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EXPO Ferroviaria 2012

SISTEMI METROPOLITANI A GUIDA AUTOMATICA

Sistemi di controllo: Progettazione/Installazione, Sicurezza, V&V, Certificazione

Torino 27/03/2012



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General overview

Acting as international Ship Classification and Industrial Certification Body since 1861, RINA provides professional services dedicated to

- **Railway, Metro and Infrastructure managers**
- **Rolling stock and equipment suppliers**
- **Maintenance entities**



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General overview

RINA relies on the competencies of experts for the main subsystems and components:

- Rolling Stock and Vehicles,
- Signalling and Traffic Control,
- Telecommunications,
- Power Supply,
- Infrastructure,
- Operations, Safety and Maintenance



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General overview

RINA GROUP (Railway)

- **Independent Safety Assessment & Certification (RINA Services S.p.A.)**
- **System Engineering (D'Appolonia S.p.A.)**
- ...



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Independent Safety Assessment & Certification

Customers and Suppliers – Needs & Services



Ministero dei Trasporti

U.S.T.I.F.



RINA

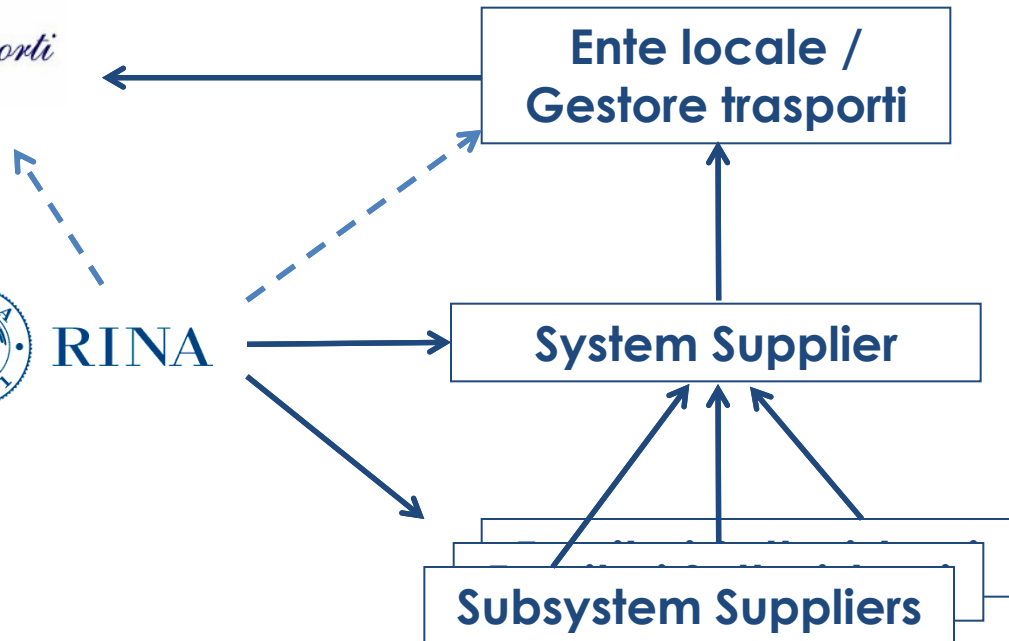
Ente locale /
Gestore trasporti

System Supplier

Subsystem Suppliers

INDEPENDENT:

Transversal competence,
experience and interests,
with respect to the
specific application





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Independent Safety Assessment & Certification

ISA Activities and Deliveries

Project Examination, Laboratory and Field Tests for assessing:

- Safety architectures
- Design and V&V processes
- Implementation and Installation

According to **applicable regulation:**

- CENELEC norms EN50126/EN50128/EN50129

→ Independent Safety Assessment Report and Certificate



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Independent Safety Assessment & Certification Projects

Specific Application ISA

- Milan Metro Line 1 ATP/ATO Signalling System by Alstom
- Alifana Metro ATP/ATO Signalling System by Ansaldo STS

Generic Product ISA

- MicroLok II / MicroCab II by Ansaldo STS USA

Specific Application Hazard/Risk Analysis

- Ikitelli Metro Signalling System by Bombardier RCS
- Rome Metro Line C System



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Independent Safety Assessment & Certification Accreditations

RINA is accredited by the **Italian NSA (National Safety Authority)** as an **Independent Safety Assessor**

RINA is accredited by the accreditation body ACCREDIA for **inspections in the railway sector according to UNI CEI EN ISO 17020:2005**

RINA is accredited by the accreditation body ACCREDIA for **certification of products according to UNI CEI EN 45011:1999**



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System Engineering (D'Appolonia)

Objectives

The modern approach to deliver complex transportation projects requires to enforce an integrated engineering process, aimed at ensuring the highest quality in terms of:

- Service Availability
- Safety
- Reliability
- Ride quality / passengers comfort

