Prof. Enzo Siviero

The Tunisia-Italy Bridge Across The Mediterranean

The *Mare Nostrum*, as the Mediterranean Sea was already defined by the Roman conquerors, for centuries has represented the central transit toward the most important commercial routes.

The function of being crossroad of the international maritime movements has represented the fortune and wealth of the whole area bathed by this sea; it also acts as as an element of cohesion and connection inside the whole territory.

This platform of exchange and mobility, shared by the African and European coasts, is part of the great history of Mediterranean civilization, which is based on culture and on the exchange of goods and ideas (**Figure 1**).

Later, in the Middle Ages, the Mare Nostrum assumed considerable importance, when the maritime republics monopolized the commercial traffic from North to South and from East to West, for over five centuries.

Starting from the 16th Century, with the discovery of the Atlantic routes, the centrality of the Mediterranean Sea has waned.

The transport system has moved to the northwest, and the nations of Atlantic Europe have become, for about the last three centuries, the main protagonists of modern history.

Africa and the Middle East have lived through the colonial period, and Italy, separated into small states, assumed for a long time, a marginal role in the political and commercial scene of these areas.

But new challenges have stimulated the intelligence, creating great works for the international connection, and new, imaginable, transportation corridors.

Among these:

The Suez Canal (1869) allowed the navigation from Europe to Asia, without the necessity of circumnavigating Africa on the route of the Cape of Good Hope (**Figure 2**).

The tunnels of the Alps, defined, a century ago, new scenarios, changing the dynamics of transportation, offering significant engineering challenges to the nations of the region, and redrawing the territorial relationships of Central Europe (**Figure 3**). The Italian tradition, in terms of ability in design and construction, and transforming missing transport links into fixed links, has played a key role.

EIRNS

The construction of the Messina Bridge connecting mainland Italy with Sicily, and the Tunisia-Italy tunnel (TUNeIT), will bring the many nations around the Mediterranean into economic, cultural, and political collaboration, said Prof. Enzo Siviero.

FIGURE 1
The Roman Mobility System around the Mare Nostrum

FIGURE 2
The Suez Canal

FIGURE 3
The Tunnels of the Alps

The Messina Bridge

But what should be the role of the Mediterranean as a system for the development of these areas?

The territorial continuity between the Italian Peninsula and Sicily offered by the Messina Bridge,[1] and the adjustment of the railway/road system interconnected to the system of the Adriatic, Ionian, and Tyrrhenian harbors, would give the South of Italy the role of the pulsating heart of the mobility corridor, from Maghreb to the Balkans and Black Sea, producing a desirable crossing of the freight flows from Suez to Central and Northern Europe (**Figure 4**).

FIGURE 4
The Mediterranean Intermodal Route from Asia to Europe

The Bridge connecting the two banks could assume an extraordinary symbolic and utilitarian value as an immediate synthesis and fusion of the cultures and the qualities of this area.

This could provide a decisive contribution to the creation of a new reality, no longer exclusively of the island [Sicily], but of a large, unique "Metropolitan City." Sicily would not only be an integral part of the

1. With its unique central span of 3,300 m, and its side spans of 183 m, it will be the longest suspension bridge in the world. The towers, located on the two coasts, will have a height of over 380 m. The suspension system will consist of two pairs of main cables, each with a diameter of 1.20 m. The bridge will be connected with the road and rail network with about 40 km of fittings. In parallel to the ongoing project of the bridge, following the philosophy of the living bridge, an hypothesis was also drawn up that involves the construction of two towers adjacent to the piles of the bridge, on the outside, covered with a transparent coating opened on the top part. Each tower can have a height of 380 m, excluding the upper crown, and it is divided into 80 floors, excluding basements. The towers can accommodate different functions (conference rooms, shopping malls, offices, homes, and hotels).

FIGURE 5
The Maghreb and the Balkans/Black Sea: Areas with Development Perspectives

FIGURE 6
Bridge over the Messina Strait (proposed)

peninsula, but also an important knot of connection with other developing countries around the Mediterranean, and with Europe.

In this way, the conditions for the realization of a virtuous process aimed at returning to the most ancient traditions of the past, would also be decisive for the reboot of the area's dynamics and development. This area deserves a new and more modern identity, from the economic, cultural, and scientific point of view. These are the fundamental added values, included in the extraordinary tradition that characterizes it. This area also can find in the concept of "union," its renewed reality.

The availability of the stable connection between the Italian Peninsula and Sicily could integrate a region with over 5 million inhabitants into the continental infrastructure network, from which it is physically separated by only 3 kilometers.

The elimination of this territorial *caesura* [interruption]—ed.] would give impetus to the development of this area, effectively reducing the operating costs of the rail ferry, reducing transportation costs for trade with Sicily, and also reducing the environmental impact of vehicles crossing Messina and Villa San Giovanni.

The inclusion of Reggio Calabria in the Metropolitan Cities can be also an opportunity to repeat, with greater enthusiasm, the idea of a Metropolitan Area in the Strait, which can be linked to an integrated system of governance able to give common solutions, not only to the problem of mobility, but also to economic development.

Also the doubling of the Suez Canal puts Italy at the forefront of the challenge to unlock, in the South, the infrastructure that is part of the North-South Corridor of the Eurasian Land-Bridge Development.

In general, Mediterranean Europe needs an intermodal mobility rotational system (which is based on spatial proximity of the South) that enhances, on the southern territory, the crossing of the main intermodal corridors of the Sea (**Figures 5-6**).

