

## **ANNEX II + III: TECHNICAL SPECIFICATIONS + TECHNICAL OFFER**

This tender comprises of 2 lots: Lot 1 - Supply of ICT equipment and software for Air Quality Monitoring System and Lot 2 - Supply of Water Quality Monitoring Equipment

**Contract title: Establishment of an integrated environmental monitoring system for air and water quality**

**Publication reference: EuropeAid/133825/D4/SUP/RS**

**Column 1-2 should be completed by the Contracting Authority**

**Column 3-4 should be completed by the tenderer**

**Column 5 is reserved for the evaluation committee**

**Annex III - the Contractor's technical offer**

The tenderers are requested to complete the template on the next pages:

- Column 2 is completed by the Contracting Authority shows the required specifications (not to be modified by the tenderer),
- Column 3 is to be filled in by the tenderer and must detail what is offered (for example the words "compliant" or "yes" are not sufficient)
- Column 4 allows the tenderer to make comments on its proposed supply and to make eventual references to the documentation

**The eventual documentation supplied should clearly indicate (highlight, mark) the models offered and the options included, if any, so that the evaluators can see the exact configuration. Offers that do not permit to identify precisely the models and the specifications may be rejected by the evaluation committee.**

The offer must be clear enough to allow the evaluators to make an easy comparison between the requested specifications and the offered specifications.

**Unless otherwise specified, the requirements in these Technical Specifications are presented as a minimum standard which the offered goods must meet.**

## Lot 1: Supply of ICT equipment and software for Air Quality Monitoring System

The main goal of the system tendered under Lot 1 is to enable competent national institution (SEPA) in collecting, updating and processing air quality data from automatic air quality monitoring stations for the purpose of reporting at national and EU level, according to the Law of Air Protection and the Regulation on establishing air quality monitoring programs in the national network.

This goal shall be fulfilled by acquisition of integrated software for air quality data collection, analysis, verification and reporting including hardware and telecommunication equipment for data collection from automatic air quality networks

### General functions of the software

- To allow integration of data from different networks: state, regional and locals for both real time and validated data;
- To enable involved institutions to get validated data for air quality from automatic air quality stations for areas of interests/responsibility (data sharing);
- To provide real time data to open public from all stations from state, regional and local networks;
- To allow SEPA to perform e-reporting functions to EEA (Decision 2011/850/EU);

The system will be implemented as distributed system with main location in SEPA, with connections to existing networks in Belgrade, Novi Sad and Pancevo.

## 1. General Requirements

- 1.1. The Contractor will be required to provide at the latest with delivery, original documents or certificates (e.g. CE mark) including the test protocols, that prove conformity of all delivered equipment to the requirements to the standards as specified in Annex II + III. Preferably these documents are to be included with the tender offer.
- 1.2. The Contractor must be aware that no provisional acceptance can be given without the presence of the complete set of documents as described under 1.1. and in addition to other requirements conditioning provisional acceptance.

## 2. Minimum requirements and supporting documentation

- 2.1. Tenderers are required to demonstrate that the offered specifications are responsive to the Tender Dossier requirements identifying model, manufacturer and country of origin of each individual item in their Technical Offer.
- 2.2. Technical specifications described in column 2, Table Annex II + III: "Technical Specifications and the Contractor's technical offer" are minimum requirements. Tenderers may offer better specifications and newer models/versions, with improved, additional or new features, but must not provide offers that do not strictly comply with the minimum requirements or are incompatible with intended purpose of use.
- 2.3. The information provided by the tenderer in column 3 of Annex II + III must be sufficiently detailed to establish that the offered supply meets or exceeds minimum requirements.

The accompanying documentation to be provided for all items being offered must contain detailed technical specifications of technical characteristics, functionality, regulatory compliance, and conformity to standards as requested in specifications in Annex II + III.

The information provided in the accompanying literature must match the Tenderer's written specifications as shown in column 3 of Annex II + III. In case there are minor differences between for example the supplied manufacturers' technical literature and the Tenderer's written specification, the reasons must be

detailed in the Tenderer's specifications.

- 2.4. Manufacturers' technical literature must be marked appropriately i.e. item model number and manufacturers' technical specification "line/s" where they correspond to the requested technical specifications. As cross-reference Column 4 "Notes, remarks, ref to documentation" must be used.
- 2.5. The Tenderer must preferably attach printed labels to the literature to identify correspondence with the item No offered, rather than handwritten identification.
- 2.6. Tenderer must provide technical documentation in English language.

### **3. Completeness of the supply**

- 3.1. Supply delivery, including installation, integration and final customization must include all needed parts, accessories, operating and maintenance manuals, and consumables required for the supplies to be presented for provisional acceptance fully installed, operational and ready for use.
- 3.2. Training, consumables, accessories, parts and documentation used during delivery, installation, integration and customisation before provisional acceptance must therefore be anticipated and calculated into the offer.
- 3.3. It shall be the sole responsibility of the Tenderer to ensure that all pre-requisites for the completeness of the supply delivery are met before its commencement.

### **4. Supply Delivery**

- 4.1. The Tenderer must provide the necessary measures to prevent any damage during delivery, installation, integration and customization stages. If any damage occurs during delivery, installation, integration and customization stages, it must be appropriately rectified by the Tenderer.
- 4.2. Installation, testing, demonstration and training must be completed within the time frame set out in the Special Conditions of Supply Contracts included in the Tender Dossier. At the end of this period, all items supplied, including hardware and software, must be fully operational and the staff chosen by the Beneficiary will have been given full training for safe and efficient use of the items.
- 4.3. There will be no partial provisional acceptance. Provisional acceptance may be requested only when all supplies of all the equipment have been delivered to site, have been installed, are fully compliant with all tender specifications and general requirements, have passed all required tests, are fully functional and after operator training has been completed.

### **5. Conformity to regulations and standards**

- 5.1. Tenderer must provide additional or specific certificates, when required in specifications for particular item(s)..

### **6. Warranty**

- 6.1 The Warranty period for all supplies must be at least 1 year from the date of the Contracting Authority having issued a certificate of provisional acceptance.
- 6.2 The Tenderer must repair defects or damaged supplies at his own cost during the Warranty period. In case the defect or damage cannot be repaired within the solution time requested, the Tenderer must replace equipment for the period of time needed for repairs. In case the defect or damage cannot be repaired, the Tenderer must fully replace the item.

- 6.3 The Tenderer must provide Service organisation contact data including organisation name, e-mail, phone and fax number.
- 6.4 Max response time to officially submitted request not later than the next working day and within 8 (eight) hours max response guaranteed time.
- 6.5 Tenderer must provide the manufacturer's confirmation/declaration that genuine accessories and spare parts will be available for a minimum of 3 (three) years after the final acceptance of the equipment.

#### 8. Visibility

All supplies must comply with the Visibility guidelines in force within the scope of external aid contracts financed from the EU general budget; c.f. [http://ec.europa.eu/europeaid/work/visibility/index\\_en.htm](http://ec.europa.eu/europeaid/work/visibility/index_en.htm). As part of the request for provisional acceptance, the Contractor must provide documentary evidence of compliance with the visibility rules.

