Protecting children from online risks while using Hatch's game streaming service

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The purpose of this thesis is to provide a comprehensive understanding of new technology in mobile game experience, game streaming, and how children are protected from online risks while using the case company's game streaming service.

To achieve the objective, which is to present the current solutions based on the development of the case company with the latest theories and from what happened in the past, the author has been using secondary research as his main research method. Secondary data resources and data sets have been collected and analyzed for the findings. The chosen research method for the thesis includes a literature review, secondary analysis and a case study.

The study has found that different matters have been carried out by the case company through its online safety measures. Technical measures are manual moderation and automation with supporting tools being implemented to the platform. The community guidelines and products have been developed by following the stated regulations and guidelines from policy makers concerning child online protection. Also, there are recommendations, which the case company can consider in its future developments.

In summary, this thesis has been completed as basic analytical research. The case company has taken different online safety measures into the development of its policies and products to protect children from online risks while using the service. Accordingly, the case company tries to mitigate and remove risk factors coming mostly from user-generated content in its products. Especially, a separately independent product eliminating almost risk factors which is suitable and safe for kids, has been built and recognized by organizations concerning children's rights.

Contents

List of abbreviations

AI:	Artificial Intelligence
COP:	Child Online Protection
CSAM:	Child Sexual Abuse Material
ESRB:	Entertainment Software Rating Board
GDPR:	General Data Protection Regulation
IARC:	International Age Rating Coalition
ICT:	Information and Communication Technology
ISP:	Internet Service Provider
ISS:	Information Society Service
ITU:	International Telecommunication Union
NSPCC:	National Society for the Prevention of Cruelty to Children (in the United Kingdom and the Channel Islands)
PEGI:	Pan European Game Information
UNESCO:	United Nations Educational, Scientific and Cultural Organization
UNICEF:	United Nations Children's Fund

List of definitions

Bullying:	Behavior of hurting someone else including physical, verbal, non-verbal and emotional types of abuse.
Cloud gaming:	An online gaming service where games are run on remote servers as known as cloud servers and those games are streamed directly to user's devices (computers, consoles, mobile phones, tablets).
Latency:	A delay of an action.

Online Safety:	The act of individuals being safe from online harms and risks, also known as internet safety and cyber safety.
Paedophile:	An adult who is sexually interested in children.
Streaming:	A technology of transferring data in a steady, uninterrupted flow over a computer network to receive and process the data.

1   Introduction

Many children nowadays have early access to mobile devices such as mobile phones and tablets. Due to the emerging of mobile gaming platforms, the world has seen many incidents that are related to children's safety from virtual world. One of the biggest and most viral was Habbo Hotel paedophile incident few years back in 2012 (Itv 2012).

So 'protecting children from online risks' must be taken into considerations in every gaming company. Many companies and organizations have been constantly implementing and developing online safety and security for their services. Hatch Entertainment is also not an exception. The company's customers and users are mainly from young people, children, and families.

1.1   The purpose of the thesis

In this thesis, the author will be focusing on children's safety when using information and communication technologies (ICTs) for the experience of mobile game. For the reason that the online safety is a broad topic and involves a variety of ICT and online industries, and relevant stakeholders (children, parents, guardians, educators, policy makers, etc.). Roles and responsibilities of stakeholders and specific sectors - such as Internet Service Providers (ISPs), mobile operators, hardware manufacturers, applications store, and law enforcement - will be less discussed than curated digital content providers and application developers.

As network technology is constantly evolving with the increase of connectivity speeds, for instance the fourth generation (i.e. 4G) and the fifth generation (i.e. 5G) of broadband cellular networks in recent years, there are potentials for developers to produce new devices, new technologies and new applications (Phippen 2017). The evolution of technology provides a device a capability of streaming media across a mobile network, which would have been an extraordinary idea ten to fifteen years ago – when the idea of a 20Mbps (Megabits per second) home internet connection was uncommon (Orland 2018).

