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SUSTAIN E+

TRAINING

SUSTAIN E+ PROJECT

MODULE 4: DIGITALISATION AND SUSTAINABILITY

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1. Introduction to the topic

Management of European projects involves different activities that can leave a carbon footprint. Carbon Footprint is the total amount of greenhouse gas emissions that goes into atmosphere. We can differentiate ICT Carbon Footprint which is produced by the Information and technology sector. Technology plays an important part in project management today and the fact that we are just using it does not mean we are acting in a sustainable way. Nowadays, there is an increasing demand for greener practices that will make sure we are acting respectfully towards the environment. The dynamic development of digital technologies is associated with a dramatic increase in the widespread use of appliances and machines, which in turn results in increased electricity consumption and more electro-waste. It is estimated that the energy use of ICT could result in an 11 per cent increase in greenhouse gas emissions by 2030. Technology needs to be used in a smart and responsible way. Cloud computing, artificial intelligence and cognitive solutions, blockchain, 5G networking, IoT and virtual reality are among solutions that can help support sustainable use of technology. European DIGITAL SME Alliance is the network of ICT SMEs in Europe that represents 450000 enterprises in total. Its main priority is to promote the exchange of best practices and experiences in ICT sector between its members. It aims at strengthening the European's digital sovereignty through twin transition of the economy. The organisation has come up with a term Sustainable digital transformation. It refers to the process of digitalising the economy. European economy can transition into green economy and develop its ecosystem.

According to their proposition the sustainable digitalisation is based on three main concepts:

1. **B2B Digitalisation**- process of business-to-business relationships that involve transitioning from a traditional analogue company's solution to the digitalised one. It is a long-term process when digital software is introduced and the company slowly switches to the new ways of operating.

2. **Circular economy**- applying concepts of reusing and repairing but here we need certain policies in action where it is legal to repair certain things.

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Greener solutions need to be introduced when it comes to hardware and climate neutral CPUs (Central Processing Unit) and servers.

3. **Regulatory Framework and Innovation friendly policies**-policy makers need to adjust the policies to enable businesses to use innovative, circular economy models and greener friendly solutions.

The solution that can be implemented by companies to support the idea of sustainability are replacing standard computer servers with Cloud Computing, choosing eco-friendly internet hosting as well as responsible use of paper within the office environment.

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2. Learning objectives

In this module we will concentrate on developing competencies relating to the Sustainable Digitalisation. The term refers to the process of digitalisation that is conducted in a way that safeguards natural resources as well as respect environment and people.

In this chapter we will focus on the following topics:

- Internet Hosting
- Cloud Computing
- Sustainable use of paper

By the end of this module, we will be able to:

- ✓ Recognize the term Sustainable Digitalization
- ✓ Understand the definition of Internet Hosting and different types of fit
- ✓ Understand why is sustainable web hosting
- ✓ Know examples of green hosting providers
- ✓ Understand the environmental impact of paper
- ✓ Know how to reduce the use of paper within the office environment
- ✓ Understand the definition of Cloud Computing
- ✓ Recognize different types of Cloud Services
- ✓ Understand the process of Cloud migration and how to perform it
- ✓ Be familiar with examples of Cloud Project Management Systems and know how to access them

Professionals working with Erasmus Plus projects are involved in daily management of the projects that involves connecting and collaborating with partners through digital tools.

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Connecting with people from all over Europe, content writing, reporting and daily office tasks are activities that require the use of various digital tools. Sustainability practices here refer to choosing the best energy efficient solutions like green web hosting, cloud computing and reducing the use of paper which significantly affects CO2 emissions.

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3. Learning contents

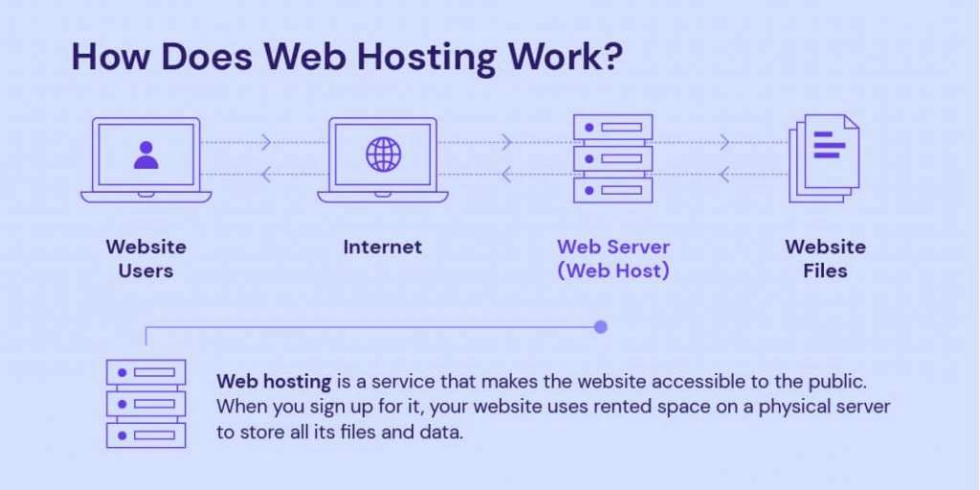
Chapter 1 – Internet hosting

1.1 What is web hosting?

Working with Erasmus Plus projects includes development of project websites and learning platforms. Project websites are the aimed at promotion of the project and can redirect us to the learning platforms that often is developed as one of the project results. In this case, choosing the right and sustainable web hosting is an important task.

In the simplest terms, **web hosting is an online service that allows you to publish your website or web application on the Internet**. When you sign up for web hosting services, you are essentially renting some space on a physical server where you can store all the files and data necessary for your website to function properly.

Hosting companies provide the hosting technology and resources required for your website to operate effectively and securely. They are responsible for keeping the server up and running, implementing security measures and ensuring that data such as text, images and other files are passed successfully to visitors' browsers.



Source: https://www.hostinger.com/tutorials/what-is-web-hosting/#What_Is_Web_Hosting

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Types of web hosting services:

Shared Hosting: because of its simplicity and affordability, shared hosting is an excellent solution for small businesses and personal sites that do not require advanced configuration or higher bandwidth. Thus, shared hosting is an excellent choice for beginners who need cheap hosting to get started.

Virtual Private Server (VPS) Hosting: with this type of hosting, your website also shares a physical server with other users. VPS hosting is a brilliant option for medium-sized sites, eCommerce shops and large blogs with rapidly growing visitor numbers.

Cloud Hosting: this hosting solution uses several virtual servers to host websites. So, if one server experiences heavy traffic or a problem, the others will take over and keep the website running.

WordPress Hosting: this type of CMS hosting service provides an optimised WordPress server environment to help your site load faster and minimise potential issues. In general, the best WordPress hosting plans come with features such as pre-installed themes, plugins for basic functionality such as caching and security, and other tools.

Dedicated Hosting: with dedicated hosting you have an option to configure the server and choose appropriate system and software. Thus, dedicated hosting is ideal for large online businesses dealing with heavy traffic.

Every year, the industry increases its use of digital technology. This leads to an increase in the need for energy to keep data centres running, leading to a 9% increase in energy consumption each year. Most hosting providers do not think about the energy their hosting consumes and the impact it has on the environment.

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1.2 Why is web hosting important?

Source: https://www.mightybytes.com/blog/green-web-hosting/

Despite its reputation as the 'greener' choice, the internet has a huge impact on the environment. This is growing with our global desire to consume more data. By investing in green hosting which is powered by renewable energy you can reduce the carbon footprint of digital services.

Green web hosting aims at reducing the impact of environment that is caused by the Internet. It refers to the use of eco-friendly practices and technologies in the operation of web hosting servers and data centres. Green web hosting companies typically use renewable energy sources, such as solar, wind, or hydroelectric power, to power their servers and facilities. They may also use energy-efficient hardware, employ recycling and waste-reducing practices, and purchase carbon offsets to mitigate their carbon footprint.

