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Altdorf – Shanghai – Shenzhen – Liebfeld: swiss-chinese entanglements in digital infrastructures

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**Aldorf
Shanghai
Shenzhen
Liebfeld**

**Swiss-Chinese
Entanglements
in Digital
Infrastructures**

Lena Kaufmann

**Photos by
Marc Latzel**

There seemed to be only one main road. Stepping off the train in Altdorf, we found ourselves in a small town in the middle of Switzerland, at the southeasternmost tip of Lake Lucerne, surrounded by mountains. We took a bus, and after some bends in the road, the screen finally showed “Dätwyler AG”—the cable producer we planned to visit. Next to the bus stop were a couple of flat, gray workshop and office buildings. Just beside them, cows were grazing, and behind the buildings the steep, forested foot of a mountain emerged. Once inside the factory, we heard the constant humming and buzzing of the machines. They seemed to be operating autonomously, although under cautious human observation. Only occasionally, a worker would halt them to start a new strand of cables, carefully adapting the machine to the right speed and distance, ensuring that the different parts that would form a specific fiber optic cable would fit well. To protect the fibers, the fiber optic cable part of the factory was warmer than the other parts, and the light shirts of the workers stood in contrast to their heavy black work shoes.

For the workers, many of whom come from other countries, such as Turkey or Croatia, the shift work in the factory is an integral part of their everyday lives in Switzerland. At the same time, people outside of Altdorf seem to be barely aware of the existence of this rather unexciting factory. Nevertheless, much of the Internet traffic in Switzerland actually passes through and depends on the cables produced there. For example, several thick strands of Dätwyler cables run through the Milchbuck tunnel in Zurich, forming the backbone of the city’s telecommunications network. The cables are a crucial component for enabling digitalization in the first place. What is more, they are also an important component of Switzerland’s intricate global digital connections.

Making raw fibers is technically most demanding and is currently not done in Switzerland.¹ However, the production of fiber optic cables is not an easy enterprise either. As several Dätwyler employees explained, the complex and lengthy process of manufacturing fiber optic cables includes coloring the raw fibers, producing a thin colored cable containing twelve or twenty-four fibers, and stranding a number of these thin cables into even thicker cables that may contain up to 500 fibers. In the process, it is important to handle the delicate fibers carefully as well as to let them rest after each step in production. Twisting the fibers too much breaks them, and touching them with bare hands deeply affects their transmission capacity. Moreover, the different colors are of particular importance. During the production process, they make it possible to trace back the origin of each individual fiber. Later, when the cables are laid and connected, the colors allow techni-

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Fiber optics or optical fibers commonly consist of a glass core that guides the light and a surrounding glass cladding that prevents the light from leaking. There are different processes for making the fibers. These include producing a preform from fused silica glass in an initial step. This preform contains both core and cladding. In a second step, the preform is heated and fibers are drawn away from it. The biggest challenge is making the preform. Further challenges are achieving the extreme transpar-

ency required for communication as well as making thin, uniform fibers. See Jeff Hecht, *Understanding Fiber Optics*, 5th ed. Auburndale, MA, 2017, pp. 125–37. To serve as media for telecommunications, the raw fibers have to be transformed into proper cables.

cians to differentiate between the up to 500 fibers and ensure that the data passing through these cables will find their correct destination. Accordingly, producing a fiber optic cable takes between four and six weeks.²

Not only that, many of these cables are customized products, meaning that they cannot be produced ahead of orders and kept in stock. The cables have to meet the requirements of specific customers. These include practical and technical issues: for example, whether a cable runs parallel to a high-voltage installation up in the air, undersea, or alongside tremoring train tracks; whether it is round, passing through ducts, or flat, serving elevators; whether it has to be fireproof or is buried directly in the ground; and whether it connects continents, data centers, or individual households. Different customers have different quality and color-code expectations. In addition, political and competition requirements may apply.³ For example, Switzerland's fiber-to-the-home network, in which partly state-owned Swisscom is the main player, is based on the so-called four-fiber model. Other countries have different models.⁴ Finally, the fiber optic industry is particularly dynamic. Not only do the raw fibers keep changing—by becoming thinner, for example—but the development of the other components that make up a fiber optic network is also a continuous process.⁵

These other network components are also called active or opto-electronic components. They are powered components that can manipulate signals, for example by controlling the intensity of light or by amplifying the signal strength in order to enhance data transfer. Moreover, they can convert signals, when linking fiber optics to other communications infrastructures such as wireless networks or copper wires.⁶ In the 1980s and '90s, the global centers of fiber optic and component research were the United States and Japan in particular, and to some extent Western Europe (especially the United Kingdom, France, and West Germany).⁷ However, in the past two decades, Chinese companies such as ZTE and Huawei Technologies have become serious competitors, challenging the world order of the fiber optics industry.⁸ The latter company has gained a strong foothold in Switzerland, where it cooperates with numerous companies, including with Dätwyler Cabling in the area of data centers.⁹

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Dätwyler factory workers, personal interviews and observations, April 29, 2019 and October 14, 2019. All the translations of written and oral (Swiss) German sources in this chapter are by the author.

3

Ibid.

4

See Gabriela Weiss, "Glasfaser-ausbau kostet 20 Prozent zu viel," *Neue Zürcher Zeitung* (September 1, 2011), https://www.nzz.ch/glasfaserausbau_kostet_20_prozent_zu_viel-1.9032095 (retrieved December 12, 2019).

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Dätwyler factory workers, personal interviews and observations, April 29, 2019 and October 14, 2019.

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See Hecht 2017, p. 33.

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IGI Consulting, *China Telecom Volume 2: Fiber Optics Markets and Opportunities*, Boston, MA, 2001, p. 101.

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See, for example, Perez Bien, "Under Siege, Chinese Telecoms Gear Champions Huawei and ZTE Pitch 5G Plans at MWC Barcelona," *South China Morning Post* (February 26, 2019), <https://www.scmp.com/tech/gear/article/2187700/under-siege-chinese-telecoms-gear->

champions-huawei-and-zte-pitch-5g-plans (retrieved December 12, 2019).

Meanwhile, Dätwyler has also become an established cable producer in China, where it has equipped numerous flagship sites and institutions with cables, such as Shanghai's Oriental Pearl Tower, major airports, a Communist Party school and a Huawei data center.¹⁰ Like an emblem of its intimate connection to China, a model of the Chinese Dätwyler factory now furnishes the entrance of the company's showroom in Altdorf.

Taken together, Dätwyler's and Huawei's Swiss-Chinese trajectories exemplarily challenge established ideas about the presumed global centers of modernity, of a one-way technology transfer from West to East, and of confining a given technology to the boundaries of a single nation. A closer look also highlights some of the everyday people behind the seemingly technical digital infrastructures and their global entanglement.

While economic relations between Switzerland and China can be traced back to the seventeenth century, these relations have entered a new dimension in the past three decades. Since the 1990s, the two countries have become deeply entangled in the field of digital infrastructures. This was the time when the Internet went commercial and grew exponentially, when globalization became a buzzword, and many North American, Japanese, and Western European companies greatly expanded their production activities abroad in fierce competition. They were grappling with overproduction, labor shortages, rising wages, and falling market prices at home as well as rising production costs in once-popular overseas locations such as Taiwan, Hong Kong, Singapore, and South Korea. In the 1980s and '90s, the People's Republic of China (PRC) became the new place to go. Under the leadership of Deng Xiaoping, the country had just undergone a decade of reform and opening up. It was moving rapidly from a planned, collective economy toward a market economy, eager to attract foreign capital, technology and know-how in order to catch up economically and regain a place in the global market.¹¹

Since the founding of the PRC in 1949, importing foreign technology and adapting it to make a new Chinese version has been an important way of creating an ostensibly modern and industrialized China.¹² Information and communications technology (ICT) in particular was a key part of this strategy. ICT was central to the process of opening up, receiving special attention, and earning policy support in China.¹³ Foreign producers, in turn, felt especially attracted by the PRC's new favorable investment policies on the one hand, and the immense number of cheap rural migrant laborers on the other hand.¹⁴

The 1990s were also the time when a global fiber optics industry emerged, paving the road for fiber optics to become the back-

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Johannes Müller, Dätwyler Cabling, personal interview, April 29, 2019.

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Ibid. Dätwyler Cabling Solutions, "Reference Projects & Case Studies: China," <https://www.cabling.datwyler.com/en/reference-projects.html> (retrieved January 24, 2020).

