
intecs Solutions

WHO WE ARE

Establishes in **1974**

400+
skilled engineers

The Offer

- Products
- Solutions and system integration
- Services
- R&D

Markets

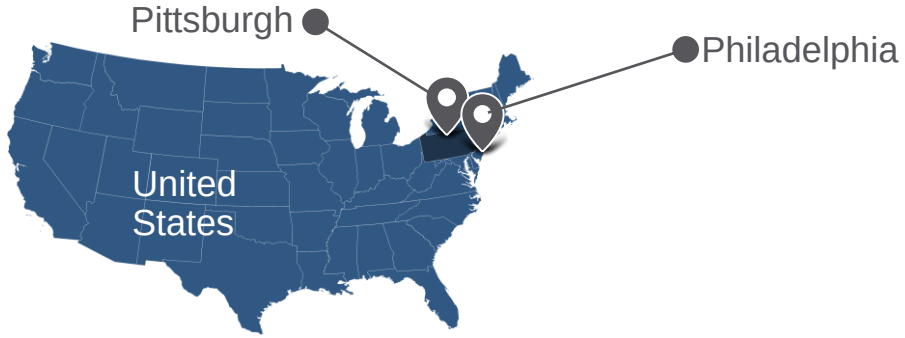
- Railways
- Aerospace
- Automotive
- Defense
- Air Traffic Control

Core competencies

- Design
- Development of Hard Real Time Safety Critical System
- Artificial Intelligence Laboratory
- Indipendent Verification an Validation

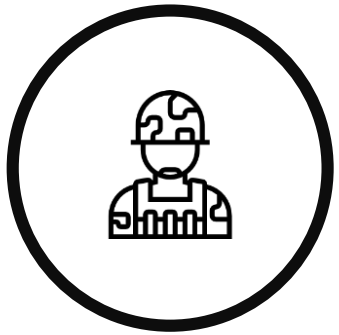
WHERE WE ARE


Milano
Torino
Genova
Pisa
Roma
Napoli

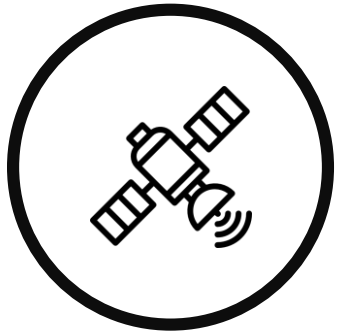

Pittsburgh
Philadelphia
United States

HIGH-TECH SYSTEMS ACROSS MARKETS

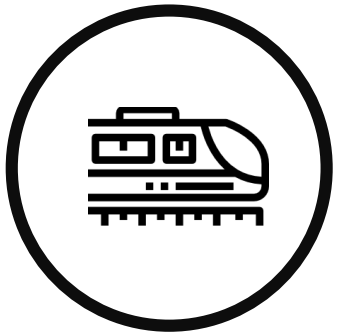
Automotive &
Smart Systems



Defense



Aerospace



Railway

Traffic Control

MODEL BASE DESIGN LAB

BIG DATA AND MACHINE LEARNING LAB

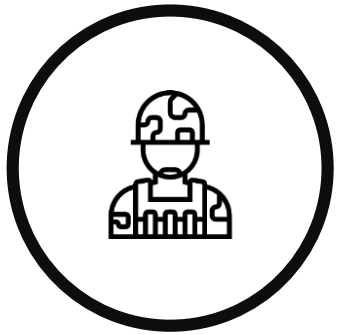
RAMS LAB

HW FAST PROTOTYPING LAB

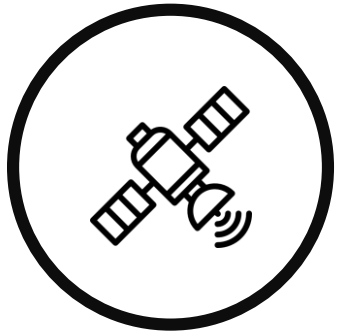
RADIO NAVIGATION & COMMMUNICATION SYSTEMS LAB

