

Technical Proposal

Bidder's qualification, capacity and expertise

SIA Technology was founded in 2009. The main direction is Information Technology.

We provide services in the field of IT, namely:

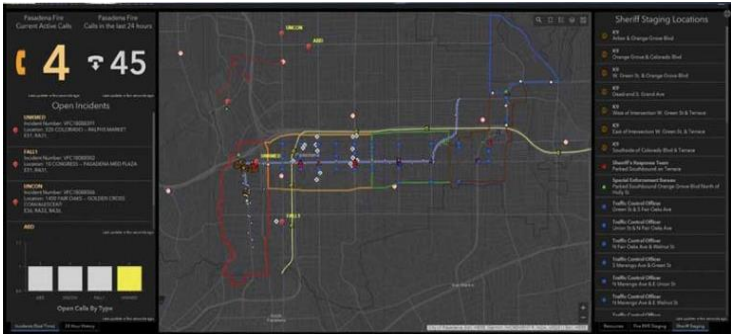
- IT consultancy for the automation of information processing and documentation processes;
- IT consultancy for cyber security;
- Improving the specifications for the elaboration of web pages, computer systems;
- Maintenance and management of IT infrastructure;
- Improving specifications and projects for IT Systems Installation and Management:
 - o computer networks (LAN);
 - a fiber optic (WAN) or telephony bus;
 - or video surveillance;
 - o access control (industrial, hotel, etc.);
 - an automation (eg & quot; Smart Home & quot; Systems);
 - or firefighting;
 - an IT security.

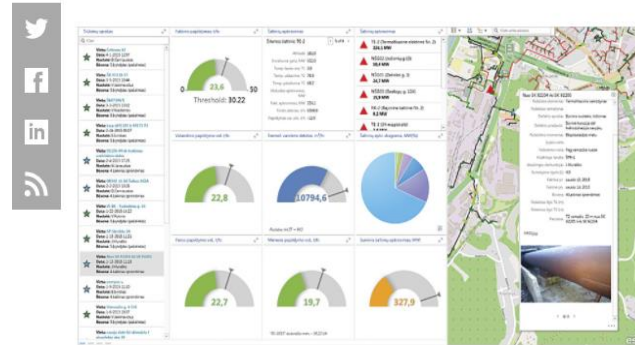
Professional approach: Quality; Responsibility; Confidentiality; Experience (over 10 years in the field); Receptivity; Flexibility; Operativity;

Clients: Primariile Chisinau, Cahul, Ungheni, UNDP, CNAJGS, MAI, Ecolux, Glastroesch, ExFactor Group, TransGrupService, Chisinau International Airport, Hotel Berd's, Hotel Zentrum, GFP Lab (Italy), Consulate General of the Republic of Kazakhstan in Chisinau, National Company Kazakhstan Sapharia Spa , peresecina village, Mereni village, Pascani town hall, Şargu-Trans SRL etc.

Proposed Methodology, Approach and Implementation Plan

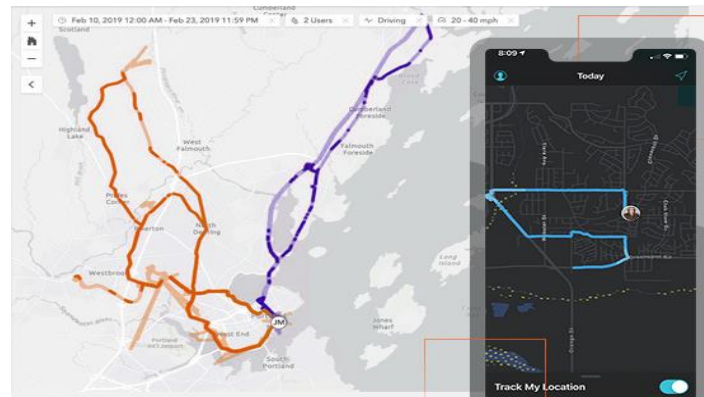
Implementation of the SMART city transport platform development (design and adjustment to the local context and needs), technology and data integration, installation. Time: (4 months) months since contract signature

