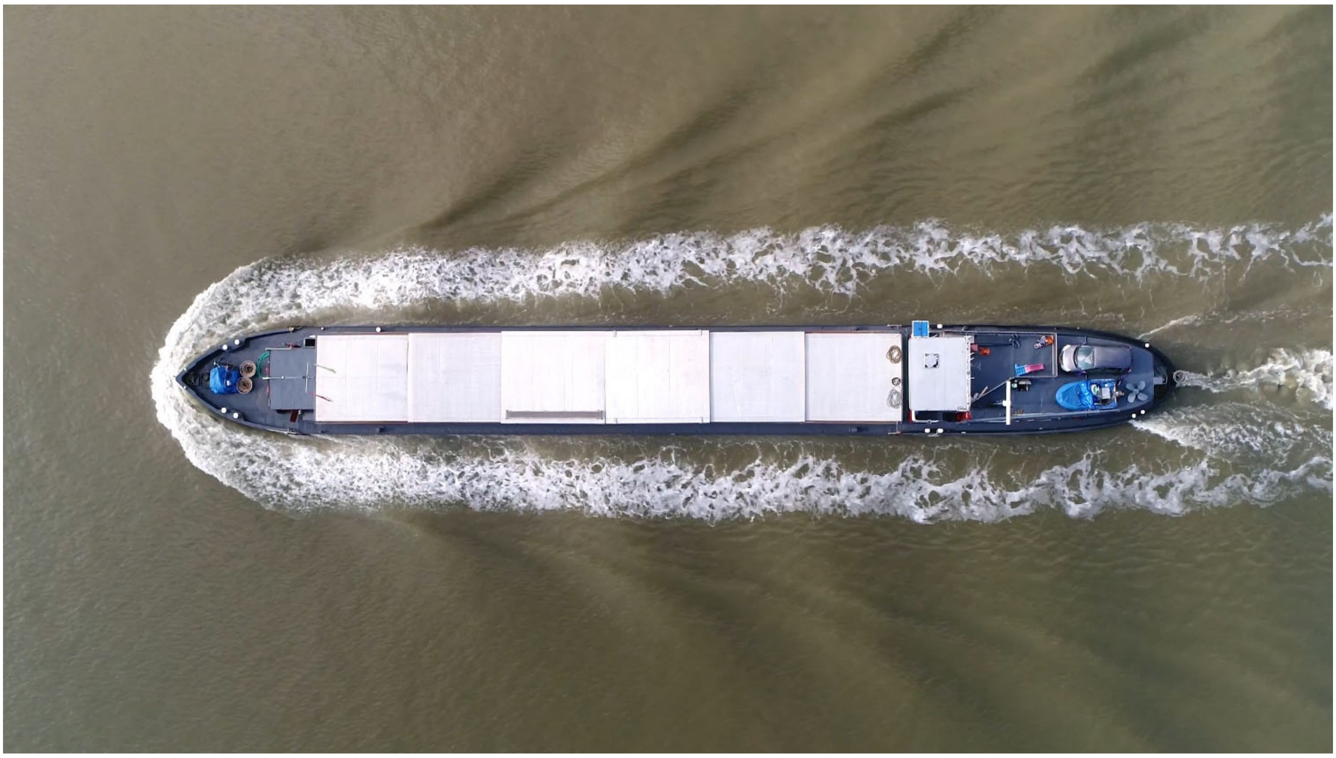

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Living Lab 4: North Germany Hinterland Hub based Synchronous Logistics

1 Background and introduction

1.1 Background

Europe is considered as one of the global leaders in the logistics sector. Eight EU Member States are ranked among the top 10 countries in terms of logistics performance for the year 2018[i], while the market size of the logistics sector in Europe was estimated as being equal to €878bn in 2012[ii].

However, in various sectors, logistics costs remain a significant part of total supply chain costs. These logistics costs represent 12% of total cost in the manufacturing sector and more than 20% in the retail sector[iii]. Moreover, logistics efficiency could be improved. Statistics have shown that 24% of all vehicle movements per kilometre in the EU are not carrying goods, while the average load factor for vehicles is estimated as being 57%[iv].

