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МИРОВЫЕ ЛИДЕРЫ В ОБЛАСТИ ИКТ: ДОСТИЖЕНИЯ И ПЕРСПЕКТИВЫ

WORLD ICT LEADERS: ACHIEVEMENTS AND PROSPECTS

Рекомендовано учебно-методическим объединением по лингвистическому образованию в качестве пособия для студентов учреждений высшего образования, обучающихся по специальности 1-23 01 02-01 01 «Лингвистическое обеспечение межкультурных коммуникаций (информационное обслуживание)»

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Р е ц е н з е н т ы : кандидат филологических наук *Н. А. Нестер* (МГЛУ); кандидат филологических наук, доцент *С. А. Дубинко* (БГУ)

Пособие предназначено для развития умений анализировать роль ключевых достижений в области информационных и телекоммуникационных технологий в высокоразвитых регионах мира. Пособие состоит из 9 разделов и глоссария. Каждый раздел включает задания для аудиторной, внеаудиторной и самостоятельной работы для практических занятий по дисциплине «Страноведение».

Адресуется студентам 3 курса факультета межкультурных коммуникаций МГЛУ и учреждений высшего образования, в которых английский язык изучается на продвинутом уровне.

INTRODUCTION

The book is designed to provide guidance for advanced students majoring in English for Information Technology and Intercultural Communication. It comprises pieces of writing essential for students to learn and discuss. The book contains up-to-date newspaper articles, technology news and reviews from scientific websites and forums, articles from scientific books and encyclopedias arranged topically in several units and is devised to provoke debates, argument. Each section consists of texts for reading, pre-reading tasks that help readers immerse into the atmosphere of professional communication and the issue to be discussed, assignments in the form of general questions for discussion of basic issues from the texts, assignments aimed at developing analytical thinking and assisting to reach a higher standard of language acquisition, more than that, language for special purposes. The activities suggested focus on professional communication rather than the language itself and its form which is used as a tool for the given communication.

The sections in the book are arranged thematically by countries, as it is the author's intention to help readers to enrich their knowledge in country studies and the choice of the counties for study is explained by their high position in various technology and innovation ratings, thus not only English-speaking countries comprise the choice of the author. The texts and assignments from the book will help readers to acquire the knowledge of the modern technological picture of the world.

INTRODUCTION INTO MODERN ICT
FINLAND IS A TOP IT COUNTRY

1. **Pre-reading. Express your opinion on the role of information technology in the present days. How has our dependence on technology and various devices changed during the last decades? Which modern innovations can't you get by without now?**

2. **Read the information below.**

What is ICT?

ICT (information and communications technology, or technologies) is the infrastructure and components that enable modern computing. Although there is no single, universal definition of ICT, the term is generally accepted to mean all devices, networking components, applications and systems that combined allow people and organizations (i.e., businesses, nonprofit agencies, governments and criminal enterprises) to interact in the digital world.

ICT encompasses both the internet-enabled sphere as well as the mobile one powered by wireless networks. It also includes antiquated technologies, such as landline telephones, radio and television broadcast – all of which are still widely used today alongside cutting-edge ICT pieces such as artificial intelligence and robotics.

ICT is sometimes used synonymously with IT (for information technology); however, ICT is generally used to represent a broader, more comprehensive list of all components related to computer and digital technologies than IT.

The list of ICT components is exhaustive, and it continues to grow. Some components, such as computers and telephones, have existed for decades. Others, such as smartphones, digital TVs and robots, are more recent entries.

The Networked Readiness Index

The Networked Readiness Index or NRI is also called *Technology Readiness*. The Index is a key indicator of how a country performs in the digital world. It measures how well an economy is using information and communications technologies to boost competitiveness and well-being.

As you would expect from such a complex issue, the ranking is drawn up using a wide range of information. Data is gathered from international agencies

such as the International Telecommunication Union, UNESCO, other UN agencies and the World Bank. Further indicators come from the World Economic Forum's Executive Opinion Survey, which was completed by over 14,000 business executives in more than 140 countries.

Top 20 countries by Networked Readiness Index 2016

Finland	Denmark
Singapore	Hong Kong SAR
Sweden	Korea, Rep.
Norway	Canada
The USA	Germany
The Netherlands	Iceland
Switzerland	New Zealand
The UK	Australia
Luxemburg	Taiwan, China
Japan	Austria

Companies are facing increasing pressure to innovate continuously. Seven countries stand out in terms of the economic impact of their corporate digitization: Finland, Switzerland, Sweden, Israel, Singapore, the Netherlands and the United States. It is noticeable that all seven are characterized by very high levels of business information-technology adoption.

2.1. What is the notion of ICT? Dwell on the multicomponent system of ICT and its most modern components. ICT vs. IT: what is the difference?

2.2. Comment on the essence of The Networked Readiness Index. What does the index reflect? Analyze the countries that are placed on the top of the rating. Why particularly these countries make up the list of "digital leaders"?

3. Learn and analyze the information below.

The capital of Finland is Helsinki and the country has two official languages – Finnish, Swedish. The number of people living in the country is about 5.5 million.

Finland is a country in Northern Europe bordering the Baltic Sea, Gulf of Bothnia, and Gulf of Finland, between Norway to the north, Sweden to the northwest, and Russia to the east.

"Twenty years ago, you couldn't imagine what we have now with information technology". – Finnish Prime Minister Matti Vanhanen

Finland is now known as a modern, Western country. However, as recently as the end of WWII that was far from the case. Yet in the last 70 years it's been transformed from an agrarian society to one of Europe's most technologically advanced nations. All this despite a problematic location between east and west and a harsh climate that literally caused famine after famine just a century earlier.

The technology industry is the most important export industry in Finland. Technology companies operate in international markets, attracting income to Finland that is paramount to maintaining the welfare state, with operations constituting *over 50 %* of all Finnish exports.

Nearly 300,000 Finns work in technology companies, while a total of around 700,000 people work in the technology sector either directly or indirectly. Responsible for 70 % of all investment in research and development carried out in Finland, technology companies play a vital role in the future success of the country.

THE TECHNOLOGY INDUSTRY IS COMPRISED OF FIVE SUB-SECTORS:

- Electronics and the Electrotechnical Industry;
- Mechanical Engineering;
- Metals Industry;
- Consulting Engineering;
- Information Technology.

Our objective is to concentrate on Information Technology in Finland. Relatively speaking, Finland's ICT sector is bigger than that of its European peers – and no country can match the Finns for advanced IT skills. It is a country where 2.2 % of graduates under 30 hold a degree in science, technology, engineering and mathematics subjects, compared with 1.9 % in Denmark and 1.6 % in Germany.

Finland uses the cloud more than any other European country – and ranks fourth in the world when it comes to entrepreneurship and opportunity, according to the Legatum Institute.

So why does Finland lead in ICT? Two main reasons stand out.

The first lies in Nokia's impact. Today's workforce grew up inspired as Finnish-made mobiles conquered the world. "Nokia's success showed that everything is possible in ICT innovation – and in Finland," said Heikki Hämmäinen, professor of communications and networking at Helsinki's Aalto University. "After the troubles of Nokia's mobile phone business, a strong startup mentality in ICT has emerged rapidly, for senior experts and university graduates alike".

How has the country achieved this economic miracle? Simple. It is invested in educating the masses with free universities and other egalitarian educational policies. One impressive consequence of this is the number of technologies Finns have created. In fact, according to the Finnish Invention Foundation, the Finnish population of six million people make around 15.000 inventions every year. Many fall by the wayside, some change the world.

The Finnish telecom industry

Let us start this chapter with citations from a couple of Finnish and foreign authors who have dealing with development of Finnish telecom and Nokia's part in this development: *"Nokia is central to Finland but not in the sense that Finland is entirely economically dependent upon or politically subordinated to Nokia. Nokia's important role in Finland is to act as the current channel for Finnish IT expertise. Nokia is a product of Finland and Finland's economy is partly driven by Nokia's innovation and competitiveness, but they are both dependent on a world of global networks in which their ties, for the time being, represent a major asset both for the company and the country".*

"The new Nokia was a product not only of the state-led investments of the 1980s, but also of the reconfigured Finnish national innovation system of the 1990s – particularly the research funding, strong educational system, and the technology collaborations with public research and universities. The domestic pool of low cost high quality technical talent and research supported the firm's accelerated growth for most of the 1990s".

"Nokia's global success has sometimes been attributed to the support it has received from the Finnish government. This impression is false; Nokia has not grown with the help of public funds. Nokia's own research expenditure is substantially larger than the public support it has received".

"R&D support was the start of an industrial policy based on functional support and promotion of networks. A key element of this new industrial policy was that it did not target specific firms or winners. It was a more functional type of intervention to improve the key factors needed to support new technologies and technology-based firms, namely R&D, higher education, venture capital, and advanced technological infrastructure".

The story of Finland's telecom breakthrough equals the story of Nokia's breakthrough in telecom. Subsequently, also the role of the Finnish state in this breakthrough has been analyzed from the same perspective. Nokia has not been the only Finnish telecom company, but it has been and still is the biggest and most dominant one. There are in Finland's telecom sector several small companies and

a few bigger companies, but common to all these companies has been their strong dependence on Nokia and its success. When Nokia did well the whole Nokia community did well, but when Nokia failed as its Mobile Phones did starting from late 2010s, the whole Nokia community was in troubles, some less, many more.

Dating of breakthroughs is not always easy, but in the case of Finnish telecom it is not too difficult. The actual breakthrough of the sector took place in the 1990s, when the ICT sector was by far the fastest growing industrial sector and Nokia the fastest growing major company in Finland. But a major part of the seeds of the success were sawn much earlier.

If we keep it simple, the Finnish telecom sector has comprised (radio) telephones and telephone exchanges. In both of these fields the state was an important player in the 1960s in the evolvement of tentative business ideas into new businesses started in Finland. Through the national Post and Telegraph Office (PTT) the state was the central telecom regulator and user. In addition to PTT Finland had a great number of small local private telcos. The telecom business was shared by a couple of big foreign companies, Ericsson, Siemens and ITT-Alcatel and three small Finnish companies, the state owned *Televa* (exchanges, radio phones), private *Salora* (radio phones) and *Nokia Cables* (radio phones, exchanges). Nokia Cables was a big company but small in telecom still in the 1960s.

The Finnish state has all reason to congratulate itself for its significant contribution to the Finnish telecom breakthrough and the Nokia success story. The value of the achievement does not diminish the fact that the outcome most certainly was a big surprise also to the state itself. The Finnish telecom industry, not to mention Nokia, was not a creation of the state. Market forces and private entrepreneurship in the form of an old, big and strong national player Nokia were in the driving seat, but the Finnish state did everything what a state of a small economy can do for industrial upgrading and renewal. This paper has been dealing with the telecom sector. The focus of policies was in the 1980s and 1990s on ICT and information technology, but innovation and education policies covered most other sectors of the Finnish economy as well. It was in these decades question about a comprehensive mobilization of national resources for knowledge-based innovation driven growth.

It is fair to say that there has not been a systematic plan to build a globally competitive Finnish telecom sector with Nokia as a flagship or even as a national champion. One thing is however sure: the long-term strategic perspective of innovation and education policies were essential to Nokia's and Finland's emergence as successful telecom player. These policies were relatively consistent over the long term starting from late 1960s and were not dictated by short-term cyclical or political considerations. The breakthrough of Finnish telecom was very

much an innovation driven breakthrough. Therefore the whole fabric of activities which various parts of the public sector executed in education, science, technology and innovation made the state an important actor in this development.

The evolution of Finland's telecom sector and its locomotive Nokia have been deeply rooted in the Finnish innovation system, but whatever the future policy could be, it can't be based on building or waiting for a new Nokia. Finland has been lucky that it has been able to host such a company and host the company still in the future. However, as an economy Finland has been more reliant on one manufacturing company than any other country in the world except Taiwan. Taiwanese company Hon Hai is at the same level as Nokia. Most probably, finding soon or even in the longer term a new Nokia is not possible, and it is not necessarily desirable either. More diversified industrial structure with a bigger number of small and medium sized companies could fit better for Finland of the future. From the point of view of state policies and many of the policy instruments which were used in Finland for upgrading and renewal of the telecom industry are still relevant for Finland and many other countries, including developing countries.

Education in Finland

<u>What is particular of Finnish education?</u>
- The school system is 100 % state funded, from elementary school to University.
- No fees, not even for foreign exchange students.
- All teachers in Finland must have a Master's degree from the University.
- Teachers are selected from the top 10 % of high-school graduates.
- The competition is extremely tough: It's more difficult getting into teacher education than law or medicine.
- The national curriculum is only broad guidelines – this gives schools and teachers a lot of freedom in terms of both content and methods (e.g. use of ICT).
- The difference between weakest and strongest students in Finland is the smallest in the World.

<u>ICT education</u>
- ICT/CS degrees can be obtained from Universities, Polytechnics and vocational education.
- People's interest towards ICT in general and ICT education particular has varied according to the various ICT-hype created by Finnish media.
  - Nokia's public image / success has been one of the main factor that has shaped attitudes.
  - Since the beginning of the millennium the amount of applicants in ICT studies have been in slight degrease.

- However, starting from 2010 there has been a surprising increase in the amount of applicants (similar trend has been observed in the US). Potential explanations for the recent increase: Success of Finnish gaming industry, realization that modern society is heavily relying on ICT.

Employment rate in ICT sector is high:

Within the first 5 years after graduation unemployment rate is between 3 to 5 %, after five years unemployment rate almost zero percent.

Problems / challenges in Finnish ICT education

- Slow progress and low graduation rate:
  - More than 90 % of the ICT students work while studying.
  - Consequently only 10 % of the students' reach the threshold value of 55 credits per year.
  - Only about 50 % of the students will eventually graduate (within 10 years or less).
  - From the point of view of the revenue model of Universities this is a huge problem.
  - From the societal / industry perspective this is much less dramatical, because ICT students are typically working for the ICT industry anyway, regardless of graduating or not.
  - This problem cannot be solved easily because there is no regulation in ICT sector who will/can be employed (unlike teachers, lawyers and medical doctors). There is a "heroic" work tradition in the ICT industry: Diplomas don't weigh nearly as much as one's actual ICT skills.

To conclude it all the following points should be underlined:

- Finland has a good ICT infrastructure in schools, but teachers utilise the infrastructure extremely poorly.
- Finland has a strong ICT sector and the general interest towards ICT studies is also sufficiently high. However, students' graduation rate in ICT sector is far from optimal.
- Overall, it appears that both the ICT knowledge and the general interest towards ICT studies develop outside the formal education in Finland.

3.1. Why is Finland considered the top country of technology? Provide general overview of the country.

3.2. Dwell on the history of Finnish IT and on the role of Nokia company in Finnish IT development.

3.3. What are the reasons for high-level IT development in Finland? Outline economic and historical prerequisites.

3.4. Dwell on the peculiarities of education in Finland. What are the social prerequisites for high-level IT development?

3.5. Learn about super Finnish technologies and inventions that changed the world.

The universal mobile phone

Launched in 2003, forever ago in tech years, the Nokia 1100 is a simple GSM phone that doesn't do much else than call and text. But that's just what the world needed at that point. As Foreign Policy magazine put it: Nokia 1100 is "humanity's most rugged, efficient calling machine". Designed to function in the harsh conditions for electronics in developing nations, the 1100's build quality allowed the handset to work for as a relatively long time for very little money. It was indeed the world's best selling mobile phone and ended up the hands of an amazing 250 million people worldwide. This is really the beginning of the success story of telecommunications in countries we westerners sometimes underestimate by a lot, based on ancient information in our school books.

Polar's Wireless Wearable Technology

Finnish company *Polar Electro* started their journey towards greatness in 1977 as they filed a patent for and launched a battery-powered heart rate monitor intended for use attached to the wearer's fingertip. However, the first major step towards a form that feels familiar came in 1982 with the wireless heart rate monitor, the sensor of which attached to the user's chest while communicating to a wrist watch like a central unit.

Subsequent models improved in affordability, already aiming for enthusiasts by the mid-80's. Around the same time, Polar started making moves in what essentially is the functions we expect from health gadgets now: data analysis software for the IBM PC. By the 90's their software was useful for plotting training schedules quickly.

Polar Sport Tester PE 2000, ▶
the world's first wearable,
wireless heart rate monitor.

SSH, the universal tool for secure computer administration

Let's make a quick jump to another type of technology entirely: the early days of the commercial internet. Back then, nearly all communications between computers happened in clear text, without encryption. That seemed to work during the hippy-dippy days of the internet as a research network. But in 1995, software engineer Tatu Ylönen made a big splash that's invisible to most laypeople: the SSH (secure shell) protocol and his company with the same name.

Mostly used as a replacement for 'telnet', a remote command line, SSH is super convenient for logging in to remotely use and securely administer computers. SSH is also the basis for the world's best hope of getting rid of the insecure FTP for transferring files to be served on the web.

