GUIDELINES FOR USE OF DELIVERABLE D.T1.3.4

Transnational Tool. Focus on Tariff & Ticketing

Version 1.0
032018

Features of the Tariff & Ticketing specific Transnational tool [D.T1.3.5]

The transnational tool for the implementation of multimodal integrated tariff and ticketing schemes (Deliverable D.T1.3.5) is aiming at providing a guidance for public authorities and public passenger transport operators in taking decisions on implementation of integrated tariff and ticketing schemes when planning implementation of ticketing systems integration. A decision support tool is focussed on facilitation of conception and planning phases for interventions and actions in CE regions and cross-border connectivity as well as on other EU public transport networks.

The decision support tool provides information on six major elements of tariff and ticketing systems that need to be addressed for successful integration of the public transport systems:

- tariff model
- tariff products
- ticket medium
- ticket sale (distribution)
- ticket validation
- ticket control.

Thus, with reference to the object the tariff and ticketing tool is composed of 6 elementary tools, each referring to one of the above listed system elements.

The tool is based on the expert knowledge gained through the analysis of the existing tariff and ticketing systems in CE regions, with particular focus on cross-border public transport services, and also on the lessons learned from identified EU best practices on successful EU cross-border implementations as well as cases where state of the art tariff and ticketing solutions have been applied. The aforementioned analyses have been delivered in the Deliverable D.T1.2.14 “Transnational study on multimodal integrated tariffs and ticketing”.

1.1. Implementation of the tool

The tariff and ticketing tool has been developed in the form of a knowledge base drawn by the user through the questionnaire where the user is asked about the features of actual tariff and ticketing system that is subject to integration and also about the user’s preferences and potential development plans. The result of the provided answers to the questionnaire is presented in the list of recommendations, proposals and remarks that is adapted to the specific user’s input.

The tool has been elaborated in the EUSurvey web portal platform where the questionnaire and the expert knowledge base have been implemented. Tariff & Ticketing Tool is segmented to 6 elementary tools that are accessed independently according to the user’s preference and focus (the user selects the topic that he/she would like to examine, e.g. the tool on Ticket Medium).

Implementation of the tool is presented in the flowchart showing the required user’s inputs, tool processing flow (decision and processing elements) and the expected results[1] gained from the knowledge base.

Flowchart elements are featured by the shape and colour as explained below:

- shape:
  - rectangle: values entered by the user or the web survey platform
  - parallelogram: YES/NO decision element
  - hexagon: multiple choice decision element

[1] Each recommendation, proposal or remark has a unique code referenced by the the flowchart.

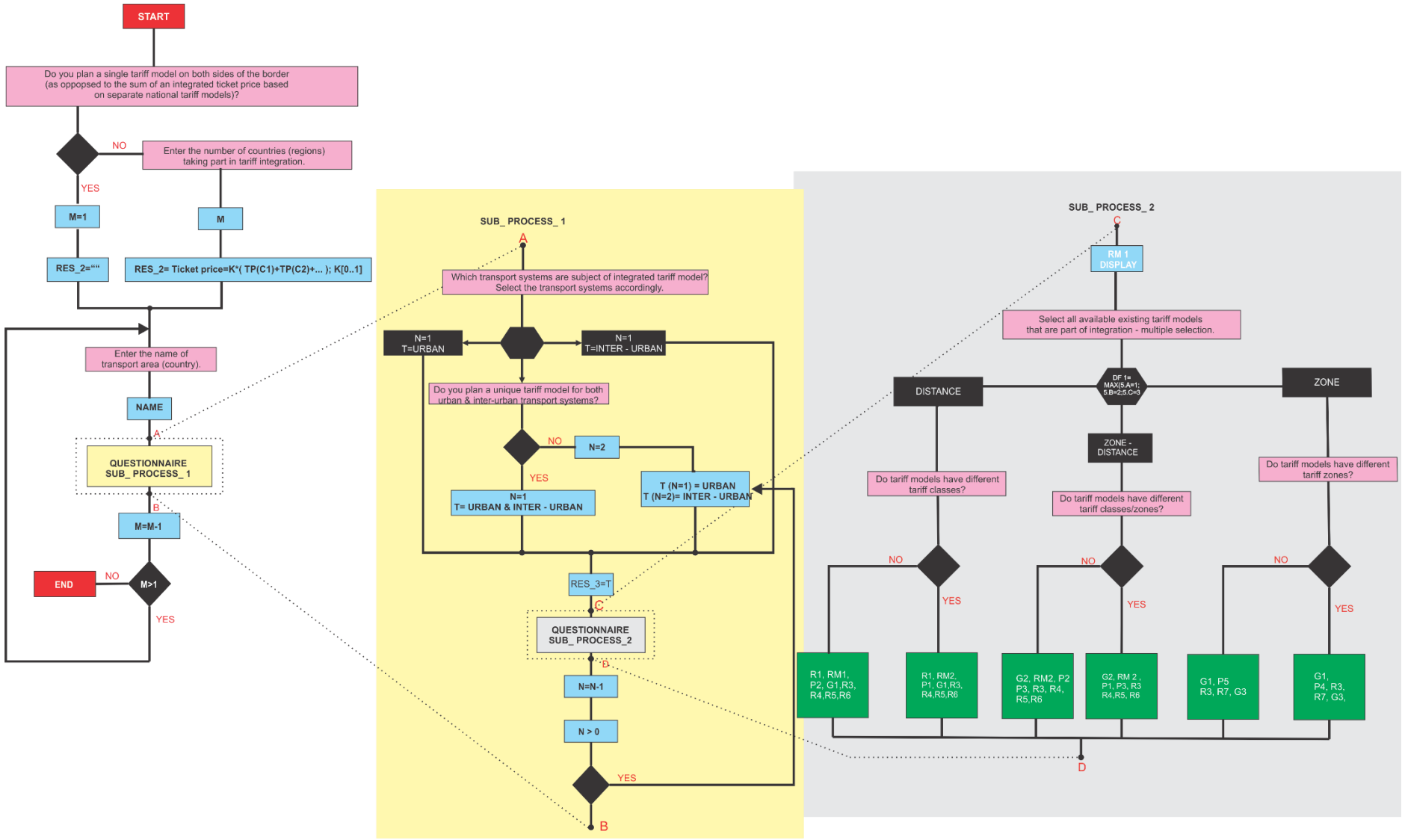
- colour:
  - red: begin, end
  - pink: user's input
  - blue: processed information by the web survey platform (assignation of values)
  - black: single/multi-choice decision elements and decision results
  - green: result of the tool.

