Engineering Expertise and the regulation of international telecommunications in Europe from the 1950s to the 1970s

Christian Henrich-Franke

“To work successfully in this field both professional knowledge and multiple personal contacts are necessary. The latter, however, depends on many years of active participation and experience. Therefore, it is important to consider these aspects when staff for international matters will be transferred.”

Helmut Bornemann, Secretary of State in the German PTT-ministry (1963-1968)

I. Introduction

On October 26, 1966, in a letter to the technical department of the German ptt\(^2\) administration, the secretary of state, Helmut Bornemann, signals the importance of professional knowledge, socialisation within an institutional arrangement of the telecommunication sector and personal networks for the international regulation of telecommunication networks. Implicitly, Bornemann points out that a membership in a transnational community of experts was a prerequisite to negotiate telecommunication standards on the international level successfully. Having been part of that community since the 1930s, he was an insider in the issue and warned his successors in the technical department to comply with traditional rules of expert governance in the telecommunication sector.

Starting from Bornemann’s statement about the key role professional knowledge, personal networks and socialization, this paper asks for the impact of transnational expertise and expert communities for the standardization and regulation of international telecommunications. It raises the

1 Letter by Helmut Bornemann to the German ptt administration’s technical department, Bundesarchiv Koblenz, B257/15523.
2 PTT is the acronym for postal, telegraph and telephone, which often were united into one administration. Usually the administrations were also responsible for radio. Here, I will use the term telecommunication for telegraph, telephone and radio.
overarching question: In how far can an analysis of the regulation of transborder telecommunication infrastructures in Europe between 1950 and 1970 increase our knowledge on transnational expertise and expert communities? How did the community of telecommunication engineers come into being? How did it react to changing external environments? Which was the internal design of the expert community? Why and at which point in time was the expert community accepted as a legitimated standard-setter?

To answer these questions, the paper combines a structural with an actor-centred approach to the topic. It will illuminate three important aspects of transnational expertise and the expert community in the field of telecommunications: (1) *The origins of the expert community*: The first part of the paper illustrates that institutional structures as well as the norms and guidelines for the regulation and standardization are the result of a long historical process up to World War II. Since the 19th century an expert community of telecommunication engineers emerged which developed its own guideline for behaviour: a ‘standardization culture’. (2) *Processes of adaptation to changing environments*: In the second part the paper discusses two examples for the most important changes in the external environment between 1950 and 1970: the Cold War and European Integration. The first one will deal with the negotiations at the International Telecommunication Union’s (ITU) World Administrative Radio Conferences (WARC) and the second with the standardization of intercontinental switching telephone exchange. Both cases show that institutional structures became redefined to maintain the expert community’s mode of operation. (3) *The role of individual actors*: In its third part, the paper traces the career of Helmut Bornemann in order to examine the role of individual actors, their socialisation and the interdependencies between actors and institutions. Bornemann’s career is just one typical example among other similar careers from engineers across Europe, which could have been presented here. (4) The fourth part analyses the empirical studies and answers the guiding questions.

The role of experts in the transnational regulation of infrastructure networks has been widely studied in the context of the Tensions of Europe network in the last decade. Expert cooperation and their participation within international organisation have been viewed as one part of the story
about the ‘hidden’ integration of Europe by infrastructures. Even the telecommunication sector has been analysed in that context. The studies unanimously underlined the particular style of international negotiations amongst engineers, which was either called ‘technocratic internationalism’ or ‘epistemic expert regulation’. According to these studies since the 19th century experts “sought to fill an emerging regulatory gap” for international technology standards with their own expertise and agenda. They formed “stable expert networks” but the “delineation and maintaining of the boundaries with the political world was not always easy”. These studies serve as a starting point, however, this paper will more systematically explain the stability and nature of expert communities.

II. The origins of the expert community

Since the 19th century international telecommunication standards were negotiated by telecommunication experts (engineers) from monopoly administrations rather independently within the International Telecommunication Union (ITU). The ITU introduced a governance structure that separated politics and expert governance already in 1875. It was composed of two types of conferences: first, the ITU’s plenipotentiary conference,

