

A Door-to-Door Combined Transport Planner

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ABSTRACT

Establishing a web-based portal functioning as a one-stop-shop for transport buyers is a radical idea of a consumer oriented intermodal freight system. This utopian vision will be materialized in a system description and a prototype of a Door-to-Door Combined Transport Planner (COTRAP), developed to fulfill the requirements of potential customers and in interaction with customers, shippers, rail and road freight operators, rail infrastructure owners and other actors in the intermodal freight system.

Conversely, successive versions of the COTRAP will be used as an instrument to identify intra- and inter-organizational barriers to the establishment of a competitive and effective combined transport system with rail freight operators as the intermodal integrator.

In this paper we describes the ideas and methodology behind the project, as well as some preliminary results.

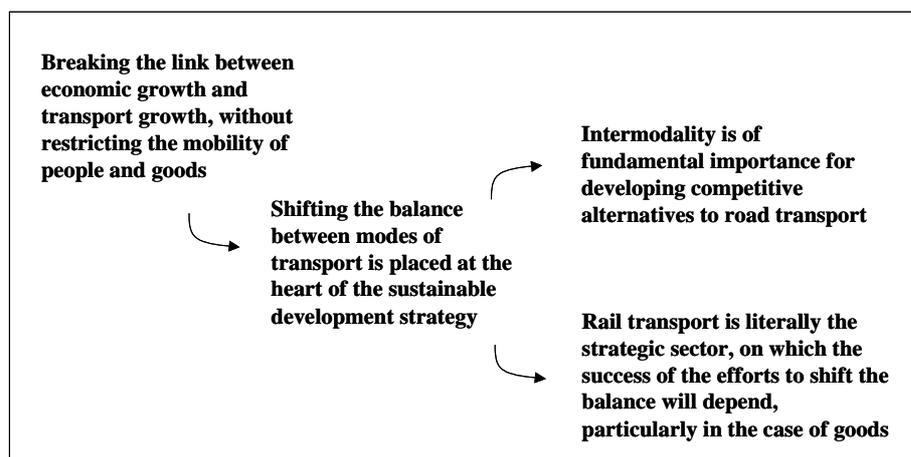
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1. Introduction

This paper presents basic ideas and some preliminary results from a project dealing with a door-to-door combined transport-planning system (COTRAP) ultimately aiming for an easier access for transport buyers and transport firms to take up the role as ‘freight integrator’ (COM, 2001). The project contains two interrelated parts – the system description and development of a prototype of transport planner as well as the analysis and identification of intra- and interorganisational barriers for using and applying such a system. This paper presents the project’s state of art on both parts.

1.1. European transport policy and the COTRAP approach

In the European transport political context intermodal (sea and/or rail based) transport is highly prioritised as a partial solution to problems or ‘commission headaches’ such as road congestion, harmful effects of environmental emissions, accidents etc (European Commission 2001). The overall rationale in the commission white paper for linking intermodal rail based transport and sustainable development is visualised below.



Thus, a more effective and competitive European intermodal rail based transport system is highly prioritised on the transport political agenda, as these types of transport hold a potential for (partially) solving some of the congestion and emission problems related to road transport. Several elements are involved in a diagnosis of the lack of competitiveness of the intermodal rail based transport system. Infrastructure problems and bottlenecks, efficiency of networks and transfer points, interoperability, technical barriers, a price structure that does not reflect all social costs, a lack of competition in the railway sectors, use of information technologies and a lack of freight integrators etc are all issues addressed when discussing the competitiveness between road and rail based systems.

Emphasis in this project is the use of information technology and the role of freight integrators. Basis for both these elements can be found in a communication from the Commission to the European Parliament (European Commission 1997). This addresses the challenge of achieving socio-economic and environmental sustainable development via the efficient and balanced use of transport modes throughout one integrated European transport system – heavily emphasised is the importance of a systems approach. On the potential of the implementation of the information society it is stated: “*The use of telematics,*

combining informatics and telecommunications, will increase the importance of customer oriented transport services which provide automated interfaces between the order of goods, transport management, invoicing and payments. Open and easy-to-use information systems will enhance the widespread use of advanced electronic services....In order to facilitate the management and control of the transport chain from door to door, the information and management systems will cover several modes and will be open to any interested service provider through an open systems architecture. The systems will provide the end-user with real time information on possibilities for intermodal transport as well as the status of their consignments. At the same time, they will enable an optimal co-ordination between operators in the same transport chain. The systems will allow a high degree of forward planning and offer further opportunities for integrating transport to the management of the full supply chain” (European Commission 1997, §§ 71-72).

