

# Minutes

**Event: Technical Visit to Caen**

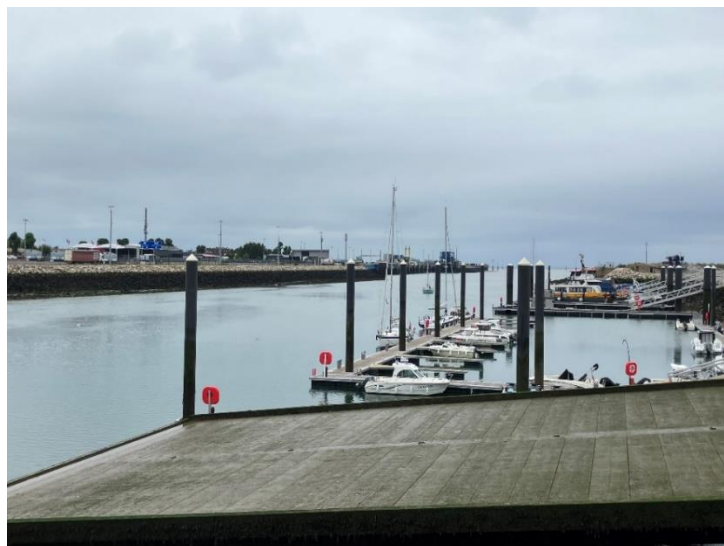
**Date: 02 September 2024- 03 September 2024**

**Place: Caen, France**

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## **Technical visit at Caen - FR**

Canal de Caen à la Mer – Caen Canal is one of most important water channels that is located in Calvados, France. The 15-kilometer-long waterway runs from the port of Caen which is situated in the city center to Ouistreham town before entering the English Channel. The latest estimates suggest that the population of Caen is about 106,000 people. It took a period of about 20 years beginning from 1837 to 1857 when this canal was formed. In the beginning it had a depth of four meters, but later modifications were made in 1920s making it ten meters deep and allowing its width to expand up to two hundred meters. Serving as a prominent center in the Normandy region, Caen is characterized by its diverse economic base. The city’s main economic activities comprise services, education and research sectors particularly associated with its universities as well as research centers. Another area where Caen excels is historical and cultural tourism which attracts numerous visitors to its monuments and WWII memorials. Furthermore, it has placed great emphasis on technology innovation and sustainable development such as electric vehicle initiatives for greener transport systems or renewable energy projects.



*Figure 1: Intersection point of canal and English Channel at Ouistreham*

Parallel to the Orne River, there is the canal containing two locks -one located in the center of Caen and another one situated at Ouistreham's port. The locks have been designed to control water levels as they depend on sea and river conditions. It is mostly meant for carrying goods; in fact, it mainly helps fishing boats. It is as well a place for recreation and sports like canoeing.

Development along the canal has led to residential areas on one side and industrial zones on the other. The region is endowed with a fish market which has good infrastructural development that allows for direct delivery of fish to local tourist hotels. The area has become attractive to logistics companies due to its growing infrastructure. Near Blainville is a Renault Trucks manufacturing plant situated between the canal and the Orne River. Across the river lies the community of Colombelles, near the historical Pegasus Bridge.

Today's scenario in the downtown area of Caen shows a steady growth in the fishing business. There are infrastructural developments such as eateries by the riverbanks. Consequently, there are small transshipment points that allows the direct flow of fresh fish to eateries thus enhancing business development within this vicinity.

## 2. Network's characteristics of the fish industry at Ouistreham

The fishery business in Ouistreham is a well-structured system that is based on daily operations of fishing, processing and distribution. Every day, fishing boats ranging from small dinghies to large trawlers make their way into the English Channel to catch various sea-foods including fishes, shellfishes and crustaceans. Upon the return of the boats to the coast, the fresh catch is taken to the local fish market where it is sold through auctions. This acts as a hub for both small scale industries as well as large scale distributors who buy seafood from here to supply restaurants, shops and export markets.



Figure 2: Containers used to store different types of fishes and official weighing counter

The movement of goods in Ouistreham's fish industry starts with fishermen bringing in their catches at the harbor. The seafood is then quickly transferred to nearby processing plants whose function is to clean, pack and prepare different kinds of fish as well as other related products for distribution purposes. From there the products are either sold within or outside this locality thus ensuring its consumption while still fresh. This means fishers sell a part of their catches to intermediaries and some meters distance in an open market other part direct to private persons daily. The efficiency of this flow plays an important role in keeping high quality seafood with a good reputation from Ouistreham.



*Figure 3: Unloading of fishes at Ouistreham port*

The Canal de Caen à la Mer supports the fish industry by providing an green transportation alternative. Seafood products can be swiftly delivered to different markets due to rapid transfer between Ouistreham port and Caen city through the canal. This is important for ensuring that restaurants and other businesses along the canal can serve fresh fish within no time and they will enhance their overall business operations.

