Building and Governing EU Networks

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contents

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"Building and Governing EU Networks"

The EU's basic objective is to create a single European market as a tool for political integration. This objective is being transposed into all economically strategic sectors, including at a data level in each of these sectors.

In the infrastructures, this objective translates into the unbundling of the network industries into a monopolistic infrastructure on the one hand and a market for services delivered on the basis of these infrastructures on the other.

Based on these unbundled infrastructures at the national level, the EU aims at creating interconnected infrastructures which offer full interoperability for all the services provided on these infrastructures. This aim is being implemented in a systematic way in electricity ("copper-plate Europe"), in railways ("Single European Railway Area") and in air transport ("Single European Sky"). One could add to this road infrastructures and perhaps telecommunications infrastructures, even though unbundling does not take place there in the same way.

Of course, the implementation of this idea progresses differently in the different infrastructures, owing to technological specificities, national interests, and funding requirements, among others. In this NIQ we will look at energy, rail and air EU-wide infrastructures, how they have developed, whether they make progress, and what obstacles they encounter. In the last paper, we will also explore the idea as to whether this idea of an EU-wide infrastructure can also apply to digitalisation.

The first contribution by **Pototschnig** analyses energy network development planning and implementation. The author argues that optimally dimensioned and efficiently operated energy networks in Europe is the key to the integration of the EU energy market, the increasing penetration of renewable-based generation and security of supply.

Mastrodonato explores the creation of a seamless and competitive European railway network. He argues that the ongoing railway regulations' revision should help to strengthen the coordination at the European level. The railway industry has to improve cross-border services and be ready to prioritise the needed investments.

Finger, Serafimova and **Zeki** reflect on the air transport, which unlike the other network industries has always been unbundled. Despite of that, the integration of the Air Traffic Management into one single European Sky is moving slowly; the currently most promising option to accelerate the process might be digitalisation.

Montero and **Finger** discuss digitalisation, which enables a new way of constructing the single market in the network industries. Digital platforms are in the position to build virtual networks on top of fragmented national assets and services managed by third parties, providing a seamless experience to users. In this sense, digital networks are a new tool to build a smarter single European market.

Matthias Finger

dossier

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Infrastructure Planning in the Energy Sector

Alberto Pototschnig*

The integration of the EU energy market, the increasing penetration of renewable-based generation, with its more variable and less predictable output profile, and security of supply all require an optimally dimensioned and efficiently operated energy networks in Europe.

Twenty years of energy network planning in the EU

Efficient network development planning and implementation have therefore been an increasing focus of energy policy in the EU. In 2003, the European Parliament and the Council adopted a set of guidelines for trans-European energy networks (Decision No 1229/2003/EC), which were replaced, only three years later, by new guidelines (Decision No 1364/2006/EC). The latter introduced the notion of 'project of European interest', alongside the pre-existing categories of priority projects and projects of common interest. The result was a list of over 500 projects, compiled mainly on the basis of a political agreement among Member States. However, while the framework established by the 2006 guidelines made a positive contribution to the selected projects by giving them political visibility, it lacked vision, focus and flexibility to fill identified infrastructure gaps.

The 2009 Third Energy Legislative Package for the first time established an EU-wide framework for the planning of energy networks. It introduced the requirement for Ten-Year Network Development Plans (TYNDPs) for electricity and gas to be compiled by the newly established European Networks of Transmission System Operators (ENTSOs), for electricity (ENTSO-E), and gas (ENTSOG). Building on national investment plans and the reasonable needs of system users, and taking regional investment plans into account, the TYNDPs aim at identifying investment gaps, notably with respect to cross-border capacities. Each ENTSO should compile a TYNDP for its respective sector every two years. It shall also include the modelling of the integrated network, reference scenarios, a European adequacy outlook and an assessment of the resilience of the system. However, in 2009 it was too early to see the need for a common network modelling approach spanning the electricity and gas sectors. The inconsistencies in the scenarios identified for the two sectors and the weaknesses of the cost-benefit analysis methodologies used to assess the net benefits of the candidate projects (especially in the gas sector) have been the main shortfalls in the TYNDP-based network development planning.

In 2013, the Regulation on guidelines for trans-European energy infrastructure (TEN-E Regulation) innovated on the approach for identifying priority infrastructure investments. The purpose was to prioritise those network developments which are essential for integrating the electricity and gas markets along eight priority corridors – four for the electricity sector and four for the gas sector – and in one thematic area – smart grids (as well as for oil and carbon dioxide networks).

Those projects which are included in the latest TYNDPs and which are the most beneficial for promoting such integration are qualified as projects of common interest (PCIs) and included in lists adopted by the European Commission every two years.

Cross-border cost allocation to enable projects of common interest

The TEN-E Regulation also introduced a new instrument for facilitating the development of PCIs for which costs and benefits accrue very differently among the different Member States involved: the cross-border cost allocation (CBCA). Previously, if a project, although overall beneficial, did not deliver net positive benefits to all the involved countries, it would have likely not been developed or an *ad-hoc* compensation would have had to be agreed. By formalising a process for the reallocation of costs among the different involved countries, the TEN-E Regulation has facilitated the developments of these projects. CBCA decisions should be jointly taken by the national energy regulators of the beneficiary countries; if they cannot reach an agreement, the decision is adopted by the European Union Agency for the Cooperation of Energy Regulators (ACER). In reality, many more CBCA decisions have so far been adopted than those which were necessary to enable PCIs for which benefits and costs accrue differently across the involved jurisdictions. This is

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due to the fact that CBCA decisions are a prerequisite for accessing funding under the Connecting Europe Facility (CEF): of the 46 CBCA decisions adopted until June 2020, only 10 involved some form of cross-border compensation, while in 24 cases the decision was taken by only one national regulator just to confirm that the costs would be fully borne by that country. Moreover, 18 of the CBCA decisions assumed some level of CEF funding, thus allocating only part of the overall costs of the PCIs among the involved jurisdictions. However, in two of these cases no grant was allocated and in other six cases the allocated grants were lower than what was assumed by the national regulators in their CBCA decisions.

In 2013 and again in 2015 ACER adopted recommendations on CBCA in which it proposed that CBCA decisions envisage cross-border compensations only when and to the extent that, without such compensation, a jurisdiction would face negative net benefits from the project. The compensation would therefore aim only at covering the net costs (costs in excess of benefits) faced by one or more of the jurisdictions involved in the project. This was a well-justified approach in the early days of the implementation of the TEN-E Regulation, as it limited the use of the new CBCA instrument to those cases for which it was essential for enabling the PCIs. Now, eight-year and close to 50 CBCA decisions later, it seems appropriate that CBCA decisions are also used to allocate the net benefits more evenly across the involved jurisdictions. This would provide incentives for all involved jurisdictions to promote a speedy implementation of the PCI, the more so the more beneficial the project is. Therefore, in the context of the revision of the TEN-E Regulation launched by the Commission in 2020 (European Commission, 2020b), the Florence School of Regulation (FSR) and the Copenhagen School of Energy Infrastructure (CSEI) issued a Policy Brief in which, *inter alia*, they recommended that "*CBCAs should not only avoid a jurisdiction facing negative net (welfare) benefits, but instead should allocate costs in such a way that all the jurisdictions involved end up with the same or similar benefit-to-cost ratios*" (Florence School of Regulation, 2020).