By choosing a green web hosting service, website owners can help to reduce their environmental impact and contribute to a more sustainable future.

We must remember that not all green web hosts are created equal. While we applaud any web hosting provider's commitment to sustainability, if they are not equally committed to security, data privacy, customer service and other important issues, then they are not worth supporting.

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Green hosting is important for several reasons. Among others:

- this can help reduce the environmental impact of the internet and promote sustainability. The internet and digital technology have become an integral part of our daily lives, and their energy consumption and carbon footprint are becoming increasingly significant. Green hosting can help reduce the carbon footprint of websites and data centres, which are responsible for a significant proportion of global energy consumption.

- by using renewable energy sources such as solar or wind power, green hosting can reduce greenhouse gas emissions and contribute to climate change mitigation.

- green hosting providers often use energy-efficient equipment, implement recycling and waste reduction practices, and purchase carbon credits to further reduce their environmental impact.

- green hosting can also be a way for businesses to show their commitment to sustainability and appeal to environmentally conscious consumers.

As more people and businesses move online, the demand for hosting services will continue to grow. By choosing a green hosting provider, website owners can help reduce their environmental impact and contribute to a more sustainable future.

How do you choose the right green host? There are various hosting provider practices that you can check before purchasing a green host. Some of these include, but are not limited to:

- Keeping work sustainable: this includes everything from using energy-efficient lighting to promoting paperless working and recycling.

- Using 100% renewable energy: this includes hosting using 100% renewable energy and other green power sources.

- Having green business certifications: the issue is whether the supplier has Renewable Energy Certificates (RECs), which verify that it uses renewable energy practices.

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- Providing carbon-neutral hosting: this refers to a carbon credit or certificate made available by the hosting company, confirming that CO2 or other harmful gases have been reduced to the amount specified in the certificate.

- Adherence to green office practices: this includes the use of energy-efficient and low-power systems. Mechanisms are being put in place to reduce the heat generated by servers and keep them running for longer.

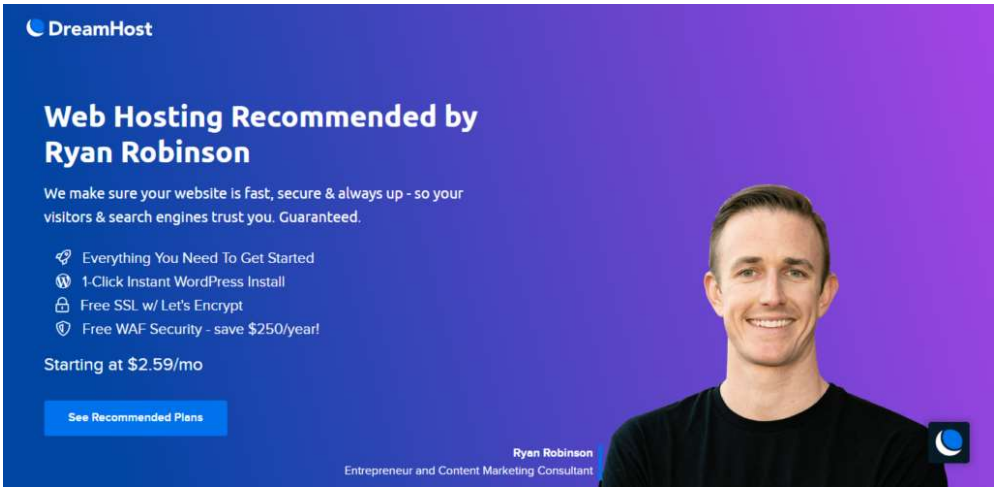
- Choosing the right green web host will give you the reassurance that by doing so you are actively contributing to caring for the environment.

1.3 Best providers of green hosting – examples

1. **DreamHost**

DreamHost is one of the most reliable hosting providers and is the provider of some of the best green hosting options on the market today. So, if you are looking for a green hosting solution, DreamHost seems to be one of the best options on the market.

In terms of environmentally friendly solutions: it uses ultra-efficient cooling systems, processors, HVAC and lighting systems to reduce the company's carbon footprint. In addition, DreamHost works with the state's clean energy programs and sources power from the grid, powered by green energy.



Source: https://www.dreamhost.com/

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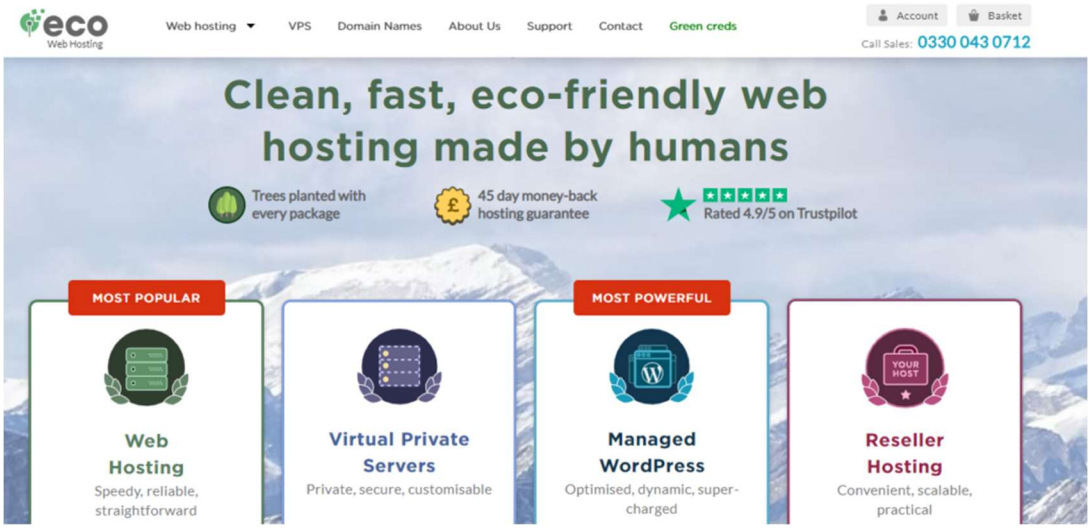
2. **Eco Web Hosting**

As it does not have a data centre located outside the UK, Eco Web Hosting is a limited tool and will only be suitable for you if you choose to operate in the UK. Eco Web Hosting not only works for eco-efficiency, but also supports conservation efforts. It works to restore biodiversity and provide natural habitats for animals. It also supports nature conservation in its home country of the UK.

In terms of environmentally friendly solutions: the company is VER certified, uses eco-friendly technology and allocates money to reforestation projects and forestry research.



Source: https://www.ecowebhosting.co.uk/

3. **GreenGeeks**

GreenGeeks offers super fast and super green hosting solutions. Using these you can automatically make your website carbon negative or carbon neutral. The company also buys three times more efficient energy than its competitors and holds various certifications to make it the greenest hosting solution provider.

In terms of environmentally friendly solutions: it has renewable energy certificates (RECs), US EPA Green Power partner and Bonneville Environmental Foundation (BEF) partner. GreenGeeks uses the most efficient energy sources for its data centres.