Therefore, the online environment is constantly changing with the development of new technologies, there are safety concerns that occur in the digital world. Those concerns must be looked at and the prevention of harms must be taken into consideration. Additionally, the most vulnerable user groups are children and young people when they go online. As active participants, rather than passive ones, they are more likely get hooked into online space – where they are pushing boundaries and taking risks, than other adult groups. They are enhancing their important assessment skills and call for assistances to make wise choices. (Byron 2008.)

1.2   Hatch Entertainment

Hatch Entertainment is a company that was founded in 2016. The company is a cloud gaming pioneer in not only Finland, but merely worldwide and is a subsidiary of Angry Birds creator Rovio Entertainment Corporation (as of June 2020). Founder of the company was Juhani Honkala (Chief Executive Officer) alongside with other co-founders Christian Tierney (Vice President of Brand and Original Content), Karl Granstrom (Chief Operation Officer), Vesa Jutila (Chief Commercial Officer).

Hatch Entertainment's main products are Hatch and Hatch Kids, which are both game streaming platforms. Hatch and Hatch Kids are the cloud gaming service built and optimized for the always on, always connected higher speed mobile internet connection, which is known as 5G. The platforms enable users to play, watch and share many games within just one application. Users do not have to download and install full-featured games to the screens already in your daily life: TVs, mobiles and tablets; in which they are streamed over a decent Wi-Fi or mobile internet connection. (Hatch Entertainment n.d.)

1.3   Research questions and limitations

The main research question is as follow:

- How to protect children from online risks while using Hatch's mobile game streaming service?

In the process of looking for the answer to the main question above, some sub-questions were used as follow:

- What is cloud gaming and how it is different from traditional gaming experience?
- What are online risks and child online protection in online gaming environment?
- What are the available systems for children's safety when they go online?

There are several limitations that the author of this thesis has encountered during the process consist of:

- Different standards and systems among continents in general and among countries in particular when it comes to Child Online Protection.
- Due to new technology in the gaming industry, which is game streaming, that leads to the confusion of which category of several guidelines and regulations that the case company's service belongs to.
- Limited information about the research topic relating to online safety in mobile gaming experience.

2   Thesis framework

2.1   Cloud gaming

2.1.1   History of cloud gaming

Two decades ago, in 2000, cloud gaming technology was firstly demonstrated by G-cluster at Electronic Entertainment Expo (also known as E3). The original demonstration was a small cloud gaming service of PC games to handheld devices over Wi-Fi by G-cluster. Ten years later, in March 2010, OnLive became officially one of the first companies that successfully launched accessible remote cloud gaming services. In 2012, Gaikai, a cloud gaming startup, launched an online advertising for games using cloud gaming as a form. Both OnLive and Gaikai were acquired by Sony Interactive Entertainment, afterwards converted their technologies to create PlayStation Now in 2015. From 2017 to 2018, Electronic Arts, Google, and Microsoft announced their cloud gaming projects and initiatives, respectively. (D'Argenio 2018.)

2.1.2   Concept of how cloud gaming works

In order to run smoothly, different video games require different technical specifications. The concept of streaming video game from a server instead of running the game on a device (a computer, mobile phone, tablet, console, etc.) has started. Many companies in the video game industry, have been investing on shifting users' gaming experience from traditional setup (Figure 1) to run their games on remote servers (Figure 2). (McGregor 2019.)
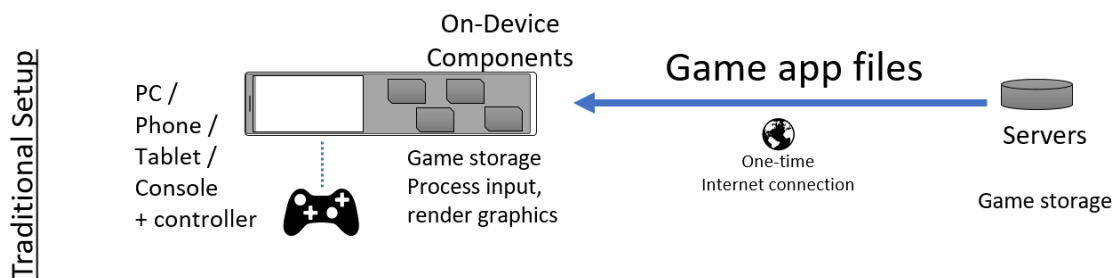

Figure 1: Traditional setup for a gaming experience. (McGregor 2019.)

