems.” Within the EBSF, the IT work package, headed by Veolia Environment Research & Innovation, aims to harmonise data and language for systems to communicate between each other and so create a single, integrated IT platform.

“The real potential for boosting the appeal of the bus lies in its services,” insists Veolia’s technical director Antoine Hurel. “And this means two things: listening to the needs of passengers to provide easy access to information and the purchasing of tickets, timetables, and CCTV for security; and efficient production to reduce service costs, for example through the use of databases to enable predictive maintenance.”

Based on open technology, the IT architecture platform will give operators and transport authorities the opportunity to use public transport data anywhere in Europe through common mechanisms, standard rules, and protocols. It will enable the delivery of on-board applications communicate with each other through the IP network.

**ON A SECURE FOOTING NORA RUBBER FLOOR COVERINGS: EXPERTISE IN SUSTAINABILITY & DESIGN**

Floor coverings in rail vehicles or buses need to meet stringent requirements. There is a very good reason for the products from the rubber specialist nora systems being the first choice in the transport industry around the world. Design-oriented, environmentally compatible and durable – on an international scale, nora floor coverings stand for quality “made in Germany”.

On the safe side with nora: The rubber floor coverings meet all international standards for transport facilities, such as anti-slip properties or safety in the event of a fire. Apart from that, they are popular due to the wide range of innovative designs and due to their environmental compatibility: nora floor coverings are free of PVC, softeners or halogens, thereby making a contribution towards a healthy atmosphere in the interior space. Its extreme resistance to wear and its long service life also make it extremely economical.

nora systems GmbH with its headquarters in Weinheim was founded in 2007 from Freudenberg Bausysteme KG. With more than 80 percent market share in Germany and more than 50 percent worldwide, the company has been the market leader in the area of resilient floor coverings for many years now.

But it is not only the quality of the products which makes nora systems a premium supplier, their after-sales service is also top class: nora application engineers advise and support every one of their business partners over all project phases - from selection to fitting the floor covering.

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information that is both personalised and dynamic by providing access to a range of diverse data that includes:
• the bus position
• passengers’ profiles and destinations
• the next stops
• vehicle speed
• traffic conditions
Yet when it comes to making buses this smart, one of the big challenges is the physical barrier of cabling different interfaces. How can manufacturers make the best use of their time and money to wire up fleets to communicate with their back offices? “All we can do is standardise the interface upstream to reduce productivity costs,” explains Mr Hurel. Hence the reason the EBSF has defined standard installation requirements (hardware, cables, connectors, antennas, etc.) and installation rules to pre-equip vehicles.

Here Plug & Play comes into its own by enabling software upgrades and extra functions to be added to vehicles over time. New equipment can be automatically installed and configured, thus immensely facilitating both maintenance and daily operations.

And with six to seven years being the average cycle for upgrading on-board IT architecture – much shorter than the service life of your average bus – this approach represents an important step in the right direction. Furthermore, with IT architecture accounting for around 15 to 20% of the investment costs of a bus, the introduction of standards means that small communities will be able to benefit from the same technology as larger towns and cities. A standard architecture, says the EBSF, is more cost-effective for the following reasons:
• no more time and money wasted on developing specific interfaces
• tenders open to more competitors, thus helping to obtain better prices
• no more money wasted on redundant equipment: bus equipment (driver terminal, gateway, GPS, etc.) and infrastructure (stop signs, fleet management control, etc.) share the same architecture
• no more need to change the whole system when a change of specific equipment is necessary
• Plug & Play integration of the new applications and IT devices facilitates installation and on-board maintenance
• operation costs are lowered through the integration of multimodal information systems that allow for better urban and regional transport planning and enable the optimisation of connections between all modes and operators, as well as taking into account efficient action in the case of incidents.

The EBSF is working with the CEN TC 278 WG3 group to integrate its results with existing European standards. The project will provide CEN with the requirements for common European interfaces, protocols, and connectors (hardware), as well as rules of consumption for equipment. “The results of projects such as the EBSF often lead to standards and even legislation,” said Liam Breslin, DG research and innovation, European Commission. “The EBSF will lead to a huge improvement in services.”

Veolia Transdev, for one, is counting on such standardised interfaces and Plug & Play architectures coming into their own in the near future. “As an operator we aren’t just going to wait until the end of the project to act,” explained the operator’s managing director Jérôme Gallot. “Indeed, we have started anticipating the European standard that may be established following the work of the project.” The idea is to establish an option for EBSF architecture when purchasing vehicles. And with this perspective in mind, Veolia’s purchasing department already includes specifications
that relate to the EBSF architecture, e.g. pre-cabling and connections in new vehicles and renovation work on buses already in service.

“We are fully exploiting our purchasing powers,” added Mr Gallot.

**EBSF in the Field**

An intelligent system with innovative vehicles and infrastructure, integrated into European urban scenarios, the EBSF initiative hopes to contribute to a change of culture from the users’ point of view, making more people choose the bus as a solution to their urban mobility needs. “We realistically expect the innovative EBSF solutions will start to be implemented all over Europe after 2012 by the main European bus manufacturers involved in the project,” said Mr Guida. “This will hopefully contribute to the achievement of the UITP strategy ‘Public transport: the smart green solution’ for the entire sector, which aims at doubling the market share of public transport worldwide by 2025.”

The Europe-wide partnership of the EBSF also illustrates how public transport has crossed borders, extending its reach beyond national boundaries. In the words of Hans Rat, former secretary general of the UITP: “Public transport used to be a local or national affair 15 years ago. Today it is international.”

Lesley Brown

References

[1] For more information visit www.ebsf.eu

[2] The IT specifications are now available on the project website

The project brings together the five leading European bus manufacturers (Evobus/Mercedes, Irisbus/Iveco, MAN, Scania, Volvo) and 42 other partners including transport operators and national transport associations (RATP, ATAC Rome, Veolia, TEC, Bremerhaven Bus, Verona, RATB, BKV, VDV, ASSTRA, UITP), public transport authorities (Västtrafik Gothenburg, Nantes Métropole, Consortio Regional de Transportes Madrid), the supply industry (Hübner, Init, Digigroup, Ineo, Pilotfish, Actia, Högia, Vulturon, Tekia), and major research centres, universities and consultancy firms (D’Appolonia, Helmut Berends Consultancy, CERU, Chalmers, CEIT, Fraunhofer, Transys, FIT, Newcastle University, PE International, IFSTAR, University of Rome 3, University of Rome/DITS, TIS, CRF).