Prussian grand design for civilization

The creation mechanism of the German imperial project

Here I saw a professor of mathematics
buried like a king beloved by his subjects,
just because he was great in his calling.

This is how the French philosopher Voltaire wrote in 1727 about the funeral of Isaac Newton, whose coffin was carried by two dukes, three earls and the Lord Chancellor. It would be difficult to find a better illustration of how in the West, science and government have entered into an inseparable partnership. At the same time, no monarch would be a better source of examples for the benefits of such a partnership than Voltaire's friend Frederick II the Great, King of Prussia. His reign was symptomatic of an extraordinarily determining process. It was not a distance was forming between West and East. Actually a whole civilizational and cultural chasm set apart these two centers of civilization.

Part 1. Frederick II

In Istanbul, Sultan Osman III ruled the stagnant and backward Ottoman Empire. He became sultan at the age of fifty-seven, having spent the previous fifty-one years as a prisoner in the harem. When he was released, he was almost completely unfamiliar with the country he was to rule.

Even at the height of its power, the Ottoman Empire was not conducive to be governed by enlightened rulers. It lacked political stability and an environment with any potential to ignite a cultural evolution. Mustafa, the eldest and exceptionally talented son of Suleiman the Great (1494-1566), was assassinated as a result of intrigues by the sultan's second wife, his stepmother, in favor of her own sons. Another son, Bayezid, was strangled.

Meanwhile, in Potsdam, Frederick the Great (1712-1786) was introducing a series of reforms that raised efficiency and rationality in the military and civil administration. He continued the visionary work of his great-grandfather, Elector Frederick William (1620-1688). What the elector brought to the process of building the power of Prussia was the transformation of Brandenburg from a war-ravaged wasteland into the core of the most efficiently managed state of Central Europe. Its finances were resilient thanks to the efficient administration of vast royal estates. Its social order

based on a class of landowners who served loyally on horseback or behind desks. Its security on a well-trained conscript army of peasants.

At the onset of the 18th century, the state modernized by Frederick William was the closest existing approximation of the ideal absolute monarchy recommended in the famous *Leviathan* by English political theorist Thomas Hobbes as an antidote to anarchy. In his state, Frederick introduced not only complete religious tolerance, but also unlimited freedom of the press. “Here everyone can seek salvation in the way that seems best to him,” he declared.

His complete openness to industrious and talented immigrants meant that at the very beginning of the 18th century nearly one in five residents of Berlin were French Huguenot, living in a French “colony.” Protestants from Salzburg, the Waldensians also made Berlin their home. The same was with Mennonites, Presbyterians from Scotland, Jews, Catholics, declared religious skeptics, and even Muslims.

It was under his reign that Immanuel Kant, perhaps the greatest philosopher of the 18th century, created in Königsberg his *Critique of Pure Reason*, written in 1781, explored the very nature of the and limitations of human rationality. Kant was an even more austere than his ruler. He reportedly went on his daily walks so punctually that the locals adjusted their watches according to his passage.

It didn't matter at all to Frederick that the great thinker was the grandson of a Scottish saddler. It meant just as little to him that another great Prussian philosopher, Moses Mendelssohn, was Jewish. By their joint efforts they were all building **the same human civilization**, which can be summed up in the words of the German poet Schiller in 1784: “I write [my works] as a citizen of the world.” The essence of the Enlightenment as a civilizational movement was the accumulation of philosophers who honed their ideas throughout Europe through increasingly common newspapers, periodicals and books. Enlightenment thinkers were concerned with the social sciences. The main object of their deliberations was both how societies could be built and how they should be built.

The freedom of thought and the influx of diverse cultural patterns produced what we called earlier in this book “energetizing ideas.” Prussia became a booming hotbed of innovation and conceptual progress (NTT usually `progress of ideas’). More and more scientific societies, reading societies, discussion groups and periodicals were established. But the most momentous symbol of the “new quality” and the bubbling energy of the center of civilization were two grand buildings. The first was the State Opera House in the center of Berlin. This magnificent building was distinguished from other opera houses in northern Europe by a key detail: it was not connected to the royal palace. It existed not for the personal pleasure and prestige of the monarch, but for the general public.

