FUEL CONSUMPTION MONITORING AND INVENTORY MANAGEMENT SYSTEM

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ABSTRACT

- Requirement for accurate, real-time information require systematic approach;
- Monitoring system should is based on web technology which enables the customer to have access to the data anywhere in the world;
- The system is comprised of several units: control of the amount of fuel taken from the central reservoir by the tanker, tracking the movement of the tanker while in transit, control of the amount of fuel dispensed for vehicles on a remote location, control of vehicles on a remote location and finally presentation and statistical processing of all accumulated data;
- Accumulated, processed and presented data enables better control and management of fuel inventory, as well as company's complete vehicle fleet;
- Authorization can be performed for vehicle, driver and company or by any given criteria.

Figure 10: Tanker / Machine on-board unit

Figure 11: Positioning and data transmission service network

Figure 12: Fuel level measurement tank probe

OBJECTIVE OF RESEARCH

Utilization of the ICT, electronics, sensor technology and specially designed equipment to collect and analyze data.

SYSTEM ENTITIES AND PROPERTIES

- entities are spatial dispersed;
- some entities can change their position / location;
- each entity has it's own properties and constraints;
- each entity must be permanently supervised;
- collected data for each entity is stored in central database.
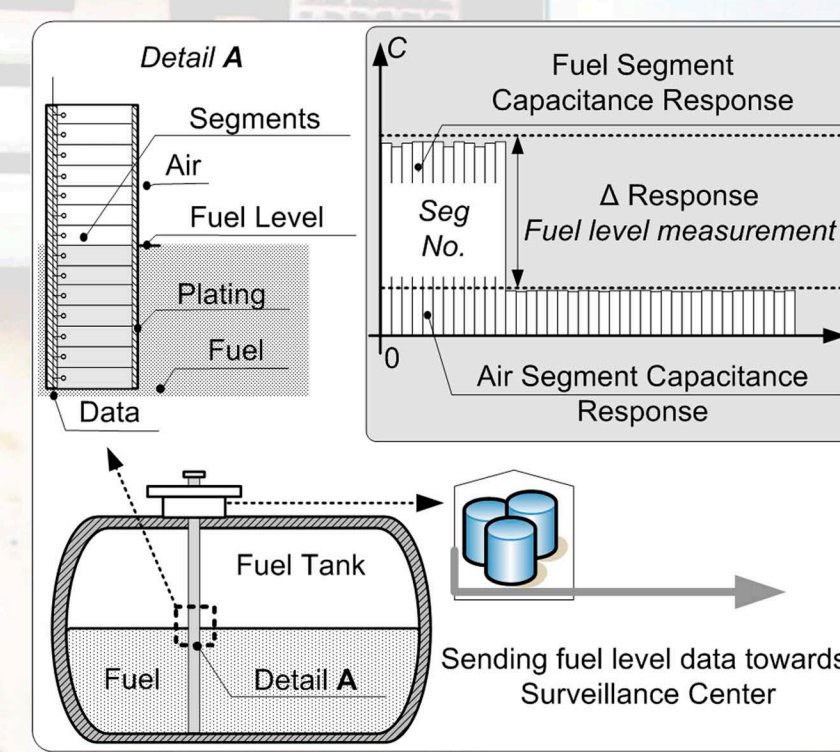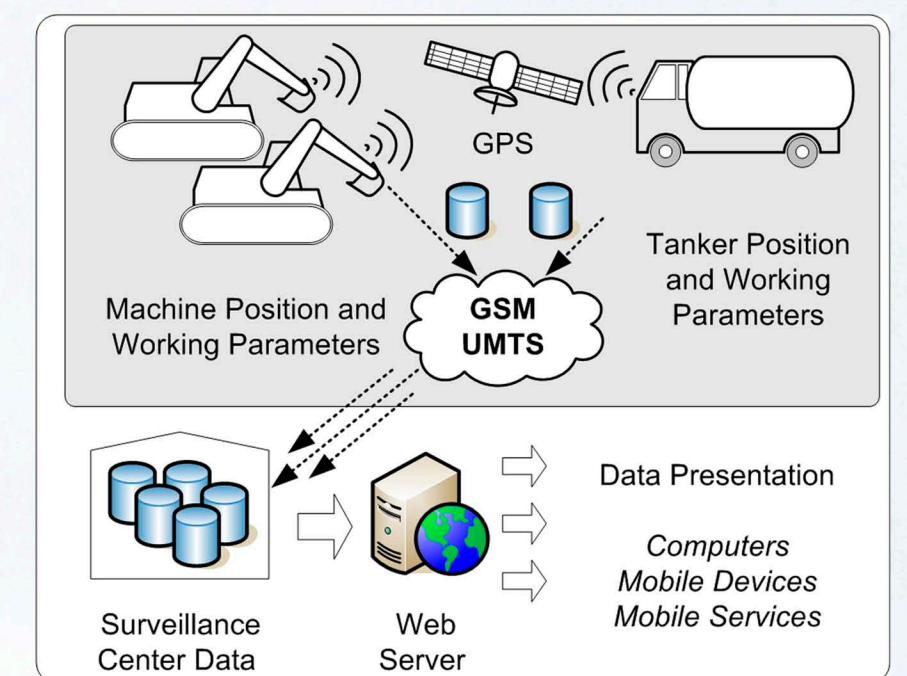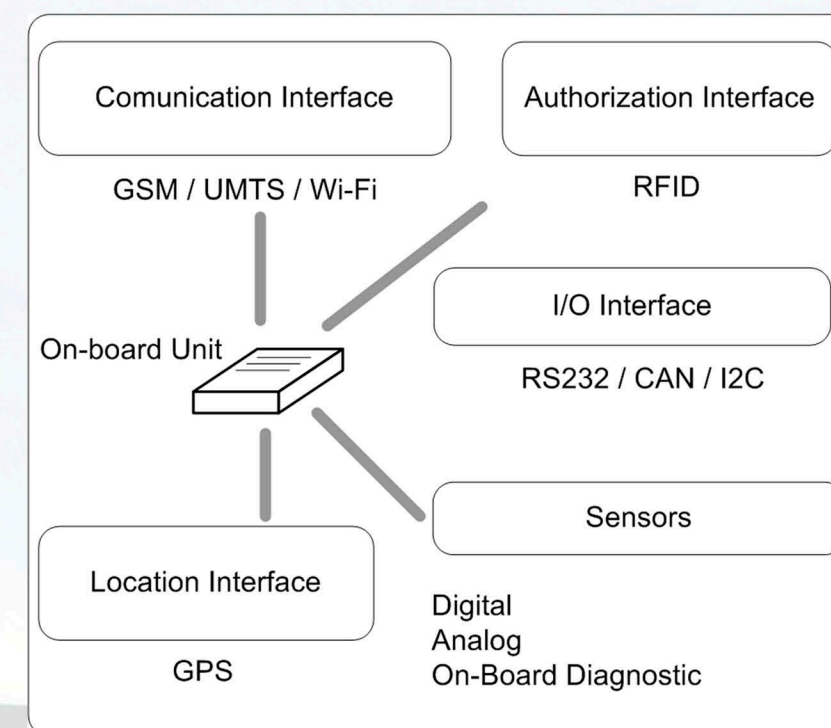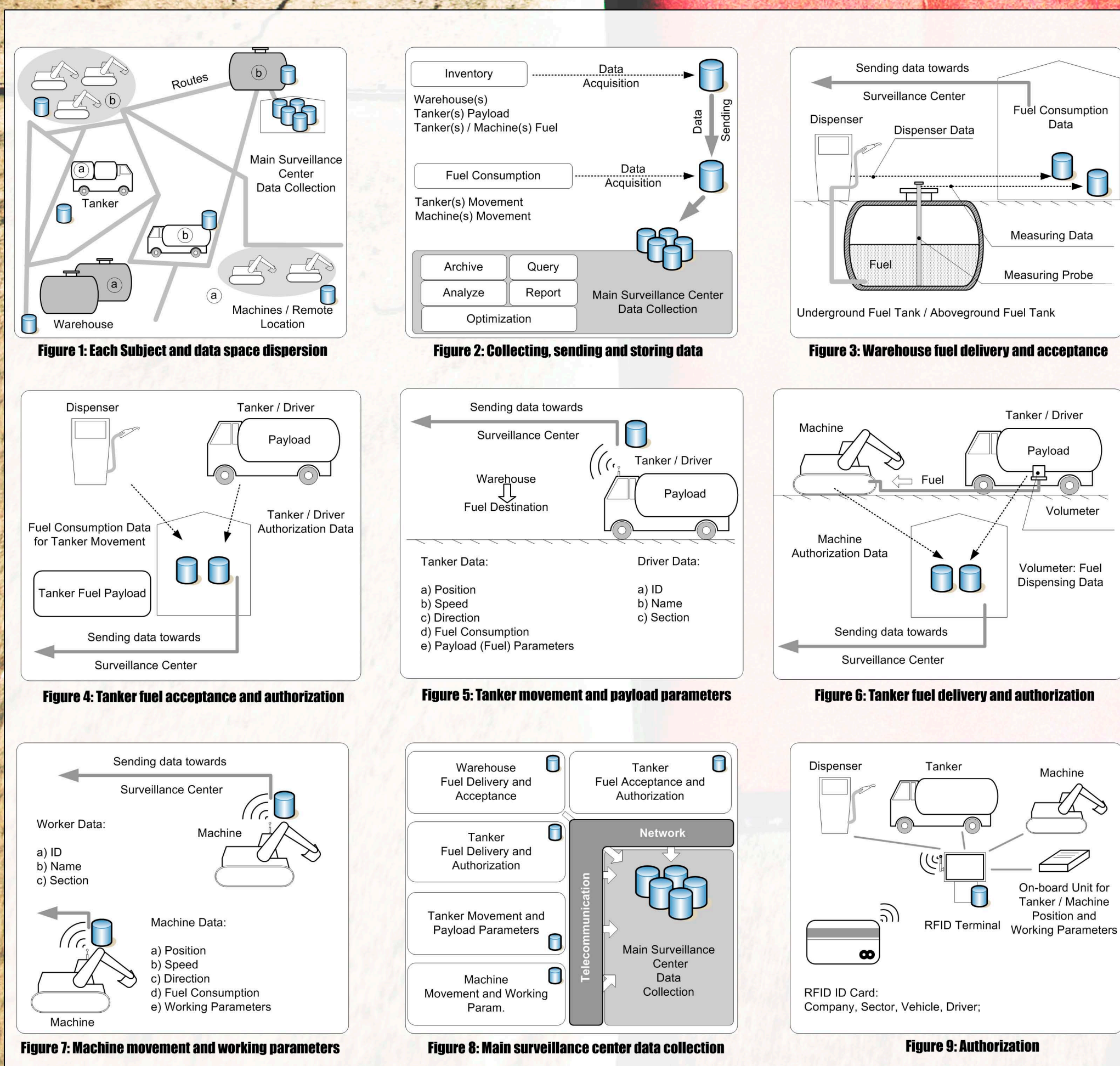
CONCLUSIONS