These objectives can be fulfilled through the development of System Engineering Activities



System Engineering (D'Appolonia)

Specialties

Project needs

- Structured and formalized V&V Process
- Requirements identification and traceability
- verification of fulfillment of requirements
- Identification and control of interfaces
- Integration of supplies at design, construction and commissioning stages

SYSTEM ENGINEERING, including the following specialties:

- Design Management (Requirements, V&V)
- Interface Management
- RAM, Safety Management
- System Performance and Operation
- Software Assurance
- QA/QC Management
- Testing & Commissioning Management

**Adequate reply
by means of SE**



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System	Metro Copenhagen	Busan-Gimhae LRT	Istanbul Metro Taksim-Yenikapi	Metro do Porto	LUAS	Rome Metro Line C	Thessaloniki Metro	Brescia Metro	Milan Metro Line 5	Dubai Metro Red Line	Metro Genova	Minimetro
Location	Copenhagen, Denmark	Busan, Korea	Istanbul, Turkey	Porto, Portugal	Dublin, Ireland	Rome, Italy	Thessaloniki, Greece	Brescia, Italy	Milan, Italy	Dubai, Emirates	Genova, Italy	Perugia, Italy
Clients	Ansaldo Trasporti AnsaldoBreda US&S	Hyundai Rotem	Hyundai Rotem	Bombardier Transport Balfour Beatty Rail Metro do Porto	Ansaldo Trasporti	Astaldi Ansaldo Trasporti	Impregilo Ansaldo Trasporti	Astaldi Ansaldo Trasporti	Astaldi Ansaldo Trasporti Alstom Transport	Thales	Ansaldo Trasporti	Siemens
Year	1996 – 2007	2006 – ongoing	2006 – ongoing	2000 – 2011	2000 – 2003	2007 – ongoing	2006 – ongoing	2003 – ongoing	2005 – ongoing	2007 – 2010	1992 – Ongoing	2005 – 2010
Technology	Driverless	Driverless	Conventional	Conventional	Conventional	Driverless	Driverless	Driverless	Driverless	Driverless	Conventional	Driverless
Current Status	Operation	Operation	Construction	Operation	Operation	Construction	Construction	Construction	Construction	Operation	Operation	Operation
System Safety	●○	●	●	●○	●	●	●	●○	●		●	○
System RAM / Assurance	●○	●	●	●○		●		●○	●		●	○
Hw/Sw Assurance / V&V	○	●							●		●	○
Interface Management		●	●						●	○	●	
Performance Management		●	●						●		●	
EMI/EMC			●						●		●	
Noise&Vibration-Environment	●		●						●		●○	
Test and Commissioning	●○	●	●	●○					●	○	●	
System	Urban Maglev	Rome Airport APM	Marmaray CR1	Kadıköy Kartal Metro	Istanbul Metro 4 Levent-Hacıosman	Incheon Metro Line 2	Stockholm Metro	Warsaw Metro Line 2	Copenhagen Cityringen	Constantine LRV	Rotterdam Metro	Turin Metro
Location	Incheon, Korea	Rome, Italy	Istanbul, Turkey	Istanbul, Turkey	Istanbul, Turkey	Incheon, Korea	Stockholm, Sweden	Warsaw, Poland	Copenhagen, Denmark	Constantine, Algeria	Rotterdam, Netherlands	Turin, Italy
Clients	Hyundai Rotem	ADR Engineering	Gulermak	Astaldi, Makyol, Gulermak	Alarko, Makyol	Hyundai Rotem, POSCO E&C, DEATI, SKC&C, LSIS	AB Storstockholms Lokaltrafik	Astaldi, Gulermak, FBDM	Salini, Tecnimont, Seli	Pizzarotti	GE Transportation	Metro 1
Year	2007 – ongoing	2005 – ongoing	2007 – 2010	2008 – on going	2008 – on going	2009 – on going	2010 – ongoing	2010 – ongoing	2011 – ongoing	2011 – ongoing	2010 – ongoing	2000
Technology	Driverless	Driverless	Conventional	Conventional	Conventional	Driverless	Conventional	Conventional	Driverless	Conventional	Conventional	Driverless
Current Status	Construction	Design	Construction	Construction	Operation	Construction	Design	Design	Design	Construction	Operation	Operation
System Safety	●	●	○	●	●	●	●○	●	●	●	○	●
System RAM / Assurance	●	●	○	●	●	●	●○	●	●	●	○	●
Hw/Sw Assurance / V&V	●	●	○	●	●	●	●○	●	●	●	○	●
Interface Management				●				●				●
Performance Management		●			●	●	●○					
EMI/EMC		●	○	●	●	●						
Noise&Vibration-Environment		●				●		●				
Test and Commissioning						●		●				●
			● Activities at overall System level		○ Activities at Subsystem level		● Technical Advisor		● Construction Supervision		● Design Services (Station and Depot)	