When it comes to business practices, a mix of old and new is used by the fish industry in Ouistreham. The distribution and unloading of the fish were conducted smoothly to handle seafood safely and efficiently. There is also a well-organized logistics system within this industry (for example, it supports fast instances both locally and internationally). In fact, many restaurants receive their fresh seafood directly from the port, which translates into elegant meals for their customers at these establishments.

On Ouistreham there is as well an events location near to the canal which could be used for WISTAR's communication and dissemination activities just as workshops or demonstrations.

### 3. Running services for urban logistics in Caen with “*Tout en vélo*”

“*Tout en vélo*” is an organization located in Caen, Normandy, which pays attention to green urban logistics using cargo bicycles. Established with the purpose of minimizing the ecological footprint resulting from urban transport, “*Tout en vélo*” provides a green substitute for conventional delivery by utilizing specifically designed cargo bikes to carry various items around the town.



Figure 4: Storage location of company “*Tout en vélo*”

They can easily ride through narrow passages, heavily populated areas as well as pedestrian sites while cars and vans/trucks may find it challenging or even completely banned. This is specifically relevant to areas with high population densities where traffic flow is usually halted by congestion. They can be used in bike corridors too which makes it possible for these two-wheeled modes of transport to become more effective than usual vehicles stuck in jams.

In highly populous neighborhoods, the supplying process of commodities through freight bikes by “*Tout en vélo*” is both productive and eco-friendly. The association works alongside several firms such as grocery outlets, e-commerce sites, DHL and eating places delivering items straight to buyers. This type of service would be particularly beneficial in Caen where there are very narrow roads that limit parking spaces thus making delivery trucks/cars unfeasible.

Customers bring the packages to the location of “*Tout en vélo*”. The bike company has as well an area reserved to keep stock of products that are frequently delivered. As an example, there are several boxes with drinks in stock on the venue of “*Tout en vélo*”.



*Figure 5: Delivery bike with container of goods*

Distribution of the items from the company's place of storage takes place between 8:00 and 16:00 as part of the "Tout en vélo" distribution strategy. The bike riders are expected to ride within a 3 KM radius in a big volume box containing a cargo volume of around 1200 liters and a payload capacity of 250 kg. In general, an individual bike rider delivers all its goods to customers on behalf of just one company. To identify themselves as the delivery person for a particular company, as bike riders may also wear t-shirts representing that organization. There are days when one bicycle rider has to make two or three journeys in one single day. Hereafter, these cyclists load their own bicycles with orders at a common hub or station point. Then, based on good knowledge on road navigation, they always use shortest paths possible making them avoid traffic congestions that may occur during peak hours by utilizing bike friendly routes in addition to taking shorter streets in towns as compared to that taken by other kinds of vehicles including cars or trucks.

In a very nice and feasible manner, the firm supplies cold items. A large container is used at the center storage location to store the cold storage on a large scale. Then the company used passive cooling trailers, as seen in figure 6, that can be attached to the bike for delivery. We tested loading the containers used for the fish on this trailer as seen in figure 6. The rider loads the cool goods from the refrigerated container into the passive cooling trailer and delivers the goods at the customer's doorstep. This box is meant for fish, liquor, and other chilly items. The small container is not temperature controlled but temperature resistant to make sure the temperature of products is upheld by it, thus allowing the agent to deliver them promptly and in perfect condition.



Figure 6: Passive cooling trailer for cold product storage and delivery

Because cargo bikes are so capable of going in all directions, *"Tout en vélo"* has been able to undertake many stops along a route and save time on several destinations in one trip. It helps businesses such as those that demand frequent, small-scale deliveries like suppliers of fresh foods or online retailers. Furthermore, through their contribution to cleaner air and lesser noise pollution in an urban environment, the use of cargo bikes has led to reduced carbon footprint in relation to urban logistics.

To sum up, *"Tout en vélo"* is a typical example showing how effective choice of bicycles for carrying goods can be in the metropolises with high populations. Therefore, they support the local community while promoting sustainability through urban logistics at large.

#### 4. Presentation of IW-Net project

Smarter tracking and tracing systems have become increasingly important in making sure urban logistics function properly, especially concerning waterway transportation. A possible answer to this problem is real-time multi-modal routing optimization with hierarchical cargo tracing. With these technologies available, logistics operators can react immediately regarding changes in delivery conditions when there is a need to manage physical logistics together with data logistics without any flaws.