HIGH-TECH SYSTEMS ACROSS MARKETS

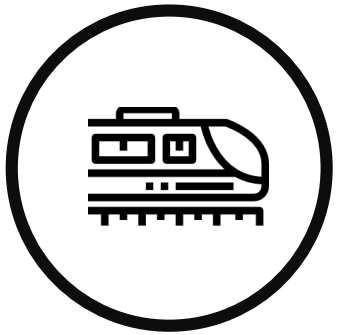
Automotive &
Smart Systems



Defense



Aerospace



Railway

Traffic Control

MODEL BASE DESIGN LAB

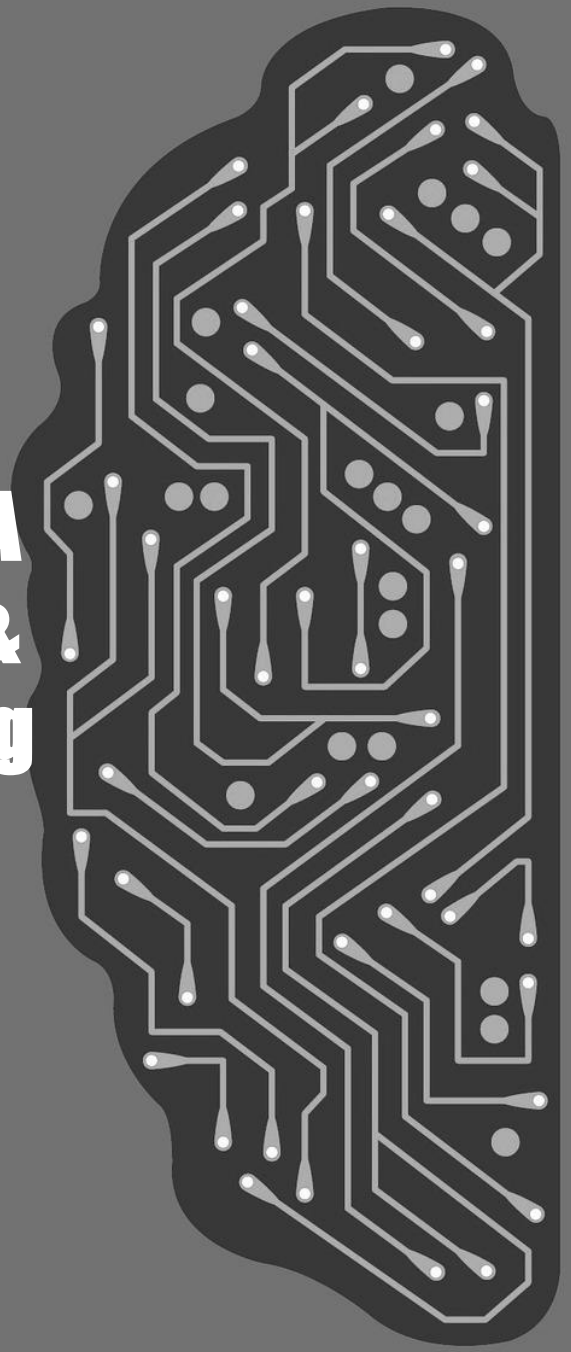
BIG DATA AND MACHINE LEARNING LAB

RAMS LAB

HW FAST PROTOTYPING LAB

RADIO NAVIGATION & COMMMUNICATION SYSTEMS LAB

BIG DATA & Machine Learning



Composed by engineers from the most important Italian Universities with strong experience in Artificial Intelligence, Modeling and Digital Signal Processing.

The main goal of the AI group is to develop state of art technologies in the Automatic Learning Theory being powered from consolidated experience in machine learning applied to:

- Acoustic and vibro-acoustic domain
- Computer Vision

HW FAST PROTOTYPING LAB

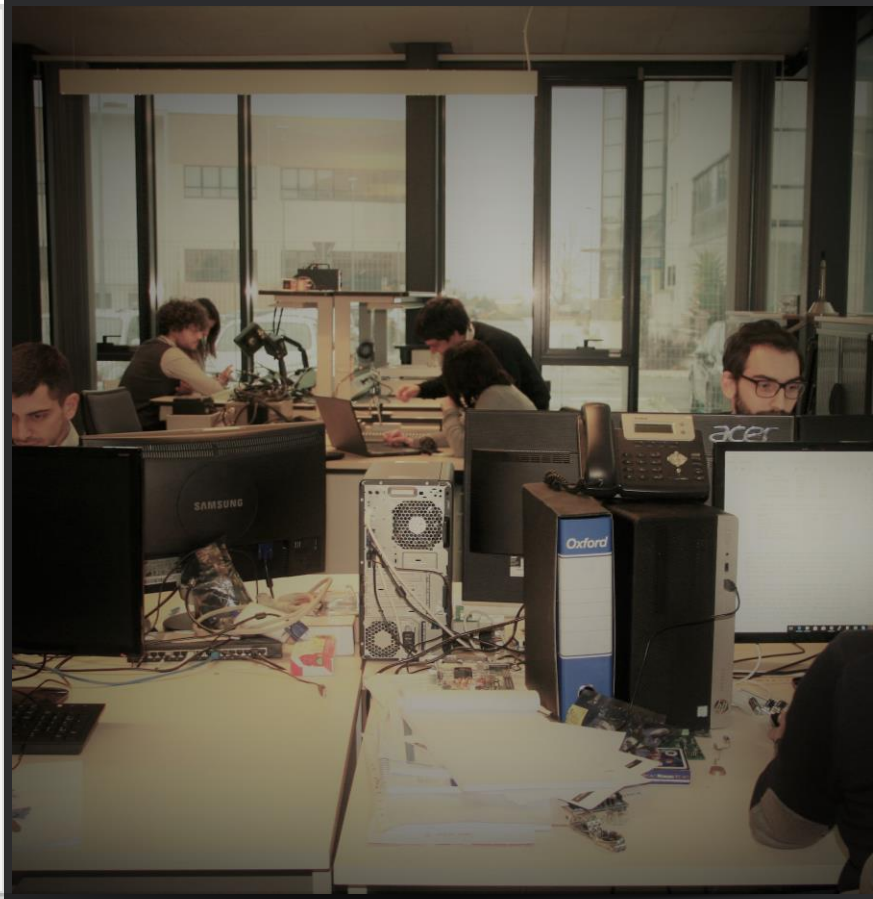
CONCEPT DESIGN
Given the idea, we prepare a concept able to fullfill preliminary requirements and face the engineering challenges.