Equally significant and remarkable in its role as a symbol of the enlightened ruler was St. Hedwig's Cathedral, built in the heart of the city's largest square. It was a Catholic church in a Lutheran city, built, moreover, by a king who himself was a Calvinist. These two monumental buildings were like beacons, magically attracting minds pregnant with great and groundbreaking ideas. Readers who have already grasped the vision of the entire book *Forces of Psychohistory* will

easily agree that these buildings were also the beginnings of a mighty empire, destined to shake the foundations of the world.

Frederick, an enlightened ruler, wrote in 1752 in the first of his two political wills:

> *The ruler is the first person in the state. He is well paid so that he can maintain the dignity of his office. In return, however, he is required to work effectively for the benefit of the state.*

In Frederick's view, royal robes had no practical use, and the crown was merely a "hat that lets the rain in." On another occasion he was to declare:

> *I can have no interests that are not equally the interests of my nation. If they cannot be reconciled, the good and benefit of the country must always be given priority.*[1]

Should the persons' names were swapped from German for Chinese, the above ruler's statements and accounts of his reforms would be a perfect apocryphal of ancient Confucian treatises extolling the designs of enlightened rulers. The statecraft of these rulers was summarized by such maxims as *renzhewudi* 仁者無敵, *the benevolent one has no enemies*. This maxim meant that as long as the ruler took care of his subjects and their needs, economic and military power will emerge on their own and none of its neighbors will be able to field an army capable of threatening it.

In 1786, at the end of Frederick's reign, Prussia had one soldier for every twenty-nine subjects. It was the most militarized country in the world, fielding the third largest army in the entire European subcontinent.

Leap change in civilization patterns

> *Citizens must be made capable and willing to use their own minds to achieve higher goals within the framework of the future unified German nation-state.*

With these words, reformer Johann Gottlieb Fichte called for a new vision of education in 1807. Prussian drill had previously relied on obedience to orders and lack of freedom to decide for the soldiers of lower rank. However, the humiliating defeat at the Battle of Jena in 1806, in which Prussian drill lost out to French mass conscription, became a turning point. The teaching of line of battle tactics[2] was abandoned. Instead, barely a year after the defeat, the tactics of *mission accomplishment* began to be taught. This gave officers flexibility. The new way of operating also required ordinary soldiers of the lowest rank to ascend to a to a higher level of mental functioning:

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1 Do I need to invoke the opening passage of *The Art of War*? "道者, 令民與上同意, 可與之死, 可與之生, 而不畏危也。"

2 https://en.wikipedia.org/wiki/Line_of_battle

personal commitment, independence in decision-making, the ability to understand the situation were needed.

But before an army of soldiers can go into battlefield, an army of teachers must be put to work at elementary schools. A change in the system of education (in this book named *civilizational formatting*) of young minds required education to be brought to a higher level. It also had an ominous effect on Prussian entrepreneurial culture. People of lowest possible autonomy (peasants, factory workers) were now taught to master the ability to direct one's own destiny. They were taught to make use of one's autonomy and agency. It resulted in a saying about the decisive factor in winning battles, very much like the one on fields of Eton in case of the British Empire ('VII.5.C):

> *The outcome of the battles of Orchard and Sedan was decided by the efforts of a Prussian elementary school teacher.*[3]

Science and technology

> *I was invited to Berlin, the cradle of the arts and sciences [...] where King Solomon*[4] *and the Queen of Sheba await.*

So wrote Gottfried Wilhelm Leibniz in a letter to Princess Scharlotte in 1697. But at the time he was proclaiming the glory of what still was a mere the beginning of the central area of the Prussian scientific activity.

This activity was designed according to a philosophy fundamentally different from that in other European countries. It was founded on two pillars: dedication to research in the service of the idea of science, and a cleverly constructed system of competition on two levels: between professors and between universities.[5] The result was a phenomenal improvement of the scientific method and effectiveness of training students in the technique of research. Even after 1820, scientific progress was made not in private laboratories or institutes, but in state-established universities, a feature unique to German states. **This mechanism enabled the transmission of practical knowledge to the young -generations of soon-to-be researchers.** Friedrich Paulsen wrote decades later about the role of independent research this way:

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3 1866 and 1870, respectively. These were the decisive battles in Prussia's war against Austria and France. The impressive saying has little to do with reality of waging wars. It should be considered as a "common myth," mobilizing discipline and perception of collective destiny. To illustrate, the Prussians won the Battle of Orchard won thanks to, among other things, a revolutionary rifle lock, which increased rapid firing rates and did not require soldiers to be in a standing position to reload.