Deliverable	Approach
8 transport units (their delivery is already contracted, KARSAN Jest model, produced by KARSAN Turkey) - ticketing system, which allows travelers to pay at least: online, cash in transport (coins), with bank card in transport, - GPS transport monitoring system, - passengers information system in transport and in 17 waiting stations (these stations which will be installed in parallel through another signed delivery contract), - the command center from where all the service will be managed and which will be set up within the Municipal Enterprise headquarters	Based on the objectives and technical requirements set forth in RFP for this project, SIA Technology comes with the technical solution which is based on state-of-the-art technology – ArcGIS platform, developed by the world leading company In this area – Esri Inc. and which was successfully tested and implemented during the last 12 years in various local governments from Moldova – starting with the small communities and up to the rayon centers (such as Cahul, Ungheni and Orhei) and up to the Chisinau municipality which embraced and successfully using ArcGIS platform across various town hall departments. The elements of already implemented solutions are shown below in our methodology and description of the technological approach. Connect to any data stream Process and analyze real-time data Make better decisions with improved situational awareness Integrate real-time data Arc GIS-based smart community information system collects information in real time and feeds it back into performance dashboards for real impact. The proposed Smart Transportation Information System will be organized around four technology pillars: 1. Planning and Engineering 2. Operational Efficiency 3. Data-Driven Performance 4. Civic Inclusion The advantages of the proposed transportation smart platform based on the ArcGIS Hub are the following: - Implemented worldwide as a smart cities platform  The City of Pasadena moved to a GIS-based strategy to coordinate safety activities City of Boston needed to plan for the present day as well as prepare for the generations to come. Using ArcGIS Urban, the city was able to examine growth capacity indicators, like population, households, and jobs, in a real-world context to make smarter decisions for its future.



With Collector for ArcGIS crews at Vilnius Energy report information from the field

- Streamlines workflows and business processes.
- Improves field data collection and mobility.
- Analyzes data quickly to change the pace of local government operations.
- Uses operational dashboards to improve responsiveness.
- Uses data and analytics to improve decision-making and service delivery.
- Provides meaningful information products to the public.



The SMART City transport solution will be configured in such a way as to offer the possibility for the Edinet city to build a modular based approach during the development of their information infrastructure, which will be interoperable and updated in such a way as to integrate and communicate with major IT systems currently employed by the municipality.

In particular the municipalities/LPAs will have the following possibilities using the ArcGIS platform, which already was tested with local examples from Ungheni, Cahul, Orhei and Chisinau (screenshots shown below).

- Unified data collection and evaluation organized under the various layers (as shown below) needed for further strategic decision making and planning
- Analysis of historical data, define current situation and trends
- Data context among connected devices and systems
- Statistics, indexes, indicators, and reports
- Economies generated due to the effective use and management of the public resources
- Central monitoring of all connected devices and systems
- Maintenance and service work planning

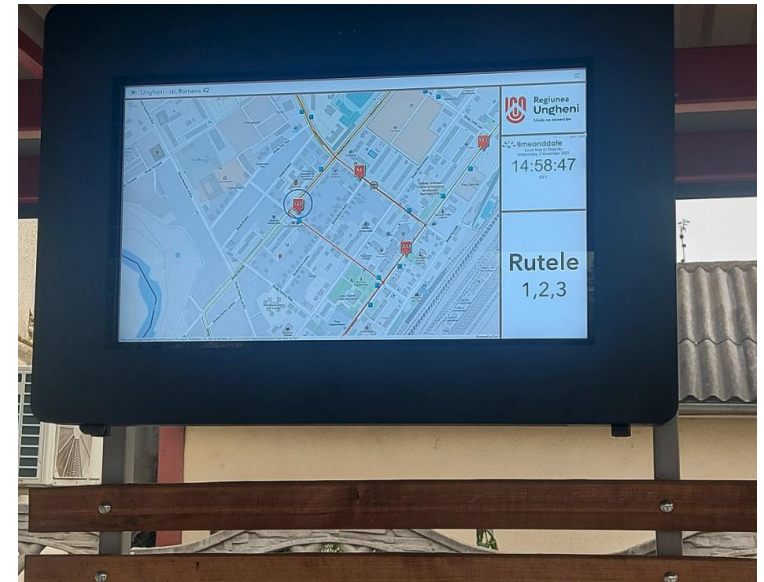
The section on IoT integration (mobile apps, street lighting sensors, mentioned in the ToR presents the most challenging part of the assignment due to the number of factors:

- **Firstly**, based on the previous UNDP project on OneStopShop in these two cities, it was evaluated that basic IT infrastructure was at the very early stage of development, which required some serious investments both in hardware and software to meet up the bid-data steams in real time wich IoT requires
- **Secondly**, as of 2023 the city has to make interoperable own geo-databases datasets of the basic urban infrastructure in order to ensure the IoT integration with the respective software

The system, through the lens of public transport beneficiaries, will provide, at any time of the day, at least information on the number of passengers/vehicle loading, the number of issued titles, the number of cards/tickets/validated trips, system fraud, as well as on the technical status of the system. The data will be processed by a software and seen in the command center, and necessary monitoring reports can be issued in order to adopt managerial decisions.

Proposed Approach of the Project team. Based on this background, our team will offer the platform based on ArcGIS Hub (cloud based platform) for an IoT integration project that is ready-to-use software platform for all IoT devices under implementation in Chisinau, Orhei and Ungheni cities (such as public transportation, street lightning, GPS tracking, etc.). Thus once this will be integrated using ArcGIS platform it will be an interoperable with other IT systems that will be part of smart-city solutions.

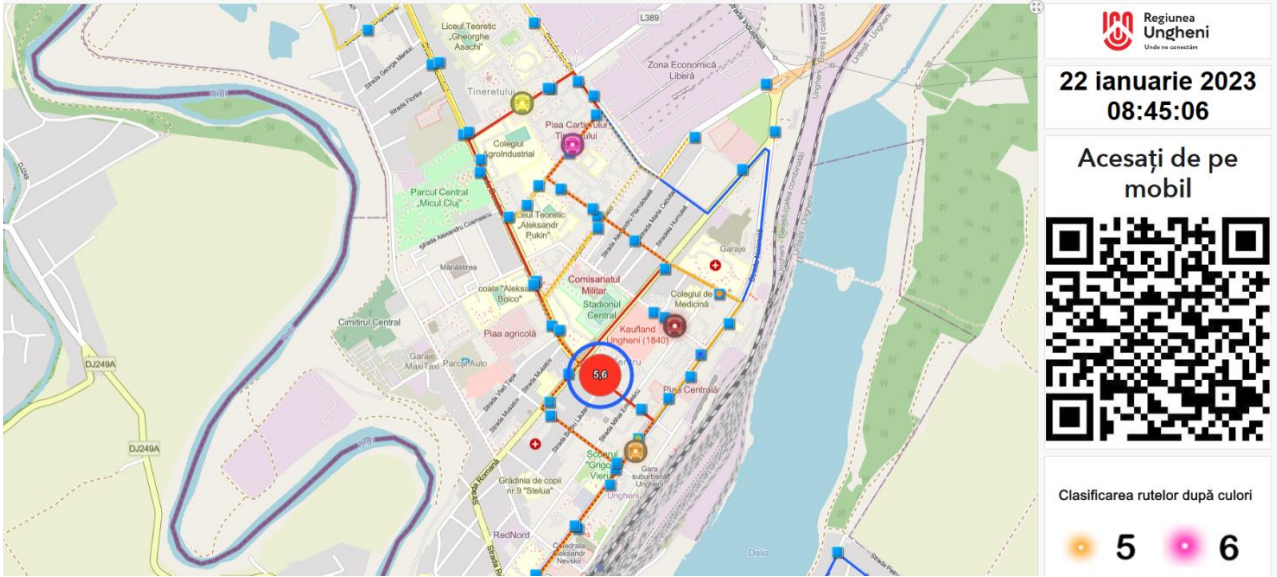
Exemples from Ungheni city implemented by the project team.