For purposes of visibility and clarity of labelling, all hardware shall have a solidly fixed metallic type (pure aluminium foil, vinyl lacquer coated aluminium foil, or similar) or solid plastic labels (synthetic surface coated, PVC, or similar) specially formulated for offset printing the design of which should be submitted within four weeks of signature of the contract. Self-adhesive paper or film labels are not allowed.

The Contractor shall produce a draft of the layout of any visibility labels and submit it for written approval by the Contracting Authority prior to production / delivery.

## LIST OF ACRONYMS – LOT 1

API – Application Programming Interface  
CE – “Conformité Européenne ” (“European Conformity”)  
CIFS – Common Internet File System  
CPU – Central Processing Unit  
DHCP – Dynamic Host Control Protocol  
DMZ – Demilitarized zone  
DNS – Domain Name System  
FE – Fast Ethernet  
FSB – Front-Side Bus  
GB – Gigabyte  
GbE – Gigabit Ethernet  
GHz – Gigahertz  
HDD – Hard Disk Drive  
HDMI – High-Definition Multimedia Interface  
HTTP – Hypertext Transfer Protocol  
HTTPS – Hypertext Transfer Protocol (Secure)  
ICMP – Internet Control Message Protocol  
ICT – Information and Communications Technology  
IEC – International Electrotechnical Commission  
IEEE – Institute of Electrical and Electronics Engineer

IP – Internet Protocol  
IPS – Intrusion Prevention System  
IPSec – Internet Protocol Security  
iSCSI – Internet Small Computer System Interface  
ISO – International Standards Organization  
IT – Information Technologies  
L3 – Level 3  
LAN – Local Area Network  
LED – Light-Emitting Diode  
MAC – Media Access Control  
Mbps – Megabits Per Second  
NFS – Network File System  
PDF – Portable Document Format  
POP – Post Office Protocol  
PPTP – Point-to-Point Tunneling Protocol  
RAID – Redundant Array of Independent Disk  
RAM – Random Access Memory  
RFC – Request for Comments  
SAS – Serial Attached SCSI (Small Computer System Interface)  
SATA – Serial Advance Technology Attachment  
SEPA – Serbian Environmental Protection Agency  
SMB – Server Message Block  
SMTP – Simple Mail Transfer Protocol  
SNMP – Simple Network Management Protocol

SOAP – Simple Object Access Protocol  
SQL – Structured Query Language  
SSH – Secure Shell  
TB – Terabyte  
TCP – Transmission Control Protocol  
TCP/IP – Transmission Control Protocol / Internet Protocol  
UDP – User Datagram Protocol  
UPS – Uninterruptible Power Supply  
USB – Universal Serial Bus  
VGA – Video Graphics Array  
VPN – Virtual Private Network  
WAN – Wide Area Network  
WCS – Web Coverage Service  
WebDAV – Web Distributed Authoring and Versioning  
WFS – Web Feature Service  
WMS – Web Map Service  
XML – Extensible Markup Language

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The equipment shall be delivered, installed and put into operation as presented in the following table:

Item Number	Item	SEPA	Pancevo-AVP	PS-AVP	IPH-B
LOT 1					
No of Units					
1.1.	Network security appliance	1	1		
1.2.	ENCLOSURE FOR SERVER and other network equipments	1	1		
1.3.	Server, type 1	1			
1.3.a.	Server operating system	1	1		
1.4.	UPS	1	1		
1.5.	Switch	1	1		
1.6.	Server, type 2		1		
1.7.	Data logger, type 1	4			
1.8.	Data logger, type 2		1		
1.9.	Air Quality Monitoring Software	1			
1.10.1	Training: Administrators ( training for 5 Administrators in Belgrade)	2	1	1	1
1.10.2	Training: User training (training for 14 users in Belgrade)	8	2	2	2

**Addresses of the beneficiaries' institutions:**

<b>SEPA:</b> Serbian Environmental Protection Agency Ruže Jovanovića 27a str., 11000 Belgrade, Serbia	
<b>Pancevo-AVP:</b> Municipality of Pancevo, EP Secretariat, Trg Kralja Petra I 2-4 st., 26000 Pancevo, Serbia	<b>PS-AVP:</b> Provincial Secretariat for Urban Planning, Construction and Environmental Protection,
<b>IPH-B</b> Institute of Public Health, City of Belgrade, Bulevar Despota Stefana 54/A st., 11000 Belgrade, Serbia	

	Province of Vojvodina, Bulevar Mihajla Pupina 16 st., 21000 Novi Sad, Serbia
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1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
1.1.	Network security appliance  Manufacturer's name:  Product type, model:			
	Quantity: 2			

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1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
<b>Specification</b>	<ul style="list-style-type: none"> <li>a) Must support installation between the Internet and Intranet;</li> <li>b) Minimum 100 concurrent user licenses;</li> <li>c) Proactive and reactive unified threat protection for complete security;</li> <li>d) Performance for network protection without affecting network speed;</li> <li>e) Modular design or architecture;</li> <li>f) Must support automatic continual updates without manual administrative intervention;</li> <li>g) Min 3 (three) FE ports must be installed;</li> <li>h) Must support min 50 Mbps firewall, 15Mbps antivirus and 15Mbps IPS throughput;</li> <li>i) Min configurable min Internal, DMZ and WAN ports;</li> <li>j) Min 1 (one) console port must be installed;</li> <li>k) Firewall protection;</li> <li>l) Must support IPS with support for scanning of IP, ICMP, TCP and WebDAV protocols;</li> <li>m) Must support VPN with support for min IPsec and PPTP based host-to-network and network-to-network VPN;</li> <li>n) Anti-malware protection with support for detection and blocking of malware (viruses, worms, Trojans, spyware, phishing, hacking tools, security risks etc.);</li> <li>o) Content protection (filtering) with support for customization of various content filtering parameters;</li> <li>p) Anti-spam protection with support for customization of scan intensity;</li> <li>q) Web access protection with support for restricting user</li> </ul>			

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
	<p>web access;</p> <p>r) Local and secure administration by using user-friendly web based interface;</p> <p>s) Display current device activity at all levels (e.g. IPS, VPN, etc.);</p> <p>t) Display detailed and user-friendly reporting at all levels (e.g. IPS, etc.);</p> <p>u) Display alerts (notifications);</p> <p>v) Min 1-year upgrade and update license must be installed;</p> <p>w) All accessories needed for installation and operation with items 2, 3, 4, 5 and 6 must be included;</p> <p>x) Must be compatible with items 2, 3, 4, 5 and 6;</p>			

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1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
1.2.	<p><b>ENCLOSURE FOR SERVER and other network equipments (Server rack)</b></p> <p><b>Quantity: 2</b></p>			
	<p><b>Manufacturer's name:</b></p>			
	<p><b>Product type, model:</b></p>			
<p><b>Specification</b></p>	<ul style="list-style-type: none"> <li>a) 19" rack enclosure, min 42 U (42 HE);</li> <li>b) Free standing, glass or metal perforated front door with key, side opening;</li> <li>c) Cooling fan(s) and cable routing elements must be installed (integrated electrical grounding);</li> <li>d) Min 1 (one) power bar with min 6 (six) output connections must be installed;</li> <li>e) Must be delivered with all consumables and accessories needed for installation, operation and maintenance of items 6,5, 4, 3 and 1;</li> <li>f) All accessories needed for installation and operation with items 1, 3, 4, 5 and 6 must be included;</li> <li>g) Must be compatible (width, depth, cooling, placement, cable routing etc.) with items 1, 3, 4, 5 and 6;</li> </ul>			