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See Martin Hart-Landsberg, *Capitalist Globalization: Consequences, Resistance, and Alternatives*, New York, 2013, pp. 15–16; Maurice Meisner, *Mao's China and After: A History of the People's Republic*, 3rd ed., New York, 1999, pp. 449–520.

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See, for example, Sigrid Schmalzer, *Red Revolution, Green Revolution: Scientific Farming in Socialist China*, Chicago, 2016; TU Berlin, Center for Cultural Studies on Science and Technology in China, "DFG-Projekt 'Making Technology Appropriate: Technology Transfer from Germany to China. The Case of Steam and Ordnance Technologies, 1860–1980,'" 2019, http://www.china.tu-berlin.de/menue/forschung/projekte/making_technology_appropriate/ (retrieved December 12, 2019); In the 1950s, the import of Soviet

bone of digitalization. Research on fiber optics goes back several decades. The development of the laser in 1960 had made it worthwhile to give fiber optics a second look as transmission media. In the 1970s and '80s, the thin, transparent glass fibers finally achieved the necessary purity, transmission capacity, and affordability to be used for wide-scale communication. In contrast to the older copper telecommunications networks, the advantage of fiber optics is that they can transmit large amounts of information at high speed and over long distances. Instead of electrical signals, they use optical signals, in the form of light.¹⁵ In the 1990s, the growth of the Internet and the unquenchable thirst for ever more bandwidth gave this technology new importance.¹⁶ Accordingly, a whole industry grew around this medium, ranging from the production of preforms, raw fibers, cables, plugs, and racks, to laser and LED transmitters, connectors, amplifiers, receivers, and testing machines.¹⁷

The most successful raw fiber producers were American and Japanese companies. Engaged in a head-to-head race with Japanese companies, the US enterprises were highly concerned about losing their dominant position in the industry. As a US industry report from 1985 notes: "The Japanese, in particular, are aggressively seeking business around the world"¹⁸—reminding us of similar remarks currently being made in the US about Chinese ICT companies. The major international raw fiber producers were AT&T and Corning in the US, as well as a range of Japanese companies, including Sumimoto Electric, Fujikura, and Furukawa Electric. The latter two were also among the biggest cable manufacturers, along with Siecor, a former joint venture between the German firm Siemens and Corning.¹⁹ Around the same time, commercial fiber optic production also began in other parts of the world, including in Switzerland. Among these producers was, for example, STR, a subsidiary of ITT—names that are now forgotten. Dätwyler, in contrast, flourished.

Dätwyler: From Altdorf to Taicang

Even though Swiss economists and policy-makers might regret that Switzerland does not have its own Silicon Valley, medium-sized companies such as Dätwyler nevertheless play an important, though overlooked, role in the making of a global digital Switzerland. Similar to the big

technologies was crucial for triggering the development of the Chinese electronic industry. Yun Wen, "The Rise of Chinese Transnational ICT Corporations: The Case of Huawei," Vancouver, 2017), pp. 48–50.

13 Yu Hong, "Distinctive Characteristics of China's Path of ICT Development: A Critical Analysis of Chinese Developmental Strategies in Light of the Eastern Asian Model," 2008, pp. 457–59.

14 See Hart-Landsberg 2013, pp. 15–16; Hong 2008, pp. 457–59.

15 See Jeff Hecht, *City of Light: The Story of Fiber Optics*, New York, 1999; Hecht 2017. According to Hecht, the idea behind fiber optics has its origins in the nineteenth century, when similar technologies were used to guide light for illumination and for seeing inside the human body.

16 Hecht 2017, p. 6, p. 11.

17 See also Timothy C. Finton and US Department of Commerce, "A Competitive Assessment of the US Fiber Optics Industry," *Fiber and Integrated Optics* 5, no. 4 (1986), p. 332, pp. 338–41.

18 *Ibid.*, p. 352.

19 *Ibid.*, p. 332, pp. 338–41, pp. 355–57; See also Hecht 1999; Office of Industries, US International Trade Commission, *Industry & Trade Summary: Optical Fiber, Cable and Bundles*, Washington, DC, 1995, pp. 5–6.

US and Japanese cable manufacturers, the Swiss company Dätwyler Cabling Solutions is able to look back on more than a century since its founding. The company has its roots in Draht- und Gummiwerke AG in Altdorf, in the Canton of Uri. In 1915, Adolf Dätwyler (1883–1958), the son of a farmer from Aargau, became its director. He saved the company from bankruptcy, bought it, and later renamed it Dätwyler AG. In 1926, the company, which had specialized in wire and gum, began producing its first telephone cables. It successively added other types of products to its production portfolio, from automotive and pharmaceutical products to food packaging and various types of cables. After several trials and field tests in the early 1980s,²⁰ the Dätwyler company began producing fiber optic cables commercially. This was in 1986, when the global fiber industry emerged—along with a few other Swiss companies such as cable manufacturer Huber+Suhner AG and raw fiber producer Cabloptic S.A.²¹ The Dätwyler company produced fiber optic cables for both private and public communications networks in Switzerland, including for the Postal Telegraph and Telephone, PTT. It did not succeed at raw fiber production, however. A raw fiber factory in Neuchâtel, which Dätwyler once purchased, was eventually sold. Instead, the company turned to importing fibers from the American company Corning.²²

The production of fiber optic cables was already under the management of Adolf Dätwyler's sons, Peter (1926–1993) and Max Dätwyler (b. 1929). The two brothers, an engineer and a chemist respectively, assumed control of the company in 1958 and transformed it into a holding. They took the first steps abroad, making Dätwyler a global company. Both of them had received part of their professional training in the United States. Having first broadened their own horizons overseas, they set out to expand the company's activities across the globe in the late 1960s.²³ This was, as a company report states, “[i]n view of the very tight labor market in Switzerland and the uncertainty regarding what Switzerland would face with the establishment of the European Economic Community.”²⁴ The brothers therefore first turned to Europe and

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See PTT Archive in Köniz, file P-15-2.

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Dätwyler Cabling Solutions, “100 Jahre Dätwyler,” 2019, <https://www.cabling.datwyler.com/de/unternehmen/wir-ueber-uns/100-jahre-daetwyler/100-jahre-daetwyler.html> (retrieved December 12, 2019); Huber+Suhner AG, “Geschäftsbericht 1979,” Pfäffikon/Herisau, 1980, University of Zurich, Zentrale für Wirtschaftsdokumentation. Cabloptic S.A. in Cortaillod near Neuchâtel was a joint venture of the three cable plants

Brugg, Cortaillod, and Cossonay. By the late 1970s, it was already engaging in raw fiber production, supported by a license agreement with Corning. Rudolf Trachsel, *Ein halbes Jahrhundert Telekommunikation in der Schweiz*, Aarau, 1993, p. 322; Hans Ulrich Dätwyler, e-mail conversation, March 1, 2020. Kabelwerke Brugg was founded towards the end of the nineteenth century by Gottlieb Suhner as a branch of his company Suhner & Co. AG. The

latter later became part of Huber+Suhner. Brugg became officially independent in 1991. Andreas Steigmeier, “Kabelwerke Brugg,” in *Historisches Lexikon der Schweiz*, 2011, <https://hls-dhs-dss.ch/articles/043147/2011-08-24/>; Thomas Fuchs, “Huber + Suhner,” in *Historisches Lexikon der Schweiz*, 2019, <https://hls-dhs-dss.ch/articles/041909/2019-07-12/>.

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Johannes Müller, personal interview, April 29, 2019.

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Hans Stadler, “Adolf Dätwyler,” in *Historisches Lexikon der Schweiz*, 2005, <http://www.hls-dhs-dss.ch/textes/d/D30538.php>; Dätwyler, “100 Jahre!: Dätwyler Holding AG,” 2019, <https://www.datwyler.com/de/unternehmen/100-jahre/> (retrieved December 12, 2019); Dätwyler Cabling Solutions, “100 Jahre Dätwyler;” Christoph Zurfluh, “Max Dätwyler wird 90,” *Luzerner Zeitung* (January 26, 2019), <https://www.luzernerzeitung.ch/zentralschweiz/uri/das-leben-ist-ein-grosses-abenteuer-ld.1088274> (retrieved December 12, 2019).