Similarly, on a new generation of freight organisers (later appearing in ‘Time to Decide’ (COM, 2001) as freight integrators) it is stated: *“Europe’s transport market will see intermodal operators compete with each other across mode and increase their market-share. In addition to operators specialised in carrying goods on certain modes of transport, a new generation of integrated operators will provide transport services on door-to-door basis. These operators will have a neutral view of the different modes. They will try to find the most cost-effective combination of modes and services, in such a way that it adds the most value to the entire supply chain. Their services will be tailored to the needs of the end-user and will include a full control of the operations and management of the information on the goods transported from door-to-door....Management and control of the complete door-to-door chain will be essential. In order to achieve this control, the integrated operator will either have to operate the vehicles in which the goods are carried (carrier-type) or ensure the control through the effective organisation of the chain and management of the relevant information (freight forwarder-type)” (European Commission 1997, §§ 56-57).*

Hence, these are the larger ‘ideas’, ‘visions’ or ‘ambitions’ that working with a combined transport planning system is based upon.

1.2. Information, freight integrators and organizational contexts

In the systems approach outlined above fair prices, the elimination of bottlenecks, the creation of technical interoperability, well-functioning and open information systems and mode-independent integrators ensures the overall efficiency of the European transport system. In that sense in the optimal situation the actors’ and operators’ motives and incentives is in perfect alignment with the objectives of the ‘total system’. However, we want to explore the potential organisational barriers in relation to what is technically feasible and what is expedient (from the overall systems viewpoint). What are for instance the interests of actors (integrators as well as other important roles) in open information systems? Does it affect their autonomy in operating practices? Do these information systems have important effects on competitive positions? How do the relationships between different roles and firms affect the interest in applying such systems? Such questions indicate that there might be an idea in considering also dilemmas, differences and balances between the technical feasible/optimal solutions and what is ‘organisationally’ allowable or possible to implement.

This project deals with both the issues of technical feasibility in system description and prototype development of COTRAP, as well as the exploration of intra- and interorganisational barriers to putting such a system into use. Ultimately the project will point to practi-

cal measures to be taken in order preferably to overcome these organisational barriers, or less preferably to alter system design towards more organisationally allowable features.

This paper presents results from initial work with the first prototype, as well as a first series of qualitative interviews with potential Danish problem owners.

2. Towards COTRAP

The idea of a freight travel planner originated in a future workshop arranged by *Roskilde University* in collaboration with *Railion Denmark* and the *Danish Technological Institute* in January 2003.

The theme of the future workshop was *Rail Freight Transport in 2008 – Development of Concepts* and aimed at developing and discussing business strategies that could promote the use of rail freight transport. The focus was Railion Denmark, the privatised (*DB Cargo*-owned) successor of the state owned *DSB Gods*, and the main freight operator on Danish rail. Even though Railion Denmark had had some substantial successes in developing new combined transport products (shuttle trains from the Oeresund region – Høje Taastrup and Helsingborg – to a number of destinations in Jutland) and attracting new customers (e.g. *Carlsberg*), the representatives from the company felt that they had to fight a lot of mental barriers in order to be regarded as a serious and competitive player on the Danish transport market.

The 20 participants in the future workshop were current and potential customers of Railion Denmark's combined transport products, employees from different levels in Railion Denmark, public authorities as well as researchers within transport and logistics.

The future workshop goes through three phases – a phase of critique, a phase of utopian vision and a phase of reality (Drewes Nielsen et al. 2004). The general outcome of the workshop is described in (Jespersen et al. 2003), but focused on the lack of customer orientation, the distorted economical incentive structure as well as the lack of technical, economical and regulation standards – both across national borders and across different transport modes.