FAST PROTOTYPING
The lab offers a quick prototyping service able to bring a first prototype from the initial idea to an initial assessment in a brief time.

TURNKEY SOLUTIONS
We offer a turnkey service to realize a complete systems integrating hardware, software and embedded systems skils based on customers requirements.

SAFETY-RELATED DESIGN
Design support of new safety-related parts for railway, automotive and industrial applications according to EN 61508.

V&V
Best practices for requirements verification, hardware compliance, signal integrity, thermal analysis.

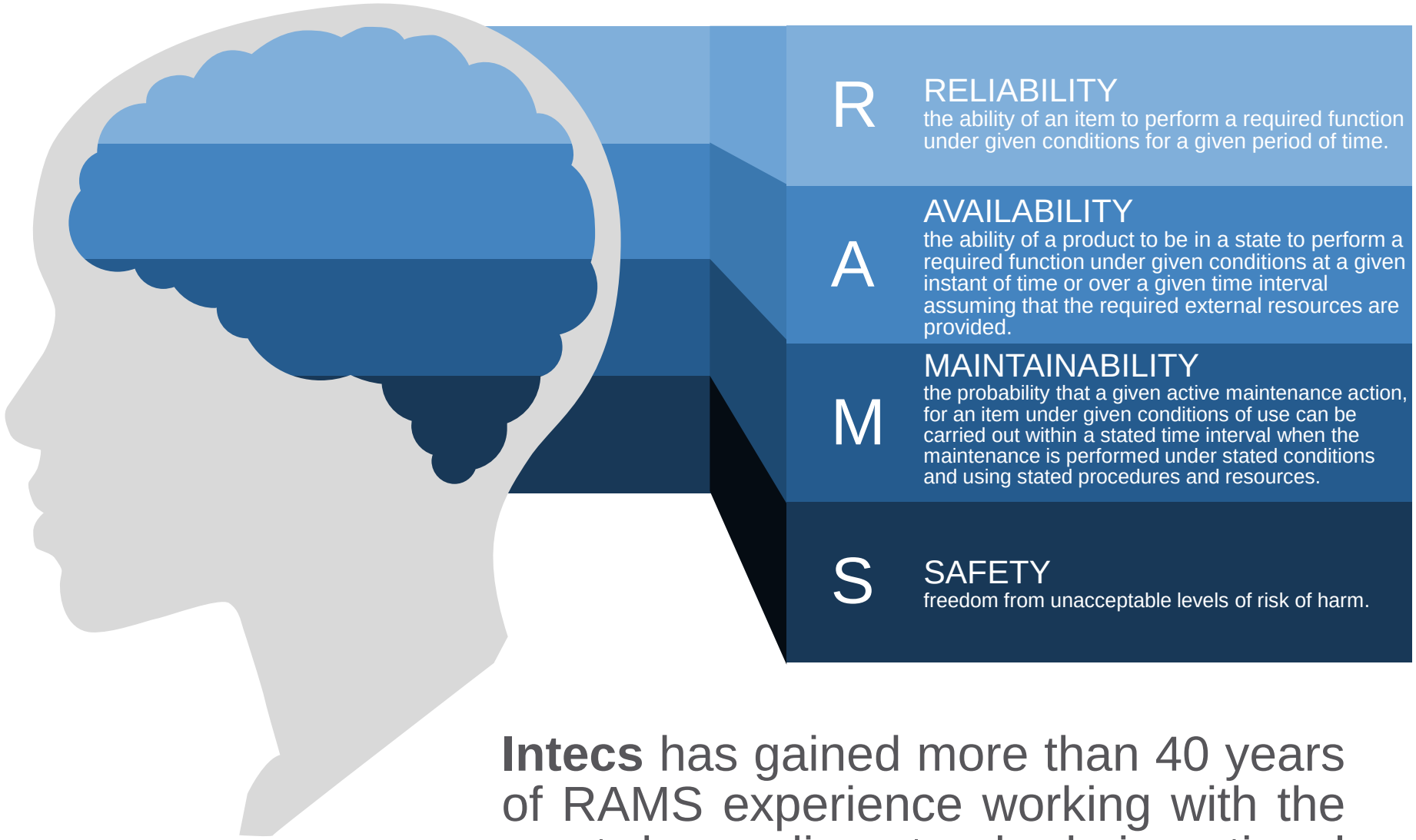


RAMS LAB

Strong knowledge of international standards: SAE ARP-4754, ARP-4761, EN-50126, EN-50128, EN-50129, ISO 26262, IEC 61508, MIL-STD-1629A, MIL-HDBK-217F, RIAC NPRD-2011, FMD-97, ECSS series, …

In-depth methodological skills and practical experience gained in our consulting activities

Cross contamination: RAMS expertise in different domains such as railway, automotive, telecommunication, defense, aerospace



Intecs has gained more than 40 years of RAMS experience working with the most demanding standards in national and international projects.

