

➤ TRAINING REPORT

# PLANNING, PROCUREMENT AND MANAGEMENT OF ELECTRIC BUSES

DECEMBER | 2021



International Association of Public Transport (UITP)  
Rue Sainte-Marie, 6 | B-1080 Brussels | Belgium

Tel: +32 2 673 61 00  
[info@uitp.org](mailto:info@uitp.org)  
[www.uitp.org](http://www.uitp.org)

© UITP – International Association of Public Transport, 2021

All rights reserved / No part of this publication may be reproduced or transmitted in any form or by any means without the written permission of the International Association of Public Transport

# TABLE OF CONTENTS

— 2 —

Introduction

— 3 —

Key Session Outcomes

— 11 —

Valedictory Session



## INTRODUCTION

UITP India, supported by Association of State Road Transport Undertakings (ASRTU) hosted a 1 and a half day training programme on Planning, Procurement and Management of Electric Buses in the city of Jaipur, India on 02-03 December 2021. The event was first of the in-person training programme after COVID-19 pandemic, and was successfully attended by 53 participants representing 16 State Transport Undertakings (STUs), 2 Original Equipment Manufacturers (OEMs), and other Non-profit organisations.

The training programme had 10 key national and international speakers and trainers joining in-person and online sharing their knowledge on key topics, namely procurement of electric buses, financial planning for transition to electric buses, route and depot level planning for electric buses and depot and contract management of electric buses. The key highlight of the training programme was the working session on procurement specifications which saw active participation of STUs working together in groups.

The training programme was kicked off by the opening remarks by Ms Rupa Nandy, Head of UITP India, followed by Captain Vinod Vasant Ratnaparkhi, Executive Director, ASRTU highlighting the urgency and importance of transition-



▶ Ms Rupa Nandy, Head of UITP India



▶ Capt. Vinod Vasant Ratnaparkhi, Executive Director, ASRTU

ing the existing bus fleet to electric buses. Ms. Mahua Acharya, CEO, Convergence Energy Services Limited (CESL) who joined online, motivated the participants and appealed them for a change towards adopting cleaner modes of transportation, and transitioning to electric buses.



▶ Ms Mahua Acharya, CEO, CESL

## KEY SESSION OUTCOMES

The sessions from the report focused on topics relating procurement of e-buses, specific improvement needed in Indian scenario, Financial Planning for the procurement, route and depot level planning and finally the contract management for the buses. A brief summary of all session is as follows.

### SESSION I: PROCUREMENT OF ELECTRIC BUSES

#### Electric bus procurement in India: The story so far

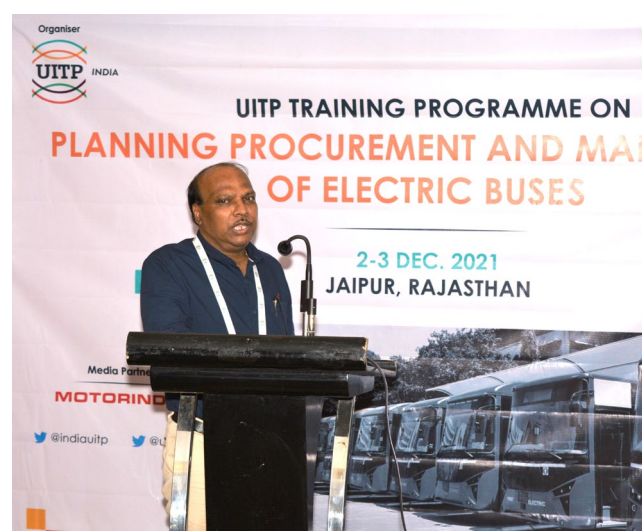
1. **Dr Ravi Gadepalli and Mr Lalit Kumar, UITP India**, shared the electric bus procurement progress so far in India with Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME) I scheme launched in 2017, followed by FAME II scheme in 2019, now extended up to 2024.
2. The key trends observed during FAME-II included low participation by bidders leading to higher GCC cost than expected, the Total Cost of Ownership (TCO) for electric buses higher than their Internal Combustion Engine (ICE) counterparts despite subsidy and variations in GCC cost across various cities.
3. Analysing the different cities E-Bus tenders, Mr Lalit discussed the key drivers that influence bidder's participation. He suggested that the conditions related to eligibility criteria, physical and financial obligations, payment timelines and penalties, and technical specifications are key to bring in more competition in the bidding process leading to reduction in the quoted rates.
4. In order to reduce the TCO, authorities need to target specific cost component under TCO of electric bus. The cities should also create a pool of eligible bidders based on pre-determined eligibility criteria. The focus should be given on tendering process and criteria for bid evaluation in order to achieve the sustainable bus operations.