Linux, everywhere but your PC

In 1992 Linus Torvalds, an ambitious computer science student from Helsinki wanted to make an operating system of his own for his new PC. Inspired by Unix, a family of operating systems derived from big institutional computers in the 70's, Torvalds made the Linux kernel available to anyone at no cost. Over a short time, countless people wanted to give feedback and contributed enhancements to the systems source code.

Many took the Linux kernel and bundled it with freely available Unix-components from the GNU project to make complete environments, like Windows or the Mac.

The source for Linux code ended up being licensed in a way that requires source code changes to be publicly available.

Concerning Torvald's original ambition of building an enthusiast OS, Linux has indeed succeeded with a notable following among computer professionals, enthusiasts and price/control sensitive governments. On the same note, Linux is sometimes considered weird and obscure because it never came close to "replacing Windows" on things we call "computers": typical workhorse PCs and laptops.
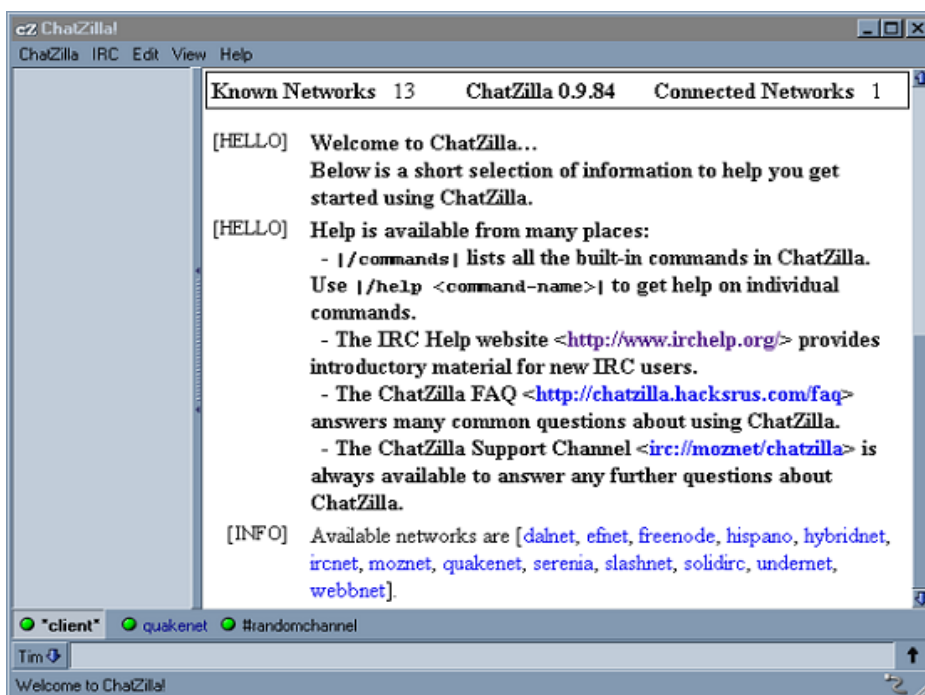
However, Linux matured for professional IT use in the late nineties when the internet took off. Being free and customizable Linux allows countless Internet-minded organizations to save on software license fees. Being built around the Unix

idea of what an operating system should look like, Linux can make a lot of sense as a network-centric server operating system. Companies like Google were able to quickly build entire data centers on moderately priced PC-based servers.

Nowadays, Linux is everywhere: machines running Linux send you web pages and most other sites you visit. Some other things running Linux: most Wi-Fi routers, industrial computers, sniper rifles, supercomputers, TVs, Android devices. And these are just examples. With Android, the world's most popular operating system, and Google's Chromebook laptops, also Linux-based, Linus Torvald's operating system core has finally breached a barrier once thought impossible: the computers everyone use.

Internet Relay Chat

IRC, short for Internet Relay Chat is a system for users to connect to a central server through which chat conversations are held in chatrooms, "channels, and private chats, "queries". This system first appeared in August of 1988 at the University of Oulu in northern Finland, well before commercialization of the internet was about to happen. Jarkko Oikkarinen, nicknamed 'WiZ', wanted to extend a bulletin board system for chats use.

Well received, IRC's code was freed and spread to HUT, today's Aalto University, and the universities in Helsinki and Tampere.
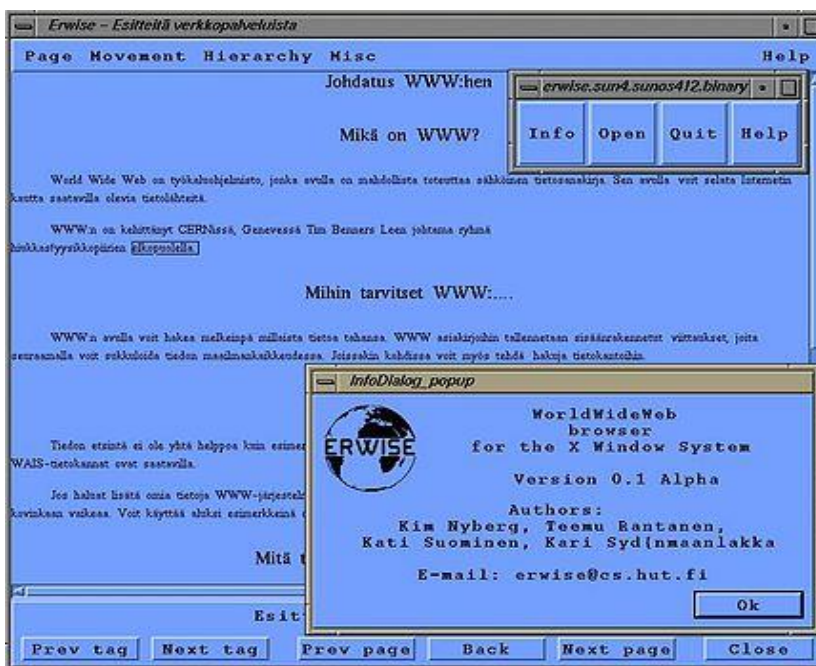
Through personal connections with people at Denver University and Oregon State University, IRC soon became a mass phenomenon for its time, being used for reporting of the first Gulf War.

By now, IRC is probably far past its prime as a major part of how the connected world communicates. The reasons are many, starting with a slight learning curve and non-commercial underdog mentality. Another elephant in the room is that smartphone-friendly ways of accessing IRC never really took off.

But the system and its major networks with geo-distributed, interconnected servers are still in use: it remains a reasonably popular among people and groups with techy leanings, everything from online gaming communities, open source software development to political activism. The system's minimalism and the distinct lack of animated emojis and formatted text can be seen as both clunky and refreshing. But the major benefit is one of no minor significance: anyone can run their own IRC server. For people who need that, IRC is going nowhere.

Erwise, the first available graphical web browser

The human-friendly, graphical web browser is another first in the surprising Finnish over-representation in early essential internet communications. Like the World Wide Web concept, which was built by Tim Berners-Lee et. al. on NeXT Unix computers at the CERN research institute, Erwise, this little known Finnish browser was more of a research project than a product, since the internet was years from including commercial activities in its acceptable use policy.

Born as a master's project of four Finnish students in 1992, Erwise was, like most of the internet, built to run on the Unix workstations and servers, like those from Sun Microsystems, that were popular in research at the time. It's hardly surprising to note that it was CERN researcher and computer scientist and web co-creator Robert Cailliau who suggested this master's topic to students Kim Nyberg, Teemu Rantanen, Kati Suominen and Kari Sydänmaanlakka.

As a side note, it's worth pointing out that Cailliau himself holds the 'first' for a web browser for a non-Unix operating system, namely MacWWW for MacOS. Yes, MacOS before NeXT founder Steve Jobs returned to save Apple with shiny new products and NeXT's Unix operating system, now used in Macs

and iPhones. If something, this is a subtle hint that well-funded research and the circles this puts you in is a central part of Finland's current stature in the world of technology.

3.6. Describe each invention mentioned above. Think about their role for future ICT.

Follow-up assignments:

I. *Based on the knowledge of Finnish IT development work out some general rules for technology development in any country.*

II. *Devise a plan of how to develop Belarusian IT sector to make it more successful.*

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Section II
SINGAPORE: SMALL IT GIANT

1. **Pre-reading. What are the smallest countries that you know? Is their level of development the same? How can a small country having no resources succeed?**

2. **Read the information below.**

Singapore is the Malay name for "Lion City". The city-state in Southeast Asia consists of the island of Singapore and about 54 smaller islands. The main island is linked by a causeway to Johor Baru on the southern tip of the Malay Peninsula.

The former British colonial trading post is since its independency in 1965, officially the Republic of Singapore, the city state is situated 137 km north of the equator, and just south of Peninsular Malaysia. In south the Strait of Singapore separates the island from the Riau Archipelago of Indonesia.

Singapore occupies an area of 718 km². The city state has a population of 5.6 million people, and a resident population of 3.9 million (in 2016). Official languages are English (language of administration), Malay, Mandarin, and Tamil. Singapore is famous for being a global financial center, a shopping paradise, and as a spot for a variety of activities, dining and entertainment.

Singapore: from colonial backwater to high-tech city state

As Singapore celebrates 53 years of independence, we chart its epic transformation from a colonial backwater into a rich, high-tech city state.

Lee Kuan Yew, as prime minister from 1959 until 1990, and a senior advisor to the government until 2011, pioneered many of the changes. The following images show just how much the country altered in his lifetime.

2000-s   1960-s

The British ruled Singapore from the 1820s until 1963. The city state gained independence from Malaysia in 1965. With a GDP per capita of around $500, a lack of natural resources and poor infrastructure, it was by most measures a third world country.

The population of the city stood at around 1.6 million in the 1960s.

Lee sought to industrialize the country and established the Singapore Economic Development Board to woo foreign investment. It soon established offices in Europe and the US to further encourage growth. In 1970, the Monetary Authority of Singapore was established. Dozens of slums were bulldozed as part of urban reforms. New towns quickly sprang up. When Lee died in 2015, The Telegraph's obituary stated: *"Stability and economic progress were, for him, unequivocally higher priorities than western notions of freedom. The result was the transformation of Singapore from a mosquito-ridden colonial trading post and military base to a proud and prosperous – if somewhat antiseptic – Asian tiger".*

Today, Singapore is the world"s fourth biggest financial center, and one of its five busiest ports. It has a GDP per capita of US$55,182, the 8th highest in the world. More than five million people now live there.

It has made great strides to encourage tourism with the construction of dramatic sights such as the astonishing Gardens by the Bay, a 135-acre green space with an aerial walkway, tropical waterfront gardens, tree-like towers and a 100ft waterfall.

2.1. Comment on Singapore's geographical position and provide general information about the state. Analyze the transformation that the country underwent.

2.2. There are a lot of success stories of different countries but the Singaporean one is outstanding. An American and German philanthropist, Nicolas Berggruen, once said: *"Singapore has been incredibly well-managed. It was created out of the swamp, with a strong emotional idea: a safe place for mostly Chinese, but accepting other cultures and other races".* Look at the mind map that outlines the reasons how Singapore succeeded, comment on each one. Is it always true that only democracy matters? Finally, why did Singapore succeed?

3. Singapore makes a significant part of our modern digital world. Learn about the things that are a part of everyday reality in Singapore.
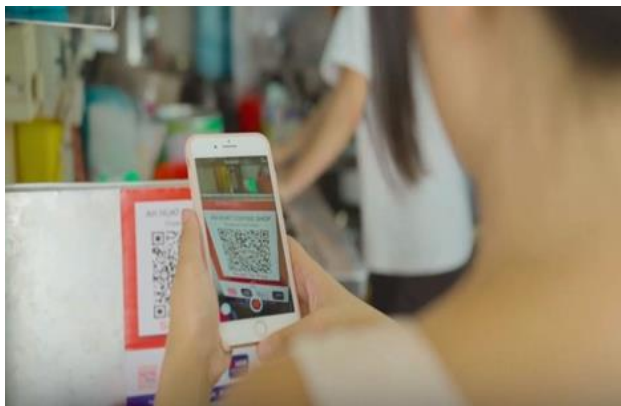
Imagine you're the owner of a small restaurant, serving traditional local dishes. But technology has radically changed the way you do business. Customers now get recommendations from friends on social media. Once they've decided to check out your restaurant, they make a reservation though a mobile app.

When they arrive and are seated, they use electronic menus on a tablet, swiping through various pictures of the items offered, before placing their orders by pressing a few buttons on the screen. And after they've finished the fragrant dishes prepared, they make the payment by using their mobile phone.

These are increasingly common scenes in Singapore, and indeed, digitalisation is changing the way businesses operate. Websites, apps, social media, cloud computing, big data, tablets, e-commerce – these technologies are among the emergent trends today that will change the way we do business in future, and companies and consumers have to be prepared to embrace it.

It's everyday reality in Singapore!

- Pay via QR codes at the coffee shop

We already have handy ATM cards for paying at fancy restaurants or retail shops. But what if you're queuing for your favourite bak chor mee at the coffee shop when you realise you're all out of notes? Instead of running to the nearest ATM or resorting to applying for an emergency bank loan from strangers in the queue, you can now opt to pay with your phone. That's right – hawker centres have started to implement QR code systems which works with various mobile banking apps.

There are already hundreds of stalls on board, and companies like NETS are planning to expand the system to more than 120 hawker centres by the end of the year, so your cash woes will soon be a problem of the past.

- Cars can now drive by themselves

You hop into the car, all ready to set off on your next adventure in sunny Singapore. But wait... where did the driver go?
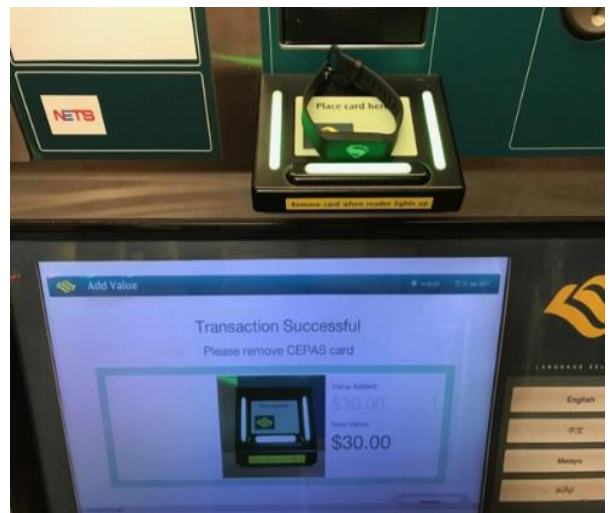
Nope, he's not on an extended toilet break – your car is your driver. These vehicles have been given a dose of self-driving technology, which allows them to move around on their own like a real driver would.

Driverless cars might sound scary, but the technology has already been tested intensively for years. It's even been used to ferry dignitaries like our very own Prime Minister Lee Hsien Loong, so you can be sure that these car know what they're doing!

- <u>Watches that double up as fitness bands and EZ-Link cards</u>

We've seen these nifty fitness bands in action before – they can keep track of your various bodily functions, and the time too. Well, now they can be used to save you time on your next bus or MRT trip. EZ-Link has recently collaborated with two tech companies to launch two fitness bands that comes embedded with EZ-Link chips.

The band can be topped up like any other EZ-Link card, and since it's on your wrist, you won't have to fumble for your wallet when tapping in or out of a ride. Plus, with the EZ-Link payment system being accepted at over 30,000 retail stores across Singapore, the band will also double up as a handy wallet.

- <u>Police are using drones to catch bad guys</u>

Technology is taking law enforcements to new heights – a height of 60m, to be exact.

That's the flight limit for the Singapore Police Force's new surveillance drones, which comes equipped with sirens, an audio warning system with a 100m range, and a searchlight that's ten times

more powerful than a car headlight. This gives the police more mobility, allowing them to follow targets through obstructions or conduct aerial searches.

Closer to the ground, the police have recently begun deploying patrol bots at public events. These autonomous fellows are able to navigate pre-planned paths on their own, allowing an officer to tap into its image feed anytime for remote surveillance.

- Intelligent HDB home systems

HDB – The Housing & Development Board is the statutory board of the Ministry of National Development responsible for public housing in Singapore. It is generally credited with clearing the squatters and slums of the 1960s and resettling residents into low-cost state-built housing.

Singapore is testing new smart home initiatives. During the testing phase in Yuhua estate, the new home systems were able to utilise sensors to monitor the movement of elderly family members within the home, and notified users if the elders were in distress. The systems also tracked the usage of various household appliances, sent mobile notifications when appliances were left on with nobody at home, and even let users turn appliances on or off remotely.

- Lamp posts that gather data

With all of these technological renovations, even our good old lamp posts are getting an upgrade. Singapore is planning to equip our vast network of street lights with sensors and analytics systems, and will be launching prototypes in Geylang and one-north next year.

The new tech will allow these smart lamp posts to gather data like weather conditions, vehicle traffic and unusual sounds like car crashes or screams in isolated areas. They could even be used to guide the self-driving vehicles we mentioned earlier.

- Robots are being integrated into society

Singapore has been introducing some robotic staff into the workforce for a while - you might have bumped into tray return robots at hawker centres or androids that deliver hotel amenities. For now, their duties seem to be limited to the fetching and returning of service items.