4 https://en.wikipedia.org/wiki/Solomon A Jewish king known of proverbial wisdom. According to Old Testament during his reign Israel become especially prosperous.

5 R. Steven Turner, *The Growth of Professorial Research in Prussia*, 1818 to 1848 – Causes and Context [in:] „Historical Studies in the Physical Sciences", Vol. 3 (1971), s. 137–182

Only one who is productive in science can be an effective teacher.

Professors specialized, while offering increasingly advanced and specialized lectures. At the same time, they set up laboratories where students could put into practice the newly acquired knowledge in their own research. For professors, teaching students was subordinate to their research activities and publishing results. Reputation in one's field was a *sine qua non* (NTT: to be or not to be, modern mechanism deteriorated into *publish or perish*) in the employment market even in eyes of the smallest universities.

A case in point is C.G.J. Jacobi, a mathematician who researched elliptic functions at the University of Königsberg. He initiated **the radically new practice of using his own current research as the content of lectures**. In late 1835 and early 1836, he and Franz Neumann launched a seminar in which the key pedagogical tool was to direct students to do their own research: "either entirely theoretical, or requiring measurements and observations based on mathematical theory."

Idealism, absolute dedication to exploration of the laws of nature, social mechanisms of competing for prestige – these three engines drove the German scientist then and always thereafter. The system not only encouraged, but obliged ambitious academic youth to devote themselves to the pursuit of knowledge. Within barely a decade, the above-described implementation of the ideology of science (German: *Wissenschaftsideologie*) began to yield exponential results. German science pushed itself far ahead of all others.

It was an era of the highest intellectual productivity that the German nation had ever experienced. It was the era of Kant and Goethe. The era that would soon produce quantum physics, and those who would give mankind the energy of the atom: Hertz, Einstein and their likes.

A sure indication of the scale of educational superiority of Germany may be the fact that in 1876, twenty years after William Perkin's discovery of the color dye of *mauve* (see below), the United States had only one-dozen organic chemistry graduates. Germany had hundreds.

The German system perfectly reinforced ideological programming with rewards in the form of achievement honors, salaries and promotions. Johann Fichte and Schleiermacher, in their treatises written on the occasion of the founding of the University of Berlin, expressed this with emphasis for the first time:

Anyone wishing to embark on a career in science is required not only to possess knowledge. He must also to be capable of producing it as a result of his own independent activity. [...] Under the reign of this idea, the German universities of the 19th century developed into what they are today: the workshops of labor and the forges of our nation's intellectual life.

Fig. 1. An American copy of the German V-1 flying bomb from World War II. A distant offshoot of the historical mechanisms shaping the power of Prussia two centuries earlier. Exposition of the Field Artillery Museum at Fort Sill, USA.

Part 2: Bismarck and social progress

The great issues of today will not be decided
by speeches and majority decisions,
but by means of iron and blood.
Otto von Bismarck, 1862

Bismarck was the one who brought to completion the work of unifying the German countries. Part of this work, in addition to winning the well-known Franco-Prussian War (1870-1871), was the Kulturkampf, the struggle to limit the power of the Catholic Church and the Pope.

But more important were the social reforms of 1883-1889. A national health care system, an accident insurance system and pensions were established. These reforms addressed the existential anxieties of working people: they provided security for old age or incapacity. Thanks to such social reforms, Prussia turned into an activity-buzzing cradle of progress. The area of unified Germany was dominated by Prussia. It vibrated with creative energy and faith in a proud future. It was a grain of imperial ambitions eagerly awaiting its historical moment to expand and shake the world[6].