1. Item Number	2. Specifications Required		3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
1.3.	Server, type 1	Quantity: 1			
	Manufacturer's name:				
	Product type, model:				
Specification	<ul style="list-style-type: none"> <li>a) Rack server type, max 4U (4HE), must be delivered min with 19" rack sliding rails;</li> <li>b) Min 2 (two) 64-bit processors must be installed, with min 4 (four) cores per processor, min 2.4GHz per processor;</li> <li>c) Min 32GB RAM must be installed with support for future upgrade to min 128GB;</li> <li>d) Min 4 (four) internal hot-plug SAS HDDs, capacity min 500GB, RAID 1 mirrored, storage RAID controller on the board with 256MB cache;</li> <li>e) Min 2 (two) 10Gbps LAN network card must be installed and support for 10GbE managed L3 switch, with min support for TCP/IP and iSCSI Offload engines;</li> <li>f) Server form must be rack mountable;</li> <li>g) Must be compatible with items 2,5 and 6;</li> <li>h) Must support min MS Windows 2008R2 and later and server virtualization;</li> <li>i) Must support min 2 (two) power supplies with sufficient power for all components in redundant configuration;</li> <li>j) All accessories needed for installation and operation with items 1, 2, 4, 5 and 6 must be included;</li> <li>h) Must be compatible (width, depth, cooling, placement, cable routing etc.) with items 1, 2, 4, 5 and 6;</li> </ul>				

1. Item Number	2. Specifications Required		3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
1.3a.	Server operating system	Quantity: 2			
	Manufacturer's name:				
	Product type, model:				
Specification	a) Must support 64-bit OS environment; b) Must be compatible with items 7 and 8;				

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
1.4.	UPS  Quantity: 2			
	Manufacturer's name:			
	Product type, model:			
Specification	<ul style="list-style-type: none"> <li>a) Must support 19" rack, max 5U;</li> <li>b) Min 5000VA capacity;</li> <li>c) Input/output voltage 220V/50Hz;</li> <li>d) Maintenance-free leak-proof sealed type of battery;</li> <li>e) Automatic self-test;</li> <li>f) Temperature-compensated battery charging;</li> <li>g) Power conditioning (a.k.a. surge, spike, lightning and other protection);</li> <li>h) Min 1 (one) input connection and min 6 (six) output connections;</li> <li>i) Min 20 minutes of backup time at half load;</li> <li>j) Supplied with built in module and software for remote TCP/IP network monitoring and management;</li> <li>k) Min front LED status indicators for status information display;</li> <li>l) All accessories needed for installation and operation with items 1, 2, 3, 5 and 6 must be included</li> <li>m) Must be compatible with items 1,2,3,5 and 6;</li> </ul>			

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
1.5.	Switch			
	Quantity: 2			
	Manufacturer's name:			
	Product type, model:			
Specification	<ul style="list-style-type: none"> <li>a) Must support 19" rack, max 1U (1HE);</li> <li>b) Layer 3 switch, support for Layer3 trace route</li> <li>c) Gigabit Ethernet;</li> <li>d) Min 24 ports 10/100/1000 Mbit;</li> <li>e) Support for IEEE 802.1d, 802.1w and 802.1s protocols;</li> <li>f) Platform must support 8000 MAC addresses;</li> <li>g) All accessories needed for installation and operation with items 1, 2, 3, 4 and 6 must be included</li> <li>h) Must be compatible with items 1,2,3, 4;</li> </ul>			

1. Item Number	2. Specifications Required		3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
1.6.	Server, type 2	Quantity: 1			
	Manufacturer's name:				
	Product type, model:				
Specification	<ul style="list-style-type: none"> <li>a) Rack server type, max 4U (4HE), must be delivered min with 19" rack sliding rails;</li> <li>b) Min 1 (two) 64-bit processors must be installed, with min 4 (four) cores per processor, min 2.4GHz per processor;</li> <li>c) Min 16 GB RAM must be installed with support for future upgrade to min 128GB;</li> <li>d) Min 4 (four) internal hot-plug SAS HDDs, capacity min 300GB, RAID 1 mirrored, storage RAID controller on the board with 256MB cache;</li> <li>e) Min 2 (two) 10Gbps LAN network card must be installed and support for 10GbE managed L3 switch, with min support for TCP/IP and offload processing of the entire TCP/IP stack, including iSCSI traffic, to the network controller;</li> <li>f) Server form must be rack mountable;</li> <li>g) Must be compatible with items 2, 5 and 6;</li> <li>h) Must support min MS Windows 2008R2 and later and server virtualization;</li> <li>i) Must support min 2 (two) power supplies with sufficient power for all components in redundant configuration;</li> <li>j) All accessories needed for installation and operation with items 1, 2, 4, 5 and 6 must be included;</li> <li>k) Must be compatible (width, depth, cooling, placement, cable routing etc.) with items 1, 2, 4, 5 and 6;</li> </ul>				

1. Item Number	2. Specifications Required		3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
1.7.	Data logger, type 1	Quantity: 4			
	Manufacturer's name:				
	Product type, model:				
Specification	<p>a) 16-CHANNEL DATA LOGGER FOR ANALYSERS;</p> <p>b) Purpose: logging of data from all available outputs of the installed monitoring, analysis, sensor and sampling devices (e.g. RS232, Ethernet, analogue signals, status information).</p> <p>c) Memory capable of storing all data logged at the AQMS for at least 1 year in the form of data couple - time/measured value.</p> <p>d) Equipped with a data port for data transfer via point-to-point protocol using GPRS.</p> <p>e) Keyboard and display.</p> <p>f) Programmable via keyboard for specific monitoring site and channel conditions.</p> <p>g) Real-time clock with battery backup. Time and date must be updatable from a central computer system via a GSM cellular network.</p> <p>h) Software for remote operation (remote access).</p> <p>i) Installation and configuration on stations in Beograd – Pancevacki Most, Bor – Gradski Park, Smederevo – Rajja, Smederevo – Radinac.</p>				

1. Item Number	2. Specifications Required		3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
1.8.	Data logger, type 2	Quantity: 1			
	Manufacturer's name:				
	Product type, model:				
Specification	<ul style="list-style-type: none"> <li>a) Data logger, using industrial type mini PC in 19" Rack housing, supporting as minimum Ethernet LAN, RS232, etc.</li> <li>b) One minute averaging database storage in the logger (storage capacity in the logger for minimum 5 years of data based on 1 minute storage);</li> <li>c) Digital sampling using serial protocol.</li> <li>d) Graphical software for logger set-up.</li> <li>e) Set-up the logging remotely via desktop client software.</li> <li>f) Client software for remote real time presentation (every second).</li> <li>g) A built in data transfer service (FTP) for EEA format, charts, database files etc.</li> <li>h) A built in web service –retrieve data in EEA format or data as charts by requesting data using the standard HTTP-protocol.</li> <li>i) Installation and configuration on station in Starčevo, Pancevo Municipality.</li> </ul>				