3.1. Which of the abovementioned innovations do you consider the most useful? Which of them can be introduced in Belarus and which cannot be used?

3.2. Choose one innovation that to your mind is particularly necessary for Singapore. Comment on your choice, provide reasons.

Follow-up assignments:

I. Singapore is always associated with the name of great Lee Kuan Yew. Present a report about Lee Kuan Yew and his contribution to the development of Singapore.

II. There are a number of famous Singaporean IT brands and innovations that are worth mentioning. Imagine you are presenting your own start-up at SINGAPORE INTERNATIONAL CYBER WEEK, tell about the functions and benefits of the following products/companies, use media:
- *Razer;*
- *The Thumbdrive;*
- *Creative Technology;*
- *X-mini;*
- *Pirate3D.*

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Section III
SWEDEN AND NORWAY – SCANDINAVIAN GIANTS

1. **Pre-reading. What can be the reasons that Scandinavian states develop technology? What else did they succeed in?**

2. **Read the information below.**

Sweden – facts and figures

Officially: Kingdom of Sweden.
Capital: Stockholm.
Population: about 10 million.
Language: Swedish.
Borders: Norway to the west and north and Finland to the east, and is connected to Denmark in the southwest by a bridge-tunnel.
Most important export goods: Machinery and transport equipment, chemicals and plastic and rubber products, electronics and telecommunications equipment, energy products, industrial machinery, road vehicles, minerals, foodstuffs.

Scandinavian counties hit the top of great number of different ratings, Sweden is not an exception. Look at its position in the additional ratings.
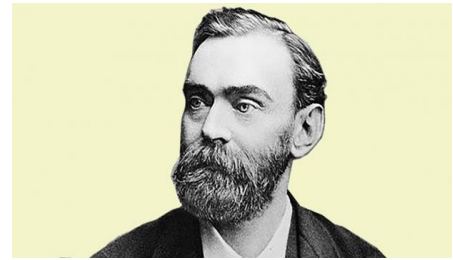
Comfortable Retirement Sweden #11	Education Sweden #8	Forward Thinking Sweden #10
Green Living Sweden #1	Headquarter a Corporation Sweden #5	International Influence Sweden #22
Start a Business Sweden #18	Raising Children Sweden #1	Solo Travel Sweden #15
Transparency Sweden #4	Women Sweden #1	Study Abroad Sweden #79

https://www.usnews.com/news/best-countries/sweden > Follow the link to know the Overall ranking of Sweden and rankings of other countries.

Sweden: science and technology

In the 18th century Sweden's scientific revolution took off. Previously, technical progress had mainly come from mainland Europe.

In 1739, the Royal Swedish Academy of Sciences was founded, with people such as Carl Linnaeus and Anders Celsius as early members. Many of the companies founded by early pioneers still remain major international brands. Gustaf Dalén founded AGA, and received the Nobel Prize for his sun valve. Alfred Nobel invented dynamite and instituted the Nobel Prizes.

A portrait of Alfred Nobel

Lars Magnus Ericsson started the company bearing his name, Ericsson, still one of the largest telecom companies in the world. Jonas Wenström was an early pioneer in alternating current and is along with Serbian inventor Nikola Tesla credited as one of the inventors of the three-phase electrical system.

The traditional engineering industry is still a major source of Swedish inventions, but pharmaceuticals, electronics and other high-tech industries are gaining ground. Tetra Pak was an invention for storing liquid foods, invented by Erik Wallenberg. More recently Håkan Lans invented the Automatic Identification System, a worldwide standard for shipping and civil aviation navigation. A large portion of the Swedish economy is to this day based on the export of technical inventions, and many large multinational corporations from Sweden have their origins in the ingenuity of Swedish inventors.

Sweden is a tech superstar from The North

While most of Europe has been mired in economic turmoil since 2008, Sweden has managed to stay afloat – and even accelerate its growth.

The country and, especially, its capital, Stockholm, have outpaced other European nations with a mix of unique cultural traditions, visionary tech leaders, globally oriented startups and smart government policies.
With companies like IKEA, Spotify, Skype, Ericsson, H&M, Electrolux and Volvo, and tech leaders like Niklas Zennström (Skype), Martin Lorentzon (Spotify) and Daniel Ek (µTorrent and Spotify), Sweden is behind some of the most recognizable global brands.

Stockholm in 2014 – with a population of 800,000 – took in 15 percent of all foreign investment in the European tech sector. A Google-funded report from 2014 showed that there are 22,000 technology companies in Stockholm, and 18 percent of the city's workforce are employed in technology-related roles.

Innovative economics and R&D

Today, Sweden boasts a low level of national debt, low and relatively stable inflation and a healthy banking system. The healthy state of the Swedish economy has given local entrepreneurs plenty of confidence to invest in companies and ideas. What's more, Sweden actively supports local startups, and some argue that the government's decision to invest in R&D is one of the driving motors of Sweden's startup successes.

"Innovation is closely linked to research and development. Sweden is one of Europe's top three spenders in this area, investing 3.6 per cent of GDP in R&D in 2009. Compare this with the EU-wide target of 3 per cent GDP investment by 2020, and it's clear that Sweden is ahead of the game. A uniquely high proportion of research funding in Sweden comes from private foundations and other non-profit bodies," says Donnie SC Lygonis, Senior Advisor at Nordic Innovation House.

"Among OECD countries, only the UK has a higher proportion than Sweden. The research financing from companies in Sweden are more modest, but in sum private, nonprofits and companies financing represent 15 per cent of research funding at Swedish universities – a level comparable to the U.S. and surpassed by only a few EU countries".

A little help from the government

"Swedish government also contributes to the success of startups. For example, government programs offer various seed fund programs, such as the 'market validation' program that provides grants to startups to get their companies off the ground. There are also government-funded tech incubators that encourage innovation and entrepreneurship," says Rickard Hansson, a Swedish serial entrepreneur, CEO and founder of Incentive, a Malmö-based startup.

"During the past decades, the Swedish government has invested heavily in the technology infrastructure, creating one of the world's most digital economies which has been a key factor in the creation of companies like Skype, Spotify and Mojang. In addition to the technological advantages, there is an enabling social safety net for those who venture on the entrepreneurial path. Entrepreneurial mothers and fathers have been able to enjoy a relatively high quality of life while building their companies".

Cultural face of nation

"The Swedish culture has a unique mix of educated, independent people who are also good team players. Swedes enjoy a good social welfare system that provides a cushion to take risk, we have not been oppressed by wars, and no country in the world has more innovation per capita".

Even though Sweden is currently in the throes of a housing shortage due to a growing influx of immigrants, it's unlikely that local or global events will threaten the northern tech superpower's dominance anytime soon.

2.1. What is the position of Sweden in the world? Comment on the various ratings presented in the text and the position of Sweden there. What surprised you most / least?

2.2. Past determines future. Dwell on the scientific past of Sweden. What are the prominent names in the branch of Swedish science?

2.3. Analyze the state of economy in Sweden and its contribution to technology. What is the role of private and governmental funding. What was the basis for tech development in Sweden initially: scientific or economic? Provide arguments.

2.4. Watch the video > https://www.youtube.com/watch?v=B0NW8ZkwWrk What is the sphere of life where the Swedish introduce great scope of innovation? Why? Name some of the technologies that revolutionize this sphere.

3. Read the information below.

Norway: one more Scandinavian IT giant

Norway, with its population of just over 5 million and the capital in Oslo, is one of the three Scandinavian countries. It is ranked as one of the best countries to live in and has one of the lowest crime rates in the world.

In recent years, Norway has repeatedly been ranked as 'the best country to live in' by the United Nations Human Development Report. This annual ranking is based largely on average levels of education and income, combined with life expectancy, but also factors such as human rights and cultural freedom. Norway is also rated high for its literacy rate, educational levels and material wealth. In addition, Norway has one of the best welfare systems in the world, making sure that people who are unemployed or unable to work are given support so that they can lead dignified lives. Norway also has one of the lowest crime rates in the world.

Why Norway wants to be the world's next big tech hub

When it comes to the latest big tech breakthroughs, many people would think of California, Singapore or China as the world's top locations for vibrant start-ups.

Norway's economy has traditionally focused around the sea, with oil, gas and fishing among its most famous industries. However as the world gradually comes round to realising these resources are somewhat finite, many Norwegians are instead turning to technology to make their fortune.

Experts headed to the land of ice and snow (aka Oslo) to speak to some of the country's top start-ups and investment firms to find out just how close Norway is to being the next big technology success story.

Oslo is hoping to help fund many of Norway's top start-ups.

To begin with, that last sentence may have been somewhat of a misnomer. Norway has had several major technology successes in recent years, including the likes of Kahoot, Vivaldi, and probably the most notable, Opera Software.

STARTUP LAB

Former Opera vice president and chief commercial officer Rolf Assev quit the company after 12 years of service in the corporate world, and now helps head up Oslo's StartupLab, a dedicated space for fledgling Norwegian firms to grow and prosper.

"When we started six years ago, no one believed in us, because no one believed you could make money of early stage tech start-ups," he says at StartupLab headquarters, on the campus of Oslo's main university.

"People believe we have never done start-ups in Norway... but we have!"

At first glance, StartupLab seems similar to the many start-up accelerators found in San Francisco or around London's Silicon Roundabout. Teams of four or five sit around wheeled wooden desks (to ensure easy movement around the floor) or huddle round screens, talking excitedly in meeting rooms.

However Assev explains that behind the calm facade, the selection process is extremely tough as the Norwegian technology scene continues to develop. StartupLab accepts only one in every 10 applicants it receives, he reveals, meaning that competition is fierce to get in.

Assev explains that although Sweden and Finland has traditionally been Scandinavia's leading technology hub, Norway is fast catching up. The traditional levels of investment pushed into the west coast of the country, home to the fishing and utility industries, is now instead being focused inland to the cities – offering a great opportunity for tech start-ups.

For StartupLab, it is often the founders themselves that make companies an attractive proposition, Assev says. He highlights Magnus Wanberg, the CEO

of reMarkable, an e-screen company that had to take on the likes of Samsung and Google, and Karen Dolva, founder of No Isolation, which builds robot companions for the elderly and children with learning difficulties, as proof that investing in people who believe in their ideas (and plan for the long term) can be the key for success. *"We believe in the founders",* he notes, *"we believe they are the best people to find out where a company is going".*

Businesses, especially start-ups, in other countries often fall victim to a model of rapid initial growth, before being sold or amalgamated into larger companies, Assev says. However in Norway, thanks to much of the investment into start-ups coming from within the country, rather than from abroad, domestic companies are able to keep their independence, and grow organically to achieve greater levels of success. *"There is no one doing the same model that we are doing,"* he adds, *"we did this not to make money, but to give back". "We don't know what the next steps are just yet – we just know we want to have global successes... and be the place for the best start-ups in Norway".*

Technology can lift the country out of the oil dopmaine, into the new world, with banks, cities, universities and corporate machines all working together to help support a vibrant Norwegian start-up scene.

"It's the right time for Norway to leave the oil industry, we need to find a new future". "We think more of the learning society – being smart doesn't mean you do the right stuff".

Norway is able to benefit not just from abundant natural resources, but thanks to its oil wealth, can enjoy national cash reserves of around £1 billion – which he believes could be invested into technology.

"We are optimistic about the future, but we can't just leave it to the technology... we have to be on top of it". "We have the DNA to take risks".

Along with innovation though, collaboration is the key to ensuring humanity benefits from the boost technology can bring.

Ultimately, it seems that the excitement around Norway's technology scene is well-placed. A young city, open to new ideas, and ready to benefit from a wealth investment – all of this seems to contribute towards the recipe for a success story. The future of the world when it comes to technology may well be found in Scandinavia, with Norway right at the heart of the action.

3.1. What is Norway for you? Is the country instantly associated with IT sphere? Why? Provide general overview of the country and the reasons why it came into IT sphere.

3.2. How does Norway catch up with the rest Scandinavian countries? Describe the most famous Norwegian IT hub mentioned in the text.

3.3. Watch the video > https://www.youtube.com/watch?v=jfJBeqi6CVU. How information and telecommunication technologies can help in green movement? What are some Norwegian IT solutions that contribute to environmental protection?

3.4. Are you preoccupied with Earth's protection? Sometimes your smartphone is enough to start saving the world today. Here is the list of "green" mobile apps from Scandinavia that are widely used. Do you find them useful for environment? Which one would you undoubtedly use?

Too good to go

Copenhagen-based app is a platform where supermarkets and food stores can list groceries that are no longer sellable, despite being perfectly edible. People can then see the food that will go to waste and buy it through the app at a reduced price. Thus you can help to reduce food waste.

No waste

Danish app to reduce food waste and food loss in private homes and on the consumer end. If you are interested in topics such as zero waste, less waste, sustainability and frugal living, NoWaste can be a great start for you. It has never been easier to know the content of your freezer, fridge and pantry. You can manage your shopping list and be notified about expiration periods of your products.

Tiptapp

Swedish app that can help you with removal of mattresses, pallets, old furniture, garden waste – you name it – to the tip ensuring all is correctly recycled, or moving your latest second hand bargain from the other side of town in to your living room. You decide the price and when you need help – fast, smooth and simple!

Follow-up assignments:

I. *Prepare mind-maps on the topic: "Reasons for Swedish / Norwegian IT success". Share them with the class.*

II. *Present short reports on the world-famous Swedish IT-brands: Spotify, Skype, Ericsson, Mojang. Use multimedia.*

III. *Present short reports on Norwegian tech companies and products: Opera Software, Kahoot.*

IV. *Be ready for discussion and debate on the topic "The Scandinavian countries are a high-tech and social heaven".*

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Section IV
THE NETHERLANDS: EUROPEAN IT HUB

1. **Pre-reading. To be successful in IT sphere does a country need to have its own large companies?**

2. **Read the information below.**

The Netherlands is a European country, bordering Germany to the east, Belgium to the south, and France. The people, language, and culture of the Netherlands are referred to as "Dutch".

With over 17 million people on an area of just 41,543km², it's a densely populated country with its gorgeous capital Amsterdam being just one of many interesting cities. Once a great naval power, this small nation boasts a wealth of cultural heritage and is famous for its painters, windmills, clogs and notoriously flat lands. A modern European country today, it preserved its highly international character and is known for its liberal mentality. As a founding member of EU and NATO, and host to the International Court of Justice in The Hague, the Netherlands is at the heart of international cooperation. Its small size, welcoming attitude to travellers and many sights make it a unique and fairly easy to discover destination and a great addition to any European trip.

The Digital Gateway to Europe

Considered one of the most wired countries in the world, the Netherlands is Europe's hotspot for leading information and communications technology companies.

The Netherlands is the world leader in the design, development and manufacture of high-tech equipment and micro / nano components.

Knowledge in the field of materials plays an increasingly important role. ICT is an integral part of the technological developments worldwide. The top sector high-tech is thus a key enabler for many other sectors, such as energy, chemistry, life sciences and agri & food.
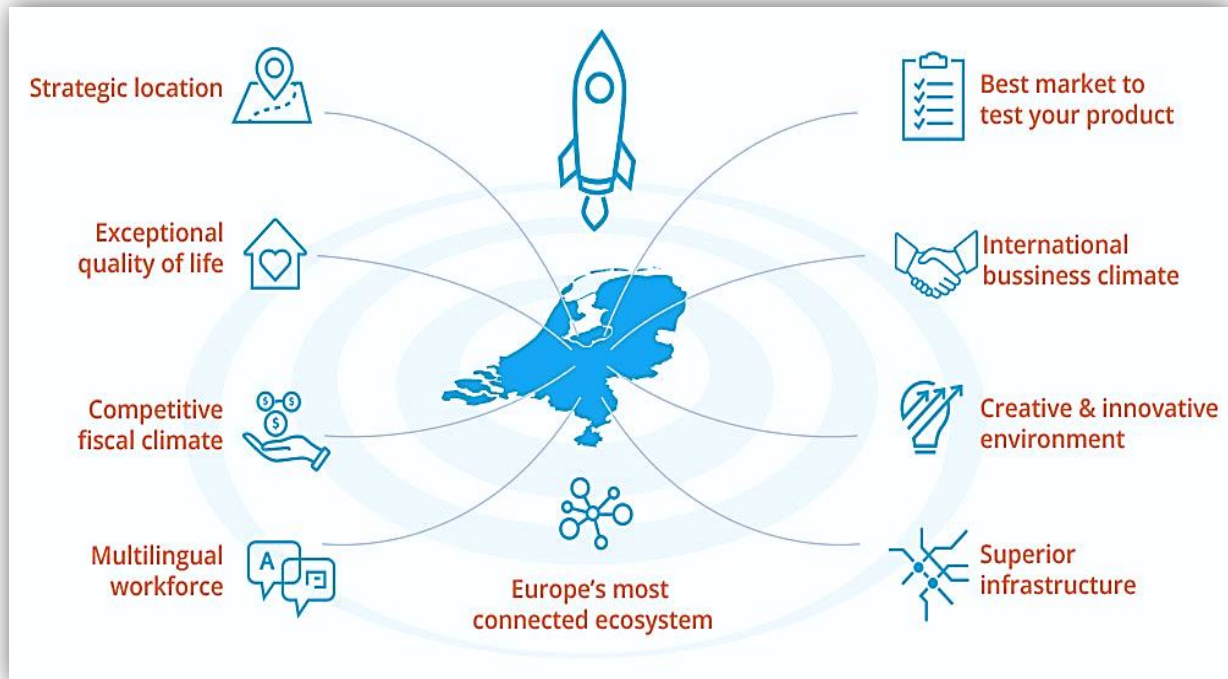
<u>IT Leaders Choose Holland</u>

Holland's state-of-the-art, 100 % digital, advanced fiber-optic network and competitive fiscal climate support a strong community of startups and global IT companies.

