

When Innovation Outpaces Legislative Reality

“Comrade, your research has no future, we will no longer support it.”

Otto Wichterle most likely heard something similar when he was working on the development of soft contact lenses. It was the beginning of the 1960s, and no one had any idea that, thanks to the results of his work, more than one hundred million people around the world would see better several decades later. Nor did anyone realize at the time that the story of the Czech scientist would, even more than half a century later, recall the problems faced by innovators to this day.

“Excellent in science, weak in commercialization”

The Czech Republic does not suffer from a lack of talent. The history of Czech science offers a number of discoveries of global significance – from Otto Wichterle’s contact lenses and Antonín Holý’s antiviral drugs to nanofiber production technology. Nevertheless, we still face the problem of how to translate scientific knowledge into everyday practice.

While in the USA, Israel, or Singapore, the path from a functional prototype to the market usually takes 1-3 years, in Europe it takes twice as long on average. The reasons are complex certification processes, an extreme administrative burden, and the slow updating of technical standards. And sometimes also an economic interest in existing technologies and procedures. The result is a situation in which innovations reach users significantly later than would correspond to the pace of scientific progress.

People from industry are also drawing attention to this fact. At this year’s regional presentation of the Diamonds of Czech Industry awards, Jiří Rösner, Director of Jungheinrich Chomutov, described the problem aptly: years pass between the completion of the development of a new product and obtaining all the permits for its production and sale. The product then enters the market technically excellent, but part of its competitive advantage has already disappeared in the meantime.

Experts therefore increasingly use the term “science-policy lag” – the delay between scientific knowledge and its incorporation into legislation, standards, and public practice. According to the frequently cited assessment (and the title of this paragraph), Europe is excellent in science but weaker in its commercial utilization.

Let There Be Light

A typical example is pro-cognitive lighting. Technologies using knowledge from chronobiology and circadian medicine can today support biological processes affecting sleep quality, concentration, psychological well-being, as well as cognitive and work performance. The scientific evidence is exceptionally strong. The Nobel Prize in Physiology or Medicine was awarded in 2017 for elucidating the molecular mechanisms of circadian rhythms, and subsequent studies have repeatedly confirmed the fundamental influence of light on human health.

Nevertheless, all Czech technical standards still assess lighting only according to parameters important for vision – illuminance, glare, or color rendering. The biological effects of light remain outside the main focus of standard-setting as well as most public investments. But let us be fair, the situation is similar in most countries. The notable exceptions are Germany and the United States, whose recently published standards already take the biological effects of light into account.

This creates a paradox. A building may meet all the requirements of applicable regulations and yet create an environment that does not support the health, concentration, or performance of its users in the long term. Conversely, solutions based on the latest scientific findings and already proven through

widespread application often find no support in the specifications of public tenders or in standard design practices.

This is not a problem of a single technology. Similar delays have accompanied, for example, building energy efficiency, workplace ergonomics, or occupational health and safety in the past. It always took many years for new findings to be incorporated into the rules according to which buildings are constructed, products are manufactured, and investments are made.

The same was true for Wichterle. When he was developing hydrogel for soft contact lenses in the 1950s, there were no manufacturing standards or system that could support the rapid introduction of the technology. Nevertheless, his discovery ultimately changed the world.

Today we face a similar challenge. If we want to increase the competitiveness of the Czech economy, it is not enough to support science and research. It is equally important to create an environment that enables the rapid implementation of verified knowledge in practice. Very often, the mistake occurs at the very beginning of the entire standard-setting or assessment process. A cocktail of ignorance of the issue, personal interest in the application of old technologies, and the belief that the EU will eventually do everything for us is paralyzing for our competitiveness.

The future does not arrive late because of a lack of scientific discoveries. It arrives late because institutions, standards, and processes change more slowly than our understanding of the world.

Human = an organism responding to light

Natural light, that is, light from the Sun, or rather its properties and changing amount during the day, regulates our biological clock, the so-called circadian rhythms. Light also stimulates the production of essential hormones – serotonin and melatonin. If everything is in order, we are active, focused, productive, and in a good mood during the day. In the evening, as the light decreases, we feel tired, fall asleep, and sleep well.

Insufficient light during the day x too much light after dark. Today's person spends up to 90 % of their time indoors. Without a sufficient supply of natural light during the day (lack of serotonin), with an abundance of inappropriate light in the evening (lack of melatonin). The result is poor sleep, daytime fatigue, numerous health problems, and exhaustion.

The solution is full-spectrum light. If we do not want to be chronically tired, we need to spend time in buildings that have a sufficient supply of natural light and are illuminated with full-spectrum lighting. It has the visual and non-visual properties of natural sunlight and affects the human organism almost identically.

New standards? So far, only abroad. Lighting design has been undergoing a major change since the advent of LED technology. Alongside the forthcoming revision of the ISO/CIE 8995-1 standard, the German DIN 5031-100 standard and the ANSI/IES RP standard in the USA are also entering practice, which for the first time systematically address the biological effects of light on humans. Lighting is therefore no longer assessed only according to the intensity on the work surface, but also according to what signal it sends to the human organism. New metrics are therefore entering lighting design, e.g. melanopic lux (m-EDI), which describes the influence of light on the circadian rhythm, alertness, and concentration. These principles are already reflected today in building certifications such as WELL, BREEAM, or LEED and are gradually becoming a new key attribute and standard of indoor environmental quality.

Daniel Štěpán, Director of Strategic Development at Spectrasol

Legatica (2024): the most extensive implementation of Spectrasol's pro-cognitive lighting to date, covering 8000 m², using several types of lighting according to the conditions of individual spaces and the needs of users. Legatica is part of the Nová Waltrovka project by developer Penta Estate in Prague.



Plzeňský Prazdroj (2025): In the control room of the brewhouse of the legendary brewery, a key part of the production of one of the world's most famous beers is managed and monitored in continuous operation. In the underground space, Spectrasol's pro-cognitive LED lighting helps operators maintain alertness and concentration, reduces fatigue, and brings a more natural lighting atmosphere to the windowless space.



Thermo Fisher Scientific Brno s.r.o. (2024, 2025): A demanding Spectrasol implementation in the dust-free facility of a global manufacturer of microscopes and spectrometers. An innovative solution in the form of retrofits, i.e. by replacing LED modules in the existing lighting, significantly shortened and reduced the cost of the extensive installation in both production and office spaces.

