



Funded by the Horizon 2020  
Framework Programme of the  
European Union



# Cost Action CA18203 - Optimizing Design for Inspection (ODIN)

## PRACTICAL INFORMATION GUIDE TECHNICAL PROGRAMME



### **Training School on Optimisation, Design and INtegration**

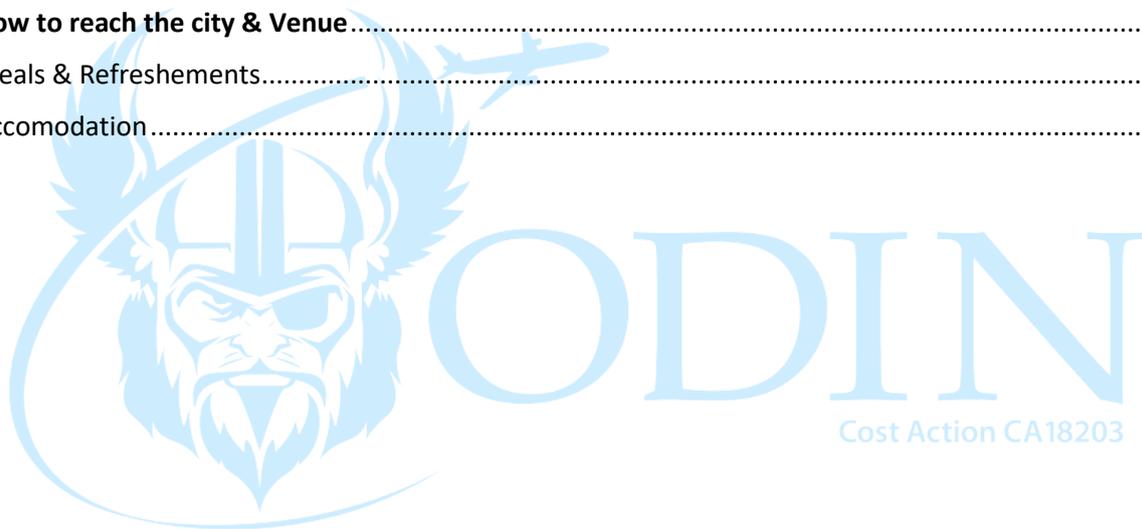
INSA Rouen Normandie  
685 Avenue de l'Université  
76800 Saint-Etienne-du-Rouvray  
France

**Date: April 12th to 14th, 2023**



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## About COST

The European Cooperation in Science and Technology (COST) is a funding organisation for the creation of research networks, called COST Actions. These networks offer an open space for collaboration among scientists across Europe (and beyond) and thereby give impetus to research advancements and innovation.

COST is bottom up, this means that researchers can create a network - based on their own research interests and ideas - by submitting a proposal to the COST Open Call. The proposal can be in any science field. COST Actions are highly interdisciplinary and open. It is possible to join ongoing Actions, which therefore keep expanding over the funding period of four years. They are multi-stakeholder, often involving the private sector, policymakers as well as civil society.

Since 1971, COST receives EU funding under the various research and innovation framework programmes, such as Horizon 2020.

COST funding intends to complement national research funds, as they are exclusively dedicated to cover collaboration activities, such as workshops, conferences, working group meetings, training schools, short-term scientific missions, and dissemination and communication activities. For more information, please go to the Funding section of the COST website (<https://www.cost.eu/>).

The COST Association places emphasis on actively involving researchers from less research-intensive COST Countries (Inclusiveness Target Countries, ITC<sup>1</sup>). Researchers from Near Neighbour Countries and International Partner Countries can also take part in COST Actions, based on mutual benefit. For more information, please visit the global networking page (<https://www.cost.eu/>).



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1 Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Macedonia, Hungary, Latvia, Lithuania, Luxembourg, Malta, Montenegro, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Turkey



## Cost Action CA18203 - Optimizing Design for Inspection (ODIN)

This Action will maximize the full benefit of in service, continuous monitoring of critical aerospace structures by integrating ultrasonic wave based non-destructive evaluation (NDE), energy harvesting and wireless sensor technologies at the design conception phase.

Optimization (of sensors and structures), computational modelling, advanced signal processing and advanced design approaches will be integrated to produce a novel framework, design tools and guidelines for the delivery of the first generation of self-sensing aircraft capable of delivering accurate structural prognosis.

