



MID TERM REVIEW CITY BUS MODERNISATION (CBM) DELIBERATION WORKSHOP



CITY BUS MODERNIZATION – IMPLEMENTING “ITS” IN CHANDIGARH TRANSPORT UNDERTAKING (CTU)

CONTENT:

- 1. Our experience**
- 2. Project for Chandigarh Transport Undertaking (CTU)**
- 3. Lessons learnt from previous experiences**
- 4. Challenges and points to be noted in CTU's project**

PERFECT CONSORTIUM



Tekia is an international consulting company, **specialized in Intelligent Transportation Systems.**

SGS is the world's leading inspection, verification, testing and certification company. It is **located in India** and provides competitive advantage, drive sustainability and deliver trust.

The technical expertise of TEKiA & SGS complement each other with an excellent international and national knowledge of Transit Management Systems and local conditions.

TEKIA: INTERNATIONAL ITS CONSULTING



ITS BUSINESS AREAS

- ✓ Public Transport Management
- ✓ Smart Mobility
- ✓ Traffic Management
- ✓ Electronic Toll Collection (ETC)
- ✓ Highway Management
- ✓ Tunnels Safety
- ✓ Strategic ITS

SOME RELEVANT EXPERIENCES ON ITS PROJECTS

PUBLIC TRANSPORT

- ✓ Engineering Service and Technical Assistance for the definition, development and implementation of a contactless Fare Collection System, for the urban and interurban bus operators, in the Metropolitan Region of Barcelona (Spain). –BARCELONA, SPAIN
- ✓ Automatic Fare Collection BiT project in Madrid region for all transport modes METRO, TRAIN, LIGHTRAIL AND BUSES using Smart Card and advanced security technologies – MADRID, SPAIN
- ✓ Regional Information System including 600 stop information panels under the Public Transport Modernization Plan – MADRID, SPAIN
- ✓ EBSF (European Bus of the Future) Project to reach a European agreement about the on-board technology on the future buses (Horizon 2020 Program)
- ✓ Technical Assistance for development of an AVL, FCS and PIS integrated solution for South American cities (Pilot in Chile)
- ✓ Fare collection project and other ITS technologies in public transport in the city of Lima and technical assistance to bidding process of the Fare Collection System in Lima and other equipment of the buses fleet (Advanced Vehicle Location & Monitoring and Passenger Information System) – LIMA, PERU

SOME RELEVANT EXPERIENCES ON ITS PROJECTS

SMART MOBILITY

- ✓ BARCELONA
 - ✓ Definition of Integrated Library Public Services (Public Transport, Administration, culture, museums, sports facilities, parking meters, car parks, bicycle hire, libraries) for the City of Barcelona
- ✓ CHILE
 - ✓ Diagnosis of the Regional Traffic Control Centers in Chile
 - ✓ Analysis for the deployment of a Smart City (Functional Model)
 - ✓ Technical specifications analysis for Smart Mobility model (Technological Model)
- ✓ PERU
 - ✓ Development for the traffic and transport enforcement through electronic media in Metropolitan Lima

PROJECT FOR CHANDIGARH TRANSPORT UNDERTAKING (CTU)

Project figures:

- **Chandigarh Population:** 10.55 lakh as per census 2011.
- **Bus Ridership:** 1.40 lakh approximately
- **CTU's city bus Fleet:** 392



PROJECT FOR CHANDIGARH TRANSPORT UNDERTAKING (C.T.U.)

Future deployment:

- Automatic Fare Collection System (FCS)
- Automatic Vehicle Location (AVL)
- Passenger Information System (PIS)
- Depot Management System (TMS)
- Scheduling & Rostering
- Transit Management Centre (TMC)

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- **Payment means accepted on-board:**
 - Contactless smartcard (SC) & Cash
- **Sales and distribution of smart cards:**
 - Costumer Service Points (CSPs)
 - Internet, APP and telephone sales.
 - Mail delivery to his address.
 - Pick up in a POS.
- **Recharges:**
 - Points of sale (POS).
 - Costumer Service Points (CSPs).
 - Internet, APP and telephone.