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Dätwyler Holding AG, “Geschäftsbericht 1989/90,” Altdorf, 1990, p. 8, Swiss Economic Archive, Basel.

bought a gum factory in the Netherlands. In 1970, they founded a steel factory in Bottrop, West Germany. In the mid-1970s, parts of the Dutch factory were moved to Belgium, and later expanded to Italy and the United States. Numerous other moves of the various company segments followed. One of the first activities in Asia was gum production in Thailand. Meanwhile, the first sales activities of technical equipment as well as pharmaceuticals targeted Hong Kong and Taiwan as well as Indonesia.²⁵ As of today, the Dätwyler Holding AG has more than 9,000 employees worldwide, 2,300 of whom are in China.²⁶

Not until the early 1990s did the cable business move abroad as well. In 2012, it became a private sister company called Dätwyler Cabling Solutions AG, which now has about 1,000 employees. The first Asian representative offices were opened in Singapore and Jakarta. In the late 1990s, the actual production of cables started in the PRC.²⁷ As Johannes Müller, CEO of Dätwyler's cable business since 2013, states, market entry in China was based on the company's premise that "[production in] China is for China," because reimporting cables to Europe would not be competitive. The strategy of producing in and for the PRC has resulted in a revenue from China that constitutes almost one third of the entire company revenue worldwide. Johannes Müller himself has traveled to China about eighty times, where he even shook hands with Chinese president Xi Jinping.²⁸

The person who established the Chinese premises amidst the excitement in the 1990s at globalization and fiber optics was Hans Ulrich Dätwyler, a distant relative of the Dätwyler company. According to him, the China story of Dätwyler Cabling unfolded along two paths. First, then CEO Robert Lombardini attended a seminar organized by the Swiss Office of Commercial Expansion (today Switzerland Global Enterprise), which convinced him to expand to the PRC. Mr. Lombardini thus established a project group that was to evaluate the feasibility of a Sino-Swiss joint venture. Hans Ulrich Dätwyler led the group. Assisted by the audit and advisory firm KPMG and the Swiss-Chinese Chamber of Commerce, the group received a thick folder containing a preselection of potential partners among the cable factories in China. From these, they selected and visited five factories near Shanghai in 1996 and '97.²⁹

At that point, there were approximately 120 Chinese optical cable manufacturers in the PRC.³⁰ These entered the fiber optic industry around the same time as companies elsewhere. However, compared to their global competitors, they often lacked longstanding experience in glasswork or cable manufacturing, and the industry initially faced some difficulties. Research and trial production of fiber manufacturing in China began in the 1970s, i.e. in

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Dätwyler Holding AG 1990, pp. 8–9, p. 37; Dätwyler Holding AG, "Geschäftsbericht 1994," Altdorf, 1995, pp. 12–13, Swiss Economic Archive, Basel; Dätwyler Holding AG, "Geschäftsbericht 1996," Altdorf, 1997, pp. 12–13, Swiss Economic Archive, Basel.

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Stadler 2005; Dätwyler 2019.

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Dätwyler Holding AG 1990, pp. 8–9, p. 37; Dätwyler Holding AG 1995, pp. 12–13; Dätwyler Holding AG 1997, pp. 12–13.

28

Johannes Müller, personal interview, April 29, 2019. Dätwyler Cabling Solutions, "Meeting with Chinese President: Dätwyler Invited to Join in the Discussions," January 24, 2017, <https://www.cabling.datwyler.com/company/news/detail-view/article/meeting-with-chinese-president.html> (retrieved December 12, 2019).

| Fig.1 |

Color-coded optical fiber strands.



| Fig. 2 |

Fiber strands come color-coded in twelve basic colors, here green.



Fig. 3

Fiber stranding: Single fiber strands are being grouped together to form a loose tube.

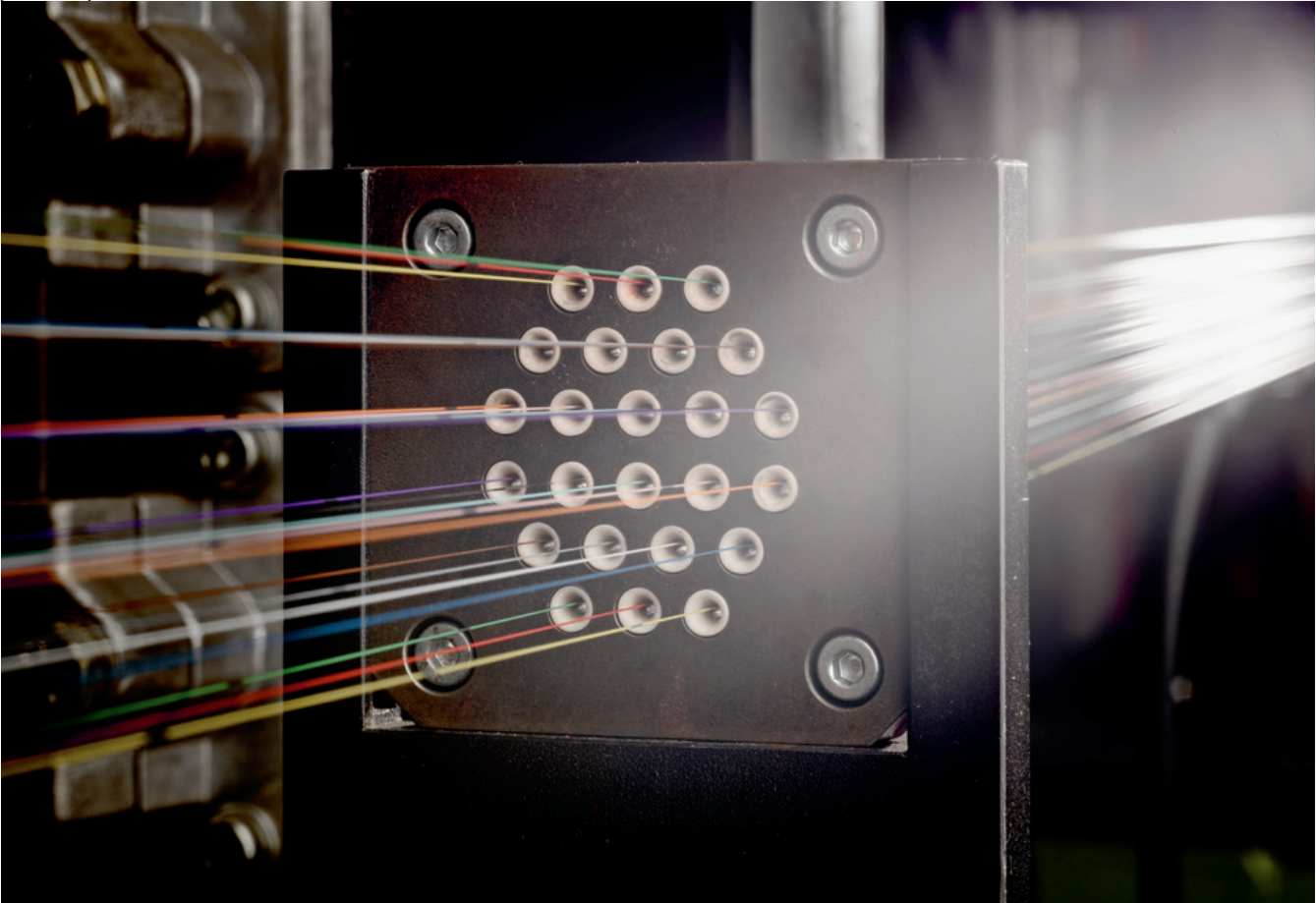


Fig. 4

Cable drums with so-called loose tubes.



the final years of the socialist era under Mao Zedong. From then until 1988, to jump-start the industry, ten still mostly state-owned Chinese companies imported optical fiber manufacturing equipment from Finland, the UK, France, Germany, and the United States. These Chinese companies mostly failed, however. Among the survivors were joint ventures with Fujikura of Japan, Lucent Technologies (spun off from AT&T), and the Dutch firm Philips. The other companies succumbed to a lack of funding and lacking complementary industries. Moreover, they resigned from making fiber optics because of the high cost of acquiring technology and know-how, especially with regard to the most challenging part of fiber production, i.e. preform manufacturing. Subsequently, some of them turned to producing fiber optic cables instead of raw fibers. Like Dätwyler, they, too, imported most of their preforms or fibers from Corning.³¹ The Chinese cable companies, however, expanded their production know-how in steps, first with regard to fiber and then to preform production. Subsequently, by the mid-2000s, the Chinese fiber optics and cable industry had become one of the largest in the world³², and now, the PRC can be considered a third center of preform production, on a par with the United States and Japan.³³

In the 1980s and '90s, the situation was still different, however, and foreign technical know-how was in high demand. One of the Chinese cable companies that emerged out of this context and that made its way onto the Dätwyler shortlist was Zhongtian Cable Co., Ltd. (now part of the Jiangsu Zhongtian Technology Group, ZTT). The choice was rather intuitive, says Hans Ulrich Dätwyler.³⁴ Nevertheless, on January 28, 1998, the two companies officially created a joint venture³⁵ and it was through Zhongtian that Dätwyler managed to enter the Chinese cable market. As Hans Ulrich Dätwyler remembers, what seemed to be close to Shanghai on the map, however, was actually worlds apart. Zhongtian was located in Rudong, a town in the countryside of China's Jiangsu Province, north of Shanghai. When he traveled there for the first time in 1996 to meet his partner, Zhongtian's President Xu, the trip

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Hans Ulrich Dätwyler, personal interview, September 17, 2019. Karl Lüönd and Christoph Zurfluh, *Die Kraft der unscheinbaren Dinge: 100 Jahre Dätwyler*, Zürich, 2015, pp. 189–90.

