

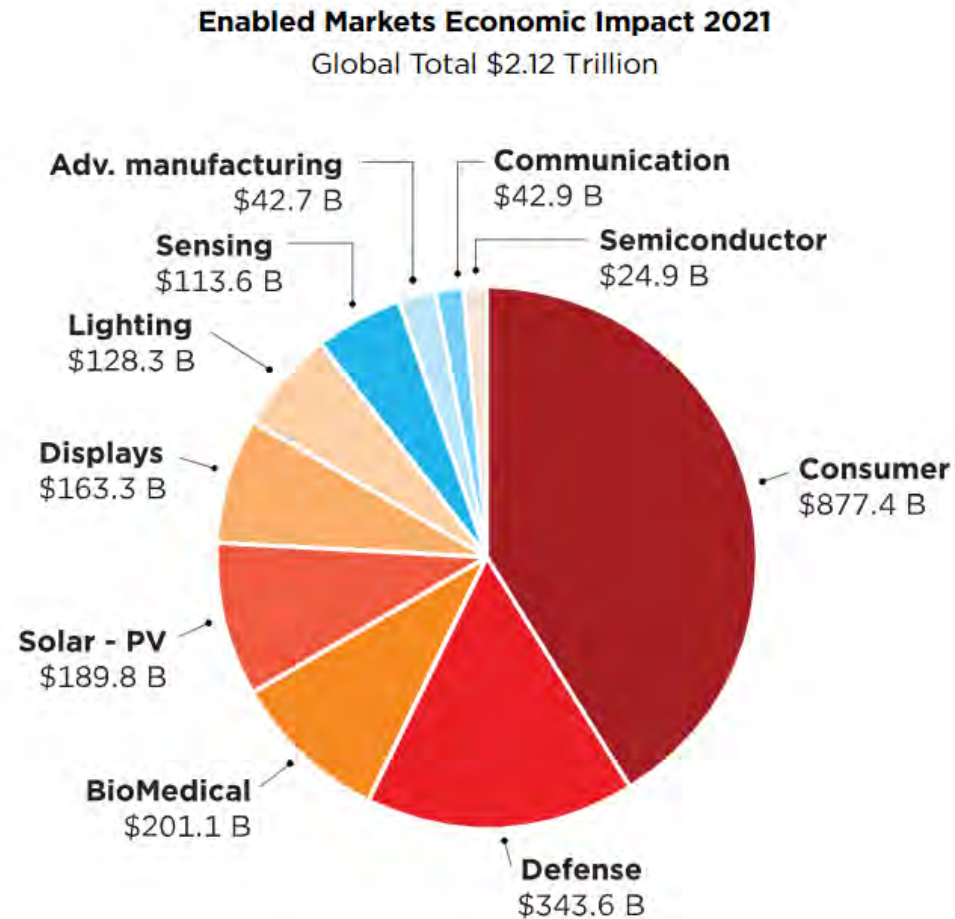
**TNO** innovation  
for life

Recent applications in  
photonics



# What is photonics?

Photonics is the science and application of light; it is the technology of generating, controlling, and detecting light.





# Some of the challenges of today

Patient monitoring

## 'Air pollution causes 8m deaths/yr' Keeping patients safe with wearable technologies

China Accounts For 1.5m Fatalities From Indoor Pollution, India For 1.3m: WHO

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**New Delhi:** Deaths due to air pollution have increased four-fold across the globe over the past decade, the latest assessment by the World Health Organization shows. The database on which the report is based shows that China and India are by far the worst affected countries.

"Air pollution is one of the main avoidable causes of disease and death globally. About 4.3 million deaths each year, most in developing countries, are associated with exposure to household (indoor) air pollution. A further 3.7 million deaths a year are attributed to ambient (outdoor) air pollution," a report by the WHO secretariat titled 'Health and the Environment: Addressing the impact of air pollution on health' presented at the World Health Assembly in Geneva last week. It highlights the need for



WHO has warned of rising pollution in developing countries by 2030 along with advancement of transportation, housing and infrastructure

increasing disease burden give details, but the datasets do not include air at home, on which it is based. WHO

1.3 million. Between them, the two Asian giants accounted for nearly two-thirds of the global total.