As a remedy to cope with some of these problems, the idea of an IT-based European Transport Exchange came up in the reality phase of the future workshop – a web-based system where all transport buyers would meet all the transport suppliers in an open bid. This idea eventually was combined with ideas from the well-known and widespread personal travel planners (in Denmark www.rejseplanen.dk) and led to the conceptualisation of COTRAP – a one-stop-shop for transport buyers with the following characteristics

- transport from door to door of containers, swap-bodies etc.
- the European rail freight system being the backbone of the transport system
- full information about alternative transport routes with associated
 - departure times
 - delivery times
 - costs
 - data on transport quality
 - environmental performance
- immediate booking should be possible

The easier access to combined transport provided by COTRAP combined with the possibilities of consolidating larger amounts of freight on rail would strongly support the goals of the EU policy documents.

COTRAP can be seen as a radical idea of a consumer oriented intermodal freight system – transport as a result of just a few clicks on the keyboard. As a utopian vision this has formed the present research project in two ways

The constructive approach – how would a system fulfilling these criteria look, what would be the data need, how could it be presented to the end users, which alternatives should be presented, what would be the algorithms to calculate e.g. least cost, minimum time, delivery time security and minimal environmental load alternatives

The analytical approach – the utopian vision of COTRAP can be used as tool to identify barriers in the combined transport system towards market and consumer orientation by confronting actors with the principles and let them depict the obstacles in the transport companies, in the interaction between transport companies, in the national regulatory systems, in the international cooperation or elsewhere.

Methodologically, these two approaches go hand in hand. Through a series of interviews with actors in the combined transport system, the analytical understanding gets deeper and the system description gets more detailed. Conversely, through a more detailed system description, more advanced *prototypes* of COTRAP can be produced and used as a tool in the interviews.

At present, only two in depth interviews have been conducted with prominent actors in the Danish combined transport system, one representative of the main rail freight operator and one representing a combined transport company. Subsequent interviews are planned mainly in the Scandinavian context.

In the following we will present some of the preliminary results and ideas.

3. COTRAP in context

The actors in the two ends of the combined transport chain are the *transport buyers* and the *operators* carrying out the actual transport, be it on wheels, on rail, on the sea or in the air. In between these are different types of *coordinators*, making actual arrangements, coordinating transports, consolidating freight, taking responsibility etc.

COTRAP potentially takes over a part of the coordination by collecting and centralizing information and making it publicly and easily available. Thus, it can be a sensible issue for coordinators to go into a concept such as COTRAP, and a very central issue is thus the different actors willingness to share information.

3.1. Information, basic functionality, market potentials and information sharing ‘willingness’

One of the major potentials seen is an ‘informative planning tool’. According to interviewees significant barriers for going intermodal lies in the insight in the intermodal system and attitudes towards this. Easy accessible information on possible door-to-door transport chains between areas (also transport chains including several operators’ links) as well as the consequences in terms of cost/price, transport time, transport quality, environmental data etc should lessen the resource and time investment in identifying relevant alternatives.

The system would require data on routes, departure and arrival times, terminal handling possibilities, prices, quality indicators etc. The functionality should according to an interviewee be that the user (transport buyer or transport firm) should be able to get information on transport time, regularity/reliability, price etc on any concrete door-to-door chain. Often

operators have these kinds of information available (to some extent) for own traffics, however, the idea of an open system on this ambition level is to integrate these systems across operators. Instead of easily available information on links between destinations in the Railion Denmark system, the user should be able to get information on how to get from e.g. Aalborg to Linköping by linking services of Railion Denmark and RailCombi, i.e. across operators – and without giving extra problems for the transport buyer..

The effects and market potentials of this is the easier access to using intermodal transport, ie getting fast reliable information on the alternatives that should be considered in comparison to the road alternative. Thus, it relates to the planning and consideration of alternatives seen from the transport firm or transport buyer. A tendency addressed by interviewees that supports this is that forwarders and transport firms tend to invest in more flexible (multipurpose) equipment, in particular semi trailers suitable for intermodal purposes, thus indicating the consideration of intermodal solutions as alternatives.

COTRAP also holds the potential of affecting the potential users' attitudes on intermodal alternatives (regarding quality, time etc). The interviewees indicate that rail-based intermodal transport suffers from negative attitudes (that might be logic in light of some historical quality problems). But these attitudes seem to remain among potential users, especially according to interviewees, among those without recent experience in using the intermodal services. Thus, reliable and easy accessible information on the potentials in relation concrete transport chains has a potential of improving these negative attitudes.