30

IGI Consulting, *China Telecom Volume 2: Fiber Optics Markets and Opportunities*, Boston, MA, 2001, p. 101.

31

IGI Consulting 2001, pp. 101–07; Xiaolan Fu, *China's Path to Innovation*, Cambridge, 2015, pp. 242–43. Contemporary China's biggest preform, fiber and cable company, YFOC (Yangtze Optical Fiber and Cable Co., Ltd.), which now ranks second globally after Corning, has its origins in this joint venture with Philips, formerly called Wuhan Changfei. IGI Consulting 2001, p. 132; Network Telecom Research Institute, "The Top 10 Competi-

tiveness Enterprises in the Optical Communications Industry of China & Global Market in 2019," 2019, <http://list.nti.news/> (retrieved December 12, 2019).

32

IGI Consulting 2001, pp. 101–7; Fu 2015, pp. 242–43.

33

Research and Markets, "Global & Chinese Optical Fiber Preform Industry Report, 2019–2025," August 2019, <https://www.researchandmarkets.com/reports/4832645> (retrieved December 12, 2019). Nevertheless, the quality of Chinese fibers and cables was thus far unconvincing to my Swiss interview partners. Various interviews with Swiss fiber optics industry experts between March and November 2019.

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Hans Ulrich Dätwyler, personal interview, September 17, 2019.

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Feng Gao 高峰, "陇上行——中天德特威勒有限公司周年庆典纪实 Long shang xing——Zhongtian Deteweile youxian gongsi zhounian yingdian jishi (Walking on the Ridge: Zhongtian Dätwyler Co., Ltd. Anniversary Celebration Documentary)," *上海微型计算机 Shanghai Computer Weekly* 185, no. 09 (1999), p. 10.

seemed adventurous to him. He had to travel 200 kilometers north from Shanghai to Rudong. Accompanied by lots of chickens, he had to cross Asia's longest river, the Yangtze, by boat. According to Hans Ulrich Dätwyler, when he arrived, many of the locals greeted him with astonishment. It seemed to him that it was the first time they had met a Westerner: "People looked at us as if we were extraterrestrials."³⁶

The delegation was accompanied by two key individuals, Mrs. Sui, a professor from Peking University, and China expert and lawyer Esther Nägeli of the Chamber of Commerce's legal chapter. Both were crucial confidants who gave legal and intercultural advice to the negotiators. According to Hans Ulrich Dätwyler, this was important, as the negotiations were not easy. Initially, written contracts did not seem to mean much to their Chinese counterpart, who kept changing the terms every other day. On both sides, there was a lot of mistrust that had to be reduced. One way to build up trust was to eat and drink with the Chinese company employees and the local Party secretary. Pointing to a photo that shows him making a toast, he recalls, "I never had to drink so much [alcohol] in my life!"—a common way of forging business relations in the PRC. His wife, who joined him in 1998, adds that sometimes they had to eat things like a "red mush" that seemed horrific to them because they were unable to identify what it was and were not accustomed to it. "People wanted to touch us," she remembers. "Almost nobody spoke English, street signs were written only in Chinese, and when we went to the restaurant, we just had to point at something, because the menu was only in Chinese.... We were totally unprepared."³⁷

Of course, the Dätwylers were not the first Swiss businesspeople in the telecommunications sector to have such seemingly exotic experiences in East Asia. In 1984, for example, the Standard Telephon und Radio AG newsletter *STR Impuls* printed a similar report by Jens Alder, who established a business in South Korea, calling himself "a product manager on the front." A year later, an export manager wrote a report jokingly entitled "Frog Stomachs, Bear Paws, and Flamingo Steaks." The report described his team's trip to China, where they participated in a telecommunications sales fair in Guangzhou organized by Swisscom. At that time, STR was already producing telecommunications equipment for the Swiss PTT in a joint venture factory in Shanghai.³⁸ While such experiences from "the front" were quite typical then, what did change was the systematic nature of such entanglements.

In the late 1990s, the second path that led the Dätwylers to the People's Republic was an invitation from the Schindler company, a Swiss producer of elevators. The two companies had previously

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Hans Ulrich Dätwyler, personal interview, September 17, 2019. Lüönd and Zurfluh, 2015, pp. 189–90.

37

Hans Ulrich and Ursula Dätwyler, personal interview, September 17, 2019.

38

The company was part of the US company ITT (later part of the French Alcatel). STR, *STR Impuls, Hauszeitung der Standard Telephon und Radio AG Zürich* 19, no. 7 (1984); STR, *STR Impuls, Hauszeitung der Standard Telephon und Radio AG Zürich*, April (1985).

39

Johannes Müller, "20 Jahre in China: Erfahrungsbericht von Dätwyler Cabling Solutions AG," *Swiss Export Journal: Fachmagazin der Schweizer Aussenwirtschaft* 2, (2019), pp. 12–13; Schindler, "About Schindler: Company Facts," 2019, https://www.schindler.com/content/com/internet/en/about-schindler/_jcr_content/contentPar/downloadlist/downloadList/19_1461919093155.download.asset.19_1461919093155/schindler-company-facts.pdf (retrieved December 12, 2019); Hans Ulrich Dätwyler, personal interview, September 17, 2019.

collaborated in Switzerland. Schindler had established the first-ever Western industrial joint venture in China in 1980.³⁹ Dätwyler made use of Schindler's production facilities in the city of Suzhou, near Shanghai, in 1998, where it began manufacturing elevator cables for Schindler. As Hans Ulrich Dätwyler remembers: "We benefited from Schindler in that we had a stable workload from the first day onwards."⁴⁰

Hans Ulrich Dätwyler had never imagined that he would be the one to go to China. At first, the couple did not expect to stay very long, but "three months turned into three years." And, as Mr. Dätwyler asserts, "there were no young people around who were willing to go." His children, in turn, were already grown up and he found the idea exciting, so "I just blundered into it."

While in China, they lived in Shanghai. According to the Dätwyler couple, they did not have a "godparent" who introduced them to the easier, though isolated, expat life. Instead, they lived in a thirty-story apartment building in a Chinese neighborhood. Instead of having a private driver, they traveled in cabs. While he had a Chinese assistant, who interpreted and taught him the necessary cultural details, she regularly met with a language exchange partner and learned from other expat women. When taking a cab, she always took along a card with their Chinese home address in order not to get lost—"because the cab drivers did not understand my pronunciation of the address." In sum, says Ursula Dätwyler, "we were little prepared, but therefore experienced more."⁴¹

The move to China was arguably a bold one. During the planning phase, Hans Ulrich Dätwyler had met with numerous doubts from the parent company in Altdorf, because establishing a production site in China was a risky endeavor. It was helpful that he soon became the president of the Swiss-Chinese Business Forum (today's Swiss-Cham). That position helped him to network and get to know the expat employees of Swiss companies such as Nestlé, Novartis, Sulzer, and Roche. In addition, talks in front of Chinese Party and economic representatives increased the appreciation given him by the Chinese.⁴²

Despite such conduits, however, the move towards the East has not always been easy. For one, the joint venture did not go well, due to conflicting interests: Zhongtian Cable was hoping to gain access to the European market (and later succeeded in Germany),⁴³ while the Dätwyler management was hoping to enter the Chinese market.⁴⁴ The headquarters in Altdorf were impatient and not satisfied with the results. Hans Ulrich Dätwyler had to demonstrate considerable effort at mediation and information to fend off skepticism, especially at home. In his words: "[I]t was almost more time-

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Quoted in Lüönd and Zurfluh 2015, p. 189.

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Hans Ulrich and Ursula Dätwyler, personal interview, September 17, 2019.