In fact, 60 % of Forbes 2000 companies in the IT industry have already established operations in Holland.

Why startups and scale-ups choose the Netherlands >

<u>Unparalleled Resources for IT Companies</u>

With the highest broadband penetration per capita in the world – 99 % of all households – as well as one of the world's fastest average broadband speeds, Holland's IT infrastructure is one of the best on the planet. Plus, they have the largest cyber security cluster and one of the most advanced markets of data centers in Europe – not to mention world-class R&D facilities and logistics infrastructure – making the Netherlands a smart choice for any IT business operation.

"Thanks to the country's excellent technical infrastructure and the fact that the AMS-IX Internet hub is located here, it's also becoming the IT Delta of Europe".

<div align="right">

Edwin Prinsen
Managing Director
Cisco Netherlands

</div>

Global IT company Cisco Systems opened its campus in Amsterdam in 2002 and now employs 1,000 people in the facility, which includes the European operations center, Dutch and pan-EMEA sales teams, customer advocacy, internal sales and other activities.

The Netherlands is home to the world's largest Internet exchange – AMS-IX[1].

The Netherlands Foreign Investment Agency (NFIA) stands ready to help companies big and small at every stage of establishing or expanding operations here.

Free, confidential services offered by NFIA include:

- Organizing fact-finding missions;
- Arranging meetings with relevant partners;
- Providing personalized guidance and counsel on tax, government and permit procedures;
- Exploring location options and business solutions.

A History of Innovation

Ranked No. 4 on the Global Innovation Index, the Netherlands has a rich history of innovation. In fact, the Dutch invented Bluetooth, Wi-Fi, the CD and the DVD.

Today, Holland's robust network of public-private partnerships, R&D ecosystems and education institutes ensure businesses have the resources they need to stay on the cutting edge of discovery.

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[1] The Amsterdam Internet Exchange (AMS-IX) is an Internet exchange point based in Amsterdam, in the Netherlands. Established in the early 1990s, AMS-IX is a non-profit, neutral and independent peering point.

1979-1995	**1991**	**1994**	**1989**	**2011**

DVD & CD Developed by Philips in the Netherlands	**WI-FI** Developed at TU Delft in the Netherlands	**BLUETOOTH** Developed by Dutch engineer Jaap Hartsen	**PYTHON** Developed by Dutch scientist Guido van Rossum	**COMMIT** Biggest IT research project in the Netherlands including 100 IT companies, users and universities

As in any IT developed country of the world, education matters!

High Tech Campus Eindhoven *High Tech Center and R&D Ecosystem* **100+ COMPANIES & INSTITUTIONS**
10,000+ R&D STAFF & ENTREPRENEURS

Delft University of Technology 19,000+ STUDENTS
3,300+ SCIENTISTS ON STAFF

Since landing in the Netherlands in 1924, New York-based technology and computing corporation IBM has grown to employ approximately 4,000 people there – making its Dutch presence almost as old and well-established as the company itself.

Multinational Companies in the Netherlands

The Netherlands is home to a number of large multinational companies – either Dutch in origin or international concerns which have established regional headquarters in the country. Holland has an open business climate with access to a highly educated, multilingual workforce. Some Dutch regions also specialize in certain industry sectors offering world-class research and development.

Basically, Dutch success story is based on such factors as high economic and education level coupled with favourable business climate, which led to establishment of great number regional headquarters of multinational giants, such as IBM, Cisco Systems, Philips, ASML etc.

Europe's Cyber Security Hub

As one of the world's most wired nations, the Netherlands is a pioneer in data innovation. The country's excellent digital infrastructure makes it an IT hotspot. Society's growing dependence on online connectivity, however, makes people and organizations vulnerable to cybercrime. So the Netherlands has made cyber security a major priority by creating an innovative ecosystem for cyber expertise.

Fast Growing Market

The cyber security market in the Netherlands is growing at a rapid annual pace of some 14.5 percent. Of the 66,000 IT companies in Holland, 3,600 have cyber security as their core business and more than 2,500 sell cyber security products and services.

Cybercrime is punished

In the Netherlands, the government deploys robust policies toward safeguarding society – including for digital protection – and the business and education sectors are strongly involved. This "triple helix" approach is characteristic for Holland and it is becoming a much sought-after blueprint for other countries.

The Hague Security Delta

The Dutch security cluster, "The Hague Security Delta," is a nationwide network of more than 300 public and private organizations that work together to accelerate cyber security solutions. Other prominent security agencies include the National Cyber Security Center (NCSC), which provides security advice across Dutch industry, and the Cyber Security Academy, a collaboration between the universities of Leiden, Delft and The Hague, to develop a "safe digital highway".

2.1. Give the general characteristics of the Netherlands. Why is the country called the digital gateway to Europe? Name the reasons why the Netherlands is considered one of the most favourable venue for IT business.

2.2. What are the economic and social reasons of the Netherlands' high-tech success?

2.3. Explain the notion "Broadband Penetration". How to your mind does it indicate the level of technological success of a country/region? What is the situation with broadband internet in Belarus?

2.4. What is cybercrime? Why cybercrime and cyber security are treated particularly seriously in the Netherlands? What are the reasons that cyber security is one of the most popular fields of world IT nowadays?

3. We all know the notion of the "American dream", but what about the "Dutch dream"? Read the following information to know why tech talent is moving to the Netherlands.

The Netherlands has an acute shortage of tech talent, which will have to be filled by local new grads, career changers and international talent. High salaries and the best work-life balance worldwide are awaiting.

You want to get a job in tech. First, stop being obsessed with Silicon Valley.

Best European place to work in tech

Amsterdam is a magnet for tech talent. There is a pool of over 250k tech workers in the city. With an urban population of around one million people, that means that 25 % of its population works in tech. Not bad, huh?

Hubspot already pointed it out in a recent survey: the dutch capital is *"The best European Tech City to work in"*. Surprised? Well, an average salary of tech workers of above €4k per month (net!).

Best work-life balance, worldwide!

The Netherlands is the only country in Europe with 3 cities in the top 15 rank of Quality of Life by Numbeo and ranks #1 country in the world for work-life balance by OECD, with only 0.5 % of people working over 50 hours per week. If you add that the commuting times to work are among the lowest in the world and that the cost of living is substantially lower than in other developed hubs, we can further understand why people love living in this country. Put it simple: pay well and live well, this is the dutch formula to attract the best talent.

Massive tech talent shortage

It is a fact: the Netherlands, and specially Amsterdam, is suffering a huge tech talent shortage. The demand for junior tech talent doubled in 2017, reaching a shocking figure of x26 job vacancy openings per available junior tech worker. 5 out of 6 tech jobs openings were not filled in 2016. Looks right, companies are desperate to hire tech talent in the Netherlands.

Huge variety of international tech companies. And growing!

Amsterdam is now home to over 600 international tech corporates, of which 170 have chosen Amsterdam for their worldwide headquarters. Actually, many of the Silicon Valley big names themselves are setting up in Amsterdam, including Google, Uber, Netflix, Salesforce, DoubleDutch or Cisco. And the Brexit will favor it even more.

It is easy to understand why international companies love the Netherlands (and Amsterdam) to locate. Among other reasons: the country's basic and secondary education level is well above other European countries; 90 % of population speaks English; it is the gateway to Europe with a unique and fast transport links at 2–3 hour trip distance to main cities in the continent; it is home to the world's latest data-transport hub and fastest internet broadband; and it is the one of the fastest early-adopter tech population in the world, which makes the city a perfect testbed for tech ventures and new tech products!

Home of worldwide renown innovators

The Dutch are worldwide recognised for their entrepreneur and innovation spirit. The Dutch have been first movers in startups since early 90s: Booking.com, TomTom, WeTransfer, Catawiki, Elastic, Takeaway.com, Shapeways, Travelbird, Ace&Tate or The Next Web have been leading players in their respective fields and shaped entire industries.

This is a country of entrepreneurs. It is not surprising then that Amsterdam, Eindhoven and The Hague are ranked #1, #2 and #3 in Europe, respectively, on "basic and post-school entrepreneurial education and training".

A real tech community, committed and collaborative

The sense of community in the Dutch ecosystem is incredible. Once you land here you feel part of the family and receive huge support from different ends.

To give you a sense of it: in 2 weeks since people arrived to Amsterdam they have been already welcomed by top entrepreneur communities in the city – StartupGrind and StartupWeekend Amsterdam (Techstars); by AMSxTech, the biggest and private slack community in the city; by top co-working spaces and community hubs such as WeWork Metropool, TQ, B.Amsterdam, Rent24 and CIC Rotterdam; by the leading tech schools transforming entrepreneurial education such as Growth Tribe, The Talent Institute and Restart.Network; by tech-specialised advisors such as NewPeople and LXA; by leading Universities such as Hogeschool – University of Rotterdam; or by tech big corporates such as Atlassian and Unilever, to name a few!

Public and private sectors working with one shared goal

But most importantly, what really sets the Netherlands apart from other tech hubs are the joint forces between public and private sectors to support new ventures, tech talent and entrepreneurs. Led by StartupAmsterdam and StartupDelta, the public and private sectors are working aligned to build unique initiatives to bring the best international talent to the country. Among other they launched:

- The 'Tech Housing' project: a large tech house that will provide an easy soft-landing place for incoming tech talent as well as connecting these tech nomads with like-minded peers.

- Project A: the Government is subsidising top international tech talent to fly-in to have them meet with Dutch tech companies and visit the country.
- Rescooling programs: great support to tech related rescooling programs in fields of developing, growth hacking and UI/UX design. Examples of these are: BSSA and Growth Tribe.
- Startup visa: A residence permit that gives ambitious international non-EU entrepreneurs a year to start an innovative company in the Netherlands.

In brief, the Netherlands is building strong pillars to become the friendliest city in the world for tech talent and entrepreneurs.

3.1. Imagine you are considering moving to the Netherlands and joining tech sector. Which points about the Netherlands mentioned above are the most appealing to you? Prioritize the points starting with the most important one.

Follow-up assignments:

I. *Watch the video > https://www.youtube.com/watch?v=E5ZNMvQlgCo.*
Name the innovations that are mentioned in the video. Which one stroke you most? What is the sphere of life where IT countries tend to invest nowadays? Why?

II. *Be ready to debate on the topic "Advantages and disadvantages of cyber security polices". Look for some additional info to be in the theme.*

III. *Report shortly on the following Dutch innovations:*
- *Bluetooth;*
- *Wi-Fi;*
- *3D houses project.*

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Section V

SWITZERLAND: SOPHISTICATED AND TECHNOLOGY RICH

1. **Pre-reading. Does a brand name contribute to economy and general development of a country?**

2. **Read the information below.**

Switzerland is a landlocked mountainous country in South Central Europe, bordered by Austria, France, Germany, Italy, and Liechtenstein.

With an area of 41,285 km², the country is only slightly smaller than the Netherlands.

Switzerland has a population of 8.3 million people (in 2015), capital city is Bern, largest city is Zürich. Spoken languages are German, French, Italian and Rumantsch, traditionally spoken in the different regions (cantons) of the country. According to the World Happiness Report 2015, the Swiss Confederation is officially the happiest nation on Earth.

The country is a famous tourist destination for its ski resorts and hiking trails. Banking and finance are key industries, high-tech products export, Swiss watches and chocolate are world renowned.

Since 2011 Switzerland has ranked 1st in the Global Innovation Index every year.

How Did Switzerland Become Innovative Country?

A small, Alpine country that lacks raw materials, Switzerland has had no choice but to continually reinvent itself over the centuries, developing alternative sources of income, such as agriculture, tourism and its service sector. What's the secret of its success, and how long can it continue?

Well into the 18th century, Switzerland was known primarily for the Alps, cows and sheep. "O learn to know this shepherd people, boy!" wrote Friedrich Schiller in his play "William Tell," referring to Switzerland.

Today, 200 years later, Switzerland is known for its innovative capacity and strong economy. It tops the major international rankings for innovation.

Patents are another indicator for measuring innovative success. Between 1985 and 2014, the number of patent applications worldwide nearly tripled, to just under 2.7 million annually.

Lacking natural resources, Switzerland has always been forced to innovate. Given the country's small and highly fragmented internal market, early on Swiss companies also had to look for foreign markets for their goods, and they had to be productive enough to compete internationally. Since the country was largely spared the ravages of the Second World War, it was in an excellent position, with intact, export-oriented production facilities, to benefit from Europe's post-war reconstruction. Also helpful were Switzerland's liberal, stability-oriented economic policy and traditional emphasis on hard work, dedication and education.

Skilled Migrants

Another factor has played an important role throughout Swiss history: immigration. From the 16th to 18th centuries, there were waves of immigration as Protestant Huguenots from France sought at least temporary refuge in Geneva. Many of them were wealthy or highly skilled in a trade.

One of their contributions was to bring the manufacture of portable timepieces to Geneva, which was a stroke of luck for the members of Geneva's venerable goldsmith trade, whose source of income had been eliminated by Calvin's strict ban on jewelry[1]. The ban did not apply to watches, which were not considered jewelry. This marked the beginning of the Swiss watch industry.

World Renowned Institutions

Along with private industry, the higher education sector plays an important role in Switzerland's innovative capacity – for example, the Swiss Federal Institute of Technology Zurich (ETHZ) and EPFL in Lausanne. Those two universities are in the top 20 worldwide. The central mandate of Switzerland's institutes of technology is to promote innovation. Each year, more than 2,000 graduates of master's degree programs and more than 1,000 PhDs leave ETHZ and EPFL

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[1] John Calvin (1509–1564) was a prominent Christian theologian during the Protestant Reformation and is the namesake of the system of Christian theology called Calvinism. He was a leader of the Swiss protestant reformation which led to banning all the things he didn't like, including dancing, "luxuries" and the wearing of jewelry. He also banned four-part harmonies and musical instruments, which he said, "only amuse people in their vanities".

to join the private sector. The two institutes also conduct basic research and partner with the private sector and public agencies to produce successful, market-ready innovations through the transfer of knowledge and technology. They apply for approximately 200 patents every year, and reported 49 spin-offs in 2014 alone.

Switzerland is recognized as a global research center where scientists in globally accredited institutions are involved in groundbreaking research. As Switzerland does not dispose of any natural resources, Science and Technology has always been in focus of the Swiss economy and was strongly promoted by the government and the private sector. 25 Nobel Laureates with Swiss citizenship marked this history of scientific success.

DID YOU KNOW THAT:

Switzerland has the highest number of Nobel Prizes per capita (25 Nobel Laureates with Swiss citizenship).

- The Switzerland's expenditures on education constitute of 6 % of the GDP.
- 50 % of university professors in Switzerland are from abroad.
- Important international research infrastructures like the CERN are domiciled in Switzerland.
- The Switzerland's expenditures on R&D constitute of 3 % of the GDP.
- Swiss researchers produce 1.2 % of all scientific papers published worldwide.
- With 3.2 publications per 1000 inhabitants Switzerland is worldwide the leading country.

GROSS DOMESTIC EXPENDITURE ON RESEARCH AND DEVELOPMENT (GERD)

24.17 %	Higher Education sector
73.50 %	Business sector
0.74 %	Government sector
1.6 %	Private Non-Profit sector

Research in Switzerland is mainly conducted by the research intensive universities, research institutions and private companies. Following the OECD statistics, the Gross Domestic Expenditure on Research and Development (GERD) are carried by 24.17 % by the Higher Education Sector, 73.50 % by the Business Enterprise Sector, 0.74 % by the Government Sector and 1.6 % by the Private-Non-Profit Sector.

<u>How to Stay Successful?</u>

If Switzerland is to maintain its top position internationally, it must ensure that the necessary conditions for innovation remain in place. These include, for example, business-friendly regulations and a moderate level of domestic taxation, as well as free access to foreign markets.

In addition, it should be made as easy as possible for Swiss companies and Swiss universities to recruit skilled workers from abroad, including from non-EU/EFTA countries. Finally, Switzerland must ensure that its education system remains strong. If these basic conditions worsen, it will have a hard time competing in the international marketplace. One thing is certain: International competitors, too, are larger and faster than ever before.