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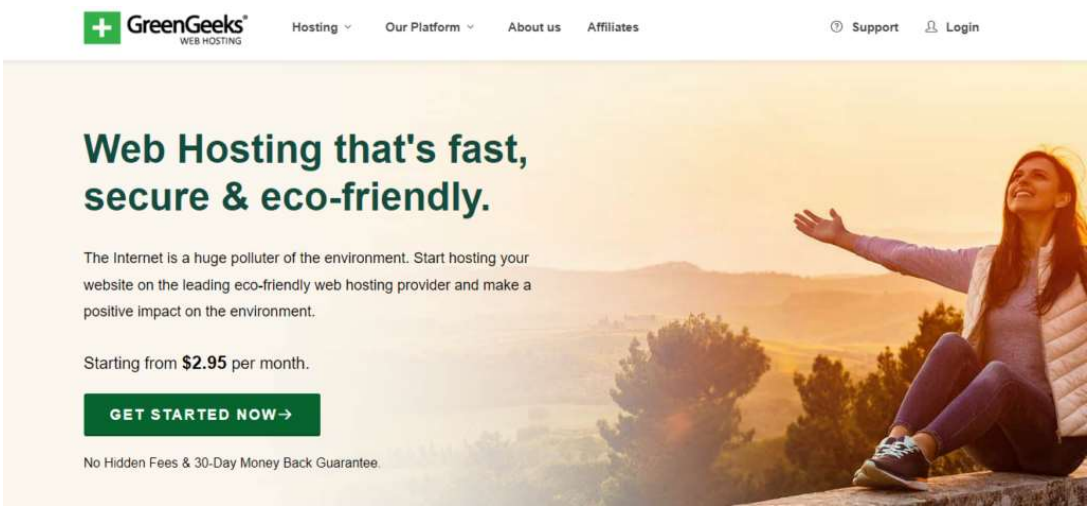

Source: https://www.greengeeks.com/

In addition, there is a green web hosting checker tool created by The Green Web Foundation, where we put the hosting company's URL into its search directory, which then gives an instant result on the green status of the site. You can try out the tool by visiting this link: https://www.thegreenwebfoundation.org/

1.4 Practical activity

Imagine you are faced with choosing a host for your website. You are very keen that the solutions practised by the hosting company in question are environmentally friendly and sustainable. You have many such companies to choose from, but they differ in the way they are committed to the environment. Which, in your opinion, points from the list below do you consider most desirable when choosing a green web host?

- Possession of a certificate from an environmental organisation
- Using only renewable energy sources
- Financial support for the environment
- Use of green practices within the company
- Providing carbon-neutral hosting

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- Cooperation with national clean energy programmes

Then briefly justify why you chose these factors. How do you think hosting companies could further contribute to environmental efforts? Think about and then write down your ideas on a piece of paper or on your computer.

Source: https://pl.freepik.com/

Chapter 2 – Cloud computing

2.1 Definition and importance for EU projects.

Source: https://pl.freepik.com/

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Managing EU project is a continuous process when all project partners are working together on the **projects' results**. These results often include educational materials which are then transferred to a learning platform. Each project is also disseminated through various social media channels. To be able to cooperate in creation of these results and work together on the promotion of the project, partnership need to be actively communicating and collaborating with each other. Traditional email is still very much used and relevant, yet there are much more efficient tools that can be used for quick communication. And this is where we can mention cloud computing in general, as a way of allowing partners' collaboration in an effective way.

Cloud Computing is the delivery of cloud services like servers, database, storage, networking, software, analytics, and intelligence through Internet which can be defined as „the cloud ". It allows on-demand access to all of the above and it is hosted at a remote data centre managed by a cloud services provider (or CSP). The resources that are stored in CSP are available to its users for a certain fee or monthly subscription. More and more companies are switching to cloud- based management systems as it offers them a lot of benefits:

- ✓ **Easy access-** all workers can access it easily provided with an internet connection. It is also a lot easier also with the use of smartphones and tablets. You won't need to connect with company's server or work on specific platform only.
- ✓ **Ease of use-** using cloud-based systems is easy and do not require specific training**.** All you need is to connect through social media platform.
- ✓ **Lower cost-** you are able to eliminate the cost of setting up and running on-site data centres that requires buying hardware and software, paying electricity to run the devices and workforce to maintain the system.
- ✓ **Better productivity-** employers productivity is increase as they can access all information in one place easily without the need to physically write and send everything.
- ✓ **Increased collaboration-** having all documents in one centralised place makes it easier for employers to collaborate on it as they can all easily see it.

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- ✓ **Security-** access to the resources is protected by passwords so that there is a limit as for who can see the information.
- ✓ **Reliability-** data backup is more secure as data can be duplicated at **multiple** redundant sites on the cloud provider's network.

According to the report "IT investments towards the development of Polish companies in the years 2021-2022. Cloud and new technologies" carried out by Computerworld in Poland one in four large organisations uses a private cloud, 30% simultaneously use multiple cloud service models, i.e., IaaS, PaaS, SaaS at various hybrid cloud providers. Also 30% use cloud computing in the IaaS model - infrastructure as a service. According to 67% of respondents, cloud computing will be or is already a major driver of technological change.

Above all, cloud computing has also a very significant benefit to the environment as it significantly **reduces energy consumption**, waste and greenhouse gas emissions. Microsoft corporation states that it is 93% more energy efficient than traditional data centres.

Maintaining data centre requires a constant power supply for the servers as well as operating a colling system so they do not overheat. When they end their lifecycle, they also create an extra waste. According to research by Berkeley Lab and Northwestern University and funded by Google businesses can cut their energy consumption by 87% by using cloud-based services.

Traditional data centres require 24 hours a day, constant energy demand that according to The International Energy Agency (IEA) study consume roughly 200 terawatt-hours (TWh) of electricity. That is 1% of global electricity demand and can generate 0.3% of the global GHG emissions.

Cloud computing also uses **Virtualization** to contribute to sustainability. Virtual machine simulates physical machine and have their own central processing unit (CPU), memory, network interface, and storage, but they are independent of physical hardware. Companies can, for example, replace a traditional server with a VM to stream videos. That can help to minimize the carbon footprint by reducing the use of energy.

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2.2 Types of cloud services.

There are different types of computer clouds available and is best to determine which solution can be working the best ways for your organisation.

The first thing to do is to decide which cloud computing architecture you may need.

Public Cloud is a system where a third- party is delivering computing resources like servers and storage over the Internet. The resources can be accesses through the web browser.

Private Cloud can be located on a company's data centre or provided by the third-party service. Service and infrastructure are maintained on a private network.

Hybrid Cloud involves combination of both Private and Public Clouds that are connected with each other where technology enables data and applications to be shared between them.

Multi Cloud is a cloud model where you can use multiple instances of multiple clouds from different providers. The multicloud model provides access to different features, underlying infrastructure, security and other vendor-specific elements. By implementing a multi-cloud strategy, businesses and organisations therefore gain access to offerings from different providers, enabling them to place their data in an environment that best suits their capabilities.

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Source: https://www.connectria.com/blog/public-private-and-hybrid-cloud-which-one-is-right-for-your-business/

We can distinguish four categories of Cloud services: Infrastructure as a service (IaaS), platform as a service (PaaS), serverless, and software as a service (SaaS).

Each type of infrastructure eases the flow of user data from and to clients through the internet to the cloud service provider's systems but they all differ in what is provided.

Infrastructure as a service (IaaS) refers to using on-demand infrastructure resources. These can include virtualization, storage and networking. When you move your company's infrastructure to IaaS you can save money on hardware costs and reduce maintenance of data centre. Examples will be Amazon Web Services and Microsoft Azure.

Platform as a service (PaaS) provides on demand environment for delivering hardware and software tools to users over the internet. It involves the full life cycle of an internet application and includes elements like web development, testing, managing and lastly, updating. Examples include AWS Elastic Beanstalk or Google App Engine.

