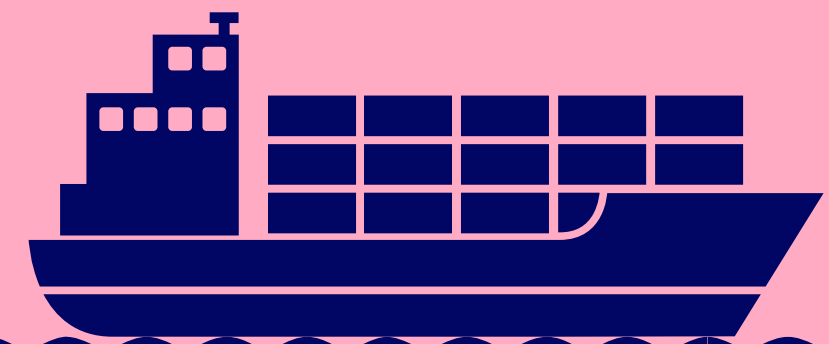
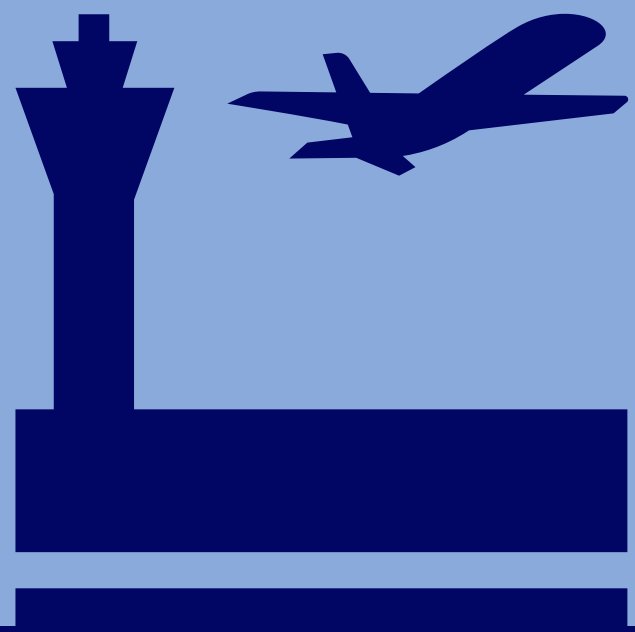


e-book #1

bit

Tech Maturity Scan

Transport and Logistics



Technology lies at the root of many innovations. It got us from combustion engine to adaptive cruise control, and from gunpowder to launching rockets to Mars.

Nonetheless, the potential of a lot of new exciting technologies is still waiting to be unlocked, such as fully autonomous vehicles and prescriptive maintenance.

Our mission at Bit is to help companies innovate 10 years earlier. We do this by helping you find out which of these emerging technologies fit your challenge, creating a chance to early adoption rewards.

For this, we created the Bit Maturity Wave.

An introduction to:

Bit Maturity Wave

The Bit Maturity Wave provides insights into promising technologies, and gives an indication of when we expect them to hit the mainstream.

Invisible

Total
adoption

Mainstream
adoption

Potential
unlocked

First
applications

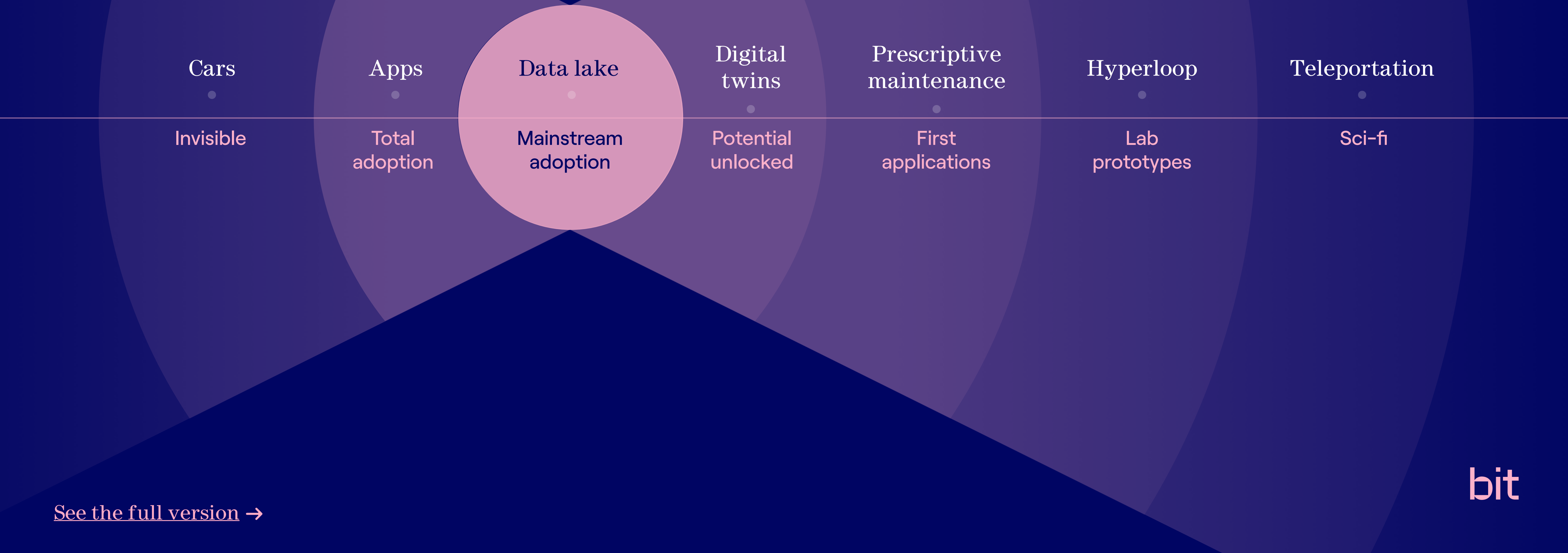
Lab
prototypes

Sci-fi

Examples on the:

Bit Maturity Wave

To illustrate how it works, we can take a look at existing technologies and where they are plotted on the Bit maturity wave.

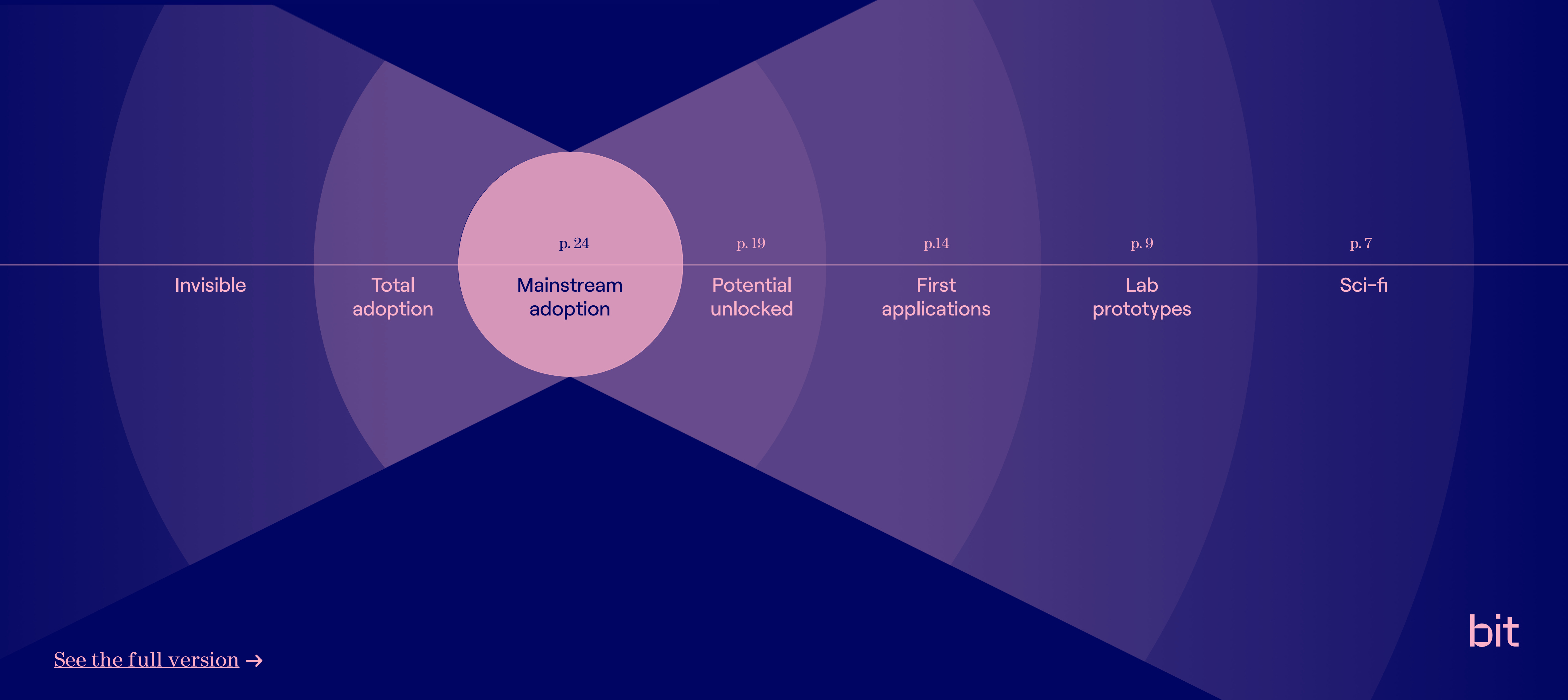


[See the full version →](#)

bit

Table of content:

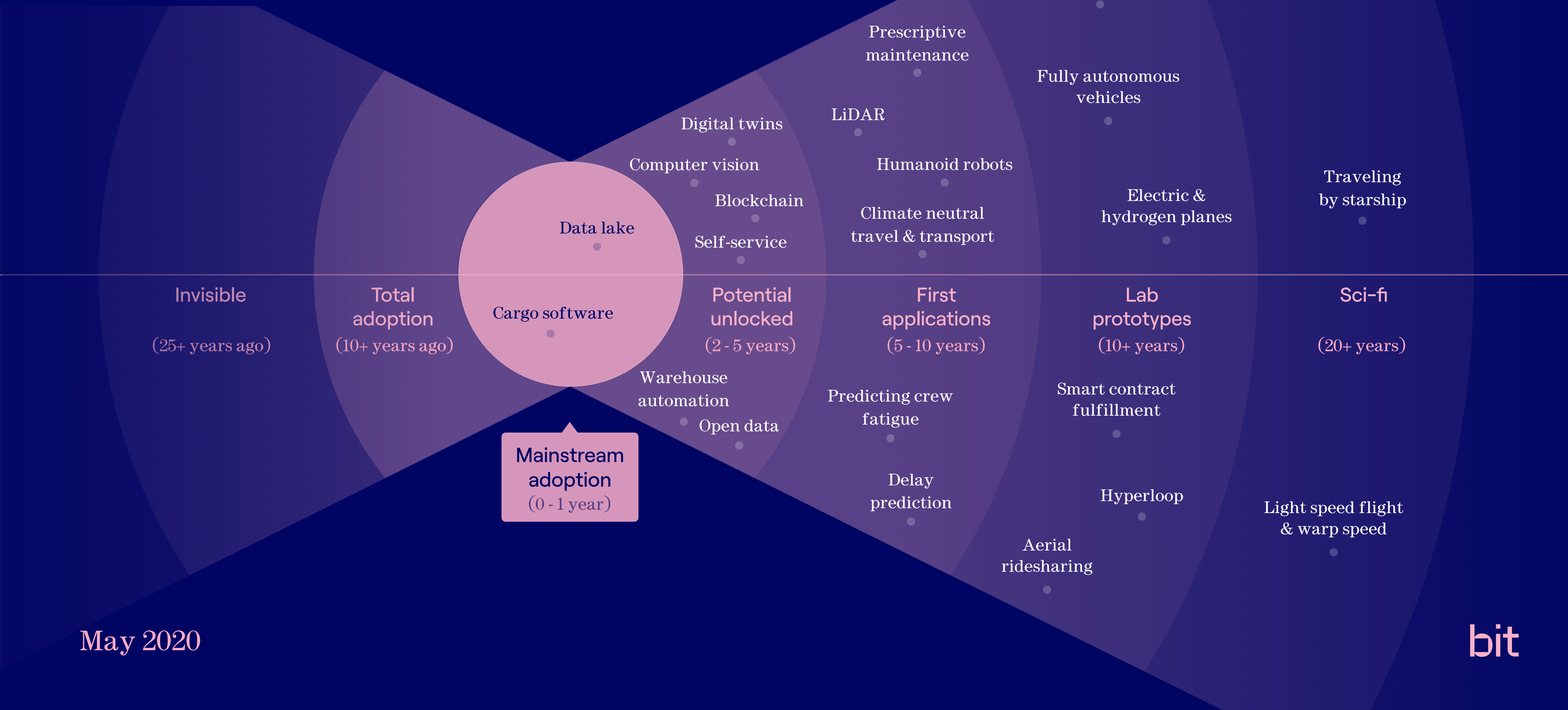
Bit Maturity Wave



[See the full version →](#)

bit

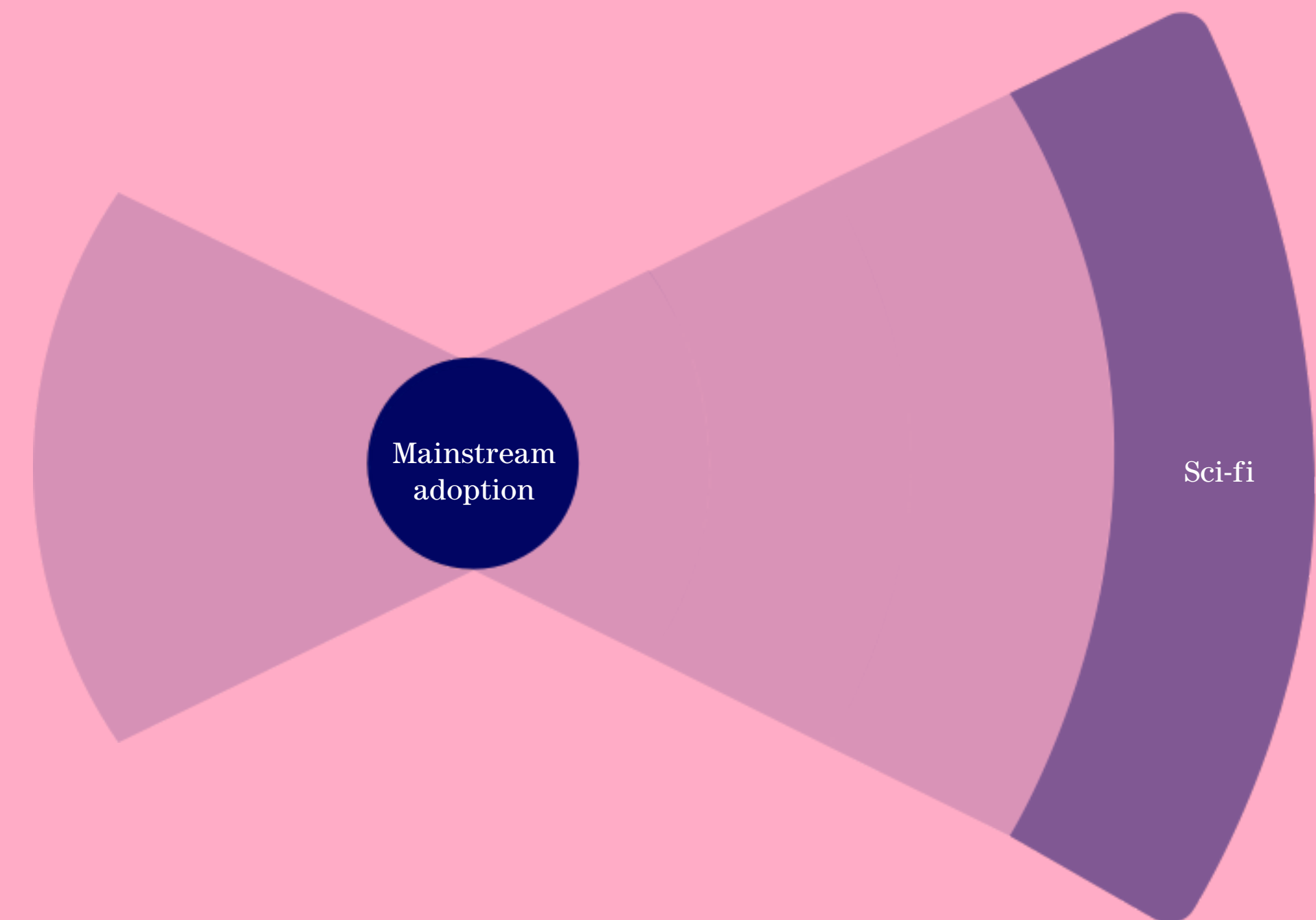
Bit maturity wave for Transport & Logistics



1 Sci-fi

The first wave is the furthest away from becoming reality. It captures technologies that we can only envision. We have yet to figure out how we would build these technologies.

Think of tech you see in Star Wars or Jules Verne novels like teleporting or Quantum internet.