<u>Foreign Investment</u>

Throughout the centuries, Switzerland has also been able to attract highly qualified workers who have played a crucial role in its economic development. Today, more than 60 percent of annual expenditures on research and development, totaling approximately 18 billion Swiss francs, are financed directly by the private sector.

About a quarter of the funds come from the government, the rest from foreign investors. Switzerland ranks about average, compared with other countries, for the level of public financing relative to its gross domestic product (GDP).

The driving force behind Switzerland's impressive success at achieving innovation is the business sector, particularly large companies. ABB, Roche, Nestlé and Novartis applied for between 400 and 600 patents each in 2014.

According to data from the European Patent Office, this puts them among the top 50 patent applicants in Europe. Switzerland's small and medium-sized businesses, too, are international leaders in taking advantage of the latest knowledge for their own innovation processes and manufacturing high-quality, specialized products for international niche markets.

In a survey of companies conducted by Credit Suisse in 2014, about ten percent of all industrial SMEs reported that they were global market leaders for at least one of their core products. Thirty percent were market leaders for at least one core product in at least one country.

High-Tech "Made in Switzerland"

Top quality thanks to top technology thanks to top research: *The Greater Zurich Area* offers world-famous research institutions optimal conditions with a successful transfer of technology and a multitude of available specialists.

Switzerland now ranks among the leading global suppliers of high-tech products. Leading research institutions from cutting-edge technology sectors such as biotechnology, materials science, sensor technology, mechatronics, photonics and optoelectronics are based in the Greater Zurich Area.

The following factors make the Greater Zurich Area extremely attractive for research and innovation:

- First-class research institutions and a successful transfer of knowledge;
- "Swiss-made" label – synonymous worldwide with the highest quality;
- High level of federal investment in cutting-edge research;
- Outstanding quality of living in the Greater Zurich Area creates ideal climate for researchers and specialists;
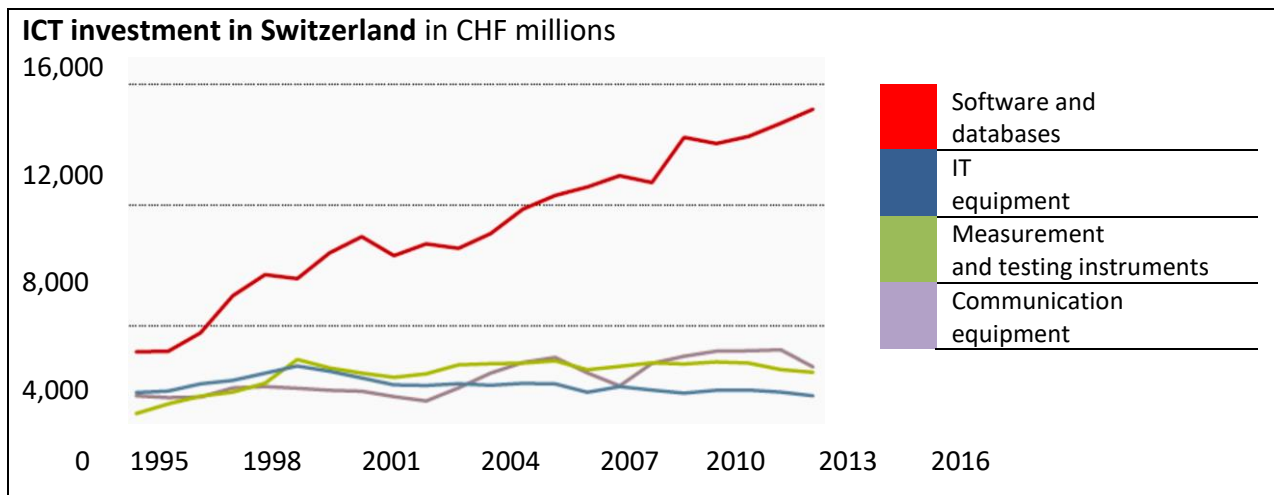- Dual educational system with lots of practical know-how encouraged.

2.1. Switzerland is a brand. What is the country famous for? What was the Swiss way to "digital" success? Dwell on all the factors that contributed to this success. What was the most important factor? What leads you to such a conclusion?

2.2. Comment on the rules that the country sticks to aspiring to maintain its technological success. Why does it work? What are some more countries from the previously discussed ones that make similar steps to maintain high level of technological development?

2.3. Where is the hub of the Swiss innovative progress? How can you explain the fact that Swiss technology is so popular among its present and future importers?

2.4. Think about peculiarities of Swiss education. What makes it so appealing? How does the education contribute into technological development of the country?

3. Rankings have shown Swiss companies to be more technology-friendly than those from other countries, as they introduce new technologies relatively quickly. Study the graph. Why is the country investing more in software rather than hardware? Is it a global trend or only the Swiss tendency? Present your considerations.

ICT investment in Switzerland in CHF millions

Legend:
- Software and databases (red)
- IT equipment (blue)
- Measurement and testing instruments (green)
- Communication equipment (purple)

4. One of the immigrants provides reasons why he moved to Switzerland to work in technology sector. Identify the reasons that are not true.

A. High living standard – Although Zurich is among the most expensive places in the world, it is easy to live here due to the high salaries.

B. Health insurance – Swiss law forces everyone to be insured. However, it is up to you "how fancy" your insurance is. You can choose between different models that vary in the monthly payment and "the franchise" (= deductible).

C. Homogenity – 90 % of residents in Zurich have a Swiss passport. In some districts only 20 % are not Swiss, so there are no intercultural conflicts.

D. Economy and democracy – Since over two hundred years Switzerland is politically neutral, meaning that they officially don't take any side in foreign policy issues or take sides in the case of war.

E. Difficult entrepreneurship – It takes 25.000 Euros to start a GmbH (=limited liability company) in Germany, while in Switzerland one needs CHF 200.000 (EUR 170.000). The more difficult – the less business competition.

Follow-up assignments:

I. *The Greater Zurich Area: heaven for work or paradise for living?*
Watch the video and discover The Area for you. https://www.youtube.com/watch?v=hgR4zXULYw4.
What are the benefits the one can get working and living in The Area? What are the three things you'd personally appreciate and why?

II. *We got used to such sports activities as biathlon, triathlon, but have you ever heard about the Cybathlon? What is particular about that? Can we name*

it a great social experiment? The video "What is the Cybathlon?" https://www.youtube.com/watch?v=At3PHNkTWqg will make you familiar with all the details of the event. "At this way we wanna start a movement" – organizers say. What kind of movement do they mean?

III. *Feel yourself a member of The Week of Swiss technology. Deliver a 3-minute presentation with multimedia on one of the following advancements:*
   A. *World Wide Web, CERN and John Berners-Lee;*
   B. *Logitech;*
   C. *Doodle scheduling.*

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Section VI
THE USA: WORLD'S INNOVAION POWERHOUSE

1. **Pre-reading. Why do people wrongly believe that The USA is best at technology and practically everything?**

2. **Read the information below.**

The United States of America lies in the central part of North American continent. Its western coast is washed by the Pacific Ocean. Its eastern coast is washed by the Atlantic Ocean and the Gulf of Mexico.

The USA consists of three separate parts. They are the Hawaiian Islands, Alaska and the rest major part of the USA. There are fifty states and district of Columbia. The states differ very much in size, population and economic development. The population of the United States is about 250 million people.

Formally, the USA has no official language. It is one of the linguistically diverse countries in the world. Historically, approximately 500 languages have been spoken in the country with English as the widely used language. Spanish is the second-most popular language in the country. In fact, the New Mexico state government uses Spanish to offer services and documents. There are also several languages native to the USA.

The USA is the world's foremost economic and military power, with global interests and an unmatched global reach. America's gross domestic product accounts for close to a quarter of the world total, and its military budget is reckoned to be almost as much as the rest of the world's defence spending put together.

How it started

From its emergence as an independent nation, the United States has encouraged science and invention. It has done this by promoting a free flow of ideas, by encouraging the growth of "useful knowledge", and by welcoming creative people from all over the world. The United States Constitution itself reflects the desire to encourage scientific activity. It gives Congress the power "to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries". This clause is the basis of the U.S. patent and trademark system.

Two of America's founding fathers were actually scientists of some repute. Benjamin Franklin conducted a series of experiments that proved that lightning is a form of electricity. Thomas Jefferson was a student of agriculture who introduced various types of rice, olive trees and grasses into the New World.

During the 19th century, Britain, France and Germany were the leading sources of new ideas in science and mathematics; but if the United States lagged behind in the formulation of theory, it excelled in using applied science. Because Americans lived so far from the well-springs of Western science and manufacturing, they often had to figure out their own ways of doing things. The result was a flow of important inventions. The great American inventors include Robert Fulton (the steamboat); Samuel F.B. Morse (the telegraph); Eli Whitney (the cotton gin); Cyrus McCormick (the reaper); the Wright Brothers (the powered flying machine) and Thomas Alva Edison, the most fertile of them all, with more than a thousand inventions credited to his name.

Nobel Prize winners by country		
Country		Nobel Prizes
USA	🇺🇸	368
UK	🇬🇧	132
Germany	🇩🇪	107
France	🇫🇷	62
Sweden	🇸🇪	30
Switzerland	🇨🇭	26
Japan	🇯🇵	26
Canada	🇨🇦	23
Russia	🇷🇺	23
Austria	🇦🇹	21
Italy	🇮🇹	20
Netherlands	🇳🇱	20

This is a list of the top 12 countries by the number of nobel prizes.

In the second half of the twentieth century, American scientists were increasingly recognized for their contributions to "pure" science, the formulation of concepts and theories. The changing pattern can be seen in the winners of the Nobel Prizes in physics and chemistry. During the first half-century of Nobel Prizes – from 1901 to 1950 – American winners were in a distinct minority in the science categories. Since 1950, Americans have won approximately half

of the Nobel Prizes awarded in the sciences. In general, The US representatives (not all of them where born in The USA) won the biggest numbers of Prizes as compared to other countries).

Strengths and Weaknesses of the U.S. Technology Enterprise

The revolution in production systems, the shifting global balance of technological power in the context of deep interdependence, and the rising geopolitical premium on economic strength, together present major challenges as well as opportunities to the U.S. technology enterprise. Considering the U.S. economy's recent legacy of large fiscal and trade deficits, slow productivity growth, and the slow growth of U.S. living standards, these trends demand that economic development become a priority objective of U.S. national technology strategy. If the nation is to address and master this new economic imperative, it must first take stock of the strengths and weaknesses of the nation's technology enterprise as revealed by the recent political, economic, and technological trends in the global economy.

Among the many **strengths** of the U.S. technology enterprise, four warrant particular attention in light of the global trends:

- The large scale, broad scope, and relative openness of the U.S. basic research enterprise.
- The size, wealth, openness, and technological sophistication of the U.S. domestic market.
- The nation's capacity for spawning new technology-intensive industries, products, and services.
- The continuing competitive strength and global reach of many U.S. high-tech industries.

As the following discussion makes clear, these four strengths are closely interrelated. Each both contributes and attests to the nation's deep-seated institutional and human resource capacity for creating new scientific and technological knowledge, new products, and new industries.

The following six closely interrelated **weaknesses** are perceived as the greatest technology-related obstacles to meeting the nation's economic development challenge:

- Outdated management philosophies, organizational frameworks, and human resource strategies of many U.S. public- and private-sector producers of goods and services.
- Insufficient investment in, and poor quality of, U.S. work force training and continuing education, particularly at the nonsupervisory level.
- Inadequate investment by U.S.-based companies in competitive production processes, plant, and equipment.

47

- Low civilian R&D intensity of U.S. economic activity and insufficient breadth of the nation's civilian R&D portfolio, including underinvestment in growth- and productivity-enhancing technologies that are high-risk or whose benefits are difficult for individual investors to appropriate.

- Insufficient awareness of, and interest in, technology originating outside their institutional boundaries on the part of many U.S. companies and federal laboratories.

- Lack of a strong institutional structure for federal technology policy in support of national economic development, and the segregation of technology policy from domestic and foreign economic policy at the federal level.

Best US tech companies today

What The USA has no equals in is its scale. US tech companies are increasingly developing not only within the country but have their subsidiaries around the world! Here is a set of companies that are the best to work in based on their employers' opinion.

Microsoft		*computer software, consumer electronics, personal computers*
Adobe		*computer software*
Google		*online advertising technologies, search engine, cloud computing, software and hardware*
Facebook		*social media and social networking service*
LinkedIn		*social networking service*
Zoom Video Communications		*conferencing services*
Paylocity		*cloud-based payroll*
Ultimate Software		*cloud-based human capital management*

Silicon Valley works for the future of US innovation

"Innovation builds on itself through collaboration and sharing
of diverse points of view.
Clients, businesses and engineering together create the best outcomes".
Erika Lunceford
Head of the Silicon Valley Innovation Center

Silicon Valley is the center for innovative technology companies. It's located south of San Francisco, California. It's home to 2,000 tech companies, the densest concentration in the world. This proximity to suppliers, customers, and cutting-edge research gives each a competitive advantage. Even more important, most of them are also leaders in their industries. These include software, social media, and other uses of the internet. Its companies also produce lasers, fiber optics, robotics, and medical instruments. Silicon Valley was named for the silicon needed to make semiconductor computer chips. Silicon Valley creates a center for innovative companies to become highly profitable. That creates jobs, more tax revenue, and higher stock prices. It gives the United States a comparative advantage over other countries.

Unfortunately, not all the benefits of Silicon Valley go to U.S. citizens. Many tech jobs are outsourced to foreign-born workers who have the engineering skills needed. There aren't enough American-born software engineers who graduate from U.S. universities. That is one reason the U.S. is losing its competitive advantage.

Reasons for Silicon Valley's Success

The main reason for Silicon Valley's success is its spirit of cooperation. For example, many founders of local companies went to school together. That makes them more likely to promote each other regardless of company affiliation. Personal loyalties override corporate ones. Professional networks led to easy information exchange. Companies found that collaboration between them made them all more successful. The State of California prohibited non-compete clauses. As a result, star performers could leave a company to start their own to test out new ideas. As a result, employees focus on helping each other solve problems.

An often-overlooked reason is Silicon Valley's cultural diversity. Between 1995-2005, more than half of its start-ups were founded by immigrants. Why? The Valley attracts top engineers from around the world, especially India and China. Diversity leads to innovation as long as everyone focuses on their shared goals.

Top-notch universities surround the Valley. Many company founders graduated from Stanford University. Other local universities contributed the trained technical support staff. These included the University of California at Berkeley, San Jose State, and community colleges.

<u>Silicon Valley Companies</u>

The most well-known Silicon Valley companies are Apple, Facebook, Google, and Netflix. The area also launched Tesla, Twitter, Yahoo!, and eBay. There are many business support companies such as Cisco, Oracle, Salesforce.com, Hewlett-Packard, and Intel. Other companies include Adobe, Intuit, and Zynga.

<u>Where Is Silicon Valley?</u>

Silicon Valley includes the cities and towns south of San Francisco. It originated in the Palo Alto/Menlo Park/Stanford University area. It's bordered by the San Francisco Bay on the east. The Santa Cruz mountains are on the west, and Redwood City is to the north. The south shares its border with several cities. These include Los Altos, Mountain View, Sunnyvale, Cupertino, Santa Clara, and San Jose. The Coast Range Mountains are in the southeast area.

2.1. American way to innovation development is a unique case that no country had experienced except the USA. What led The USA to success in technology?

2.2. The average answer to the question "What is the best country in the world in terms of living and economic, technological, military and other advancements?" is "It is USA". What are the strong points in the US technology that can make us name the country as "innovation powerhouse"?

2.3. Being strong The USA still does not occupy top position in various ratings of technological advancement. Which factors explain this state of things?

2.4. What are the reasons for the American companies to be characterized by global importance?

2.5. What is Silicon Valley? Dwell on its success and importance for world's technology.

3. There are always people who are tech stars today, even globally known ones. Elon Musk is presented everywhere – from science articles to internet memes. But what is the name for you? What is the first thing that comes to your mind when you hear the name "Elon Musk"? Read the information below and decide what is the most prominent Elon's achievement.

"If there was a way that I could not eat, so I could work more, I would not eat. I wish there was a way to get nutrients without sitting down for a meal".
Elon Musk

Elon Musk, (born June 28, 1971, Pretoria, South Africa), South African-born American entrepreneur who cofounded the electronic-payment firm PayPal and formed SpaceX, maker of launch vehicles and spacecraft. He was also one of the first significant investors in, as well as chief executive officer of, the electric car manufacturer Tesla.

Musk attended Queen's University in Kingston, Ontario, and in 1992 he transferred to the University of Pennsylvania, Philadelphia, where he received bachelor's degrees in physics and economics in 1995. He enrolled in graduate school in physics at Stanford University in California, but he left after only two days because he felt that the Internet had much more potential to change society than work in physics. That year he founded Zip2, a company that provided maps and business directories to online newspapers. In 1999 Zip2 was bought by the computer manufacturer Compaq for $307 million, and Musk then founded an online financial services company, X.com, which later became PayPal, which specialized in transferring money online. The online auction eBay bought PayPal in 2002 for $1.5 billion.