As for outdoor pollution, the south-east Asian region, which includes India in the WHO categorisation, accounted for about 9.4 lakh deaths and the category that includes China had 1.7 million. The two regions were home to over two-thirds of global deaths due to this cause. While developing countries were found bearing the maximum disease burden due to air pollution even in 2005, the WHO report then had warned of rising pollution in developing countries by 2030.

In particular: ischaemia, myocardial infarction, stroke, chronic obstructive pulmonary disease and cancers.

Lung cancer deaths due to air pollution have also increased significantly since 2005. According to the latest report, around 30% of all lung cancer deaths can be attributed to the joint effects of household and ambient air pollution, whereas in 2005, 62,000 lung cancer deaths out of the total 1.2 million deaths each year worldwide were attributed to urban outdoor air pollution.

Health ministers from around the world will deliberate on the issue and consider the recommendations, made

The NHS is seeking to advance the roll out of virtual wards and implement more efficient ways of working, in a bid to tackle the backlog and reduce pressures on UK hospitals. Advances in mobile patient monitoring are helping to keep patients safe and support new models of healthcare delivery. **Louise Frampton** reports.

During the first wave of the pandemic, NHS accelerated a pilot that gave COVID-19 patients a pulse oximeter and an App. This meant they could leave hospital early or avoid admission altogether. The technology enabled patients to provide their NHS clinical team with regular data on symptoms, including temperature and blood oxygen rates, so that they could receive advice being monitored in the comfort of their own home. If the patient showed signs of deterioration, clinicians could be quickly alerted and respond.



Prior to the pandemic, some trusts had trialled 'holistic' approaches to healthcare delivery but the need for such models almost instantly really came to the fore as a means of dealing with the surge in demand for hospital care.

model we use, and hospital administrator



## Latest haze could be from local sources

Experts say domestic pollution was likely cause as Indonesia had very few hot spots

Audrey Tan

The haze that hung over Singapore from Thursday night till yesterday morning was probably caused by local pollution instead of forest fires in the region, experts say. "Based on the latest satellite images, there were no significant hot spots or smoke detected in the

nearby region," said a spokesman for the National Environment Agency (NEA). "The haze was due to the accumulation of particulate matter under light wind conditions," he added. The 24-hour Pollutant Standards Index (PSI), a measure of air quality here, reached a high of 95 in southern Singapore at 8am yesterday. A PSI reading above 100 indicates

unhealthy air quality, while a reading of between 51 and 100 is considered moderate.

The 24-hour PSI across Singapore stayed in this range for the rest of the day, although readings in southern Singapore leaned towards the higher end. Experts told The Straits Times there were a negligible number of hot spots in Riau, Sumatra and Kalimantan - provinces in Indonesia whose fires are usually the cause of smoke haze. "This makes Indonesia unlikely to be the source of the bad air," noted

Ms Zhang Wen, executive director of volunteer group People's Movement to Stop Haze (PMHaze), which monitors haze conditions here. "Another significant source of our poor air is exhaust from traffic."

Usually, domestic pollution can be alleviated by the wind, she said. "But as it was not windy yesterday, the pollutants could not disperse, making it look hazy." The hourly concentration readings for PM2.5 - tiny pollutant particles associated with haze - also started inching up from Thursday evening, although their

levels across Singapore returned normal by 9am yesterday.

An air quality scientist Erik Vela noted that hourly concentration nitrogen dioxide, a pollutant associated with the combustion of fuels, also started going up at the same time as PM2.5 concentration levels. Most of the haze dissipated by the afternoon, as the rain in the morning helped to improve air quality here. But even without the rain, the PM2.5 readings would have fallen as the day progressed, as local, turbulent air movements during the

## Italian highway bridge collapse

A bridge on a main highway between Italy and France collapsed in the Italian port city of Genoa, causing multiple casualties