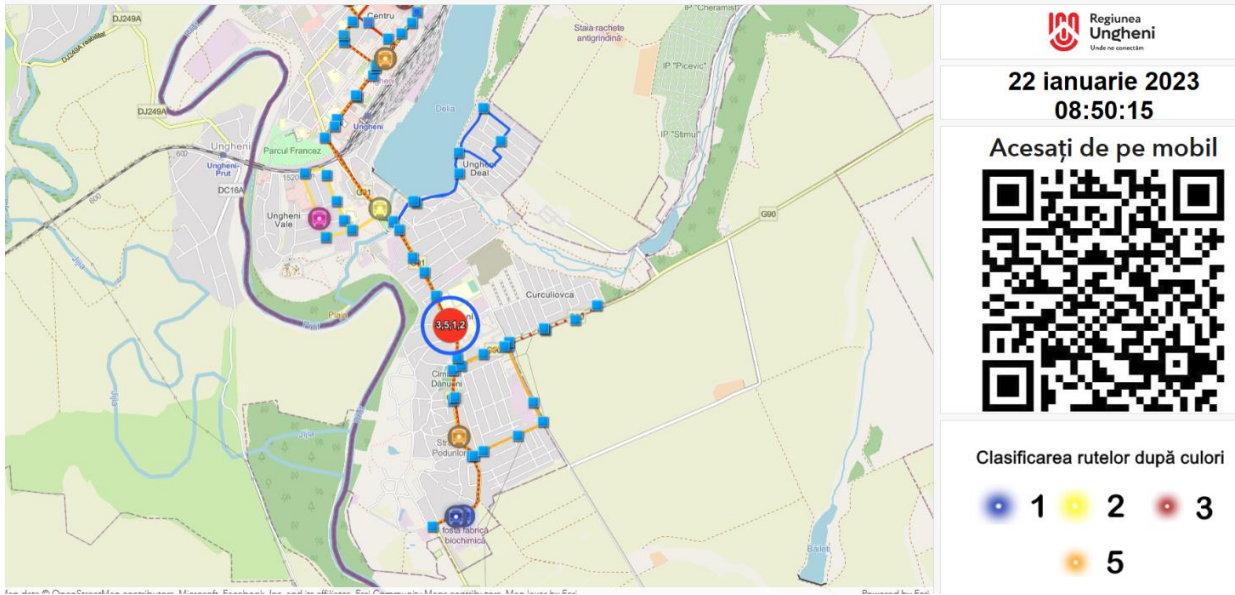
The system will be designed in such a way as to allow later access to the system or interoperability with the urban data platform of the municipality of Edineț (to be created later), it will also allow the extension of the provision by the managing Enterprise of traffic record and monitoring services of travelers at the district or even regional level.