The revision of the TEN-E Regulation

The revision of the TEN-E Regulation proposed by the Commission takes into account the shifted focus of energy policy in the EU and its implications for infrastructure development. Alongside the geographical integration of markets, which has been substantively achieved in the last years, going forward the objective of network development would be to enable smart sector integration, in particular among the electricity, the gas and the nascent hydrogen sectors. Therefore, the Commission proposed to shift the focus away from gas infrastructure (which should be no longer eligible for PCI status), and towards hydrogen infrastructure and electrolysers, as well as gas smart grids. Hydrogen is considered the molecular energy carrier of the future, especially if produced through processes using renewable energies. The Commission proposed that, in order to be eligible for PCI status, projects meet a mandatory sustainability criterion, specified in different terms for the different infrastructure categories. This is to support the energy transition towards the goal of carbon neutrality by 2050, to which the EU has committed, and the ambitious intermediate energy and climate targets set for 2030.

The Commission also proposes that CBCA decisions allocate the full costs of PCIs, so that the impact on network tariffs in the different jurisdictions could be assessed. This would allow CEF funding to be targeted to address affordability issues, even though the Commission is not explicit on this. A similar suggestion was formulated by the FSR and the CSEI in their contribution to the Commission's consultation, where they considered that dealing with affordability issues is likely to be the best use of CEF funds, since non-monetisable or even poorly quantifiable benefits do not justify EU financial support since, at a national level, they have been dealt with by regulation for many years without any major problem.

Great emphasis in the Commission's proposal is also given to the development of offshore infrastructure. Offshore wind-based electricity generation has the greatest potential to support the increased electrification of the economy and the production of renewable hydrogen (through electrolysers). While cooperation among countries on the shores of each sea basis and integrated network planning at the sea-basin level are envisaged, the proposal does not seem equally to stress the importance of the integration of on-shore and off-shore network planning. However, the Commission's proposal does require the gas TYNDP also to include hydrogen networks, although it misses the opportunity to prescribe a cross-vector approach to network planning covering (at least) electricity, gas and hydrogen infrastructure. This is even more important considering the need to identify the best locations for power-to-gas facilities, which should take into account the needs of the electricity system, the capability of the gas and hydrogen systems and the demand for hydrogen.

The future hydrogen network

An emerging issue in energy infrastructure planning is whether and when a backbone hydrogen network will be needed to support the development of the hydrogen sector and the extent to which parts of the current gas network could or should be repurposed to transport hydrogen. At present hydrogen is produced and consumed within industrial clusters, and therefore transported through local private networks.

In its Hydrogen Strategy (European Commission, 2020a), the Commission considers that "*to harness all the opportunities associated with hydrogen, the European Union needs a strategic approach*" and that "*EU industry is rising to the challenge and has developed an ambitious plan to reach 2x40 GW of electrolysers by 2030*", where 40 GW will be installed in Europe and the remaining 40 GW will be located in Europe's neighbourhood with the export of hydrogen to the EU. With this electrolyser capacity, the Commission expects a "*production of up to 10 million tonnes of renewable hydrogen in the EU*". This however implies a high rate of utilisation of the electrolysers. In fact, the actual utilisation rate of electrolysers in the future is highly uncertain and it will critically depend on the rules which will be put in place to ensure the "additionality" of the renewable electricity used by such installations in order for the produced hydrogen to be considered as "renewable". Additionality is the requirement that the renewable electricity used by the electrolyser be "additional" to what would be produced and consumed anyway to meet the renewable penetration target in final electricity consumption. Even assuming a notion of additionality which allows a high rate of utilisation of electrolysers, 40GW of electrolyser capacity would produce in the order of 4-5 million tonnes of renewable hydrogen. This is roughly half of the current consumption of hydrogen as a feedstock. It is moreover expected that some of the facilities currently producing hydrogen through methane reforming will be retrofitted with carbon capture and storage/use technologies, so they will be able to produce low-carbon (blue) hydrogen. This production will mostly serve current consumption needs – which hydrogen mainly been used as a feedstock – and therefore it is unlikely to require additional dedicated infrastructure, at least not to a large extent and unless import from neighbouring countries starts to play a sizeable role.

For 2050, the Commission, in its Hydrogen Strategy, refers to projections of 500 GW of electrolyser capacity. This capacity could realistically produce up to 40-50 million tonnes of renewable hydrogen a year. The demand to absorb this additional production is also highly uncertain. Beyond the use of hydrogen as a feedstock, its role as an energy carrier will compete, in most uses, with increased electrification. At the moment, it is envisaged that hydrogen will replace natural gas as an energy vector in those processes hard to electrify, usually referred also as "hard to decarbonise", but it is likely that, by the time the energy transition takes pace (after 2030), advances in electricity-based technologies will have increased the usage of electricity also in these processes.

These considerations illustrate that it is still far from obvious at which rate hydrogen demand could and will develop in the years to come, and which levels it will reach. The development of the hydrogen network should assist the expansion of the sector, however avoiding that over-development of the transport infrastructure becomes a burden.

At the same time, gas demand in Europe will gradually decrease and the volumes of gas transported in the European gas network shrink. Some pipelines will no longer be necessary to transport gas and might become available for repurposing to transport hydrogen. For example, a group of 23 European gas TSOs, in their European hydrogen infrastructure vision covering 21 countries of April 2021 (Creos et al, 2020) envisage the development of a 40,000km hydrogen backbone network by 2040, mostly comprising repurposed gas pipelines.

However, care should be taken that the development of the hydrogen network is not driven by the availability of disused gas pipelines, but rather by the demand for hydrogen transport services. In this respect, the geographical spread of hydrogen production and consumption becomes relevant. In the case of gas, mostly imported from outside the EU, a long-range backbone network was clearly necessary to connect the external gas sources to internal consumption points. In the case of hydrogen, internal production might be able to serve most, if not all, of the demand and it might well be that most Member States will (want to) enjoy a fairly balanced hydrogen demand and supply. If this were the case, the need for a trans-European hydrogen network might not emerge as soon as some stakeholders suggest.

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Accelerating the Creation of a Seamless and Competitive European Railway Network

Emanuele Mastrodonato*

Where are we with the creation of a single European railway network? The ongoing railway regulations' revision should help to strengthen the coordination at the European level. The railway industry has to improve cross-border services and be ready to prioritise the needed investments (TEN-T high-speed network).

Railway as a fragmented system

The fragmentation in the railway sector can lead to lower efficiency of the railway as a system, especially in its competition with other modes of transport. Transport is a cornerstone of European integration, as interconnected networks and sustainable transport are necessary conditions for the completion and correct functioning of the European Single Market. However, opting for a clear separation of the railway infrastructure manager from the operator of the transport services has brought to a plurality of companies for transport services. This process has been developed with significant differences on the chosen competition model between countries, in most of the cases this has resulted in a national fragmentation that is particularly acute in the railway sector.

In the last decade, each country of the European Union has had to implement some reforms to adapt their railway system to the new EU regulations that have come into force gradually and have started the liberalisation processes. However, in some countries, much more demanding reforms than those required by European directives, have been carried out in advance and have led to a radical restructuring of the rail transport industry. In some cases, we saw a competition on the market for goods and passengers, but with some limits as regards the tenders to obtain the right to serve, exclusively, certain lines for a certain number of years (services that require public subsidies); in some other cases, the reform entrusted passenger transport fully.