Based on presented facts and figures fuel consumption monitoring and inventory management system benefits and constraints are following:

Benefits:

- Advanced and centralized fuel order, distribution, delivery and inventory management;
- Current or time interval cumulative fuel inventory and consumption by many different criteria (location, user, driver, sector, company etc.);
- Resource management (customers, suppliers, tankers, transportation and working means, warehouses, locations);
- Overview of current and historical fuel inventory and consumption, reporting options and long-term data-storage;
- Statistical analysis and presentation of collected data;
- Automatic forecasting of fuel demand at the warehouses or remote destinations to automatically generate orders/necessary deliveries;
- Data-mining from a filtered history of data on fuel demand and other factors that influence the fuel demand and consumption;
- Supporting multiple users, each with self defined workplace and set functionality restrictions;
- Minimizes human factor and environmental risks;
- Fleet and driver management;
- Integration with third party products;
- Easy data sharing and presentation.

Constraints:

- Initial costs and prerequisites;
- Requirements for suitable, reliable and robust ICT infrastructure;
- Implementation of specially designed equipment (e. g. tank probes and on-board units);
- Dependency and coordination with "outside" systems and services (mobile GSM/UMTS network and GPS service providers);
- Necessity for trained and skilled personnel;
- Maintenance and support costs.

Figure 1: Each Subject and data space dispersion

Figure 2: Collecting, sending and storing data

Figure 3: Warehouse fuel delivery and acceptance

Figure 4: Tanker fuel acceptance and authorization

Figure 5: Tanker movement and payload parameters

Figure 6: Tanker fuel delivery and authorization

Figure 7: Machine movement and working parameters

Figure 8: Main surveillance center data collection

Figure 9: Authorization

REFERENCES

1. Microsoft Developer Network (MSDN), Prescriptive Architecture – System Connections – Integration Patterns http://msdn.microsoft.com/en-us/library/ms978715.aspx (31.07.2008.)
2. Ultra Inventory - Fully integrated inventory management for the oil & gas industry, Ultra d.o.o., 2002.
3. Ultra Supply Chain - Industrial strength tool for managing oil & gas supply chain, Ultra d.o.o., 2002.
4. Ultra PS-1,1 Tank Probe, Ultra d.o.o., 2002.