Citizens online information about traffic or parking status

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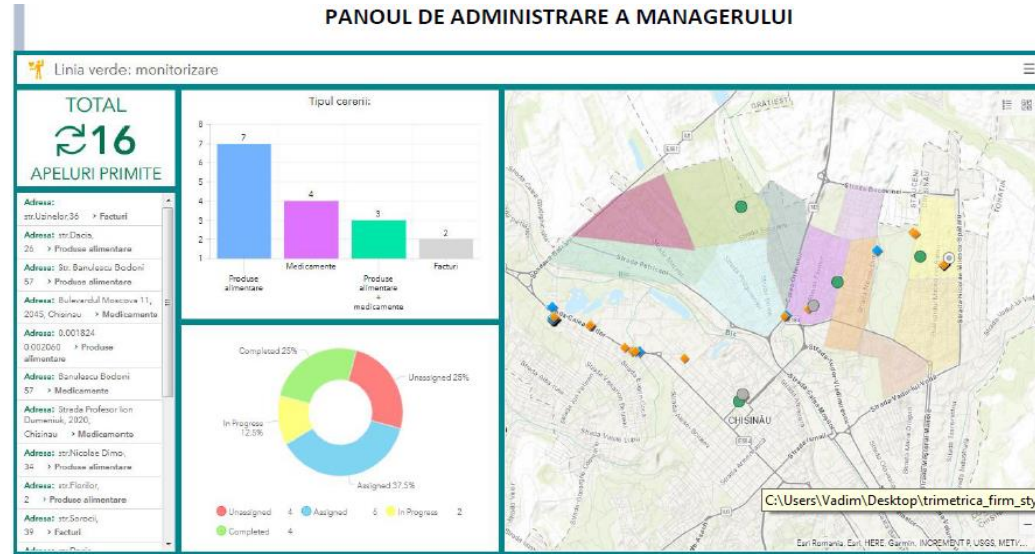


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The command center will have at least real-time management information regarding the operation/operability of equipment in the system, both in vehicles and in stations.

At the same time some elements of IoT solutions can be ensured by integration of various public data and preparing the layers and dashboards such as once shown below for various urban management departments, implemented by the project team including the public transportation one.



Main IT and functionality features of the proposed technical solution

The solution provides an integrated suite of role-based apps that helps emergency response personnel (for example, duty officers, field operations, incident commanders, and public information officers) share information as they perform the unique tasks required to accomplish incident objectives. Following the Request for Proposals (RFP), the following state-of-the-art tested and resilient solution based on the following key points of the system:

- Implementation of an interoperable, flexible and accessible system for various types of devices (PC's, laptops, tablets, phones) with different operating systems web based solution on the ArcGIS Portal platform
- Basic functions are user groups record, setting access rights for user groups and application modules, recording all events and errors in the system.
- Introducing to the system patient data (personal data) by operators, through ergonomically designed modules to facilitate the input process and optimize processes throughout the entire system.
- Full monitoring of states of the files and of stages reviewed by specialist.
- Full control of the file processing.
- Mandatory or optional attaching process of documents to the file such as pictures, scanned documents etc., that represents test results, scanned medical books, X-ray images, etc.
- Import, export and data verification to the EGov platform.
- Graphic evidence of all processes.
- General display panel with advanced search and sort tools.
- Detailed reporting system.
- Process and task management system.
- Development of a scalable system to ensure the appropriate level of security.

- Data storage will be performed on the governmental MCloud platform

Enable users with the right level of access

Content management strategies are often centered around ensuring that people have access to—and are using—the right data and information ensuring that users have access to the right capabilities within ArcGIS Enterprise to do their work. For example, ensuring that editors can edit data, content creators can author and publish content, and administrators have administrative access. Within ArcGIS Enterprise, this is controlled through user types, roles, and privileges.

Match users with user types

User types determine what high-level capabilities each member (user) will have. It is likely that there will be some members in your organization that just need to view content, some who will edit, and some who will need to do everything—view, edit, create, analyze, and administer. User types match these common needs and personas. For example, if you have a member who just needs to view data, you can assign them the Viewer user type.

The five general purpose user types in ArcGIS Enterprise are:



Each member of ArcGIS Hub is assigned a user type by their administrator as their account is created.

Leverage member roles

As shown, user types determine the high-level capabilities of each member—view, edit, create, analyze, administer. This is then refined through the use of member roles and privileges. Member roles are sets of privileges and allow privileges to be quickly and systematically assigned. When privileges have been assigned through member roles, certain actions in ArcGIS Enterprise are allowed/shown. Privileges are divided up between general privileges for groups, content, sharing, analysis, and editing, and administrative privileges for members, groups, content, and system settings.