20+ years
Time to mainstream

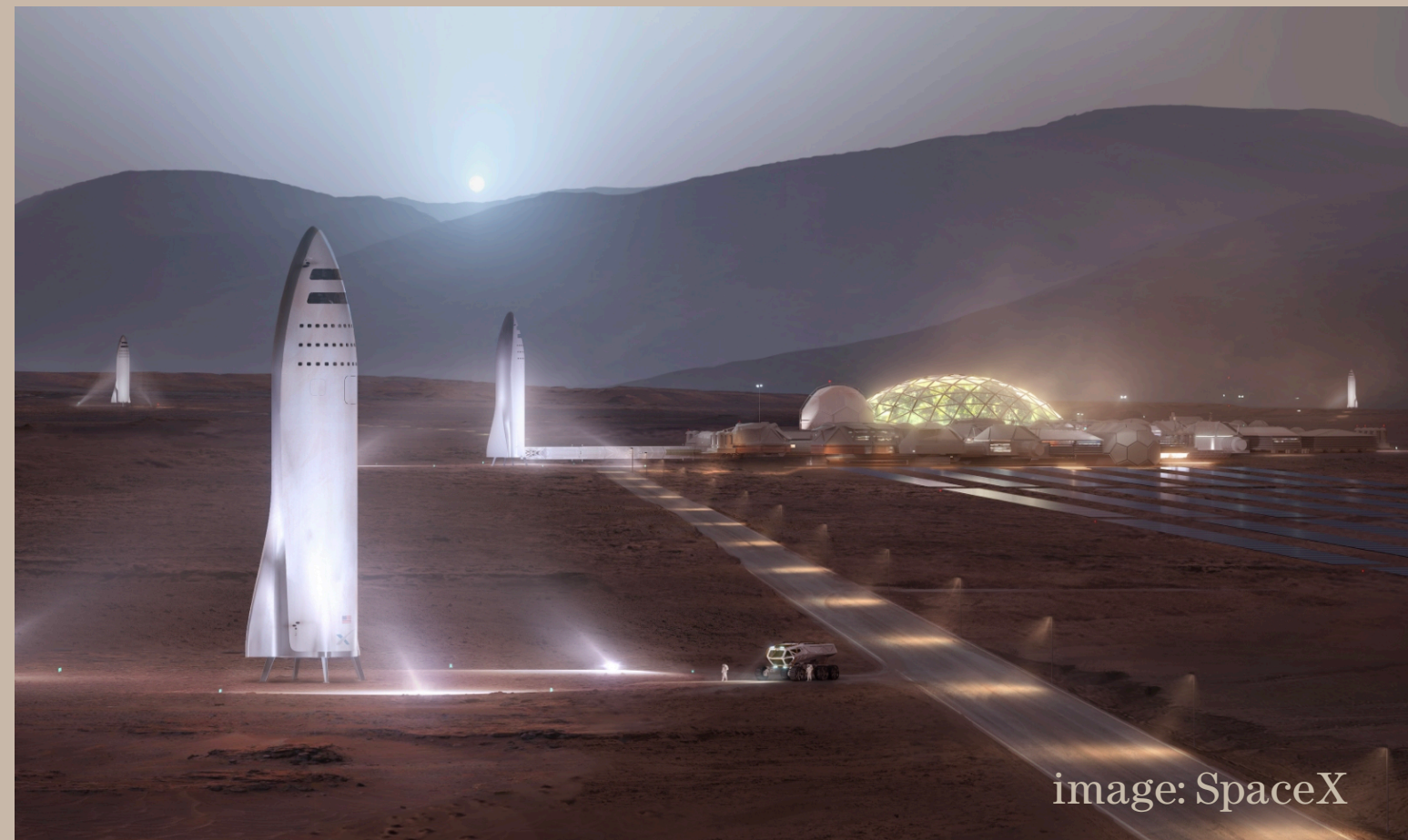


image: SpaceX

Traveling by starship

The Big Falcon Rocket (BFR) is SpaceX's concept of a potentially passenger-carrying heavy launch vehicle and spacecraft. While the spaceship is fit to bring more than 150 tons of cargo into orbit, it is also designed for Earth-bound trips, reducing travel time drastically compared to conventional airplanes. While some critics write the concept off as a far-fetched dream, true fans of Elon Musk are waiting patiently for this to become their new mode of transportation. [Read more →](#)



image: Star Wars

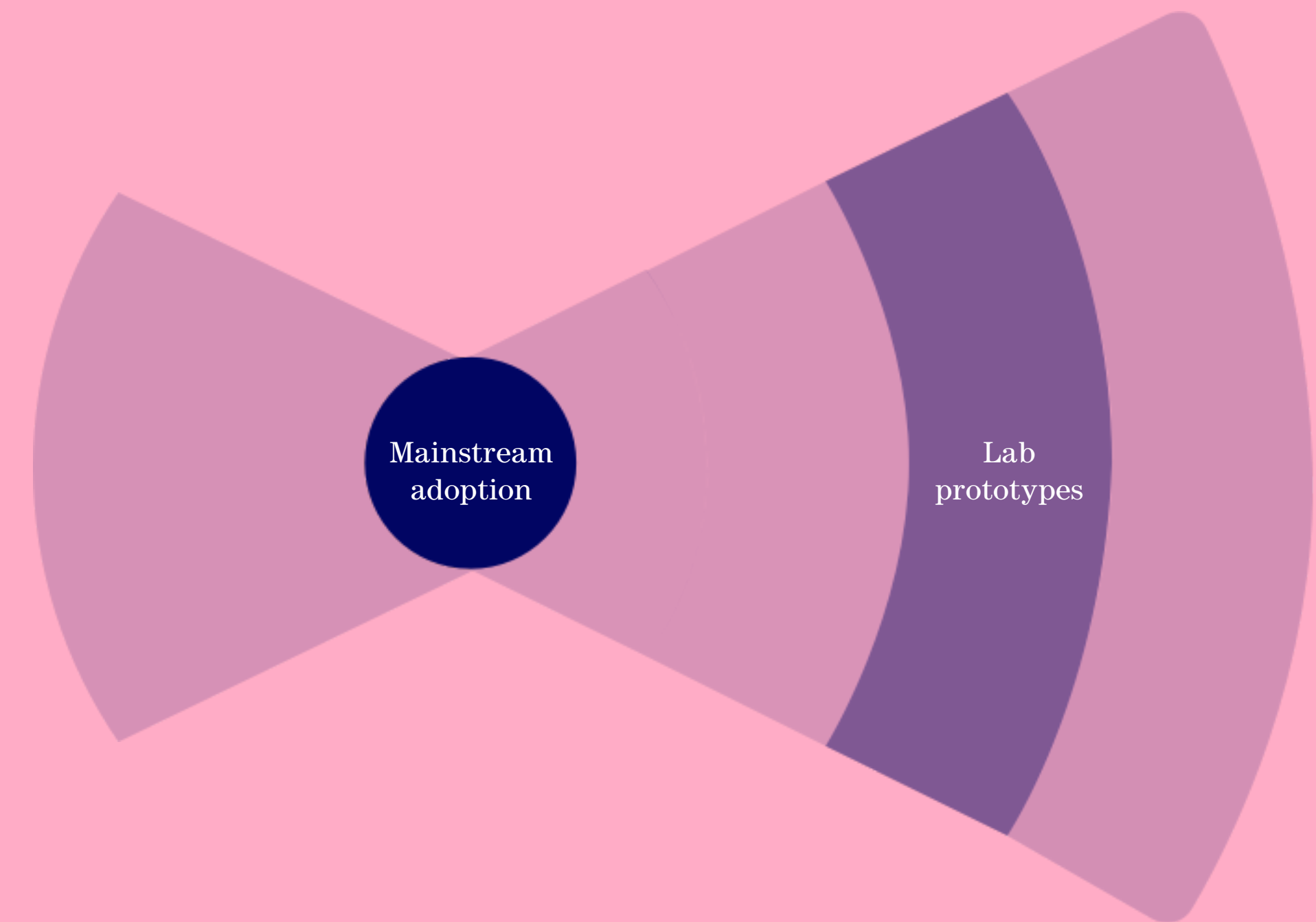
Teleportation

For the first time in history, Austrian and Chinese scientists have succeeded in teleporting three-dimensional quantum states. In their study, the researchers teleported the quantum state of one photon (light particle) to another distant one. High-dimensional teleportation could play an important role in future quantum computers. Could this be the first step towards human teleportation in the future? [Read more →](#)

2 Lab prototypes

The second wave comprises the first manifestations of what used to be sci-fi. These prototypes that emerge in research labs (MIT, Harvard) or R&D heavy companies (Google, IBM) are tasked to show that it can be built in a controlled environment.

Now we have proof that conceptually it can be built, but these prototypes are not built for scale. From these prototypes, it can take over 10 years to reach mainstream adoption.



10+ years
Time to mainstream



2

Lab prototypes

bit

Hyperloop

Presented by Elon Musk in 2012, the Hyperloop has fascinated the scientific community ever since. The transportation device can achieve great speeds as it encounters no air resistance in its vacuum tube. Dutch initiatives such as the TU Delft Hyperloop team have been hard at work on making first versions of the device functional, and are planning to open a test center in Groningen in 2022. [Read more →](#)

Fully autonomous vehicles

Several companies are developing fully autonomous vehicles, including Tesla, which has been working on its Autopilot technology for years. Amazon and UPS, which have been working on drones for delivery. Also Volvo, which announced its next-gen autonomous truck in June of 2019 (see image.) While the technology is there, the main challenge for manufacturers will be convincing people of its safety. [Read more →](#)



Aerial ridesharing

In 2018, for the sixth straight year, Los Angeles earned the dubious honor of being the most gridlocked metropolis in the world, where the average driver spends 2.5 working weeks per year trapped in traffic. And countless cities are close behind. For the average driver, dreams of being elevated above jammed freeways and flying to one's destination seem well out of reach. Yet these visions will soon become realities, with companies like Uber planning to have their first aerial ridesharing fleets up in the sky by 2023. [Read more →](#)



2

Lab prototypes

bit



Electric & hydrogen planes

Everybody knows that flying kerosine-consuming airplanes is bad for the environment. Yet, there is no clear solution to this, as it is the fastest and most efficient way to transport people and cargo. However, companies such as ZeroAvia have been working to make hydrogen-powered airplanes a reality, already working on making 500 mile short-haul electric trips a reality. [Read more→](#)