To enhance efficiency in the EU logistics sector, increased collaboration could improve the current situation. More efficient synchronized networks and a decrease in operational costs are the main

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benefits for the companies involved in cooperation schemes[v], as it has been estimated that cost savings and efficiency gains of 6-10%, according to Transport Intelligence[vi], or a reduction of 9-30% in distribution costs, could be expected[vii].

1.2 SELIS

However, a key barrier to collaboration is doubts around secure data exchange, and this is the barrier that SELIS aims to remove. The Shared European Logistics Intelligent Information Space (SELIS) project is a €17 million European Union Horizon 2020 Research and Innovation Programme, running from September 2016 to August 2019. The project has built a scalable and replicable platform for pan-European logistics applications, at every level allowing a standardized exchange of core data between any number of registered users.

The SELIS project combined strategies for innovative, efficient and green logistics with leading edge open source information technology techniques that support collaborative logistics, through building applications and testing them in real world use cases.

1.3 Living labs

Living Labs have been used by SELIS as the testing and proving environment by using current commercial and operational scenarios to test and refine the SELIS developed technical solutions. Some solutions incorporated opensource systems integrated into the overall platform.

The SELIS Living Lab activities have included the stress-testing of the solutions developed for building the basis for a safe, secure, reliable and robust data-sharing platform.

- Each living lab involved business partners willing to support the development and piloting of these applications.
- Each of these living labs tested one or more applications, with each pilot containing one or more trials, or use cases, which allowed the testing of developed solutions in a number of different scenarios, with different groups of collaboration partners, each effectively conducting a stand-alone experiment which generated a set of real-world results which can then be compared with the expected and anticipated benefits.
- Each real-world pilot and use case trial created insight on implementation, and the enablers and barriers to success.

1.4 The Concept of SELIS Community Nodes

SELIS has developed the concept of a network of logistic communities, each created as localized shared intelligent logistics information spaces, each adaptive, configurable and providing the privacy that collaboration requires. These communities are termed as SELIS Community Nodes (SCNs). The aim is to stimulate the growth of a network of these SCN, that will create a distributed common communication and navigation platform for transport and logistics, a platform that through multiplication can be extended and expanded to support Pan-European logistics applications, adaption and collaboration.

Each SCN is a secure domain where supply chain partners share data (e.g. raw data, analytics predictions, inventory, routing decisions etc.) in a secure and governed manner that, in turn, enables the implementation of a specific collaborative logistics model.

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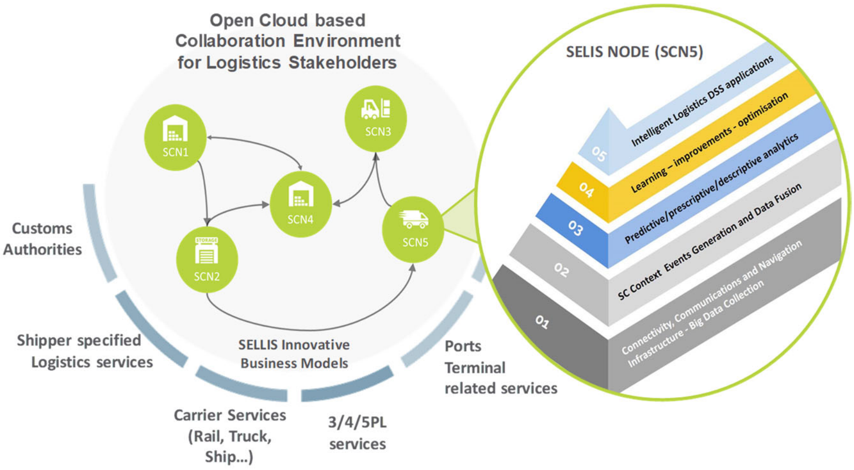

Figure 1: SELIS SCN concept

An SCN includes the necessary architecture to allows users (data publishers and/or subscribers) to:

1 - connect to multiple data sources;
2 - transform, reformat and normalize data;
3 - share data securely by means of user-defined access rights, thereby enabling collaboration;
4 - make use of machine learning that allows for self-learning and improving capabilities, such as continuous improvement in forecasting based on the ongoing and real-time use of accumulated data.
5 - adapt and deliver the capability as required by a specific industry or sector.