When the operators can compete on the rail networks, with a level playing field, new entrants emerge; subsequently, we see a market fragmentation; and the railway sector, as a system, results fragmented as well.

In the railway sector, the national vertical separation exacerbates the fragmentation and the consequence is that switching from a national system into a European network is a big step. Legislative changes are contributing to break the national monopolies and big national groups see their market share falling down in some cases; on the other hand, this encourages them to invest in innovation, and efficiency; and this allows reaching the expected objectives of the unbundling in the railway sector: passengers and freight forwarders can use more efficient services at a lower cost, with an increased overall rail market.

Observing the results of the implementation of the railway legislation in recent years (demand, modal share, competition, access charges, etc.) we reckon that the cooperation among the stakeholders has been improved; and now the railway sector is improving in presenting itself as a unique system competing against the other modes of transport, thanks to better operational conditions and using more intermodality.

European transport policies are under revision, and this is an opportunity to accelerate the creation of a truly European railway network system, with efficient cross-border services, minimising technical barriers, and promoting a seamless and safe transport. Times are, therefore, mature to merge the concepts of the Core Network Corridors (CNCs) and the Rail Freight Corridors (RFCs) into a new idea of European transport corridors, meaning joining efforts to individuate priorities and offer options with a European view of railway (and multimodal) transport investments and fostering operational cross-border improvements, in a way that one element can support the other.

Concrete measures to double freight volumes transported on rail by 2030 are now urgent; the needed capacity has to be offered within a fair access charges scheme, and its allocation should be optimised by introducing adequate functions and tools that could work at the European network level. The traffic should now be coordinated in a more integrated manner across countries, and the national rules cleaning-up process, as well as cross-border operation harmonisation, can take a step further to pave the way to the future opening of big railway infrastructures, now under construction.

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What's in front of us today: a network of European corridors and interoperability issues

The result of the railway reforms in terms of demand growth, modal share, competition, employment and fare levels, can now be analysed after their implementation in the recent years. This is undoubtedly the right moment, as the shift to rail has become a big challenge, to reach the Green Deal objectives.

Looking at the established legislative framework, we see that the Trans-European Transport Network (TEN-T) policy (Reg. 1315/2013) addresses the implementation and development of a Europe-wide network of railway lines and multimodal transport including railroad terminals, with the objective of closing gaps, removing bottlenecks and technical barriers, while strengthening social, economic and territorial cohesion in the EU. The 4th Railway Package 'technical pillar', including (Reg. 2016/796, Reg. 2016/797 on railway interoperability, Reg. 2016/798 on railway safety), has been designed to boost the competitiveness of the railway sector by significantly reducing costs and administrative burden for railway undertakings wishing to operate across Europe. The EU rail freight (RF) policy, based on the Regulation 913/2010, has set out the rules for the organisation of the EU RFCs, aiming at creating international RFCs for competitive freight (e.g. via the coordination of traffic management) across the EU.

In the last few years, we have observed that the number and length of RFCshave raised, and a growing number of high-speed cross-border services are going to connect the European continent's networks. Thanks to the European corridors provisions, the European market trends have been studied to better meet the market needs. The cooperation among the railway Infrastructure Managers (IMs) has been reinforced on several matters, improving operational conditions and intermodality. The use of a "One Stop Shop" for the capacity management in each European Corridor has provided with access to the infrastructure in a transparent and non-discriminatory manner, showing great achievements in some European macro-regions even though with modest results, in average, at the European level, due to the lack of favourable conditions.

The revision of the legislation on rail freight competitiveness and TEN-T network

The TEN-T and Rail Freight Regulations revision will reinforce eliminating technical barriers, promoting seamless, safe and efficient cross-border mobility, and represents also an opportunity to take a step further from a corridor approach to a European RFCs' network approach. The Commission published a report on the implementation of the Regulation, where explains that, although improved cooperation for infrastructure management is recognised, RFC services could be more adapted to the needs of the customers; the area of improvement addressed, in particular, capacity issues, planning and operational issues.

The Rail Freight Regulation has certainly contributed to a better cooperation between the players in the logistics chain of rail freight transport, but it has contributed to a much lesser extent to the increase of the competitiveness of rail transport (compared to road transport). Conversely, with the COVID-19 pandemic, the performance of rail freight transport has greatly improved following the reduction in passenger rail services and this has shown that the key factor in increasing rail freight is represented by greater availability of good quality routes (capacity). A more recent assessment of the European Commission has also highlighted that the incomplete implementation of the Regulation and the prevalent adoption of national procedures have jeopardised the achievement of the modal shift objectives and the increase in transport performance (reliability, punctuality and speed).

The European Commission has also launched the TEN-T evaluation process (included in the European Green Deal), and this has reconfirmed the key role of the TEN-T network for transport decarbonisation. In its work programme the Commission announced an initiative that will include the revision of the Regulation 913/2010 and actions to boost passenger rail. The policy objective on "Sustainable and smart mobility" addresses among others: the revision of the Directive on Intelligent Transport Systems, including a multimodal ticketing initiative; the revision of the Regulation on the TEN-T (Trans European Transport); an EU 2021 Rail Corridor initiative, including the revision of the Rail Freight Corridor Regulation and actions to boost passenger rail.

The adoption of the same standards, rights and regulations across the EU can benefit travellers and freight forwarders. So far, we've observed a stepwise approach, and a common policy made up of small concrete steps, but some encouraging results seem to be not enough to create a positive "snowball" effect and accelerate reaching a more efficient and competitive international rail freight transport. The success of the European policies

will depend, therefore, on how all the pieces of legislation (including the more recent 4th Railway Package, technical and market pillar) are implemented by the Member States.

Ideas for the future: priorities and options

To make the railway system more efficient and to boost the modal shift now, it is urgent to individuate priorities and offer options to strengthen the coordination of functions at the European/corridor level, prioritising specific investments on TEN-T network (high-speed networks), and adapting the rules for an adequate infrastructure charges scheme. In the view of improving the competitiveness, the need for a network approach is becoming prominent among some operators, and this own to some international freight transport functions being developed, natively, across not only several countries but also several European corridors. This aspect can lead the sector to reinforce the concept of European corridors recognising that, what has been done at the European macro-regions level is bringing concrete achievements, and the processes and systems established by the stakeholders in those macro-regions, are now in a more mature stage.

From the experiences of implementation of liberalisation measures in other network industries, we can learn that the coordination of some elements and functions at the European network level can help the sector working better while opening the market. As new actions need to be taken working in parallel from different angles, the TEN-T revision will be carried out alongside the revision of the Alternative Fuel Infrastructure Directive, and of the Rail Freight Corridor Regulation, this will enable building on the new Transport Strategy of the Commission.

The optimisation of existing processes, as well as the development of new processes and the deployment of IT systems and platforms, can enable a network approach for: capacity management, traffic coordination, End-to-End performance monitoring. However, strengthening the coordination of some functions at the European or corridor level, can only work if the players are willing to co-operate on cross-border services and are ready to prioritise the needed investments (high-speed networks). Digitalisation can facilitate their exercise, ensuring that the quality of the data will enable creating the necessary interfaces with the existing systems and requirements; moreover, the COVID crisis has further showed us the urgent need to harness all the possibilities of digital solutions and the revision is also expected to make the TEN-T policy ready to the digital transition.