Smart contract fulfillment

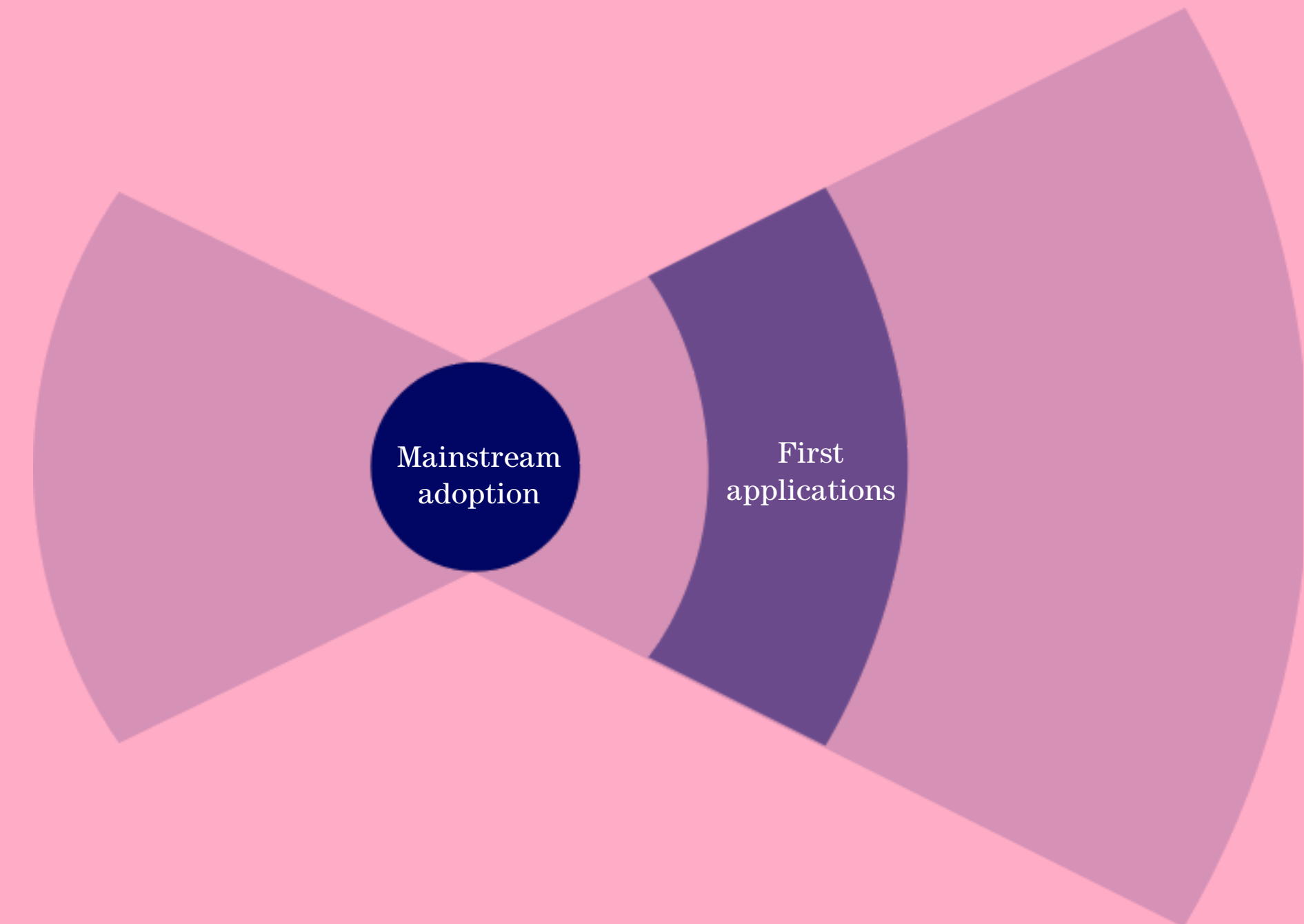
Port of Rotterdam, ABN AMRO and Samsung SDS have been working on a proof of concept that could potentially disrupt the supply chain. Every day, more than \$140 billion is tied up in disputes for payment in the transportation industry. By tracking containers using Smart Contracts, and only sending the payment once the load has arrived, a lot of these disputes can be solved before they even occur. This project — which has been worked on by a Bit alumnus — is currently being developed further, and could potentially save millions in the future. [Read more →](#)

Identification of congestion points

A big factor of flight delays is the mismatch between the planned taxi out time of a plane, and the actual time. This is often due to congestion on the taxiway, because of other flights passing through at the same time. Researchers from Madrid, Spain have been working on determining which taxiway intersections create most instances of delay, in order to suggest alternate routes that would remove these congestions, and reduce delays for passengers. [Read more →](#)

3 First applications

The third wave occurs once a technology leaves the lab. At this point, it's exposed to the real world. Startups, prototyping studios and new ventures try to find the right applications for the newly available technology. A lot of blockchain solutions are in this wave, as they are applied in many areas to see which are a good fit. Once this fit is found it will usually take 5 to 10 years to reach mainstream adoption.



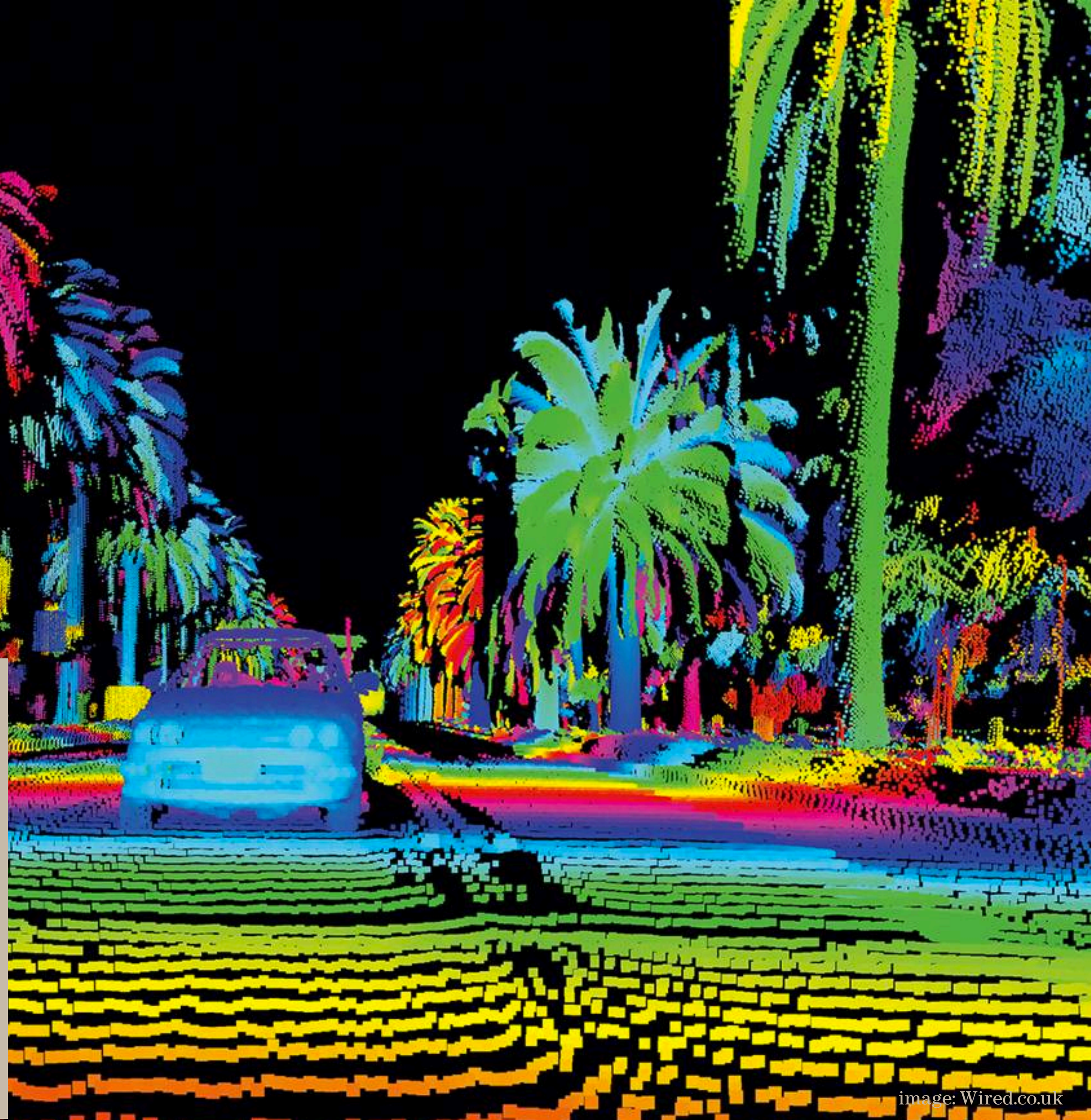
5 - 10 years
Time to mainstream

3

First applications

Light Detection and Ranging

Light Detection and Ranging (LiDAR) sensors are nowadays widely used for multiple applications such as autonomous driving, wind estimation and robots. With LiDAR sensors are decreasing in cost, research in the field has been increasing. A group of researchers from Toulouse, France have recently introduced a new approach to ground aircraft detection at small airports, which could decrease costs of air traffic control drastically. [Read more →](#)



Humanoid robots

The use of intelligent humanoid robots is not limited to the airports of the future, it is a reality that has been present for some years now in various airports around the world. In tests or on a permanent basis, different airport centers have opted to implement robots for the performance of tasks related to passenger assistance, security or cleaning. KLM, for example, introduced their robot assistant called Spencer in 2016. The robot has since been guiding passengers at Schiphol Airport to their gates, shops or facilities. [Read more →](#)

Predicting crew fatigue

A lack of sleep can have effects on performance, ranging from lack of concentration to severe threats to one's health. This can impose dangers to your freight or passengers, as well as being an annoyance to your crew. To solve this, some crew management solutions allow addressing fatigue risk. For example, developers of the Crew Rostering solution from Jeppesen started integrating bio-mathematical models of fatigue into flight crew scheduling software. Their goal is to provide schedulers with the ability to rely on data about predicted fatigue to reduce risks in the planning phase. [Read more →](#)

A low-angle, upward-looking photograph of an aircraft wing against a clear blue sky. A technician, wearing a dark blue long-sleeved shirt, a high-visibility yellow safety vest with reflective stripes, and a black cap, is pointing their right index finger towards the wing. The wing's surface is metallic and features various rivets, bolts, and technical markings. One prominent marking reads 'JET FUEL PRESSURE' and 'MAX 1.29 PSI'. Another marking indicates '0.8 BAR'. The technician's left hand is also visible, held open. The overall scene suggests an inspection or maintenance activity.