Aditionally to the general process flowchart also specific flowcharts for implementation in the EUSurvey web tool have been elaborated. They follow the specific implementation logics and available functionality of the web survey platform. They are specific to the particular tool implementation and are not specified in this document.

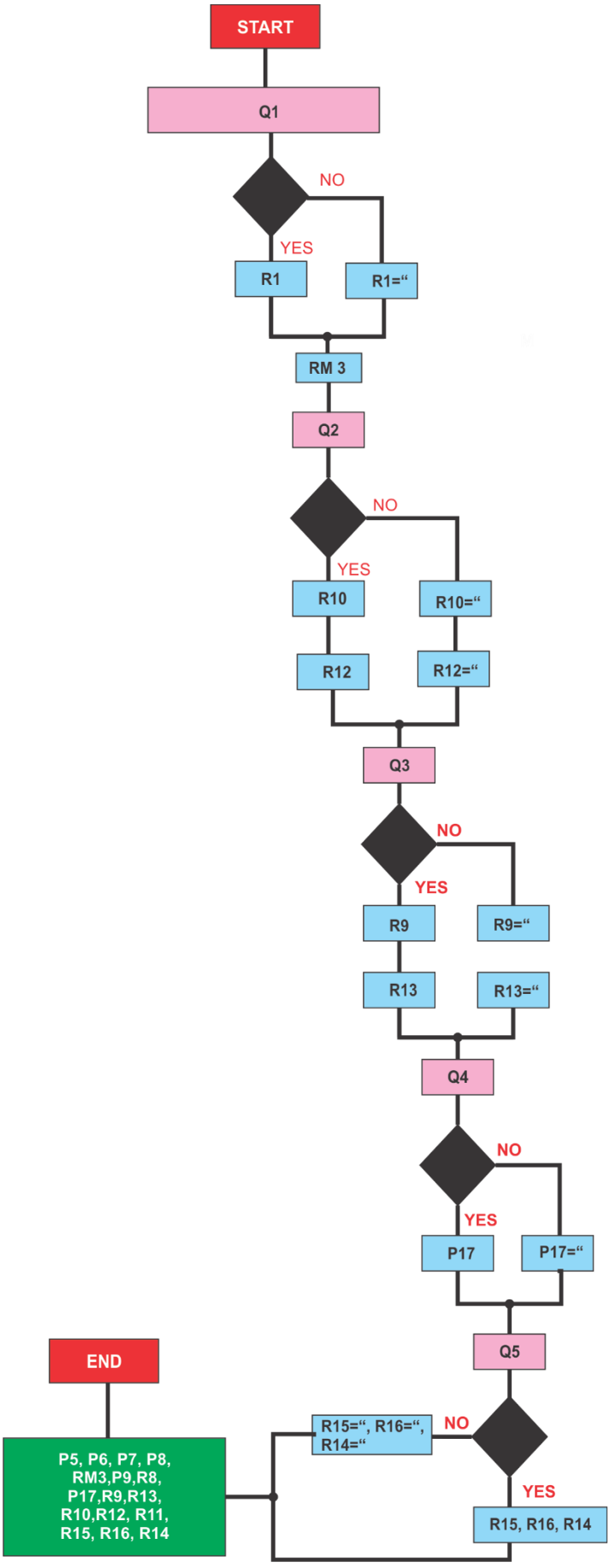
The flowcharts for the six Tariff & Ticketing elementary tools as well as the expert knowledge base are presented below.

1.1.1. Flowcharts

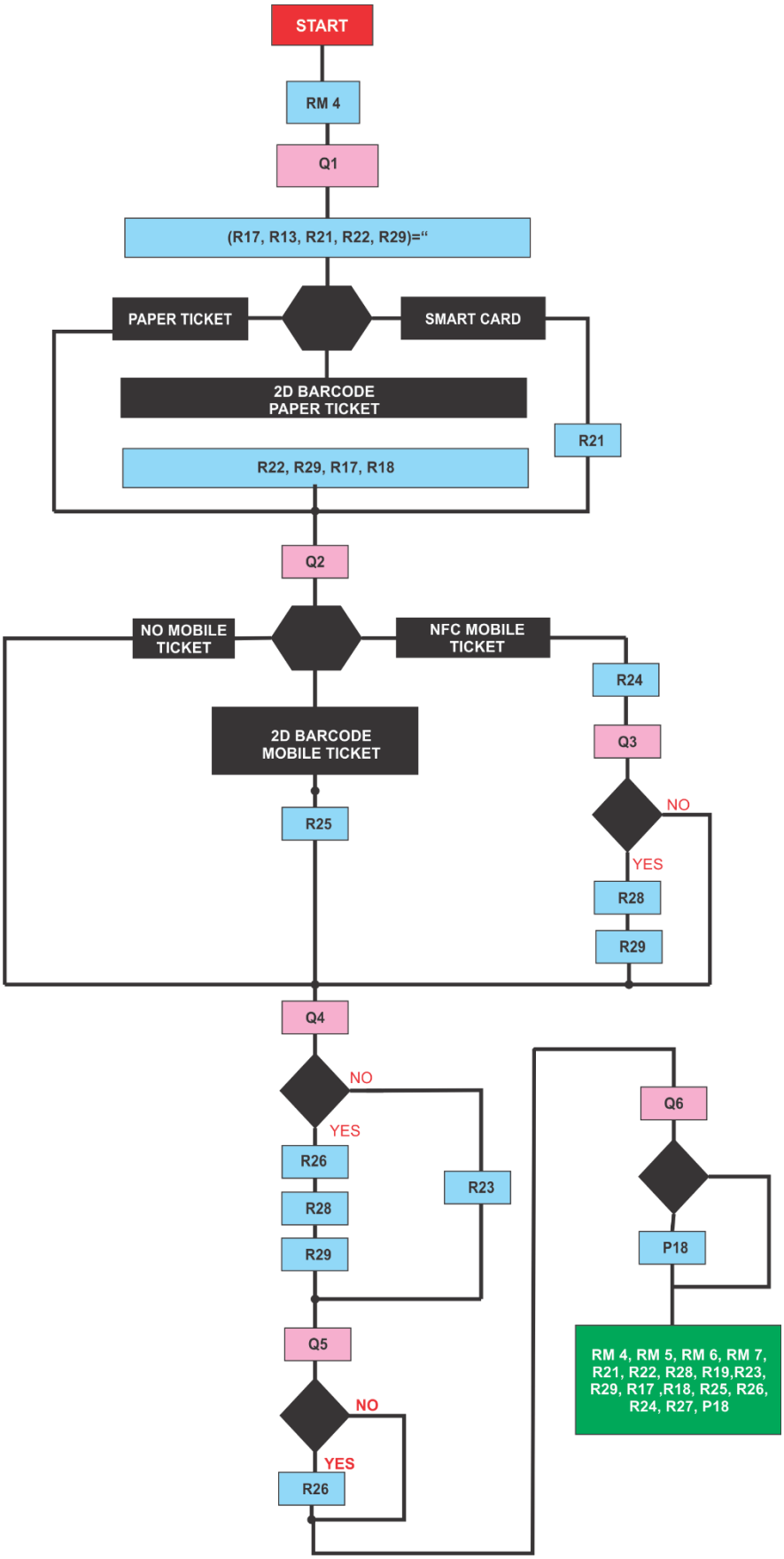
1. Elementary Tool Flowchart: **Tariff Model** (elaborated by Prometni institut Ljubljana)