Our Services

- Planning the system and hardware safety lifecycle (safety plans, RAM plan, hazard logs, safety case, etc.)
- Hazards identification and risk assessment
- Definition, quantification and apportionment of RAMS requirements to subsystems
- Qualitative and/or quantitative RAMS analyses/methods:
    - Reliability prediction
    - Process and Product FMEA
    - Fault Tree Analysis
    - Common Mode Analysis
    - Maintenance (preventive and corrective) analysis
- Participation to technical reviews all along the life cycle of the product development to guarantee compliance with applicable safety and quality standards
- Providing highly specialized technical support to the activities of "safety assessment" in different domains
- Support to the major Notified Bodies
- Evaluation of the RAMS process currently performed by the customer (as-is) in order to improve effectiveness and efficiency (to-be)

RAMS in the Railway domain

- **RFI**: INFILL system (Hazard Analysis e Fault Tree Analysis)
- **Ansaldo STS:**
    - Metro Salonicco (RAMS Analyses)
    - Metro DOHA (RAMS for LCC analysis)
    - 3 BIDS Spagna (RAMS Analyses)
    - Radio Infill Unit (RIU) for Railway Applications EN50129 (RAMS Analyses)
- **FerrovieNord (TreNord):** SCMT/SSC (RAMS Analyses)
- **Bureau Veritas, Italcertifer, RINA:** RAMS support for EN50126/50128/50129
- **SIR:** Elaboration Unit for railway monitoring RADAR (RAM Analyses)
- **SITE:** DIGITAL INFILL (RAMS support)
- **Selta:** Signal encoder (RAMS Analyses)
- **Intecs:** SIRIO OD e SIRIO LX (SIL4 certification process)
- **Eurotech:** MMI (MTBF)
- **Far System:** STES (RAM Analyses)

RADIO NAV. & COM. SYSTEMS LAB

DESIGN & DEV. OF GNSS-BASED NAVIGATION SOLUTION

From design to development of GNSS-based solution, customized on specific user requirements and fit new market needs of positioning, navigation, and localization.

MONITORING & SURVEILLANCE

Monitoring/surveillance solutions to preserve the integrity of GNSS signals against jamming, spoofing, meaconing, RF interferences, etc., in safety-critical scenarios

HYBRID SOLUTION & INDOOR POSITIONING

Hybrid GNSS-based solutions combined with INS or IoT sensors to foster navigation in severe environments, indoor positioning, personnel localization, logistics, etc.

FAST PROTOTYPING OF SDR-BASED TX/RX SOLUTIONS

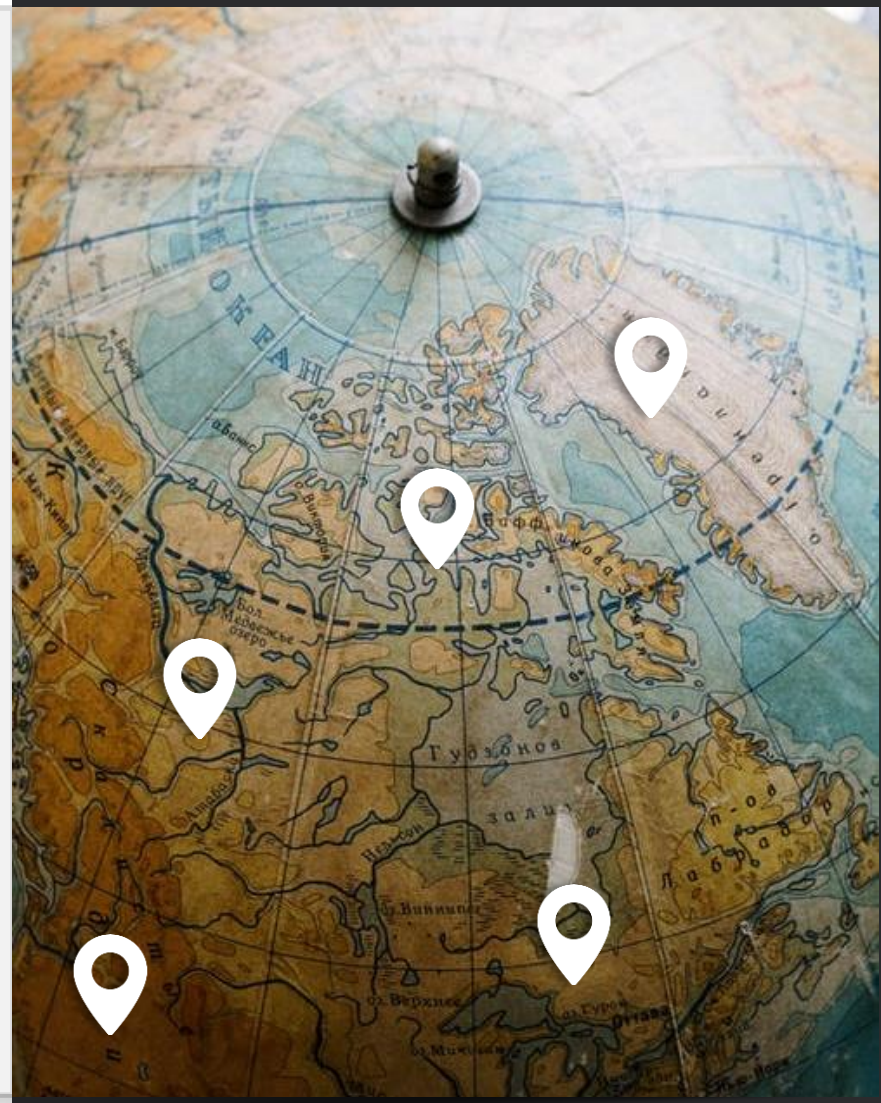
Fast prototyping of Tx/Rx SDR-based solutions characterized by high-level of flexibility, scalability, and configurability. Such solutions are suitable for RF tests, signal recording/analysis/investigation, performance measurements, GNSS scenario characterization, etc.

