1st UIC DIGITAL AWARD

2016

Application form

Company name	Fretless Idea srl
Activity	Information systems from concept to maintenance
Company classification	Innovative startup
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Statement of compliance with 1st UIC DIGITAL AWARD requirements

Fretless Idea S.r.l. is a privately held company established in June 2014 and it is not a subsidiary of any company nor a laboratory nor an individual company.

We confirm that Mr. Righetti has a valid biometric passport and, if selected for presentation, he will participate and present our innovation at the Digital Conference taking place at the time of the UIC General Assembly in Saint Petersburg on 30 November 2016.

Confidential nature of information in this document

All information in this application form is intended for the selection of the 1st UIC DIGITAL AWARD only, and may be used only for the purpose of evaluation and selection within that framework. Please treat as confidential the information contained in this application form as they could represent a current competitive advantage of Fretless Idea.
Please find attached to this application form a presentation which can be freely published in case our topic is selected for presentation.

Name of the innovative product/service

Description of the innovation

Reptile is a “brainy” analysis service in the form of a digital platform in the cloud able to “understand” a system's evolving status by analyzing digital data describing that systems.

Reptile can be plugged into any existing information system and “observe” its evolving status, detecting context changes and collecting metrics.

It is fully tamable via its user interface and he (she?) has excellent memory. So far we provided Reptile with the ability of understanding whether a signal is above/below a threshold and performing logical and mathematical operations. He (she?) is also able to understand whether a moving object entered/exited a geographical area, and other basic reasoning.

Any combination of such abilities can be configured in few minutes so we can ask Reptile to measure the energy consumed by a locomotive within a geographical area but only if..... - fill in with any criteria, no matter the complexity.

Reptile remembers all digital data in a big-data style and can replay the whole life of the system with new “eyes”, so any new configuration can be run against historical data to create new historical metrics in minutes.

Reptile can be taught on when to complain about an annoying situation so he (she?) will finally send an email or a message to another system.

Providing data connections, any system can be monitored: from worldwide infrastructures to clouds of small IoT objects.

The first railway application of Reptile

We would like to focus the presentation on the very first application of Reptile, the event-recorder data analyzer

Locolog
journey details

Locolog is a service that analyzes locomotives' event recorders data files. By architectural design it can also analyze live data streams.

Thanks to Reptile, Locolog has a dynamic picture of the train's evolving status.

Performance indicators, events and metrics are collected automatically and are available to the users and to other information systems.

Alerting is configurable with an escalation functionality, so the more severe the situation the higher the email recipient in the organization's hierarchy can be.

We provided users with a graphical user interface from which s/he can query journeys, events, KPIs and metrics. Advanced graphical analysis can be performed from any modern device connected to the internet.

Systems can query Locolog data by train number or locomotive number and a date range, as an example.

Locolog's data analysis is continuous and systematic, and the huge amount of data is collected and can be re-analyzed with new rules. Rules may be changed without changing the source code, adding lot of stability to southbound processes.

Locolog can currently be configured to detect **almost** anything that a skilled and accurate person can detect by inspecting the event-recorder data.

This opens to a new paradigm of monitoring train operation's safety and performance.

International Societal and competitive challenge addressed

Locolog and Reptile provide accurate analysis of what is happening in the locomotive during train journeys and they bring to any railway company an accurate level of understanding and monitoring of risk factors with a specific accent on the human factors. Many recorded signals in fact describe actions taken by the train driver, and few signals also regard passengers.

Reptile gives to railway companies a demonstrable knowledge, replacing assumptions-based reasoning with certainty - and removing some blind spots. Research teams can use Reptile to find correlations and improve prediction on safety, maintenance, training needs and other grounds.

Locolog for instance is mainly appreciated by train driver instructors, as they automatically get indicators on what the single driver needs to review.

Locolog can also be tuned to identify and model best practices, like energy consumption. As an example it can monitor all curves and alert when a lower energy consumption curve has been detected on a specific path.

The “Company's eco driver of the month award“ process will never ever be cheaper to activate and maintain.

National, regional and worldwide bodies may collect very fine KPIs and metrics to support policies and statistics. Now there is no need to wait years for new statistics: if data is available and the information can be derived from that data, Reptile and Locolog are able to provide new KPIs and metrics in minutes.

Innovative level of the product or service given the state-of-the-art

LOCOLOG is already very close to provide the same service level a well trained person would provide by inspecting engine recorded data row by row.

Locolog has a standardized data model which makes it interoperable for all locomotive types, so the user and Locolog “talk” with a normalized semantic.

The accuracy of the analysis is higher than human inspection when considering speed and mistakes avoided. Every company may own a personal customized “brain” to grow, as “neuronal connections” of Reptile are not in the source code - and they are not shared with competitors with the next software release.

We fully designed and developed the algorithm and we applied for patents so we have a more solid baseline for continuously investing in service improvements and give the railway market an additional reason to invest in our services.

