

Transport Research Arena– Europe 2012

## Facing Up The Congestion And Environmental Challenges Of Europe

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### Abstract

In Europe transport is characterized by growing demand of freight services versus constrained infrastructures. Rail freight has difficulties in satisfying the customers' needs. The Ports of entry into the Union are strategic points. The container vessels of more than 12.000 TEUs, are totally deployed on the maritime lanes calling at a fewer number of ports where a higher number of movements are handled. The maritime traffic doubled from 2000 to 2007 while no changes have occurred on the overland infrastructure both road and rail. Congestion is a common feature in Europe. The citizens awareness on environmental issues is growing making the quality of life the focus for any future planning. A more sustainable mobility is necessary making modal shift from road to Rail a necessary step change. Major infrastructure expansion due to budget and construction timings cannot be an immediate solution generating the need of extracting maximum performance from the available resources. TIGER and MARATHON are European funded projects, implementing concepts based on port decongestion, dry ports and hinterland distribution by rail together with transport industrialization through faster, longer and heavier trains. Despite all efforts, Rail freight has not attracted new market share. A profound modernization of the rail economy based on lower costs and better services is necessary for responding to environmental changes. TIGER and MARATHON are addressing in an holistic way all these issues developing in practice the following dimensions:

- Longer, heavier, faster trains adoptions on existing lines.
- New technologies in equipment and management systems.
- Rail transport industrialization between ports/hubs reducing costs increasing the overland transport capacity to maritime traffic volumes.
- Cooperation between key actors in the Rail transport chain by sharing the benefits deriving from the increased rail competitive profile.
- Completion of rail bottlenecks elimination.

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Ports decongestion;transport industrialization;sustainable mobility;inland distribution;capacity generation;cooperative approach;

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## 1. INTRODUCTION

TIGER is the acronym of “Transit via Innovative Gateway concepts solving European - intermodal Rail needs”. TIGER DEMO is the continuation of TIGER up to full market uptake. MARATHON is the acronym of “MAke RAil The HOpe for protecting Nature. Substantial increase of freight mobility demand versus an insufficient or constrained infrastructure and particularly the rail one is creating a big cargo mobility problem in the EU. The Ports of entry into the Union, both North and South were congested before the recession due to difficulties of moving their traffic inland in an industrial way coherent with the economies of scale generated at Sea. The economic recovery will reproduce again the congestion unless corrective measures are adopted. The following figure (Figure 1) reproduces the trend of new World tonnage constructions up to 2013. The additional capacity is concentrated on giant container vessels.

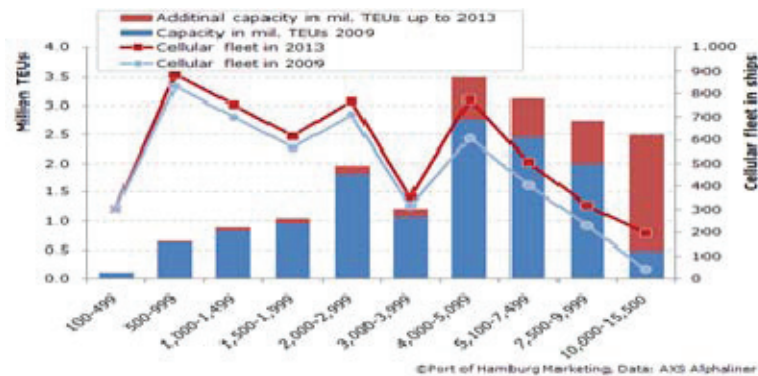


Fig. 1. Cellular vessels capacity increase evolution. Source **Alphaliner**

The environmental situation and climate changes are imposing transport solutions towards a more sustainable mobility. Modal shift is being encouraged. Costs and construction timings dictate that any infrastructure expansion on land will take at least a decade to produce its beneficial effects. It is therefore imperative that the best possible productivity is extracted from the available European infrastructures as from now.