**Morandi Bridge:** 80m section over Polcevera River and rail tracks collapses

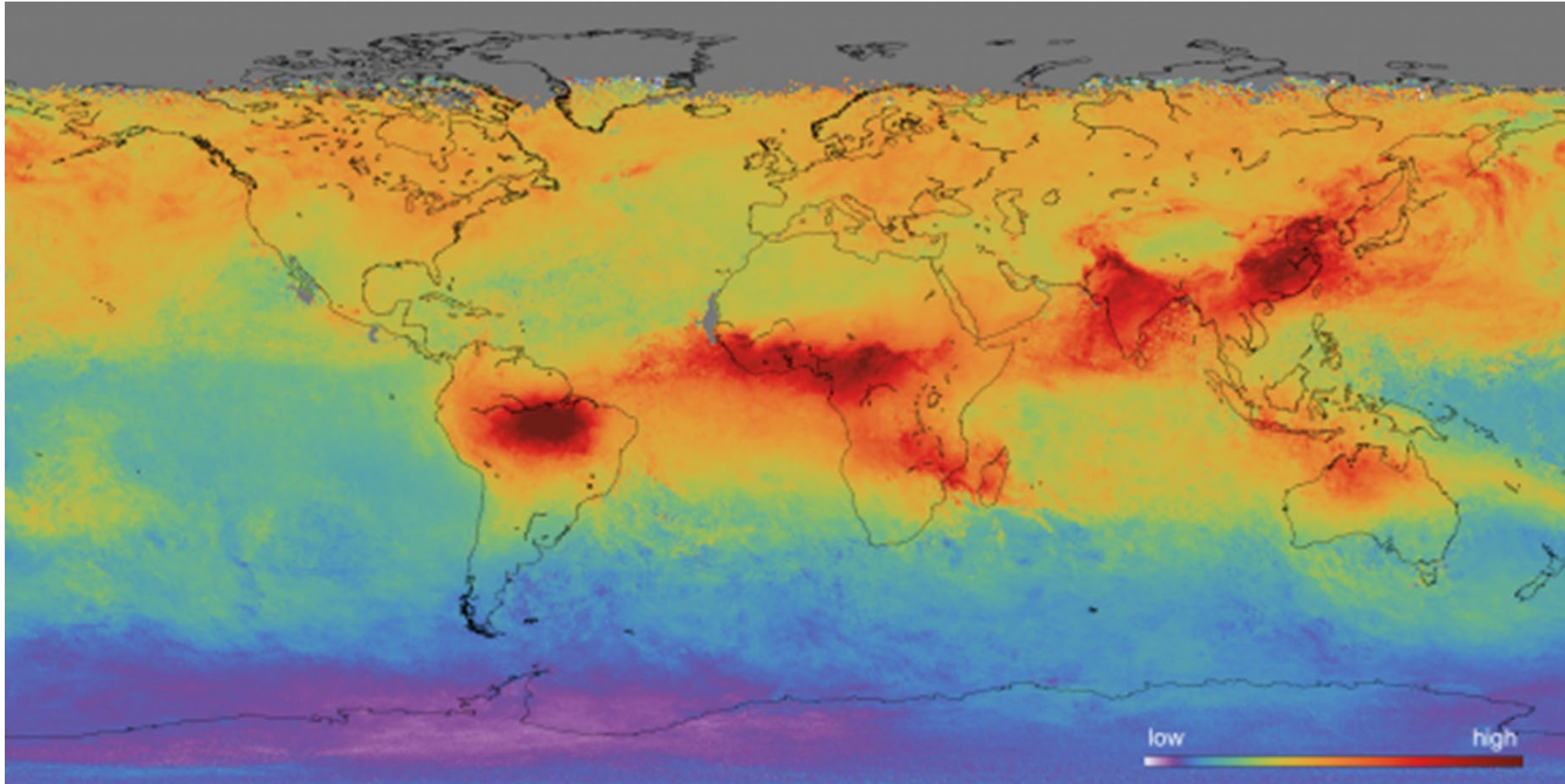
**Casualties:** At least 22 people confirmed dead, others seriously injured. Over 20 vehicles, including cars and trucks, involved