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8 The ITU was originally formed in 1865 as International Telegraph Union and renamed into International Telecommunication Union in 1932.
where governmental representatives could meet to discuss the Telecommu-
unication Convention, which laid down the organizational structure and
fundamental rules for telecommunications; second, the administrative con-
ferences for telegraph, telephone (since 1885) and radio (since 1906),
where technical experts (mostly engineers) met to negotiate the Telecommu-
nication or Radio Regulations, which contained more variable regul-
atations and standards that needed to be adjusted to the technical and opera-
tional development of telecommunications. This division initiated an en-
during process of turning international telecommunication governance into
an engineering affair. On the one hand, the plenipotentiary conference was
called only once between 1875 and 1947. On the other hand, the adminis-
trative conferences were called ever more frequently in order to adjust in-
ternational regulations to a technology developing rapidly. Experts more
and more autonomously governed international telecommunication links.¹⁰

Subsequently, a ‘standardization culture’ emerged as a transnational
guideline for the behaviour in and the outcome of processes of standardi-
ization and regulation of international telecommunication infrastructures
and equipment. It was based on two elements that combined professional
knowledge of an engineer with national protectionism and sovereignty.
First, standardization and regulation within an independent committee of
engineers was established as the sole way. Second, international intercon-
nectivity¹¹ became the major guideline. Interoperable networks¹² and high-
level integrated networks were not envisioned. The national (sovereign)
right to shield terminal equipment by incompatible national standards was
not disputed as long as this allowed international connections.¹³ Standards
and regulations that were negotiated by following the ‘standardization cul-
ture’ were well balanced. The ‘standardization culture’ was ‘politically’
够 enough to protect national markets and it was ‘technically’ enough to en-
able the interworking of telecommunication networks. Therefore, the ex-

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10 G. Coddington (1952) The International Telecommunication Union. An Experi-
ment in International Cooperation (Leiden, Brill).
11 Interconnectivity is the ability to connect technologically separated infrastruc-
tural systems at interfaces.
12 Interoperability is the ability to merge infrastructural systems, enabling the ex-
change of system components between different systems.
13 C. Henrich-Franke (2014) “Regulating Intra-European Connections: telecom-
munications and European integration 1950-1970.” In L. Mecchi, G. Migani,
and F. Petrini (eds.), The UN and European construction: a historical perspec-
tive (Cambridge, Cambridge University Press), pp. 77-94.
pert’s autonomy depended on a ‘tacit political agreement’ between the experts and the political authorities.

The interwar years marked an important period for the consolidation of the transnational telecommunication expert community. Between 1924 and 1927 the ITU members set up three consultative committees (telephone/CCIF; telegraph/CCIT\(^14\) and radio/CCIR) to prepare recommendations for technical and operational standards which did not violate national sovereignty. The European telephone network, for example, which was build up in the 1930s, enabled pan-European connections but, for example, a French telephone could for technical reasons not be used in the German network. To underline the experts’ independency, the CCIs remained independent from ITU, even though their tasks were connected to ITU issues (see graph 1). Internally they brought together experts from the administrations and the industry to address international standardization issues.\(^15\) Professional education as an engineer was the prerequisite to membership in the CCIs and prevented ‘non-experts’ from entering. The national administrations, which appointed staff for the CCIs, kept an eye on this issue. To become an accepted member of the expert community, however, the engineers had to be able to negotiate standards and regulations according to the ‘standardization culture’.

The CCIs and its study groups only issued non-binding recommendations, but these had a significant normative impact.\(^16\) They were “the rules of the road for the world’s telecommunication highways”\(^17\) and often put into national law by the national governments. Each telephone wall jack and each telephone set got a seal of approval by the CCIF (since 1956 by the CCITT). Ministers as well as the Foreign Offices got reports about the CCI’s activities but they hardly commented on them as they saw no reasons to question the output of international telecommunication standardization and regulation. A European telephone network, for example, hardly existed prior to the CCIs. There had been only 28 direct connections be-

\(^{14}\) In 1956, the CCIF and the CCIT merged into the CCITT.


between European major cities in 1922 but when the CCIF took up the matter the number raised to 98 in 1928. In the early 1930s one could speak of a truly pan-European network.\(^{18}\)

Due to the amalgamation of public and private stakeholders, the CCIs accumulated a vast expertise and accelerated the transnational knowledge transfer. It was another tesserae in a long process of transforming engineering experts into ‘de facto’ decision-makers. The typical ‘expert governance’ style, which had begun to take shape in the 19\(^{th}\) century, intensified. The ‘standardization culture’ was the lubricating oil of that type of governance.\(^{19}\)

**Graph 1:** Institutions of international telecommunication regulation in the interwar (source: author)

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The setting up of the CCIs was an important step to subdivide the international telecommunication regime into a political and an engineering arena. On the political arena, at plenipotentiary conferences, political authorities defined binding general rules for transborder telecommunications. On the engineering arena, engineers either negotiated binding regulations for transborder telecommunication at administrative conferences or non-binding standards (recommendations) within the CCIs (see graph 1).