For this reason, the Network of Schools of Engineering in the Mediterranean RMEI (Réseau Méditerranéen des Ecoles des Ingenieurs)[2] has developed a research project called MedTracking. The aim of this project is to draw up future scenarios of a Intermodal Mobility system in the Mediterranean, suggesting the idea of the continuity of transport between Africa and Europe in its central axis, which sees in the Italian Peninsula, Sicily, and Cape Bon in Tunisia, the natu-

2. RMEI includes four colleges (Engineering, Management, Architecture and Agronomy), one student structure, more than 100 universities and colleges, and more than 100,000 students.

ral alignment of the Euro-African corridor.

TUNeIT

And here, the TUNeIT [Tunisia and Italy—ed.] project appears. It is an alternative to the solution proposed by ENEA [Italian National Agency for New Technologies, Energy and Sustainable Economic Development], that involves the construction of a rail tunnel linking the territory of Bon (Tunisia) and Pizzolato (Sicily) in the north of Mazzara del Vallo, for a total length of about 150 km (**Figures 7-9**).

TUNeIT supposes the repetition, multiple times, of the Messina Bridge project, to create a stable crossing of the Strait of Sicily, covering a total length of about 140 km.

Even in this case, as in the ENEA project, it is necessary to create artificial islands, constructed with the recovery of materials from the excavation. In these islands, all the services necessary for the operation of the infrastructure would be situated.

These islands divide the route into five parts, each of which is covered by a bridge with multiple spans of 3,000 m, for a total from 21 to 30 km.

The impact of these islands on the marine life will be minimized by a careful design of the environment. The islands can also be equipped with facilities for tourists.

In relation to the connection with traffic, the intermodality is relatively easy, and it can consider shuttle-cars for the carriage of vehicles, combined with hydroplane racing.

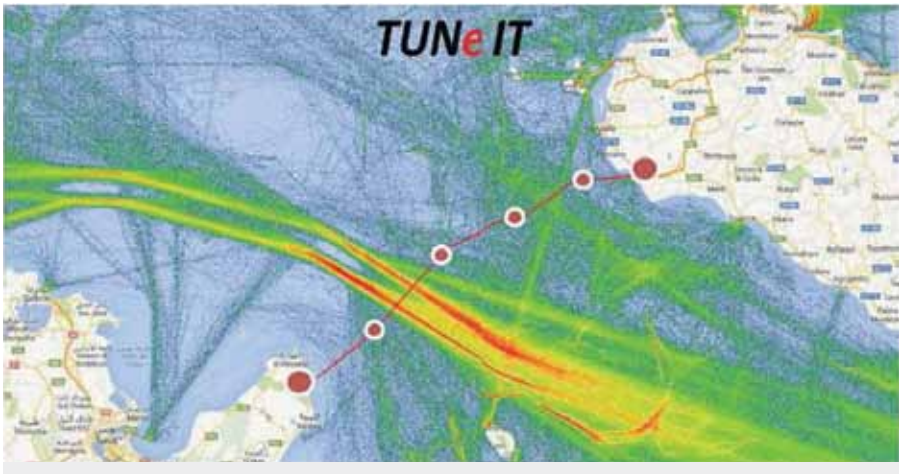
On these islands, there will be appropriate junctions for the connection with the existing mobility, in order to promote several access routes and different uses. Freight and passenger traffic would be handled with 3-4 railway lines, and by emergency and service lines; in the center, there would be freight and passenger trains in both directions, and outside of those, roads for vehicles, for a total width not exceeding 60 m.

The Tunisia-Sicily connection would not only be commercial and railway; it would allow the different worlds and cultures to come in contact.

The consequences of this project would be the creation of new scenarios of communication, and the rein-

FIGURE 7
TUNeIT (Tunisia & Italy), Stable Connection between Sicily and Tunisia

FIGURE 8



"The birth of a new connection between Europe and Africa across the Strait of Sicily, and the creation of new means of communication and relations among nations, will make possible new programs of development and collaboration." *—Galileo Magazine*

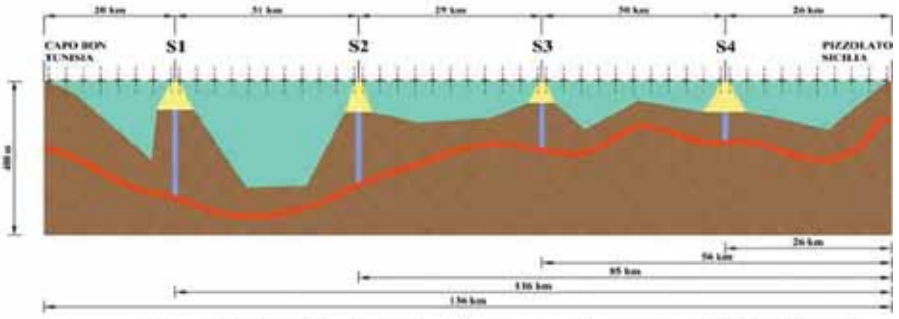
forcement of the relationships between the countries, new development and cooperation programs (especially economic and commercial) among the regions of Europe and Africa, the attraction of multiple foreign investors for new infrastructures, and/or other activities.

This is a work that, for its peculiarities, would be unique in the world!

TUNeIT would create a transcontinental territorial continuity between Europe and Africa, like other works able to connect Europe with Asia (tunnels and bridges on the Bosphorus), Asia and Africa (doubling the connection of the Suez Canal), as well as the stable connection between Europe and Africa across the Gibraltar Strait.

The main objective of this important work is the reduction of the time needed for exchanging goods, and easier communication between Northern Europe and North Africa (from 20 to 2 days). CNI [an Italian engineering company—ed],[3] RMEI, EAMC (Engineering Association of Mediterranean Countries),

FIGURE 9



To cover the entire length of crossing is necessary to create artificial islands, which divide the path into 4 parts; these islands will be the support for the suspended structure of the bridges dividing the path in segments of about 20-30 km each.

3. Italian National Council of Engineers.