Sources: Associated Press, BBC  
Picture: Google Earth  
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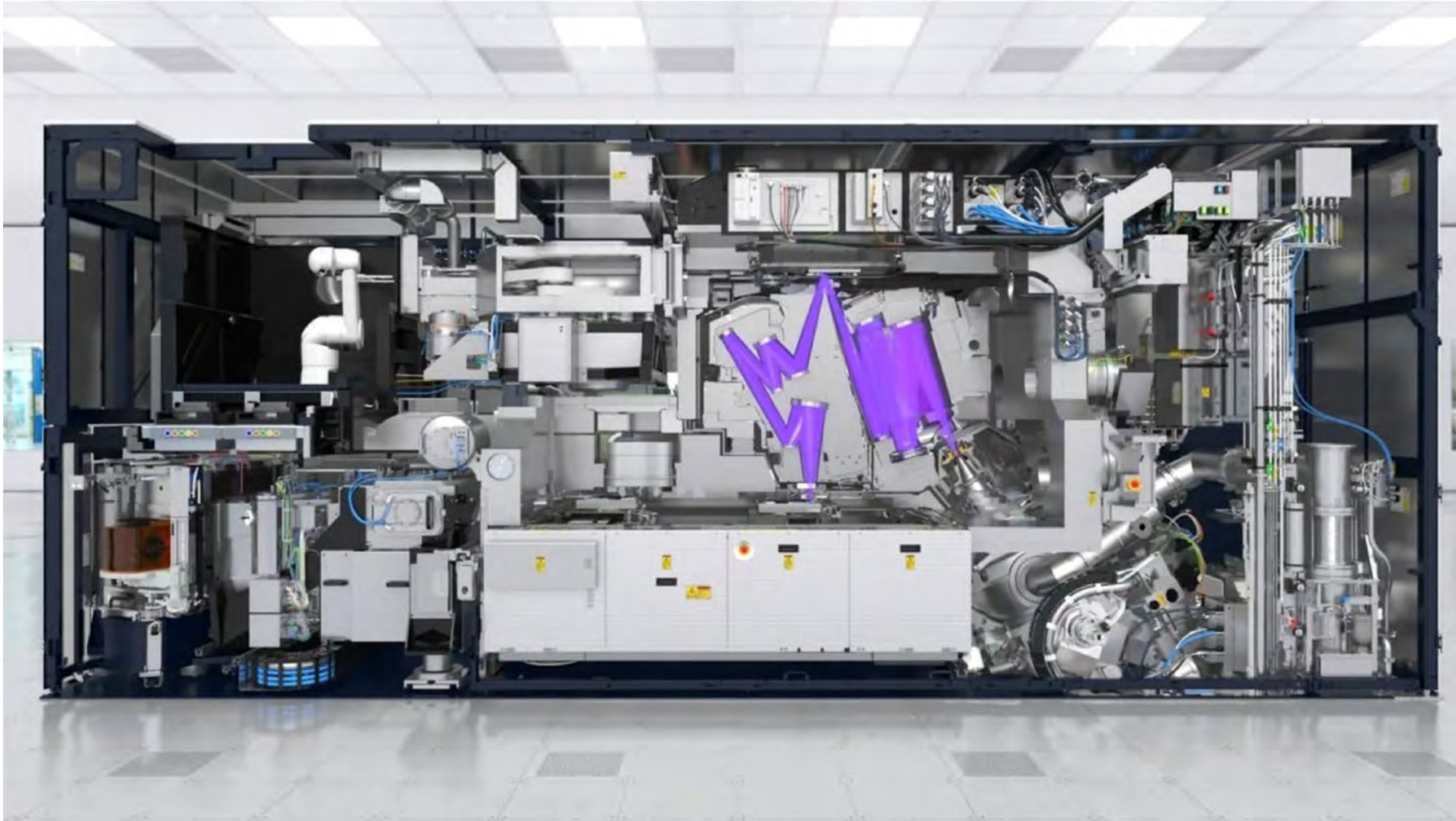




