

# Longer Term Investments

## Digital data

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- We expect digital data to continue growing exponentially, by a pace of more than 10x from 2020 to 2030.
- The drivers of this digital data boom include rising global internet penetration – we expect 2bn new internet users over the next decade – increased data usage in emerging markets, and secular trends like changing consumer digital lifestyles and the Internet of Things.
- Hence, we continue to believe digital data provides solid long-term growth opportunities. Investors can participate in two ways: by investing in data enablers and/or in data infrastructure companies, where we believe software and semiconductor firms will be winners.

### Our view

The amount of data created has grown exponentially since 2010, and we expect this to continue in the next decade. In fact, nearly half of the total data generated worldwide was created since our last publication in November 2016.

Driven by a desire to stay connected all the time and the need to efficiently multitask throughout a busy day, many of us have become digital omnivores, producing unprecedented amounts of data. In the next decade, favorable demographics and other secular trends should drive solid data growth.

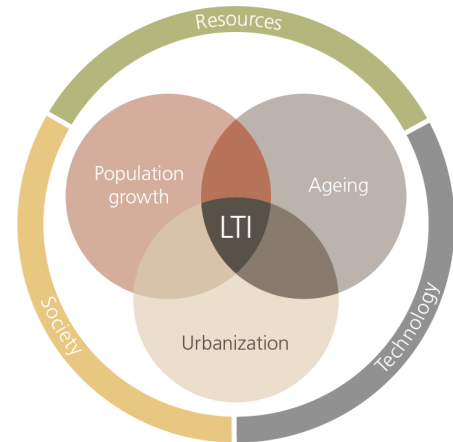
Thanks to rapid urbanization in emerging markets, we expect the **global internet user base to increase by 2bn from 2017 to 2027 and internet penetration to reach 75%**. Our strong outlook is mainly driven by rising internet adoption and data usage in large economies like China, India, and Indonesia. The secular trends include changing consumer digital lifestyles and the proliferation of Internet-of-Things (IoT) connected devices, which should facilitate rapid data growth in the coming years.

Based on IDC, EMC, and Bloomberg Intelligence, the annual size of the data universe is expected to reach 44 zettabytes by 2020, a more than 50-fold increase from 2010. We expect the data universe to grow more than 10 times from 2020 to 2030, reaching 456 zettabytes – equivalent to **840 iPhones (64 GB) per person**.

The exponential growth in data has far-reaching investment implications, in our view. We expect steady growth for both data enablers and data infrastructure companies, as significant capex investments are required to support the surge in digital data.

## Introduction to the Longer Term Investments (LTI) series

- **The Longer Term Investments (LTI)** series contains thematic investment ideas based on long term structural developments.
- Secular trends such as population growth, ageing, and increased urbanization create a variety of longer term investment opportunities.
- These investment opportunities are influenced by the interplay of technological advancement, resource scarcity, and the societal changes.
- Investors willing to invest over multiple business cycles can benefit from potential mispricings created by the typically shorter term focus of stock markets.



In particular, we believe **data-related software and semiconductor companies will be long-term winners** due to their better pricing power.

### Growth drivers

We believe the digital data universe will grow more than 10x in the next decade (see Fig. 1) due to favorable demographics and secular trends. Regarding demographics, we believe rising internet penetration and increasing data usage in emerging markets are key drivers. Changing digital lifestyles and the Internet-of-Things, meanwhile, are key secular trends for data growth.

### Demographics

Urbanization is a key driver of this theme, as explained in the next two segments.

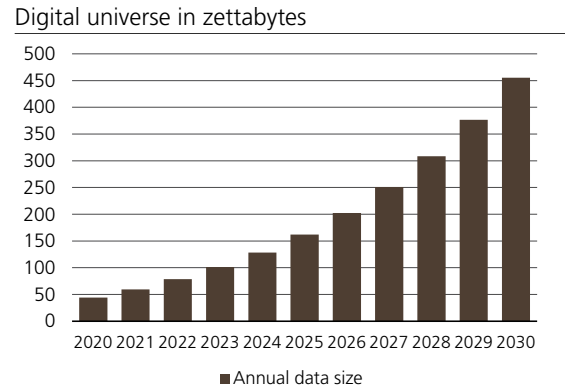
#### Rising global internet penetration

From 2013–17, around 1.4bn people gained access to the internet. The bulk of the growth came from emerging markets like India, Indonesia, and China. While internet penetration has vastly improved in these countries, it is still low compared to developed markets like the US or Japan, where penetration is close to 90%. We expect 2bn internet users will be added over the next decade, with the majority from emerging markets. As a result, global internet penetration should increase from 54.6% in 2017 to around 75% in 2027, according to our estimates. We believe emerging markets will continue to provide the majority of new internet users due to the increased availability of cheap smartphones, nationwide rollouts of faster 4G and broadband networks, and rising affordability of internet services. Our estimates may prove to be conservative if connectivity devices become more affordable, or if emerging market governments take more proactive measures to promote internet usage.