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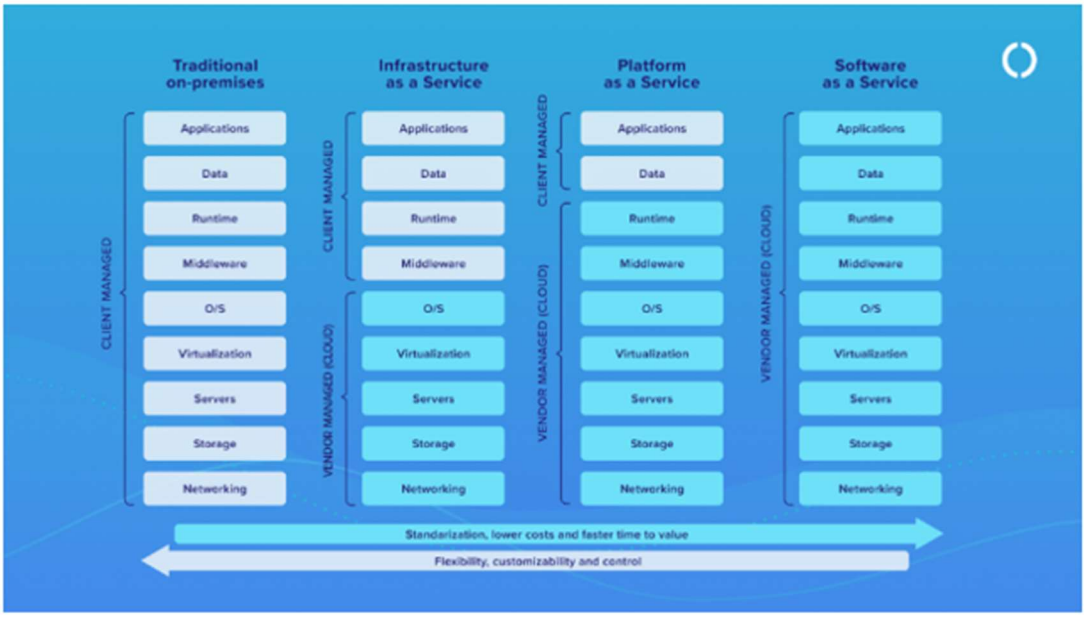
Serverless computing is a cloud computing application model in which the cloud provider allocates machine resources on demand and handles the setup and server management. The developer/architect focuses solely on creating the business logic, rather than the infrastructure on which it is to be executed. Example here can be Slack or Google Cloud solutions. When creating a serverless solution, the developer does not have to concern himself at all with setting up machines, updating operating systems, configuring networks or scaling applications. This responsibility is taken over by the provider of the serverless service in question, e.g., Amazon, Microsoft, Google. Each of the large public cloud providers has what we might call serverless services on offer.

Software as a service (SaaS) is a model where users can connect and then use the cloud apps through the internet. It provides you with a complete software solution that you can purchase on a pay as you go basis from a cloud service provider, for example, Microsoft Office 365. Using SaaS, cloud providers host and manage the application and the underlying infrastructure. They also take care of its maintenance, software updates and security patches. Users only connect to the application using Cloud Computing over the internet, using a phone or computer, which is usually done via a web browser.



Source: https://oktawave.com/pl/blog/chmura-obliczeniowa/

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2.3 How to manage migration to the cloud

Cloud migration is a process of transferring data and applications from the local Internet systems to the cloud. This can be done partially or involves moving to the cloud as a whole. The whole process requires preparation an analysis beforehand so that the cloud solution will be adjusted to the needs of the organisation.

The first thing to start with is to perform an audit at the company to make a full list of IT systems that are used and that will be moved to the cloud. Then the systems need to evaluated in terms of which are the most essential for the functioning of a business and which can be considered as assistive only. Some of the systems may at this stage, be no longer needed and need to be replaced with, for example, SaaS services.

There are two options that can be used to choose the systems that need migration:

1. Migrating minor systems
2. Migrating more important systems and then running them in parallel so that here behaviour is tested and compared in the cloud and in the on-premises model

You must consider two factors when considering its cloud migration strategy. One of them is the deployment model, whether it is a public, private, hybrid or multi cloud. The second refers to the service category. Will that be SaaS, PaaS, Iaas or Serverless computing?

You need to make a list of an inventory of the technology stacks used in systems and determine how much infrastructure like servers and storage space is used in any of these systems.

There are services suppliers who can perform such services if the company does not have the internal resources to perform such a „physical inventory “or find a cloud supplier who can after auditing execute a migration.

Taking the above into consideration you may adopt a three main types of cloud migration approaches:

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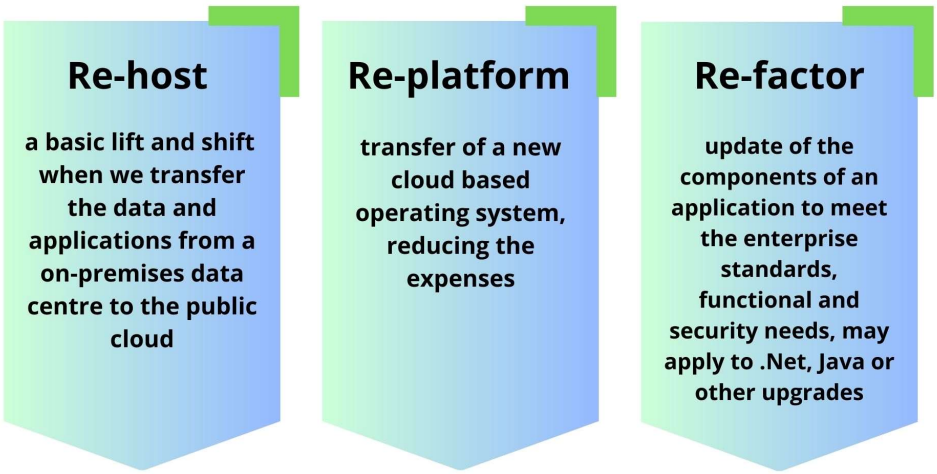

There might be some problems that may occur during cloud migration which some you may find challenging:

1. Some applications might be difficult to move.
2. Some of the applications need to be modernized so they can perform optimally in the cloud.
3. How to manage moved applications?
4. How to resolve infrastructure and application dependencies in order to reduce risk, time and cost.

Google Cloud Platform is the third largest cloud service provider in the world. It delivers business ready cloud services. The company undertakes many actions to fight climate change. In 2010 Google stated to look for cleaner energy sources and add it the grid so that they can reimburse their consumption. It plans to be carbon free by 2030 and aims at removing all carbon that is created by its energy usage by 2050. In 2020 they also introduced tracking the carbon free energy percentage (CFE%). What it does is it tracks he average percentage of carbon free energy that is used in certain location on an hourly basis. It also considers the carbon-free energy that Google added there. CEF% describes the average percentage of time that a company uses their applications using carbon free energy.

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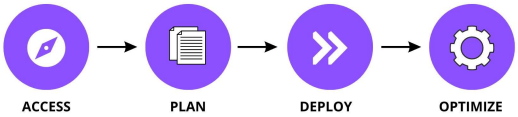
Learn how to migrate your resources to the Google Cloud through the following video:

Source: *https://www.youtube.com/watch?v=Bqhvb9eMrss&t=51s*

The process of migration first starts with identifying your current environment and apps and resources to migrate.