# Photonics to quantify air pollution and climate change

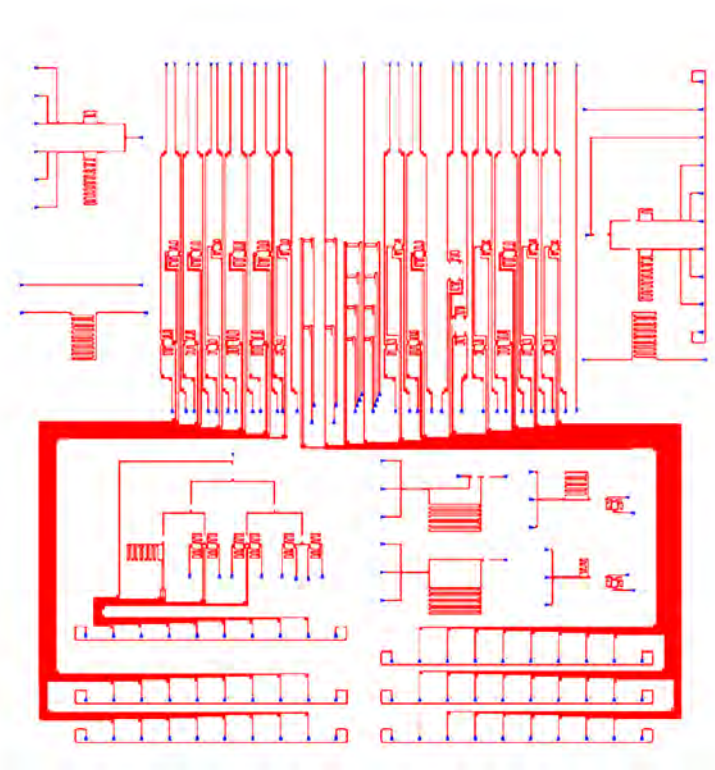
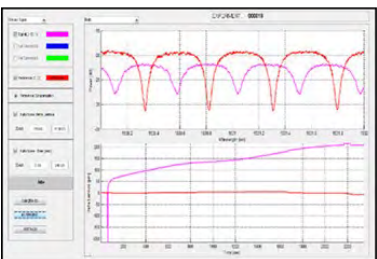
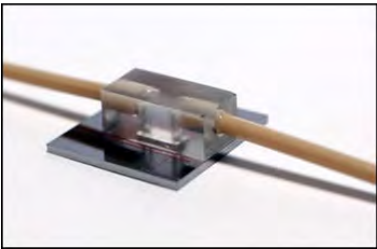