5. They also highlighted that there is a need to harmonise RFP and MCAs to improve bankability and encourage competition. The operational expenditure risk of operators can be reduced by establishing loan guarantee mechanism and guarantee mechanism for timely payments.

#### Procurement challenges-The bus agency perspective

1. **Mr C.S.Birajdar, BEST Undertaking, Mumbai** explained challenges in E-bus tendering in Indian context by comparing the two tenders floated by Brihanmumbai Electricity Supply and Transport (BEST).
2. Discussing the experience of both outright purchase as well as GCC of electric bus operations by BEST, Mr. Birajdar discussed the tendering challenges faced over the course of time. For instance, during FAME-II tender, many Original Equipment Manufacturers (OEMs) requested for lower operating range, higher assured kilometers, requirement of opportunity charging and increased payment for under-utilised and over-utilised kilometers.



3. Keeping in mind the OEMs request, BEST made changes in recent tender of 1900 electric buses. For example, the contract period is increased to 12 years from 10 years. Maharashtra state EV policy incentives are clubbed with FAME-II incentive, opportunity charging up to 60 minutes is provided, assured kilometers increased to 5800 kilometers, and subsequent reduction in subsidy bank guarantee and infractions are capped at 5%.
4. All these changes resulted in up to 35% reduction in the GCC rate in comparison to last tender. The similar exercise can be conducted by other cities to attract more bidders and reduce the prices.



## SESSION II: PROCUREMENT OF ELECTRIC BUSES: IMPROVEMENT NEEDS

### Improving bankability of Gross Cost Contracts (GCC) and emerging business models for electric buses

1. Mr Gerald Ollivier, Lead Transport Specialist, World Bank, discussed the changes required to improve the bankability of GCC and emerging business models for electric buses.
2. Mr. Gerald discussed that providing an enabling improvement for private sector through less complex steps such as the consistent Goods and Services Tax (GST) regime, separate funding for infrastructure readiness, balanced subsidy structures and systematic approach for e-bus implementation can have high impact. Based on the analysis of 11 tenders representing authorities across 28 cities, bidding outcomes and MCA, following recommendations were considered as high impactful on prioritised basis to
  3. He suggested to provide a framework for different business models that should include institutional readiness, financial capacity of the state/ city, aggregated potential for procurement, operational capabilities and energy readiness. Based on the parameters, the state-led aggregator model or market-led aggregator model can be selected.
  4. He also suggested that the cities need to improve their capacity to monitor performance of operators and improve transparency in payments. The monitoring of vehicle and operational performance through warranties, ITS will lead to efficient management of payments and penalties.

**Measures to improve bankability**

Summary of important measures to improve bankability, prepared based on

(a) perspectives of various stakeholders,

(b) estimated impact on

- Bid Participation, and
- Affordability (i.e. Cost for the STU / Authority)

		Impact on Bid Participation	
		High	Low
	High	<b>PRIORITY-II</b> - Standardization of RFP and MCA - Program Timelines - E-Bus Specifications	<b>PRIORITY-I</b> - Removal of (relaxation in) Subsidy Bank Guarantee requirement
		- Relax exit rules (change in ownership) - Payment Security - Escrow Account (Supplementary Escrow Agreement)	- Capping of penalties - Payment securities - Termination and force majeure
		- Eligibility criteria	- Bid timelines - Readiness of the Authority - Creditworthiness of the Authority
	Low	<b>PRIORITY-III</b> - Advisory Cell within DHI - Accelerated Depreciation	<b>PRIORITY-II</b> - Reduction in GST rate on leasing, supply, subcontracting activities - Change in subsidy structure
		- Payment Cycle	- Fee Revision - Payment for Underutilized KMs
		<b>Low</b>	<b>High</b>
		<b>Impact on TCO</b>	