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Lüönd and Zurfluh 2015, pp. 189–90.

43

ZTT, "ZTT International Limited," 2019, <https://www.zttcable.com/> (retrieved December 12, 2019).

consuming to convince the company management in Switzerland of the correctness of the business in China than to get it going locally.”⁴⁵

The company finally took over the joint venture by buying out the Chinese share, and also set up its own factory in Shanghai.⁴⁶ The Dätwyler couple recalls how they had to start from scratch at the new location, buying their own folders and pencils and struggling to find staplers. Moreover, there was laundry hanging inside the office, because the migrant workers who constructed it also used it as living space. And when the government suddenly decided to construct a subway line there, the company had to move again.⁴⁷ Finally, in 2014, Dätwyler’s two Chinese production sites were combined in a new factory in Taicang in the north of Shanghai.⁴⁸ By the end of the year 2000, Hans Ulrich Dätwyler had already returned to Switzerland. Looking back on his professional life, he says that “this was certainly one of the most interesting experiences.”

While Dätwyler Cabling Solutions successfully entered the Chinese market, technology transfer did not occur in only one direction, of course. Today, different facets of a purported new Chinese modernity are also contributing to making Dätwyler part of a global digital Switzerland. These are occurring on both technical and social levels, whether with regard to specific technical components made in China and used by Dätwyler or with regard to collaborations with Chinese companies. For example, on a technical level, the stabilizing cores—also called “strength members”—of the bigger cables produced in Altdorf are directly imported from China. Two large, black Chinese characters referring to Shanghai Xiao-Bao FRP Co., Ltd. reveal the origin of these strength members, while they wait on bulky wooden reels to be processed on the Altdorf factory floor.⁴⁹ In other words, the thick optical cables that contain Chinese cores, American fibers, and Swiss coating technology, produced by workers from southeastern Europe, are thus really a multinational product spanning at least three continents.

On another, more social level, Dätwyler also cooperates with the Chinese firm Huawei, which produces components for networks. Mr. Müller states that Huawei was willing to cooperate with the much smaller Dätwyler Cabling Solutions for several reasons: because Dätwyler already had a Chinese crew, which would ease communication, and because Huawei was interested in establishing long-term relationships; both companies had long-term employees who had been collaborating with each other for years. Finally, he adds, both stand for high quality, and being a Swiss company in China generally works better than being an American one: “it’s a question of trust!”⁵⁰ Accordingly, the comprehensive data center solutions offered by Dätwyler in

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Johannes Müller, personal interview, April 29, 2019.

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Quoted in Lüönd and Zurfluh 2015, p. 190.

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Johannes Müller, personal interview, April 29, 2019.

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Hans Ulrich and Ursula Dätwyler, personal interview, September 17, 2019.

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Müller 2019; Dätwyler Cabling Suzhou, “德特威勒开业典礼成功举办 Deteweile kaiye dianli chengong juban (Dätwyler Opening Ceremony Successfully Held),” *现代建筑电气 Modern Architecture Electric* 5, no. 09 (2014), p. 69.

49

Dätwyler factory workers, personal interviews, and observations, October 14, 2019.

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Johannes Müller, personal interview, April 29, 2019.

51

Wen 2017, p. 60.

Altdorf today also incorporate crucial Chinese know-how. Some decades ago, when the PRC was just on the verge of opening up, the fact that Chinese technology is now “modernizing” Swiss digital infrastructures would have been unthinkable. Yet companies such as Huawei have by now become an important part of digital Switzerland.

Huawei: From Shenzhen to Liebefeld

In the mid-1980s, around the same time that the fiber optic cable industry was emerging in Switzerland and elsewhere, a range of Chinese ICT companies began to appear as well. These included several enterprises that are now widely familiar, such as Huawei, ZTE, TCL, Lenovo, and Haier.⁵¹ Among these, Huawei in particular has become a key player with regard to globalizing Switzerland’s digital infrastructure. It now equips the Switzerland, which is well-known for its ascribed innovative capacity, with a new purported modernity made in China.

This would have been hard to imagine at the time when Huawei Technologies Co., Ltd. was founded in 1987—one year after Dätwyler began producing fiber optic cables in Altdorf. The story of the meteoric rise of Huawei has, by now, been told many times. Former People’s Liberation Army engineer Ren Zhengfei founded the company with only six employees in Shenzhen, a city bordering Hong Kong in the southern Chinese province of Guangdong. In 1979, under the new leadership of political reformer Deng Xiaoping, the area became one of the first four Special Economic Zones. Since then, the city on the Pearl River Delta has undergone rapid transformation—from a former fishing village into the putative Silicon Valley of the East. In this special economic zone, private ownership, which had been prohibited in the Mao era, became possible in the high-tech sector in 1987. In the same year, eighty-five ICT companies, including Huawei, were established as so-called “people’s enterprises” (*renmin qiye*). They deeply diversified the landscape of China’s hitherto exclusively state-owned enterprises (*guoyou qiye*). Similar to the Chinese fiber optic companies, Huawei did not initially focus on developing its own components. Instead, the company mainly engaged in the telecom wholesale sector, trading with switches and other equipment.⁵²

Over the course of recent decades, this has changed as Huawei has become a global ICT company. This rise is related to a unique framework of domestic and foreign policies. While the Chinese electronics industry had received special support since the founding of the PRC, the foreign firms that were allowed to enter the Chinese market during the period of reform also introduced new challenges to this industry. The result-

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Ibid., pp. 64–65; Jin Sun 孙焱, “[1987] 华为之兴：如何离冬天远些 [1987] Huawei zhi xing: Ruhe li dongtian yuan xie ([1987] The Flourishing of Huawei: How They Moved Somewhat out of Winter),” 第一财经日报 *First Financial Daily*, September 30, 2007, <http://finance.sina.com.cn/chanjing/b/20070930/10514030947.shtml>. (retrieved May 14, 2020). After the founding of the PRC, there were only limited exports of Chinese electronic products. Such export of radios, telephones, and electronic tubes to Hong Kong

and Southeast Asia can be traced back to 1956. Wen 2017, p. 94.

ant fierce competition between foreign and Chinese firms as well as overcapacity in the Chinese market prompted Huawei to look for new overseas markets. This was facilitated by the PRC's foreign policy, which since the 1990s gradually changed from a strategy of "attracting in" foreign technology to one of "going out." In the early 2000s, the government encouraged Chinese companies through various instruments and forms of preferential treatment to go abroad and invest and set up operations in other countries. Huawei was one of them. Supported by these policies, the PRC surpassed Europe and the United States to become the main ICT-exporting country in 2004 and the largest exporter of telecom equipment in 2010.⁵³

Huawei's move abroad began in the mid-1990s, at just about the time when Hans Ulrich Dätwyler first came to China. However, the strategies of the two companies differed. Dätwyler had gained its initial experience abroad three decades prior to Huawei, targeting economically well-off western European countries first. Huawei's approach, in turn, was similar to the strategy that founder Ren had initially followed within China, that is, to start from doing business in the economically poorer rural regions. Likewise, in going global, he first targeted the emerging markets in Asia, Africa, and Latin America. The first step was an office in Hong Kong, followed by an entry into the Russian market in the late 1990s, which considerably benefited from official strategic diplomatic relationships between the People's Republic and Russia. In 1998, Huawei managed to enter other countries in Asia through international bidding, and in 1998 and 1999 offices in Kenya and Brazil became the company's first offices in Africa and South America, respectively.⁵⁴

Only after Huawei gained solid ground on these continents since the early 2000s did the company eventually expand to North America and western Europe. This trajectory was less smooth, however, and fraught with numerous difficulties and challenges due to inter-state and inter-capitalist competition. Huawei was markedly more successful in Europe than in the United States.⁵⁵ It benefited from the European recession that followed the burst of the Internet bubble in 2001. The downturn forced operators to procure cheaper yet high-quality equipment, which was something that Huawei could offer. Similar to the way companies such as Dätwyler initially approached the Chinese market, Huawei aimed first at establishing joint ventures with local companies in order to access the European market. In 2003, Siemens, a German company involved in fiber optics and one that had been present in China since 1872 and had good contacts with the Chinese government, agreed to sign a cooperative contract. The breakthrough came in 2004, however, when Huawei won major telecommunications bids in Sweden and the Netherlands.⁵⁶

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Wen 2017, p. 76, pp. 94–98.

54

Ibid. p. 76, pp. 94–98.

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See Bruno Mascitelli and Mona Chung, "Hue and Cry over Huawei: Cold War Tensions, Security Threats or Anti-Competitive Behaviour?," *Research in Globalization* 1 (December 2019), pp. 1–6; Wen 2017, pp. 133–38.