# Light technology in the digital industry

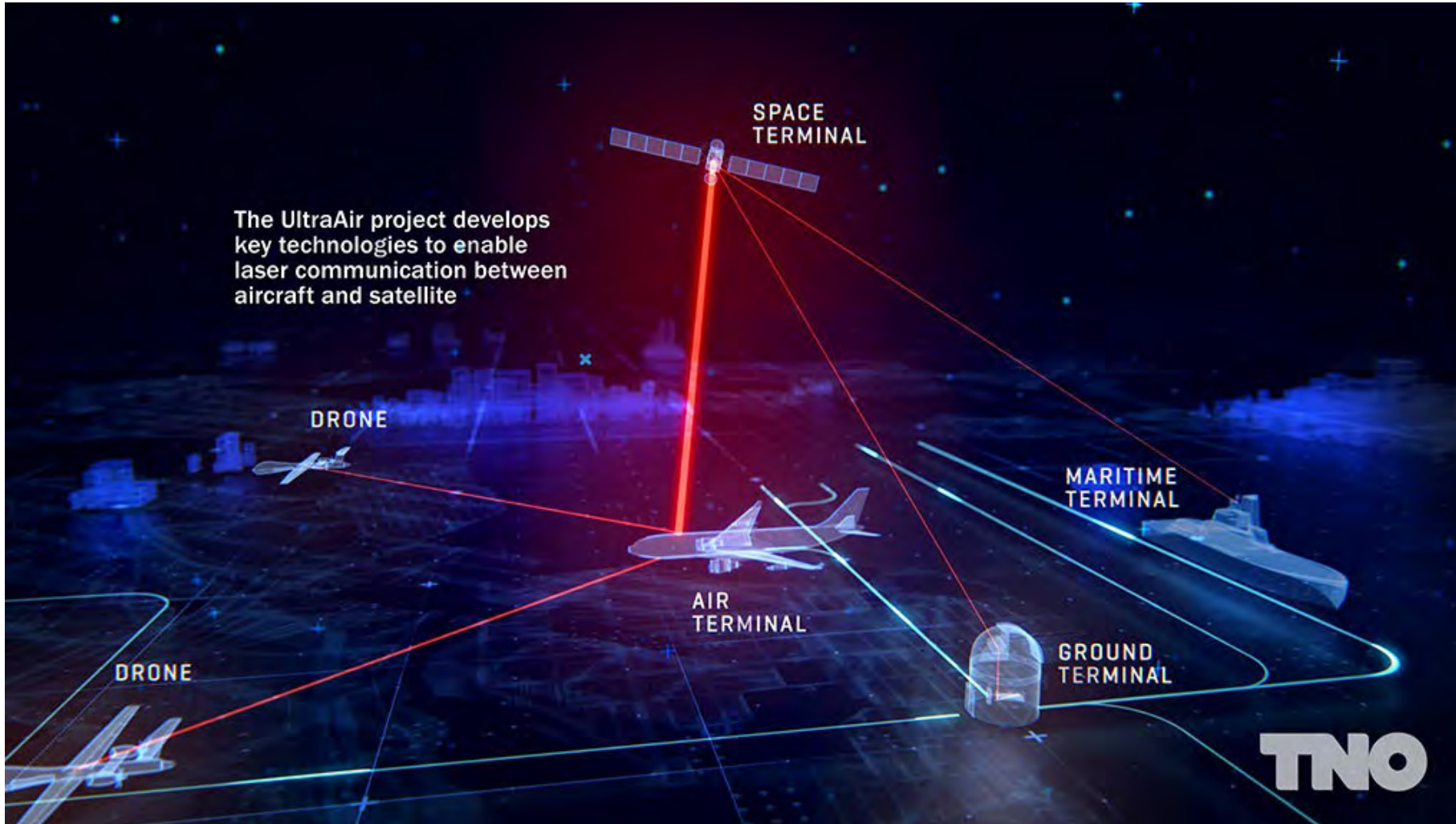




# Photonics in medical solutions

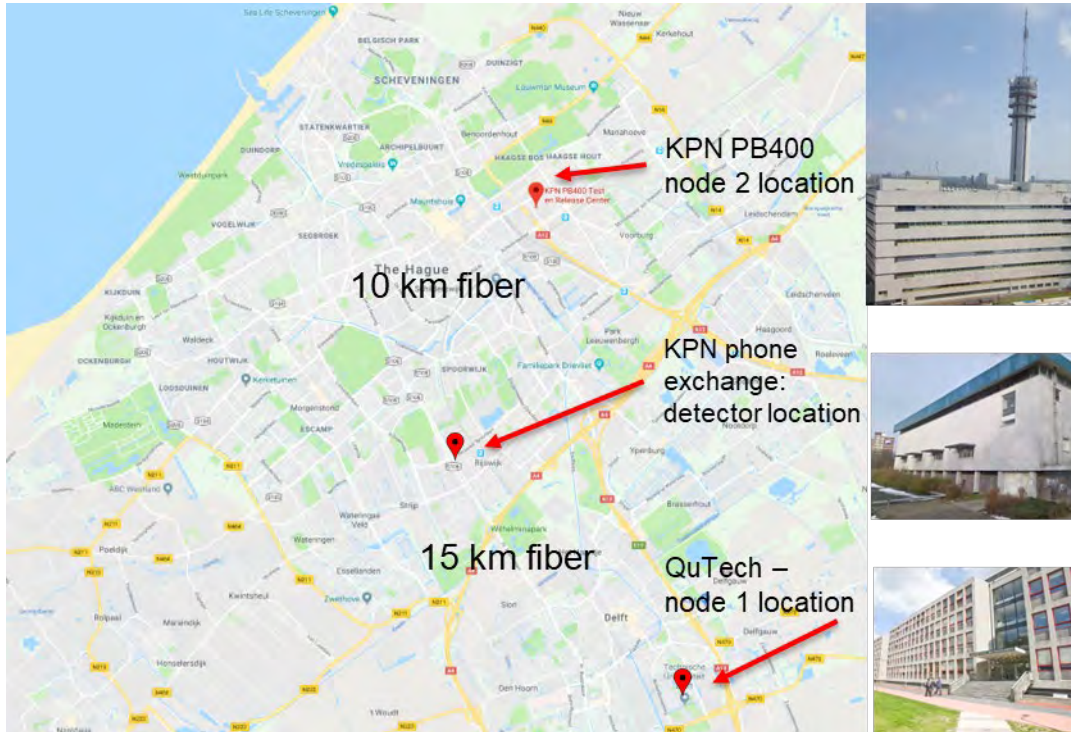


# Light technology for worldwide communication





# Light technology for