If appropriate, an SCN could communicate with other SCNs through an open and cloud-based architecture to create a network of SCNs; this would allow any operator to connect with another, such as a single port SCN, which could share appropriate data with an inland 3PL (Third party Logistics provider) or rail SCN.

2 Living lab 4 - North Germany Hinterland Hub based Synchronous Logistics

2.1 The problem - inland waterways have an image problem

Compared with road transport, inland water transport has a reputation for lower reliability, a higher complexity of planning and a lack of monitoring or visibility. Whether these traits are real or perceived, the perception sometimes dissuades shippers and LSP from making use of inland water transport. As a result, road transport is often preferred over inland waterway transport, although the cost and environmental benefits of inland waterway transport are well known.

Particularly, many inland waterway transport providers are not well and not extensively integrated with other logistics information systems. The lack of supply chain visibility is making them notorious black holes in end-to-end supply chains. Inland waterway barges are also characterized by volatile capacity utilization and manual, labour-intensive planning, in part a consequence of difficult access to planning data and constraints. Nevertheless, the inland waterway barge is a very reliable means of transport, which is also not affected by traffic jams.

Living Lab 4 was built around container hinterland transport that utilises the inland waterway system in the North-West of Germany, the Netherlands and Belgium. LL4 addressed the business

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requirements of inland waterway transport (IWT) service providers that connect major seaports in this region with inland terminals at hinterland hubs.

2.2 SELIS solution to improve integration of inland waterway transport

Living Lab 4 addressed these problems encountered by inland waterway transport providers in interrelated trials, each representing a specific user perspective and different technical challenges. The aim of the Living Lab was to produce two analyses of the logistics data

- A Supply chain visibility service platform
- A dashboard providing real-time KPIs (Key Performance Indicators) and operational status tracking, summarizing the status data fed by external information sources. This dashboard is generated through the handling of real time data on the status of container bookings, supported by deep-sea planning and tracking data, vessel schedules, container availability, and handling status
- The provision of a CAPA (capacity and preventative action) dashboard, which required use of an Advanced Capacity Planning tool providing feasible alternative configurations and utilisations of services based on lead-time, process and capacity constraints

The Living Lab directly involved two operating companies TRIMODAL and NWL[viii], who together operate a fleet of twelve barges that offer regular, shared transport, and bespoke, dedicated container shuttle services along the Weser, Mittelland Canal, Rhine corridor and ARA (Amsterdam-Rotterdam-Antwerp) ports. The SELIS solutions that have been designed and implemented with the assistance of ISL[ix] were aimed to facilitate the cooperation between TRIMODAL or NWL, seaport terminals and inland hubs, through improvements in the information exchange required for successful planning and smooth execution of inland waterway transportation services.

The conceptual technical architecture deployed by SELIS SCN that allows this to happen is shown in Figure 2.