3

First applications

bit

Prescriptive maintenance

In the world of maintenance, repair and operations (MRO), even slight advances in the way day to day technicians operate can be revolutionary. Since this field has a high-cost, low-demand and is asset-intensive, this type of maintenance advancement can make significant waves. With prescriptive maintenance, technicians have the advantage of knowing when a problem is likely to occur before it does. Because of this, they are able to apply fixes before it's too late. Plus, they'll have different options that can be considered and then immediately to ensure resolutions. [Read more →](#)

3

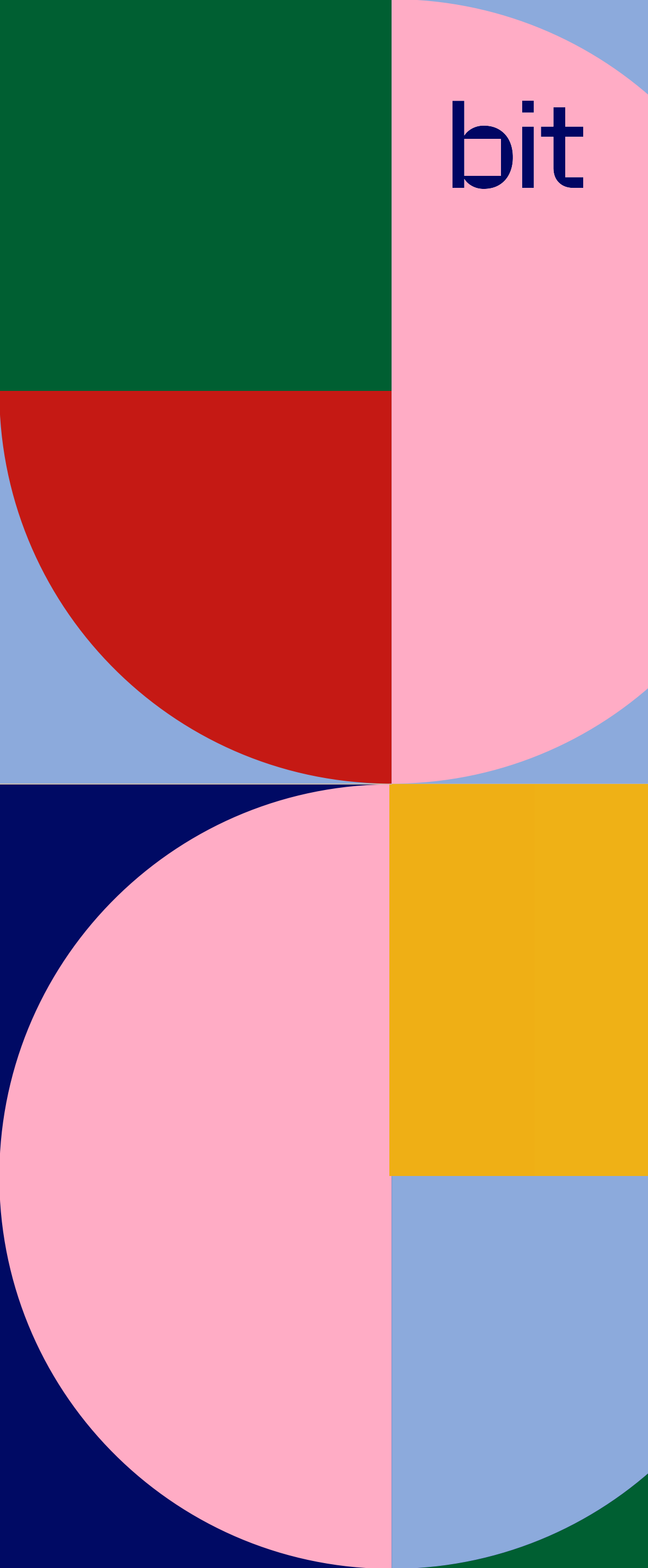
First applications

Delay prediction

Advancements in the fields of Machine Learning and Artificial Intelligence (AI) have made it possible to predict whether a plane is going to be delayed before it is announced by the airlines. There are a number of different approaches, with data ranging from weather forecasts to historical departure times. We listed a number of especially interesting and unique applications below.

Climate neutral travel and transport

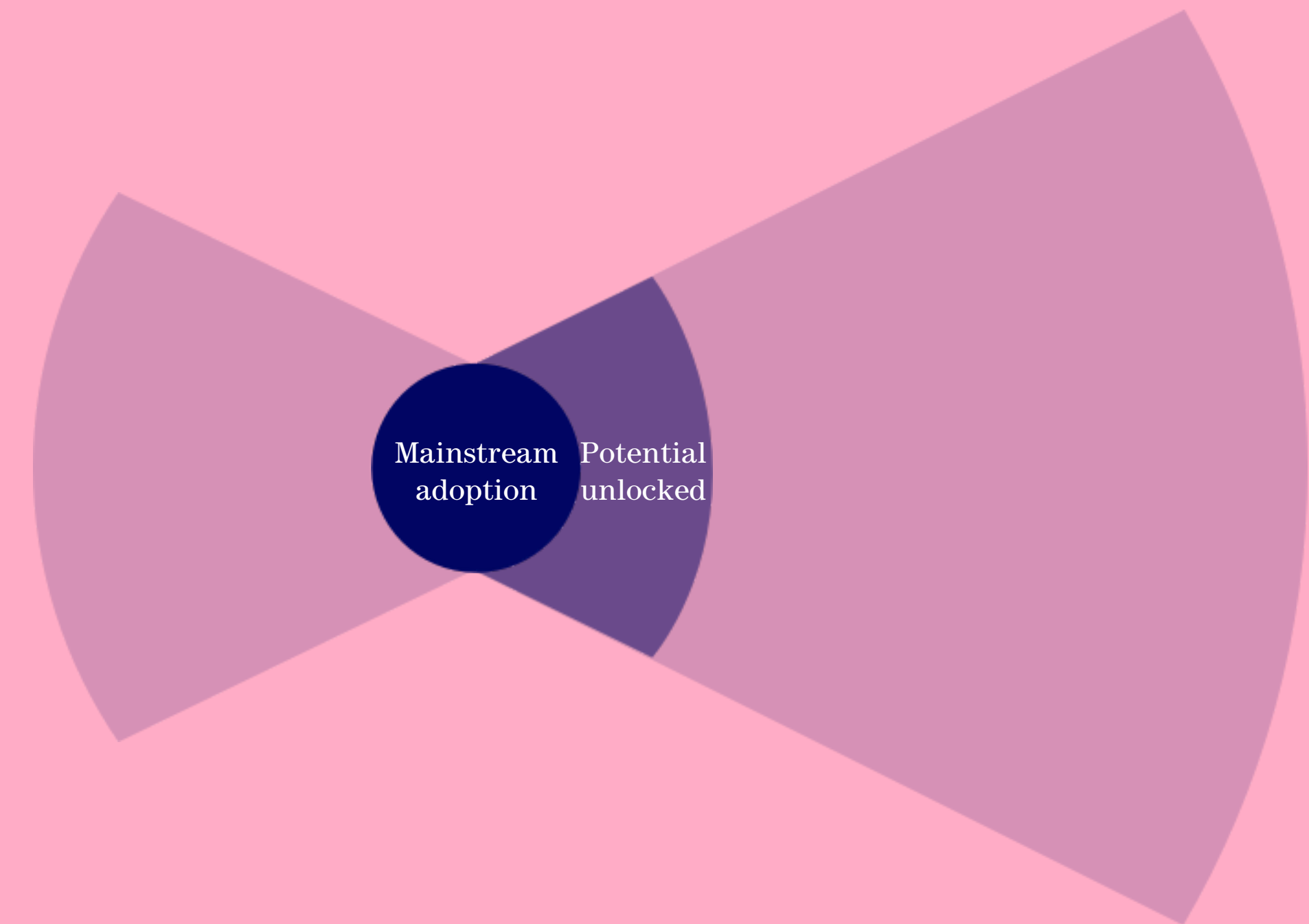
Durability is becoming more and more important as customers are realizing the impact their choices have on our planet. Mobility companies like airlines have long been offering options to compensate for your plane's emissions by paying for trees to be built elsewhere, but companies from the logistics sector such as DHL have also been making waves by offering services like GoGreen for "climate neutral" transport of freight. [Read more →](#)



bit

4 Potential unlocked

The fourth wave is crucial when spotting early successes. Once an applied technology has found its place in the real world and starts to provide value, its potential will truly be unlocked. Note that for adoption to ensue, the value it generates should at least be on par for the competing solutions. This is the reason why blockchain is stagnating, as in many cases it isn't superior to a centralized database. Within 2 to 5 years, a technology in this wave can become mainstream.