The number of contacts between the national experts increased dramatically, as it actually was a small number of telecommunication engineers that met periodically.20 The several weeks lasting telecommunication conferences, their intensive preparation and the permanent work of the CCIs offered the opportunities for these contacts. Engineers from ptt administrations and the industry met within official meetings as well as within a variety of informal umbrella events like parties or trips to local sights. Bigger conferences even issued their own journals like the ‘Morning Electron’ (Atlantic City, 1947) or the ‘Gazette de Grands Palais’ (Paris, 1949) which were of a more entertaining character to provide the delegates with stories and background information about participants or local particularities. These encounters made telecommunication engineers become better acquainted with each other. Many personal friendships developed regardless of national backgrounds or dividing political ideologies. Sometimes the engineers were accompanied by family members, which also made friends among engineers and their families. Gradually they began to talk about family situations or other private matters. Sharing the ‘standardization culture’ as valuation standard and acting rather independently from political influence the experts had a real transnational character as the common interest was given priority over individual or national interests.21 Trust and friendship among them emerged and the new cadres that were socialised within ITU became intimate with causal beliefs and notions of validity. Trust in institutions was subsequently complemented by trust in other engineers, regardless of their national background.

To sum up, since the mid-19th century an expert community of telecommunication engineers subsequently took shape. The values of the ‘standardization culture’ were the basis on which norms and rules of behaviour among the individual members of the expert community developed. Having an engineers’ professional education was a prerequisite for membership in the expert community whereas the acceptance of the ‘standardization culture’ served as a ticket. On the basis of a ‘tacit political agreement’ with the political authorities, the engineers were able to independently regulate and standardize international telecommunication infrastructures and equipment because they satisfied the national political authorities. Or to put it into other words: experts ‘de facto’ became decision-makers.

III. The Cold War and European Integration: two examples for processes of adaptation to changes in the environment

a) The Cold War and the World Administrative Radio Conferences

The Second World War resulted in a dramatically changed political environment, especially since the Moscow Conference of Foreign Ministers in March 1947. The political tensions arising from the ideological competitions of the Cold War were a high barrier for the administrative conferences, which were scheduled to evaluate telecommunication regulations. Bloc confrontations between East and West challenged the regulation and standardization activities and made a number of conferences and issues fail in the years 1947 until 1950. Rhetorically well-trained diplomats and militaries disputed non-technical matters like participation of particular countries and voting powers. At the World Administrative Radio Conference (WARC) 1947 in Atlantic City, long debates about individual participation of Soviet Socialist Republics delayed the conference.22 Especially the administrative conferences’ general assemblies hosted numerous ideologically charged discussions driven forward by non-engineer actors like foreign offices’ diplomats. The telecommunication engineers, which hadn’t changed since the interwar, perceived these discussions as a threat to the traditional way of negotiating regulations and standards. On the one

hand, their trust in the institutions was upset. On the other hand, they feared a denunciation of the ‘tacit political agreement’ between the experts and the political authorities. The Swedish engineer, Erik Esping, for example, heavily complained about diplomats, which were unable to negotiate without political directives from their Foreign Offices.\footnote{Letter from Erik Esping to the Swedish Telecommunication Administration, Sveriges Riksarkiv (Arninge), Televerket, Ekonomibyrån, F IV:45.}

At the same time, the CCIs restarted their activities already in August 1945 by following the pre-war style of negotiating standards according to the ‘standardization culture’. Although the political environment surrounding the negotiations had changed dramatically, the engineers, their norms and their routines of behaviour in the CCIs had not changed. The engineers found themselves in a strange situation. They were able to successfully and smoothly negotiate telecommunication standards within the CCIs, even though the official rhetoric at the WARC was confrontational. The key factors were the ingredients of the pre-war expert community. The individual engineers on both sides of the iron curtain still shared the ‘standardization culture’ as valuation standard. This had a confidence-building effect and accelerated the re-establishment of the pre-war expert community. Trust in the expert community and its individual members re-emerged and the engineers’ behaviour in negotiations was again predictable and reliable. The numerous national and international reports from the different CCI meetings between 1945 and 1953 clearly indicate the gradual revival of the expert community.