*Leg:*

<b>Policy level interventions</b> Primarily to be done by GoI (NITI Aayog, DHI, and respective line ministries)	<b>RFP and Tendering Process</b> Primarily to be addressed by respective tendering authorities
<b>Concession Agreement</b> Primarily to be addressed by GoI (NITI Aayog and DHI) and followed by respective tendering authorities	<b>Counterparty</b> Primarily to be addressed by respective tendering authorities and respective state/city governments

Transcript

### Modifications needed in the Model Concession Agreements (MCA)

1. Mr Pankaj Sinha, International Finance Corporation shared insights into Model Concessional Agreements of the electric bus tenders and modifications required to increase the uptake.
2. He suggested that the authority should provide the utility connection including electricity connection to the maintenance depot as they are best placed to manage this responsibility. The norms to allow change of ownership should be relaxed in order to make the project more attractive to investors and circulation of capital.

3. He also discussed that the payment for under-utilised kilometers should be at GCC rate or in any case should not be below 70% of GCC rate as this would enable the operator to better manage its working capital requirement. On the other hand, there should be capping on the penalties as equivalent of monthly payment. The recommended values are 3% to 5% as capping of penalties ensure that it does not hamper the ability of operator to meet operational and maintenance obligations.

ORGANISER  
UITP  
ADVANCING PUBLIC TRANSPORT

PARTNER  
IFC  
International Finance Corporation  
WORLD BANK GROUP  
Creating Markets, Creating Opportunities

**E-Bus PPP:  
Sharing IFC perspective  
on e-bus MCA**

Presented By:  
**Pankaj Sinha**

UITP Training Programme On  
Planning and Procurement of  
Electric Buses  
2-3 December 2021  
JAIPUR, RAJASTHAN

GO  
Gerald Paul Olivier  
NANDY Rupa  
KL  
KUMAR Lalit  
DD  
DHOK Divyanka

4. In order to make any contract bankable, there should be due diligence from technical, legal and financial perspective as well as consultations with key stakeholders.

**Our Products and Services**  
IFC offers a wide range of products and integrated solution to increase development impacts for our clients

IFC

**INVESTMENT**

- Loans
  - Project and corporate financing
  - On-lending through intermediary institutions
- Equity
  - Direct equity investments
  - Private equity funds
- Trade and Commodity Finance
  - Guarantee of trade-related payment obligations of approved financial institutions
- Derivative and Structured Finance
  - Derivative products to hedge interest rate, currency, or commodity-price exposures of IFC clients
- Blended Finance
  - Using donor funds to crowd in private financing
- Syndications
  - Capital mobilization to serve development needs

**UPSTREAM**

- Create proprietary projects and investment opportunities by developing a sustainable pipeline of bankable transactions
  - Early-stage, project level intervention in return for proprietary rights for equity and debt arranger role
  - Promoting and anchoring the design and implementation of platforms and programmatic approaches
  - Working closely across the World Bank Group to help develop policies, regulations and frameworks for private sector investments

**ADVISORY**

Innovative Solutions Combining IFC's Expertise and Tools to:

- Structuring and implementing public-private partnership transactions
- Help create markets
- Unlock investment opportunities
- Strengthen clients' performance and impact
- Improve environmental, social, and corporate governance standards

KUMAR Vipul

Pankaj Sinha



### SESSION III: WORKING SESSION ON PROCUREMENT SPECIFICATIONS

1. Mr. C.K. Goyal, Vice-President DIMTS guided the working session on procurement specifications of electric buses.
2. From the public transport authority view, he focused on key terms and conditions of bid document such as e-bus specification, infrastructure required, bank guarantee, and payment terms. He also discussed



key implementation challenges such as development of charging infrastructure, battery type, maintenance of vehicles, energy consumption, and sustainability of infrastructure over 10-12 years.

3. Reflecting on the OPEX Model and developing an eco-system for operation of electric buses, Mr. Goyal discussed key contractual obligations such as provision of power load, guaranteed timely payments, unified timetable for public operators, and formation of economic unit at depot level for open bidding. Mr. Goyal also discussed the key learning from different case cities examples such as BEST Mumbai, BMTC Bangalore and Shenzhen.
4. In the second half of the session, the participants participated in a group activity on discussing the financial and technical procurement specifications of different case study cities. Divided into four groups, with each group constituting a team of about 8-9 members, the teams discussed the best and alternative financial and technical options for procurement of e-buses. The group activity provided an opportunity for officials of different state transport authorities to brainstorm and work on real-time modalities of e-bus procurement.