As regards the design of the core network, some adjustments will certainly be needed – for example, the inclusion of missing cross-border connections or enhanced connectivity for some peripheral regions. From the governance point of view, we can expect that the concepts of the CNC Corridors and the ones from the RFCs will be somehow merged into a new set of concepts towards European transport corridors. In any case, there is the certainty that to make mobility more sustainable, we need to implement measures to better manage and coordinate international rail traffic, including, if necessary, revised rules for the capacity allocation and infrastructure charging.

How can the new measures for the European network be concretely developed?

Any possible solution for a dramatic improvement of the rail transport in terms of competitiveness and shifting substantial volumes to rail must be explored now; this could mean reinforced actions at thr European macro-area level (cross-border), corridor level (TEN-T, RFC), or centralised European level. Rail freight has historically a European dimension and more than 50% of the railway freight transport is international, this means that guaranteeing real interoperability between the different networks and of coordination of operations, at the borders or in terms of rail capacity and traffic management is essential.

Rail needs to be able to offer the capacity needed for the anticipated modal shift from road and air and an effective and fair cost system for the track access. Reducing track access charges for rail freight could be one measure, but this should be subject to an extension of the existing European legal framework allowing Member States to waive and reduce track access charges, and the framework conditions are very different across countries. A relevant number of stakeholders stress that these measures are a good way to support the rail freight industry in a fair, transparent and non-discriminatory manner. However, there is a need to pay attention that direct support to the incumbent companies does not bring any cross-subsidisation.

As regards capacity, one measure to explore is a unique entity that could allocate tracks to operators (similarly to what EUROCONTROL does in civil aviation). Cross-border path allocation should in any case be facilitated to find

alternative routes in case of need, as this would increase efficiency and decrease costs. Even the cleaning-up of national rules should be continued being addressed, together with the further development of the RFCs and the platforms governing the European macro-regions preparation of mega-infrastructures future opening.

According to some opinions, the governance of a new European body (with Member States, EU representatives, IMs, capacity allocation bodies, agencies) could improve a rail traffic supervision and monitoring at the European level, and it is, in any case, not in question that Infrastructure Managers and capacity allocation bodies need a structured and standardised way of coordinating traffic across borders. A unique European traffic control will be a viable solution, only if the development of specific technology and operation processes, governing safety aspects, will allow a holistic and seamless approach. This development could enable overcoming those barriers that have made some functions with exclusive coverage of the national level, so far.

Besides technological and operational progress, another hurdle to overcome is the criticisms coming from some parties. For various reasons, the need of strengthened coordination at corridor/European level in the railway sector is not seen as a priority, nor, even, the need to reinforce the harmonisation of processes and technological systems at the borders. This element could make more difficult investigating other possible solutions to improve the coordination of traffic management centres, like – for example, a virtual layer, for each European corridor, that could support the national decision-makers dispatching trains from one part of the network to the other.

In any case, the coordination and the planning among the parties, towards better connections between train paths and services, should be developed on a basis of sound technological system/framework and harmonised processes (operational processes and rules) across countries. The European transport system must continue exploring any possible solution at a fast pace, transforming itself to become more competitive and fully digital, greener, and resilient to any possible future emergency.

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The Single European Sky (SES), a European Infrastructure in the Making

Matthias Finger *, Teodora Serafimova **, Engin Zeki ***

Unlike in the other network industries, air transport has always been unbundled: airlines were State-owned and subsequently privatised while airports were locally owned, and some of them are now under private management. Air Traffic Control (ATC), or more precisely Air Traffic Management (ATM), has been state-owned up to now. Because of such unbundling, one could think that the seamless integration of ATM into one single European Sky would be easier. In this article, we will show why this is not so, yet highlight how digitalisation may well accelerate the process.[1]

How It All Started (1999 – 2012)

Conceived back in 1999, the Single European Sky (SES) initiative was the European Commission's response to reducing delays, increasing safety, mitigating the environmental impact and reducing costs related to service provision in the aviation sector. The SES sought to address these challenges by promoting the de-fragmentation of the European airspace and by creating a more efficient ATM system.

Historically, airspace structures and ATM infrastructures have been developed along isolated national blocks within the territorial and aerial borders of sovereign states. Because ATM operates national legacy systems with little interoperability and develops capacity in isolation from one country to another, internationally available airspace capacity remains severely restricted, and resilience/redundancy between the many ATM providers is almost inexistent. In 2013, the Commission estimated that the lack of standards and differences in procedures leads to roughly €5 billion in unnecessary costs each year, not to mention millions of tons in wasted jet fuel and excess CO_2 emissions due to inefficient routes. Seven years later, this figure has more than tripled to €17.4 billion per year due to the continued absence of a seamless airspace structure.[2] Most of these costs are being passed on to passengers in the form of higher ticket prices.

In 2004, the Commission set four high-level objectives, committing itself to tripling airspace capacity in order to reduce delays, both on the ground and in the air, halving the costs of ATM services, improving safety tenfold, and reducing by 10 percent the impact of aviation on the environment by 2035. To achieve these goals, a framework of five pillars was established based on technology, safety, performance, airports and human factors.

From the very beginning, it was evident that technology would play a key role in this process, not only as an enabler of a more efficient ATM, but also as a way to facilitate the transition to a more logical organisation of the airspace without compromising the politically undesirable closure of control centers. In view of this, in 2007, the SESAR (Single European Sky ATM Research) Joint Undertaking was set up to manage the technological and industrial dimensions of the SES. While SESAR has been largely successful and technology is no longer considered to be a barrier, progress on the political side has lagged behind.[3]

The second SES package of 2009 created a so-called "performance scheme", along with concrete indicators, as well as a refined Functional Airspace Blocks (FABs) concept. The FABs were set up so as to enhance the cooperation across national boundaries and to lower the costs of ANS. Nine FABs were created in total, each of which was to set up common operating procedures, technologies and fee structures. This was initially seen as an intermediate step towards a fully integrated SES. But the plan was met with resistance from national governments wary about sacrificing too much sovereignty over their airspace and giving up authority over their Air Navigation Service Providers (ANSPs). Also, and contrary to their initial intention, FABs have engendered an additional layer of bureaucracy, thus creating an additional obstacle to realising the SES. As a result, people produced a series of novel ideas about how to centralise

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[1] This article builds on our European Transport Regulation Observer, Issue 2020/18, April 2020, entitled Context and history of ATM data services, co-authored by Matthias Finger, Teodora Serafimova and Engin Zeki, pp. 2-7; https://cadmus.eui.eu/bitstream/handle/1814/66906/PB_2020_18_FSR.pdf?sequence=1&isAllowed=y

[2] ICCSA-University of Bergamo for A4E, Cost of Non-Europe in Aviation (CONEA), February 2020

[3] Finger, M., Bert, N., and Kupfer, D., (2014), Making effective use of technology in SESAR deployment, https://cadmus.eui.eu/bitstream/handle/1814/39128/ETR_Observer_2014_04.pdf?sequence=1&isAllowed=y

some of the services ANSPs are providing, all somewhat based on the assumption that the various activities of the ANSPs could be decoupled and that some of them could be centralised and tendered out to private services providers. In parallel, the emergence of digital platforms – e.g., Google, Facebook, Amazon – has created an intellectual climate, which led some people to ask whether the same evolution could not also happen or be actively promoted in ATM.