#### Rising data usage in emerging markets

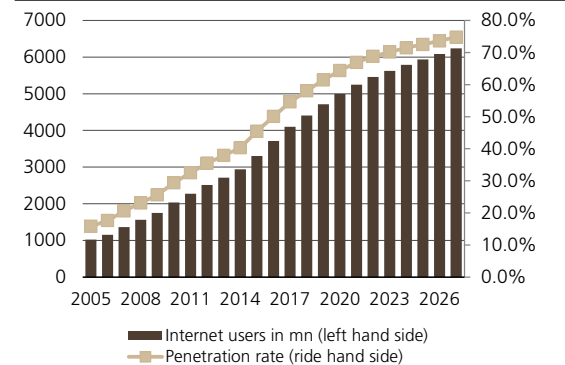
In addition to rising penetration rates, we expect increased data usage in emerging markets, particularly among the younger generation, to lead to a data surge in the respective regions. With freedom from legacy assets, emerging markets are well positioned to participate in the data wave. Take for instance the e-commerce industry, where an increasingly large number of consumers in China, especially those below the age of 40, shop online. This is evident in China's high e-commerce penetration rate – online sales account for around 20% of total retail sales in China, compared to about 10% globally. Another factor contributing to the data surge in emerging markets is the strong reliance on mobile phones to access the internet. Unlike in developed markets, smartphones are often the first computing device for many individuals in developing countries, as many people have never owned a PC. With on-the-go connectivity, we see an increased scope for data usage in emerging markets.

**Fig. 1: More than 10x growth expected in data from 2020–2030**



Source: IDC, EMC, Bloomberg Intelligence, UBS, as of April 2018

**Fig. 2: Global internet penetration expected to reach 75% in a decade**



Source: World Bank, Bloomberg Intelligence, UBS, as of April 2018

## Secular trends

### Changing consumer digital lifestyles

The advent of smart devices like smartphones and tablet PCs has significantly changed the data consumption patterns of consumers. While initial demand for smart devices was largely driven by their so-called "cool" features, such as enhanced touch-screen performance and lighter weight, smart devices have practically become necessities. So what has made them such an integral part of our lives? A simple answer is that they have become great productivity tools for professionals and a storehouse for our personal desires and memories. Thanks to solid innovation and superior execution, the prices of technology devices like smartphones, tablets, and PCs have been falling rapidly, significantly increasing their affordability in emerging markets. The end-result is a sharp rise in per-capita connected devices. The average number of devices in 2014 stood at 1.95 globally and is expected to rise to 3.2 by 2020, according to Cisco. While the growth is broad-based, the improvement in the emerging markets of Asia Pacific or Latin America has been particularly solid.

With a two-thirds share of the digital universe currently, consumer data should continue to outpace overall data growth, in our view, in light of changing digital lifestyles.

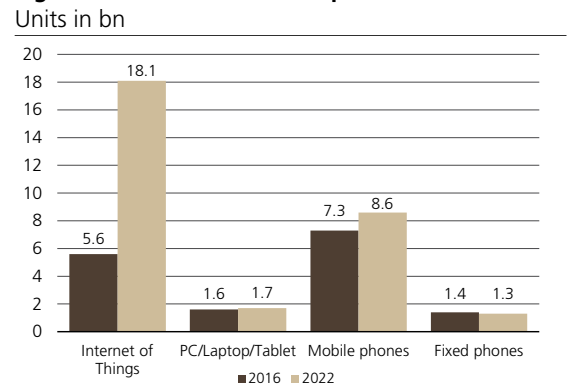
### IoT remains another growth driver

The Internet of Things (IoT) refers to a network of connected devices, in which everyday objects are constantly sending and receiving data. A combination of connected chips (Bluetooth/WIFI or cellular) and sensors or low-power processors linked to a remote hub is making regular objects, like refrigerators, cars, wind turbines, and public lighting, "intelligent."

We believe the IoT industry is at an inflection point due to both supply and demand factors. Key supply factors include affordable pricing, the emergence of industry standards, and a well-established IoT ecosystem. And demand from both consumers and industrial customers as well as emerging markets is increasing thanks to improving awareness. Growth was initially driven by consumer applications like wearables and home-connected devices, a trend that we expect to continue. But the increasingly rapid adoption of IoT in industrial processes should lead to strong unit growth, as IoT offers industrial customers the opportunity to improve efficiency and reduce maintenance costs.