Recognising the continued effectiveness of the expert community the engineers considered solutions to re-establish the traditional style of ‘expert governance’ even at the administrative conferences. The institutional structure of the administrative conference provided a loophole to escape from the looming political tensions. The engineers began to relocate decision-making from the general assemblies, where decisions about telecommunication regulations were usually made, to the sub-committees or working groups. Over that, the CCIs increasingly prepared recommendations for the topics, which the administrative conferences had to decide upon. These CCI recommendations were increasingly accepted as binding regulation without further discussion. To get the telecommunication and radio regulations signed by all delegations, the engineers purposefully predefined the general assembly’s decisions by using information asymmetries (expert knowledge) on the technical impacts of telecommunicatio-
tions. In their reports on the content of regulations and standards they simply left no room for additional adjustments and justified their proceeding with technical arguments. At WARC 1951, for example, the Swedish engineers successfully negotiated radio beacons for the Baltic Sea with their ‘very congenial’\textsuperscript{24} Soviet counterparts at the ITU’s entrance hall. The results of these informal talks were the basis for a recommendation, which was accepted by the general assembly.

The well-established division between a political and an engineering arena, which prior to the war ran along the line of plenipotentiary and administrative conferences, became implicated in the administrative conferences. The general assembly was in many respects transformed into a battlefield for political issues; meanwhile the engineers in the sub-committees de facto decided on technical regulations and standards. Politicians and engineers tacitly accepted that style of decision-making. On the one hand, controversial discussions within the general assembly were accepted by the engineers as a ritual act because in the changed environment of the Cold War ‘politicians had to do their business and we accepted that.’\textsuperscript{25}

On the other hand, politicians and diplomats hardly intervened when the sub-committee reports were put for discussion as long as political objectives like technical progress or the protection of national markets were not violated. The ‘standardization culture’ offered a workable basis. It again equipped the engineers with the pre-war approach to standardization that made standards politically acceptable (national protectionism) and technically sufficient (transnational connections).

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\textsuperscript{24} Report to ptt administration’s director, Sven Gejer, Sveriges Riksarkiv (Arninge), Televerket, Ekonomibyrån, F IV:83.

\textsuperscript{25} Unpublished interview with Rudolf Binz, April 2003.
In the engineering arena, even the informal and private connections were re-established. In one case, the wives of a Soviet and a Western German delegate prepared cookies and coffee together to supply their husbands in a difficult night session of an administrative conference. According to their husbands, these ‘Cookies for ITU’ were an important factor for successful negotiations. The German delegate to administrative conferences between 1959 and 1983, Rudolf Binz, explains it as follows: “It was a community that hardly knew grouping from the parties. Therefore, parties were of such importance as the decisions were made there. And, of course,
long-lasting friendships were made.”26 A variety of pictures and private photo albums gives evidence of this.27

Having been unable to sign the final acts unanimously between 1947 and 1951 – just a limited number of issues like the Baltic Sea radio beacons became international law – the final acts of all World Administrative Radio Conferences from 1959 onwards were signed by all delegations and ratified by all governments.

b) European Integration and the ‘Conférence Européenne des Administrations des Postes et des Télécommunications’

When European Integration challenged international telecommunications in the 1950s the experts expanded the institutional arrangements in a way that the division between the political and the engineering arena was expanded in a way that Western European organisations became part of the engineering arena. After lengthy discussions about the founding of a supranational European postal and telecommunication organization according to the style of the European Coal and Steel Community the interadministrative ‘Conférence Européenne des Administrations des Postes et des Télécommunications’ (CEPT) was founded in June 1959 by 24 ptt-administrations from 20 (Western) European countries as a non-governmental organisation solely composed of ptt-administration.28 Even though many protagonists of European Integration spoke in favour of a new supranational organisation, the majority of governments saw no reason for a fundamental change as long as the output of the telecommunication engineers’ regulation and standardization satisfied their needs. The CEPT emerged as a second multilateral pillar for standardization of telecommunication infrastructures in Western Europe and complemented the ITU’s activities from a European perspective. It dealt with matters of importance within Europe and coordinated European positions for the ITU. It

was relevant for the regulation and standardization of telecommunication infrastructures as it prepared the negotiations within ITU and dealt with standard setting for intra-European purposes. The separation of the political and the engineering arena was adopted by the CEPT and thus the ‘standardization culture’ embraced an even larger number of institutions. Within the CEPT the majority of the work was performed by the same engineers of the expert community, which also met at the ITU administrative conferences or the CCIs.  