LESSONS LEARNT. Pre-implementation (Solution Design)

- **General issues:**

- **Integration:**

- For optimal efficiency, all systems should be integrated sharing a common data structure.
- Standardized data models such as Transmodel, SIRI (or similar ones) are highly recommended. Companies with low experience in this field use simplified models providing systems that are not easy for future integrations and evolutions.
- Standardized and unified models optimize information updating processes and reduce the probability of errors in data editing.
- Specific requirements need to be defined at on-board level (i.e.: AFC – AVL integration: lines, bus stops, ...) and at level TMC.

- **Intellectual property issues**

- Fare integration requirements (memory map and/or data storing structure of the SC, functional specifications of each field equipment, ...).
- Non proprietary communications protocols (at on-board level and TMC level).
- Source code ownership.

- **Open Source.** Use of open source tools and software to reduce the costs of software licenses.

- For instance: database-management system in TMC.

LESSONS LEARNT. Pre-implementation (Solution Design)

• AFCS:

• **Objective:**

- To reduce on-board cash management. It is essential to implement fare policies that promotes the use of SmartCard (SC).

• **Single journey issue:** on-board cash payment & wide sales network.

• **Future complementary payment means:**

- Smartphones:
 - NFC (not recommended as payment mean from the beginning; to consider like SmartCard recharge device -> required user bank account).
 - EMV (only hardware compatibility).

• **Sales and recharge network:**

- CSM: Customer Services Points –Sales, recharges, complaint's management.
- POS: recharges.
- Internet, APP and IVRS (call centre): SC sales, SC recharges, some complaint's management.

• **Inspection:**

- Legal framework required.



LESSONS LEARNT. Pre-implementation (Solution Design)

• AVL & PIS:

• Transport company operations need to be re-defined

- Implementation is not only a question of equipment but training and new procedures.
- 12-24 months implementation periods until stable operation are not rare.

• Bus stops boards:

- Very interesting for users, only to be installed after AVL is running well.
- Power supply connection could be very expensive, depending on location.
- Avoid installation in areas that are not vandalism free.

• Communications:

- Between TMC and ETMs (AFCS): 3G/4G Primary communication main, with “latency time” < 2 minutes (*between on-board transaction record and message reception in TMC*).
- Between Depots and vehicles, external on-board WiFi. For:
 - SW updatings.
 - Download on-board videos.



LESSONS LEARNT. Pre-implementation (Solution Design)

• Cloud computing:

- This is a future trend, gradually being extended.
- When using cloud computing, Transport Operator/Authority does not need to worry about:
 - Power supply disruptions.
 - Hardware maintenance, redundancies.
 - Software processes supervision.
 - Software and information backup.
- When Transport Operator/Authority decide to have their own centre:
 - A support team (IT specialist) need to be provided, ready to act 24/7/365.
 - Their own IT specialists have a good control over the systems.
 - They need to care about secure power supply, hardware redundancy, data storage, supervision of software processes, etc.
 - Operation of the centre and full access to the information does not rely on an internet connection.
 - They do not need to pay a monthly fee for clouding
- It is suggested to start with the traditional approach (Transport Authority/Transport Operator operates and maintains its own center equipment), and later to migrate to a cloud computing system, but it depends on clients strategy concerning IT.



LESSONS LEARNT. Implementation & Post-Implementation

- **Installation requirements:**
 - On-board communications: Triband antenna (GPS, 3G/4G, WiFi).
- **Implementation recommendations:**
 - Careful planning for not affecting the transportation service.
 - Issues to take into account:
 - Daily production capacity of the System Integrator (for example: buses/day)
 - Maximum number of daily buses that CTU can immobilize without affecting the transport service.
- **Training and knowledge transfer:**
 - Careful planning for not affecting the transport service: especially for drivers and conductors.



CHALLENGES AND POINTS TO BE NOTED IN PROJECT OF CTU

- Re-use of current on-board equipment: even if it is compliant with UBS-II, operational status of equipment and software capabilities are unclear.
- Integration of different sub-systems.
- Budget constraints & ambitious scope:
 - ITS (AVL, AFCS, PIS, Scheduling & Rostering, TMC).
 - TMS (Depot, Workshop, Stores and Inventory, HR & Payroll, Managerial MIS/ERP Functions).
- Organizational challenge for CTU while many ongoing changes for CTU: new buses, lines being re-planned, city card?,...



THANK YOU