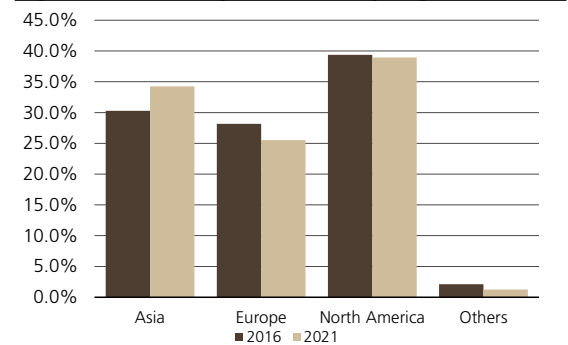
We believe the IoT industry is still in the early stages of the fifth computing cycle. According to Ericsson, IoT units are expected to grow from 5.6bn units in 2016 to 18.1bn units in 2022, an average annual growth of 22% (see Fig. 3). On a per-capita unit basis, this translates to 0.75x IoT devices per person currently versus more than 2x in 2022, which we find reasonable given the widespread proliferation of IoT devices in the past few years.

**Fig. 3: IoT is at an inflection point**



Source: Ericsson, UBS, as of April 2018

**Fig. 4: IoT industry revenues by region**



Source: Zinnov, UBS, as of April 2018

In terms of addressable market, the strong unit growth should translate into a revenue opportunity of USD 253bn by 2021 from USD 120bn in 2016, according to Zinnov, or an average annual growth rate of 16%, which would make IoT one of the fastest-growing technology segments. Asia is expected to be a clear driver of this growth, as seen in Fig. 4.

### Analytics – the big data opportunity

Despite the strong growth in the digital universe, we believe only a tiny fraction of digital data is being fully exploited – i.e. data that, if analyzed properly, could lead to either cost savings or revenue maximization. Examples of such applications include a public utility's analysis of power usage patterns that leads to cost-efficient power distribution, or the identification of correlations in scientific data from independent studies.

Nonetheless, we see promise in "big data" technology as a potential solution to data analysis problems. Big data technology, which should not be confused with the big growth in data, refers to analytics used to extract value from large and untapped pools of data that are generally too complex to manipulate with standard methods or tools. As most generated data is unstructured, non-traditional technologies like big data, which mainly include standards like Hadoop, NoSQL, and MapReduce, are employed to analyze data and add value to business.

On the enterprise side, big data analytics tools are widely used by retailers like Walmart and e-commerce companies like Amazon and eBay to generate more business. Other companies have started to allocate more spending on big data tools to potentially save costs or generate revenues from new sources. Examples of how big data analytics help online retailers include product recommendations based on what other customers with a similar profile have bought, and instant coupons to effect the purchase. According to IDC and Bloomberg Intelligence, banking, retail, and professional services are some of the biggest spenders on big data analytics (see Fig. 5).

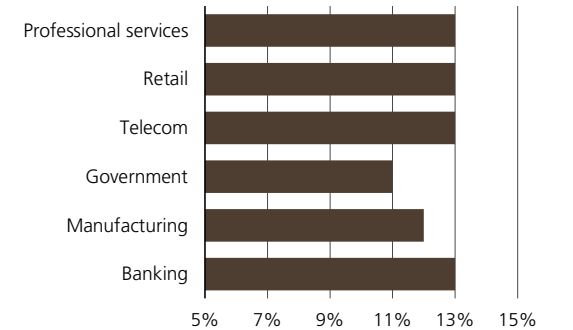
### How to participate in the data wave?

Given the strong volume growth in data, we believe digital data offers a very good long-term investment opportunity. In our view, there are two broad ways to participate in the digital data wave: while conventional wisdom argues in favor of data infrastructure companies, we believe investors will be best rewarded by also focusing on data enablers.

**Data enablers:** The first group to participate in the digital data wave was data enablers, or companies that promote the creation and growth of data, including internet, enterprise-application, and smart-device companies.

**Data infrastructure providers:** The next group to participate in the digital data wave was data infrastructure providers, which mainly include companies that store, carry, and analyze data. They often belong to broader sector groups like semiconductors, networking, hardware, software, and services.

**Fig. 5: Average revenue growth for big data analytics from 2016–21 by industry**



Source: IDC, Bloomberg Intelligence, UBS, as of April 2018

Data enablers and data infrastructure providers are both part of the lifecycle of digital data, in our view.