Other potential positive effects may be easier access for spot market use of intermodal transport. Intermodal operators mainly rely on relatively fixed agreements (on price and quantity) with important customers, however the spot market seems to account for larger shares. This potential use of intermodal transport based on day-to-day agreements may be improved with the easier accessible information and planning possibilities. Further, the transport buyers based on their potential insight from an open system can require that their forwarder takes these alternatives into consideration (the operators interviewed indicated this pull effect).

A condition for the transport planner at this level is that the operators are willing to make the necessary information available (as well as an obvious necessary commitment to the data discipline, i.e. the commitment to constantly update the information on departures, prices etc). From the interviews there seems to be only small barriers to 'release' already public information such as routes, departure and arrival times and standard prices (to be distinguished from negotiated prices).

Furthermore, there is according to an interviewee a large amount of data available on transport quality in the operators' organisations, and a major ambition with the transport planner could be to systematise this information to give specific quality measures on specific transport chains. This could be an extremely important sales argument according to this interviewee, and there was no indication of perceiving this information as confidential or problematic to reveal. Information on environmental effects of transport activities is not readily available at present. This could quite logically be a part of the system as well. However, the interviewees do not perceive this information as significant a 'sales argument' as transport quality.

Obviously, one problem of revealing information is real prices or negotiated prices. An open access transport planner must be based on standard prices and this might give a reliable picture on spot market prices. As such the prices for a certain door-to-door chain can

only be seen as rough estimates or perhaps standard price based offers. However, the transport planning actor must take into account the negotiated prices between the actors involved as well as the margins earned by possible middlemen.

Another problem in relation to revealing information addressed in the interviews is the operation on the links. The core systems in intermodal transport are relatively inflexible and in certain situations it might be expedient to transport some shipments with another system, via another terminal, or even by road. One of the interviewees is not certain that they as an operator are interested in revealing any other information than the destination for delivery and pick up. The rationale is 'our commitment to the customer is the time of departure and arrival, how it is done is our problem'. Perhaps (or probably) this is not necessary in a transport planner, however it affects the information on transport quality and especially the information on environmental effects.

Thus, seeing the system as a collection, integration and simulation tool on information, COTRAP is perceived to hold a significant amount of information in a easily accessible form of intermodal transport chains as an alternative to road. Some barriers in relation to the willingness of revealing necessary information for an open (public accessible) system can be identified.

3.2. Relationships from operators towards the markets – 'always a middleman'

'Always a middleman' is the more or less unquestioned attitude and practice of the operators interviewed, and it may represent a major conflict area in relation to what is technically feasible.

Transport buyers mostly buy door-to-door services from forwarders or road carriers who in turn buy the rail (and sea) links from operators. The major parts of intermodal transport in Europe is organised in this manner¹. Thus, the operators customer is a forwarder. The logic of the operators is to access the market and cargo flows through forwarders interested in (or committed to) using intermodal as an alternative to road. Therefore, according to the logic, an operator cannot at the same time address transport buyers as customers – "and thereby steal our customers' customer".

COTRAP ideally makes it possible for transport buyers to evaluate and consider and perhaps coordinate own intermodal door-to-door chains. In that sense, if the technical potential is used (ie linking transport buyers directly to operators) this prevailing logic and practice is changed. This practice represents a kind of 'truce' between the actors in the transport chains that will be broken/challenged if transport buyers can coordinate door-to-door chains themselves. Jensen (1990) talks about integrability as the ability of a new system to absorb components from the existing system. These components can be equipment, existing IT systems, existing relationships, and in this context and existing 'truce'. So there might exist a trade-off (or strategic question) between applying COTRAP to its potential and thereby challenging the existing truce (between the operators and the coordinating transport firms having the contact to the transport buyers) and applying COTRAP within the boundaries of the established truce, ie as an expedient planning tool that do not question the 'always a middleman' rationale. The practice of the operators when dealing with

¹ Exceptions are company trains such as those operated by eg Hangartner and Norfolkline, or transport buyers large enough to run own trains (eg IKEA).

enquiries from transport buyers is to refer to transport firms using intermodal transport. It is by the operators perceived as a very important balance to take care of.