Musk was long convinced that for life to survive, humanity has to become a multiplanet species. However, he was dissatisfied with the great expense of rocket launchers. In 2002 he founded Space Exploration Technologies (SpaceX) to make more affordable rockets. Its first two rockets were the Falcon 1 (first launched in 2006) and the larger Falcon 9 (first launched in 2010), which were designed to cost much less than competing rockets. A third rocket, the Falcon Heavy (first launched in 2018), was designed to carry 53,000 kg to orbit, nearly twice as much as its largest competitor, the Boeing Company's Delta IV Heavy, for one-third the cost. Beginning in 2012, SpaceX's Grasshopper rocket made several short flights to test such technology. In addition to being CEO of SpaceX, Musk was also chief designer in building the Falcon rockets, Dragon, and Grasshopper.

Musk had long been interested in the possibilities of electric cars, and in 2004 he became one of the major funders of Tesla Motors (later renamed Tesla), an electric car company founded by entrepreneurs Martin Eberhard and Marc Tarpenning. In 2006 Tesla introduced its first car, the Roadster, which could travel 394 km on a single charge. Unlike most previous electric vehicles, which Musk thought were stodgy and uninteresting, it was a sports car that could go from 0 to 97 km per hour in less than four seconds. In 2012 Tesla introduced the Model S sedan, which was acclaimed by automotive critics for its performance and design.

The company won further praise for its Model X luxury SUV, which went on the market in 2015. The Model 3, a less-expensive vehicle, went into production in 2017.

Tesla bought SolarCity in 2016, a company that specializes in solar energy services and whose largest shareholder and Chairman was none other than Elon Musk.

Follow-up assignments:

I. *Here are the American IT innovations that changed the world. Briefly outline the history of their creation and today's importance, use media.*
- *Video games;*
- *Email;*
- *Mobile phones;*
- *Personal computers;*
- *The internet.*

II. *Discussion and debate.*

It's acknowledged that although having the best universities in the world, the population of USA is famous for lacking education. Conduct research and outline the reasons that lead to "undereducation" and the way the country deals with the problem.

A lot of talented immigrants brought their ideas to America and are still working hard. Can that be one more reason for the decline of US education? To buy brains from abroad or to stimulate education among their own population? Decide on the best option and prove your point.

Watch the video to understand the situation in education better: https://www.youtube.com/watch?v=vX1VdllddRM.

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Section VII
THE UK: WELL-INTEGRATED ICT

1. **Pre-reading. Countries make their way in technology by different means. Some states develop science and invest in education for ages, others start developing tech sector only today and try to catch up with all the newest technologies. Can old tech "giants" still compete with trendy "newly appeared IT countries"?**

2. **Read the information below.**

United Kingdom, island country located off the northwestern coast of mainland Europe. The United Kingdom comprises the whole of the island of Great Britain – which contains England, Wales, and Scotland – as well as the northern portion of the island of Ireland. The name Britain is sometimes used to refer to the United Kingdom as a whole. The capital is London, which is among the world's leading commercial, financial, and cultural centres. Other major cities include Birmingham, Liverpool, and Manchester in England, Belfast and Londonderry in Northern Ireland, Edinburgh and Glasgow in Scotland, and Swansea and Cardiff in Wales.

The United Kingdom is a highly developed nation that exerts considerable international economic, political, scientific and cultural influence. The country has made significant contributions to the world economy, especially in technology and industry.

The nation's global influence has its roots in the British Empire that formed during the European colonial era and peaked in the early 20th century before embarking on decolonization following World War II. The United Kingdom of today dates to the formation of the Medieval Kingdom of England, and later, the establishment of a constitutional monarchy and parliamentary democracy in the 17th century.

British technology development

Great Britain, preeminent in the Industrial Revolution from the mid-18th to the mid-19th century, has a long tradition of technological ingenuity and scientific achievement. It was in the United Kingdom that the steam engine, spinning jenny, and power loom were developed and the first steam-powered passenger railway entered service. To British inventors also belongs credit for the miner's safety lamp, the friction match, the cathode ray tube, stainless steel, and the first

calculating machine. One of the most famous scientific discoveries of the 20th century, the determination of the double-helix structure of the deoxyribonucleic acid (DNA) molecule, took place at the Laboratory of Molecular Biology at Cambridge University. In February 1997 the first successful cloning of an animal from an adult (resulting in "Dolly" the lamb) was performed at the Roslin Institute near Edinburgh, Scotland's leading animal research laboratory. The United Kingdom is also in the forefront of research in radio astronomy, laser holography, and superconductivity.

The total national expenditure for research and development in 1987–97 was 1.9 % of GNP; 2,448 scientists and engineers and 1,017 technicians per one million people were engaged in research and development. The leading government agency for supporting science and technology is the Ministry of Defense, which plays an important role in both the UK's national security and its role in NATO. British industry funds half of all national research and development, and government-industry cooperation in aerospace, biotechnology and electronics have opened new frontiers in science.

The largest issue facing British scientists, engineers and technicians in the 1990s is the challenge of providing new technological innovations in the global economy. In 1993, a government white paper, Realizing our Potential, called for the most sweeping changes in British science and technology since World War II. Among the changes called for in this white paper is the creation of a "technology forecasting program" which will allow scientists and engineers from all over Great Britain to have a more direct say in setting national science and technology priorities. It is likely that many of the recommendations from the white paper will be incorporated into national science and technology priorities, including the technology forecasting program, over time.

The most prestigious scientific institution in the United Kingdom is the *Royal Society*, founded in 1660 in London. The British Association for the Advancement of Science, headquartered in London, promotes public understanding of science and technology.

Royal Society, in full Royal Society of London for Improving Natural Knowledge, the oldest national scientific society in the world and the leading national organization for the promotion of scientific research in Britain.

The backbone of the Society is its Fellowship of the most eminent scientists of the day, elected by peer review for life. There are currently more than 60 Nobel Laureates amongst the Society's approximately 1400 Fellows and Foreign Members.

Throughout its history, the Society has promoted excellence in science through its Fellowship and Foreign Membership, which has included Isaac Newton, Charles Darwin, Ernest Rutherford, Albert Einstein, Dorothy Hodgkin, Francis Crick, James Watson and Stephen Hawking. The Society is independent of government, as it has been throughout its existence, by virtue of its Royal Charters. In 1663, The Royal Society of London for the Improvement of Natural Knowledge was granted its Arms and adopted the motto "Nullius in verba", an expression of its enduring commitment to empirical evidence as the basis of knowledge about the natural world. The Society's activities include influencing science and education policy, funding leading researchers, publishing journals that span all the sciences and the history of science, and the provision of science communication activities for a variety of public audiences.

Technology today

The UK is one of the world's largest information communication technology (ICT) markets, with the country being in 2nd place in the ranking of ICT spending per head (U.S. is #1). The UK ICT sector covers digital goods and services including audio-visual (AV); e-commerce; telecommunications; IT, software and computer and cloud services; artificial intelligence (AI); augmented and virtual reality (AR/VR); financial technology (FinTech); the internet of things (IOT)/smart cities and cyber security.

The UK ICT sector contributed $160 billion to the UK economy in 2016, increasing by over 20 % from 2011. The sector also accounts for 5 % of all UK jobs.

Opportunities exist to supply organizations of all sizes with major opportunities found in industries with large IT spending e.g financial, utilities, manufacturing, public sector, retail.

Cloud computing offers significant growth opportunities: almost all software companies in the UK are using cloud and opportunities exist in both the public and private sectors for companies offering cloud or linked services. The UK government has been strongly supporting the adoption of cloud technologies over the past years with the G-Cloud frameworks allowing the government to buy directly from suppliers after reaching an agreement on basic terms of use.

Artificial intelligence and machine learning also present substantial prospects with the UK being home to some of the biggest names in the business such as Deepmind, Swiftkey and Babylon.

VR is the fastest growing segment of the UK's entertainment and media sector and growth will be driven by a second wave of hardware that is easier to use, better supported and competitively priced.

FinTech is an area of growth and opportunity in the UK market, particularly in the subsector areas of blockchain and insurtech.

IOT opportunities streches across a variety of UK sectors including health and social care, power & utilities, transport, public sector, and manufacturing.

The UK ICT market is open with many U.S. companies operating successfully in the UK.

Tech: why the UK?

A culture of innovation and creativity

The UK has a history of generating new thinking and technical breakthroughs. These have included many of the early stages of computer science, and the first MP3 player, first portable computer, first handheld television set and the first 3D computer game. In the thriving mobile content market, the UK is now the leading centre for app development in Europe.

An important contributing factor has been the UK's open, competitive environment in which innovators are able to develop ideas and collaborate, and find funders and partnering organizations. It offers excellent educational institutions. The UK is ranked third worldwide for the quality of its scientific research institutions and second for the quality of university-industry collaboration (Source: 2013 Global Competitiveness Report, World Economic Forum).

A flexible intellectual property and business system

The UK has a well-established, transparent framework for protecting technology innovations and a stable business and political environment. Overall, the UK is ranked as the most attractive location in Europe for research and development (source: Department of Business, Innovation and Skills report) and fifth globally for innovation (source: Global Innovation Index).

Advanced consumer markets and a multicultural workforce

The UK provides tech companies with a market of an estimated 48m people, with an estimated 26m broadband connections, and 12.8m superfast broadband connections. This provides a laboratory in which to test and launch new products. With high levels of broadband penetration and widespread adoption of digital behaviour in consumption and e-commerce, the UK is "digitally-ready".

Creative convergence

The UK has the conditions to support a culture of cross-pollination across creative sectors. According to an Ofcom report, an estimated £11.6bn was spent on digital advertising in the UK in 2017, with £5.2bn invested in mobile advertising. The UK is also a leading market for TV streaming services, video games and social

media. These attributes mean the market is well placed to take advantage of convergence across creative genres and platforms. UK creative clusters of different sub-sectors can be found in cities such as London, Bristol, Glasgow, Cardiff and Manchester.

The UK's multicultural population, social liberalism and quality of life also make it an attractive prospect for global technology companies to relocate and hire staff.

British FinTech

UK is by far Europe's biggest FinTech hub employing ~76,500 people (as of April 2018). It is widely believed that the sector will employ more than a 100,000 people by 2030, creating 30,000 new jobs according to an estimate by Innovate Finance, the independent membership association representing UK's global FinTech community.

The City of London's role as the beating heart of global financial markets has been established over decades and remains intact despite fierce international competition and globalization.

As a city, London is the UK's financial capital, tech capital and political capital all merged into one. Eileen Burbidge, a tech venture capitalist and the UK's FinTech envoy summed London's strength up as:*"You basically have Silicon Valley, plus Wall Street, plus Washington DC, all in one place".*

Blockchain is one of startups that radically changed the world's financial system. Blockchain was founded in 2011 and is headquartered in London. Having successfully raised investment of $70 million from some of Silicon Valley's biggest VCs, as well as names such as Sir Richard Branson, the world's biggest Bitcoin wallet provider can lay claim to being one of the UK's biggest FinTech companies. The company describes itself as being 'the world's leading software platform for digital assets', supports over 23 million cryptocurrency wallets and has facilitated over 100 million transactions. Blockchain also has an enterprise solution to help businesses accept Bitcoin payments.

Today British FinTech counts dozens of startups providing services that deal with currency, banking services, market, etc.

2.1. Dwell on the position of the UK in the world. What is the country's technological capacity? What led the UK to the success in technology sphere that it can boast of today? How does the UK technology contribute to its overall economy?

2.2. Science and innovation had always occupied a special place in British history, explain why. Look for additional information and tell about the most important inventions that the UK gave the world.

2.3. Speak about the role of the Royal Society in British technology. Go to their website https://royalsociety.org/topics-policy/new-emerging-technology/ to know about the projects they are engaged in today.

2.4. The UK provides innovations in all the spheres of information technology. Which of them are the most popular on the global market to your mind?

2.5. Financial technology or FinTech occupies a separate niche in British High-Tech sphere, why? Briefly outline the major British FinTech projects besides the Blockchain that are relevant in this sphere nowadays. Look for the additional information.

3. In 2017 The Telegraph introduced the voting for the best British technology. Follow the link to see its results https://webarchive. nationalarchives.gov.uk/20170405141446/http://www.topbritishinnovatio ns.org/ . Explain the choice of #1 invention of the past.
Look at the choice that was voted most likely to shape the 21st Century. How can you explain the choice of future innovations?

Follow-up assignments:

I. *Music that we enjoy today using a large set of devices is an indispensable part of our lives. We owe this aesthetic pleasure to the UK, where the Stereo was invented. The new possibilities in music are opened with great number of apps that make it easier to look for, edit and download our favourite tracks. One of this revolutionary apps is Shazam, that is originally British, although later purchased by Apple Inc. Dwell on the history of creating Stereo and Shazam app.*

II. *There's no secret that a traditional British house is the thing that characterizes the whole nation, but what about the newest smart houses? Watch the video https://www.youtube.com/watch?v=VTZzx0N19QM and tell about the things that are appealing and surprising to you in a smart house shown. What is the future of housing to your opinion: Smart house or Traditional House still?*

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Section VIII
HONG KONG SAR AND THE REPUBLIC OF KOREA: ASIAN 'SMART' POWER

1. **Pre-reading. How does "a digital picture" of Asian IT sates differ from that of European and American region?**

2. **Read the information below.**

Hong Kong – general information

Records show that Hong Kong was controlled by China since the Tang Dynasty (618-907) and became a British colony in 1842. In 1997, Hong Kong was reunited with China. The official name of Hong Kong is the Hong Kong Special Administrative Region of the People's Republic of China (Hong Kong SAR).

Today Hong Kong has many differences from the mainland China such as having different economic systems as well as political systems making it almost an independent "country" by itself. There are currently about 7 million people living in the Hong Kong area making it one of the most densely populated cities in the world (6,410 people per square kilometer). Hong Kong uses its own currency and has low taxes and has an excellent trading economy being the twelfth largest in the world. Part of this is due to its good geographic location and easily accessible human labor.

Success story of Hong Kong

How did this small city-state of 7.3 million people go from having a per-capita income of only a few hundred dollars per year to a per capita income that is equal to that of the United States in only 50 years? The simple answer is they had the British common law legal system, strong private property rights, competent, honest judges, a non-corrupt civil service, very low tax rates, free trade and a minimal amount of economic regulation. There was no big brother government looking after the people, so they had to work hard, but they could keep the fruits of their efforts.

Hong Kong became a British colony in 1842, and the adjacent "New Territories" were leased for 99 years in 1898. In 1997, Hong Kong was returned by the British to China, with an agreement that it would become a special administrative region – "one country, two systems". Hong Kong retained the British legal system, most individual liberties, and a high degree of local

autonomy, except for foreign policy and defense. The amount of democracy has been limited – with the British serving as the ideal benevolent dictator and the Chinese as a somewhat less benevolent dictator for the past 17 years.

Innovation and Technology Industry in Hong Kong

Overview

Hong Kong's innovation and technology sector together with that of Shenzhen – the Shenzhen-Hong Kong technology cluster – ranked the world's second largest based on the Global Innovation Index 2018.

Hong Kong's start-up ecosystem is thriving. Some 2,000 start-ups were in Hong Kong employing over 5,000 employees in 2016.

Biotechnology, artificial intelligence, smart city and financial technologies were identified as the four areas of strength for development in Hong Kong, and the expenditure on research and development as a percentage of the gross domestic product is expected to be doubled in five years from 2017.

Industry Development

With opportunities brought by the Guangdong-Hong Kong-Macao Bay Area[1] development, Hong Kong will further capitalize on its advantages in R&D capabilities, technological infrastructure, legal system and intellectual property to spearhead the I&T (innovation and technology) industry, and act as a business platform for innovative companies looking to access the Asia market (China in particular), or mainland innovative companies to go international.

Major research focus of Hong Kong start-ups includes information and communication technologies (ICT), software as a service (SaaS), Internet of things (IoT), data analytics, biotech, artificial intelligence (AI), robotics, virtual reality (VR) and augmented reality (AR), as well as new material. In terms of applications, fintech (financial technology), smart city and smart home, healthcare and big data applications are among the most popular sectors.

With rising corporate engagement in incubation and accelerators programmes, new initiatives to promote start-ups springing from universities, *Cyberport* and *Hong Kong Science Park*, and a string of notable funding rounds for start-ups, particularly the emergence of start-ups with "unicorn" status, it is anticipated that Hong Kong's technology sector may soon reach a tipping point and will be propelled into much faster growth.

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[1] The bay area, covering Hong Kong, Macao and nine cities in Guangdong (Guangzhou, Shenzhen, Zhuhai, Foshan, Huizhou, Dongguan, Zhongshan, Jiangmen, and Zhaoqing), is a dynamic economic hub in South China and features an array of fascinating destinations. Rich in heritage and home to some of China's most dynamic cities, the advanced infrastructure of the region puts the cultural and natural attractions of the bay area within easy reach of Hong Kong.