It can presented illustrated by the following diagram



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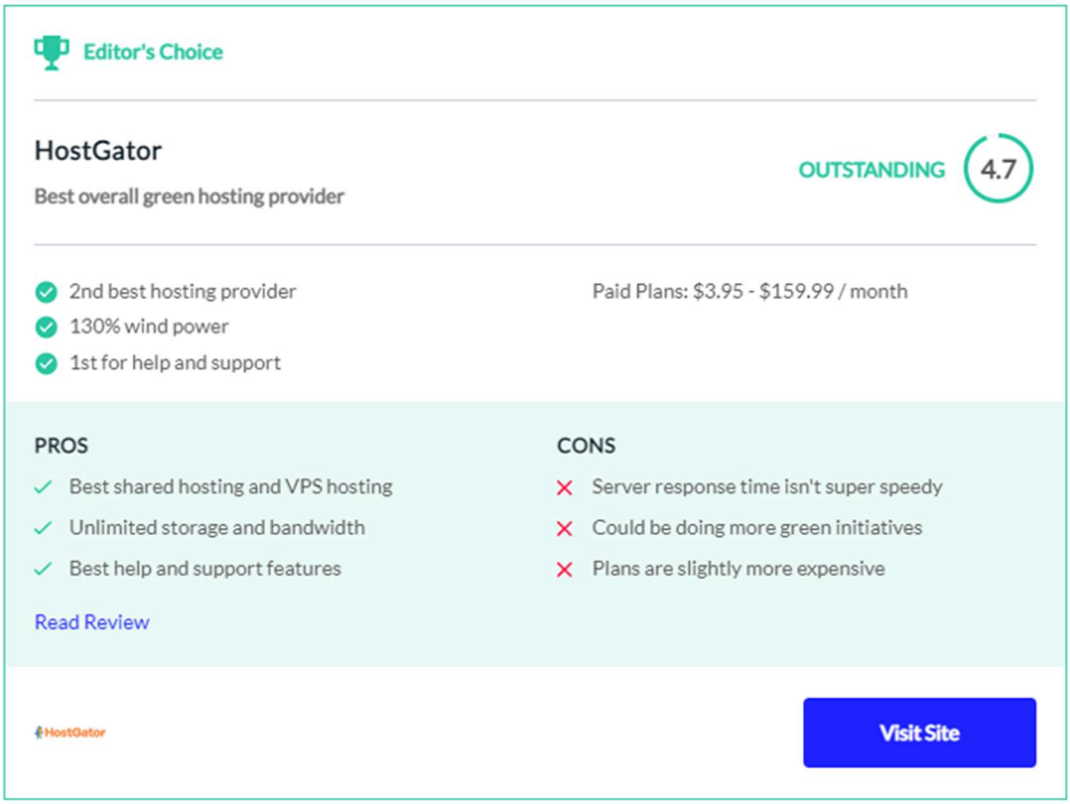
2.4 Examples of Cloud Project Management Systems

Choosing **Cloud Computing System** can improve your overall performance and can help your maintain security with your documents and resources. When deciding which system to use you need to consider what do you need the service to do and what practical features will work out the best for your needs. Different cloud systems can have slightly different features.

HostGator is the cloud service that has been voted as very green. It uses renewable energy and 130% of wind power to cool the servers they use. It still has lots to do in terms of their commitment to fighting climate change but it has been voted the best solution in terms of what they offer in Editor's Choice. They offer the cheapest price plan with unlimited storage and bandwidth, a free migration option and free unlimited subdomains in the first year. You are also offered a great customer service with their 24/7 live chat and 24/7 phone support.



Source: https://www.websitebuilderexpert.com/web-hosting/green/

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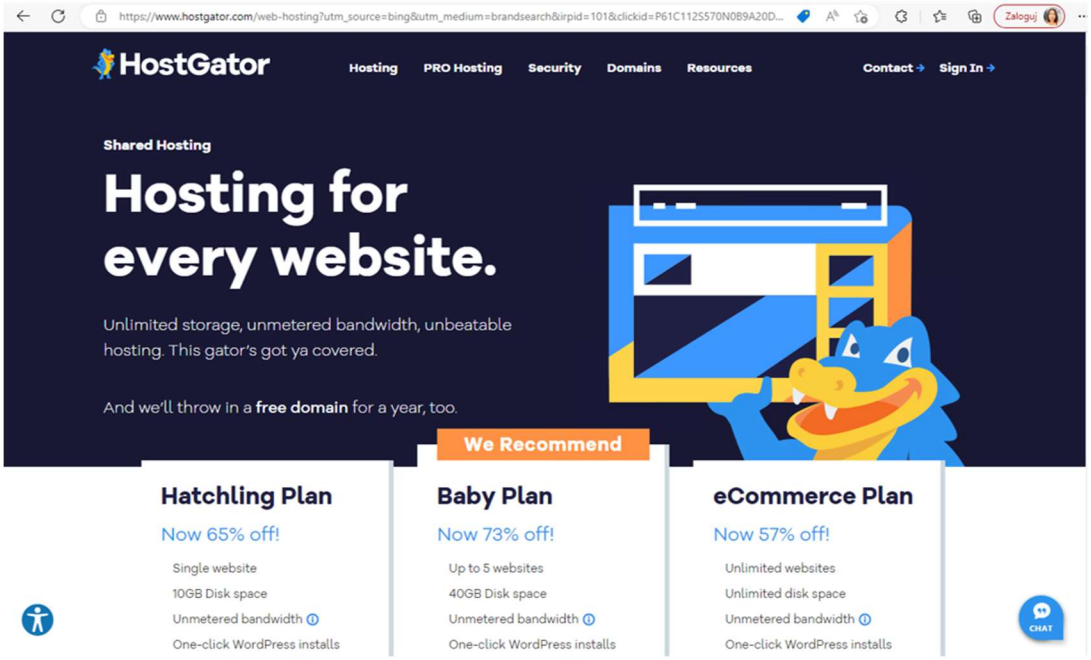
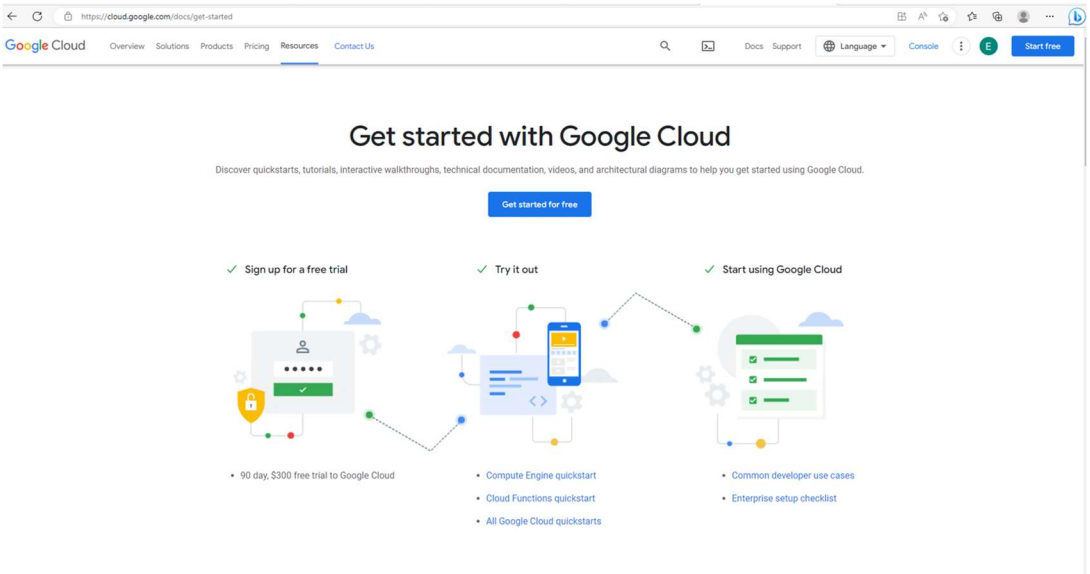


Google Cloud is a very convenient cloud computing system which has a straightforward interface. It is very secure and offers analytics to give you an extra insight into your data.