Virtual Centres

Enter the virtual centre model which had originated from Skyguide's local need to consolidate its two Air Traffic Control Centers (ACCs: Zurich and Geneva) into a single virtualised centre in 2012. Previously, cloud-based services and service-oriented architectures, the founding technologies of virtual centres, had already been extensively used to increase cost-efficiencies and performance in other IT and network industries. Even though the virtual centre model is not revolutionary from a technical point of view, it is nevertheless ground-breaking for the ATM sector. This is due to the fact that it implies a paradigm shift from legacy and geographically-based ATM systems to service-oriented and virtual, i.e., location-independent architectures. As Skyguide's systems were at the end of their life cycle, the question arose whether the company should invest in existing (outdated) technologies or take the riskier path of the pioneer. The internal strategy discussions lasted over two years. In the end, the decision was clearly in favour of the virtual centre.

Elevating the Idea to EU Levels

During the same period, but often at less advanced stages of development than the virtual centre, a series of other disruptive ATM operational concepts also started to be discussed in EU circles, and even to be developed by some of the established ATM players, such as "remote towers", "sector-less ATM" and "flight-centric operations" as well as new upcoming "drone technologies". While some of these technologies and operational concepts have the potential to disrupt operations, others may lead to the disruption of the entire aviation industry. But among all these new technologies, the virtual centre clearly offered the most immediate and most obvious solution to Europe's fragmented airspace, something that became rapidly obvious to many of the actors involved in European ATM. Consequently, both in parallel and in collaboration with Skyguide, other ANSPs also started to explore its virtues. SESAR, furthermore, was investigating where use cases could be explored. Many of the stakeholders, including major European ANSPs such as ENAV, NATS, DFS, ENAIRE, DSNA and COOPANS (a group of ANSPs), started projects to rationalise their infrastructure or to modify their flight data planning systems (FPDS) so as to adapt to cloud server functionality and to offer flight data planning (FDP) services. Within the SESAR framework, the idea of a virtual centre was and continues to be explored by way of three distinct types of use cases, specifically adapted to the operational and business needs of each ANSP. These are the rationalisation of the infrastructure, the delegation of airspace, and contingency. Additionally, these use cases all rely on the definition of an ATM Data Service Provider (ADSP), providing data and services to multiple Air Traffic Service Units (ATSUs), thus enabling cross-border operations. In addition, Eurocontrol and the A6 Alliance of ANSPs joined the effort by working on a "digital Backbone", a shared data exchange infrastructure for the European ATM. This, among others, and together with SESAR, helped and continues to push stakeholders to move towards virtualisation.

The importance of transitioning towards virtualisation and towards progressively increased levels of automation in ATM made its way into the Commission's 2015 Master Plan. Subsequently, in 2017, a joint European industry declaration stressed the need for a digital transformation of aviation. Virtual centres were particularly mentioned as a tool to enable the progressive decoupling of ATM service provision from the physical infrastructure. This, it was argued, could create both enormous efficiency and resilience gains since data and infrastructure can be shared between different centres, thereby enabling better use of existing resources and reducing investment costs. As a matter of fact, Skyguide's virtual centre had already demonstrated important cost-saving potentials thanks to the elimination of systems' and data centres' duplication.

However, many of these new technologies are not compatible with the current fragmented and nation-based institutional system of actors. For example, flight-centric operations, despite being at a mature stage of development today, are only efficient in larger airspaces, thus calling for a cross-border approach. In short, and even though the virtual centre and other technological ATM innovations can lead to significant gains, notably in terms of efficiency, safety and resilience, they have direct and immediate economic, political, social, and legal implications. On the social side, the resistance might come from

Air Traffic Controllers (ATCOs) and operational staff due to their fear of losing jobs and incurring changes in work practices and salaries. Also, the virtual centre implies significant long-term investment, which typically only makes sense at the end of a legacy technology's life-cycle. Additionally, at a political level, location-independent ATC could be perceived by Member States as a threat to national sovereignty over their airspace. Finally, the legal framework of European ATM must be modified in order to allow for data sharing and service provision among ANSPs. No doubt, ATM is a conservative sector in which technological modernisation can be implemented, at best, in an evolutionary manner. And such evolution, if it ever to take place, must thus be accompanied and facilitated by a corresponding evolution in EU regulations.

Airspace Architecture Study

Enters the Airspace Architecture Study (AAS) in March 2019. Developed by SESAR-JU, it aims at reaching a Single European Airspace System thanks to digitalisation and virtualisation of ATM, along the lines initially proposed by Skyguide's virtual centre. In order to implement such a Single European Airspace System, the current airspace architecture is to be modified, more precisely duplicated by the addition of data and application services layer in between the ground infrastructure and air traffic services. Ultimately, decoupling the provision of raw data and air traffic services, it is argued in the study, will improve airspace organisation, notably thanks to higher levels of automation and the active use of common ATM data services. This new model for ATM data service provision would be supported by the creation of dedicated ATM data services providers (ADSPs), who would provide flight data, Aeronautical Information Services (AIS), Meteorology (MET) and Communication, Navigation and Surveillance (CNS) services to ATSUs regardless of flight information regions (FIR) boundaries.

The AAS considers virtual centres as one, if not the key technology to enable a Single European Airspace System. Specifically, virtual centres, it is argued, make a geographical decoupling between ADSPs and ATSUs possible. This, in turn, allows for location-independent ATC service provision: in its virtualised configuration, a single ATSU might use ATM data services from multiple ADSPs, and, inversely, one ADSP might be able to serve multiple ATSUs. Such flexibility is expected to increase competition for the provision of services, hence increasing cost-efficiency and scalability. The AAS anticipates that the implementation of virtualised services could be implemented by 2030.

Wise Persons Group

2018 saw the creation of the Commission's "Wise Persons Group" on the future of the SES. Motivated by the persistence of airspace inefficiencies and their negative impacts on the travelling public and the airspace users, the group was charged with producing recommendations as to the direction that European ATM should take. In April 2019, the group published its Report, issuing a set of ten recommendations.

The Report reinforces messages of the AAS, among which, the need to optimise airspace by embracing new technologies and automation. Building on the AAS, the Report calls for transforming its recommendations into an actionable roadmap to be reflected in the ATM Master Plan, thus lifting the concept of ADS onto the EU policy agenda. The Report underlines the need to ensure that the right governance be put into place to drive this transformation, which in turn is to be overseen by the European Commission.

The European Green Deal and the Sustainable and Smart Mobility Strategy

Digital technologies have been consistently acknowledged as critical enablers for reaching the EU's climate and sustainability goals. In December 2019, the Commission published its action-plan towards a climate neutral economy, the European Green Deal, which identifies the modernisation of the SES regulatory framework as one of the key measures to "help achieve significant reductions in aviation emissions". This is reiterated in the Commission's subsequent Sustainable and Smart Mobility Strategy (SSMS), which highlights the role of digital ATM infrastructure in reducing bottlenecks and in enabling flights to depart and arrive more punctually. What is more, the Commission's post-COVID-19 stimulus package, the Resilience and Recovery Facility, is framed as an opportunity to transform the transport sector, whereby green and digital spending are its guiding principles.