Issues that affect this discussion is first of all the interest and power of transport buyers. If transport buyers can get easier access to coordinating the door-to-door chains themselves via a COTRAP tool, they might have the interest and (increased) power to put pressure on their forwarder/road carrier or do without this organisational layer. Some large transport buyers may have this interest, and in that sense the pressure to challenge the truce between operators and forwarders may come from transport buyers.

Another issue that affects this discussion is the distinction between spot market and more fixed agreement between transport buyers and transport firms. The potential conflict or truce addressed above applies mostly for the 'agreement market', whereas the perceived conflict is much smaller when it comes to spot market. The 'agreement market' is quite important for the operators. It counts for large shares of their cargo access in the intermodal system and it represents a base for utilising the relatively speaking inflexible technology (fixed lumps of capacity on the departures). That might be the explanation of sticking to the 'always a middleman' rationale.

3.3. Cooperation, competition and uncertainty in relations between operators

The idea of COTRAP is an open system, i.e. it is not a system for one operator but a system that all operators can put departures, routes and times into. The potential in this is the users easy access to links across operators, not just what can be done within e.g. Railion Denmark's system. The interviewees mention this potential as addressed earlier. However, it also implies that an operator must consider being a part of a system that also involves potential competitors. The relations between operators involve elements of both cooperation and competition, both mutuality and conflict, they involve different degrees of trust and distrust, and these elements are very much characterised by uncertainty due to many changes in ownership, alliances, strategies etc.

The operators use each other's traffics to large extent – to reach destinations outside ones own networks and occasionally as a capacity buffer. In the interviews examples are given on such 'cooperative' arrangement based on both fixed agreements as well as use of each others systems based on day-to-day standard conditions. What seems to characterise these relationships differ on the extent of cooperation/competition (or mutuality/conflict). In some instances the complementarities are perceived 'obvious' and no serious conflict potential is perceived. An example given are a relationship between a Ro-Ro operator and a rail-based operator in which there is no perceived potential conflicts. Between rail-based operators the potential competition and conflict is perceived more serious. But still among these relationships there seems to be differences in 'atmosphere'. Some relationships are based on rather well established (and agreed upon) domains, while in other relationships there is at the same time a (potential) competition going on in taking over each others' domains. The issue of trust or distrust is highly related to this. Relationships similar in content (eg use of each others' traffics on day-to-day conditions) may be inflated with different degrees of mutual trust. This is based on the former experiences with the actor involved, as well as the 'reading' of the strategic interests of that actor.

Thus, there is an important aspect of who is considered reliable partners and who is considered potential competitors in a transport planning system based on open access. The problem is obviously smaller in relation to actors perceived as reliable partners. However, there is great uncertainty attached to these issues. An interviewee mentioned how an estab-

lished truce between top operators can change from month to month – who is considered a reliable partner presently can change within quite short time frames. The tendency within especially the rail-based fragment of the industry in which ownership structures change frequently through mergers, acquisitions etc creates or increases this uncertainty. It seems as if there is not a day without a new acquisition or rumour that the actors have to consider the implications of.

This coexistence of both cooperative and competitive aspects - in differing degrees as well as the uncertainty attached to these elements – is seen as a major barrier in relation to an open transport planning system. It affects to some degree the willingness to share information and to a large degree the willingness to ‘give away’ booking rights. The information problem does not seem to be the major hurdle - obviously it depends on the types of information that is put into the system (cf above). One interviewee mentions that as long as it is already public information (standard prices, departure times, routes etc) there is no problem. On the other side the same interviewee stated: “I don’t think that we will participate with departures and prices in a transport planner in which firm XXX participate as a direct competitor, but it is hard for me to say as I don’t know what will happen”. This might indicate some reluctance to participate even with public available information. Another interviewee stated that there is no perceived problem in being in the same system as competitors (regarding routes and departures), and continues “and even if you have a problem with it you cannot stop it”.

The other issue of giving away booking rights is seen as more problematic (cf below).

In relation to these issues one interviewee addressed a requirement for an adaptable system. A system that can quite easily be adapted in relation to changes in ownership structures and relationship commitments. However, such a requirement seems to clash with the open system logic of COTRAP. Thus, it seems as if the more sensitive information that is required and the more ‘decision rights that is ‘given away’ the larger is the required organisational stability and mutuality, i.e. inside firms or between close partners. The open system logic of COTRAP must work between potential competitors, and must therefore probably limit the ambitions on information and decision rights.