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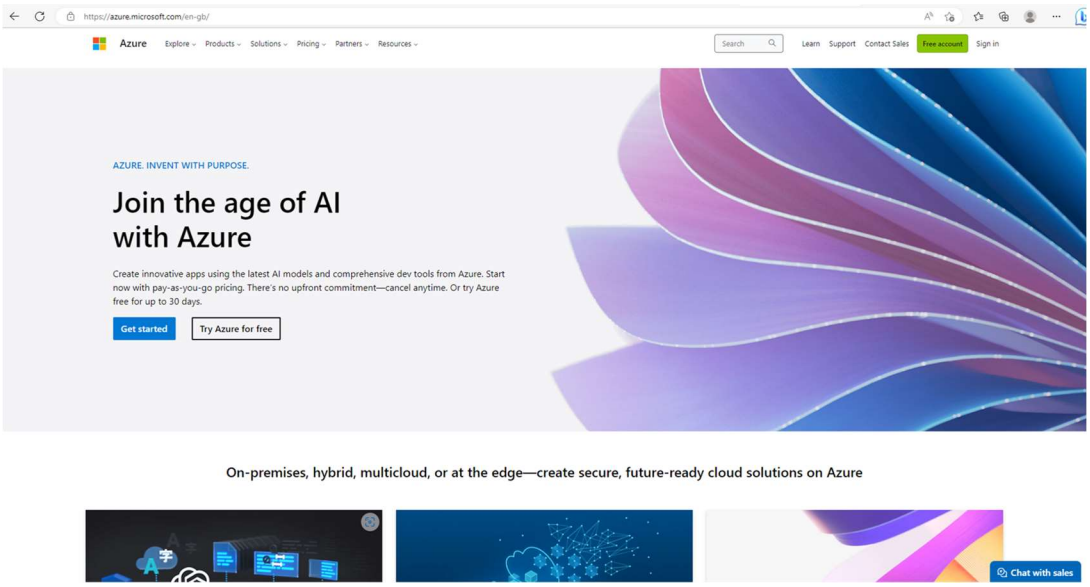
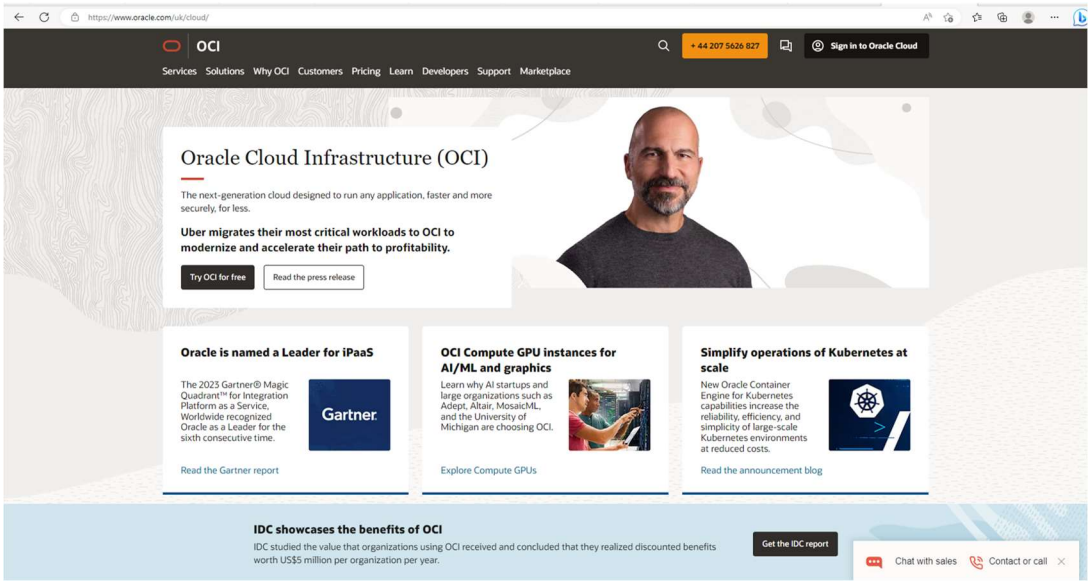
Microsoft Azure offers Virtual machines and durable storage accounts. It allows creating cloud applications for web and mobile through hybrid cloud services.



Oracle is a hybrid cloud service that offers many services and solutions. It has a cloud backup and you are able to recover data so it is very safe to use. It is easy to use for beginners with its straightforward interface. Data can be easily migrated.



AWS (Amazon Web Services) Cloud is a very popular computing service offering features cloud migration, cloud operations, content delivery, database migrations,

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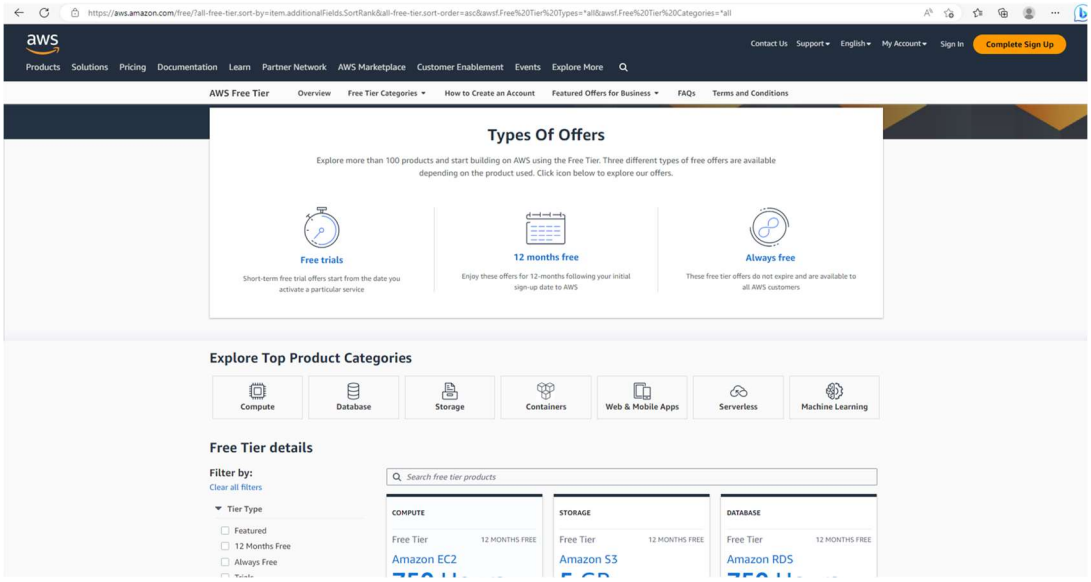
data lakes, analytics, edge computing, and front-end web & mobile development. It can be used by any industry, such as marketing, advertising, media, entertainment, retail, industrial, financial services, etc. It offers Elastic Compute Cloud which is easy to set up and use for beginners.



2.5 Practical activity

Please list advantages and disadvantages that cloud computing may bring for the management of your project.

Use template available here:
https://www.canva.com/design/DAFiao81Cx0/qrdusDSeAksSJY6TaL7bYQ/edit?utm_content=DAFiao81Cx0&utm_campaign=designshare&utm_medium=link2&utm_source=sharebutton

2.6 Case study

Evernote- a cross platform for note-taking and task management application aimed at helping its users to organize ideas, tasks and deadlines.

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Migration objective: by managing on -premises servers Evernote was limited by its infrastructure and it proved to be time-consuming and expensive to maintain. They wanted to improve their speed, reliability, security a recovery procedure.

Strategy: concentrating on test parts of the migration before committing fully. They added levels of security so that they improved their recovery processes.

Results: Migration of 5 billion notes and 5 billion attachments in 70 days

Conclusions and findings:

- ✓ Cloud migration can be conducted in parts, not all in once. Services can be grouped by service or users first.
- ✓ Concentrate on security- Evernote worked with Google who provided them with extra security layers

Chapter 3 - Cutting on paper use

3.1 The environmental impact of paper

Ever since the first paper was made by the ancient Egyptians from a papyrus stem, it has become one of the most important elements in the lives of people all over the world.

While the huge waste of paper products is a huge environmental concern, there are actually as many as three steps in the paper-making process that have significant negative consequences for the world around us. More than 30 million acres of trees, mostly from old-growth forests, are harvested from around the world to provide the 420 million tonnes of paper needed to meet global demand. 420 million tonnes of paper are equivalent to two sheets of paper for everyone on Earth every hour!

Researchers estimate that demand for paper will double between 2005 – 2030.

