

NGI101x - The evolution of infra-systems

Welcome to “The evolution of infra-systems: a historical perspective”, my name is Johan Schot, professor in History of Technology and Sustainability Transitions from University of Sussex Science, Technology and Policy Research Unit, in short SPRU.

This lecture will deal with the question how infra-systems we know today came into being?

I will address this very broad question from one specific angle which is the problem of interoperability across borders. This is the ability of specific infrastructures to connect up to other infrastructures in other countries.

Such interoperability is key to a successful development of infrastructural systems, since they can only function when they are a network, not only on a national level but also beyond.

Let me introduce the importance of this issue through an example: the so called Berne key. What is the Berne key? It is a key designed for the first time in 1886 and used to open wagons when they crossed borders. Why was this such an important innovation and pivotal for the development of the rail system in Europe? Since this key made it possible to travel across the Europe without needing to transfer freight from one kind of wagon to another at the borders of different national railway systems.

Before this invention, there were several different keys, standardization was lacking. It took many years of international negotiations to come up with design. This happened between 1878 and 1886. Why did it take so long? Because companies and nation-states could not decide on which key should become the main key. They all promoted their own solutions. The design visible on the picture is typically European compromise: it combines a French and German key into one. But we have to recall and understand that interoperability is never easy and will always be based on compromises.

The Berne Key is a symbol for many other similar inventions. Think about it! In the nineteenth century many hundreds of smaller railway networks in Europe that all had started as local lines and networks run by private companies had to connect up? How could they connect up? After all, they used different gauges, trains, wagons, platform technologies, signaling systems etc. All these technologies had to become interoperable.

This process was further complicated by two facts. First companies were competing for traffic, and second, nation-states wanted their national champions to win the game. Hence standardization was shot through with tensions.

How was then interoperability achieved? How was it made possible that in 1900 passenger and freight could move all over Europe in large numbers?

The answer is that the negotiation about standards was delegated to a community of experts, on the national as well as the international level. They became the mediators of the

tensions between companies and states about standards. How did they achieve this aim? Through the development of a specific philosophy on how to negotiate interoperability, I would like to refer to as technocratic internationalism.

What is technocratic internationalism? It is a background ideology, which has determined the historical development infrastructures during the twentieth century. It rests on three elements.

First, it assumes that nation-states are a natural unit for infrastructure development, and national governments should use infrastructures as a public utility, which brings welfare to people. International, European and Global network development is not in conflict with national network development. On the contrary European and Global networks should be built out of national networks.

Second, infrastructure building across borders can help to avoid conflicts between nation-states since they connect people and this will create mutual understanding, cooperation and peace. This is the myth of the network. It is a myth because infrastructures have often been used for military purposes and its use led to conflicts as much as to cooperation.

Third, infrastructures should be developed by experts, not by politicians. The political and technical should be treated as separate spheres, and as much power as possible should be delegated to experts. This will automatically lead to the best solutions. Supposedly ideological neutral engineers will find and implement optimal solutions both on the national and international level and be able to harmonize national and international developments. In short the question how to create a European railway, or any other infrastructure should be left to experts. They should decide how the train will go from Amsterdam to Paris and where it should stop. Needless to say that experts were far from neutral. On the contrary they often stood behind specific political and nationalistic aims. Yet, it is true that technification of problems might create a basis for negotiation and conflict resolution.

The model of delegation of negotiation to experts had persuasive and path-dependent impacts on the governance of the infrastructure industry. I want to highlight two impacts:

First, it became an expert driven national industry, with high ideals. Infrastructures became public utilities. The experts wanted their systems to serve the people but without any explicit involvement of the public.

Second, it became an industry dominated by national systems which were connected internationally. Experts controlled both the national and international level, and this made it possible for them to create interoperability. They agreed on voluntary standards among themselves on the international level which they then could implement nationally.

When the European Economic Community was set up during the 1950s it wanted to develop a new European infrastructure policy in which nation-states would transfer their power over

national infrastructure development to the Community and the EU would create one liberalized market, also for communication, transport and energy services.

The EEC promoters also embraced the working methods of technocratic internationalism, in particular delegation to experts, but they wanted experts to serve a new political project: the integration of a new liberalized Europe.

This did not happen because experts in the industry did not want to work with the European Economic Community. Why not? After all, also the Community preferred an expert driven model, yet one in which experts would triumph European Union ideals and not national ones.

The experts perceived the Community as a political project and a technical suboptimal one. For example, the Community only consisted of six nation-states: Italy, Germany, France, Luxembourg, Netherlands and Belgium. How could this be a rational basis for expert driven decision-making about infrastructure networks? Why should only experts of these countries be involved and not others?

In addition they did not believe in liberalism, but in national public service and national monopolies for energy, transport and communication provision.

In addition, they believed they did not need a new actor such as the European Economic Community which later became the European Union. They had an alternative. They could build European networks themselves, through their own expert-led organizations which were already connecting national networks. They perceived the new Community as a direct competitor.

In the 1980s the EU had gained a lot of power. It was enlarged and it had become clear that the enormous internal growth of trade, among others also made possible by the expert driven technical interoperability for communication, transport and energy infrastructure developments could not handle all problems any more. The system got jammed. New solutions were necessary. This paved the way for a new initiative called the Trans-European Network Initiative.

In the 1980s the European integration process got traction again, now under the banner of the completion of the internal market. The idea was, among other things, we have to reduce all barriers due to lack of operability of infrastructure networks, and construct new missing links. These were missing links from a top-down European vision.

This time infrastructure experts aligned themselves with the EU, also because the EU continued to be an expert driven organization, they felt comfortable with. But also because they felt they could gain more by cooperation than resistance. The EU delegated the choice of new projects to experts, without much involvement of stakeholders and in particular the broader public. In this sense the EU followed the technocratic internationalist work methods.

Although this time many experts were willing to work the EU, and the EU needed the support of experts, however they also had their doubts about the EU political project of integration. In particular its liberal face. The projects they proposed were in principle national projects, which they relabelled as European, and they resisted full liberalization of European infrastructure markets.

The future of the Trans-European Network Initiatives is open. Old Dilemmas are haunting its development. Yet it is also clear that globalization is demanding governance of infrastructure to move to new levels, and a complete return to the public utility ideal is not possible.

Technocratic internationalism is still very strong, but is moved from the national to the European level. It sits uncomfortable, however, with the liberalistic tendencies of EU policy making and nation states wanting to keep and regain control over the future of their infrastructures, which they consider as vitally important for the future of the nation-state itself. Yet it is also clear that globalization is demanding governance of infrastructure to move to new levels, and a complete return to the public In addition, technocratic internationalism sits uncomfortable with the wish for stronger public participation and control over infrastructure development. The dilemma is how to combine technocracy and democracy. Many European citizens do not want experts to design new infrastructures without any direct public involvement. Yet it is unclear how to organize this involvement, and combine it with the necessary expert knowledge.