2 - 5 years

Time to mainstream

4

Potential unlocked

bit

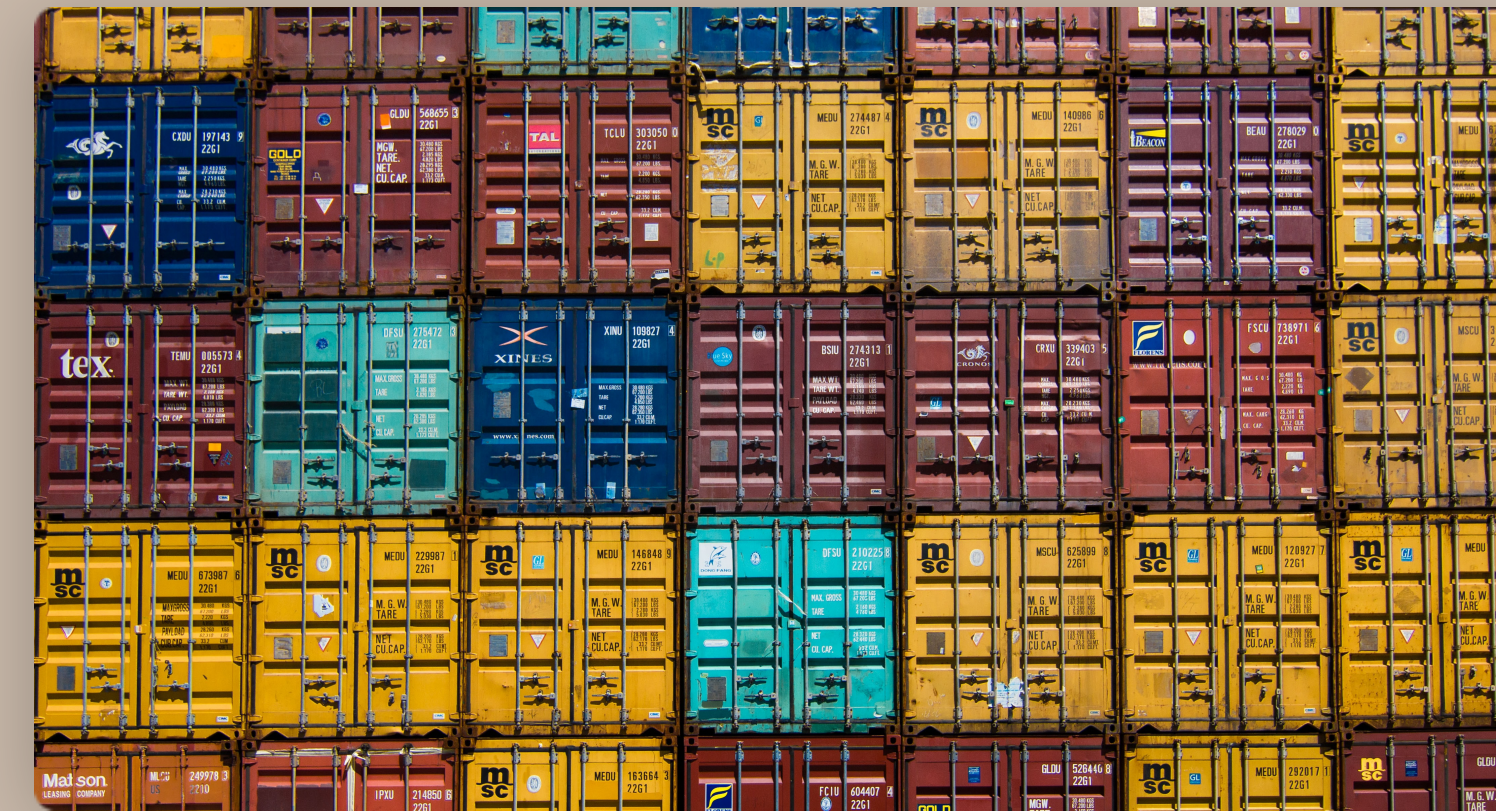


Digital twins

Having ‘digital twin’ versions of your resources can be valuable for a number of reasons. It allows you to run complex simulations, and makes it easier to prepare for otherwise unforeseen circumstances. With interest in digital twin technology at an all-time high across a wide variety of industries, the aerospace and defense industries are pioneering its adoption. Example applications include engines and landing gear. [Read more →](#)

Shipment data in blockchain

ShipChain is a blockchain-based platform designed specifically for transport and logistics companies. Through the use of smart contracts, it's able to track shipments from the beginning to the end of their journey — as it leaves the factory and makes its way to the customer. All of the information about its travels are recorded in the blockchain, which triggers smart contracts once the terms are fulfilled. [Read more →](#)



Self-service

The aviation and postal industries have long been traveling towards automatizing parts of their customer journey. Instead of having to go to a postal office to drop off your package, PostNL recently introduced parcel machines where customers can leave their packages for pick-up 24/7. Similarly, Schiphol has been a frontrunner in introducing self-service bag-drop machines at their airport, effectively eliminating manual check-ins.

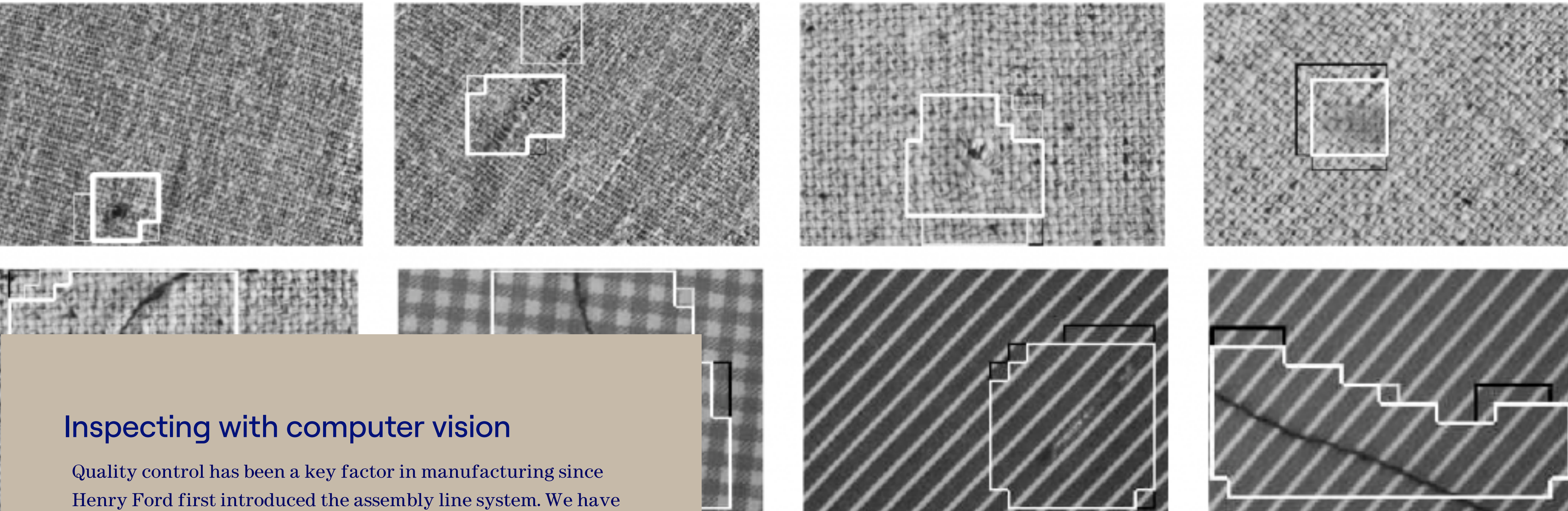
[Read more about parcel machines →](#)

[Read more about self-service bag-drops →](#)