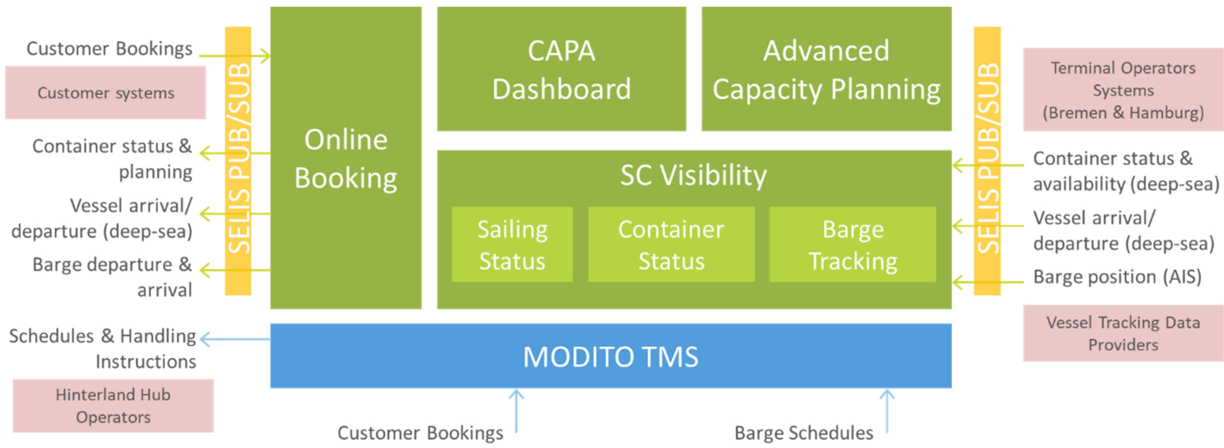

Figure 2: Conceptual technical architecture and information exchanges

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2.3 Results of the Living Lab

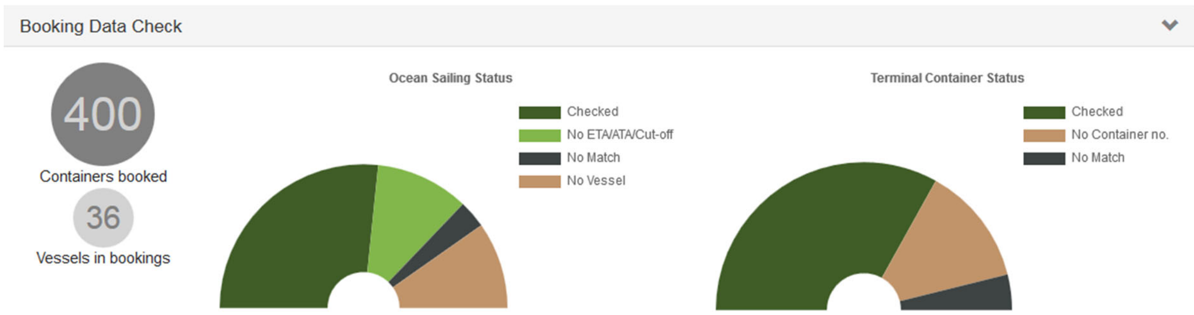
2.3.1 Major Achievements

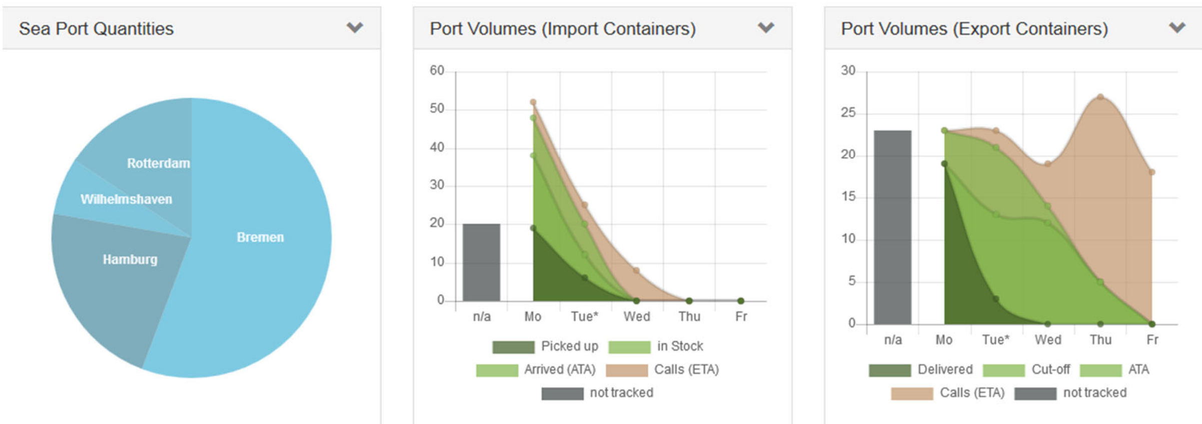
Living lab 4 delivered three specific SELIS data services linked to existing transport management systems, to share data on barge position, vessel sailing status and individual container status. The SELIS data services were designed to deliver these data services with the Living Lab applications.

- Integration of data services with Living Lab applications
- Implementation of adapters to legacy systems to allow centralised access to transport order data and planning data
- Dashboard to monitor data quality, coverage and forecast or transport volumes. Screengrabs of the dashboard are shown below.