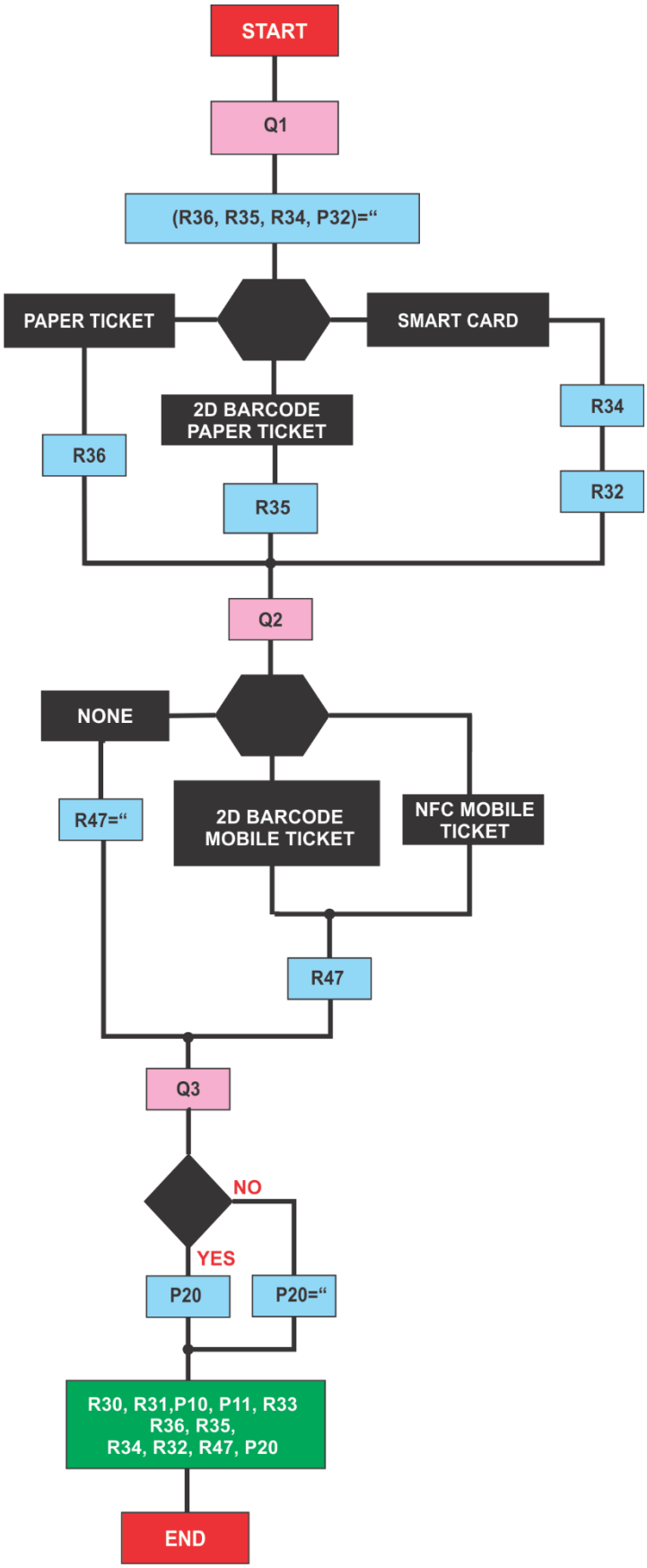
2. Elementary Tool Flowchart: **Tariff Products** (elaborated by: Prometni institut Ljubljana)



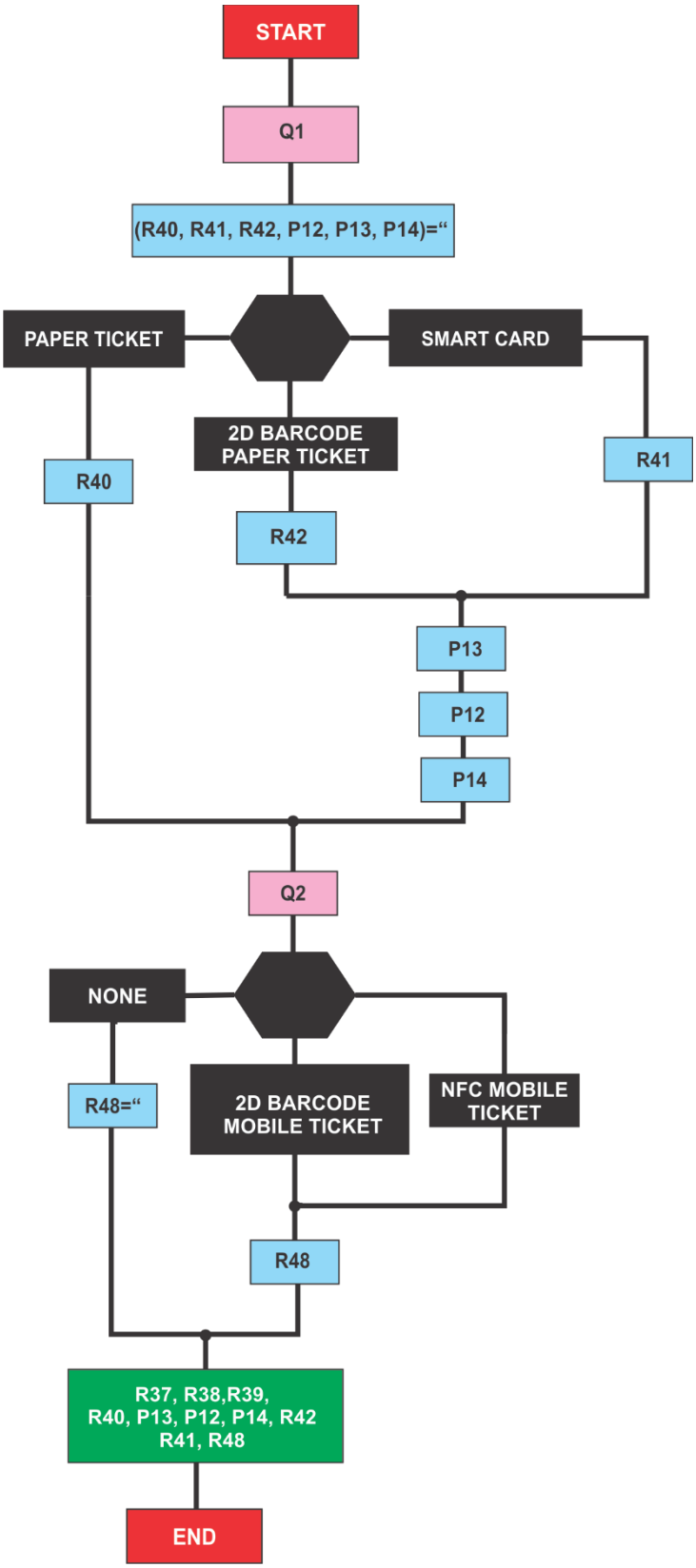
3. Elementary Tool Flowchart: **Ticket Medium** (elaborated by: Prometni institut Ljubljana)