4 Potential unlocked

bit



Inspecting with computer vision

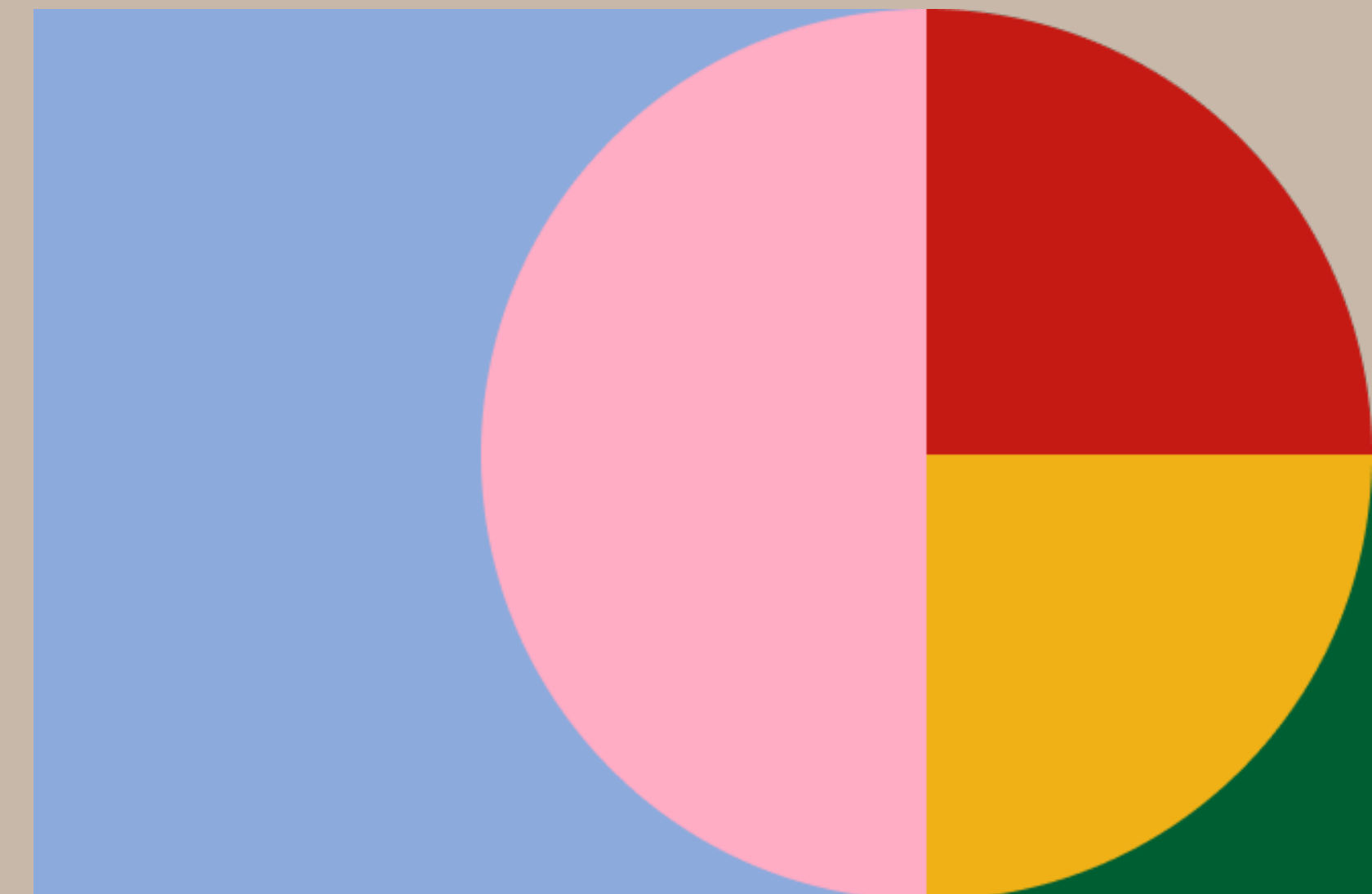
Quality control has been a key factor in manufacturing since Henry Ford first introduced the assembly line system. We have obviously come a long way since then. The traditional assembly line still exists in many forms, even though machinery has replaced many manual processes. Research has shown that this step can be doable by machine learning algorithms. [Read more →](#)

Warehouse automation

Warehouse automation became widely recognized over the last few years. While automating the entire infrastructure of your warehouses is not viable for everyone, there are levels of automation ranging from basic automation (using scanners, applications, printed papers) to advanced automation (automatic sorters, palletizers, robot picking) and everything in between. Read about it in this article to see if it might be something for your business case. [Read more →](#)

Open data

Data has the power to revolutionize and disrupt the way societies are governed. None more so than open data, which is free to access, free to use and can be shared by anyone. It's non-personal and can be used to identify and predict large-scale trends and behaviors. Applications such as the FlightXML API allow customers to design their own applications that leverage extensive open-source aviation data. [Read more →](#). Other companies like Airbus focus more on sharing data between their partners. Through their new service, Skywise, they aim to take data from more than 100 airlines, and more than 9000 aircrafts, and opens it up for everyone to benefit. They then combine these data sources in order to improve reliability, support safety, and decrease costs. Delta Airlines has utilized this platform in a recent AI tool they made. [Read more →](#)

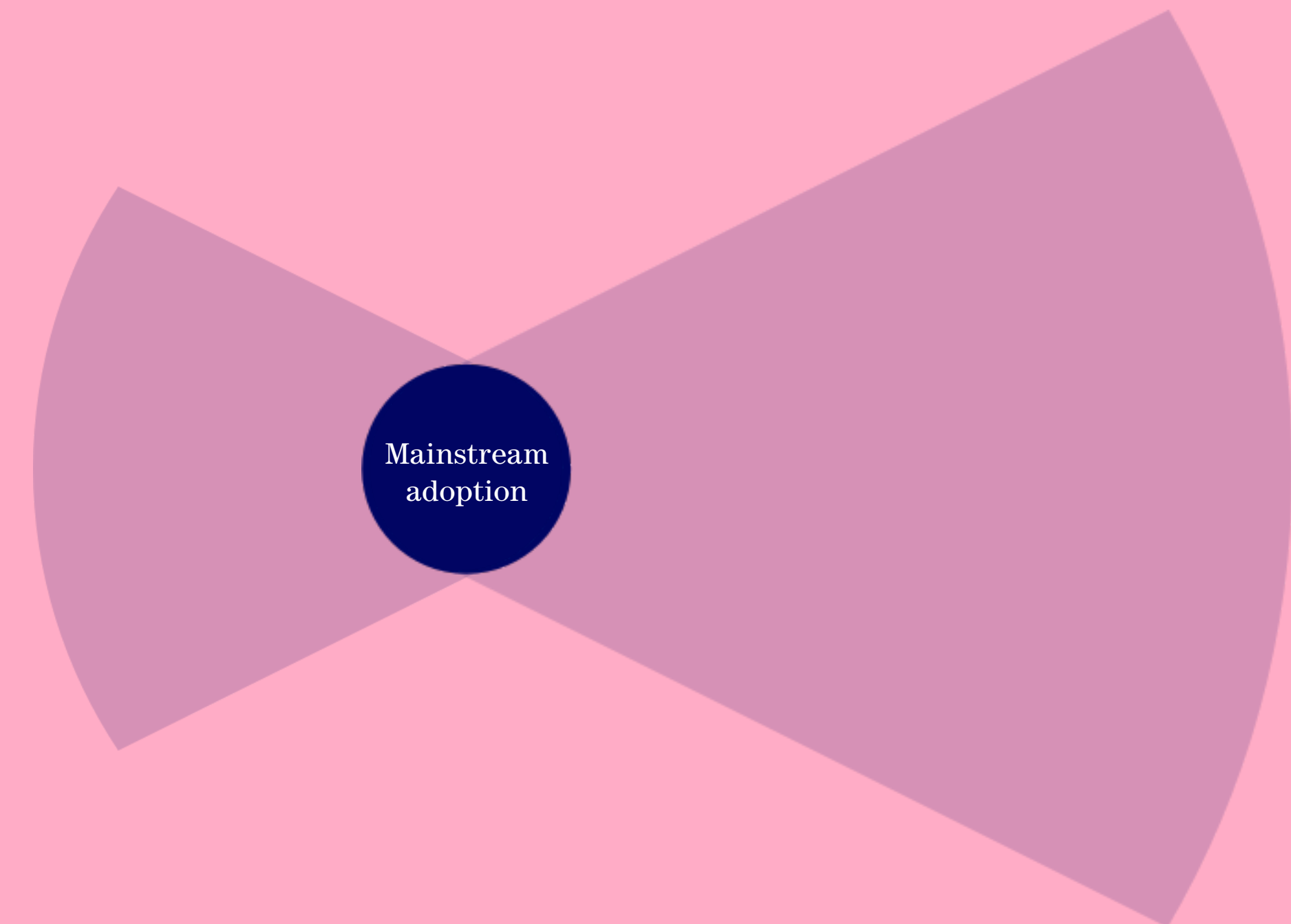


4 Mainstream adoption

When potential is unlocked, things start to develop really fast. Solutions become easier to implement as technology becomes available off-the-shelf. Think of how easy it is these days to integrate a chatbot on your website. 10 years ago, this would have required fast teams of developers to build it.

When the technology hits mainstream adoption, being a forerunner is hard, as there is a lot of competition. It means you have to get into it within a year, or you are out.

Think of having an app as a customer interface.



0 - 1 years

Time to mainstream

Creating a data lake

While a hierarchical data warehouse stores data in files or folders, a data lake uses a flat architecture to store data. Each data element in a lake is stored in its native format until it is needed and is assigned a unique identifier and tagged with a set of extended metadata tags. When a business question arises, the data lake can be queried for relevant data, and that smaller set of data can then be analyzed to help answer the question. It allows your analysts to discover new relationships between your data, and delivers faster results than the traditional approach. [Read more →](#)

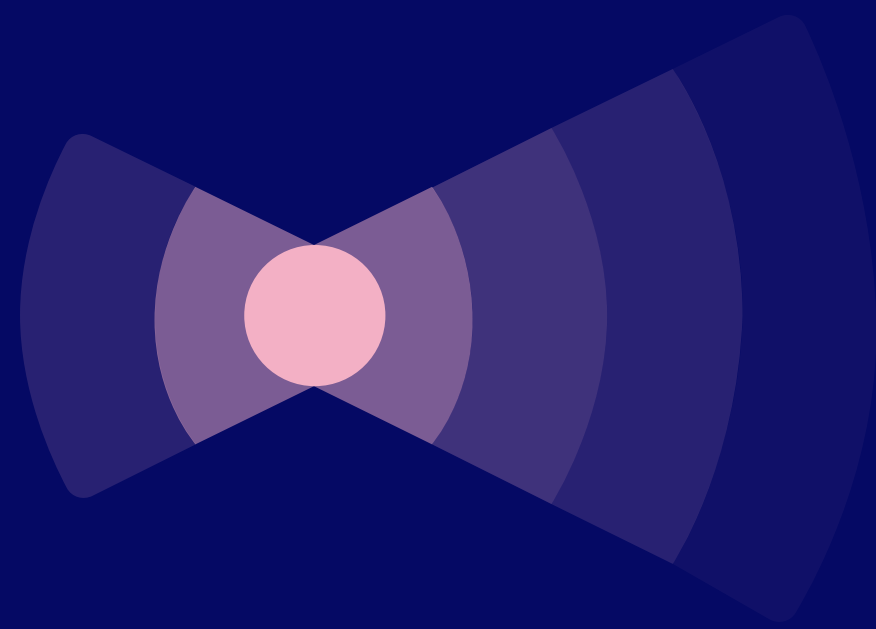
Last-mile delivery

Amazon has developed a service that not only closes the last-mile gap between retailers and consumers, but actually allows a delivery person to unlock your door and enter your home. Available initially in 37 U.S. cities across the United States, Amazon Key allows Amazon Prime members to grant secure home access for guests and, Amazon promises, eventually tens of thousands of service providers, such as home cleaners and pet sitters. The service includes an app, a smart lock and a cloud-based indoor security camera. Basically, the new service allows customers to have their packages delivered inside their home without having to be there. [Read more →](#)

You can now...