**Graph 3:** Institutions of international telecommunication regulation in Europe since 1959 (source: author)

The example of the first transatlantic telephone cable will serve as a basis for the discussion that the CEPT adopted the 'standardization culture' as basis for the engineers' behavior. In 1956 the first transatlantic telephone cable was put into operation, which was supposed to be equipped with a common European transit switch telephone exchange for all telephone calls between Europe and North America. This required a governmental and politically binding European agreement on operational questions, on the tariffs/costs and on the technology to be used, which nevertheless had

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to be negotiated by the engineers. A proposal on the issue was forwarded by the Swiss telecommunication administration at the CEPT plenary meeting in October 1960 in Paris.

The CEPT appointed a special study group to consider the proposal at its plenary assembly in 1960 and it subsequently succeeded in implementing a common European switching exchange system in 1964/65. After a discussion of the proposal and a series of test trials (pooling trials) the group successfully finalized its study at the CEPTs plenary assembly in June 1965. The same engineers from the ptt administrations and the equipment industry, which also participated in the ITU, were present in every meeting to discuss standards and to search for a common European position. Within the working group, the different national delegates took care of their common technical interest: the successful installation of the switching telephone exchange. It was only a limited number of engineers, mostly from Belgium, Germany, the Netherlands and Switzerland, that negotiated for all CEPT members. As they were able to build working procedures on the trust in institutions and persons from the ITU, the British delegate, Andrew, at a meeting in Berne in 1961 was even in a position to ask his Swiss colleague, Rütschi, to act for Britain as he himself was tied up with business.30

The chairman of the working group, who was responsible for a ‘European point of view’, amalgamated in preparatory reports for the meetings of the working group almost autonomously different technical and operational aspects that came up. The group’s members relied on him acting for a common European welfare. The reports were discussed at numerous meetings, between the meetings via mail or phone and even informally at ITU conferences. The CCITT assembly in Melbourne, for example, offered an opportunity to reconsider particular aspects like the methods for data collection during the test trials between the private US Company AT&T, the European equipment industry and the European administrations. The few controversial issues that came up during the whole process (1960-1965) originated mostly from economic interests of the US-American counterpart, AT&T.

During the whole standard-setting process the participating engineers made a number of test trials and build up complex test connections to determine the capacities of the telephone lines that were used for transconti-

30 B. Ahr (2013) Integration von Infrastrukturen in Europa: Telekommunikation, Bd. 3 (Baden-Baden, Nomos).
nternational calls and the methods to automatically direct phone calls into the correct national network. The allocation of the transcontinental lines during the periods of high traffic was an equal tricky business as the accounting methods. A side effect was the definition of international telephone numbers.

Governmental authorities hardly took care of the matter, albeit the political and financial impact of the intercontinental switching telephone exchange. CEPT working procedures were accepted according to the ‘tacit political agreement’ in the same way as those of ITU as long as the output satisfied political needs. The autonomy of the expert community in the international arena became obvious when the switching telephone exchange system was made a permanent service in 1964/65. Before having officially resolved the financial impacts with their governments or with high-level representatives, the test trials were turned into a permanent service. The matter was actually settled between AT&T and the CEPT working group before the CEPT’s plenary assembly in Lisbon in June 1965 took place, where a recommendation could be adopted which was non-binding for the governments. The plenary assembly at the Lisbon meeting simply nodded the report through without further discussion. That this non-binding report of the working group was in the next step accepted across CEPT-Europe as a binding rule for all participating states indicates the power of a limited number of engineers for an infrastructure which is the backbone of modern information societies. After all, this standard affected the majority of telephone calls across the Atlantic.

To sum up, in the cases of the Cold War and European Integration the experts adapted institutions to changing environments so that rules and procedures of standardization and regulation maintained constant. The ‘standardization culture’ remained the basis for norms and rules of behaviour in an expanding engineering arena.

IV. The role of individual actors: the case of the German engineer Helmut Bornemann

To open the black box of an expert and to demonstrate the impact of socialisation as well as the individual engineers’ role for the shaping and reshaping of institutions this part of the paper will illuminate the career of the German telecommunication engineer, Helmut Bornemann. Bornemann’s career is neither outstanding nor unique across Europe. He is rather one typical example for the career of a European telecommunication
engineer who was socialised in the expert community in the interwar, became intimate with the ‘standardization culture’ and subsequently shaped and reshaped institutions according to the internalised norms in the 1950s and 1960s.