Ultrasound based NDE techniques, energy harvesting and wireless sensor networks are being increasingly demonstrated to be effective in monitoring damage in aerospace components at a laboratory setting.

These components include critical elements such as airframe, engines, landing gear and control surfaces. However, there is an urgent need to integrate these approaches and techniques at the inception of an aircraft. This COST Action will bring together the top European experts across these areas to support the development of an integrated framework for optimized self-sensing structures capable of diagnosis and prognosis, together with demonstrators and educational activities, including training programs, which will ultimately lead to cleaner and safer skies.

### General information

Start of Action: 02/10/2019

End of Action: 01/10/2023

Cost Action CA18203

### MAIN CONTACTS

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Domain website: <https://www.cost.eu/actions/CA18203/>



## Action's Working Groups

Working group 1	<b>Design, Optimisation and Integration</b> This group will encompass industrial aerospace design engineers and experts, mathematicians, computer scientists and optimizers with the objective to analyse the requirements for integrating SHM systems at the inception of an aerospace design. A significant challenge for this group is to ensure that specific aerospace requirements are communicated effectively and efficiently to the SHM system designers.
Working group 2	<b>Damage detection</b> This group will focus on the analysis of existing strategies including sensor technologies. They will quantify the capability of systems to identify damage in new structures, power level requirements and compare state of the art signal processing approaches to damage location and characterisation. Finally, the group will deliver a strategy for sharing data and signal processing algorithms.
Working group 3	<b>Power management and energy harvesting</b> Power requirements are a crucial element of this Network. Currently there is a power gap between low power systems and the available energy through current harvesting approaches. Furthermore, there are large disparities between published data and that which is achievable based on methods of testing and analysis. Therefore, this group will seek to develop a detailed understanding of current vibration levels and temperature differences and the location or position they would be found on an aircraft and standard testing procedures to allow a comparison across European research groups. There will be cross work group activities associated with this group.
Working group 4	<b>Wireless Communications</b> Wireless communication is of great importance to unlocking the potential of SHM systems in aerospace, bridge structures and wind turbines. However, the greatest challenge lies in aerospace where there is a restriction in allowable wireless protocols and the complex geometry that signals have to propagate through and around. The working group will focus on aerospace protocols and strategies that will reduce power requirements at a sensor node. In addition, the working group will review the safety and security of existing protocols.
Working group 5	<b>Data management and signal processing</b> This working group will focus on human interface, data interpretation, data presentation, data mining, data efficiency/reduction and hardware integration. There are three tasks associated with this working group. The group will be heavily linked to WG1 and WG2. In addition, there will be strong activities focused on low power processing to reduce power consumption of systems.



## Agenda

Time	Day 1	Day 2	Day 3
<b>Morning</b>	Registration/ Wel- come	Keynote Lecture 3	Teambuilding
	Keynote Lecture 1	Teambuilding activity II	activity III
	Coffee-break	Coffee-break	Coffee-break
	Keynote Lecture 2	Visit to the labs	Teambuilding
	Teambuilding activity I		activity IV
<b>Break</b>	<b>Lunch</b>	<b>Lunch</b>	<b>Lunch</b>
	Workshop of Trainees I		Workshop of Train- ees III
<b>Afternoon</b>	Coffee-break	Visit	Coffee-break
	Workshop of the Trainees II		Workshop of Train- ees IV
The agenda presented here can be changed, subject to the participant's mutual agreement.			