Economic benefits the innovation provides to customers

Economic benefits are ultimately correlated to any small improvement in safety and service quality. In one of the safest transportation systems, which railways is, any small improvement might cost lot of effort.

By zeroing analytical costs Reptile opens to the dynamic analysis of big amounts of data, bringing knowledge to “minor” aspects.

from belief to knowledge in . The analysis is also performed orders of magnitude faster.

As railway accidents are rare but a single event can cost million euros, it makes a lot of sense to answer questions like: how far is my company from generating a railway accident?

That question can be expanded: “Do I know which is the level of risk of my trains? How many train drivers act in a way I would consider as risky? Do I need to rebuke anyone for behaving in a risky way?”. Locolog and Reptile can provide some objective evidences on that topics.

Another hot topic is service delay and another question might be “Are all my train drivers trying to recover a train delay? How do I **know** that?”.

The Reptile brain can tell which trains missed a **reasonable** chance to recover a delay.

With Locolog and Reptile the railway sector can now extract lot of new indicators that before were considered too expensive to calculate or impossible to get in an efficient way.

Customers can use those new accurate indicator as a solid knowledge base for decision support like tracking, purchasing and contract performance checks.

Any digital data can be analyzed - not only the engine-recorded data. So also Infrastructure Managers can have applications of a “lizard brain”. We currently work with >100M records in a very smooth way.

It is also possible to demonstrate that part of the operational risk is systematically monitored, which could support insurance cost negotiation.

Competitive advantage the innovation brings to the sector

The railway sector is already a very safe sector but it suffers the public opinion more than the main competitor, the transportation via road. A train derailment often makes a hit in the news, while a single truck going off-road gets little echo in TV.

A single train accident costs million euros, while a truck accident does not.

Funding and investments preservation is a hot topic in many countries and regions, independently on whether they are public or private. Railway accidents destroy million euros of investments, so it makes a lot of sense to invest in avoiding even only one of them.

UIC yearly reports clearly show that the main cause of railway accidents has a behavioral nature. Risky behavior should then be monitored with accuracy in order to have a clear perception of the risk level of a company's train operations.

While the behavior of people outside the railway organization is quite difficult to monitor, practices performed in the train cabin can now be monitored systematically. Statistics show that the train driver is estimated to be the cause of 29% of train derailments and of 58% of collisions between trains.

So the question is: how far is my company from generating an accident?

That question can be expanded: “Do I know which is the level of risk of my trains? How many train drivers act in a way I would consider as risky? Do I need to rebuke anyone for behaving in a risky way?”. Locolog and Reptile can provide some objective evidences on that topics.

Another hot topic in railways is service delay, so another interesting question could be “Are all my train drivers trying to recover a train delay? How do I know that?”. Locolog and Reptile can tell which trains missed a reasonable chance to recover a delay. Many little improvements makes an overall service improvement, and help shifting the transportation of people and goods to the railways.

Builders and ECMs may use Reptile's capabilities to configure maintenance prediction. Rules can be modified and run against historical data to find correlations which can predict disruptions.

Infrastructure managers can monitor the evolving status of any sensorized system with an independent “brain”.

Best practices can be shared between actors increasing the overall service quality of the railway service - which is more and more becoming a short-term goal for the sector.

Positioning of the innovation

Locolog has been designed specifically for the railway sector and digging into railway specific semantics and data formats.

As a premium service in the cloud, it can already server any users worldwide and provide him/her the configuration of complex analysis in minutes.

Locolog speaks the railway language and can process any digital data stream, both live and batch, from one locomotive to a fleet of thousands units, from a single sensorized cabinet to the signals' monitoring from a national railway network.

Creation of the innovation by networking

We started the project from within the railway sector in cooperation with a small railway undertaking company in the Italian Alps, Trentino Trasporti Esercizio. They operate passenger transport by running nine diesel multiple units.

With the “lizard brain” software fully designed we identified safety indicators that the customer wanted to know. We configured the analysis from Locolog's user interface and run the analysis against the normalized data imported from files.

In few validations runs and fine tuning and the customer started to receive emails with the prompt notification of event they wanted to have.

Improvements and added-value functionalities are regularly added, for instance now events a re geolocalized and shown in a geographical map along with the train path.

Effect scope

Locolog is now a global service in the Cloud. Companies from any country may start collecting events, KPIs and any information which can derived from locomotive's event recorder, no matter how complex the processing is.

Mobility is leveraged by providing the users email notifications and the capability to perform graphical analysis from any device connected to the public internet.

In addition, the normalization of different locomotive's data format provides a consolidated data base for the whole fleet, finally leveraging a unique process in corporate data mining and business intelligence of locomotive's data.

This paradigm opens the road to new tactics of risk and performance analysis, bringing on the table sophisticated indicators while removing the probabilistic nature of spot checks.

Lot of small aspects of railway's safety and performance can be now monitored systematically, contributing to the attractiveness of the railway sector.