The IW-net system is important for tracking and tracing goods along inland waterways from their places of origin to destinations. Nowadays, Xeolis Cloud Series is used for monitoring cargo in real time to give detailed information about the status and movement of goods. Every item being transported gets its own unique identification number which aids in tracing what type of goods, their sizes, weights and any special handling instructions just as minimum and maximal temperature might be assigned to each

delivery. The tracking process starts when a receipt is produced by a supplier containing relevant details about what has been delivered which is then sent over onto the client's end. It is only after acceptance of this request that clients can gain access to specific details regarding transshipments, hence enabling them to track everything that happens within a logistics chain. Such identification numbers or special IDs are essential during tracking since they relate each good with respective information thereby allowing stakeholders to receive real-time updates on cargo statuses.

The delivery process of the goods is constantly monitored; they keep updating their status from shipment to acceptance, pickup, transportation or even damages (sent- accepted-pickup-departure-damaged, -enroute). Such modes of tracking the freight make it easy for the supplier as well as customer to have total control of the logistics. Another aspect that we can't ignore about this package is temperature measurement because there are items which need to be stored under specific temperatures like those that can easily decay. The tracking system, coupled with a temperature sensor accompanying the cargo, allows to record the temperature of the cargo at any time continuously.

It also supports real-time decision-making on the issue of route changes and delivery adjustments. In situations where goods are damaged or a delivery cannot be made as planned, events can be instantly registered in the system. A new order will be created to redefine the destination of the goods to ensure that logistical processes downstream are accomplished. This is enhanced by the employment of scanning devices, which help to make possible changes on-site. Decisions regarding the route of delivery for goods are made on the spot through scanning its identification code, allowing the cast to make dynamic changes in logistics.

The WISTAR project could employ IW-net and Xeolis Cloud Series systems that will benefit greatly from improved visibility and control in the inland waterway transportation logistics. Along the waterways, there is likely to be an improvement in the efficiency of tracking goods because every stage of their journey can be traced and managed from a single platform. This can be done by adopting real-time tracking so that resources may be utilized more efficiently, thus dealing with delays', low reliability on transport network etc.

Additionally, they are suited to meet environmental objectives set by WISTAR project as well as support logistical efficiency. When these rivers are made part of urban logistic networks, dependency on roads decreases leading to less road congestion and emissions. Using cargo bikes along with rivers for last-mile deliveries has proved to be an efficient and sustainable way to transport goods within densely populated cities.

Finally, these systems of tracking and tracing used by IW-net, and Xeolis Cloud Series provide an integrated method for controlling the transshipment interfaces of inland waterways transport. This is so because they can show situations as they change with time both online or offline based on satellite data from GPS and other systems enabling them to recommend best possible route for each mode. That is why this ability to give real-time visibility, adjust to modifications in conditions, and improve multimodal routes are going to be important for achieving success in WISTAR project thus supporting more environmentally friendly urban logistics as well as making it more efficient.

## 5. NEAC electronics autonomous water shuttle

The NEAC Electronics autonomous water shuttle demonstration was performed on 5 km of the Canal of Caen as a test run to appreciate operational efficiency and energy optimization. The electric-powered shuttle is a leap forward for sustainable water transport, having been designed for cargo and direct delivery services alike. To showcase its traveling capacity across urban waterways, the shuttle can achieve maximum velocities of about 10 knots. There are three modes under which this vessel can operate: Autonomous, Manual and NEAC. Under autonomous mode, the shuttle utilizes GPS positioning and sophisticated sensors that navigate it around the canal. These sensors not only follow its path but also keep track of how deep it is in the canal thus ensuring safe passage through various water conditions.

The shuttle is a potential transporter for the fish through canals in a sustainable way. The shuttle could get fish from Ouistreham port and take them directly to the restaurants situated along the canal right in front of their doors. There is transshipment points established on the route for unloading goods from the shuttle. These processes can be performed manually thus ensuring that fish are handled well and supplied properly.



*Figure 7: Stop at transshipment point*

Accordingly, there are future such as development and implementation of technology that will automate loading/unloading procedures hence making it possible for more efficient operation instead of relying much on labor. This would improve the shuttle's ability while simultaneously making delivery services more streamlined.





Figure 8: NEAC E-Shuttle test run at Caen canal.

The shuttle's performance was smooth and indicative of future urban logistics possibilities during testing periods. The shuttle is powered by two batteries. Each battery provides 10 hours of navigation and may weigh up to 10 kg. Two batteries provide enough energy for the boat to go around 40 km on a single charge. The batteries can easily change and exchange with charged batteries. This might potentially lead to the development of charging station infrastructure along the route in the future. The efficiency of its electric motor was remarkable since it operated with almost no noise and without emitting any harmful discharges, making it ideal for transportation that respects ecological principles. This means that these vessels will improve logistics, lower emissions and make it possible for timely delivery of goods. Because of their efficiency in operating quietly and sustainably, these ships are preferred by urban centers as well as waterfront industries thus promoting cleaner methods of movement.

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