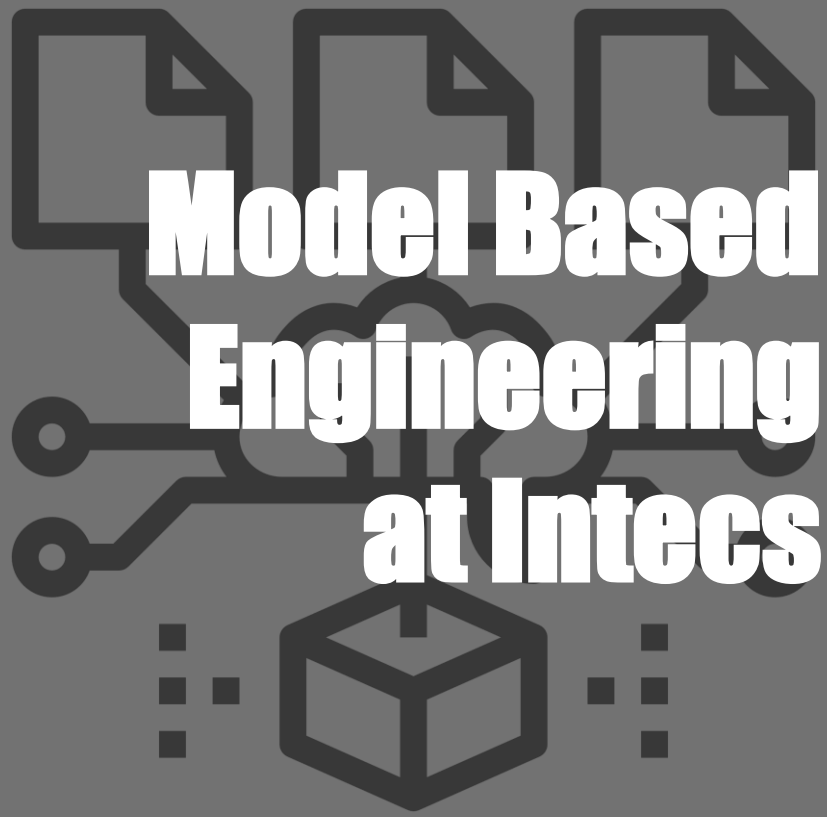
SIGNAL PROCESSING

Design and development of ad-hoc signal processing algorithms for real-time applications, simulations, and tests for R&D or innovative applications.

DATA-LINK ANALYSIS, TESTS & VALIDATIONS

Link-budget, radio-link analysis, test and validation, on-field test campaigns, modelling of communication links, etc. in order to support developments of UAVs, communication systems, IoT-based applications, etc.





Model Based Engineering at Intecs

One of the Intecs main capacities acquired through

- Well-established cooperation with major Italian and European industries, academic and research institutes
- R&D projects partially funded from European and national organizations (e.g. EC H2020, ECSEL, ESA ESTEC)

Applications to the domain of embedded systems

- Component and Contract Based Design, Contract refinement, Model Checking approches
- Predictability, Reliability, Safety and Cybesecurity by Design
- Reuse

Initial focus on the Unified Modelling Language (UML) and other OMG Standards (SysML, MARTE, etc.) since