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1. Item Number	2. Specifications Required		3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
1.9.	Air Quality Monitoring Software For more information on required software please refer to Appendix 1	Quantity: 1			
	Manufacturer's name:				
1.9.1 General requirements for central software	<b>Product type, model:</b> a) The central software must be able to receive all the data (Air Quality data: measured parameters - e.g. 1minute, 3 minute averaged values of SO2, O3, CO, NO, NOx, NO2, PM2, PM1, PM10 (from API TELEDYNE and HORIBA analyzers), Meteorological Data: temperature, pressure, relative humidity, wind speed, wind direction; Automated calibration data: zero span for analyser calibration; Data, regarding status of instruments) from all stations in SEPA and all networks (IPH-B, Pancevo-AVP, PS-AVP) and carry out all necessary operations (store data on centralized location, calculate 1 hour average data for all stations and parameters defined in State and local network for AAQM and visualize within the software environment) with the received data. b) The software must have functionality to exchange/collect data from all networks on a database level or web services level or ftp data transfer of log text file or equivalent. c) The software must have the following licensing requirements: <ul style="list-style-type: none"> <li>i. Unlimited license time (no license expiration);</li> <li>ii. Unlimited number of users (or equivalent license package for min 50 simultaneous users);</li> </ul>				

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
	<ul style="list-style-type: none"> <li>iii. Administrator level users;</li> <li>d) Web user interface;</li> <li>e) Intuitive personalized web interface with functionality for dynamic modification for every authorized user, according his predefined user role;</li> <li>f) Functionality to initiate every station individually and to download data with values from samplers, meteo stations and station's parameters.</li> <li>g) Flexible and possible for the user to implement future modifications in the network, e.g. addition of new parameters, averaging times etc.</li> <li>h) If any customization (application software development) of the supplied software is required all source code must be provided, with detail comments and instruction to setup of software environment and build the source.</li> <li>i) Run on Windows, Linux or equivalent with use of a SQL database or equivalent.</li> <li>j) The warranty over the system, cover the correction of any fault, which may occur in the custom software;</li> <li>k) Multilanguage features (minimum two English and Serbian) with separate editor for data dictionary.</li> <li>l) Have an on-line help in English and Serbian language;</li> <li>m) Maintenance period until final acceptance;</li> <li>n) Compatible with the supplied hardware equipment (items # 1, 2, 3, 4, 5, 6, 7 and 8);</li> </ul>			
1.9.2 General requirements for data management	<ul style="list-style-type: none"> <li>a) All data taken from stations (e.g. standard data from automatic air quality monitoring stations includes, but not limited to SO<sub>2</sub>, CO, NO, NO<sub>x</sub>, NO<sub>2</sub>, Temp, RH, Pressure) must be documented in one file with information on the dynamics of the acquisition system.</li> </ul>			

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1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
	<p>(e.g. name of the station, the date and time when the file is sent, period of time to which the data relate and information about data validity, alarm, zero, span.) The data must arrive from a station every 1-5 minute depending on user setting. The central software must aggregate data, average them by requested criteria and make report with statistics about data validity. (AAQM stations and station parameters are described in Serbian Bylaw on air quality control program of national network, described in State Gazette of Republic of Serbia, #58/11). Official)</p> <p>b) Central software must have list of all stations with all parameters, with option to set up parameters for every station;</p> <p>c) The central software database must contain all necessary data or equivalent:</p> <ul style="list-style-type: none"> <li>i. name of the network organization, about responsible staff, technical support, service and other information concerning network organization;</li> <li>ii. description of the stations, samplers, meteo and all other equipment;</li> <li>iii. table overview of acquisition process and alarm configurations;</li> <li>iv. message configurations (sms and/or email), distribution lists and telephone numbers;</li> <li>v. service and technical monitoring with complete list of real-time working regime and possibility to notify user in the station;</li> <li>vi. calibration gas cylinders' expiry dates, spare parts;</li> <li>vii. review of all measuring elements from station;</li> <li>viii. review of all stations in the network;</li> </ul>			

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
	ix. review of one measuring element in the network;			
1.9.3 User management and administrative functionality	<ul style="list-style-type: none"> <li>a) Functionality to create/modify/delete users, with user name and passwords;</li> <li>b) Functionality to assign user to access to one or more automated air quality networks (e.g. National/Regional/Local);</li> <li>c) Functionality to select from predefined user role and assigns to users (e.g. Viewers/Editors/Quality Assurance, etc.);</li> <li>d) Functionality to create/modify/delete organizational units;</li> <li>e) Functionality to select from predefined organizational units and assigns to users (SEPA, Pancevo-AVP, PS-AVP, IPH-B) with options to create/modify/delete organizational units;</li> <li>f) Functionality to store and securely display of internal and external user data user description, organizational unit, organization, e-mail, access rights, mobile phone, etc.;</li> <li>g) Functionality to access security log table in the database, with information for each user role, user name, record id, parameter id, value, user activity type (view/edit data).</li> <li>h) Functionality for configuration of specific information e.g. reports, graphs, maps, automatic validation procedures, etc.</li> <li>i) Functionality for backup of raw and verified data</li> </ul>			
1.9.4 Queries, display and analysis functionality	a) Functionality to provide trends/graphs for the last 24 hours or for predefined time period from/to custom date, for one or more station/parameter;			

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1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
<p>b) Functionality to select stations by parameter or parameters by station set of data for predefined time period</p> <p>c) Functionality to select/query one or more stations and parameters, for predefined time period (e.g. daily mean, hourly min, 30 mins, 1 min) with option to save query with name for future use;</p> <p>d) Functionality to select Date/Time option for query filtering with options for last 1, 3, 6, 12, 24 and 31 days and also with from/to custom date;</p> <p>e) Functionality to save and store the predefined queries for a particular user, logged into the system or for general usage of all users of the system;</p> <p>f) Functionality for unlimited number of predefined combinations of queries;</p> <p>g) Functionality for new query parameterization including new measurements;</p> <p>h) Functionality for output (export) options: Excel, CSV, Table view in a web browser (HTML/XML), Graph representation, txt, pdf, xml;</p>				
<p>1.9.5 Reporting functionality</p>	<p>a) Functionality to calculate/conversion from ppb to micrograms;</p> <p>b) The central software must be harmonized with the Serbian legislation (ByLaw on requirement for monitoring of Air Quality, Official State Gazette of Republic of Serbia, #11/10, 75/12, 63/13 and later. The ByLaw defines the AAQM stations, the required parameters and frequency) and EU reporting requirements for AirQuality (available <a href="http://acm.eionet.europa.eu/country_tools/ac/eq-dem/">http://acm.eionet.europa.eu/country_tools/ac/eq-dem/</a> and e-reporting requirements - <a href="http://www.eionet.europa.eu/aqportal">http://www.eionet.europa.eu/aqportal</a>, Decision 2011/850/EU):</p> <p>i. Daily, monthly and yearly reports for the local</p>			