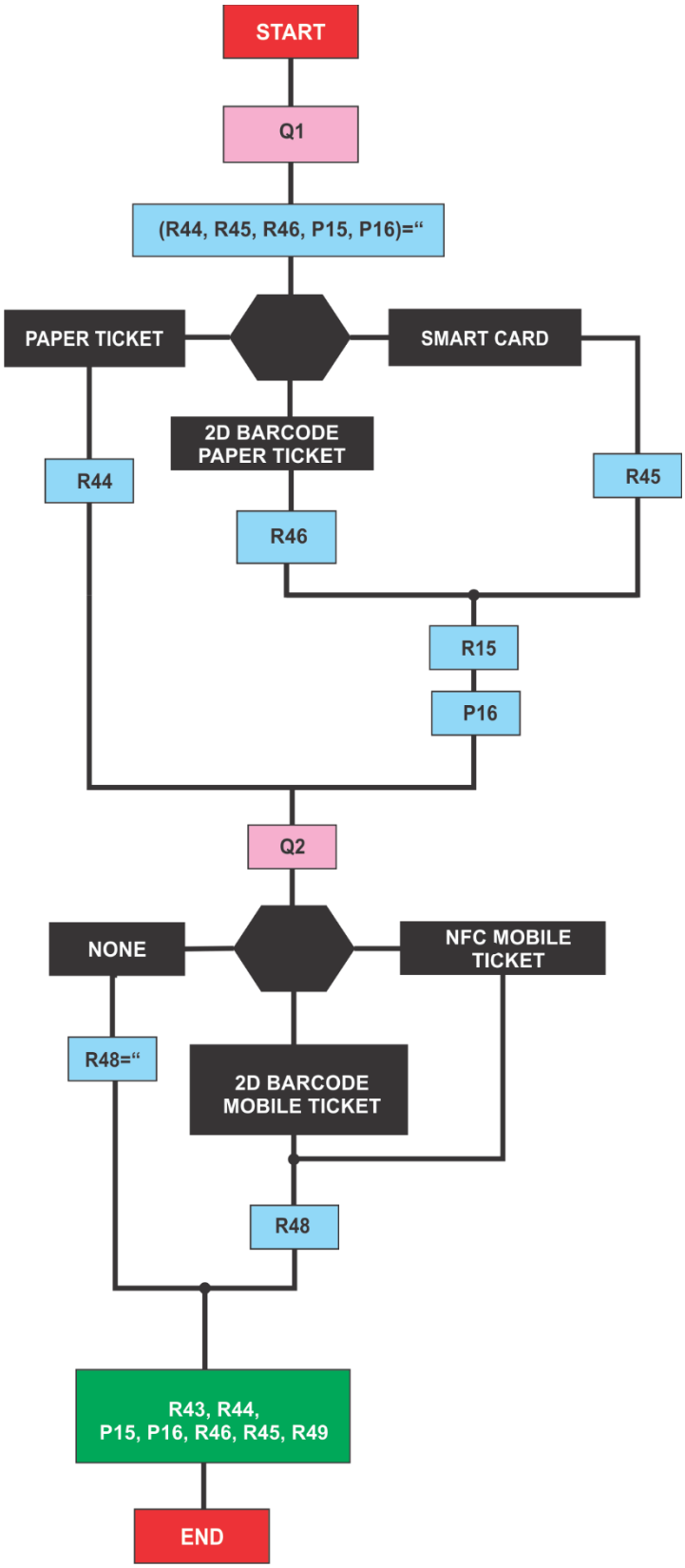
4. Elementary Tool Flowchart: **Ticket Sale** (elaborated by: Prometni institut Ljubljana)