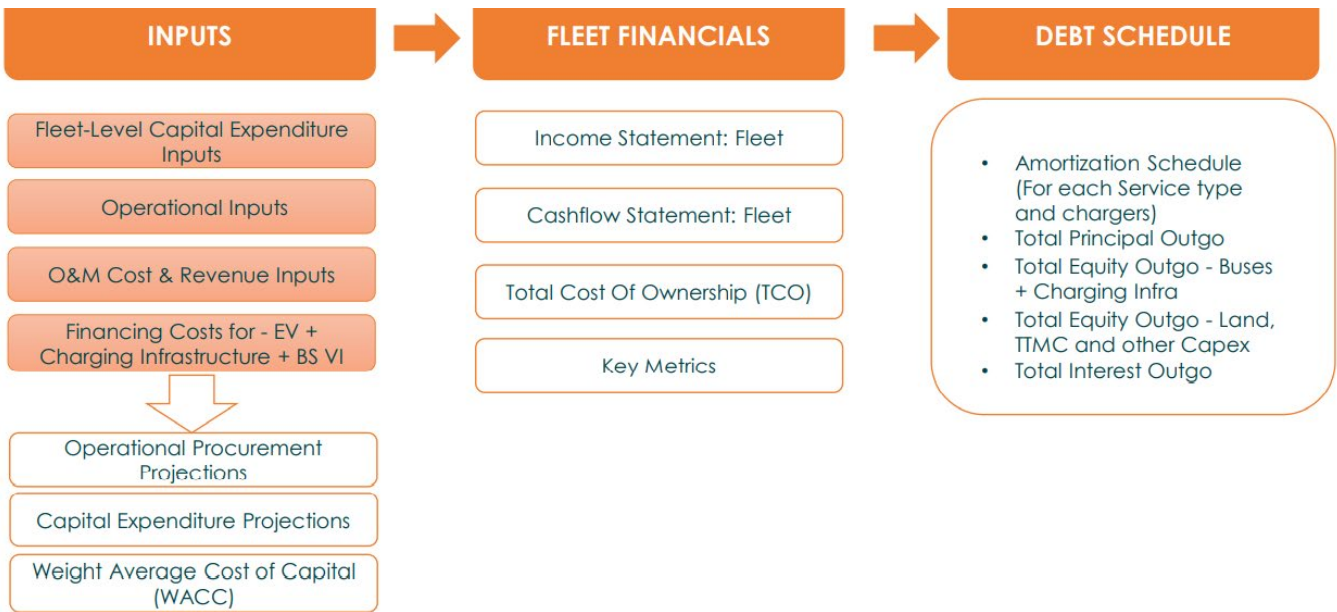


## SESSION IV: FINANCIAL PLANNING FOR TRANSITION TO ELECTRIC BUSES

Fleet level Total Cost of Ownership (TCO)  
Financial modelling framework for in-house and outsourced e-buses

1. Mr. Sagar Gubbi, Managing Director, Ecoforge Advisors Private Limited discussed financial planning

for transition to electric buses taking the case of Karnataka State Road Transportation Corporation (KSRTC). This model, included operational and financial inputs, fleet financials calculations and debt schedule. It also includes outputs such as estimation of fleet-level investments, estimation of fleet level revenue, total cost of ownership, payback period, internal rate of return, and sensitivity analysis.



2. He discussed in detail the different scenarios for KSRTC comprising mix of BS VI buses and electric buses, and funding through internal CAPEX or through GCC model. Mr. Sagar explained how the KSRTC is indicative and can be modified for each operator and STU's different specifications and demands.