## 2 THE TIGER, TIGER DEMO PROJECTS

TIGER, TIGER DEMO are European full operating projects. They implement in the market place concepts and discoveries focused respectively on port decongestion based on the dry ports concept, on containers inland distribution by Rail, and on transport industrialization. Both projects are not theoretical but have the objectives of bringing these innovations up to full market uptake through effective demonstrations. Leading shippers, manufacturing industries, logistics service providers, transport companies, Intermodal operators, integrators, distributors, shipping lines, Ports and also road operators, are demanding a new approach to the rail business different from the one we have come to know. Despite the recent economic recession which forced European industries to restructure themselves and the transport operators to re-focus on their core businesses, the most important trade pattern are not likely to change in the near future. The Picture 1 stands to confirm this situation. The traffic volumes which are generated by the Far East, China and South East Asia constitute the backbone of commercial interchanges with Europe. In addition the overland traffic to and from the East of Europe following the EU

Enlargement continues to grow. The giant container vessels already delivered having capacities in excess of 14.000 TEUs are totally deployed on the maritime trade lanes. These vessels call at a fewer number of ports where a higher number of CTS movements are handled. The shipping industry has placed already orders for a new generation of container vessels up to 18.000 TEUs which means that the race towards gaining a competitive advantage through ever bigger economies of scale is likely to continue. The citizens pressures towards the environmental issues such as traffic congestion, pollution, accidents and climate change are growing. The quality of life improvement is becoming a central issue in every decision-making both at European and local Government level. A more sustainable mobility is necessary. Modal shift from road to Rail is thought to be a necessary step towards achieving this objective. The TIGER and TIGER DEMO Projects are constituted by 4 Demonstrators: Genoa Fast Corridor, Mariplat, iPort & Hinterland operations, Intermodal Network 2015. These Demonstrators are highlighted in the following Fig.2.(a)(b); Fig.3(a)(b).

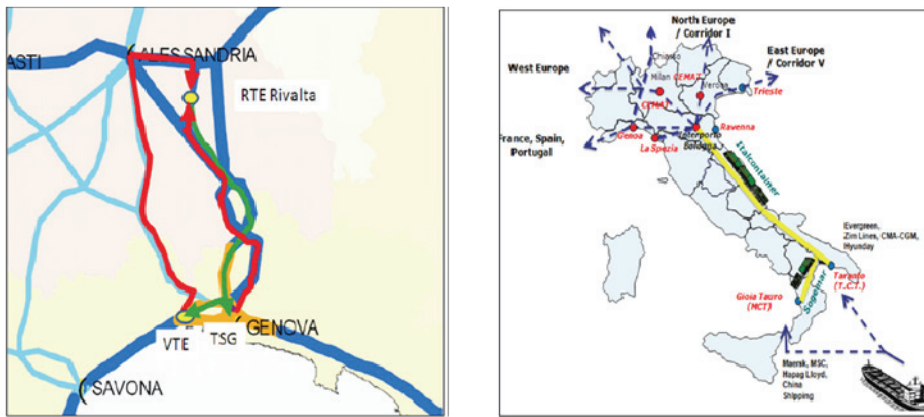


Fig. 2.(a) Genoa Fast Corridor (GFC) “LOOP” system; (b) MARIPLAT “Y” concept. Source Tiger

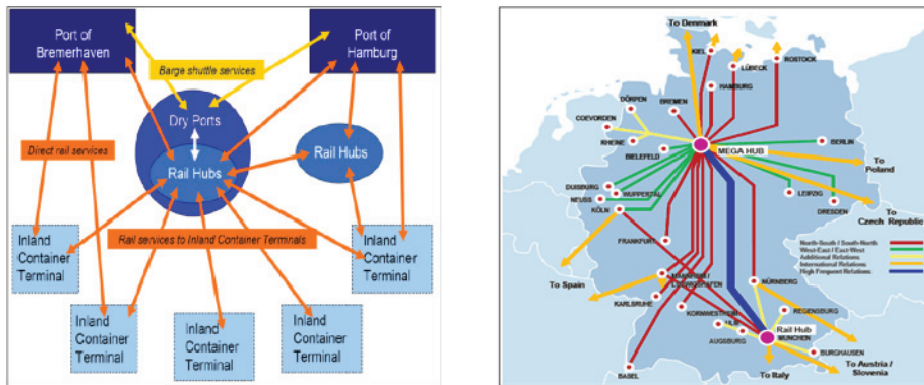


Fig.3.(a) Innovative Port & Inland operations “iPORT Web” concept. (b) Intermodal Network 2015 “Mega-Hub SPIDER” concept – Near and Distant approach. Source Tiger.