There are five built-in roles in ArcGIS Enterprise: Viewer, Data Editor, User, Publisher, and Administrator. Each of these roles includes a set of privileges relating to the function of the name (e.g. Publishers can create and publish content, among other privileges). It is common to use both built-in roles as well as custom roles, which are roles that you, an administrator, have created to match your user base.

Develop a strategy for creating and managing content

Within ArcGIS Enterprise, members can create, manage, and share many different types of items, such as web maps, apps, layers, surveys, and dashboards.

Workflows can be different for creating each of these items. For example, to create a feature layer, one can publish data from ArcGIS Pro via the user interface or by scripting. Also can create a feature layer by running analysis in your Enterprise portal, or by directly uploading documents like CSVs and publishing layers from those files.

Different types of layers—feature layers, map image layers, scene layers, stream layers—have different capabilities and features. For more information on the relationship between services and portal items, see the help topic [Services and portal items](#).

Roles and authentificaiton for the townhall specialists and management related to smart urban public transportation system

Database layers/user roles	Statii	Auto	Rute	Pasageri	eTicket
Mayor	VD	VD	VD	VD	VD
Deputy Mayor 1	VD	VD	VD	VD	VD
Deputy Mayor 2	VD	VD	VD	VD	VD
Sp. tehnologii informaționale	CSA	CSA	CSA	CSA	CSA
Responsabil sectia transport public	VD	VA	VA	VS	CSA
Specialist Finante publice	CSA	VA	CSA	VA	VA
Economist	V	V	V	V	V

V - vizualizare
VS - vizualizarea și modificarea datelor spațiale
VA - vizualizare și modificarea datelor atributive
CSA - control asupra datelor spațiale și atributive
VD - vizualizare și luarea deciziilor bazate pe date spațiale

Advantage of data maintenance capabilities

The organization may have—or develop after some time—standards for maintaining, editing, and enforcing data integrity. Within ArcGIS, different options exist based on the specific item type and the origin of the data. When the layers reference data in an enterprise geodatabase, one can use advanced functionality like versioning, which allows multiple users to edit the same data simultaneously. Also use functionality like archiving, which records and accesses changes made to your data over time.

Software components of ArcGIS Enterprise

ArcGIS Enterprise is comprised of four software components:

- Portal for ArcGIS: The component that powers the ArcGIS Enterprise portal, the front-end interface where users create, manage, organize, and share maps, apps, data, and information.
- ArcGIS Server: The engine that powers your GIS services and processes user requests such as zooming into a map, finding a location, running an analysis tool, etc. ArcGIS Server can also be licensed to unlock additional capabilities for imagery, big data, real-time data, and more.
- ArcGIS Data Store: A data repository, fully managed by ArcGIS, that provides storage for hosted layers and 3D scene caches. There are three types of ArcGIS Data Store: relational, tile cache, and spatiotemporal.

- ArcGIS Web Adaptor: An Esri built software load balancer that appropriately directs network traffic, serves as a reverse proxy, and enables web-tier authentication such as IWA and PKI.



ArcGIS Data Store (relational)

The relational data store is not a replacement for or in competition with enterprise geodatabases that you have configured and administer (RDBMSs such as SQL Server, Oracle, or PostgreSQL.) Enterprise geodatabases provide a level of control and wealth of functionality that is not exposed with ArcGIS Data Store.

Server capabilities

ArcGIS Enterprise can be extended beyond a base deployment to include capabilities geared towards specific workflows, like big data, data science, real-time tracking, and more. Five server capabilities are available:

1. GIS Server: licensed on top of ArcGIS Server (always part of a base ArcGIS Enterprise deployment)
2. ArcGIS Pro
3. ArcGIS extensions and interoperability module

The base deployment consists of the following software components:

- Portal for ArcGIS
- ArcGIS Server, which has been licensed as a GIS Server, federated with Portal for ArcGIS, and designated as the hosting server
- Two ArcGIS Web Adaptors: one for ArcGIS Server and one for Portal for ArcGIS
- ArcGIS Data Store configured as the relational and tile cache types and registered as the managed data store with ArcGIS Server

Logical architecture

Base Deployment Configuration

The base deployment can be configured in one of two ways:

- With all components on a single machine as an all-in-one deployment.
- With the components installed on multiple machines as a multi-tier deployment.