Bornemann studied engineering at the technical university of Berlin between 1921 and 1925. He was among a new generation of engineers, which was trained in experimental research instead of the older style of theoretical education. At that time, the amalgamation of mathematical, theoretical and experimental research resulted in a new type of (telecommunication) engineer. Bornemann started his professional career at the ‘Reichspostzentralamt’ and became a member of the CCIF already in the mid 1920s. He was a pioneer for international telephone connections in Europe and among that generation of engineers, which made the CCIs an important transnational forum for the standardization of international telecommunications. In the CCIF Bornemann internalized the ‘standardization culture’. Coming to the CCIF as a national engineer for Germany Bornemann’s preferences were redefined in a way that national objectives were amalgamated with a transnational approach to technological efficiency. Throughout the 1930s, Bornemann represented the German telecommunication administration at all Administrative Telephone Conferences and at all CCIF meetings. He became chairman of the CCIF’s study group IX, where he was responsible for the compilation of reasonable compromises that satisfied national needs across Europe and introduced efficient transnational technology.

Being convinced that the regulation and standardization of telecommunications was a purely technical issue Bornemann hardly saw any reason why the CCIs’ activities should be ceased during the war. Together with Giuseppe Gneme, an Italian engineer and pioneer of the CCIF, Bornemann initiated the founding of the European Postal and Telecommunication Union (EPTU) in 1942, which up to 1944 dealt with intra-European telecommunication issues. Both wanted to continue the standardization of telecommunication infrastructures and equipment, especially with regard to the automatization of the European telephone network. The founding of a new organization was a price both had to pay as the Nazi regime rejected a formal continuation of the CCIs’ activities. However, as long as the engineers were able to negotiate telecommunication issues rather autonomously, the price was worth it. Within the EPTU nearly the same engineers continued to negotiate telecommunication standards like in the interwar. Bornemann was the key organiser of EPTU meetings and thus took care that the institutional design of the ITU was adopted and that the
EPTU followed the norms and principles of the ‘standardization culture’. Bornemann managed to keep even those few engineers indirectly connected to the discussions, which for political reasons were barred from participating by their national governments like the Swiss or Swedish colleagues. Remarkably, the ‘tacit political agreement’ between engineers and political authorities was still valid under the Nazi regime during World War II.\(^{31}\)

When the war was over the CCIF restarted its activities with a plenary assembly in London already in August 1945 and a second one in Montreux just a year later. Naturally, Germany was not invited and as a result, Bornemann missed the meetings. His colleagues from the CCIF, however, trusted Bornemann personally and unofficially requested his statements on the technical issues that were on the agenda like the automatization of the European telephone network, which had also been discussed in the EPTU. Bornemann was informally kept informed about the CCIFs activities. He hardly had any problems when he was allowed to re-enter the CCIF officially in 1949 as the rules and interpersonal relations hadn’t changed at all, even though the Cold War impacted the WARC.\(^{32}\) Experiences of that kind made Bornemann and other engineers resume their trust in the expert community and motivated them to adapt institutional arrangements to the Cold War political environment.

In the meantime, Bornemann climbed up in the German administration’s internal hierarchy and was put into a position to shape European Integration in the telecommunication sector. Being an expert for international telecommunication issues Bornemann was appointed as German representative in the Spaak-Committee that discussed the founding of the European Economic Community (EEC) in 1955/56.\(^{33}\) In the Spaak-Committee’s sub-committee for transport and ptt Bornemann and some of his engineer colleagues, which were also appointed by their governments as representatives, were in a key position to influence the decision about a supranational European organisation or a supranational European policy.

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32 Personal correspondance of Helmut Bornemann between 1945 and 1949, Bundesarchiv Koblenz, B257/20556.

for telecommunications. In the Spaak-Committee they tried everything to prevent the supranational EEC from entering the telecommunication sector as this was a potential threat for the basic elements of the ‘standardization culture’ and for the independency of engineers.\textsuperscript{34} Engineers like Bornemann rejected everything that seemed to be incompatible with the ‘standardization culture’. That they succeeded in founding the CEPT instead depended on the expert communities shared interests, their unanimous pleading for the traditional way of regulating and standardizing technology and the fact that the majority of governments saw no reason for a fundamental change as long as the output of the experts’ regulation and standardization satisfied their needs.\textsuperscript{35}

Just a year later Bornemann was appointed, due to his expertise and international contacts, as coordinator for all German activities regarding international telecommunications. He still played an active part in the CCIIs and became chairman for the CEPT’s working group for telephony in 1959. In that position, Bornemann not only headed the establishment of the intercontinental switching telephone exchange but also established the traditional style of ‘expert governance’ – along the lines of the standardization culture – within the CEPT.\textsuperscript{36} Needless to mention that Bornemann in his leading position guided young German engineers like Rudolf Binz into the expert community.