quantum internet

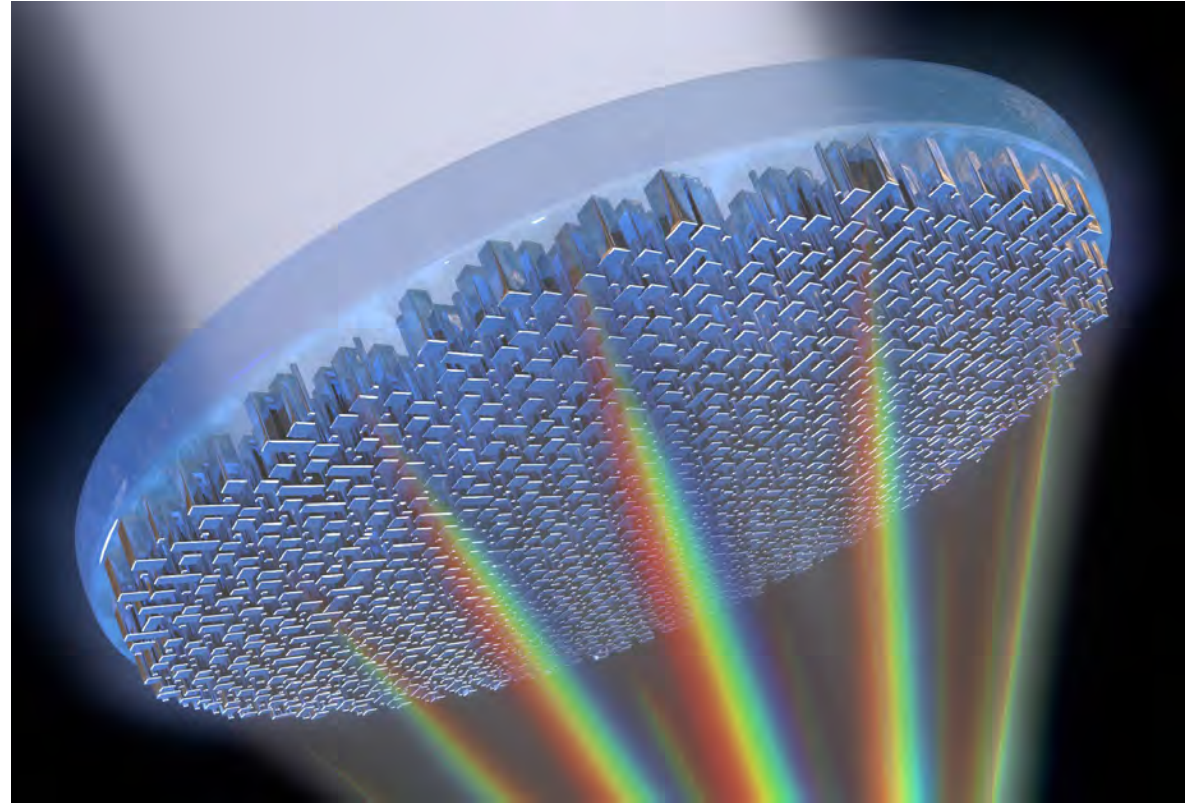




# Photonics in Infrastructure



# Light technology in smartphones, tablets, laptops








**Thanks for your attention**  
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