Functionality of the base deployment

A base deployment of ArcGIS Enterprise provides many capabilities, including the ability to:

- Map, visualize, and spatially analyze data in a browser.
- Manage, organize, tag, and categorize all your organization's content.

- Publish map services, feature services, and geoprocessing services, with content referencing a user managed data source, such as an enterprise geodatabase or file-based data (file geodatabases, shapefiles, etc.).
- Leverage hosted layers to do self-service mapping and analysis.
- Share and collaborate on data, maps, and apps with members of your organization, as well as other ArcGIS Enterprise deployments and ArcGIS Online.
- Build and tailor websites and pages using ArcGIS Enterprise Sites to provide users a customized gateway to access data, maps, and apps.
- Tell your story through customized applications built using Story Maps, Web AppBuilder, and other configurable web application templates.
- Use GIS services in custom apps that you build using the ArcGIS API for JavaScript and ArcGIS Runtime SDKs.
- Access and utilize a rich collection of Esri provided data from the Living Atlas.

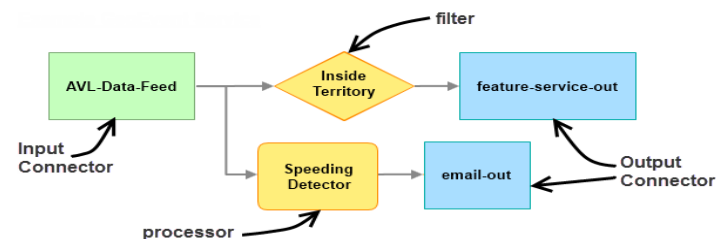
The ArcGIS Data Store component can be configured as three types:

- Relational: Used for storing hosted feature layer data (created by choice, such as when publishing from ArcGIS Pro, or by default when copying data when publishing from ArcGIS Pro, uploading a CSV to the Enterprise portal and publishing a layer, the result of spatial analysis in the portal, and other workflows).
- Tile Cache: Used for storing the 3D tile caches that power hosted scene layers for 3D visualization.
- Spatiotemporal Big Data Store: Used for storing large volumes of records streamed using GeoEvent Server, locations recorded through Tracker for ArcGIS, analysis results from GeoAnalytics Server tools.

Only two of these, the relational and tile cache data stores, are used in the base deployment. It is important to note that all ArcGIS Data Store types (relational, tile cache, and spatiotemporal) are always registered with the hosting server site of the base deployment.

The relational and tile cache data stores can be scaled by adding resources to existing data store machines (scaling vertically). Like the other software components of the base deployment, it is important to monitor ArcGIS Data Store infrastructure—in particular, CPU, memory, disk space, and disk I/O.

The spatiotemporal big data store is not required for an ArcGIS Enterprise base deployment. It is designed to store large volumes of tabular and vector data and is specific to deployments using GeoAnalytics and Tracker for ArcGIS.



A connector is made up of an adapter and transport. Adapters interpret data formats; transports send and receive event data over a specified communication channel.

Adapters include generic JSON, Feature JSON, GeoJSON, RSS, XML, and text.

Transports include system files, HTTP, SMS, SMTP, TCP, UDP, WebSocket, Esri XMPP, and Esri feature services.

By editing a connector, an administrator can see which adapter and transport are used. It also provides information on the properties available to service designers, who will use the connector to create input connectors and output connectors for GeoEvent Services.