<u>R&D Capabilities</u>

Human capital is one of the essentials in I&T. While universities in Hong Kong occupy respectable positions in different ratings, particularly in science and engineering subjects, they have played an important role in Hong Kong's I&T capacity building. In terms of research, universities have seen a rising trend in in-house R&D expenditure and the number of R&D personnel. A rising number of these research has been successfully converted into commercialized products, industry research collaborations or other forms of contribution to the society and economy.

Besides local grooming, Hong Kong's openness to foreign talents has also contributed to the growth of its R&D activities. According to the 2016 start-up survey by InvestHK, around 35 % of the responded start-ups was not founded by locals. Besides, some multinational companies attracted by the Chinese market also locate their R&D employees from overseas to Hong Kong where foreign talents may find it easier to adapt to living and working than in the Mainland.

<u>Technological Infrastructure</u>

Hong Kong ranked first in infrastructure out of the 126 surveyed economies in the Global Innovation Index 2018. The government has invested in necessary infrastructure setting up the Innovation and Technology Fund (ITF), founding the publicly-funded Hong Kong Applied Science and Technology Research Institute (ASTRI), and establishing the Hong Kong Science Park, Cyberport and five Research and Development Centres.

The Hong Kong Science Park is home to more than 680 technology companies and approximately 13,000 technology talents. The park houses five distinct clusters: (1) biomedical technology, (2) electronics, (3) green technology, (4) information and communications technology (ICT) and (5) material and precision engineering. Its current development focus is on three over-arching cross-disciplinary platforms – smart cities, healthy ageing and robotics.

Cyberport, a wholly-owned Hong Kong government facility, is a creative digital workspace with more than 800 community members. With an avowed mission to establish itself as a leading global I&T hub, Cyberport is committed to boosting the local economy by nurturing digital industry start-ups and entrepreneurs, driving collaboration in terms of resources and the creation of business opportunities, while accelerating digital adoption through strategic initiatives and partnerships.

<u>FinTech</u>

Being an international financial hub complemented by a highly developed ICT sector and an increasingly conducive start-up ecosystem, Hong Kong's Fintech industry has witnessed significant growth in recent years. Hong Kong has

138 Fintech start-ups, up 60 % from 2015 according to InvestHK's 2016 start-up survey. There are many factors that make Hong Kong ideal for Fintech companies. Hong Kong is leading in high-tech in Asia-Pacific region, attracting Mainland Fintech, IT and e-commerce companies to set up in Hong Kong as a base for regional and international expansion.

As regards specific Fintech segments, Hong Kong's most significant technology development are seen in data analytics, robotics, big data, P2P technologies and natural language processing.

Biotech

Excellence in scientific frontiers with continuous research breakthroughs have fuelled development of a competitive biotech industry in Hong Kong. It is estimated that currently Hong Kong universities produce about 250 biomedical publications of high impact factor per annum. Hong Kong has two excellent medical schools rated among the top in the world in the field of clinical medicine. Some of the achievements of these two medical schools include research in molecular diagnostics using circulating cell free DNA in blood and prescription drug "Oral Arsenic Trioxide" to treat Acute Promyelocytic Leukemia (APL). Patents of the researches held by Hong Kong universities have been licensed and sublicensed globally, and resulted in start-ups in this field. With its strong linkage with the mainland biotech companies and research institutions, Hong Kong is positioned as a bridge between Mainland China and the international market.

Artificial Intelligence

Artificial Intelligence (AI) is the major driving force of the fourth Industrial Revolution which is characterised by automation and connectivity. In particular, with the wide adoption of internet-connected devise and advancement of cloud computing technologies, AI has become a mainstream technology today, and is an increasingly integral part of many industries, including finance, marketing, retail, and logistics.

Hong Kong also has a number of leading private AI technology companies such as SenseTime. SenseTime was co-founded by Professor Sean Tang who developed a novel facial recognition system with deep learning with an accuracy rate of over 99 %, grew into a unicorn in 2017 in just three years' time. Other examples include WeLab, an online lending platform utilises AI to come up with personalised lending proposals for its clients.

Smart City

As one of the most densely populated cities in the world with world-class ICT infrastructure and Internet connectivity, Hong Kong is an ideal testing ground for a lot of smart city applications. To catch up the global trend and build Hong

Kong into a world-class smart city, the Government released the Hong Kong Smart City Blueprint in December 2017 that maps out development plans in the next five years.

Hong Kong's Smart City Blueprint embraces I&T for a smart Hong Kong under six major areas: (1) smart mobility – intelligent transport system and traffic management, (2) smart living – free public wi-fi access and eID for government and commercial services, (3) smart environment – green buildings and technology applications in energy efficiency, waste management and pollution monitoring, (4) smart people – I&T capacity building, (5) smart government – open data, smart city infrastructure and e-public service, and (6) smart economy – leverage I&T to strengthen existing and develop new economic pillars, and promote sharing economy.

The Republic of Korea: General information

South Korea, officially the Republic of Korea is a country in East Asia, constituting the southern part of the Korean Peninsula and lying east to the Asian mainland. The country comprises an estimated 51.4 million residents. The capital and largest city is Seoul, with population of 10 million.

The Republic of Korea was one of the "Asian Tigers" whose rapid economic and social development in the latter 20th century was critical in the global shift towards the Pacific in economics and politics. Despite its small size, the Republic of Korea is considered the most developed region of Asia in terms of Human Development (HDI) and with the highest annual median wage (~40,250 USD), outpacing both smaller and larger states – Japan, Singapore, China, India, etc. – in the region by many metrics, and vastly outperforming the Democratic People's Republic of Korea (North Korea). The split between South and North Korea after the 1953 ceasefire of the Korean War has played a critical role in the geopolitics of East Asia ever since its inception, with South Korea becoming heavily tied to the United States and the western economies, while North Korea allied itself with China, the USSR and other communist states. Following the collapse of the USSR, North Korea has become increasingly isolated and hostile to South Korea, though it claims these actions are defensive and aimed at the imperialist / capitalist powers that control the South Korean government as a proxy state.

- Korea is the world's 15th largest economy and 9th largest trading nation, with a trade volume of more than 1 trillion US dollars.
- Korea is the world's number one producer in mobile phones, displays, semiconductors and shipbuilding mainly exporting machinery, automotive, semiconductors and petroleum products.

- The number of researchers in the Business enterprise sector in Korea has reached over 250,000 in 2011, ranking Korea 2nd within OECD.
- Korea's labor productivity is the 2nd highest country in OECD.
- In 2010, Korea spent 3.74 % of its GDP on R&D, making Korea the 5th largest R&D power worldwide.
- Korean electronics giant, Samsung Electronics is the 6th company spending most on R&D in the world in 2012.

Korea owes its technological development and industrialization to the development of a strong human resource base and an outward-looking development strategy. Two major lessons form the Korean experiences are that human resources are the key to S&T (science and technology) development and thus to economic growth, and that nothing can better motivate private businesses to invest in technology development than market competition. But for Korea to sustain past development into the future, it has to further strengthen basic scientific research capability and improve framework conditions for innovation.

High tech and high culture

"Wireless Internet, electronic blackboards, virtual reality (VR)
devices, notebooks, tablet PCs, digital textbooks…
are being used by individuals, teams, and classrooms".
Professor Jeong Rang Kim

South Korea has the potential to give Silicon Valley and China a run for its money. The country has ranked as the most innovative economy by Bloomberg, dominating international charts in R&D intensity, value-added manufacturing, and patent activity.

It's a melting pot of innovation. Think about it: which other country is competing head-on with Apple in the high-end smartphone race? The East Asian nation is also home to the fastest internet on earth and broadband services per capita is the highest in the globe.

Leading the fourth industrial revolution
The world is seeing its fourth industrial revolution, spearheaded by digitization, artificial intelligence, robotics, increased connectivity, and autonomous vehicles. Korea could have a huge part to play. Smartphone and appliance companies in the country have begun adopting artificial intelligence. Samsung's Galaxy S8 is one example with AI-based voice recognition technology as one of the phone's new features.

Korea is also a leader in digital banking. The first digital-only bank in Korea, K Bank, kicked off recently. One of its backers includes Alipay. The government has also approved the launch of Kakao Bank, created by Korea's predominant messaging service, KakaoTalk. Users would be able to perform transactions with friends directly without the hassles of typing bank account numbers.

Staying ahead of the curve

To up its IT game, South Korea is harboring partnerships with foreign startups. Attracting ideas from global-minded teams is a step forward in advancing the country's quest for a fourth industrial revolution. The government-backed K-Startup Grand Challenge is in its boom, and startups all over the world are invited to apply. The top 50 teams will participate in a four-month accelerator program which include mentoring and sharing sessions.

Teams will also have the opportunity to interact with major Korean companies like Samsung, Hyundai Motors, Kakao, and Naver among others to understand Asia's and Korea's business culture, which is crucial to success in the region.

Last year, startup Fingertips Lab emerged as the winner. It has created a rotary dial which allows drivers to stay connected to their phones without looking and touching the screen. Since last year, the startup has already received pre-orders from three of the world's biggest automotive OEMs.

The challenges

But just like any tech industry in the world, there are challenges that startups can encounter once they bring their operations to Korea. The dominance of family conglomerates is an issue.

Recently, the Korean government unveiled a comprehensive plan to ease regulations on investments in startups. Foreign entrepreneurs are also welcome to pitch business ideas. The new president, Moon Jae In, is also set to remove policies hindering the growth of IT in Korea. Startups need not worry about potential language barriers. There are innovative ways like hiring locals who can speak fluent Korean and English as country managers. This will not only help startups tear down the language barrier but will also aid them in networking with local top investors and executives. Any startup that chooses Korea to establish its operations will find itself surrounded by constant innovation and evolution.

Visions of the Future: Smart Cities, IoT and 5G

Busan Metropolitan City, the country's second most-populated city, is as economically important as the Republic of Korea's largest shipping port and one of

the world's Top Ten Largest Container Ports. In recent years, it is being reimagined as a Smart City of the future – using technology to improve the lives of its citizens – and propelling the country towards next generation technologies.

The pioneering Smart City of Busan boasts a "first of its kind" policy that was announced at ITU's Plenipotentiary Conference in Busan in 2014, said Vice Mayor for Economic Affairs in Busan, Kim Young-Whan during a Smart City Tour during the recent ITU Telecom World this autumn. In Busan, Smart City projects for community safety, traffic improvement, urban living and energy conservation are already being implemented. Open data projects and data monitoring systems are at work monitoring traffic flows and working with emergency services on real-time communications flows. Other test-bed projects including IoT-led solutions and cloud architectural projects are aiming to make life more convenient for Smart City dwellers.

5G leadership

In addition to Smart City technologies, the Republic of Korea is also leading the development of next generation wireless broadband technologies, and aims to deploy 5G earlier than any other country. 5G is expected to become the infrastructure backbone for the 4th Industrial Revolution. It is predicted that the Internet of Things revolution will reach more than 30 billion wireless connections by 2020. These devices will be constantly connected and will demand bandwidth supplied by 5G and next-generation services.

2.1. Hong Kong: China? Britain? Both or neither? Dwell on the position of Hong Kong in the world. What formed Hong Kong and its technology the way it is today?

2.2. Which spheres comprise Hong Kong's technology sector? Which ones are of greatest importance nowadays? Prove your point of view.

2.3. Any high-tech country has its own "Silicon Valley", Hong Kong is not an exception. What are the most famous technological hubs of Hong Kong and what are their activities?

2.4. Once in decline, The Republic of Korea has chosen some other way in comparison to its northern neighbour. How did it affect the country's economy and technology?

2.5. Characterize the Korean technological sector, its major directions and trends. What are the strongest sides of South Korean technology?

2.6. The Republic of Korea poses the challenge to and holds competition with such global tech giants as The UK and The USA, how is it manifested? Are there any winners and losers?

Follow-up assignments:

I.   *The concept of a smart house in great, but what about smart city? Watch the videos and outline the major components of a smart city project. Why particularly Hong Kong is suitable for the implementation of this kind of project? What other smart cities can you name? What strikes you most about a smart city?*
     https://www.youtube.com/watch?v=MyhEfkRMDDU.
     https://www.youtube.com/watch?v=bANfnYDTzxE.
     https://www.youtube.com/watch?v=FhtgVCuNaxE.

II. *The Republic of Korea have the world new possibilities in electronics. Look for the additional information and outline the role of Samsung and LG companies in Korean technology and economy.*

III. *A lot of technologies in different countries form startups that later become "unicorns". What is a Unicorn company / project and how can a startup become one?*

IV. *Discussion and debate. "The world is seeing its fourth industrial revolution". What is the revolution about? Which states are ahead in this game? Be ready to tell about the first three industrial revolutions and their implications for the world's further technological development.*

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Section IX
JAPAN: COMPETING FOR TECH TOP

1. Learn the information about the aspects of ICT in Japan.

Japan: general information

Japan is a fascinating 40 years from 1968 to 2010. Tokyo, Japan's capital city, is the world's largest country of economic and business prowess, rich culture, technical wizardry, spatial conundrums and contradictions. Japan held onto the title of the world's second largest economy for more than metropolitan area, with a population of 32.5 million people. Despite having an area slightly bigger than Germany and smaller than California, Japan is the world's tenth largest country by population, with 127.3 million people.

Despite Japan's challenging domestic economic environment, many Japanese companies have continued to perform well on the world stage. As of 2011, Japan counted 68 companies in the Fortune/CNN Money Global 500 ranking of the world's largest corporations. Japanese companies in the top 100 of the Fortune ranking include: Toyota Motor, Hitachi, Honda Motor, Nissan Motor, Panasonic, Sony and Toshiba. Japan's corporate sector has continued to push the technology envelope in fields such as robotics, medical devices, clean energy, satellite communications and spacecraft, water processing and other high tech industries.

Toyota became the world's largest car company in 2009, before losing a bit of ground to unprecedented product recalls. Nintendo's innovative Wii marked a virtual revolution in the large, global market for gaming and family entertainment products.

What is behind Japan's success?

JAPAN has become a front-runner in industrial development, thanks mainly to its efficient managerial and administrative system. Apart from durability, quality and craftsmanship, low cost has made Japanese goods immensely popular the world over. Japanese goods have virtually swamped the American consumer and capital goods sectors.

Since the Meiji period[1], Japan has spared no effort to promote the realization of materialistic gains. From time to time, major policy changes – both economic

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[1] The Meiji Era was the 44-year period of Japan's history from 1868 to 1912 when the country was under the rule of the great Emperor Mutsuhito. Also called the Meiji Emperor, he was the first ruler of Japan to wield actual political power in centuries. Japan industrialized with incredible speed Japan would not only build up its economy and its military capacity well enough to avoid being colonized – it would become a major imperial power itself in the decades following the Meiji Emperor's death.

and political – are effected to further economic development; the thrust given to small-scale industries in the early period of Japan's economic development programme is a case in point.

Foreign technology

Until a few decades back, Japan was largely dependent on technology – not capital – borrowed from the West. A good part of the investment required for economic development came from the agricultural sector. And soon, foreign trade became the engine of Japan's economic growth.

The key imports that set the Japanese economy on the revival path were aluminium, nickle, iron ore, crude oil, copper, and so on. But the tempo of development got a boost only when exports of machinery and equipment, metals, and metal products got underway. Soon, high quality Japanese watches, clocks, precision instruments and scientific apparatuses became much sought after in the world market.

Right from the beginning, the Japanese manufacturing and production systems were highly organized and governed by developments in science and technology. Such a progress towards industrialization was possible because of:

i) the enterprising spirit of industrialists;
ii) severe competition among industrialists;
iii) perfect mobility of labour;
iv) huge government investments, which helped improve industrial productivity.

Much importance was also given to planned development, under which the following industries were given focus: optical and electric goods; bearing, machine tools and machines; iron and steel; non-ferrous metals, and mining, manufacturing and quarrying.

The development of these industries, in turn, helped enhance the productivity in the consumer and capital goods sectors. In the realm of industrial development, optimal use of capital and technology, and innovation was given due recognition. However, emphasis was also given to labour productivity within different industries.

Steps to success

The secret of Japan's rapid economic growth is the well-knit relationship between management and labour. The Japanese do not believe in strikes, and are dedicated to the work assigned to them. Interestingly, Japanese companies do not look upon the employer-worker relationship as a labour contract but as a joint membership in the same family. The firm wins the loyalty of the employees by its

attitude of paternalism – influenced more by humane, rather than economic, considerations in its dealings. Progress is the main aim and not profit. The Japanese have a strong banking habit, and are often motivated to invest for the sake of industrial development and prosperity.

People's outlook

The Japanese are materialistic in their outlook and have a spiritual sense of awareness in their social and economic life. As a result, while at work – be it in the field, farm or factory – they are a dedicated lot, always trying to achieve optimum productivity and progress. Perhaps, the main reason why Japanese goods are considered synonymous with quality.

The Japanese have certain unique characteristics. Notwithstanding their dedication to work, they are always willing to learn, especially the developments in science and technology. They place much importance on education, which is directed towards boosting economic growth. Moreover, they have developed group consciousness as a unique characteristic for creating awareness.