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
1.9.6 Data Quality Control/Validation functionality	<p>network describing the situation according to Serbian, EU and European Environmental Agency (EEA) legislation, standards or other norms, with export to XLS, Word, XML, TXT, PDF;</p> <p>ii. Daily, monthly and yearly reports of maximum values of pollutants grouped by measurement stations and for the whole network with export to XLS, Word, XML, TXT, PDF;</p> <p>Monthly and yearly statistical reports of the data validity of every sampler compatible with Serbian and EU requirements with export to XLS, Word, XML, TXT, PDF;</p> <p>iii. Creating tables by the parameters from all stations for the purpose of creating periodic and annual reports about the state of air quality (mean value, number of days with exceedances, statistics specific for certain pollutants, Air Quality index SAQI)</p> <p>c) The central software must have implemented communication module with Eionet network (DEM software - <a href="http://acm.eionet.europa.eu/country_tools/aaq/aaq-dem/">http://acm.eionet.europa.eu/country_tools/aaq/aaq-dem/</a> and e-reporting requirements - <a href="http://www.eionet.europa.eu/aaportal">http://www.eionet.europa.eu/aaportal</a>, Decision 2011/850/EU, which is the central system by the laws of Serbia and the EU and EEA standards.</p>			
	<p>a) The central software must provide user the possibility of real-time data checking and data validation.</p> <p>b) The central software must provide functionality for user-control of the received data and automatically detect, select and mark all invalid data, data with alarm or data gather in zero/span period.</p> <p>c) The central software must have functionality for:</p>			

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
	<ul style="list-style-type: none"> <li>i. Identification of missing values;</li> <li>ii. Out of range or very high or very low values (compared with user-settable limits in terms of values and averaging periods);</li> <li>iii. Calibration not done, if zero/span not done report of reasons why it wasn't done;</li> <li>iv. "Dead" zones in the data, if station stop working or data transfer failure;</li> <li>v. Setting algorithm for notification about pollution;</li> <li>vi. Setting algorithm for notification about changing pollution direction;</li> <li>vii. Informing about the average values;</li> <li>viii. The central software must provide interface for manual data input and import (ascii, excel) of some measuring methods that are being carried out in laboratory conditions (i.e. gravimetric data of PM, data collected on site, calibration data from calibration laboratory, metadata: station owner, location, coordinates, type of network (state, regional, local), sampling line length, type of station (urban, traffic), surroundings, period of operation - from/to, etc.). This input must be verified by the authorized person and only after that validation reports can be done.</li> <li>d) The central software must provide possibility of inserting new measurements and closing of existing without losing data in the database</li> <li>e) User's data validation and whole system management as a minimum must include: <ul style="list-style-type: none"> <li>i. data acquisition status for every station and every sampler (last connection, last transmitted</li> </ul> </li> </ul>			

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
	<ul style="list-style-type: none"> <li>measuring value, last transmitted alarm or information ...);</li> <li>ii. data acquisition status on public information panels (web presentation, web portal ...);</li> <li>iii. review of data arrival in last 48 hours from all stations and samplers in network;</li> <li>iv. review of alarms and information by period, user, user's area from the first day of network;</li> <li>v. the central software must everyday provide listing of alarms that was that day.</li> </ul>			
1.9.7 Map interface functionality	<ul style="list-style-type: none"> <li>a) Must provide a simple map module with location of all stations with links to photos and summary parameters from raw data (e.g. Name of parameter, Value, Unit);</li> <li>b) Must provide a map module for picture generated on the base on averaged values for 1h, 24h, 1 month and 1 year and another averaged period using different method of interpolation (e.g. Kriging, Inv Dist.)</li> </ul>			
1.9.8 Calibration functionality	<ul style="list-style-type: none"> <li>a) Automatic calibration of analyzers;</li> <li>b) Zero span check;</li> </ul>			
1.9.9 Manual data input for metadata and calibration laboratory reports	<ul style="list-style-type: none"> <li>a) Web based interface for input, store, access and review of metadata for all stations;</li> <li>b) Metadata must contain as minimum information for station owner, location, coordinates, type of network (state, regional, local), sampling line length, type of station (urban, traffic), surroundings, period of operation – from/to, etc.);</li> <li>c) Web based interface for input, store, access and review of calibration laboratory</li> </ul>			

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1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
1.9.10 Web portal functionality	<p>a) The system will have the functionality to publish the information on a web site;</p> <p>b) The central system must have a module for Internet data display, with information for the whole network, each station individually, each sampler individually and other parameters from station;</p> <p>c) All raw data must be published on a web portal for internal usage;</p> <p>d) All validated data (monthly and annual reports) will be published on a web portal, with user/name password restrictions for specific users, based on the organizational structure (e.g. PS-AVP, Pancevo, IPH-B) and geographic area (e.g. Pancevo users can see/access data only for Pancevo stations).</p>			
1.9.11 Data management (acquisition) functionality	<p>a) The data management (acquisition) functionality must be available at all locations where is continuous air quality monitoring (e.g. SEPA, IPH-B, Pancevo-AVP, PS-AVP) in order to integrate data from all networks into central place in SEPA;</p> <p>b) All existing networks must be integrated into the central software system/database;</p> <p>c) Data from data loggers from SEPA network should be integrated, based on supplied equipment item # 7 (namely stations in Beograd – Pancev Most, Bor – Gradski Park, Smederevo – Rajja, Smederevo – Radinac).</p> <p>d) Data from all other data loggers (namely API Teledyne) from SEPA should be integrated.</p> <p>e) Minimal requirements for data acquisition and station software:</p> <p>i. sampler has communication through rs232, rs485 or Lan port. Possibility of data transferring adjustment in the range of 1 to 60 minutes;</p>			

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1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
	<ul style="list-style-type: none"> <li>ii. Automatically invoke zero and span checks at user-defined settings for one or more samplers and time of starting these operations;</li> <li>iii. Possibility of remote access to the station software (gsm modem, gprs, hsdpa, cable, wifi or equivalent) and remote control of the zero/span check;</li> <li>iv. Possibility of remote control and management of the sampler functions or all samplers functions at the same time such as: <ul style="list-style-type: none"> <li>i. time setting;</li> <li>ii. basic data reading from sampler such as serial number, version, for some samplers current state of sampler – lamp detrition, pump flow;</li> <li>iii. turning off the sampler or whole station;</li> </ul> </li> <li>v. Collecting data from samplers, archiving and sending data. Basic data should have: <ul style="list-style-type: none"> <li>i. measured value;</li> <li>ii. zero and span (if the sampler has this option);</li> <li>iii. station alarm (below/above permitted working temperature, power failure, below/above permitted humidity);</li> </ul> </li> <li>vi. Sampler data and meteorological data must be stored on local station for at least 5 years at intervals settable by user for all parameters measurements (1 to 60 minutes);</li> <li>vii. System must generate averages in 1 hour, 8 hours and 24 hours intervals;</li> </ul>			