In 1963 Bornemann finally crowned his career as secretary of state in the German ministry for postal and telecommunications. This was a remarkable step for an engineer and their expert community as a whole because their way of regulating and standardizing telecommunication infrastructures and equipment – the standardization culture – arrived at the highest political level.

To sum up, the example of Helmut Bornemann demonstrates that in many key situations, when political environments changed, the individual engineers, their socialisation, their expert community and their guiding


\textsuperscript{35} Personal correspondence of Helmut Bornemann between 1955 and 1959, Bundesarchiv Koblenz, B257/25190.

\textsuperscript{36} Correspondance of Helmut Bornemann about the standardization of the intercontinental switching telephone system, Bundesarchiv Koblenz, B257/16246-16249.
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norms were central issues for the maintenance and expansion of expert governance in the engineering arena.

V. Analysis

Empirical research on the expert community in the international telecommunication sector gives us a number of interesting insights into transnational expertise and expert communities. A key element is the relation between (engineering) expertise and the expert community’s mode of operation. Expertise as we have seen has been an important element for the community, however, it doesn’t explain the community’s emergence, stability and the output of its activities in all its facets. Expertise as an engineer was primarily a prerequisite for the community. It was a necessary but not a sufficient condition. The components of the expert community of telecommunication engineers exceed a simple sharing of knowledge and thus, exceeded other cases of professional networks like the ‘communities of practice’\textsuperscript{37} or the ‘advocacy networks’\textsuperscript{38}. Over that, if these communities or networks are viewed from the perspective of decision-making power the telecommunication engineers and their expert community are even more outstanding, as they did not only influence political decision-makers but were rather ‘de facto’ decision-makers by themselves. The following analysis will, therefore, put into focus the internal and external dimension of the expert community as well as the interdependencies of actors and institutions in a historical perspective. Bornemann himself in the introductory quote implicitly pointed into this direction when he wrote to the technical department: “Years of active participation and experience” were necessary to “work successfully in this field.”

a) The internal dimension of the expert community

Besides having the professional education of a telecommunication engineer, three interdependent and partially overlapping elements that shaped


the internal structure of the expert community turned out to be crucial: socialisation, trust and habitus.

(1) Socialisation was an important aspect for internal community building. In the process of socialisation, the actors internalised the ‘standardization culture’ and redefined their preferences in a way that national objectives and transnational technological efficiency became amalgamated. Following a definition by Checkel, socialisation in that context means not just a process in which “an actor requires the knowledge that is necessary to play his role” in a given community irrespective of his personal attitude but a process in which “the actor adopts the interests and the identity of a community being convinced that he is doing ‘the right thing’”.\(^{39}\) The case of Helmut Bornemann illustrates, that engineers were socialised within an institutional arrangement of the ITU (administrative conferences and CCIs) and so became intimate with it and the general rules of behaviour. Engineers like Bornemann internalised the ‘standardization culture’ and then shaped the process of institutional development by going back to their own dispositions. The relocations of the negotiations at World Administrative Radio Conferences into the sub-committees or the founding and functioning of the CEPT demonstrate the engineers’ role in the shaping of institutional arrangements. Engineers strove to protect the previously internalized institutional arrangements and found a cognitive embedding in these arrangements. They were convinced to do ‘the right thing’ even within a changing environment.

(2) In the telecommunication expert community, the individual members developed a kind of interpersonal trust, which strengthened the in-group feeling within the expert community. They did so because community members reciprocated trusty behaviour. In his works on social identity Tanis has already elaborated that “reciprocity expectations may be created by interpersonal perceptions of trustworthiness or a shared group membership.”\(^{40}\) Even in the case of telecommunication engineers interpersonal trust among community members resulted in a shared social identity and a generalized expectation that the members of the community operated reliably at different times and in different situations. Having


more trust in their foreign engineer counterparts across Europe than in their own national ministries of foreign affairs made the engineers’ expert community truly transnational.