SES II+ proposal

Building on the above, in September 2020 the Commission proposed the long-awaited upgrade of the SES

regulatory framework, in order to modernise the management of European airspace and to establish more sustainable and efficient flightpaths. Among other things, the amended SES II+ proposal calls for the creation of an EU market for agile ATM data services provision and incentives. The proposal was originally tabled already back in 2013, but culminated in a dead-end during the subsequent negotiations. One of the main blocking points of the unsuccessful 2013 reform attempt was the proposal for a mandatory vertical unbundling of ANSPs (i.e., mandatory separation of en-route air navigation services from other air navigation services, such as air traffic data services, communication services and meteorological services), which was deemed politically unacceptable by Member States.

Bearing this in mind, the Commission's new SES II+ proposal takes a softer approach whereby monopolistic ANSPs would be allowed to voluntarily procure air navigation services necessary to control air traffic, in particular data services. This, in other words, means that ANSPs are free to continue providing all the services in an integrated manner, but they cannot hinder other providers from offering competing services. The Commission also proposes a modification of the rules governing the availability of and access to air traffic data, so as to facilitate the provision of air traffic data services on a cross-border and EU-wide market. The creation of such a data market, where providers can purchase data as opposed to producing it themselves, is hoped to enable cost savings along the lines of the AAS. Conversely, only the air navigation services that are not provided under market conditions would be subject to economic regulation, and have their costs and service quality levels scrutinised.

… and now in the hands of the co-legislators and the Commission

There is firm agreement within the aviation sector that European ATM needs to be reformed to cope with both the sustained air traffic growth over the last decade and with significant, unforeseen traffic variations, such as those caused by the COVID-19 pandemic. This, in turn, calls for regulatory changes that promote a safe, cost- and flight-efficient European ATM system that will support the measures outlined in the European Green Deal and reduce aviation emissions. Once the pandemic is contained, it will be even more crucial to increase resilience, scalability and sustainability in the management of manned and unmanned air traffic.

Clearly, important momentum has built up over the past years, notably through the AAS, and the subsequent Wise Persons Group Report, on the need to overhaul European ATM with a key role attributed to digitalisation. In its subsequent European Green Deal and SSMS, the von der Leyen Commission pledges to progress work on its proposal towards a truly Single European Sky in order to help achieve significant reductions in aviation emissions. After having developed a clear vision and tabled the promised proposal for the upgrade of the SES, however, the Commission now needs to steer the co-legislators and the different technological actors into the right direction, as negotiations between the EU Member States and the European Parliament on the SES proposal basic are still ongoing.

Enormous technological progress has been achieved to date. However, technology alone will not suffice in getting us to this efficient European ATM system. Rules and institutions will have to evolve to accommodate or simply to allow these technologies to be deployed. Indeed, the pursuit of the SES has been a big European laboratory which has given rise to all kind of technological innovations, but if the rules of the game do not change now and do not allow at least some of these technologies to be rolled out, this will hamper the development of many innovative European firms and ultimately the European air transport industry altogether.[4]

ANSPs, in particular, will be decisive in driving the technological change, yet the barriers and risks they currently face will have to be addressed. While it is becoming increasingly clear that public funds will not be used for incentivisation purposes, early adopters will have to be rewarded by means of direct financial support or via links to the performance and charging regimes. Conversely, disincentives for late movers will also have to be envisaged. A future performance scheme should only allow cost levels that are equal to or below that of the corresponding data services in Europe. ANSPs whose systems are at the end of the life cycle should be motivated to switch to service-based technology. This could be encouraged by supporting the purchase of services (OPEX) more than the investments in own systems (investments). The European Commission will have an important role to play in overseeing progress and in ensuring interoperability. In this respect, the performance and charging schemes along with the role of the Network Manager will have to revisited, with a view to facilitating new capacity for on-demand services and improving the system's efficiency and resilience.

[4] Finger, M., Bert, N., and Kupfer, D., (2014), Making effective use of technology in SESAR deployment, https://cadmus.eui.eu/bitstream/handle/1814/39128/ETR_Observer_2014_04.pdf?sequence=1&isAllowed=y

Back in 2010, air travel across Western and Northern Europe was severely disrupted as a result of volcanic eruptions in Iceland. The absence of a coordinated European response to the crisis, leaving millions of air travelers stranded, was a clear illustration of the insufficient progress towards an efficient ATM system and a truly single European airspace. While the event built up momentum for an overhaul towards a unified ATM system, it was short-lived in nature. Ten years later, today, the COVID-19 crisis offers a second chance to redesign the system by taking advantage of the low traffic period to invest in the necessary technological and infrastructural changes and, most importantly, to put into place a conducive regulatory framework.

A Smarter Single European Market: Building European Digital Networks on Top of Fragmented Infrastructures

Juan Montero *, Matthias Finger **

Digital platforms provide new instruments to complement and perhaps to complete the European internal market in the traditional network industries. Over the last 35 years, EU policies in telecoms, energy and transport have eliminated national state-owned monopolies but they have not always led to the creation of an effective internal market in each industry. European players have rarely emerged, but on the contrary, the number of players has multiplied as markets have been vertically separated (railways and energy) and also horizontally (more competitors). Digital technologies enable a new form of construction of the internal market in the network industries. Instead of European players owning assets in all the continent, digital platforms are in the position to build virtual networks on top of fragmented assets and services managed by third parties, providing a seamless experience to users. In this sense, digital networks are a new tool to build a smarter internal European market.

The limitations of the current policy instruments when constructing the internal market in the network industries

The construction of the single market has been the guiding purpose of the European Union since the adoption of the Single European Act in 1986. The network industries, communications, energy and transport, have been deeply transformed as a result of it since: national state-owned monopolies have been unbundled and competition has been introduced in most industries. However, after 35 years, this deregulation strategy may have reached its limits in the network industries, not the least because of digitalisation (Finger at al., 2019).

National state-owned monopolies were a structural obstacle for the construction of the internal European market from the very beginning. State-ownership was not a problem in itself, as the Treaty has always been neutral regarding ownership. Even exclusive rights might have been compatible with the internal market idea, if defined at a European scale and by the Commission. Rather, it was the national boundary of the state-owned monopolies that was incompatible with the objective to construct the internal European market.

De- and re-regulation was the mechanism by which the internal market was built in the network industries. Exclusive rights were declared incompatible with the Treaty, starting in telecommunications, and later in postal services, electricity, gas, air transport, railways and so on. EU legislation introduced competition in the network industries, expecting that market dynamics would overcome national monopolies and that the industries would consolidate around European players in the position to compete at a global scale. This objective would be complemented by way of the harmonisation of the liberalised markets thanks to common rules about market entry, common public service obligation frameworks, common network access obligations, etc.

Competition *in the market* yet on the basis of a monopolistic EU-wide infrastructure was considered to be the main instrument to overcome economic (and political) nationalism. The introduction of competition was not specific to the network industries, but was applied transversally to most industries and through very different policies, from competition law to tendering.