An issue raised by one interviewee is track and trace, and examples are given in which actors/operators as users have been denied access to such systems with the argument that it was considered competitive information. While track and trace has not been considered a part of COTRAP the principal issue raised is a discussion of information systems as an ‘infrastructure’ accessible to anyone (it might be difficult or impossible for many firms but the largest to build up) or information systems as a competitive parameter (which according to this interviewee is the perceived tendency). This balance or dilemma relate to the discussion above.

3.4. Problems of booking and the right to dispose

In the first section we dealt with COTRAP as a planning tool that should provide easily accessible information on door-to-door possibilities, and we dealt with issues of willingness to share the necessary information. However, direct booking is another feature of the system. It should be possible for users of the system to book directly in the system also across operators. A user of the transport planner should be able to see whether available capacities exist on the departures involved in the door-to-door chain in question so that booking is conformed immediately or at least within a short timeframe. The market potential is that users are to obtain an easy booking procedure comparable to that of the single modal road alternative.

This gives a possible information willingness barrier – are operators willing to share real time information on booking status on their departures? But another issue is that it meshes with central decision rights of the operators.

Often the operators have or work towards direct booking procedures for customers within their own system. This is based on giving customers access to do this – hence some element of control over who is getting this booking possibility exists. An open system could logically imply that competitors and competitors' customers have direct booking possibility in the system, and ones customers can book directly into competitors' systems. So the control of who is given right to book into ones departures will decrease if COTRAP is applied in its fullest version. Procedures of 'accepting' users will probably be possible to implement. A parallel is the Cesar-online terminal-to-terminal system operated by combined transport operators Kombiverkehr, CEMAT and HUPAC in which the operator of the different departures grant passwords on those departures, and in that sense users simply need a password for each operator in question.

However, what is done in the situation in which a departure is overbooked? In an open COTRAP system in its fullest version an operator can be forced to let competitors' customers use capacities before own customers if one follow a 'first comes, first served' principle. Alternatively, if involved operators keep their right to dispose their own departures the system will potentially suffer from 'local sub-optimisation' in which the single operator favour own customers. Thus, the right to dispose own departures and the right to decide on these departures capacities represent a quite central barrier. A central economic logic of the operators is to utilise capacities - due to the large fixed cost of running a departure and the relatively inflexible cancelling possibilities. Thus, the operators' running profit heavily depends on the ability to fill up the trains. The ability to postpone cargo less time sensitive, the ability to prioritise between transport tasks, and the ability to prioritise between core customers and marginal users are central elements of this puzzle solving - and the decision right on own departures is central in this respect. The solution applied is a system with direct booking but a limited confirmation time. Within X minutes from booking the operator must either accept or reject. While keeping the right to dispose own departures, the time frame for prioritising is limited – obviously depending on the time for acceptance. Hence, the important day-to-day planning of capacity utilisation is pressured from more condensed time frames.

Interviewees indicate more or less implicit that they are not interested in giving up this right to prioritise own departures. There is explicit reluctance towards letting customers book in competitors' or complementary operators' departures, and from addressing how the interviewees can imagine the system working it is quite clear that this right to decide on own departures is not be partially overtaken by COTRAP.

4. Summary and Perspectives

Summing up, some serious problems seems to exist in relation to applying COTRAP to what is technically feasible. These problems relate to the sensitivity of the required information; they relate to the division of labour between operators, forwarders/coordinators and transport buyers; they relate to the degree of trust/distrust, competition, possible conflict and uncertainty in the relationships between operators; and they relate to an important right to dispose own departures. But as stated by an interviewee: "There are many barriers, but if you make the system and it is successful, then the transport firms will ask to join – you cannot keep yourself outside on long term".

The project will continue along the constructive line and the analytical line described above, in its most ambitious version leading to

- A system description and prototype of a Door-to-Door Combined Transport Planner
- A system wide analysis of the Scandinavian-North European combined transport system identifying and classifying the main hindrances to develop flexible and consumer oriented services
- A series of tools for the involved companies to work with the barriers identified, among these
 - Scheme for coping with intra-organizational barriers.
 - Checklists for planning and operating kombi-transports.
 - Focus group and scenario workshop methods for working with inter-organizational and trans-border barriers.
 - Education and training programs.

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