5. Elementary Tool Flowchart: **Ticket Validation** (elaborated by: Prometni institut Ljubljana)



6. Elementary Tool Flowchart: **Ticket Control** (elaborated by: Prometni institut Ljubljana)



1.1.2. Results: recommendations, proposals, remarks

1.1.2.1. Recommendations

CODE	RECOMMENDATION

R1	For tariff integration it is proposed to adopt a uniform tariff model on the entire area of integration. A uniform tariff is more transparent to the passenger as well as for ticket revenue sharing and future modifications of the integrated system tariff model or extension of the integrated area.
R2	In pursue of the principle of "tariff rates flattening" the integrated zone tariff model tends to application of larger zones.
R3	The integrated tariff scale should be defined on the basis of the simplest full rate tariff product (e.g. daily ticket or single ticket if available).
R4	Integrated ticket prices are set out administratively for the available "origin – destination" pairs by taking into account the valid tariff scale. Namely, the actual distance between origin and destination may vary as several routes are optional for a transport with the same ticket. The "selected" administrative distance may be the shortest, the longest, the mean distance of the routes etc.
R5	The integrated tariff model should define the optional routes (public transport lines) or zones where the integrated ticket can be used, thereby configuring "dynamic zones" which are defined for each pair of transport origin and destination specified on the ticket. Dynamic zones are defined by using several instruments like permitted zones, stations, line sections, connecting/transfer points etc.).
R6	It is always recommended to additionally flatten the tariff model, especially for multimodal transport. Flattening is achieved by increasing the existing tariff class or by implementation of variable tariff classes (e.g. tariff classes increase with the distance).
R7	The fare is to be calculated as the number of traversed zones between origin and destination, defined on administratively basis. The valid number of traverses my be defined as the smallest, the average or the largest number of traverses between departure and destination zones. Ticket fare also takes into consideration different zone categories if exist (e.g. a higher fare in a city centre, ...).
R8	Integration of tariff systems should pursue a **simplification of existing non-integrated tariff products schemes** in terms of special discounts for protected passengers (personal entitlement) as it highly impacts complexity of ticket revenue determination and distribution. Simple product scheme is very important for successful implementation of initial development phases.
R9	Complex tariff product scheme is strongly discouraged especially in the systems **without electronic ticketing**.
R10	If integrated products are sold as unique the product scheme should include the discounts for the passenger categories that are subject to protection by law in any of the integrated transport areas.
R11	In the **single tariff model** has been applied in the entire integrated transport area, also the same **discounts are valid for the whole integrated transport area** (discounts valid in one country should automatically be accepted also in another country even if not declared in country regulation).
R12	If **other ticket products** (not-integrated, e.g. products issued by individual operators) are available on the same cross-border lines **in parallel to the integrated products**, **the price** of the integrated products should be correspondingly low in order to be **competing and** also **affordable** to protected passenger categories without specific integrated products for them. Prices of the integrated products are inherently lower due to flattening of the tariff model and distance digression applied on larger areas.
R13	Today tickets are ubiquitously issued electronically. **If electronic ticket validation is not provided** it is important to keep the **product scheme simple** in order to keep the revenue sharing transparent and simple.
R14	Product scheme should provide **discounts to promote more advanced** sales channels (e.g. on-line purchase) or ticket mediums (e.g. smart cards, bank cards).
R15	For integration of urban and inter-urban transport where a unique tariff model for both systems hasn't been applied it is important to provide integrated products. **Integrated ticket** can physically be implemented as separate tickets (due to technical disintegration of ticketing systems) but as one product with lower price as if the tickets were bought separately. A portion or full ticket price for origin and destination urban transport is already included in inter-urban ticket price. (if urban ticket is issued for free as part of the inter-urban ticket then the urban ticket is issued automatically). For integrated tickets it is important that revenue calculation

	model takes into consideration the full ticket price to fairly distribute the loss of ticket-generated income!
R16	If the **unique tariff system hasn't been applied** for inter-urban and urban transport system the integrated Public Transport Authority needs to set the **conditions for acceptance of urban ticket on inter-urban transport means** (vehicles) -full acceptance, time based, direction based (e.g. towards the city centre...). If partial acceptance has been established, the acceptance rules should be transparent and easy for the user.
G1	Integrated systems are easier to implement if the tariff model tends to the flat ticket tariff rates which facilitates the use of the integrated system passengers. This is particularly important for the multimodal integration where transport means pertaining to different modes also run between the same origin and destination on transport routes featuring large difference of route lengths. This implies to move from distance based tariff models to zone tariff models and from small tariff classes/zones to larger tariff classes/zones.
G2	If distance based tariff models are part of integration they must be transformed to the distance-zone tariff model following the rules and specifications of the applied integrated distance-zone tariff model.
G3	If different types of public passenger transport are being integrated, the integrated tariff zones tend to be larger than the existing tariff zones.
R17	If **2D barcode tickets** (paper ticket, mobile ticket) are to be implemented it is strongly recommended to apply **AZTEC** 2D barcode which has been standardized by UIC and additionally can hold more data at a given resolution and is slightly faster to scan in comparison to the QR code that has not been standardized for transport use.
R18	Barcode ticket is very convenient for on-line ticket distribution as print@home ticket.
R19	On-line distribution of smart card tickets can be implemented via distribution list system used to physically store the purchased ticket on the first communication between the smart card and any validation device where a distribution list has been stored (over the air).
R20	Electronic ticketing is important for having a possibility to introduce additional services for a passenger (e.g. check of dynamic travel zones pertaining to the ticket, rewarding on the basis of individual ridership, price capping, on-line purchase, loyalty scheme, personalisation of offer...) as well as to alleviate post processing of big data.
R21	If smart card ticket medium is widely implemented in the integrated transport areas (in more than 85% of selling and validation points), given that the implemented smart card technology (MIFARE, Felice, Calypso) and version (e.g. MIFARE EV1) is the same on the entire area (more than 85% of smart card readers have the same technology) **it is recommended to use smart card medium for ticketing integration** by harnessing the existing technology through keeping it and by building the missing ticketing infrastructure.
R22	If smart 2D barcoded paper ticket medium is extensively implemented in the integrated transport areas (in more than 85% of selling and validation points) **it is recommended to use 2D barcoded paper tickets** by harnessing the existing information technology and building up the missing terminal infrastructure.
R23	**Use of plain paper ticket medium is not recommended**. Plain paper tickets are easy way to achieve the required interoperability level. Implementation of the technology is cheaper to implement and it needs only limited less standardisation effort but is more expensive in for maintenance of the distribution (sale) network, the process of ticket manipulation is longer (e.g. ticket control), less transparent and prone to mistakes without electronic support. It entails substantial effort in data post-processing or on-filed research campaigns to identify ticket use and passenger ridership. Additionally the paper ticket is not suitable for implementation many of additional ticket services for the passenger.
R24	If NFC mobile ticket already exists it can be upgraded to integrated ticket by defining the corresponding technical standard for integration on mobile ticketing. NFC mobile tickets can serve as additional ticket medium to the smart card tickets.
R25	If 2D barcode mobile ticket already exists it can be effectively upgraded to integrated ticketing by defining the corresponding technical standard for integration on mobile ticketing. 2D barcode mobile tickets can serve as additional ticket medium to the 2D barcode paper tickets.