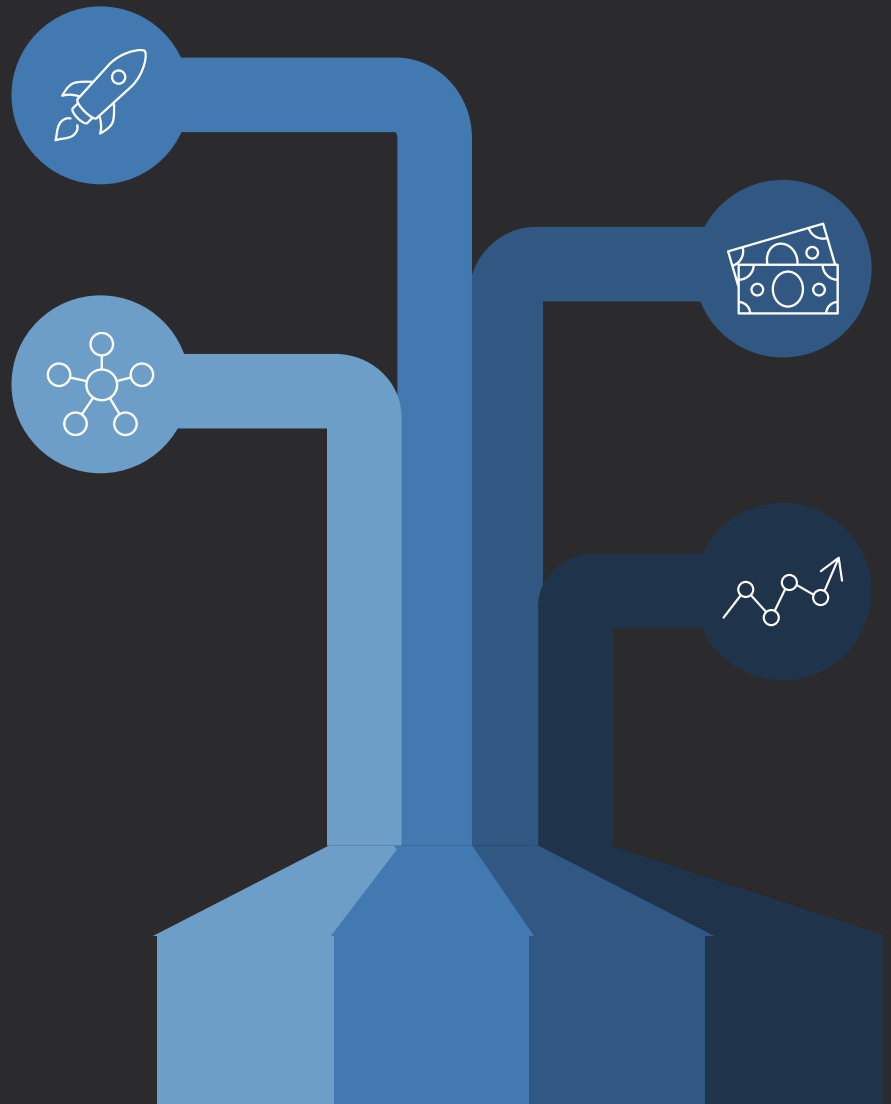
MAJOR ACTIVITY AREAS

01 System and software model-based proprietary and open source solutions

02 Application and evolution of standards

03 Definition of methodologies, support

04 Education and training



Model based engineering

Based upon Eclipse and Papyrus

CHESS Modelling Language

Specialized to capture the non functional properties of components -
Real Time -
Reliability/Safety/Security -