## The lifecycle of digital data

As noted, the world is awash in data, whether from the digital "bread-crumbs" we leave as we send another email, hit a friend back with a text, browse the internet, show our "likes" on Facebook posts, post comments on Twitter, and light up GPS data with our smartphones as we travel about our day, or the thousands of credit and debit card swipes we make every year. Additionally, the IoT continues to grow, with sensors, cameras, and other data-gathering endpoints (in addition to our smartphones, which are the ultimate data-gathering endpoints) increasing in number at an almost immeasurable rate.

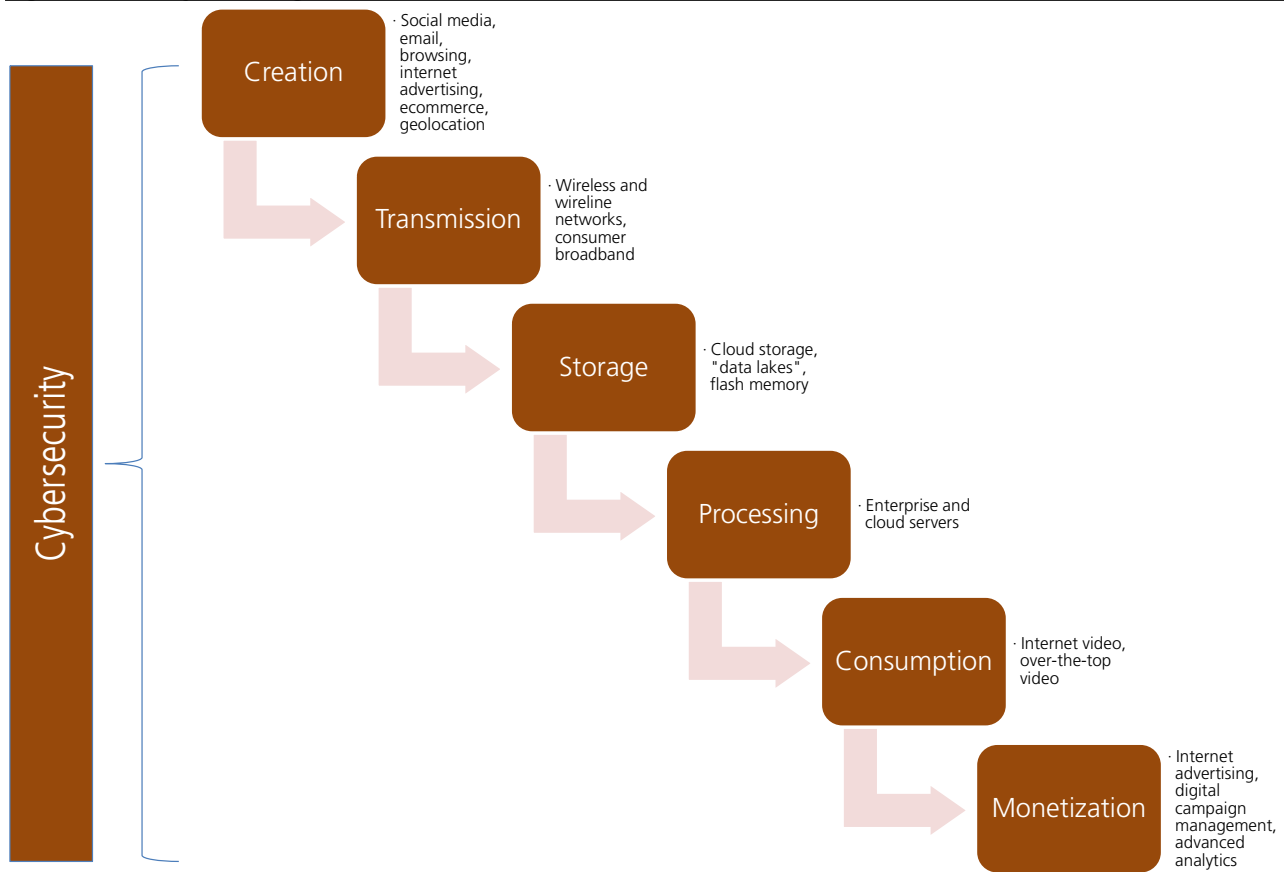
It's become popular to say that "data is the new oil." In some ways, data may ultimately be more valuable than oil. In our view, data is the most valuable asset a company has – data about customer preferences and behaviors, new products, sales and marketing campaigns; financial data that can show the profitability of individual products and customers; IT operations that can find a hacker or a malware attack. All of this data is increasingly the key feedstock for the modern corporation.