R26	If planned to replace the existing ticketing system or if building a new electronic system from the scratch it is advised to implement 2D barcode integrated ticket medium as it as not so expensive and needs less standardisation effort. On the other hand, for full harnessing of additional functionalities that are brought about by the electronic ticketing systems it is recommended to implement smart card ticketing.
R27	As the evolution of the core ticket medium or as a second ticket medium from the very inception of the integrated ticketing system it is recommended to roll out a mobile ticketing. Almost everybody has a smartphone. Mobile ticketing application turns a smart phone into both ticket as well as ticket machine (ticket purchase, ticket validation...). This removes the need to waste time waiting in line or fumbling for the right change, allowing riders to buy their tickets anytime/any place, and then use their phone as the ticket. Even though NFC mobile ticketing has already been implemented it is recommended to reconsider an option to implement a 2D barcode mobile ticketing as NFC, although a very powerful technology, isn't supported by many smartphones and additionally iPhones do not allow their smartphones to emulate a standard transit smart card. The future will also bring other smartphone mobile ticket technologies, e.g. Bluetooth Low Energy (BLE), as they become sufficiently reliable and stable and enter a mass production.
R28	Electronic manipulation of a smart card in all phases of its use (sale, validation, control etc.) is the main advantage. Comparing to barcoded plain paper tickets the smart ticket can store more data and is stronger protected, it can store e-wallet, easy adding of a new ticket or extension of periodic pass validity, on-line use is transparent, connection to the on-line user account and loyalty scheme (also anonymous - based on smart card CUID), it can bear a photo of the user etc. For implementation of integrated smart card ticketing it is important to standardize the ticket medium technology, access to the ticket application and ticket data on the smart card by setting up a security key infrastructure, data exchange among terminal devices, central data server and operators etc. If decided so, smart cards and operate in parallel with the 2D barcode tickets provided barcode readers for the terminal equipment and standardisation of the 2D barcode.
R29	2D barcode paper tickets can be checked and validated in two different ways - visually, like a traditional paper ticket and also with a barcode that can be scanned by a member of staff with a barcode scanning device, smartphone, on the bus/ferry, or at the transit gate. A standardized coding should be adopted based on AZTEC UIC standard. It is advantageous that the same 2D barcode readers can be employed to read different coding. It is also important to define data exchange among terminal devices, central data server and operators etc.
R30	Integrated ticket **distribution (sale) network should be efficient and accessible** to the potential integrated ticket users. Integration of ticketing systems should either bring reduction of stationary ticket sale network (over-the counter) by consolidation of parallel ticket sale systems governed by separated transport operators or expansion of the offer by increasing the number of points-of-sale.
R31	In the integrated network a passenger purchasing a ticket should be equally able to buy it at a ticket office/ticket counter that is run or commissioned by any of the transport operators included in the ticketing integration. The same is true for other sale channels.
R32	On-line distribution of smart card tickets can be implemented via distribution list system used to physically store the purchased ticket on the first communication between the smart card and any validation device where a distribution list has been stored
R33	**The existing information support for sale** (ticket distribution) network points need to be **adapted** to provide for issue of unique integrated tickets everywhere.
R34	**Implementation of integrated smartcard ticket (also NFC mobile app) sale to the existing POS terminal;** Before implementation of a smart card ticket a smart card ticket application basing on a smart card ticket data model should be specified and standardized to assure interoperability. On the terminal side (POS) a new or upgraded sale application may be needed for selling integrated products (user interface, definition of products, tariff scales and fares etc.). Also ticket readers (smartcard RW interface) need to be replaced or additionally mounted in order to exchange ticket data with the sale terminal; printers for smartcard faces are required for personalized smartcards and Secure Access Module (SAM) for each terminal to assure secure authentication of smartcard or EMV card data exchange with the POS terminal. On the server side a ticket distribution support system needs to be assured in order to provide the POS terminal with the products change, price list, black list, execution list etc. to allow

	inter-availability of the sale system. All sale data from POS need to be centrally collected to control the sale in the system and provide a background for ticket revenue sharing and clearance among the PTA, ticket sellers and transport operators.
R35	**Implementation of integrated 2D barcode ticket (paper or mobile app) sale to the existing POS terminal;** **Before implementation of a 2D barcode ticket a ticket model (ticket elements coding) should be specified and standardized to assure interoperability.** On the terminal side (POS) a new or upgraded sale application may be needed for selling integrated products (user interface, definition of products, tariff scales and fares etc.). Also ticket readers (2D barcode scanners) need to be replaced or additionally mounted in order to exchange ticket data with the sale terminal. On the server side a ticket distribution support system needs to be assured in order to provide the POS terminal with the products change, price list, black list, execution list to allow inter-availability of the sale system. All sale data from POS terminal need to be centrally collected to control the sale in the system and provide a background for ticket revenue sharing and clearance among the PTA, ticket sellers and transport operators.
R36	**Implementation of integrated paper ticket to the existing POS terminal;** On the terminal side (POS) a new or upgraded sale application may be needed for selling integrated products (user interface, definition of products, tariff scales and fares, ticket design - size, disposition of information etc.). Printers may need to be adapted or replaced to fit the new ticket design. On the server side a ticket distribution support system needs to be assured in order to provide the POS terminal with the products change, price list, black list, execution list to allow inter-availability of the sale system. All sale data from POS terminal need to be centrally collected to control the sale in the system and provide a basis for ticket revenue sharing and clearance among the PTA, ticket sellers and transport operators.
R37	Passengers need to validate their ticket in order to check if the **ticket is eligible for use of a particular transport service and to register their ride**. A ticket can also open the gate for the passenger to enter to the platform. Tickets are **validated** (checked) on entry of the passenger to the **station**, **platform** or **vehicle**. Ticket check-out on exit is suitable for closed - gated transport systems. Ticket validation is even more important in intermodal and multi-operator integrated ticketing systems where the same **integrated ticket can be used at different service providers**. Furthermore, the same ticket can be provided for use at the operator **only for a part of the complete service**.
R38	Validation of the tickets in the integrated transport has additional importance as it also provides **registration of the ticket ride with a respective transport operator** and thereby also **mutual relationship between a passenger and a transport operator** related to the particular journey (e.g. safety responsibility of the transport operator for a particular transport in compliance to the terms and conditions of integrated transport use).
R39	Collection of data on ticket validations and consequently registrations of ticket use with the respective transport operator may also serve to **automatic research of travel patterns of the passengers** for transport planning and control and also for **revenue sharing** among transport operators on the basis of the registered ridership made with integrated tickets. Complex revenue sharing models particularly apply to net financing models of transport.
R40	Integrated ticketing system based on **paper tickets** (without electronic identification) **doesn't need further investmen**t to the ticket validation infrastructure (**visually controlled**) but on the account of manpower controlling the tickets and shortcomings of exact data. Operators' responsibility for the passenger may be difficult to establish if tickets, that are not timely and visibly checked, can be used with several transport operators, regular ridership surveys need to be carried out to get the data for revenue sharing among the transport operators etc.