The Japanese have a practical outlook and believe in showing results in their work, even if this meant trial and error methods. They are law-abiding, have great respect for kinship, are generally sensitive, and are extremely loyal to their nation. These traits have helped them become one of the most prosperous and richest countries.

ICT as the main part of Japanese technology

The Information and Communications Technology industry in Japan is touted to be the top industry in the country. In fact, with the government steadily coming up with innovative ideas and efforts to significantly impact and contribute on a global scale, the industry is expected to exceptionally boom in the upcoming years. Both the public and the private sectors are aware of the importance of the latest, most innovative ICT solutions to advance the economy and are taking steps towards this. Hence, this sector holds immense business potential.

Japan is home to huge multinational ICT conglomerates. These include Sony, Panasonic, Fujitsu, NEC and Toshiba among many other globally acclaimed brands. However, though there are some key players operating here, many of the enterprises are still struggling especially amidst international competition. This is where latest and innovative ICT solutions can make all the difference by playing a vital role to stay above the competition. As people use their mobile devices to access the Internet to access information and for other market activities, Japanese companies need to catch up and evolve in the way they conduct business.

2. In writing answer the following questions:

A. What makes Japan so successful although the country is small?

B. Did Japan increase its economic power due to its original inventions? Why?

C. Do the Japanese work hard, create things and develop to gain profit? Give details.

3. In Japan technological advancement does not only exist to be sold, but firstly to be implemented in everyday life. Here is a set of high-tech things that the Japanese people use. Which of them can be found nowhere but in Japan? Explain your point of view.

Bullet Train

The first high-speed train, or bullet train, was built in Japan and was first put into operation in 1964. These trains are faster, more efficient, and help reduce environmental damage, not to mention they provide a huge benefit to the economy. They can travel anywhere from 120 mph to 260 mph.

Capsule Hotels

While capsule hotels used to have a more inglorious reputation, they're becoming increasingly popular. These compact pods offer cheap accommodations for those who just need a place to sleep. That being said, more extravagant capsule hotels are popping up across Japan, providing their guests with flat-screen TVs and access to saunas and hot springs.

High-Tech Toilets

Most people know about Japan's revolutionary toilets, and while you might be lucky enough to find one in some of the swankier restaurants in New York or Los Angeles, they're fairly common in Japan. In fact, many domestic residences in Japan come fully equipped with these first-class toilets. Most high-tech toilets allow water temperature and water pressure to be adjusted to match the preferences of the user and much more additional functions.
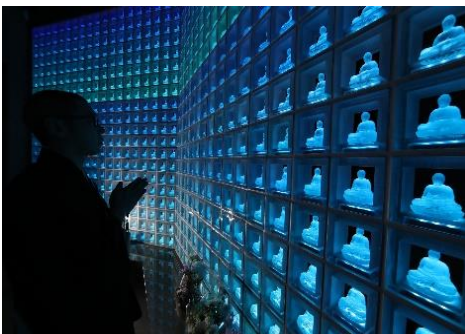
Vending Machines

Japan is the undisputed home of the vending machine. They can be found in huge racks in train stations and on street corners all over the country providing everything from hot ramen noodles to fresh eggs.

Underground Bike Parking

Nearly 14 % of Tokyo's population gets around on bikes, so Japan installed 50 of these automated bike vaults across the country. Like the automated parking systems, these vaults help save space and keep bikes safe from theft and weather damage.

Futuristic cemetery

A Buddhist burial building in downtown Tokyo houses over 2,000 neon glass Buddha statues. Each statue corresponds to a drawer containing the cremated remains of the deceased. When a visitor enters the building they swipe an electronic pass card, which makes a single Buddha glow a different color, guiding the visitor to their loved one's statue.

Smart Mirror

Not your ordinary looking glass – this mirror detects wrinkles, redness, pores and sun damage, and offers a range of suitable products to address them.

This Panasonic device also lets you virtually try out a variety of makeup looks – and mustaches – in the mirror. You can event print out the makeup, set on a sheet like a temporary tattoo, from a 3-D printer and stick it on your face.

The Smart Mirror debuted in October 2016 at the Combined Exhibition of Advanced Technologies in Japan.

73

4. **Study the information below and briefly comment on the attitude of the Japanese people towards robots.**

Japan: the Land of Rising Robotics

Have you heard of the word *"monozukuri"*?

"Monozukuri" is a term that has been used since the end of the 20th century to describe Japan's manufacturing industry. The concept of monozukuri covers everything from the production techniques, frameworks and philosophies that support the manufacturing industry and the products that are created through these processes and systems, to the individuals (craftspeople and engineers) who create these products. Monozukuri has long been the source of Japan's international competitiveness.

In recent years, robotics has been the driving force behind Japan's monozukuri culture.

In the area of industrial robotics, Japan has continuously maintained its position as the world's top exporter of robots in terms of value of shipments and number of operating units. Japan shipped approximately 3.4 billion yen's worth of robots in 2012, comprising nearly 50 % of the global market share. The number of operating units in Japan was close to 300,000, which was about 23 % of the global market share.

Japan leads the world in the field of robotics with highly competitive research, development and applied technologies. Further progress is being made in robotics so that Japan can become a creator of new values in monozukuri and services, as well as a base for creating robots that will contribute to the transformation of society.

Since the 1970s, Japan has been at the world's cutting edge of industrial robotics.

In the past, the main places industrial robots could be found at work were

> ### Cultural influences
>
> Robots are generally viewed positively in Japan. Some Western commentators attribute this to the ancient Japanese religion, Shinto, in which objects (as well as people and other natural phenomena) are believed to possess a spirit. This is not a commonly-held view in Japan, however. Manga comics and animations have had a much stronger cultural influence on interest in robotics. Robots are often depicted as children's' friends in mangas, and the post 1950s generation, who grew up with these mangas, learned about friendship, courage, justice and charity through stories that included robots. Thus, Japanese people tend to have friendly feeling towards robots.

factories for automobiles and electronic equipment. With the aim of freeing humans from rigorous labor, the use of industrial robots became widespread as they performed simple jobs such as assembling parts and physically dangerous work such as transporting heavy items in harsh and hazardous environments.

Due in part to the impressive effectiveness of robots at improving the productivity and quality of manufactured items, as well as guaranteeing safer work environments, Japan's "monozukuri" has maintained a globally competitive edge.

While robots have long been relegated to assistant roles in the monozukuri process, today's advancing technology, as well as external factors and societal circumstances, are taking robotics into new frontiers.

In recent years, public and private sector robotics projects in Europe, the Americas, China and other countries outside of Japan have caused a dramatic boost in demand for robots in these countries. Progress in robotics in the Americas and Europe is being shaped by the Internet of Things (IoT), which is seeing increasing implementation and usage as network technologies are upgraded. The advancement of IoT adoption will necessitate major reforms of the existing business models and frameworks of every industry, and countries around the world are jostling to take the lead in utilizing robots to capitalize on these developments. The integration of IoT and robotics will work to reform the very frameworks of industry, making such a large impact on our lives that it could be called "The Fourth Industrial Revolution".

Meanwhile, China, which faces rising human labor costs in manufacturing and intensifying competition with developing countries, is placing focus on introducing industrial robots to improve productivity and quality. These efforts have led to China becoming the top country in the world for number of industrial robots purchased, as well as the world's largest robot-importing country.

As global trends show the roles of robots growing ever greater, the "Robot Nation" of Japan is putting to use cutting-edge robotic technologies in a variety of fields besides manufacturing while keeping in mind societal demand. Robots are now working on the front lines in a diverse array of areas, including aeronautics, medicine / welfare, disaster mitigation, disaster investigation and rescue.

As Japan's population ages and the birth rate is too low to sustain growth, the country is no stranger to coping with a limited number of working age people.

Automation and robotics, either to replace or enhance people in the workforce, are familiar concepts in Japanese society. Japanese companies have traditionally been at the forefront in robotic technology. Firms such as FANUC, Kawasaki Heavy Industries, Sony, and the Yaskawa Electric Corporation led the way in robotic development during Japan's economic rise. Automation and the

integration of robotic technology into industrial production have also been an integral part of Japan's postwar economic success. Kawasaki Robotics started commercial production of industrial robots over 40 years ago.

For policymakers, the first hurdle is to accept that change is coming. The steam engine was likely just as disconcerting, but it came nonetheless – putting an end to some jobs but generating many new ones as well. Artificial intelligence, robotics, and automation have the potential to make just as big a change, and the second hurdle may be to find ways to help the public prepare for and leverage this transformation to make lives better and incomes higher. Strong and effective social safety nets will be crucial, since disruption of some traditional labor and social contracts seems inevitable. But education and skills development will also be necessary to enable more people to take advantage of jobs in a high-tech world. And in Japan's case, this also means a stronger effort to bring greater equality into the labor force – between men and women, between regular and nonregular employees, and even across regions – so that the benefits and risks of automation can be more equally shared.

4.1. Robots have been already integrated into the Japanese society and there are various types of them. Study the additional information on the web and fill in the table with the functions and spheres of use of the robots given below.

Robot	Functions	Spheres of use
PaPeRo		
Banryu		

TPR-ROBINA 		
SmartPal V 		
i-REAL 		
T-53 Enryu 		

HRP-4		
Kirobo		
Erica		

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GLOSSARY

5G – Fifth-generation wireless – is the latest iteration of cellular technology, engineered to greatly increase the speed and responsiveness of wireless networks. With 5G, data transmitted over wireless broadband connections could travel at rates as high as 20 Gbps by some estimates. 5G will also enable a sharp increase in the amount of data transmitted over wireless systems due to more available bandwidth and advanced antenna technology. In addition to improvements in speed, capacity and latency, 5G offers network management features, among them network slicing, which allows mobile operators to create multiple virtual networks within a single physical 5G network. This capability will enable wireless network connections to support specific uses or business cases and could be sold on an as-a-service basis. A self-driving car, for example, would require a network slice that offers extremely fast, low-latency connections so a vehicle could navigate in real time. A home appliance, however, could be connected via a lower-power, slower connection because high performance is not crucial. The internet of things could use secure, data-only connections.

Artificial intelligence (AI) is an area of computer science that emphasizes the creation of intelligent machines that work and react like humans.

Asian Tigers are often used to refer to the economies of South Korea, Taiwan, Singapore, and Hong Kong that underwent a steady growth between the 1960s to 1990s.

Augmented reality (AR) is the technology that expands our physical world, adding layers of digital information onto it. Unlike Virtual Reality (VR), AR does not create the whole artificial environments to replace real with a virtual one. AR appears in direct view of an existing environment and adds sounds, videos, graphics to it.

Big data refers to the large, diverse sets of information that grow at ever-increasing rates. It encompasses the volume of information, the velocity or speed at which it is created and collected, and the variety or scope of the data points being covered. Big data often comes from multiple sources and arrives in multiple formats.

BioTech – Biotechnology – is the area of biology that uses living processes, organisms or systems to manufacture products or technology intended to improve the quality of human life. Depending on the technology, tools and applications involved, biotechnology can overlap with molecular biology, bionics, bioengineering, genetic engineering and nanotechnology.

By means of low-cost computing, the cloud, big data, analytics, and mobile technologies, physical things can share and collect data with minimal human intervention. In this hyperconnected world, digital systems can record, monitor, and adjust each interaction between connected things. The physical world meets the digital world – and they cooperate.

Cloud computing is a general term for anything that involves delivering hosted services over the Internet. These services are broadly divided into three categories: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS). The name cloud computing was inspired by the cloud symbol that's often used to represent the Internet in flowcharts and diagrams.

Cutting-edge means the latest or most advanced stage in the development of something.

Cybercrime also called **computer crime**, the use of a computer as an instrument to further illegal ends, such as committing fraud, trafficking in child pornography and intellectual property, stealing identities, or violating privacy. Cybercrime, especially through the Internet, has grown in importance as the computer has become central to commerce, entertainment, and government. Because of the early and widespread adoption of computers and the Internet in the United States, most of the earliest victims and villains of cybercrime were Americans. By the 21st century, though, hardly a hamlet remained anywhere in the world that had not been touched by cybercrime of one sort or another.

E-commerce also known as electronic commerce or internet commerce, refers to the buying and selling of goods or services using the internet, and the transfer of money and data to execute these transactions. Ecommerce is often used to refer to the sale of physical products online, but it can also describe any kind of commercial transaction that is facilitated through the internet.

FinTech is a general comprehensive term for financial technologies, many of which are rapidly changing the financial industry. FinTech is often used by technology journalists and others to describe technologies as diverse as cryptocurrency tools, financial transaction platforms and industry-specific middleware programs.

GDP is one of the most common indicators used to track the health of a nation's economy. It includes a number of different factors such as consumption and investment. In this short article, we look at why GDP is such an important economic factor, and what it means for both economists and investors. It represents the total dollar value of all goods and services produced over a specific time period, often referred to as the size of the economy. GDP is usually expressed as a comparison to the previous quarter or year.

Green Tech is an umbrella term that describes the use of technology and science to create products and services that are environmentally friendly. Green tech is also called environmental technology or cleantech. Cleantech is used to describe products or services that improve operational performance while reducing costs, energy consumption, waste or negative effects on the environment. Green tech can also refer to clean energy production. Clean energy is the use of alternative fuels and technologies that are less harmful to the environment versus fossil fuels. Although green technology is a relatively young market, it has garnered investor interest in response to fears of climate change and a growing scarcity of natural resources.

InsurTech – Insurance technology – is a subset of fintech. It's the technology that lies behind the creation, distribution and administration of insurance business. Smartphone apps, wearables, claims processing tools, online policy handling and automated processing are all insurtech. Insurtech is useful for collecting and analysing customer data to provide a better service.

IoT – The internet of things – is a computing concept that describes the idea of everyday physical objects being connected to the internet and being able to identify themselves to other devices. Over the past few years, IoT has become one of the most important technologies of the 21st century. Now that we can connect everyday objects – kitchen appliances, cars, thermostats, baby monitors – to the internet via embedded devices, seamless communication is possible between people, processes, and things.

Patent is the granting of a property right by a sovereign authority to an inventor. This grant provides the inventor exclusive rights to the patented process, design, or invention for a designated period in exchange for a comprehensive disclosure of the invention.

R&D – Research and development – is the process by which a company works to obtain new knowledge that it might use to create new technology, products, services, or systems that it will either use or sell. The goal most often is to add to the company's bottom line.

Robotics includes design, construction, and use of machines (robots) to perform tasks done traditionally by human beings. Robots are widely used in such industries as automobile manufacture to perform simple repetitive tasks, and in industries where work must be performed in environments hazardous to humans. Many aspects of robotics involve artificial intelligence; robots may be equipped with the equivalent of human senses such as vision, touch, and the ability to sense temperature. Some are even capable of simple decision making, and current robotics research is geared toward devising robots with a degree of self-sufficiency

that will permit mobility and decision-making in an unstructured environment. Today's industrial robots do not resemble human beings; a robot in human form is called an android.

Smart used to describe an object that uses computers to make it work so that it is able to act in an independent way.

Spin-off is a corporate divestiture accomplished through (1) separation of a division or subsidiary from its parent firm to create a new corporate entity by issuing new shares. These shares are distributed to the current stockholders (shareholders) in proportion to their current shareholdings, and may also be sold to the public, or (2) a leveraged buyout by the management of the division or subsidiary.

Start-up is a young company founded by one or more entrepreneurs in order to develop a unique product or service and bring it to market. By its nature, the typical startup tends to be a shoestring operation, with initial funding from the founders or their families.

State-of-the-art means something the best available because it has been made using the most modern techniques and technology.

Triple helix model is an innovation system format based on a triadic relationship between university, industry, and government, to foster economic and social development. The potential for innovation and economic development in a Knowledge Society lies in a more prominent role for the university and in the hybridisation of elements from university, industry and government to generate new institutional and social formats for the production, transfer and application of knowledge.

Unicorn is a term used in the venture capital industry to describe a privately held startup company with a value of over $1 billion. The term was first popularized by venture capitalist Aileen Lee, founder of CowboyVC, a seed stage venture capital fund based in Palo Alto, California. Unicorns can also refer to a recruitment phenomenon within the human resources (HR) sector. HR managers may have high expectations to fill a position, leading them to look for candidates with qualifications that are higher than required for a specific job. In essence, these managers are looking for a unicorn, which leads to a disconnect between their ideal candidate versus who they can hire from the pool of people available.

Virtual reality (VR) is the use of computer technology to create a simulated environment. Unlike traditional user interfaces, VR places the user inside an experience. Instead of viewing a screen in front of them, users are immersed and able to interact with 3D worlds. By simulating as many senses as possible, such as vision, hearing, touch, even smell, the computer is transformed into a gatekeeper to this artificial world. The only limits to near-real VR experiences are the availability of content and cheap computing power.

CONTENTS

Учебное издание

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МИРОВЫЕ ЛИДЕРЫ В ОБЛАСТИ ИКТ: ДОСТИЖЕНИЯ И ПЕРСПЕКТИВЫ

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