However, in the network industries liberalisation and competition has faced specific obstacles. Some infrastructure appeared to be irreplicable, confirming their natural monopoly nature, as it is the case of railroads and some electricity transport infrastructures. In other infrastructures such as ports and airports and some telecoms infrastructure in rural areas, the scope for competition was very limited. The EU developed a harmonised framework for the regulation of such infrastructures, mostly around the concept of network access, so as to foster competition in the provision of services on top of and thanks to these infrastructures. This is a process that has proven successful in telecommunications, but it is still work in process in other network industries.

Other instruments targeted the interoperability of the existing national networks along with investments in missing cross-border infrastructure links. Fostering interoperability among the previously fragmented national

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infrastructures has been a useful tool of the EU policy for the construction of the internal market in the network industries. Interoperability was a given in industries such as telecommunications, as telecom developed thanks to global standards. Air transport was also always international in scope, with a high degree of interoperability across borders, but fragmentation in air traffic management has remained an obstacle for more efficient operations. Interoperability has been an important obstacle in industries such as railways, as infrastructure standards evolved mostly at a national level, making it difficult for trains to travel across borders (different rail gauges, different signaling systems, different electricity tension levels and so on). EU legislation, standardisation policies and financing had as a priority the interoperability of the national networks.

After 35 years of construction of the internal European market in the network industries, it is possible to identify the limitations of some of the above policy instruments. Infrastructure remains still too often developed and exploited according to national policies, Competition does not sufficiently discipline infrastructure managers across the continent. Competition is however more effective in the service layer, but contrary to the original expectations, very limited consolidation has taken place and no real European players have emerged in telecoms, electricity and transport (maritime and aviation might be an exception). Infrastructure services markets are more fragmented than ever, and this is in part due to EU policies: network industries have been vertically fragmented in energy and railways; in addition there has been also horizontal fragmentation as national monopolies have been replaced by a number of competitors in each national market.

Still, we do not imply that the internal market policy should be reviewed. On the contrary, we suggest that new and additional instruments might be necessary to reach the still valid objective of building internal European infrastructure markets. In addition, we think that digitalisation offers interesting instruments to build European networks on the data layer, on top of fragmented infrastructure managers and services providers.

Digital platforms as the new network industries

Literature on digital platforms has underlined the power of digitalisation in order to overcome fragmentation by building new and powerful complementarities on top of fragmented ecosystems (Montero & Finger, 2021). In economic terms, digital platforms build network effects: direct, indirect, and algorithmic ones.

Digital technologies reduce transaction costs, facilitating coordination at a scale that was previously unthinkable. Social networks such as Facebook and communications platforms such as WhatsApp build communities or clubs (e.g., "club effects") composed of unprecedented amounts of members. Digital platforms achieve this thanks to so-called direct network effects: the more users in the network, the better it is for all other users.

Furthermore, digitalisation enables interactions, not only among member of the same group (telephone users, members of a social network), but also across different groups composing the ecosystem by creating so called "indirect network effects". Social networks enable the interaction of users with advertisers. Transport platforms enable the interaction of passengers with different transport modes (taxis, shared-bikes, public transport, etc.). Platforms create new complementarities leading to what has been named as "multi-sided markets" (Rochet & Tirole, 2003).

Even more transformative is the fact that digital platforms build such network effects on top of assets they do not own but are owned and operated by third parties. Traditionally, in the network industries network effects were created and exploited by corporation that would acquire the fragmented assets and would coordinate them inside a single hierarchical organization. State-owned infrastructure monopolies were the typical example. They would build and operate all the infrastructure in a country, coordinating the different pieces of infrastructure into a coherent network, and then exhaust the network effects.

But contrary to the traditional network managers, the most successful digital platforms do not own the assets they coordinate: Airbnb does not own any real estate, Uber does not own any vehicle, YouTube does not produce content and distributed electricity platforms do not produce any electricity. They are not active in the infrastructure layer and do not own the physical assets. And they are not active in the services layer either, as they do not provide the transport or the media service. They are only active in what we can call the data layer. They merely extract data and use sophisticated machine learning algorithms to identify and exploit complementarities between assets and services provided by third parties, ag-

gregating such assets and services to exploit direct and indirect network effects.

Big Data and machine-learning algorithms allow to effectively manage systems with billions of users and interconnected assets. Network effects can create value, but they can also become negative, when additional users only add congestion to the network. Digital networks, however, are different. Contrary to the traditional physical networks, which tend to become congested when the network grows beyond a certain point (a phenomenon called "tipping"), digital networks can actually grow beyond such thresholds: the larger the data collected by the platform, the more data can be fed to the machine-learning algorithms, and the better the platform becomes in its role of system coordinator. This is an effect we have named "algorithmic network effect". It has proven powerful in markets such as internet searches: the more searches an engine manages, the netter the engine gets, particular with rare searches, the more a user uses a social network, the more data the network has about the user, and the more personalised the ads served to the user, the more revenue can be generated by the platform from advertisers, and so on.

For all these reasons we think that digital platforms are the new network industries.

Smarter European networks

Europeans can already experience the first European digital networks built by platforms on the data layer on top of fragmented assets. Platforms such as Airbnb offer an app to contract accommodation all around Europe through a single window and a seamless experience. Airbnb did not build a network of hotels with thousands of rooms across the continent, adapting their assets to local regulations, etc. They built a network on the data layer, coordinating the assets of thousands of real estate owners through common standards defined by the platform. Similarly, Europeans can enjoy an internal market in urban transport services (at least taxi and Private Hire Vehicle services) through platforms such as FreeNow (previously MyTaxi) and Uber, among others. The underlying assets and services were particularly fragmented, with tens of thousands of services providers and very different local regulations. Digital platforms have already succeeded in building seamless experiences for Europeans, who, thanks to digital technologies, are provided with single windows to contract services all around the European territory, be it in shopping, lodging, or travelling.

This business model can be extended to all the traditional network industries, as digital platforms have the potential to build European digital networks on top of fragmented national infrastructures. Platforms can aggregate previously existing assets and services into a coherent and efficiently coordinated system for the benefit of users. Still, in doing so, platforms face important challenges.

Firstly, the EU aims at constructing so-called "data spaces", whereby data can be safely stored, accessed and exchanged. Eight such data strategic dataspaces have been proposed so far, among which a mobility and an energy data space. Such data spaces also have a physical element: data should be physically located within EU territory, and the control over the corresponding infrastructures (e.g., data centers, European cloud services, etc.) is necessary in order to guarantee resilience and control. The corresponding governance of such data spaces is currently being defined.

Secondly, data sharing is perceived by EU policy makers as necessary for the full digitalisation of complex ecosystems formed by multiple players. In such ecosystems, digitalisation has to be a shared effort, with common standards in the definition of the data to be shared, standards about data quality and others more. The Commission also supports voluntary data sharing schemes.

The most delicate debate is around the need to impose data sharing obligations upon specific players. Commercial negotiations are considered to be the default mechanisms for players to share data. However, bottlenecks are increasingly becoming evident. There are players who refuse to share data with other members of their ecosystem, thus impeding the full potential of EU-wide network effects. This is something particularly obvious in the network industries, where especially the traditional infrastructure managers with market power are reluctant to share their data with new entrants. They will also be reluctant to make their data available in the European data spaces.

There is an increasing body of legislation imposing data sharing obligations on traditional players in the network industries. A good example is the creation of the so-called National Access points with whom the traditional physical services providers will have to collaborate and

to whom they will have to provide at least some of their data.