## SESSION V: ROUTE AND DEPOT LEVEL PLANNING FOR ELECTRIC BUSES

### Need for Route level planning for electric buses- Case study of Bangalore and Santiago

1. Mr. Ray Minjares, Director of Heavy-Duty Vehicle Program, ICCT shared his insights of ICCT perspective on E bus deployment, primarily in Latin America (Santiago, Chili and Bogota, Colombia) which has the largest scale deployments of e-buses outside of China.
2. For the Latin American context, he explained how of the 4 stages of market transition (commitment towards procuring e-buses, pilot on a small scale, early scale up stage after successful pilot and commercial level scale up), Santiago and Bogota have reached
3. Mr. Minjares focused his presentation on two lessons. Lesson 1 on management of technical risk of procurement by undertaking fleet and route level planning, which determine the easiest routes to electrify, and informs the process of simulating the performance and charging strategy of e-buses in detail on those routes for delivering diesel equivalent performance along the route.
4. Lesson 2 focused on pursuing new financing and business models, taking a case of Santiago, Chili to unlock private investment and rapidly scale up e-bus deployment. He included examples such as utility company procuring e-buses through outright purchase and leasing it to operators, and government having two separate contracts with operators, one for bus provision, and another for operation to invite different players to emerge, and form cost effective consortia. Thus, these two lessons may help cities transition faster to e-buses and bring in new investors.



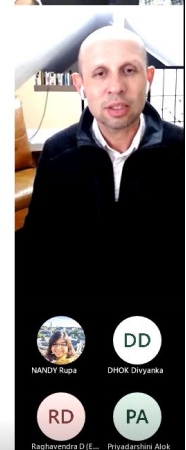
### > Santiago, Chile: Largest Operational E-Bus Fleet in Latin America

#### QUICK FACTS

- 784 ebuses in regular operation
- 991 additional ebuses purchased in 2021
- 6,981 total buses in regular operation
- 271 total chargers across 11 depots
- 32 mW installed charging capacity
- 7 ebus models available in Chile
- 2035 target for 100% zero-emission bus fleet



Courtesy: ZEBRA/COPEC





## SESSION VI: DEPOT AND CONTRACT MANAGEMENT OF ELECTRIC BUSES

### Depot layout planning for electric buses

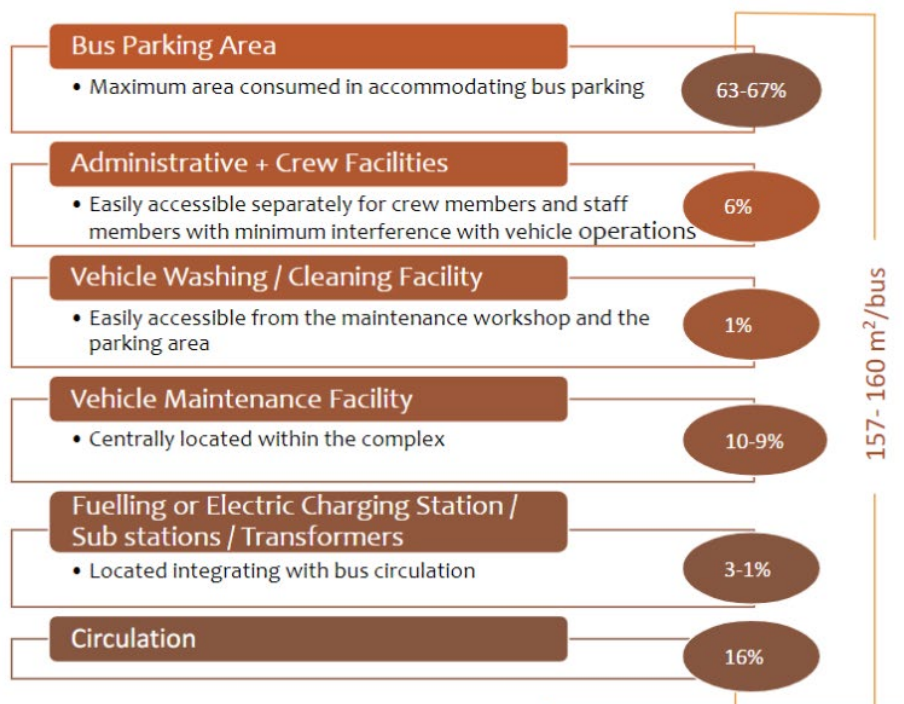
1. **Dr Sandeep Gandhi** in his session focused on Bus Depot Design essential for e-buses. He started by sharing the differences in bus depot operations for diesel and electric buses, and thus emphasising on the difference in design of both depots.
2. The six functional areas for e-buses were discussed along with the space allocation distribution to it. In each of these six functional areas, the detailed facility planning, and spatial requirement was listed.



3. For fueling and charging stations, the design of bus space was focused on to ensure optimum utilisation of space.
4. Examples of master plans of electric bus depot designs for different cities were shared to elaborate on the need of optimum space utilisation.