A fascinating civilization effort, planned and stretched over generations, was undertaken there. It ended with the introduction of such groundbreaking and geography-changing balance of power

6 NTT: Original version of this sentence has the feeling of the Chinese famous maxim 見微知著. Can you please try to include the maxim in the Chinese version?

technologies such as the production of synthetic fertilizers and synthetic gasoline. It led to the supremacy of German scientific thought in theoretical physics... and then a disastrous world war costing millions of lives.

Pushed by the aspirations of its decision-makers, the German Empire was able to generate the causal powers of psychohistory and compete with colonial powers for control of the world's wealth.

Indigo and tectonic change in the balance of power

Natural indigo is made from a plant that grows in India *Indigofera tinctoria*. It made its way to Europe in the 13th century. It wasn't until the 17th century that this extremely expensive dye made its way from painters' palettes to the fabric-dyeing industry - yielding massive profit especially for the British Empire, which controlled production concentrated in in Bengal (the eastern tip of India).

Synthesis of artificial indigo was considered an impossibility until 1894, when a process was developed to synthesize its industrial quantities. It was exactly four decades since the groundbreaking discovery of the color *mauve* (pale purple) by William Perkins in 1856. Indigo dye brought BASF, especially at the very beginning, amazing profits. For the British, the success of the Germans meant the opposite, a catastrophic collapse of their entire dye industry. It had long-term political and economic consequences. It frightened the Brits.

At the 1900 World Exposition in Paris, Germany had something to brag about. Aside of the spectacular huge glass sphere of pure indigo, they presented a whole range of chemicals. For the Americans, French and British, who watched these achievements, it was a harrowing experience. It was deepened by Heinrich Brunck, head of BASF. In 1900, he outraged the public of London by suggesting that all indigo producers in India should switch to food crops.

At the time, the BASF factory in Ludwigshafen was an area of 206 hectares. It housed a mega-complex of 421 buildings connected by a network of 42 km of railroad tracks. The company employed 6,300 workers, including 146 chemists, and annually consumed 243,000 tons of coal, 20 million cubic meters of fresh water, 12 thousand tonnes of ice, and nearly 13 million cubic meters of natural gas. And BASF was not the only German chemical company present at the Paris exhibition. Hoechst, Bayer, Cassella, Agfa and others were there too. In 1906, in an article marking the anniversary of William Perkin's discovery of the color *mauve*, the Daily Telegraph jokingly noted:

> *We have lost our heritage, and on the foundation of the work of a single Englishman [NTT William Perkins, mentioned above] has been erected the superstructure of the Vaterland[7]'s leading scientific industry.*

As late as 1913, the United Kingdom imported four times as much indigo from Germany as it produced on its own.

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7 Synonym for Germany, German word Vaterland means literally Country of fathers.

The synergy of civilizational progress

Industrial chemistry emerged in the 19th century thanks to the perfect confluence (NTT synergy) of two motives: scientific curiosity and competitive mentality of inventors, who were off to the races trying to replicate in their laboratories natural fabric dyes. Before, the duopoly for these dyes was enjoyed by France and England. Now, the Germans, who were paying them massive amounts to purchase the dyes, were driven by unspeakable determination to break out of their dependence.

The ability to produce aniline and post-gas tar gave them a starting point. German manufacturers were also lucky as to the location of their factories. They built plants near the Rhine and its tributaries. Dyes were expensive by size and weight, so the low cost of transportation allowed them to concentrate production in small areas. The rivers, by the way, were a source of water and a supply route for the most important raw material, coal. The concentration of capital and the minds of experienced chemists, transportation, access to raw materials... everything seemed to be waiting for its time (NTT can you please ust the phrasae ‘eastern wind’?).

The man who triggered the avalanche of prosperity was the son-in-law of Bayer's founder, Carl Rumpff. He was funding scholarships for talented scientists, came across the one who finally succeeded in synthesizing indigo.

A major change came to the chemical industry. The money was in medicine drug production. The race to make huge profits from new drugs was full of deceitful tricks. Acetanilide was a popular antipyretic, and pharmacists could decide for themselves which manufacturer they bought it from. Then Kalle and Company invented, reserved and promoted to the medical world the catchy trade name Antifebrine. The follow-up masterful campaign resulted in doctors ordering a specific product from a specific manufacturer, at prices much higher than alternatives of identical composition. To this day, the name Antifebrine is treated as an alternative name for the active substance itself.