## Rouen, Capital of Normandy

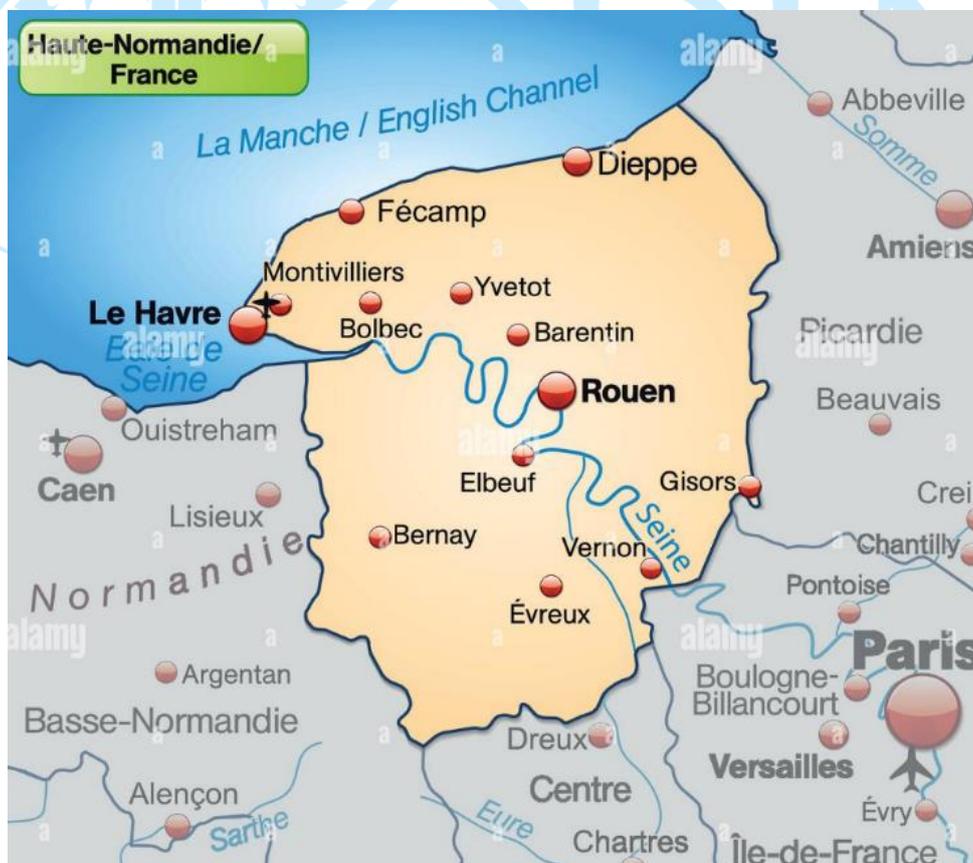
Located less than two hours from Paris by means of transport, Rouen and the Seine Valley are a haven of peace for locals and foreigners. With its many monuments, the tallest cathedral in France, its cultural heritage, its gastronomy and local products, its events and its central location, only Rouen could be the capital of Normandy!

The history of Rouen, capital of Normandy is still tangible in the corner of every street. It is difficult not to feel this past so full of the events that marked the history of France. Nicknamed the “city of a hundred Spires” by Victor Hugo, the city of Rouen is endowed with many religious buildings illustrating the strong spirituality of the town.

Rouen has a rich historical past and traces of its Medieval history of Rouen can still be seen in some of the city’s houses and abbeys.

Joan of Arc, the maid of Orleans, is one of the town’s symbols of medieval and spiritual heritage. The History Museum, the dungeon or Joan of Arc Tower, the stake in Place du Vieux-Marché (the old market square) or the Joan of Arc church are the essential sites for tourists in Normandy.

The architecture of the centre of Rouen with its pedestrianised streets interspersed with timber frame houses (the town has close to 2000 houses with this architectural characteristic) makes Rouen the ideal destination, whether for couples looking for a romantic weekend, family holidays to experience daily life in the Middle Ages or educational school trips.





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## INSA of Rouen



France's leading group of publicly funded graduate engineering schools **INSA Rouen Normandie** belongs to France's leading network of publicly funded engineering schools. INSA schools are located in major French cities (Centre Val de Loire, Lyon, Rennes, Rouen, Strasbourg, Toulouse and Valenciennes) but also in Fez, Morocco. The 7 national INSAs, the first international INSA and their six associated schools embody a model that has been recognized throughout the world for more than half a century.



## INSA Rouen Normandie in figures

### + Training

- 2,000 students
- 400 engineering graduates every year
- 11 engineering specializations, including 4 under apprenticeship contracts
- 1 specialized Master's Degree
- 7 research Master's Degrees
- 3 doctoral schools  
*Normandy doctoral school of Chemistry // Mathematics, Information and Systems Engineering doctoral school // Physics, Engineering Sciences, Materials, Energy doctoral school*
- 147 doctoral and post-doctoral students
- 30 theses defended every year
- 1 teaching chair

### + Research activities

- 8 research laboratories
- 2 LABEXes - 2 EQUIPEXes - 2 CARNOTS
- 7 common laboratories with companies
- 2 research chairs
- 5 interregional research federations

### + Human resources

- 156 teachers and teacher-researchers
- 215 administrative and technical staff
- €40M budget
- 50% training - 50% research



## How to reach the city & Venue

Rouen is easy to get to from Brussels, London or Paris by car, train or airplane. You can arrive to Paris via airport Orly, Beauvais or Charles de Gaulle (CDG) or arrive via the Eurostar train at Gare du Nord. From there you can take a train, taxi or navette to Rouen.