### > Functional Areas

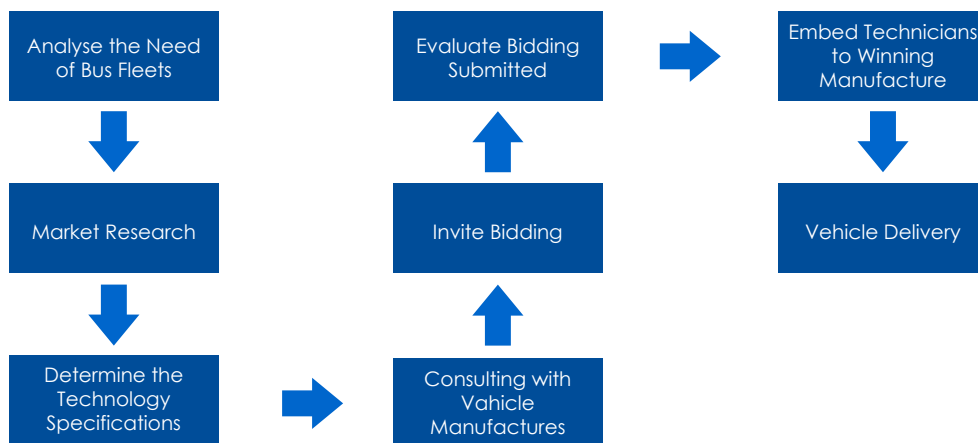
(120 buses)



## Case study of shenzhen

1. Chris Liang from Shenzhen Bus Group (SZBG) shared Shenzhen's experience with electric buses. He focused on how there is a need of good vehicle (technical specifications, sturdy chassis, sufficient space and clearance, and drivability), appropriate operating environment (temperature, terrain, route length, headway) and permissive technical ecosystem (charging infrastructure, unified charging protocol, electricity price and used battery utilisation).
2. He showcased the cost difference of e-bus and diesel buses, with e-buses having lesser cost for energy, repair and other cost. SZBG also focused on electric fleet rather than only electric buses, thus including metros and taxis.
3. He also shared the steps taken up by SZBG for electrification of buses.

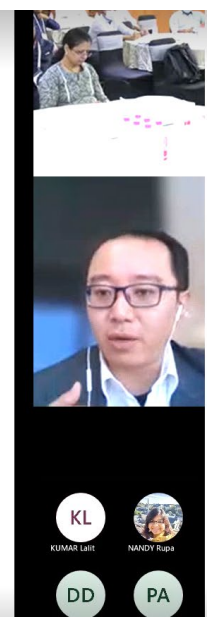
### > Procurement Workflow



4. SZBG started electrification of buses with about 50percent CAPEX subsidies from the national and local level. However, these subsidies are decreasing over the years, asking operators to think of economical and appropriate models in the future.
5. He explained the process how SZBG started the electrification of buses and the workflow adopted for procurement of these buses.
6. He also emphasised how the intelligent bus management system based on historical operational data, dispatch analysis, timetable and with the local dispatch center- help in fleet management and dispatch the buses on

### > Permissive Technical Ecosystem

- Charging Infrastructure
- Unified Charging Protocol
- Electricity Price
- Used Battery Utilization





## VALEDICTORY SESSION

The 1 and half day training programme was successfully completed with active participation and discussions among the participants. Participants from the State Transport Undertakings, and Metro operators such as Noida Metro Rail Corporation, and Nagaland State Transport Undertaking reflected on some of the learnings from two days of training programme. Lastly, mementos and participation certificate were presented to the trainers and participants by Ms Rupa Nandy, Head of UITP India.



---

This is an official Report of UITP, the International Association of Public Transport. UITP has more than 1,800 member companies in 100 countries throughout the world and represents the interests of key players in this sector. Its membership includes transport authorities, operators, both private and public, in all modes of collective passenger transport, and the industry. UITP addresses the economic, technical, organisation and management aspects of passenger transport, as well as the development of policy for mobility and public transport worldwide.

This Report was prepared by UITP India.



Rue Sainte-Marie 6, B-1080 Brussels, Belgium | Tel +32 (0)2 673 61 00 | Fax +32 (0)2 660 10 72 | [info@uitp.org](mailto:info@uitp.org) | [www.uitp.org](http://www.uitp.org)

**DECEMBER | 2021**