(3) The community members were held together by a kind of ‘engineer habitus’ which in the sense of Bourdieu\(^4\) must be regarded as a system of embodied dispositions about the perception of telecommunication regulation and standardization. This ‘engineer habitus’ was built around the acceptance of the ‘standardization culture’. Consequently, the experts shared the perception of telecommunication as being above all a technical matter that should foster technical progress under the precondition of maintenance of national monopolies. Non-technical impact of telecommunication standardization was valued as second-class. A sharing of the described dispositions served as a ticket to the expert community even for representatives of the industry. The community provided an opportunity to negotiate standards unaffected by non-engineer actors and their differing interest. Of course, non-engineers hardly had a chance to enter but even engineers which didn’t share the ‘standardization culture’ and its particular mixture of national objectives and transnational technological efficiency hardly entered. The individual members had a distinctive feeling against non-engineers and preferred to discuss telecommunication matters among like-minded engineers. Therefore, they sub-divided the administrative conferences into a political and an engineering arena.

b) The external dimension of the expert community

If the community is placed within its external conditions two crucial aspects have to be emphasised: the acceptance of the expert community by the national authorities and the ability of the community to adjust the surrounding institutional arrangements to changing political environments. Since the 19\(^{th}\) century, the expert community was accepted by the political authorities as a legitimated regulator and standard-setter for international telecommunication networks because the national equipment industry made high profits on national monopoly markets and the telecommunication networks grew constantly up to the 1970s making telecommunication services available for the economy and the society. As long as nobody

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complained about the policy outcome, the governments had no reasons to question or cut the community’s power. Political authorities already in the 19th century concluded a ‘tacit political agreement’ with the engineers that enabled the expert community to standardize and regulate international telecommunications independently as long as national political objectives were not violated. Being capable of negotiating standards against the background of Cold War political tensions gave the engineers and their expert community additional credit and legitimacy. Governments not even stepped in when the expert community adjusted the institutional arrangement to changing environments. The case of the telecommunication engineers’ expert community is a remarkable case as the experts were subsequently made to ‘de facto’ decision-makers on policy outcomes and processes of institutional change by withdrawing political authorities.

c) The historical developments

The paper has shown numerous interdependencies between actors and institutions, which were an important factor for the stability of the expert community. These interdependencies can be grasped theoretically by the concept of institutional path dependency. The concept argues that outcomes at a ‘critical juncture’ trigger feedback mechanisms, which reinforce the recurrence of a particular pattern in the future. In its basic model institutional path dependencies are generated by four such mechanisms: institutional learning (socialisation), network effects on individuals (trust in persons), network effect on institutions (trust in institutional arrangements) and specific investments in institutions, technology, capital etc.42 All these factors played – as we have seen – a key role for the stability of the expert community and the outcomes of its activities. In the 19th century, the ITU has brought a particular style of regulation and standardization, which was chosen at a critical juncture in the interwar. The creation of the CCIs was the final ‘lock in’ into an institutional path that lead to a permanent reinforcement of that particular pattern. Viewed from that perspective, the adoptions of the pattern in the contexts of the Cold War and

European Integration must be seen as the result of feedback mechanisms. While the engineers in the expert community were shaped by the institutions, they themselves shaped the institutions when they directed the process of institutional change.

To understand expert communities like that of telecommunication engineers forces us to go back to their origins and trace their coming into being stepwise. The concept of institutional path dependencies offers helpful tools to understand and explain their development.

VI. A final remark

The case of the telecommunication engineers’ expert community has shown that besides transnationally shared expertise social factors (socialisation, trust and habitus) as well as historical trajectories are crucial to understand the functioning and the policy output of expert communities. Further studies on transnational expertise and expert communities should elaborate on these aspects. Nevertheless, the basic requirement was the acceptance of that style of governance by the national political authorities. It is important to underline that experts were able to regulate and standardize international telecommunications independently as long as the authorities were satisfied by the policy outcomes.

In the 1970s and early 1980s, the engineers and their expert community became pressurized. European equipment companies increasingly lagged behind their US and Japanese competitors on the growing global markets for digital telecommunications. In Europe, the independent regulation and standardization of telecommunications no longer satisfied the political needs. This made the political authorities cancel the ‘tacit political agreement’ with the engineers. Especially neoliberal economists charged the monopoly administrations and their cartels with the industry of the decrease of the innovation potential in Europe. This finally made the European Commission to enforce a liberalisation of European telecommunication markets and a break-up of the ptt administrations’ monopolies in 1987. In that context, also the institutional arrangements of ITU and CEPT were substantially rearranged. In how far this influenced expert governance and the expert community is a story to be told elsewhere.
References

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