R41	**Implementation of smartcard/NFC validation**; If validation is not yet machine-supported, new validation terminals need to be provided (fixed or hand-held). The existing validation terminals need to be upgraded. On the terminal side (validation device) a new or upgraded **validation application** may be needed for validation of the integrated products (user interface, definition of products, validation procedures etc.). Also ticket **readers** (smartcard RW interface) may need to be replaced or additionally mounted (to the existing devices) in order to exchange ticket data with the validation terminal; Secure Access Module (SAM) is needed for each terminal to assure secure authentication of smartcard or EMV card data exchange with the validation device. On the server side a ticket validation support system needs to be assured in order to provide the validation terminal with the data on products change, black list, execution list etc. to allow inter-availability of the validation system. All validation data from the terminal need to be centrally collected on the server to control the ridership and provide a background for ticket revenue sharing and clearance among the PTA, ticket sellers and transport operators if based on a ticket use. Electronic ticket control system can be adapted and enhanced for check-in/check-out (CI-CO) ticket control if required by system development.
R42	**Implementation of 2D barcode ticket validation;** If validation is not yet machine-supported, new validation terminals need to be provided (fixed or hand-held). The existing validation terminals need to be upgraded. On the terminal side (validation device - terminal) a new or upgraded **validation application** may be needed for validating the integrated tickets (user interface, definition of products, validation procedures etc.). Also ticket **readers** (2D barcode scanners) may need to be replaced or additionally mounted (to the existing devices) in order to exchange ticket data with the validation terminal. On the server side a ticket validation support system needs to be assured in order to provide the validation terminal with the data on products change, black list, execution list etc. which allows inter-availability of the validation system. All validation data from the validation terminal need to be centrally collected on the server to control the ridership and provide a basis for ticket revenue sharing and clearance among the PTA, ticket sellers and transport operators if grounded on a ticket use. Electronic ticket control system can be adapted and enhanced for check-in/check-out (CI-CO) ticket control if required by system development.
R43	Ticket control is performed sporadically by ticket inspectors. Ticket inspectors control if the passengers have duly validated their tickets in order to register the right for transport service. In the environment where conductors validate tickets the inspectors also control the conductors if they regularly control the passengers. Ticket validation and consequently ticket control are very important to assure the rightful revenue from the tickets to transport operators or to the integrated public transport authority (IPTA). In the net financing model of integrated public passenger transport where the operators are fully commercially responsible and strive for ticket revenue, the ticket inspectors are affiliated to the operators. If the gross financing model of integrated public passenger transport has been applied to integrated public transport the ticket inspectors are affiliated to IPTA - IPTA is entitled to all ticket revenue to fill up the funds for full financing of the transport operators' service.
R44	Control of **paper tickets** without electronic identification **doesn't need further investment** in process of ticketing system integration. The tickets are only visually controlled. Visual control of the tickets is not reliable and is prone to man-operated mistakes. The possibilities to discover counterfeiting, duplication and other sophisticated ways of ticket misuse are very limited without information support. Visual control is very tiresome for the controller, slower and less efficient.

R45	**Implementation of smartcard/NFC ticket control;** If the existing ticket control has not been machine-supported, new hand-held ticket control terminals need to be provided for the integrated system. The existing ticket control terminals need to be upgraded. On the terminal side (ticket control terminal) a new or upgraded ticket control application may be needed for control of the integrated tickets (user interface, definition of valid products, control procedures etc.). Also ticket readers (smartcard RW interface) may need to be replaced or additionally mounted (to the existing terminals) in order to exchange ticket data with the ticket control terminal; Secure Access Module (SAM) is needed for each ticket control terminal to assure secure authentication of smartcard or EMV card data exchange with the ticket control terminal. On the server side a ticket control/validation support system needs to be assured in order to provide the ticket control terminal with the data on products change, black list, execution list etc. to allow inter-availability of the ticket control system. All control data from the terminal need to be centrally collected on the server to collect control data and provide exchange of the data among the peer control terminals.
R46	**Implementation of 2D barcode ticket control;** If the existing ticket control has not been machine-supported, new hand-held ticket control terminals need to be provided for the integrated system. The existing validation terminals need to be upgraded. On the terminal side (ticket control terminal) a new or upgraded **ticket control application** may be needed for controlling the integrated tickets (user interface, definition of products, control procedures etc.). Also ticket **readers** (2D barcode scanners) may need to be replaced or additionally mounted (to the existing terminals) in order to exchange ticket data with the ticket control terminal. On the server side a ticket control/validation support system needs to be assured in order to provide the control terminal with the data on products change, black list, execution list etc. which allows inter-availability of the ticket control system. All validation data from the ticket control terminal need to be centrally collected on the server for reporting and calculation and for exchange of the data among peer control terminals.
R47	If mobile app integrated ticket is planned or already available in the integrated ticketing system a mobile ticket sale function should be integrated in the app. Ticket purchase possibilities should be open to standardized payment means: credit card, smart card and PayPal to also include occasional passengers. Also additional payment options are important for the regular passengers, such as subscription to bank o mobile operator's account etc. The payment solutions shouldn't be closed to a particular service provider (e.g. voice mobile payment - available only to subscribers of a particular mobile communication provider).
R48	If a mobile app integrated ticket is planned or already available in the integrated ticketing system where only plain paper tickets exist an electronic ticket validation devices (fixed or handheld) need to be provided to assure automatic validation of 2Dbarcode or NFC mobile tickets. If either 2D barcode paper tickets or smart card tickets are already implemented or are planned to be issued in the integrated ticketing system, no additional ticket validation devices need to be provided as the existing (or planned) ones can also serve for mobile ticket validation.
R49	If a mobile app integrated ticket is planned or already available in the integrated ticketing system where only plain paper tickets exist an electronic ticket control devices (handheld devices) need to be provided to assure automatic control of 2Dbarcode or NFC mobile tickets. If either 2D barcode paper tickets or smart card tickets are already implemented or are planned to be issued in the integrated ticketing system the same handheld devices can be used for ticket validation and ticket control, only ticket control and ticket validation applications need to be developed separately.