Training Time: 1 month

Deliverable	Approach
Training sessions: • Agendas of trainings sessions and training materials; • Results of the training sessions' evaluation questionnaires. The final duration of the trainings/informative sessions (i.e. on the functionality of the platform, user interfaces, technical details, challenges, etc.).	Resources: The project team has 3 experienced staff members (trainers with teaching and training experience ranging from 5 years up to 15 years working with local governments' employees and training on the implemented SMART solutions. These materials will be based on the best state-of-the-art world technology and experiences of many cities worldwide and web based training resources from the leading company. On-job training: This component is very important and based on the many years of SMART public transportation solutions implementations, our team of experts have proved that this approach is working the best in the context of busy schedule of public servants from local governments when it's hard for them to devote many hours during the lengthy period of time to the formalized trainings. Another advantage of this approach will be that piece-by-piece during the implementation of the SMART solutions in the respective departments/functional areas of primaries, even complex issues are grasped much easier when learning by doing. This has proven in Orhei and Chisinau municipalities even with personnel with no technical background at all. Basic Training Modules It is important to have a structured and focused time period (about 30 hours in total spread over the two courses) and end of the implementation period of the SMART solutions. This will consolidate the knowledge gathered till then during the on-job-training approach. The training materials will have a modular structure to ensure the linkage between various parts of the SMART platform and its complex functionality comprehension by various stakeholders, whose role will be pre-determined in consultation with partner communities and city leadership. At the end of each training module there will be a formalized test on-line which will measure the degree of material assimilation by the respective employees. This will serve as performance indicator for the employee him/herself as well as for the management to understand the bottlenecks and motivational aspects of on-going learning process and best evaluate the abilities of their staff. IT administrator Training Module A separate module for the geodatabase administration and on-line editing and publishing of various layers with roles' administration will be carried out for the partner cities IT managers and designated responsible IT personnel. This is to ensure that technical aspects of the interoperability of the SMART city platform is correctly and duly taken care of. This module will include the aspects of data security and geodatabase storage back up to ensure the flexibility and/or historical data integration. Awareness campaign and support will be ensured by publishing and spreading the news and various SMART data on the public websites of the partner communities and local mass media during the entire process of project implementation and especially linked to the launching of specific data dashboards for the citizens. ArcGIS Hub solution can be linked and embedded onto the primary webpage without any scripting.

Maintenance and Technical Support.

	Approach
Maintenance and Technical Support.	The project team already has an extensive experience of over 10 years in supporting and maintaining the SMART city platforms of various complexity in Moldova. Ex: in Chisinau municipality for 8 years and Orhei municipality for 12 years. For the Primaria Edinet the following maintenance and technical support services will be offered by the project team: • ensuring the functioning of the software platforms and solutions • ensuring the interoperability with the other connected systems within the predetermined range of functionality by the producer of the software • ensuring the updates and upgrades of the available software within the offered licensing agreement • offering on-line ticketing support for the potential errors and bugs till their remedy. • Offering the brief consultancy at the functional level for the predetermined range of functionality by the producer of the software • Assisting the IT managers and city employees with installing and configuring the software with the respective users' access both by on-line and on the premises once the problem will be escalated.

Handover of SMART Transportation Solution and City HUB Platform to the Edinet municipality.

	Approach
SIA Technology Srl Guidelines and extensive User Manuals.	SIA Technology following the modular process of the implementation of the Smart Transportation Solution following the training modules described above, will formally handover to the IT System Administrator of the Edinet city together with all related materials (user manuals, APIs and codes for the apps elaborated on top of the ArcGIS platform for which the Licensing Agreement will be signed with the Esri Inc through its local representative – Trimetrica Ltd. Subsequently, the smooth process of handover will be arranged in such a way that by the time it will be finalized, most of its technical components and documentation will be already familiar to the municipalities's responsible persons. Thus the handover process will consist of the following: a. preparation phase (during the final stages of implementation) which will consist of technical issues clarifications b. formal part of handover with documentations and licensing agreements c. follow-up period of ensuring full assimilation and usability