THE GFC “Loop” or Genoa Fast Corridor Fig. 2.(a) transfers the CTS arriving both at Genoa Voltri and Terminal San Giorgio to Rivalta Terminal Europa immediately behind the Apennines mountains. Shuttle trains will be operated joining together the Voltri and the San Giorgio traffic adopting random loading from ships to speed up operations in a total industrial way. The trains operations are designing a

“loop” formed by using a secondary up-hill Rail link and returning to the Genoa port via the main rail line.

THE Mariplat “Y” concept Fig. 2.(b) is based on the concentration of CTS traffic destined to inland Italian and European destinations originating both from Gioia Tauro and Taranto ports. The Gioia Tauro traffic is transferred to Bari by “Antenna trains” using the Ionian Rail line which is almost free from traffic. Likewise the traffic from Taranto is shunted by Rail to Bari using the available Rail link from there. The traffic is consolidated in one longer and heavier train operated between Bari and the Bologna Interporto freight village using the Adriatic Rail line avoiding the more congested Tyrrhenian line.

The iPort “Web” concept Fig. 3.(a) has the objective of optimizing the traffic transfer operations from the ports of Hamburg and Bremerhaven to Bremen Dry Port. From Bremen Dry Port which can be accessed by rail shuttle trains, by barge shuttle services and by road the German web network is available to all inland destinations. Massive expansion investments are being made in both the ports of Hamburg and Bremerhaven in order to secure their continuous development, having achieved above average expansion rates in the last few years. The iPORT “web” concept has been planned to avoid the bottlenecks between the two ports and the hinterland.

The Mega-Hub “Spider” concept Fig. 3(b) aims at making a further step change in the inland distribution by intermodal trains via the Kombiverkehr extensive shuttle service network. This step change is achieved through new investments in Mega Hub which are being executed in Lehrte near Hannover and Munich Riem. These investments are set to increase terminals productivity and efficiency both to and from the sea ports/inland waterway ports and the national/international inland destinations. New production concepts based on train to train transfer will be planned and implemented, together with the “near” and “distant” approach to/from the ports.

New technologies, innovative management systems, new production systems, track and trace, E/Customs as well as investments in dry ports, mega hubs, ports infrastructures, ports internal rail network, rolling stock, handling equipment are integral part of these four demonstrators. Rail freight however, despite a lot of efforts by European authorities, Governments and operators, has not been capable of attracting new market share. This is due to a number of factors amongst which the lack of competitiveness and inadequate service profile, are major contributors. A profound modernization of the rail economy based on lower costs and the restructuring of the service offerings are necessary. In order to achieve these two major objectives, the capacity generation obtained either by increased productivity or by new investments in infrastructures, becomes paramount. These tasks are possible by acting on five complementary dimensions described in the following paragraphs.

### *2.1 Infrastructure investments to reduce bottlenecks in execution.*

The Rail system itself through a UIC financed project called DIOMIS has identified a number of bottlenecks on the European rail network to be removed. One has to understand that a “European Corridor” is as strong as its weakest point which is limiting the entire “corridor” performance. These points have been largely identified and corrective actions are in progress. However delays and Budget constraints of the Governments involved are postponing the effective solutions of the bottlenecks.

### *2.2 Operating longer heavier & faster trains on existing lines. The MARATHON project.*

The answer to resolving the paradigm of increasing the rail capacity at lower costs is provided by operating longer, commercially faster and heavier trains. This approach can be synthesized by a declaration of a Top Rail Official when he sentenced that “we have to transport much more cargo with the available resources” Road transport is limited by the truck dimensions and any efforts to change the existing rules in the general public environment awareness seems to go against history. Rail freight, on