The same was true of the better antipyretic drug, acetophenetidine, marketed as Phenacetin. A notable common feature of these antipyretics was that they were created not by scientists or doctors driven by cognitive curiosity, or by a doctor driven by vocation. The drugs were invented by industrialists driven by profit. Big profit.

The British chemical industries, booming in the mid-19th century, now were completely uncompetitive. They were poorly managed and without the mental capacity to innovate. There was a deep conviction among Germans that the British had neither the Teutonic[8] tenacity nor the ability to work hard enough to lift themselves out of stagnation. Carl Duisberg, inventor of synthetic indigo, said:

8 A historical name for Germany. In propaganda, especially in 19th and 20th centuries, the word was used to refer to national strength built throughout centuries.

It requires a special ability to wait for things to come, combined with endless patience. We Germans possess to a special degree of this willingness to work and wait at the same time. We take pleasure in scientific results without technical success.

Over the next few years, dyes and pharmaceuticals were followed by a whole range of new products in German chemical factories: soaps, detergents, photographic materials, printing inks, fertilizers, paints, glazes, explosives, chemical processes for the production of iron and steel (which also began to outperform the British, and already far outperformed the French) and many, many more.

To the worry of its competitors, Germany was becoming an economic and industrial powerhouse. This, combined with the growing political and military ambitions of the young imperial dynasty and the supporting Junker class (land-owning aristocracy, was a cause for deep concern. **Everyone understood perfectly well that any future conflict would certainly be industrialized. And a nation that had the resources, technology and knowledge to equip and support the resource-hungry war machine, would certainly have the advantage.**

Fertilizers

Even prehistoric farmers noticed that legumes somehow renewed overworked soil. Today we know that the nitrogen compounds needed by plants are produced by bacteria. Other sources of nitrogen, potassium and phosphorus were animal bones and manure. In the 19th century, population growth forced a race for other sources of these substances.

Even human feces were used for fertilizer, despite the significant health threat of parasites. In 19th-century Paris, annually one million tons of horse manure were collected from streets and used in suburban vegetable gardens. Similarly, countless amounts of buffalo bones were processed in the US. However, nothing surpassed the quality of bird guano, which was discovered in huge quantities on islets off the coast of Peru. Over two decades, some 20 million tons were extracted and shipped to Europe. After Peru's resources were exploited, the world went to neighboring Chile for nitrates - for fossilized saltpeter, which had accumulated in the Atacama desert for millions of years.

These resources, too, were eventually going to run out. Anxiety was growing. Then, in 1898, Sir William Crookes announced an imminent deliverance: “Famine will be turned into abundance by laboratories.” Some method of extracting nitrogen from the air must be found. Numerous attempts were made, but only Fritz Haber succeeded. He found that the only way was to hydrogenate nitrogen to receive ammonia as the output. This required unusually high temperatures and pressures in range of 200 atmospheres.

The process was extremely inefficient, but Haber soon managed to find catalysts, osmium and then uranium. When On July 1, 1909, Karl Bosh showed up at Haber's lab, to watch a demonstration, the apparatus was damaged by an explosion. Frustrated, Bosh set off on his way back. However, his catalyst expert, Alywin Mittasch, stayed. His patience paid off... and changed the face of the world forever after. The next day, Mittasch witnessed how the apparatus produced 70 drops of ammonia per minute.

Now it was Bosh's turn. He was not only a chemist, but also a specialist in metallurgy. However, it took him as long as two years to construct safe tanks that allowed dangerous hydrogen to escape into the atmosphere. It tooka nother two years until the giant ammonia plant in Oppau began industrial-scale production.

But it looked as if the fed would still wage war[9], since nitrogen compounds are an essential ingredient in explosives. Conflict, everyone felt it, was coming. But despite the German efforts, the supplies they accumulated could only last only for a short military campaign. Germany was short of everything: crude oil, metals and rubber. The German army did not see the threat. Industrialists, did. Particularly threatening was the shortage of saltpeter, available in large quantities only in Chile. Supplies were sure to be cut off by the British. Stockpiling was out of the question, as no country could accumulate enough raw materials for more than a year of conflict.