While collaboration in the form of data sharing seems to benefit the final user, it is also true that data sharing can modify the balance of power and disrupt traditional players (Montero & Finger, 2017). It can seem that the traditional monopolists in the network industries are abusing their market power by refusing to make available some of their data to small start-ups, but the experience in other industries (from newspapers to music and postal service) shows that platforms have the ability to very rapidly disrupt the seemingly solid position of the most established companies. Any data sharing obligation has to take into account not only the current balance of powers, but also the potential evolution of the market once it is "plaformised" and the risk of platforms becoming "gatekeepers", For this reason, data sharing obligation have to be defined with caution, taking into account the long term consequences, and defining a balance between the obligations imposed on traditional players and the obligations imposed on the platforms to share their data.

Thirdly, in the network industries, data in itself has a limited capability to modify the physical reality, as it happened in the content industries. The interactions enabled by platforms in the network industries will often require an active collaboration of traditional players to make the transaction a reality. In other words, the debate on data sharing often expands beyond the mere sharing of data. A good example is the debate on port calling. Today, there is little coordination between ports and shipping companies. Ports do not know when vessels will be arriving to port, and shipping companies have little incentive to provide such data to ports, as ports do not commit to serve vessels at a predefined time slot, but merely serve them on a first com first served basis. Data sharing for port calling would only have a substantial impact on efficiency if shipping companies would be obliged to respect announced arrival times, and ports would commit to serving vessels at the appointed time slot. As we can see, the digitalization of port calling requires something more than the mere exchange of data.

Similarly, it is common to refer to data sharing in transport ticketing when platforms are not only interested in transport data, but also on the possibility to sell transport tickets as distributors. Platforms have the ambition to disintermediate traditional transport companies, aggregate supply from different providers and monopolize the relationship with passengers and shippers. It is therefore understandable that traditional players are reluctant to share their data under these circumstances.

Conclusions

Digitalisation and platforms offer new instruments to build the internal European market in the network industries. The more fragmented an industry is, the more advantages can be reaped from the use of digital technologies to coordinate it. As network industries in Europe are still very fragmented, and have become even more fragmented as a result of their liberalisation, digital technologies have a unique opportunity in these industries to build value by coordinating the fragmented assets and services into smarter European networks as well as into a smarter single European market.

However, building a smarter Single European Market in the network industries poses very significant challenges. The right balance has to be reached between the traditional players and the digital platforms. While data sharing obligations can accelerate the construction of European digital platforms, the same obligations can also create an unbalanced playing field by accelerating winner-take-all dynamics at the platform level. Consequently, not only regulation of data sharing, but also regulation of platforms will be needed.

Finally, being network industries services of general interest, it is important to ensure the continuity and resilience of such services and the control of the new coordinators (platforms) by European public authorities so as to preserve and perhaps even enhance the general interest.

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The Rise of the New Network Industries

Regulating Digital Platforms

By Juan Montero, Matthias Finger

Edition: **1st Edition**

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ABSTRACT

Cutting through the confusion around the nature and implications of digitalization, this book explores the rise of the new digital networks, how they affect traditional infrastructure, and how they will eventually need to be regulated. The authors examine how digitalization affects infrastructures in telecommunications, transport, and energy, and how digital platforms establish themselves as a new network on top of and in addition to traditional ones.

Complex concepts are introduced through short and colorful stories about the founders of the most popular platforms (Google, Facebook, Skype, Uber, etc.) and how they grew to positions of power, drawing parallels with century-old traditional network industries' monopoly power (AT&T, General Electric, etc.). The authors argue that these digital platforms strongly interfere with traditional infrastructures that are heavily regulated and provide essential services for society – meaning that digital platforms should be considered as a new and much more powerful type of infrastructure and will require regulation accordingly.

A global audience of policy makers, public authorities, consultants, lawyers, students, and academics, as well as anyone with an interest in these digital platforms, will find this book enlightening and essential reading.

For more information you can click here

networkindustries quarterly

Network Industries Quarterly, Vol. 23, issue 3, 2021 (September)

'Infrastructure Investment Challenges: reconciling Competition, Decarbonisation and Digitalisation'

Presentation of the next issue

Investment has always been a challenge in the network industries. Since the 1990s liberalisation has exacerbated this challenge, owing to the different time horizons between the interests of the private sector, the long-term nature of the infrastructure assets and their public service nature. Climate change and the need to decarbonise the infrastructures, as well as the recent focus on digitalisation have only added to the investment challenges in the different network industries.

How can we ensure investments in the context of competition, decarbonisation and digitalisation? What should be the role of governments and that of the private sector? How should the right incentives be set?

The next special issue of the Network Industries Quarterly will be dedicated to some of the best papers that were presented at the 10th FSR Annual Conference on the Regulation of Infrastructures "Infrastructure Investment Challenges: reconciling Competition, Decarbonisation and Digitalisation', which took place on June 10 and 11.

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Open Call For Papers

Implementation of the liberalization process has brought various challenges to incumbent firms operating in sectors such as air transport, telecommunications, energy, postal services, water and railways, as well as to new entrants, to regulators and to the public authorities.
Therefore, the Network Industries Quarterly is aimed at covering research findings regarding these challenges, to monitor the emerging trends, as well as to analyze the strategic implications of these changes in terms of regulation, risks management, governance and innovation in all, but also across, the different regulated sectors.
The Network Industries Quarterly, published by the Chair MIR (Management of Network Industry, EPFL) in collaboration with the Transport Area of the Florence School of Regulation (European University Institute), is an open access journal funded in 1998 and, since then, directed by Prof Matthias Finger.

Article Preparation

The Network Industries Quarterly is a multidisciplinary international publication. Each issue is coordinated by a guest editor, who chooses four to six different articles all related to the topic chosen. Articles must be high-quality, written in clear, plain language. They should be original papers that will contribute to furthering the knowledge base of network industries policy matters. Articles can refer to theories and, when appropriate, deduce practical applications. Additionally, they can make policy recommendations and deduce management implications.
Detailed guidelines on how to submit the articles and coordinate the issue will be provided to the selected guest editor.

Additional Information

More Information

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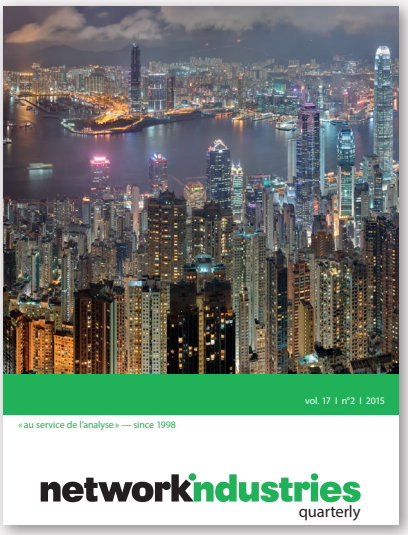
Published four times a year, the **Network Industries Quarterly** contains short analytical articles about postal, telecommunications, energy, water, transportation and network industries in general. It provides original analysis, information and opinions on current issues. Articles address a broad readership made of university researchers, policy makers, infrastructure operators and businessmen. Opinions are the sole responsibility of the author(s). Contact *fsr.transport@eui.eu* to subscribe. Subscription is free.



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