Separation of concerns

Functional vs non functional -
Among design views -

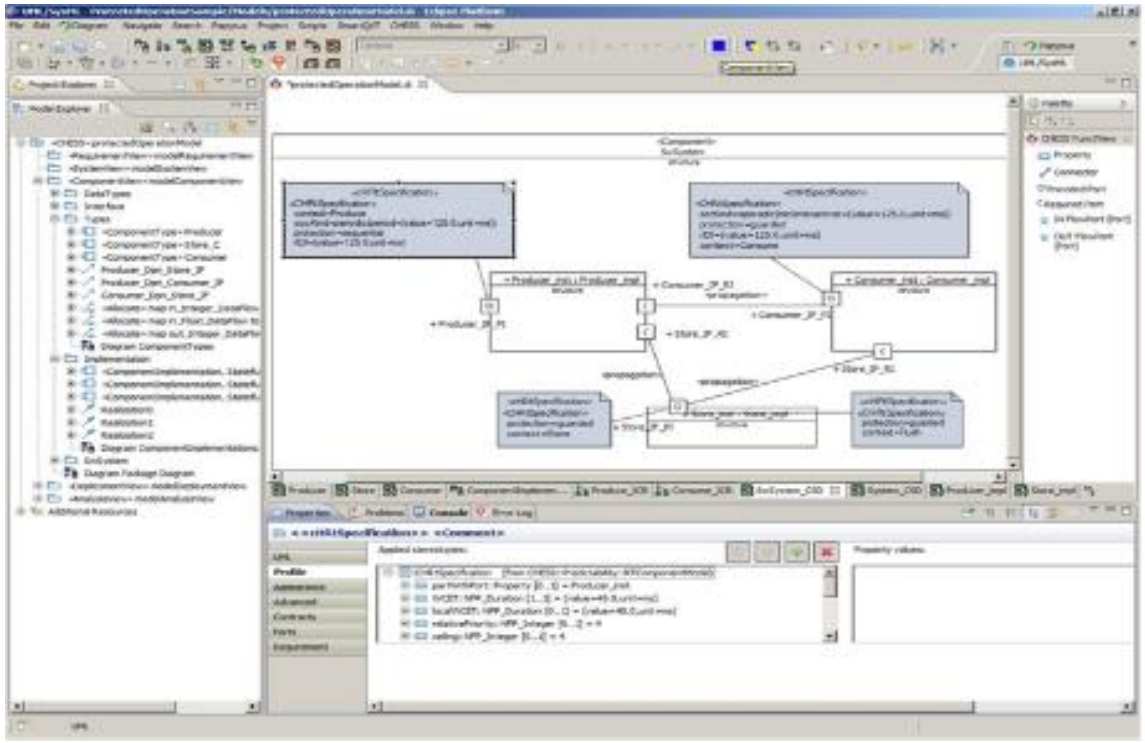
Component based SW development

Contract based design

Model cheking

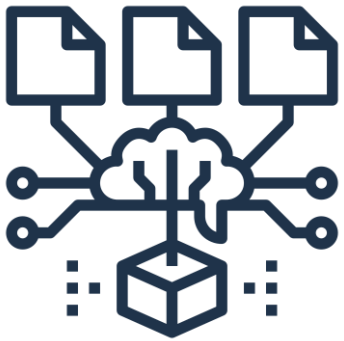
The CHESS Open Source Toolset

Composition with guarantees for high-integrity embedded software component assembly

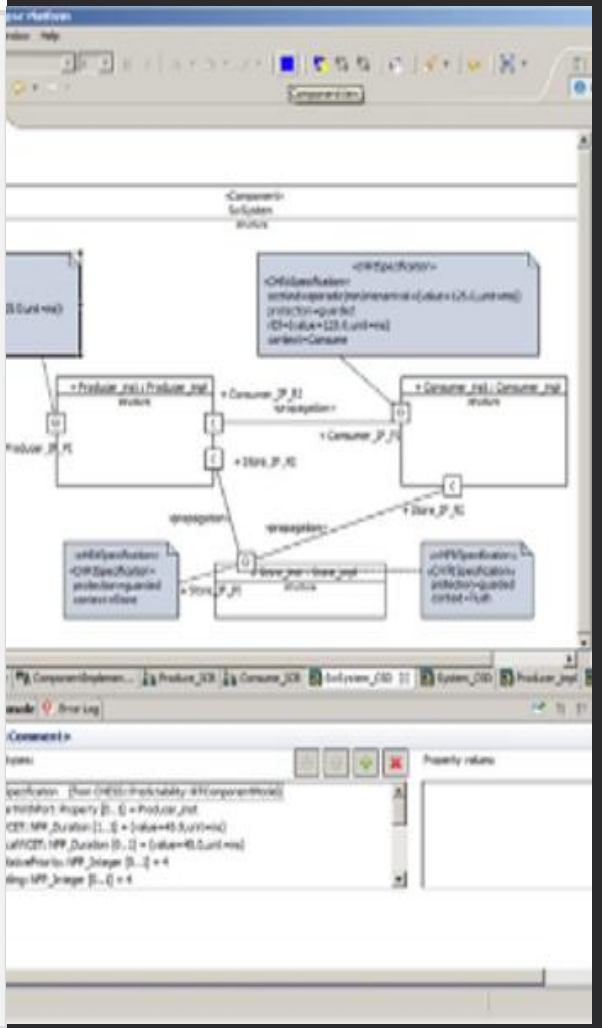


Available as **Eclipse Project**
https://www.eclipse.org/chess/index.html

MAJOR CAPABILITIES AND ANALYSIS TOOLS



- Model consistency checks
- Failure Propagation Analysis and and FMEA generation (CHESS-FLA)
- State-based Dependability Analysis (by DEEM integration)
- Quantitative Reliabiability Analysis (by Mobius integration)
- Contract-based Design and Analysis (by OCRA, nuXmv)
- Fault Injection and Safety Analysis, FMEA and FTA generation (by XSAP integration)
- Safety case generation (by OpenCert integration)
- Real time analysis (by MAST integration)
    - Schedulability and end-to-end response time analysis (with multi-core support)
    - Back propagation of analysis results
- Domain specific needs
    - IMA support
    - AUTOSAR support
- Code generation for Ada (and C)
- Support for run-time monitoring



MODEL-BASED SAFETY ANALYSIS (MBSA)

Documentation-based safety analyses

Model-based safety analyses

MBSA is model-based safety analysis approach in which safety expert can

- rely on formal models for safety analyses
- use automated analysis tools to analyze model behavior.