When war broke out, for a few tempting weeks, the command's ambitions of conquering all of France, seemed achievable. On November 4, 1914, a message arrived in Berlin that lifted the spirits of even the most gloomy official: a few days earlier, ships of the Imperial German Navy had won a seemingly decisive victory over the main British force at Coronel off the coast of Chile. The German command received the news with euphoria. It seemed that a key trade route could be reopened. However, the optimism quickly faded. A month later, in a battle near the Falklands, the Royal Navy retaliated and made up for its earlier defeat. Germany lost its last chance to restore the flow of Chilean saltpeter.

A brief moment of respite came when one hundred thousand tons of Chilean saltpeter were discovered in the holds of ships moored in the occupied Belgian port of Antwerp. But afterwards only BASF's Carl Bosch stood between the Kaiser's troops and inevitable disaster. Then, on May 1, 1915, BASF declared its ability to produce synthetic nitric acid. Dependence on supplies from Chile was no more.

BASF and the German state had become part of the same machine. In a confusingly similar way, the American military-industrial complex would emerge. Already between 1917 and 1918, a staggering 78% of BASF’s sales went to the military itself. The level of cooperation with the state and the army of the other companies making up German industry was equally high.

Germany’s “natural advantage”, synthetic gasoline

In 1926, the US Federal Oil Conservation Board set up a team that estimated the world's oil reserves at 0.5 billion barrels, which was expected to last six years. Independently, in the early 1920s, Bosh concluded that the world's dependence on oil would become critical. And since Germany, of all industrialized nations, had the greatest shortage of natural resources, it simply had to learn to synthesize liquid fuel. Germany had abundant coal reserves, the natural solution was to hydrogenate it and liquefy under high pressure.

The breakthrough was made in 1914 by Franz Fischer and Hans Tropsch of the Kaiser Wilhelm Institute. They used a mixture of carbon monoxide and hydrogen. Problems finding a catalyst meant

9 Reference to a famous ditty “well fed do not start wars”. A falsehood, by the way.

that it wasn't until 1923 that Bosh's scientists developed a process for the industrial production of methanol from coal. The first gasoline produced at the extremely expensive Leuna plant hit the market in April 1927. The cost of production far exceeded the market price, however... it was more profitable to keep producing than to dismantle the costly plant.

But then, in 1930, giant oil fields were discovered in Texas, and a year later in the Middle East. The plant in Leuna was losing its *raison d'être*[10]. The plant's owners had to ask for help from the government. The card to be played was obvious: without oil, the industrialized economy is unthinkable. And self-sufficiency means political independence. At the time, 75% of Germany's fuel was imported. As a result, a landmark agreement, known as the Benzinvertrag (gasoline agreement), was signed in Berlin on December 14, 1933. In exchange for a promise by IG Farben (the syndicate was founded in 1925) that production at Leuna would increase to 350,000 tons per year by 1935, the Reich (NTT the Germany's official name as a state entity) agreed to buy all of the factory's output that could not be sold on the free market.

A citizen of the Third Reich, if he wished, could get up every morning to the sound of the bells of a plastic IG alarm clock, wash and shave with IG soap, and then sit down at a table covered with IG synthetic cloth to eat a breakfast cooked with IG synthetic fats and drink IG saccharine-sweetened coffee. When he left for work, he would board a bus equipped with IG buna tires and powered by IG synthetic gasoline.

It had been essential to the Führer's (NTT Adolf Hitler) plans since 1936, and the company's top executives, with few exceptions, were content with this fact and cooperated unreservedly. This level of militarization was no longer unique to IG. Throughout the industrialized world, large corporations were hurriedly transforming themselves into executors or tools of government policy. In the UK, for example, Imperial Chemical Industries had been preparing for military production since late 1937, setting up factories to produce almost all of Britain's explosives, light metals and basic chemicals for the war effort.

More than 90 percent of the phosphorus incendiaries that soldiers carried, were made from materials supplied by IG factories. The Wehrmacht's invasion force of 1.5 million men owed IG Farben about 25 percent of their equipment, including canteens, belt buckles, straps and helmets. ■

10 NTT: reason to exist (French).