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Wen 2017, pp. 133–38.

| Fig. 5 |

Manual inspection of fiber strands.

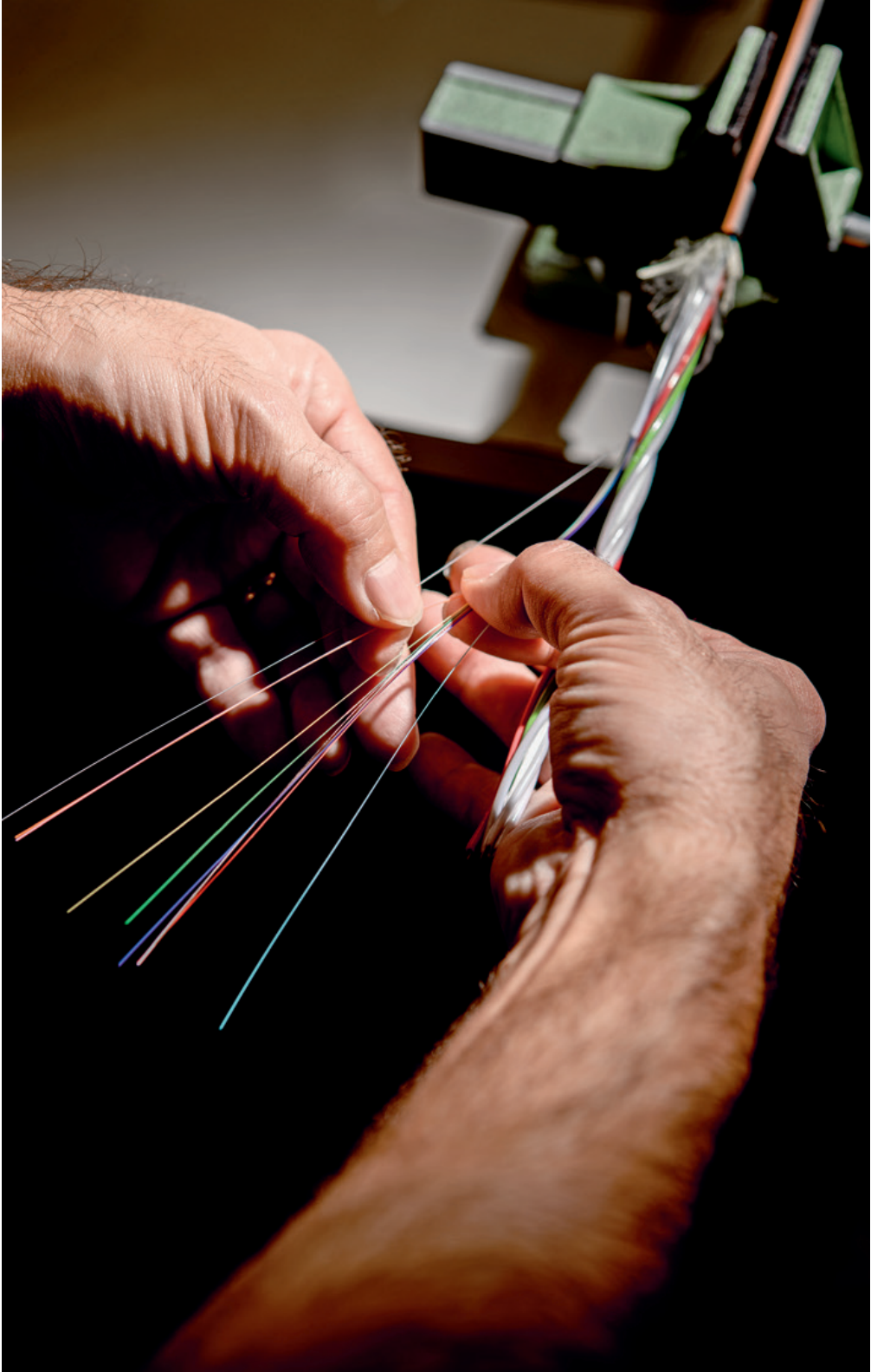
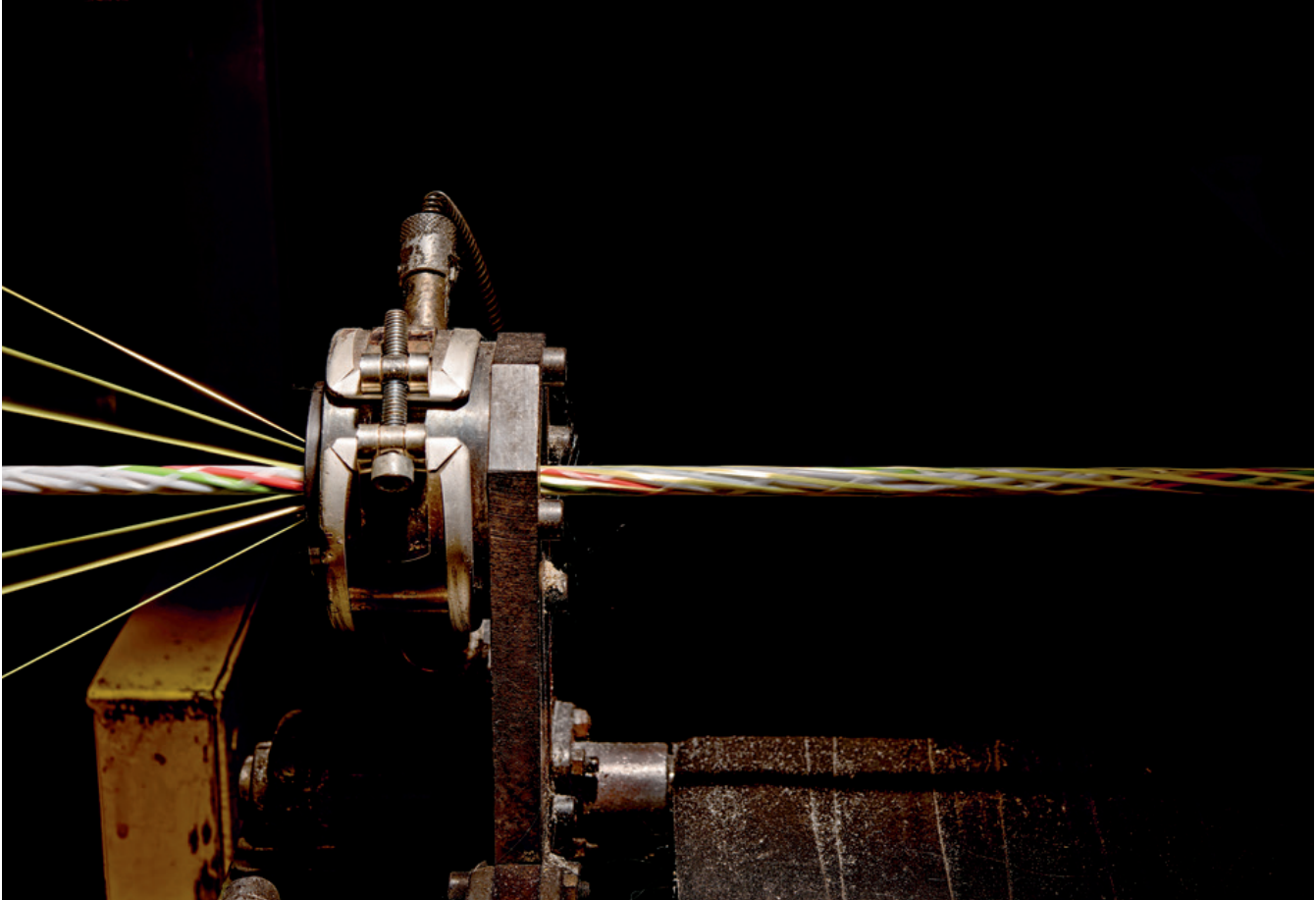


Fig 6

Loose tubes are being stranded together to form a cable, including strain relief and water-repellent protective coating.



| Fig.7 |

Quality check: The cable is measured and labeled.



Fig. 8

Visual check of the completed cable.



Fig. 9

Production plant in Altdorf with a view of the Uristock.



Huawei's official entry into the Swiss market—notably the last country in Europe where Huawei opened a branch⁵⁷—is thus to be seen in this context of European market expansion. Around that time, the company was basically unknown in Switzerland. The company's first appearance in the Swiss Confederation was reportedly during an exhibition at the International Telecommunication Union's trade fair in Geneva in 1999. At that time, "[e]veryone was shocked that this sort of stuff was being made in China."⁵⁸ Nevertheless, only industry experts took notice of this.