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Cutting down trees for paper has a drastic impact on the plants, animals and people living in the area. Biodiversity of wildlife can be affected, as well as soil fertility and water quality, but this is only the beginning of the process. Paper production is one of the processes that contributes to the deforestation of our planet, which in turn accelerates man-made climate change.

Huge amounts of water are needed to produce paper (it is the third largest industrial user of water), and **highly toxic chemicals** such as chlorine compounds **are often added to bleach the paper**.

It is estimated that more than 200 million tonnes of hazardous substances are released into the air and water each year, and paper production ranks as the fourth largest industrial emitter of greenhouse gases. Although the situation is improving thanks to the clean air and water laws, there is still much that consumers can do to reduce waste.

The environmental impact of paper production is significant. Its production affects many areas of the environment. To mitigate this impact, many paper companies are implementing sustainable forestry practices, using recycled paper, reducing water and energy use in production and using fewer harmful chemicals. In addition, individuals can reduce their paper consumption by opting for digital communications and using paperless options such as e-invoices and e-tickets, as well as recycling paper products.

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Source: https://pl.freepik.com/

3.2 The concept of *paperless* - how it can help make the business world more sustainable

The EPA - the US Environmental Protection Agency - estimates that office workers use approximately 0.91 kg (2 pounds) of paper documents, folders, as well as envelopes and cardboard packaging every working day. This is the equivalent of 182 sheets of 80gsm A4 paper. Meeting such a huge demand, as well as producing printer ink and toner, involves serious environmental pollution. Experts cite as the biggest threats:

- air pollution - emissions of nitrogen dioxide, sulphur dioxide and carbon dioxide (NO_2, SO_2, CO_2);
- water pollution - nitrogen and phosphorus increase the risk of eutrophication of water bodies;
- poisoning by toxic, volatile organic compounds, heavy metals or non-renewable oils.

The vision of paperless offices, which was regarded as science fiction a few decades ago, is slowly becoming standard today. The term paperless office first appeared in publications from the second half of the 1970s. Initially, the aim was to improve bookkeeping and organise documentation - today, progressive digitisation and new technologies offer many more possibilities. Thanks to electronic document

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circulation, it is possible, for example, to control who viewed the documents, when they were viewed, what changes were made and so on.

Paperless refers to the process of conducting business or personal tasks without the use of paper. In a paperless system, information is created, shared, and stored electronically, eliminating the need for physical paper documents. This can be done through the use of computers, mobile devices, and cloud-based storage services.

Paperless systems can include electronic documents, digital signatures, online forms, and electronic payment methods. They can also involve the use of technologies such as document management systems, optical character recognition (OCR), and workflow automation software.

The move towards paperless systems is driven by the desire to reduce paper waste, increase efficiency, and reduce costs associated with paper-based processes. Paperless systems can also improve security by reducing the risk of physical documents being lost, stolen, or damaged.

While paperless systems offer many benefits, they also require careful planning and implementation to ensure that they are effective and secure. This can involve training coworkers on new technologies and developing policies and procedures to govern the use of electronic documents and data.

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Source:https://people.acciona.com/innovation-and-technology/paperless-office/?_adin=02021864894

The transition to a paperless organisation mainly involves digital transformation. Nothing is possible if you do not make use of the technologies that enable this

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change. This concept provides you with sustainability, savings and greater profitability. However, it also poses great challenges.

Digital transformation offers a more sustainable world, and if you take advantage of this opportunity can save and prosper even more.

3.3 How to reduce paper consumption in the office – tips

Did you know that the average office worker uses 10,000 sheets of copy paper a year? Or that an estimated 45% of all documents printed in offices end up in the bin at the end of the day?

Paper waste is a big problem in business, and if you can reduce the amount of paper waste in the workplace, you can have a positive impact on the environment. In fact, paper accounts for the largest proportion of non-recycled waste generated by offices.

Reducing paper consumption in the office not only helps the environment but can also save money and improve productivity.

Here are some tips on how to reduce paper consumption in the office:

- ✓ **Go digital:** Encourage employees to use digital methods for communication and document sharing, such as email, cloud-based file sharing, and electronic signatures.
- ✓ **Print only when necessary:** Print only when it is absolutely necessary and avoid printing multiple copies of the same document.
- ✓ **Print double-sided:** Set your printers to automatically print double-sided. This will save paper and reduce printing costs.
- ✓ **Use recycled paper:** When printing is necessary, use recycled paper. This reduces the environmental impact of paper production.
- ✓ **Use paperless billing:** Switch to electronic billing and payments to reduce the amount of paper used for invoices and statements.
- ✓ **Reduce paper waste:** Set up recycling bins in the office and encourage employees to recycle all paper products.

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- ✓ **Digitize archives:** Scan paper documents and store them digitally to reduce the need for physical storage space.
- ✓ **Use whiteboards:** Instead of using paper for notes and brainstorming sessions, use whiteboards or other reusable writing surfaces.

Taking the first steps to reduce paper waste is quick and easy. You can immediately stop printing all documents, take paperless notes and start using the cloud to store documents using different software.

Source: https://pl.freepik.com/

In general, reducing paper consumption in the office can have a positive impact on the environment, while saving money and increasing productivity.

3.4 Case study – paper saving in the company

YALE UNIVERSITY – REDUCING PAPER USE POLICY with SIGNAGE AND BINS

Yale universtity has introduced it‘s own policy reffering to the use of bins and using appropriate signs to communicate the proper ways of waste disposal. By using the appropriate signs on the bins there is a clear message communicated for everyone how to use them. Bins are labelled with additional signs displayed nearby to what and what not to place in a bin. Bins also need to be available, accessible and displayed in the right places.

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Yale provide a larger container by the desks which has recycling information attached to it. It has a smaller container inside it for non-food waste.

Source: https://sustainability.yale.edu/take-action/managing-materials/best-practices-signage-and-bins

Below you can see what signage they use with explanantion which paper can be put in a bin and which not.

ACCEPTABLE	NOT ACCEPTABLE
White paper	Paper clips
Colored paper	Hanging files
Glossy Paper	Food Service paper
Newspaper	Paper cups
Thin cardboard	Copy paper wrappers
Paper bags	
Envelopes with windows	
Manila folders	
Sticky notes	

Source: https://sustainability.yale.edu/take-action/managing-materials/best-practices-signage-and-bins

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3.5 Practical activity

With a view to reducing your company's paper consumption, match appropriate practices to activities.

ACTIVITY	WHAT CAN I DO?
PRINTING	ONLINE COLLABORATION AND FILE TRANSFER BY E-MAIL
DISTRIBUTION OF LEAFLETS AND NEWSLETTERS	USE OF RECYCLED PAPER
TAKING NOTES	USE OF BOTH SIDES OF A SHEET OF PAPER AND LIMITATION OF NEW PRINTOUTS TO THE MINIMUM NECESSARY
DOCUMENT SHARING	DISSEMINATION OF CONTENT AND INFORMATION BY E-MAIL AND/OR WEBSITE
USING OF PAPER	USE OF A WHITEBOARD OR NOTEPAD ON THE COMPUTER

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https://sustainability.yale.edu/

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5.1 Exploitation of the practical activities given in the module under the trainer perspective

Practical Activity 1

Type of activity: individual or group work

Time: 20 minutes

Material: computer

Description: Please read through pros and Cons of Cloud Computing. Provide a few examples to students and then ask them to come up with their ideas. The objective of this task is to realise can cloud computing improve digital sustainability and what possible challenges it may bring.