the contrary, has the ability to fulfill in practice the basic criteria of transporting more cargo at substantially reduced costs by managing longer, commercially faster and heavier trains on the existing infrastructures. Longer faster and heavier trains are deployed in many areas of the world and also in Europe, particularly in Russia. The reasons why these trains have not been developed in Central Europe which is the busiest area of commercial interchanges, is due to a number of reasons. One can indicate only few as examples: lack of technology, old rolling stock, braking and signaling to be upgraded, infrastructures to be upgraded, axle load limited to 22.5 Tons, psychological barriers and, last but not least, the lack of a clear policy in order to operate these trains on the existing lines. The MARATHON project which is co-financed by the European Commission is dealing with this dimension and is currently in execution. Through the adoption of double traction with the second loco in the middle of the convoy, new radio communication technologies, adequate signaling systems, new rolling stock, and innovative ways of managing the rail infrastructure, MARATHON is set to demonstrate the actual feasibility of managing a train of 1500m on a section of the European Rail Network in France between Lyon and Miramas (near Marseille). The final MARATHON project output will be a TEC REC and a HANDBOOK containing the recommendations for operating these trains on the European network. Some infrastructure upgrading are necessary for overtaking rail sidings on the main lines, as well as in the hubs and terminals.

### *2.3 Adoption of new technologies both in equipment and management systems.*

The Rail Freight has been rather refractory to technological system innovations and to ICT technologies. A huge effort has to be undertaken for modernizing every segment of the rail freight and Intermodal transport chain. The European Commission is also dealing with these dimensions through E/Service and E/Freight innovations. TIGER, TIGER DEMO and MARATHON are projects where new systems and technologies are tested and introduced.

### *2.4 Transport Industrialization*

Industrialization of Rail transport between ports, hubs, dry ports and freight villages, in order to reduce costs and to adapt the overland handling capacity to the traffic volumes generated by the maritime industry is one of the TIGER, TIGER DEMO key objectives. In particular longer commercially faster and heavier trains are to be deployed between Ports, Dry Ports and Mega hubs and between Terminals/Freight Villages once the full MARATHON implementation is achieved.

### *2.5 Cooperation between Key Actors of the Rail Transport Chain*

The selling of transport capacity is the generator of the economy of scale driving itself the transport industrialization and hence force giving significance to the “asset based business model”. The asset based business model is the opposite of the traditional Rail Freight business approach adopted by the incumbents based on service costs on top of which an element of profit was calculated for reaching the selling price. This philosophy supported by the monopolistic situation never took into consideration the competitive market forces. Gradually but surely the customers abandoned Rail for more competitive modes of transportation. The selling of transport capacity equates to a revolution for Rail Freight. The reversing of decades of wrong practices is achievable through the adoption of a business model where services are “products”. Service products must be available for the market to access them immediately according to customers’ needs. The prices must be competitive when compared to other transport modes. The advertised service products must have the characteristics of regularity and punctuality. The transit time on the declared journey must be guaranteed. The transport capacity must be available for the market



and is adequate for the traffic basins serviced by the transport links. The service products distribution is multi-channel using both direct, indirect and E-freight tools. These channels are capable of generating the required traffic volumes adequate for filling up the operating trains. The marketing techniques are adopted as a supporting tools for the selling of the service products. The approach of selling the service products through the multi-channel distribution network is pro-active and not re-active. The multi-channel distribution approach is achieved through a cooperation with all the key actors in the Rail transport chain such as forwarding agents, MTOs, logistics operators, integrators, consolidators, etc. Such cooperation is based on economic interests through the sharing of the benefits deriving from economy of scale generation and the traffic industrialization. The selling and the filling up of the trains capacity is a driving force of this industrialized business model. The filling up of the capacity is generating the lowest operating costs which is the fundamental pillar of service competitiveness. The standardized efficiency through the best rotation of assets secures the return of the capital employed. The selling of capacity business model is adopted by maritime, airlines and integrators industry as well as in the Rail field itself by the High Speed services where standardization and services industrialization has been in execution for some time (Thalis, Frecciarossa, etc.).

