HS.HELIOS

HS.HELIOS is a *toolset* that acts as a centralization system of clinical and demographic processed data transmission in health institutions, allowing the extraction of metrics related to Health Information Systems integrations of distinct vendors, checking the integrity of the HL7 messages semantics and monitoring the preformed integrations in real time.

Being a *toolset* allows its tools to be total or partially integrated in the systems that are in use in the institutions taking advantage of the existent resources.

◇ CHALLENGES

The health sector has experienced a remarkable technological evolution in the last decades with the use of several Health Information Systems (SIS) as a tool to support the provision of health care. The existence of several of these SIS from different suppliers makes it very challenging to integrate them and to take advantage of the large amount of data distributed by all SIS in the different hospital departments.

The interoperability systems in hospitals are sometimes inefficient due to difficulties in using them, and assistance and/or maintenance by suppliers, both by the involved costs and by the delays in interventions. This, inevitably, affects the SIS's cost-effectiveness, and consequently the clinical decision-making process of health professionals, that cannot make decisions based on the patient's actual available and updated data.

◇ OUR SOLUTION

HS.HELIOS is an integration system that promotes interoperability, by regulating and analyzing the exchange of messages between different health information systems that are currently deployed at a Health institution. Its main business empowerment capabilities are:

- **Business Processes Monitoring -** monitor in real time the production of information by various departments at your institution;
- **Real time Data quality analysis** – Launch actionable alerts about business data quality and accuracy;
- **Data Redundancy** - Create new data sources for business intelligence solutions and directly extract from the network relevant information to directly feed central data repositories, controlled by the Hospital.
- **Global data analysis** – Be free to correlate and directly analyze patient data originating from different systems, provided by different vendors.

- **High Tolerance to Failures** – Real time construction of data caches of critical information (for example patient demographic and visitor information) to reduce data dependencies and keep critical systems operational in the face of disaster.
- **Communication and system integration normalization –** Implementation of mechanisms to obtain business operational data and define institutional overall system integration rules using applicable IHE standards;
- **Data empowerment and Independency from software vendors** – Resist vendor *lock-in*, by promoting the creation of institutional databases, based on real time actionable eHealth data, which is independent from software providers and is directly under institutional control.

Current Number of Messages ▬ Average Number Of Messages
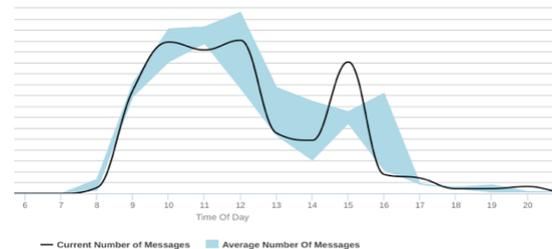
◇ HS.HELIOS BENEFITS

- Centralization of integrations between Health Information Systems;

- High availability of the data integration platform;

- Real-time monitoring of the hospital computer's network traffic;

- Preform data to control supplier support levels;

- Launch actionable alerts about business data quality and accuracy.

◇ **ARCHITECTURE**

HS.HELIOS uses a very lightweight and transparent approach to directly collect data from the computer network infrastructure present at each institution and has very small impact on the performance of existing systems and network communications. Since HS.HELIOS relies on its ability to directly analyze the network exchanged messages, there is no need to make any changes on the information systems involved in the exchange of messages. It's completely transparent and independent from the other software vendors.

In an eHealth context, HS.HELIOS acts as a system bus, and can be used to collect, interpret, route and audit HL7, DICOM or other more generic XML messages. These messages are collected and sent to an integrator responsible for analyzing, processing, validating and record its relevant content in institutional controlled databases, before sending them to their final destination.

HS.HELIOS takes full advantage of the fact that many hospitals environments already use the HL7 standard to exchange and share medical information. Our solution is, thus, able to collect meaningful actionable metrics that can be very useful in terms of hospital and informatics management. HS.HELIOS dashboards are for example capable of directly presenting actionable business indicators and historic trends, such as: the HL7 messages frequency by origin and destination department and type of message, within a certain period of time. The result of the analysis on data quality and business processes is actioned by the HS.HELIOS monitoring system (based on Nagios/iCinga) for which specific sensors have been

developed. These can also be easily integrated with other existing alarmistic systems already present at the institution (ex. Zabbix). The system is very flexible and can be configured according to the client's needs and is also capable of routing alarms by sending emails or SMS, in addition to the alarmistic directly configured and displayed at the system dashboard view.

As an example of this tool usefulness, one of the very simple but highly useful HS.HELIOS type of analysis indicators are based on the overall number of observed exchanged messages of a certain type. These indicators are presented and can be analyzed in several different charts that compare, in almost real time, their current values with the expected value for each one of those parameters. The system maintains an extensive historic database of business indicators that is used to accurately predict in real time the expected values for those parameters at that particular point in time. These charts allow for a very quick assessment of the current state of overall message exchange within the entire Hospital, and can constitute a very accurate indicator of current overall business productivity. Associated to these values are rules that can trigger actionable alarms when those values do not fall within the predicted expected values for those type of messages. This normally constitutes a strong indication that something is wrong at that particular department within the Hospital and buys the system administrators time to act before the Hospital overall productivity is severely affected and health professionals start to complain about the systems not performing as they should.