The additional functionality required included:

- Visibility functions and APIs (Application Programming Interface) for customers and terminal operators
- Applied Connectivity Infrastructure
- Capacity Planning and Forecasting of transport volumes
- Real CO_2 emissions calculation





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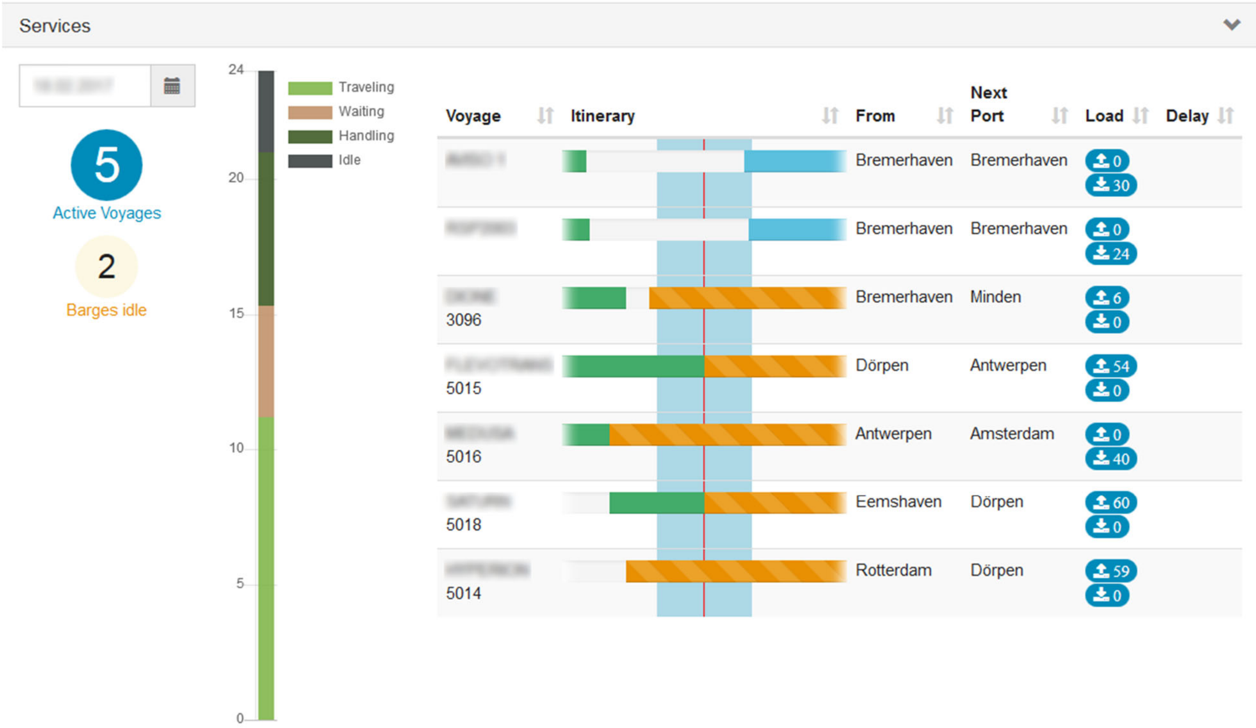

Figure 3: dashboard view of the platform implemented with participants

Figure 3 above highlights functionality within the dashboard, allowing:

- Current status of the updated ETA (Estimated Time of Arrival) information.
- Share of port volumes and status of import and export containers.
- Operational status by origin and destination.

2.3.2 Business Impact

The SELIS solutions delivered optimisation of planning and operational processes, and increased use of existing capacity through better planning. The dashboard provided a user-friendly interface for shipping dispatchers and transport operations managers. A control map (Figure 4) displays geo-referenced status information, such as the position of barges, transport order volumes in ports and hinterland terminals, and deep-sea vessel arrivals and departures are shown for all port calls within scope. The map combines a snapshot of the current operational situation with an intuitive display of the most relevant information.