### 3 THE CONCLUSIONS

Many operators have used the recent economic recession for optimizing the freight system productivity by extracting from each available transport mode its overall best performance. Mega hubs and freight villages are being built in strategic nodal points of Europe where integration of maritime, overland, transport and logistics activities are concentrated. Rail traffic industrialization between these Mega hubs is achieved using longer heavier and faster trains, generating the conditions for reducing Rail operating costs and improving the service performance. Urban hubs built in the vicinity of densely populated areas provide the platform for last mile distribution of consumers products. After the Tiger Project start-up phase, the European and Global economy started to grow again demonstrating the validity of the Tiger Project concepts. In fact the Tiger Ports traffic volumes projections obtained by combining separate researches which adopted both market and commercial tools as well as mathematical modeling, showed a new steady season of continuous growth. These projected volumes targeted at 2020 would imply the full technical capacity saturation of the ports involved failing corrective measures. Only by applying the Tiger concepts of routing the traffic to/from the Sea Ports to the hinterland dry ports by rail in an industrial way, the container traffic will keep moving avoiding congestion problems. By so doing the Sea Ports will regain their original mission of being the link between ship to shore achieving maximum productivity of the deployed resources and at the same time valuing the rail intermodal services for what they are most capable of producing. The Co-modal approach is used at its best with Road services performing the last mile connections between the dry ports and the customers, or other short hauls. The inland waterways are also integral part of this European network. The emerging result is delivering the desired benefits of costs competitiveness combined with sustainable development, better services and environmental protection. The visual impression is provided by the following Fig. 4;5;6.

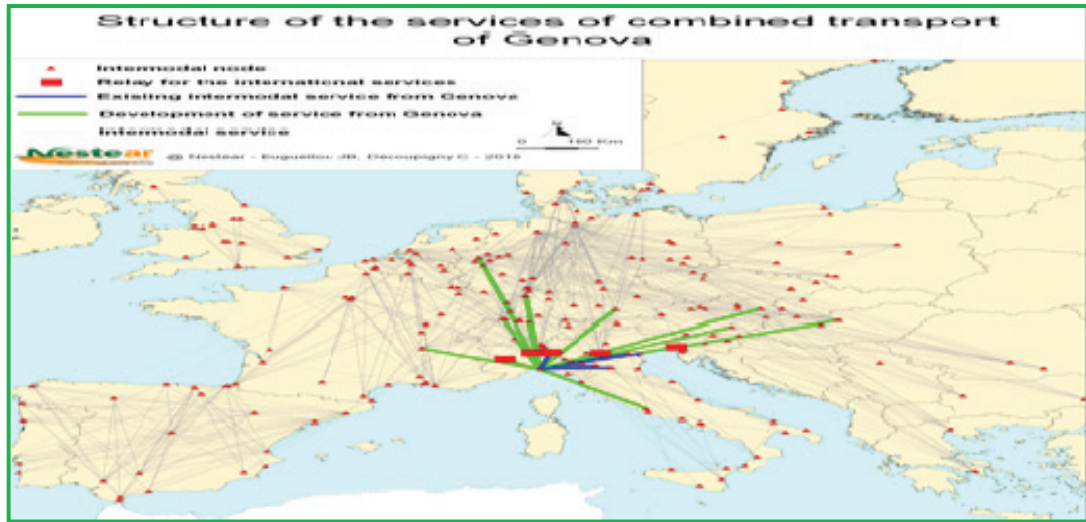


Fig. 4. Additional intermodal services from Dry Port Rivalta with TIGER. Source Nestear for Tiger