MBSANice

A methodology to perform MBSA on complex systems defined by Intecs (supported by CHESS)

Trademark registered

Based on the realization of system models through the use of the SysML

Calculatus of the failure behaviour of an entire system from the failure behaviour of its individual components

Aims at safety analysis artifacts, mainly FMEA and FTA, to support the safety assessment process

KEY POINTS

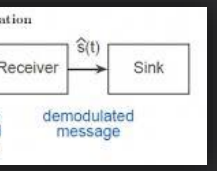
- Formal models of the system
- Exhaustive analysis, supported by automated calculus
- Reduce manual effort and the error proneness of the safety analysis process
- Improve correctness, consistency between different safety analyses, modularity, scalability and reuse

Agile Experience

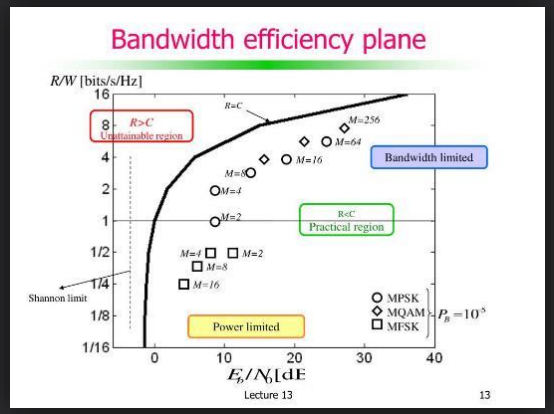
- Intecs has been involved in the Agile movement since its start nearly twenty years ago
- Participation in the working group for ECSS-E-HB-40-01A, the ECSS Agile software development handbook, published in 2020

Development of the Agile-R ® methodology for tailoring of Scrum in the railway domain according to the CENELEC standards

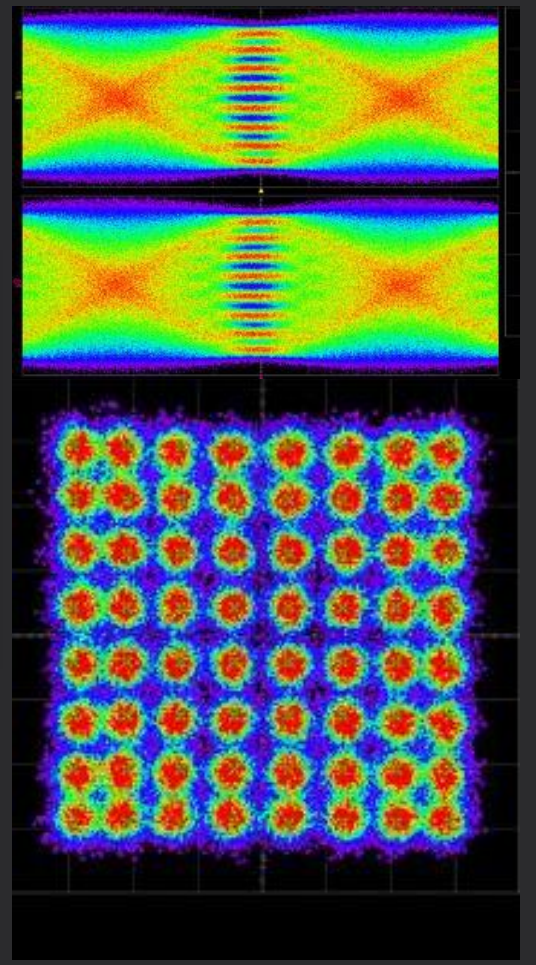
Trademark registered



Current R&D Projects



01



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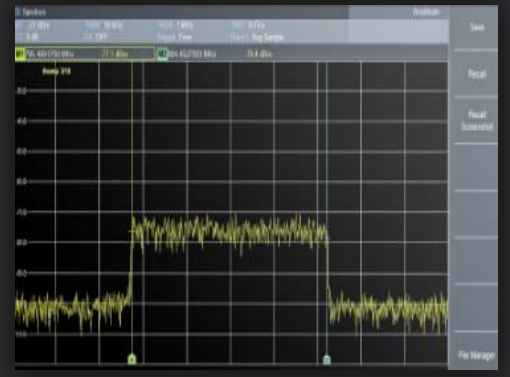

03

Recent R&D Projects

Cross-layer and multi-objective Programming approacH for next generAtioN heTerogeneous parallel cOMputing systems (PHANTOM), H2020, ICT-4-2015, Customized and low power computing

Multi-core, heterogeneous hardware platforms managed by a hardware-agnostic software platform, hiding complexity from the programmer, multi-dimensional optimization

01

Architecture-driven, Multi-concern and Seamless Assurance and Certification of Cyber-Physical Systems (AMASS), ECSEL Call 2015 Project

Assurance and certification tool platform for software-intensive critical systems, model-based development

02

Safe Cooperating Cyber-Physical Systems using Wireless Communication (SafeCOP), ECSEL Call 2015 Project

Safety-related cooperating cyber-physical systems, characterized by use of wireless communication, multiple stakeholders, dynamic system definitions, and unpredictable operating environments

03

MegaModelling at runtime - scalable model-based framework for continuos development and runtime validation of complex systems (MegaM@art), ECSEL Call 2016

Methods and tools for continuous system engineering life cycle and traceability between design and runtime

04

Aggregated Quality Assurance for Systems (AQUAS), ECSEL Call 2016

Model-based solutions for Safety/Security/Performance Co-Engineering (CE)

05

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https://www.linkedin.com/company/intecs

Silvia Mazzini

Head of Model Based Engineering Lab

She is involved in both technical leadership and management activities in the context of several R&D projects. She has many years of experience in System and Software Engineering; her main topics of interest are modeling languages, methods, processes and tools for system and software engineering in the domain of critical and complex systems.

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