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1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
	<p>viii. Data exchange between station and central server for data processing should be via gsm modem, gprs modem, hsdpa modem, cable or wireless wifi connection or equivalent;</p> <p>ix. All other data collected from all samplers and sensors in the station such as pump flow, temperature, humidity, power failure, etc. must be stored in the station and have the option of direct notification to the user about the current status even if its not connected to the central server;</p> <p>x. All specified parameters must be sent near real-time through gsm modem, gprs modem, hsdpa modem, cable or wireless wifi connection on the central server;</p> <p>xi. The software must have possibility to notify user about current status of the network via sms or email from alarms on samplers, alarms in the station at intervals set by user and possibility of setting according to system users privileges category;</p> <p>xii. The software must provide user a real-time status of the station, current operations in station and managing of the station. Every user's access to the station and all the operations that a user does on a particular station and samplers must be stored at the local station and at the central server in the form of a report that can be get with certain category of privilege;</p> <p>xiii. The software must allow the user to manually start the process of remote calibration, zero and span;</p> <p>xiv. The software must allow power users (i.e. system administrators) complete remote managing and</p>			

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1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
	<p>setting of station, adding new samplers to system and removing existing samplers from system;</p> <p>xv. The software must allow the user remote control and diagnostics of all samplers and sensors in the station;</p> <p>xvi. Converting parameters with harmonized concentrations;</p> <p>xvii. Storing data to the external media (usb hdd, usb flash disk, memory card or equivalent for 1 year normally operation period);</p> <p>xviii. Possibility to make connection with external computer (laptop, tablet, pda, smart phone or equivalent) via cabel or wifi. All reports and data backup could be done on external computer;</p> <p>xix. The software in the station must have 2-way communication with central server for the case of communication protocol failure;</p> <p>xx. The software must be customized to work with samplers from all producers as well as combinations of various producers in one station;</p> <p>i. The user must receive a report about average value from the software in intervals of half an hour, one hour, 8 hours, 24 hours, a month, a year;</p> <p>ii. All reports must have arithmetic mean, vectorial average, linearization, unit conversion;</p> <p>iii. The software must be able to display graphs, tables with measured values, diagrams, pivot, wind rose, air pollution rose, wind and air pollution rose, service and calibration protocols in the form of text;</p>			

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1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
	iv. The user configures software to send date to the central server but the dynamics should not be longer than 1 minute;			
1.10.	<b>Training</b> <b>Quantity (courses):</b> 2			
	a) Tenderer will be solely responsible for provision of all training related services, products, equipment and documentation; b) The Tenderer must submit as part of the offer training plan with minimum following: i. Detailed training program (overview, objectives, offered syllabus, offered materials, trainee prerequisites, etc.); ii. Proof of qualification of instructors for all training modules (certificates relevant to software solutions on which training is to be provided, examples of previous relevant professional experience, years of experience). c) Training materials must be provided on min 1 (one) electronic media and in min 1 (one) duplex printed bonded hard-copy per trainee; d) Training materials must be delivered in adequate quantities for all trainees at least three days before the training begins; e) Training materials must include min training syllabus overall description, detailed description of theory (lectures) and step-by-step instructions (exercises), training sample data (electronic media only) and training software/procedures/scripts exercises (electronic media only);			

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1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
1.10.1	<p><b>Training course: System administration and maintenance training</b> <b>Quantity (trainees): 5</b></p> <p>f) Tenderer must provide training facility in Belgrade, Serbia, equipped with computers and software for min 1 computer per 2 trainees.</p> <p>g) Training courses must be on Serbian language (in case of English speaking lecturer simultaneous translation must be provided).</p> <p>h) Overall assessment of training quality: at least 80% of trainees must have achieved training objectives, by means of basic written evaluation (test or exercises).</p>			
	<p>a) Training methods: on-site training;</p> <p>b) Number of trainees: minimum 5 users;</p> <p>c) Course duration: minimum 5 days;</p> <p>d) Course syllabus:</p> <ul style="list-style-type: none"> <li>i. Installation and configuration of the system;</li> <li>ii. Backup and restore procedures;</li> <li>iii. System troubleshooting;</li> <li>iv. User and functionality management on all levels (central software, web portal, data collection software).</li> </ul> <p>e) Minimum qualification of trainer:</p> <ul style="list-style-type: none"> <li>i. <i>Qualifications and skills</i> <ul style="list-style-type: none"> <li>1. University level degree or relevant professional qualification;</li> </ul> </li> </ul>			

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
	<p><i>ii. General professional experience</i></p> <p>1. Minimum 3 years of relevant professional experience in IT, data loggers, set up and configuration of automated air monitoring stations.</p> <p>2. Minimum 3 courses in automated monitoring system (air, water, weather or equivalent) administration, tuning and maintenance);</p>			
1.10.2	<p><b>Training course:</b> System user training</p> <p><b>Quantity (trainees): 14</b></p>			
	<p>a. Training methods: on-site training;</p> <p>b. Number of trainees: minimum 14 users;</p> <p>c. Course duration: minimum 5 days;</p> <p>d. Course syllabus:</p> <ul style="list-style-type: none"> <li>i. System introduction: general interface and functionality;</li> <li>ii. Data quality control and validation;</li> <li>iii. Data export &amp; analysis;</li> <li>iv. Reporting functionality;</li> </ul> <p>e. Minimum qualification of trainer:</p> <ul style="list-style-type: none"> <li>i. <i>Qualifications and skills</i></li> <li>2. University level degree or relevant professional qualification;</li> <li>ii. <i>General professional experience</i></li> </ul>			

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1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes YES/NO
	<ol style="list-style-type: none"> <li>1. Minimum 3 years of relevant professional experience in IT, data loggers, set up and configuration of automated air monitoring stations.</li> <li>2. Minimum 3 courses in automated monitoring system (air, water, weather or equivalent) administration, tuning and maintenance);</li> </ol>			

**Appendix 1: Explanatory note on general architecture of the system**

The main goal of the system is to enable competent national institution (SEPA) in collecting, updating and processing air quality data from automatic air quality monitoring stations for the purpose of reporting at national and EU level, according to the Law of Air Protection and the Regulation on establishing air quality monitoring programs in the national network.

This goal can be fulfilled by acquisition of integrated software for air quality data collection, analysis, verification and reporting including hardware and telecommunication equipment for data collection from automatic air quality networks

**General functions of the software**

- To allow integration of data from different networks: state, regional and locals for both real time and validated data;
- To enable involved institutions to get validated data for air quality from automatic air quality stations for areas of interests/responsibility (data sharing);
- To provide real time data to open public from all stations from state, regional and local networks;
- To allow SEPA to perform e-reporting functions to EEA (Decision 2011/850/EU);

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## I. General architecture

The system will be implemented as distributed system with main location in SEPA, with connections to existing networks in Belgrade, Novi Sad and Pancevo. The sites must be connected fast Internet links, to allow data reporting near in real time.