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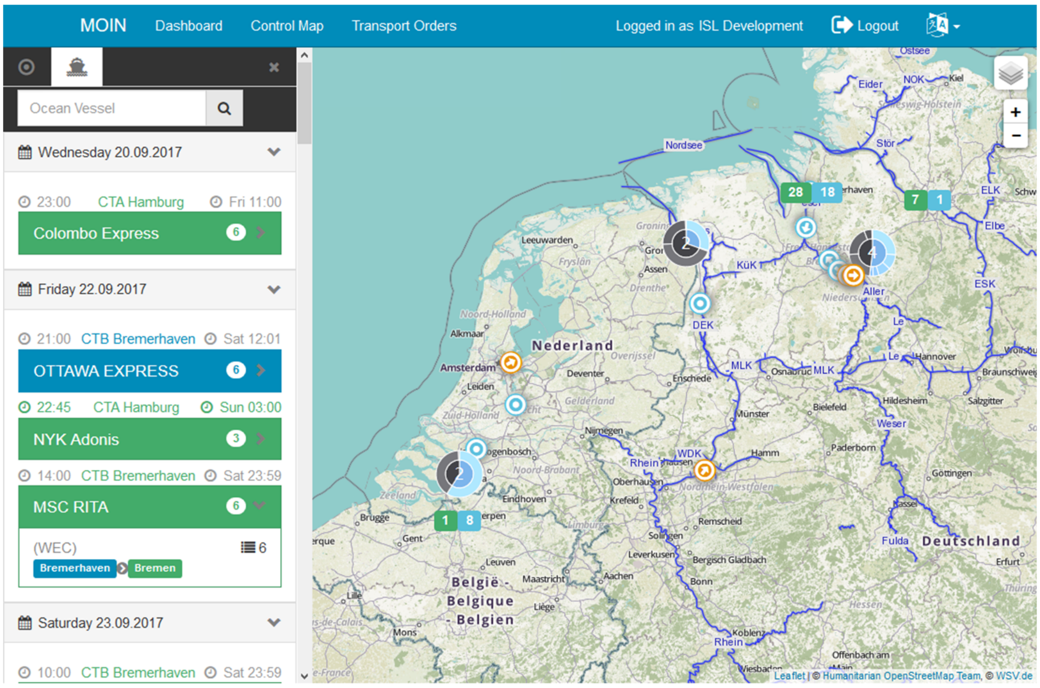

Figure 4: control map visualising geo-fenced information

The successful implementation of the tools has allowed for more effective and efficient monitoring, automated and rapid calculation of different barge traffic optimisation solutions, delivering better capacity management and utilisation of inland water transport services. In doing so, the case study is expected to deliver increased competitiveness for participating logistics providers, plus reduced CO_2 emissions through better asset utilisation and promotion of modal shift from road to barge.

3 Conclusions

3.1 Lessons learnt for future development and implementation

During collection of existing planning data used by inland waterway transport providers, the quality of data, especially the estimated time of arrival data, presented challenges for comparable evaluation of schedule adherence accuracy. The estimated time of arrival data was typically updated occasionally, when deemed necessary, and was collected manually so that changes and their consequences were only fully understood and managed by the planners from the inland water transport providers. As a result, in order to generate reliable on-time schedule adherence calculations, improvement in the quality and flow of raw data was a key focus for enhancement.

Extending the utility of the solutions deployed would mean extending and improving the data received in inbound flows from shippers and deep-sea terminals and expanding the scope to include other deep-sea ports such as Bremerhaven, Hamburg as well as the ARA ports, creating a network of hinterland hubs and deep-sea port terminals. The stakeholders of this living lab hope and anticipate that take up and roll out of these solutions will accelerate as the benefits and effectiveness of the deployed solutions become apparent.

3.2 Further next steps and recommendations

The participating providers TRIMODAL and NWL intend to integrate the SELIS solutions as a standard part of their transport management systems. This will require a step by step integration to avoid interruption of daily operations, and a test and scale approach means that key customers

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and accounts will be migrated one at a time, and an early adopter group will trial the new approach for a minimum of six months before the new integrated digital services are offered to other customers.

4 Further questions

If you wish to ask further questions of the teams involved in this project, please contact Stephen Rinsler (steverinsler@elupeg.com), or Beatriz Royo (broyo@zlc.edu.es).

The SELIS website is https://www.selisproject.eu/

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