In the following years, the company began to explore the Swiss market. According to Felix Kamer, Huawei Switzerland's vice president, who was part of the branch office's founding team, Switzerland initially did not have a strategic role in the company's business. Activities in Switzerland were first coordinated by Huawei's European headquarters in the German city of Düsseldorf and were later delegated to the Italian branch office in Milan.⁵⁹ From there, Toni Cheng (today the general manager of Alibaba's European cloud business) traveled to Switzerland regularly by car to sell Huawei Data Card, a product that could provide a Wi-Fi hotspot to mobile phones at a time when mobile phones did not yet properly support Wi-Fi.⁶⁰

The turning point for a proper Swiss branch was in 2008, when the country's major telecommunications provider Swisscom planned to modernize its network on the basis of fiber optics. Vivian Gong Frey, Huawei Switzerland's chief technology officer, who was also part of the founding team, recalls the early beginnings of Huawei in Switzerland. Accordingly, Huawei was among several companies that were invited by Swisscom to make an offer and join the bid. However, the company did not yet have an office in Switzerland, and the colleagues from Swisscom initially did not know how to set up the contact. They knew Toni Cheng, however, and thus simply sent their request for information (RFI) to his hotel room when he was visiting Switzerland from Milan. At that time, people at Huawei hardly dared to dream that a seemingly high-end country such as Switzerland would even accept a Chinese vendor. However, says Mrs. Gong Frey, they presented a convincing, comprehensive, and solid network solution, which was developed directly in China.⁶¹

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Felix Kamer, personal interview, August 23, 2019.

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Quoted in Bruce Gilley, "Huawei's Fixed Line to Beijing," *Far Eastern Economic Review* (December 28, 2000), p. 96.

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Felix Kamer, personal interview, August 23, 2019.

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Vivian Gong Frey, personal interview and text communication on August 27, 2019 and December 10, 2019.

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Vivian Gong Frey, personal interview, August 27, 2019.

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Vivian Gong Frey, personal interview, August 27, 2019; René Schumacher and Said Rassouli, Swisscom, personal interview, September 23, 2019.

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A telephone system consists of several hierarchical subsystems. Very roughly speaking, there are three layers. At the base, there is the local access network. The access network links individual telephones to local telephone switching offices or central offices (CO). These are located on the second layer, called the regional or metro network. Swisscom has 17 metro networks. The metro network connects the COs of cities, towns, and suburbs in a given region. Third, on top of the hierarchy, there is the long-distance

network or backbone, which connects the different regional centers and major cities and, from there, provides links to the networks of different countries. Altogether, Swisscom has about 900 COs, including access COs, metro COs, and a few backbone COs. Huawei connected all of them, for example through technologies such as switches and multiplexing. As explained better in footnote 80, the former are technologies that ensure that our calls or e-mails are "switched" in the intended direction.

Yet, unlike Dätwyler Cabling, which was able to build upon the Chinese joint venture, Schindler, and its Swissness, Huawei first had to prove itself. After a test phase, the negotiations between Huawei and Swisscom began.⁶² The first telecom equipment that Huawei sold to the latter in 2008 was high-capacity optical transport network (OTN) products to connect the various central offices (CO) across Switzerland.⁶³ Winning the Swisscom bid was the go-ahead for the company's business in Switzerland. A major requirement for being awarded the bid, however, was a local office. In setting up the business, they received strong support from the Bern Economic Development Agency.⁶⁴ Subsequently, in October 2008, Huawei registered an office.⁶⁵ Toni Cheng became its head, reporting to Italy. In March 2009, he began hiring a staff of four local and Chinese experts.⁶⁶ Among them was a senior local, Felix Kamer, who had previously worked at Swisscom and had received an offer from Huawei during a business trip to Shenzhen,⁶⁷ and Vivian Gong Frey, who was recruited as a senior network solution manager.

Mrs. Gong Frey recalls that she started to work at Huawei Switzerland rather by happenstance. She had been living in Switzerland since 2000 and spoke English as well as some German. Born in the Mao era, when women were supposed to “hold up half the sky,” and being a telecommunications IT engineer with a degree from a top university in Beijing, she recalls that she was used to relative gender equality in technical fields. However, in this regard, Switzerland “was the biggest shock in my professional life!” At her first position in Switzerland, a managing role at a Canadian telecommunications company, “nobody talked to me unless they really needed to.” Nevertheless, she reports, she went on, quitting the job only when she gave birth to her daughter and the industry was shaken by the burst of the Internet bubble.

Unexpectedly, on May 12, 2008, a major earthquake occurred in China's Sichuan Province. Mrs. Gong Frey registered as a volunteer to assist the victims. When one of the organizers heard about her telecommu-

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Multiplexing enables a given telephone line to carry several signals at once by combining numerous signals into one higher-speed signal. Hecht 2017, p. 43, pp. 54–55; personal interviews with René Schumacher and Said Rassouli, Swisscom, June 27, 2019 and September 23, 2019; text and e-mail conversations with Vivian Gong Frey, Huawei, December 10–16, 2019.

Felix Kamer, personal interview, August 23, 2019.

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Commercial Registry Office of the Canton of Bern, “Commercial Register of Huawei Technologies Switzerland AG” (Swiss Official Gazette of Commerce SOGC, October 14, 2008), <https://shab.ch/api/v1/archive/4690286/pdf?tenant=shab> (retrieved December 12, 2019); Economic and Commercial Office of the Embassy of the People's Republic of China in the Swiss Confederation, “华为落户瑞士 Huawei Luohu Ruishi (Huawei Set-

ties in Switzerland),” May 26, 2009, <http://ch.mofcom.gov.cn/aarticle/jmxw/200905/20090506279707.html> (retrieved April 23, 2020).

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Vivian Gong Frey, personal interviews, August 27, 2019 and November 14, 2019.

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Fabian Vogt, “Komme an zweiter Stelle,” *Computerworld.ch* (February 18, 2013), <https://www.computerworld.ch/business/politik/komme-an-zweiter-stelle-1405564.html> (retrieved December 12, 2020); Felix Kamer, “My Happy Ten Years at Huawei,” *Huawei People* 1, no. 298 (2019), pp. 5–6.

nications background, she told her that Huawei was about to establish an office in Switzerland and put her in touch with Toni Cheng. Once Huawei officially launched its business in Switzerland, Toni Cheng invited her to join the team. She accepted the full-time position, although her friends from Switzerland, knowing that she was then the mother of a six-year-old, said: “Are you crazy?”⁶⁸

As Felix Kamer remembers, the founding team of five people “established Huawei Switzerland from scratch.”⁶⁹ With little time to find office space, they first started the business in a three-room apartment in Bern near Helvetiaplatz.⁷⁰ They had to set up everything by themselves, from buying their own laptops and traveling to Milan in order to get the right software from Huawei Italy, to going to IKEA and assembling the furniture purchased there, to improvising office curtains made from bedsheets.⁷¹

In addition to assembling these infrastructural materials, they had to develop intercultural understanding. As Felix Kamer notes, “Building trust is a challenge for any company, but it is much more demanding across cultural borders.”⁷² In the early years of working with Swisscom, says Vivian Gong Frey, “we had to act as a bridge to bring the two companies together.” It was the first time they were using a Chinese product, and they had some doubts. The fact that the Huawei engineers could hardly speak English did not make things any easier. “We had to ... do a cultural exchange and integrate body language,” for example in intercultural workshops.⁷³ During these workshops, Felix Kamer recalls, the Swiss and Chinese sides “talked about culture, food ... We sang ‘Frère Jacques’ and ‘*zhu ni shengri kuaile*’ [Happy Birthday to You] in Chinese.” The aspects of Switzerland that astonished his Chinese colleagues the most were the high cost of living, the impressive quality of services such as trains and buses always running on time, and public services, as well as the way the Swiss could eat heavy meals such as cheese fondue.⁷⁴ “I missed Chinese food,” recalls Vivian Gong Frey. “At first I didn’t know what to order at restaurants. I only knew spaghetti.”⁷⁵

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Vivian Gong Frey, personal interview, August 27, 2019.

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Kamer 2019, pp. 5–6.

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Felix Kamer, personal interview, August 23, 2019.

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Kamer 2019, p. 7.

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Felix Kamer, personal interview, November 14, 2019.

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Vivian Gong Frey, personal interview, August 27, 2019.