Additional source for the trainers with example advantages and disandvantages of cloud computing. Trainers can also refer to the following articles: https://www.zdnet.com/article/cloud-computing-pros-and-cons/ and https://www.javatpoint.com/advantages-and-disadvantages-of-cloud-computing

ADVANTAGES	DISADVANTAGES
• No specialists (employee side) • Low start-up threshold (especially for start-ups) • Speed of start-up (time-to-market) • Cost savings • Availability • Data security • Ready-to-use solutions • No messing about in the Data Centre	• Costs • Complicated pricing model for cloud services • Cloud data transfer costs money • Lack of specialists (from the employer side) • Data security (we trust that it is safe there) • Flexibility (when we don't set limits) • Multiplicity of services • When migrating, need in application architecture

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• Unlimited possibilities which can only be limited by our ingenuity • Access from anywhere • Disaster recovery in the cloud for local resources • Cost optimisation as you get to know your services better • Sets of best practices replicated in various cloud projects • We "control" devices not physically but through code • Very dynamic development of the cloud, more and more new solutions • Easier to adapt the application to new legislation such as RODO • Good documentation • A.I. as a Service (image recognition, face comparison, text reading) • Ability to develop solutions in different technologies	• Like any novelty needs time to adapt and learn • Belief in the cloud - we think that once we are in the cloud it is secure and will be cheap • Lack of general understanding of the cloud at management level • Low technical awareness • Lack of flexibility in unusual solutions • Resistance of large organisations to change • Possible increase in cost per service • Lack of control (e.g., during failure) • Designing more complex cloud solutions requires more advanced knowledge than basic knowledge of its services • Service usage limits • Less possibility to use customised solutions

Practical Activity 2

Type of activity: individual or group work

Time: 30 minutes

Material: computer

Description: https://krystal.uk/green or https://raidboxes.io/en/platform/green-wordpress-hosting/ are great examples of companies that are very clear about their sustainability approach

Practical Activity 3

Type of activity: individual work

Time: 5-10 minutes

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Material: computer

Description: Objective of the activity is to realise ways of reducing the paper use.

Answers:

PRINTING- USE OF BOTH SIDES OF A SHEET OF PAPER AND LIMITATION OF NEW PRINTOUTS TO THE MINIMUM NECESSARY

DISTRIBUTION OF LEAFLETS AND NEWSLETTERS- DISSEMINATION OF CONTENT AND INFORMATION BY E-MAIL AND/OR WEBSITE

TAKING NOTES- USE OF A WHITEBOARD OR NOTEPAD ON THE COMPUTER

DOCUMENT SHARING- ONLINE COLLABORATION AND FILE TRANSFER BY E-MAIL

USING PAPER- USE OF RECYCLED PAPER

5.2 Other practical activities

Practical activity 4

Type of activity: Self-evaluation questions

Time: Up to 10 minutes

Material: Sheets of paper and pens (only if participants do not do the exercise on computers/laptops)

Description: To test participants' knowledge of what hosting is in general and the concept of green web hosting.
Participants read the questions and then tick one of the given answer options, indicating their level of knowledge of the issues related to the topic of the exercise.

Questions for the activity:

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1. I know what web hosting is and what it is used for.
    - poorly
    - sufficiently
    - good
2. I can name the types of web hosting and indicate the main differences between them.
    - poorly
    - sufficiently
    - good
3. I can define 'green hosting' in simple terms.
    - poorly
    - sufficiently
    - good
4. I am aware of ways in which hosting companies are trying to reduce their environmental impact.
    - poorly
    - sufficiently
    - good
5. I know of examples of green hosting providers.
    - poorly
    - sufficiently
    - good

Practical activity 5

Type of activity: Discussion, brainstorming

Time: 20-25 minutes

Material: A computer and projector to show the film to participants, possibly some paper and pens to write down participants' ideas during the brainstorming session

Description: Let the participants watch this short film:
https://youtu.be/HC_D3KYlwhA

After watching, ask them about the strengths and weaknesses of the strategies presented in it. Then discuss which solution is best and why. Brainstorm with

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participants on other strategies, not mentioned in the video, for getting the company as paperless as possible.

5.3 Tips and examples of best practices to apply this module to your own training activity

DO	DON'T
• Familiarise yourself well with each activity to ensure that you have a good understanding of its purpose and the theme on which the activity is based. • Ask participants for feedback to get their opinions on the activities. • Focus on different aspects of each activity and try to add variety to better encourage participants. • Be prepared to answer questions if necessary. • With each activity, encourage learners to delve more deeply into the topic and to implement more environmentally friendly behaviour. • Try to help learners if they encounter any problems during any of the activities.	• Avoid using pieces of paper if it is possible to do the exercise on a computer. • Do not ask learners to do more than the activity provides for the module, as they may not have enough knowledge and will feel lost. • Do not be critical of participants. • Avoid too much theoretical information - focus on practice in activities. • Do not be in too much of a hurry to do the activities, as everyone works at their own pace and some participants may need more time to do them. • Do not make participants do everything at once - it is better to divide the activities into smaller parts, the knowledge from which will be easier for them to assimilate.

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Module assessment

1. You have just received a plan for a company meeting with co-workers. What will you do?
    A. I will print out a copy of the plan for each participant in the meeting. (2 points)
    B. I will print out a copy of the plan for myself only and send it to the rest of the participants via email. (3 points)
    C. I will send each colleague an email with an attachment which will include the meeting agenda. (4 points)
    D. I will print out at least two copies of the plan for everyone, in case it should get lost. (1 point)

2. You are thinking about choosing a host for your website. What will be your primary consideration in this situation?
    A. The price. (1 point)
    B. The popularity. (2 points)
    C. The environmental friendliness. (4 points)
    D. The user feedback. (3 points)

3. When choosing a green host, what will be most important to you?
    A. The host is certified as environmentally friendly. (4 points)
    B. Referral of a host by friends. (2 points)
    C. Ensuring the host leaves as small a carbon footprint as possible. (3 points)
    D. Host popularity in the country. (1 point)

4. Where do you start to introduce the paperless concept in your company?
    A. With replacing regular printing paper with recycled paper, but still printing the same number of documents. (1 point)
    B. With reducing printing to the bare minimum. (3 points)
    C. With taking notes on a laptop/computer instead of on paper. (2 points)
    D. With printing everything double-sided and keeping document printing to a minimum. (4 points)

5. What benefits do you see from reducing your company's use of paper?
    A. Financial savings. (1 point)
    B. Extending the company's digitalisation in this way. (2 points)
    C. Reducing the harmful impact that paper production has on the environment. (4 points)

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D. Better image in the market due to environmentally friendly attitude. (3 points)

6. Why would you decide to switch to a cloud-based management system in your company?
   A. Because it significantly reduces energy consumption, waste and greenhouse gas emissions. (4 points)
   B. Because other companies do so. (1 point)
   C. Because the company will be perceived in the market as adopting a pro-environmental attitude. (2 points)
   D. Because this will increase the efficiency and productivity of employees. (3 points)

7. The use of digital technologies in industry:
   A. Increases every year, which can be seen as a positive development. (3 points)
   B. Has an environmental impact, but it is negligible. (1 point)
   C. Is a phenomenon that should be curbed because of its devastating impact on the environment. (2 points)
   D. Leads to a 9% increase in electricity use each year. (4 points)

8. Companies choosing to reduce paper consumption:
   A. Can achieve great results with this. (4 points)
   B. May expose themselves to losses in the long term. (1 point)
   C. Contribute significantly to reducing the carbon footprint and pollution caused by paper production. (3 points)
   D. Need implementation of new technologies to make such a change. (2 points)

9. You want to apply a cloud solution to your business. You want the best possible protection for the data placed there. What type of cloud will you choose?
   A. Hybrid Cloud. (3 points)
   B. Private Cloud. (4 points)
   C. Public Cloud. (2 points)
   D. It doesn't matter, because they all basically work the same way. (1 point)

10. Host companies can work to improve the environment by:
   A. Limiting their services to certain users. (1 point)
   B. Using renewable energy sources. (4 points)
   C. Subsidising certain environmental programmes. (3 points)
   D. Requiring users to pay extra for using their services. (2 points)

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