1.1.2.2. Proposals

CODE	PROPOSAL
P1	Integrated tariff model should adopt the largest tariff class among the models that are part of tariff integration.
P2	The integrated distance tariff model keeps the valid tariff class.
P3	The allocation of existing transport zones can be retained, regardless of the average zone size. If the zone size is subject to unification, the largest zone size should be implemented.
P4	Integrated tariff model is based on the largest existing tariff zone.
P5	Integrated tariff products within one transport system (e.g. one urban transport are, inter-urban transport on the integrated area) need to be the same on the entire area of integration, regardless if a single tariff model is applied on both sides of the border or not as well as if a tariff model is unique for urban and inter-urban transport or not. Moreover, if the applied tariff model is not unique for the urban and inter-urban transport but only combined tickets are available for seamless travel within both systems, then at least time validity of the ticket products that are part of a combined ticket needs to be harmonised (e.g. time validity of urban monthly pass, time validity of inter-urban monthly pass and validity of combined inter-urban/urban monthly pass need to be harmonised; example all passes expire on the 5th day the next month of declared validity).
P6	It is proposed to replace single ride tickets to daily tickets, especially if multimodal integration takes place where passenger lines don't run strictly in parallel and it is therefore determination of the direction difficult. Integrated tariff product scheme should encourage use of network ticket as opposed to origin-destination tickets.
P7	For the initial phase of product integration only **daily pass** (replacing a single and return ticket) and **monthly ticket** are proposed for implementation.
P8	If a **network ticket** is rolled out (similar to road vignette) as the only option than the price should be reasonably low not to exclude the short distance passengers. At least it is advised to keep only the products that ensue from intersections of the product schemes subject to integration.
P9	Product price list should be determined on the basis of simulation of expected revenue taking into account the same level of passenger ridership. If new integrated products have been introduced passenger migration from old to new products should also be assessed.
P10	Traditional ticket sale channels need to be kept to provide inclusion of various passenger categories. **Integrated ticket distribution should be based on the network of ticket counters** which is **supported by automatic ticket counters** (ATC) and **on-line sale** (web, mobile app). It is advised to use commercial tools to encourage use of on-line sale as it is efficient and the cheapest ticket distribution channel. Availability of ticket distribution channels is inherently related to the available ticket medium therefore ticket mediums that support electronic reading are advised to implement.
P11	**Sale commission system needs to be provided** for the integrated sale network as the functions of a ticket seller (seller of the service) and transport operator (service provider) are no longer tightly connected. A passenger can freely choose the transport operator regardless where the integrated ticket has been bought. This issue may be overcome if a gross financing system of transport service has been agreed.
P12	Technical implementation of the **validation procedure, terminal equipment and data exchange** with the central server system needs to be specified in the **technical standard of integrated ticketing system** that is controlled by the integrated PTA (or consortium of integrated transport operators).
P13	**Location of the validation devices** is proposed to be either on the **platforms or in the vehicles**, where all passengers are required to check-in before or on the entry in the vehicle. **Ticket validation at the vehicle conductors** (using hand-held devices) **is discouraged.** Types of ticket validation can be mixed - it can vary from by transport operators, transport modes or even vehicles/transport means. If transport operator cannot provide fixed validation devices in the vehicle (e.g. international trains including foreign carriages) then validation can be performed by the vehicle conductors or validation devices should be mounted on the stations (platforms). For the new transport operator might be easier if the integrated PTA provides validation on the stations (platforms).

P14	**On-line data communication of validation terminals with central validation support server** is recommended in order to provide updated information on black lists, execution lists, latest travel information, other ticket validations etc. at any point of public transport operation and thereby **provides better service for the passengers as well as helps discover potential ticket misuse** (e.g. prevention of double use of a ticket on two validation terminals). On-line communication can use mobile data (e.g. GPRS).
P15	Ticket inspectors use handheld ticket control terminals to control ticket validity and registration of the ride. Technical implementation of the ticket control **procedure, terminal equipment and data exchange** with the central server system needs to be specified in the **technical standard of integrated ticketing system** that is controlled by the integrated PTA (or consortium of integrated transport operators).
P16	**On-line data communication of ticket control terminals with central ticket validation/control support server** is recommended in order to provide updated information on black lists, execution lists, latest travel information, other ticket validations etc. at any point of public transport operation and thereby **helps discover improper ticket use or potential ticket counterfeiting or forgery** (e.g. prevention of double use of a ticket on two validation terminals). On-line communication can use mobile data (e.g. GPRS).
P17	If the cross-border integrated transport area attracts many tourists it is advised to provide the products that are of particular interest for the tourists and would encourage them to use public transport: - combined travel tickets & entrance fee to tourist facilities, - short periodic pass (1, 2, 3, 5 days) or optional selection period length (up to 30 days) - network pass for the whole transport area or restricted area (e.g. municipality area within the transport area) - ...
P18	If the cross-border integrated transport area attracts many tourists and smart card technilogy is included or is planned to be included in the integrated ticketing system it is advised that the plastic smart card is refundable in order to avoid additional cost deterring the tourist from using it. Multilingual ticketing app and disposable (paper) smart cards tickets are welcome by the tourists as well as by other occasional passengers. The costs of disposable smart cards and their distribution should be taken into consideration.
P19	If the cross-border integrated transport area attracts many tourists it is advised to have a ticket counters or ATC on the locations (stations and stops) in the vicinity of busy tourist attractions. For the ATC it is crucial to provide multilingual operation.

1.1.2.3. Remarks

CODE	REMARK
RM1	For a zone-distance tariff model the entire traffic area is divided into zones, and the tariff is determined on the basis of the distance between the centres of gravity of the zones.
RM2	For the initial phase of cross-border product integration it is recommended to keep separate tariff model for inter-urban and urban transport as too many levels of harmonisation are needed for the unique tariff model.
RM3	Integrated product scheme can be used on integrated lines /integrated area as exclusive or in parallel with the existing products. The existing product scheme should already include obligatory discounts for protected passenger categories obliged by the law.
RM4	Ticketing systems today offer several ticket medium options to be used by the passengers. Integration of the ticketing systems should be based on "core ticket medium" that is distributable to all users under the same conditions without discrimination. Plain paper, 2D barcoded paper or smart card ticket are classified as core ticket mediums (electronic ID cards can also be used in a sense of smart cards). Mobile tickets, bank cards and other tokens (also registered with bank accounts) are very convenient and also important supplementary ticket medium. Supplementary ticket mediums should be promoted through tariff schemes as they can lower the costs of ticket manipulation and attract more passengers due to ease of use but unfortunately can not replace the core ticket mediums.
RM5	Integrated ticketing brings a lot of coordination and balancing among the operators and other stakeholders of the system in all phases of ticketing system to ensure eligible and justified revenue. The coordination and balancing is easier if sufficient data are available. Data can completely be provided only by automatic data generation and collection systems which are inherently electronic ticketing systems (electronic ticket issue, ticket validation and control). Although bringing reduction of workload on the post-processing side the electronic ticketing systems can be quite expensive to implement on one hand. On the other hand they need to be **interoperable** in order for already implemented systems in use by the operators to be able to communicate and share data. Ticketing systems technology is strongly related to the applied ticket mediums. Therefore, paper ticket and if possible **barcoded paper ticket medium** seems to be a good **fundament of integration**.
RM6	E-ticketing and mobile ticketing need a well-defined interoperability and security standard to be adopted and followed by the stakeholders in integrated transport operations in order to ensure secure and correct data interchange.
RM7	If e-ticketing or mobile ticketing has already been implemented it may contribute to lower costs of a new system implementation on the account of the existence of the basic information infrastructure needed.