The continuous declines in the cost of foundational information technology, including the cost of computing, storage, and networking, enables corporations to monetize their data in ways that were not possible even a decade ago. This trend will likely accelerate as cloud computing becomes more mainstream and helps drive development and adoption of artificial intelligence.

Data travels through six distinct stages during its life: creation, transmission, storage, processing, consumption, and monetization. We believe our theme touches on all of the steps within the digital data lifecycle. Further, enhanced cyber-security is needed to protect data throughout its entire lifecycle. In Fig. 6 on the next page, we show the lifecycle of data and where different industries in our "Digital data" theme participate.

Within the realm of digital data, we prefer companies that can capitalize on the lifecycle of data. While data has always been important, the aforementioned dramatic declines in the cost of computing, storage, and networking, along with the development of advanced analytics, have made data the new global commodity that is increasingly critical to companies in all sectors and industries. Additionally, there is still further room for growth of connected users, who will create new pools of valuable data, despite saturation in developed markets.

**Fig. 6: The lifecycle of digital data**



Source: UBS

**Opportunities in digital marketing**

Digital marketing may not be a new development, but we believe the saturation of smartphones and the increased usage of technology to analyze large untapped pools of data provide a strong tailwind for further growth. Digital marketing has the potential to significantly increase customer interaction and engagement, and improve the return on investment for marketers. A key aspect of digital marketing is its ability to analyze the effectiveness of a digital campaign in near-real time and to course-correct as necessary. While digital marketing has largely been focused on internet search (search engine optimization and search engine marketing) and direct digital marketing, we believe non-linear video consumption (e.g. YouTube or other on-demand video) will provide a significant opportunity for further use of digital marketing.

Additionally, we believe companies increasingly understand that they have tremendous amounts of customer data and other information that can be monetized through more effective digital marketing and customer interaction.

Lastly, there is an opportunity for digital marketing to subsume other traditional media advertising formats such as print and radio, as digital marketing may increasingly be viewed as the primary marketing function rather than an adjacency to more traditional methods.

### Investment implications

With strong growth continuing for digital data, we believe companies exposed to both enabler and infrastructure segments will continue to witness strong earnings growth. Fig. 7 shows the strong earnings growth potential of our theme over the next few years.

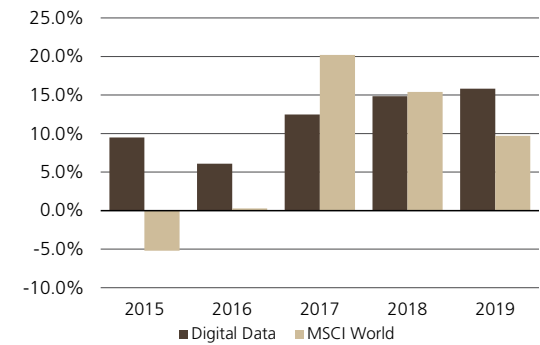
We expect digital data companies to post low-double-digit earnings growth in the coming years, driven by high-single-digit revenue growth and margin expansion on a better software mix and greater scale. Investors, in our view, will be best rewarded by investing in our digital data theme in a diversified way, with a focus on software, platform, and semiconductor companies, all of which we believe will enjoy superior pricing power.

### Risks

Key risks to our views on digital data are data-related security and limited pricing declines. We believe a large portion of data globally requires protection but is still unprotected, and data losses and concerns about security could hurt confidence and slow overall data growth. This could affect the shift to digital. That being said, our other Longer Term Investment theme "Security and safety" highlights opportunities from the broader trend of rising spend on cyber security. Another risk relates to data storage costs, which generally decline by 25–30% a year. If this pace slows down, it may inhibit data growth due to higher costs.

Also, our theme focuses on long-term opportunities in digital data, so any potential economic shock or disruption may result in the growth rates not materializing in the short term. The emerging nature of digital data means the potential list of winners will likely be more dynamic and should continue to evolve. Hence, investors need to pursue a diversified approach when investing in digital data.

**Fig. 7: Strong earnings growth expected to continue for digital data companies**



Source: Factset, UBS, as of April 2018

## Appendix

**Terms and Abbreviations**

Term / Abbreviation	Description / Definition	Term / Abbreviation	Description / Definition
A	actual i.e. 2010A	bn	Billion
Capex	Capital expenditures	COM	Common shares
E	expected i.e. 2011E	Shares o/s	Shares outstanding
UP	Underperform: The stock is expected to underperform the sector benchmark	CIO	UBS WM Chief Investment Office

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