Pick technologies

What technologies reveal promising opportunities for the context of your industry and organization?



Plan innovation

When will these technologies be relevant and applicable? How does this translate to your short- and longer-term innovation strategy?

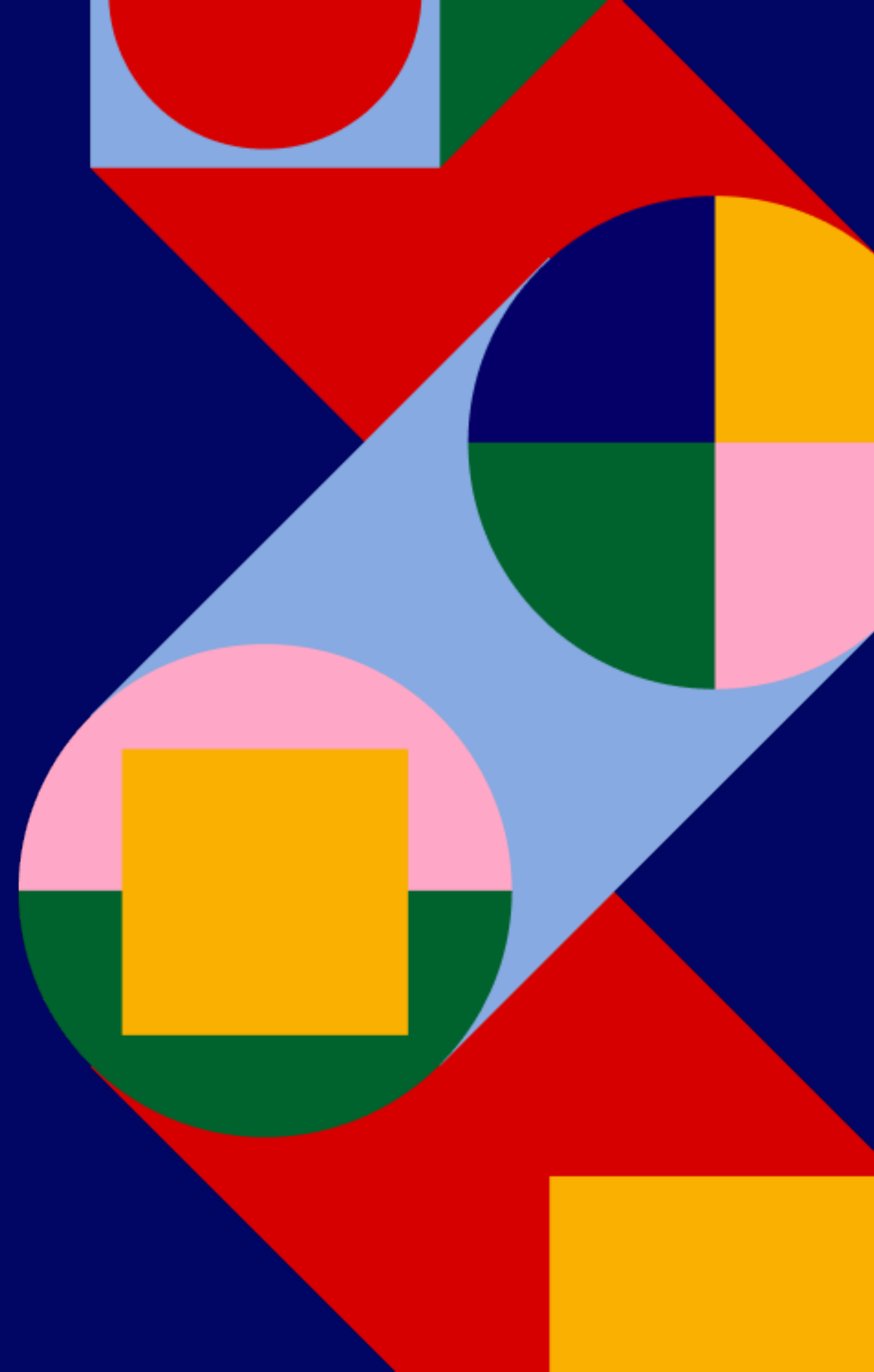


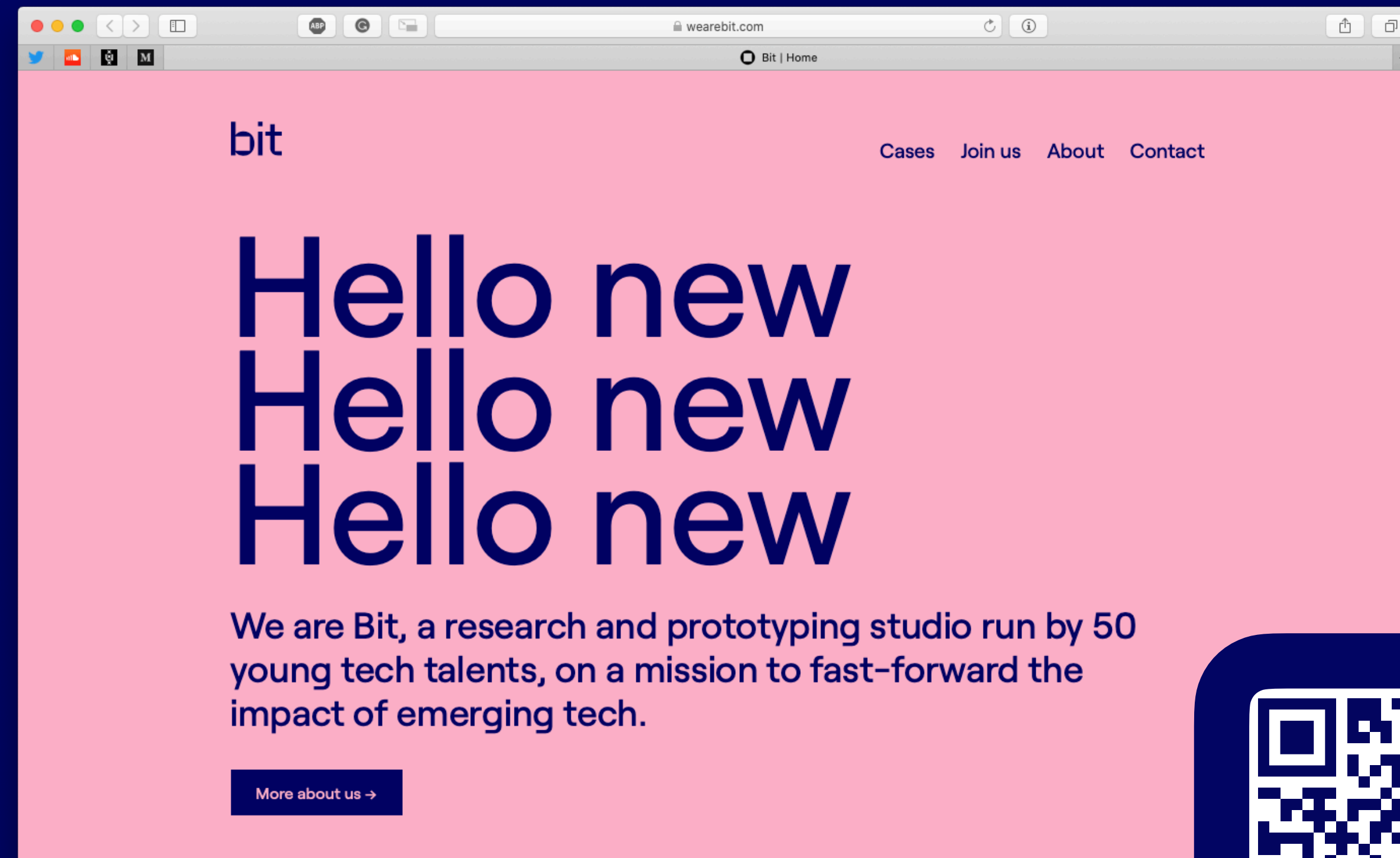
Start experimenting

What technology fits your challenge and creates a change to early adoption rewards?



For a bit more Bit,
check out our free weekly newsletter,
tech trends & intelligence platform,
and consulting services at
wearebit.com





Let's innovate 10
years earlier! 🚀

wearebit.com

