Request for Industrial Partners

Functional safety in the process industry

Acronym: FUNCTIONARY

Project ID	
Type	ICON
Period	2 Years
Starting date	2024
Total project budget	TBD
Subsidy percentage	According to SBO and O&O regulations
Current partners	Current consortium consists of 4 companies, 3 knowledge institutions and 1 sector federation, led by BASF and essenscia
Catalisti contact	Aron Deneyer (adeneyer@catalisti.be) Isabelle Monnaie (imonnaie@catalisti.be)

Project description

Introduction

Functional safety in the process industry is an important feature of the chemical and life science industry. However, functional safety design is to date often approached as a linear, purely risk-based problem, leading to an important number of shortcomings:

- A full mapping of cost determining factors throughout the plant's lifecycle is often missing, resulting in the general trend of over-expending on functional safety. This is due to inefficient and complex structured safety measures resulting in wrong allocation of CAPEX and OPEX and production losses related to unnecessary shutdowns. That latter even leads to a cascade effect due to the ever-increasing degree of interconnectivity within a chemical cluster such as in Antwerp (Europe's largest and the world's second-largest integrated petrochemical cluster).

- Risk assessment, failure rates for quantification and human factors are parameters fiercely influencing the classification and performance of the safety instrumented systems, however the combined effect of these parameters is not properly known, neither accounted for in the design.

Layers of protection approach and (recently) also (cyber)security push the industry in the application of strictly segregated safety loops ignoring the opportunity offered by the standard using shared components. It remains unclear how factors such as cybersecurity and risks inherent to ICT systems should be analyzed and mitigated.

To overcome these shortcomings, the current project aims at an integral approach to achieve a paradigm shift in functional safety design, by switching from a purely risk-based to an enriched performance-based approach without compromising and even improving the process safety of the production units. It becomes clear that a smarter and more rational approach towards functional safety will be an essential element for the license to operate of our Flemish chemical industry.

Impact of improving safety measures on environment and society will have a direct environmental and social impact (is inherent to HSSE Health, Safety, Security & Environment).

Since the goal of the project is to provide an improved guidance to optimize the cost-effectiveness of safety measures without compromising the process safety, valorisation of the project results will directly lead to a major economic impact for the involved companies and for the entire sector in general. Indeed,

implementing the integral functional safety framework, should lead to less CAPEX and OPEX spending, unnecessary shutdowns and more reliable operations. Therefore, the economic impact of this project is expected to be very significant. Furthermore, it will be a crucial element in maintaining the competitiveness of the Flemish chemical industry. Moreover, this project targets the entire Flemish ecosystem encompassing both *(i)* large companies and *(ii)* small companies. The latter is of high importance because small companies often do not have the financial means to assess the scale nor the value of purchased certified (functional safety) material in-house.

Goals

The goal of the FUNCTIONARY project is to develop a guidance that enables judging the reliability of functional safety measures based on a novel, enriched performance-based approach that has been validated on specific industrial use cases (field data instead of generic data and qualitative operating practices). More specifically, this guidance will:

- Support the chemical sector in safeguarding processes in a balanced way to maintain their license to operate.
- Eliminate unnecessary shutdowns based on test inspections of functional safety loops.
- Eliminate over-investment and subjectivity in functional safety due to a false feeling of safety (optimize CAPEX and OPEX).
- Guide PME's through the process of functional safety.
- Transfer knowledge from industrial high standard companies towards smaller companies.
- Protect the industry from cyber-attacks via functional safety applications.
- Limit the administrative burden during the life cycle.

This project is highly innovative and will go beyond the state-of-the-art by:

- For the first time approaching functional safety in a truly multidisciplinary fashion to obtain a bottom-up integral approach. This will imply balancing safety, security (including cybersecurity), financial and operational aspects instead of an individual linear approach counteracting the integrality. This is a completely new research approach.

- Unlocking the potential of industry experience to enter a new era of functional safety design based on data and elimination subjectivity and elimination of a probabilistic approach.

- Targeting evolutions towards more autonomous plants and associated automated utilities requiring a specific level of control and functional safety.

The project will start with modelling a couple of generic scenarios based on different reactor types, after which the complexity will be gradually increased towards real company use cases.

Request

To complete the consortium, Catalisti is searching for additional industrial partners within the process industry that would like to innovate in the field of functional safety. Companies that have interest in sharing their actual strategy and are open for the application of an improved strategy on functional safety.

How to reply to this request

Please send an **email** before 8/01/2024 to Aron Deneyer (adeneyer@catalisti.be) and Isabelle Monnaie (imonnaie@catalisti.be), and **briefly describe your interest and potential contribution** to the project. Based on all offers, the current industrial partners will determine together with Catalisti which partners can join the consortium. After submission of your offer, you can be contacted to further elaborate your offer.

Important notice: Partners that wish to participate in Catalisti-supported projects are required to be member of Catalisti. For more information on membership and membership fees, please visit our website or contact Aron Deneyer (adeneyer@catalisti.be) *and Isabelle Monnaie* (imonnaie@catalisti.be).

Contact

Please contact Aron Deneyer (adeneyer@catalisti.be) or Isabelle Monnaie (imonnaie@catalisti.be) if you have questions concerning this RfP.