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Felix Kamer, personal interview, November 14, 2019.

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Vivian Gong Frey, personal interview, November 14, 2019.

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Felix Kamer, personal interviews, August 23, 2019 and November 14, 2019.

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Felix Kamer, personal interview, August 23, 2019.

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Martin Zeller, Huawei Product Presentation, FTTH Forum Baden, May 7, 2019. Worldwide, Huawei has about 194,000 employees in more than 170 countries. Huawei, “About Huawei,” 2020, <https://www.huawei.com/ch-en/about-huawei> (retrieved January 29, 2020).

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IT Reseller, “Huawei baut Forschungszentren in der Schweiz,” August 13, 2018, https://www.itreseller.ch/Artikel/87393/Huawei_baut_Forschungszentren_in_der_Schweiz.html (retrieved December 12, 2019); Tobias Marti, “Bern fürchtet den Zorn Amerikas: Chinas Entwicklungszentren in der Schweiz,” *Blick* (July 5, 2019), <https://www.blick.ch/news/politik/weil-china-entwicklungszentren-in-der-schweiz-plant-bern-fuerchtet-den-zorn-amerikas-id15293817.html> (retrieved December 12, 2019).

Nowadays, Huawei Switzerland no longer organizes intercultural workshops: “We have a better understanding of how Switzerland works, and the customers have also become more open.” Nevertheless, Felix Kamer asserts that “the language is a barrier.” While he spent one year in Shenzhen recently, practicing Chinese characters with flash cards in the evenings, his job kept him too busy to pick up more than rudimentary Mandarin.⁷⁶ To overcome such challenges, the staff of Huawei Switzerland is still made up of local, i.e. European, and Chinese employees, including people of Chinese origin with a Swiss passport. There is also a division of labor, with Chinese colleagues mainly being responsible for the technical side of the business and communication with headquarters.⁷⁷

Today, Huawei Switzerland has about 350 employees of thirty-three different nationalities⁷⁸ working in offices near Bern, Zurich, and Lausanne. Despite the ongoing discussion about cybersecurity, the company continues to grow. Moreover, it is about to open one or two major research centers, likely to be linked to ETH Zurich and/or EPFL in Lausanne. In times of a trade war and in view of not wanting to endanger negotiations on a free-trade agreement with the United States, however, it seems that the negotiations on the research centers have been kept discreet.⁷⁹

In practice, Huawei can already be found nearly everywhere in Switzerland’s digital realm. Private consumers are addressed in advertisements for Huawei mobile phones on Switzerland’s streets and in its train stations. Moreover, the company provides a range of network systems and devices for enterprises and telecommunications providers. These include switches and routers,⁸⁰ antenna components, wireless local area networks (WLAN), Internet of Things gateways, and security products. In the fixed telecommunications network, for example, Huawei provides crucial components that link Switzerland’s older copper and coaxial networks to the fiber optic network.⁸¹ Universities also use Huawei components; these include Switzerland’s top technical university, ETH, which has distributed more than 3,000 of Huawei’s WLAN access points across its campus. When traveling up mountainsides in the cable cars of Titlis Bergbahnen, skiers can now access Huawei’s WLAN hotspots,⁸² and the National Swiss Ski Alpine Team is currently competing in Huawei racing bibs.⁸³

Swiss data centers rely on Huawei technology as well—although they are not always willing to talk about this in public. Such technologies include, among other things, servers, storage solutions, switches, and other network components, such as DWDM (Dense Wavelength Division Multiplexing).⁸⁴ In short, the range of technologies offered by Huawei is wide.

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Very simply put, switches are devices that direct information through the right “pipes” or cables so they reach their intended destination. Switches basically do not pay attention to the content of the data they direct. After setting up a circuit, they “... leave it alone as long as it’s carrying signals.” Routers can perform a similar task of directing information. However, in contrast to switches, routers are more complex: They “... may bundle together packets that are going in the same direction, to be sorted and redistributed at their

destination. In addition to reading the headers, routers monitor network conditions to establish the best routes for sending data packets.” See Hecht 2017, p. 9, p. 402, p. 483. Interestingly, only a few decades ago, the PRC had to rely on imported switches, which was perceived as a national Chinese security concern. In 1994, Ren Zhengfei advised then president Jiang Zemin that “... switching equipment technology was related to national security. And if a nation did not have its own switching equipment, it was like

a nation without its own military.” Ren, in Eric Harwit, *China’s Telecommunications Revolution*, New York, 2008, p. 148. Today, it seems that this situation has turned around, as Western countries express similar concerns with regard to employing Chinese technology.

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Huawei, “Huawei Switzerland: Building a Fully Connected, Intelligent World,” 2019, <https://www.huawei.com/ch-en/> (retrieved December 12, 2019); personal observations and multiple interviews between March and November 2019, including with representatives from Swisscom, Cablex, Huawei, and Glasfasernetz Schweiz.

Accordingly, one data center IT engineer from the University of Zurich recalls that, after having gone through five hours of product presentations with Huawei engineers, “I just told them ‘okay, just tell me what you don’t have!’”⁸⁵

While furnishing Swiss infrastructures with optical network components, Huawei’s designers also draw inspiration from Swiss technologies—including in more unexpected ways. Huawei has invested 1.5 billion Swiss francs in the construction of its new Ox Horn campus near Shenzhen in southern China. By November 2019, more than 10,000 employees, mostly research and development staff, had already moved there. Once construction is complete, 25,000 people are expected to work there in twelve “cities” that will imitate various European cities and regions such as Paris, Verona, Oxford, Heidelberg, and Fribourg in Switzerland. An eight-kilometer rail network connects these places. The bright red, somewhat nostalgic shuttle trains that run there are modeled after the Jungfraubahn, a famous Swiss alpine train—an idea by Felix Kamber.⁸⁶

In conclusion, Swiss-Chinese digital infrastructures are interwoven in complex, multidirectional, and multifaceted ways—not only by cables and network devices, but also by the people behind these infrastructures. Accordingly, the digital technologies involved can hardly be assigned clearly to a single nation. Throughout the last century, Chinese engineers have been adapting technologies and know-how from the Soviet Union, Western Europe, North America, and Japan, by studying abroad, learning from foreign experts, and importing technologies. They have developed these technologies into new Chinese versions, which are now finding their way back and promising a new modernity in their places of origin. At the same time, Swiss-made fiber optic technologies such as cables or plugs often contain components made in China or the United States. In addition, the people who work at Swiss and Chinese fiber optic companies in Switzerland and contribute their time, labor, and skills are often from many different backgrounds. In practice, it is therefore difficult to draw clear national boundaries, whether with regard to Chinese technology or when it comes to the making of digital Switzerland.

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Huawei and Absolut Value Distribution, “Kundenreferenz: ETH Zürich setzt auf leistungsstarkes WLAN von Huawei,” 2018, https://absolut-distribution.ch/wp-content/uploads/2018/04/Absolut_SuccessStory_ETH_2018.pdf (retrieved December 12, 2019); Huawei and Absolut Value Distribution, “Kundenreferenz: Titlis Bergbahnen steigern Gästeerlebnis durch leistungsstarkes WLAN von Huawei,” 2018, https://absolut-distribution.ch/wp-content/uploads/2018/02/Absolut_Story_Bergbahnen_Titlis.pdf (retrieved December 12, 2019).

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Swiss-Ski, “Huawei Schweiz wird offizieller Partner von Swiss-Ski,” December 14, 2019, <https://www.swiss-ski.ch/newsroom/news/huawei-schweiz-wird-offizieller-partner-von-swiss-ski/> (retrieved January 29, 2020).

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Huawei, “Huawei Switzerland: Building a Fully Connected, Intelligent World”; DWDM is used to increase the bandwidth of existing fiber networks. It does so by “... transmit[ing] separate signals through the same fiber at many wavelengths.” See Hecht 2017, pp. 10–11.

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Swiss data center IT engineer,
personal interview, May 27, 2019.

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Matthias Müller, "Huawei bringt ein bisschen Jungfrauoch in den Süden Chinas," *Neue Zürcher Zeitung* (January 22, 2019), <https://www.nzz.ch/wirtschaft/huawei-bringt-ein-bisschen-jungfrauoch-in-den-sueden-chinas-ld.1452614> (retrieved December 12, 2019); Villager/China, "Working in a Castle," *Huawei People* 11, no. 308 (2019), p. 34; Felix Kamer, personal interview, August 23, 2019.

**DATA CENTERS
EDGES OF A WIRED NATION**

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