## II. Scope of the system

### i. Information scope

The informational scope of the system includes two main groups of data:

- **Data, received from data loggers from the Automatic Air Quality Monitoring Stations and Automatic Weather Stations:**

1. Air Quality data: measured parameters (e.g. SO<sub>2</sub>, O<sub>3</sub>, CO, NO, NO<sub>x</sub>, NO<sub>2</sub>, PM<sub>2</sub>, PM<sub>1</sub>, PM<sub>10</sub>).
2. Meteorological Data: temperature, pressure, relative humidity, wind speed, wind direction.
3. Automated calibration data: zero span for analyser calibration;
4. Data, regarding status of instruments:

- **Data, entered manually:**

1. Calibration data from calibration laboratory:
2. Metadata: station owner, location, coordinates, type of network (state, regional, local), sampling line length, type of station (urban, traffic), surroundings, period of operation – from/to, etc.);

The existing data is stored in different computer systems and in different data formats (log files in txt format or DBMS storage in MySQL or PostGRE DBMS) and different computer operating systems (Linux or Windows based). Different networks are set up independently, with different suppliers and data compatibility between existing networks/systems is essential.

### ii. Organizational scope

The organizational scope of the system aims to describe the key actors, participating in the system from the view point of generic activities.

# National Air Quality Information System

<p><u>Open Public/ Other Institutions</u></p>	<p>Access to all raw data into one single portal</p> <p>Requests for validated data</p>
<p><u>IPH-B</u></p>	<p>Provides automatically validated data</p> <p>Provides automatically near real time raw data</p> <p>Access information for all other networks within their area</p>
<p><u>Pancevo - APV</u></p>	<p>Provides automatically validated data</p> <p>Provides automatically near real time raw data</p> <p>Access information for all other networks within their area</p>
<p><u>PS - APV</u></p>	<p>Provides automatically validated data</p> <p>Provides automatically near real time raw data</p> <p>Access information for all other networks within their area</p>
<p><u>SEPA</u></p>	<p>Administer the system</p> <p>Quality control</p> <p>Analysis and modeling</p> <p>Reporting (National/ EEA)</p>
<p><u>Centralized Data warehouse</u></p>	<p>National Air Quality Database</p>

Figure 1 Organizational structure

### III. General Principles of Data Organization

#### i. Description of monitoring procedures

All institutions, the competent authority of the autonomous province (Provincial Secretariat of Vojvodina) and competent authority of the local government (City of Pancevo, Public Health Institute of Belgrade) shall report their data to SEPA every month and on yearly basis for the needs of preparation of "Yearly state of air quality report", which is sent to MEDEP. SEPA reports this information to EEA, using DEM software (based in MS Access DB). Currently the yearly reporting to SEPA is done in MS Excel files and there is irregular monthly reporting.

The system will introduce integration of the existing systems on data level – for raw data on near real time basis, and on validated data on time period agreed between institutions.

#### ii. Data and information flow

National data flow includes the following automated air quality networks, which will be integrated into the system:

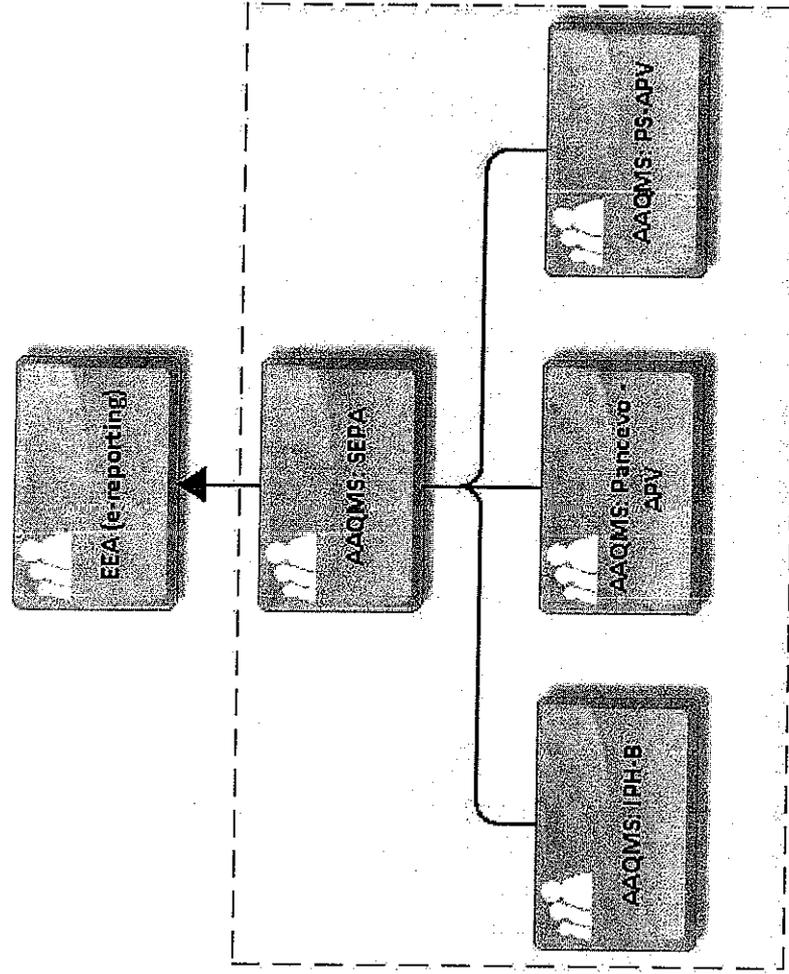


Figure 2 National data flow

- **AAQMS: IPH – B:** Automated Air Quality Monitoring system: Institute of Public Health, Belgrade;
- **AAQMS: Pancevo – APV:** Automated Air Quality Monitoring system: city of Pancevo – Autonomous Province of Vojvodina;
- **AAQMS: PS-APV:** Automated Air Quality Monitoring system: Autonomous Province of Vojvodina;
- **AAQMS: SEPA:** Automated Air Quality Monitoring system: Serbian Environmental Protection Agency;
- The integrated system will provide e-reporting functionality to European Environmental Agency.

The data flow in SEPA is:

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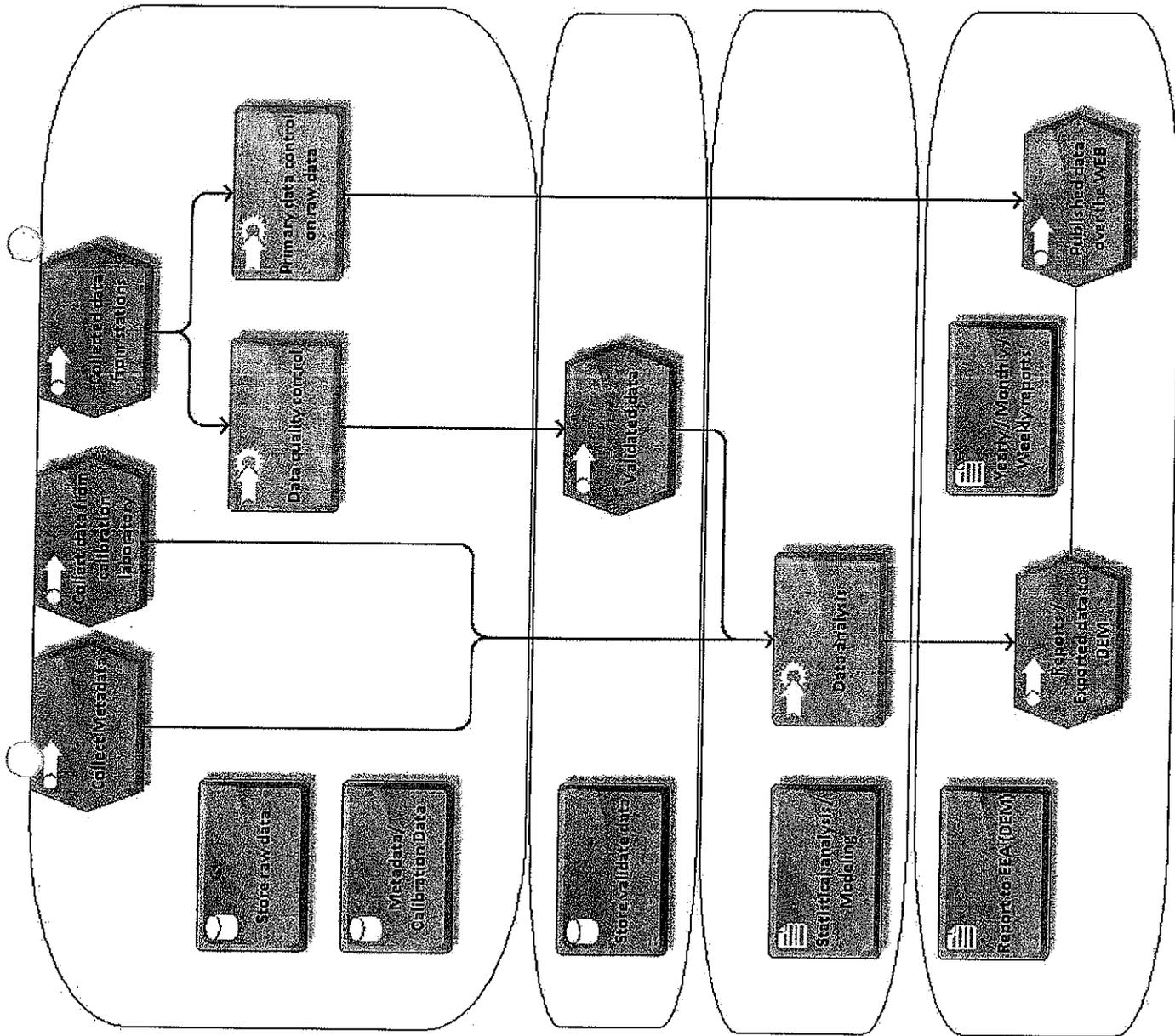


Figure 3 SEPA Data flow

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# IV. Information and Communication Technology Infrastructure

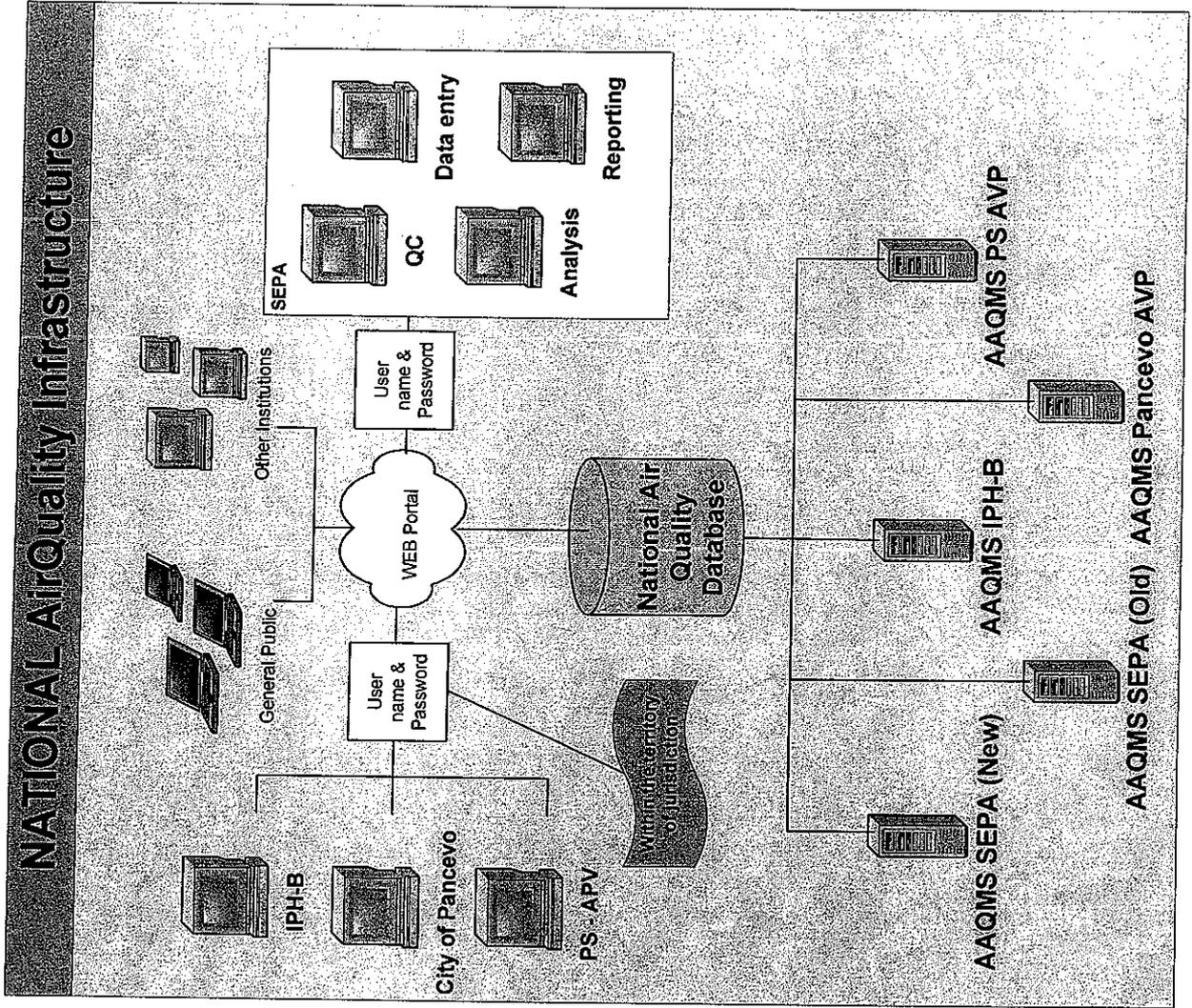


Figure 4 Infrastructure

B

Main modules:

- **AAQMS:** all existing stations will be integrated into one centralize database;
- **SEPA Modules:** functionality for quality control and validation, data entry, analysis and reporting;
- **IPH-B/City of Pancevo/PS-APV:** functionality to access with user name and password a web based portal for view, use and download data for their own territory (e.g. PS-APV will access data for Autonomous province of Vojvodina, etc.)
- **Open public/ Other institutions:** open public will have access to one common portal to see and use raw data from all networks. Other institutions might request validated data for specific period or specific use.

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