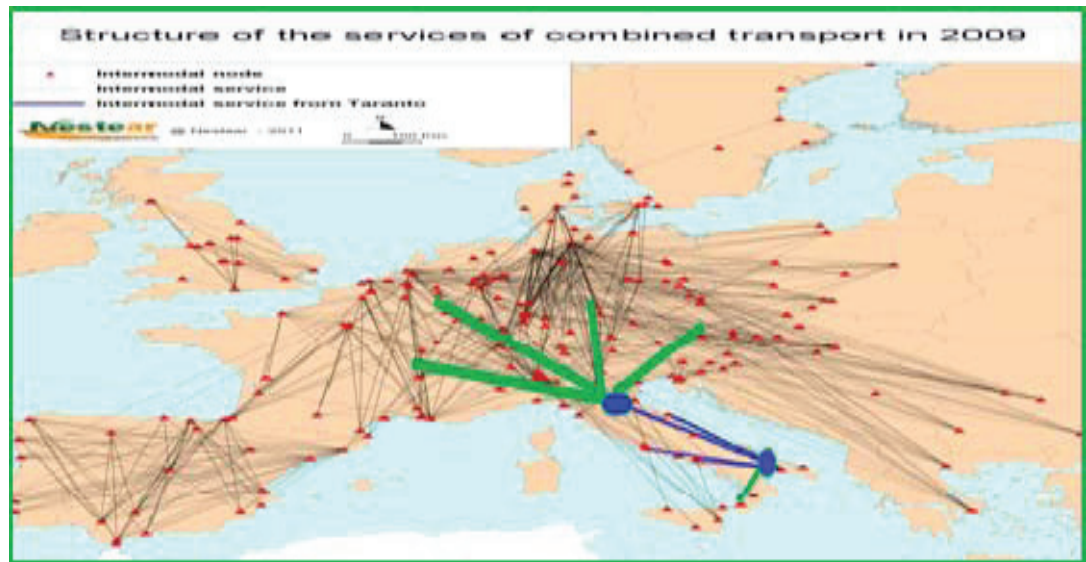


Fig.5. Additional intermodal services from Dry Port Bologna with TIGER. Source Nestear for Tiger.

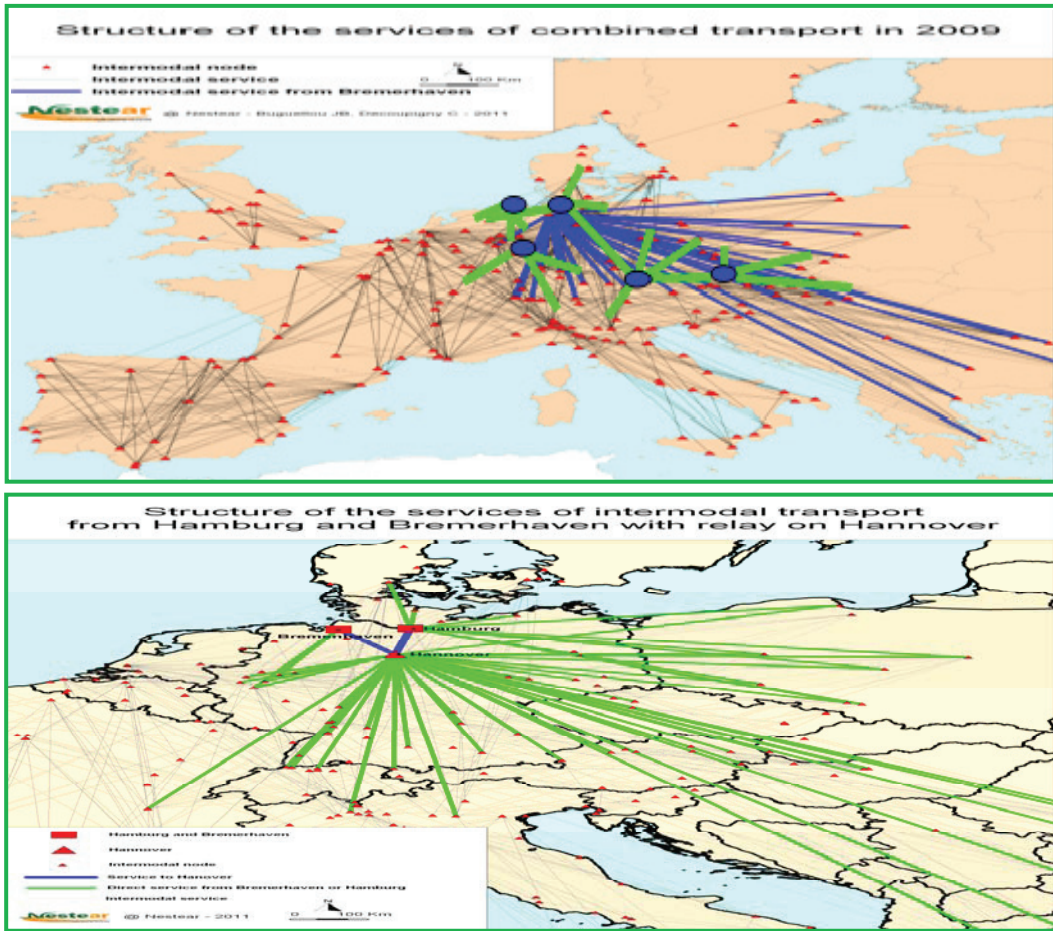


Fig.6A & B. Additional Intermodal Services from Dry Ports in Germany with TIGER Project. Near and Distant approach to end market. Source Nestear for Tiger Project.

TIGER, TIGER DEMO, MARATHON are EU funded projects addressing and resolving in a practical holistic way all these issues.



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- Research Platforms as below:
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