Some typical distances from the center of Rouen:

Airport Charles De Gaulle (CDG)	133 Km
Airport Orly	150 Km
Paris (Notre Dame Cathedral)	132 Km
Paris (Eiffel Tower)	129 Km
Beauvais (Low Cost Airport)	82 Km
Dieppe	58 Km
Giverny (Monet's gardens)	50 Km
Honfleur	72 Km
Etretat	85 Km
Le Havre	86 Km
Deauville	94 Km
Caen	129 Km
Mont Saint Michel	236 Km
Brussels	343 Km

### BY PLANE

Rouen is located just under an hour and a half from Paris and its Orly and Charles De Gaulle airports.

- **JOINING ROUEN BY SHUTTLE FROM PARIS AIRPORTS:** [Cost Action CA18203](#)

Shuttle services connect Rouen to the most important Paris airports. Consult the websites of the companies [Périer](#), [Transnormandie](#), [Taxi Tour Evasion](#), [Navette Paris Aeroport](#).

- **THE EASIEST WAY TO ROUEN FROM AIRPORT ROISSY CHARLES DE GAULLE IS TO TAKE THE BUS!**

By bus from CDG to Rouen direct. From Terminal 3 take the Flixbus. Prices vary between 5 and 20 euros and tickets can be purchased online before your departure. The journey is easy and comfortable, the buses have wifi and go direct to Rouen Bus Station.

- **JOINING ROUEN BY THE BEAUVAIS AIRPORT:**

The airport of Beauvais is specialized in low-cost flights and offers connections to Barcelona, Bergen, Bucharest, Budapest, Copenhagen, Dublin, Glasgow, Katowice, Milan, Oslo, Rome Ciampino, Shannon, Stockholm, Warsaw, Venice. Shuttle transport from Beauvais to Rouen is available. Airport Website: <http://www.aeroportbeauvais.com>

### BY TRAIN

From the Gare Saint-Lazare (Paris), ten trains daily in each direction connecting Paris and Rouen in about 1h15. TGV lines connect daily Rouen to Lyon and Marseille. See the French national railways website: <https://www.sncf-connect.com/>



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## VENUE

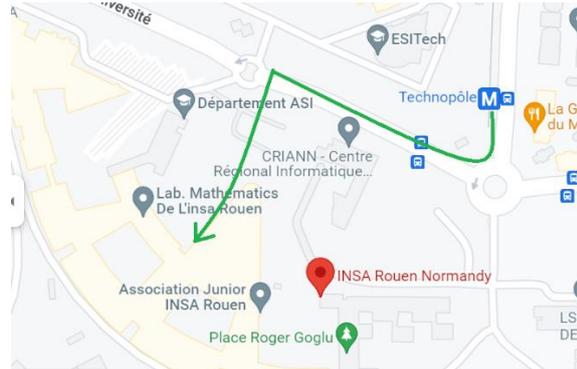
### INSA Rouen Normandie

685 Av. de l'Université, 76800 Saint-Étienne-du-Rouvray

GPS : 49.38516927278252, 1.0688831232996885

Virtual visit of the school (in French)

<https://www.insa-rouen.fr/insa-rouen-normandie/visite-virtuelle-de-lecole>



The beautiful centre of Rouen is connected to the venue site by direct metro/tramway line "Technopole" in about 30 minutes of travel from the city center.




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*Stations to take in the city center*

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*Finale destination Technopole*

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## Meals & Refreshments

Refreshments will be served during the meeting according to the program schedule/as agreed.

## Accommodation

Rouen has more than 3,700 hotel rooms. Many hotels corresponding to different budgets are available in the center. More information may be found at the site of the tourist office of Rouen: <http://www.rouentourisme.com/>

As an Action, we advise you to book the hotel in the center and use the public transportation to go to the Venue.