Figure 2: Streaming setup for a modern gaming experience. (McGregor 2019.)

The biggest difference between the two setup is hardware. In the traditional setup, a device that is not powerful may not cope with more complex or high-end games. On the other hand, players may not need expensive hardware (high-end computers, game consoles, smartphones), but they must have a low latency server being always available and a constant internet access from an ISP with a superfast broadband connection. Moreover, unlike the traditional method of buying games, users are charged a monthly fee – also known as subscription – to use the streaming service.

2.2   Risk of online abuse

Within traffic safety, it is a predictable environment, which consists of such factors as vehicles, roads, road users, etc., and commonly recurring behaviors ruled by clear legislations. It is not likely that the traffic safety will have major changes with the road safety environment. Comparing to "traffic safety", which is static, "online safety" is more dynamic. Unlike traffic safety, online safety sits in a constantly changing environment, where many matters that are being created online every day without concerns how they might be used and mistreated. (Phippen 2017.)

In this digitalization era with easy accessibility, young people are frequently exposed and are encircled to potential risk from online environment. It is vital for children and their parents to study and understand how to be safe and protected online. When going online for some homework, talking with friends, surfing social media, watching videos, listening to music, and playing games, young people and children might be at risk of online abuse. Risk of online abuse can occur across different devices that are connected to the internet. The Table 1 below defines different types of abuse that happens online that children and young people might experience.

Type of online abuse	Definition
Cyberbullying	*is bullying that takes place online. Unlike bullying in the real world, online bullying can follow the child wherever they go, via social networks, gaming, and mobile phone.*
Emotional abuse	*is often called psychological abuse, which is involves the constant emotional harm of a child. Intention of scare, humiliation, isolation, or neglect of a child can be included to emotional abuse.*
Grooming	*is the process in which someone builds a trusted relationship, and emotional connection with a child or a young person over time so they can engage in sexual, manipulative, and abusive behavior. Children and young people who are groomed can be abused, exploited, or trafficked.*
Sexting	*is when someone sends sexually explicit images, messages or videos of themselves or others through electronic devices.*
Sexual abuse	*is when a child or young person is forced or tricked into sexual activities. They might not understand that, for example, being forced to create, see, or share online abusive materials is abuse or that it is wrong.*
Sexual exploitation	*is a type of sexual abuse, when they may be tricked or forced to create sexually explicit materials or given gifts, drugs, means, affection, and substances, in return for sexual activities.*

Table 1: Definitions of different types of online abuse (NSPCC n.d.)

The apps, sites and games they are using can also bring risks. Parents and careers must be aware of what their children are doing on the internet and who they are chatting or talking to. Understanding different types of online abuse from the table above helps involving stakeholders (including parents and careers) identify and prevent any risks from online environment.

2.3   General Data Protection Regulation 2018

The EU GDPR came into force on 25th of May 2018. Under the GDPR, companies, organizations that do not comply with the regulation can bring about drastically greater fines with, whichever is greater, a top limit of 20 million euros or 4 percent or yearly global turnover. Young people and children who are under 16 years old must merit specific protection by measured verification of a child's age and managing consent. According to Recital 38 of the GDPR, because "children may be less aware of the risks, consequences and safeguards concerned and their rights in relation to the processing of personal data", it is mandatory for ISS to put in place proper organizational and technical measures to integrate data protection rights into the service from the beginning and processing activities through its lifecycle.

Age of digital consent needs to be taken into consideration when an ISS is targeting a child as its data subject. Moreover, it importantly helps to ensure the selection of lawful bases for processing children's personal data as stated in Article 6 of the GDPR.
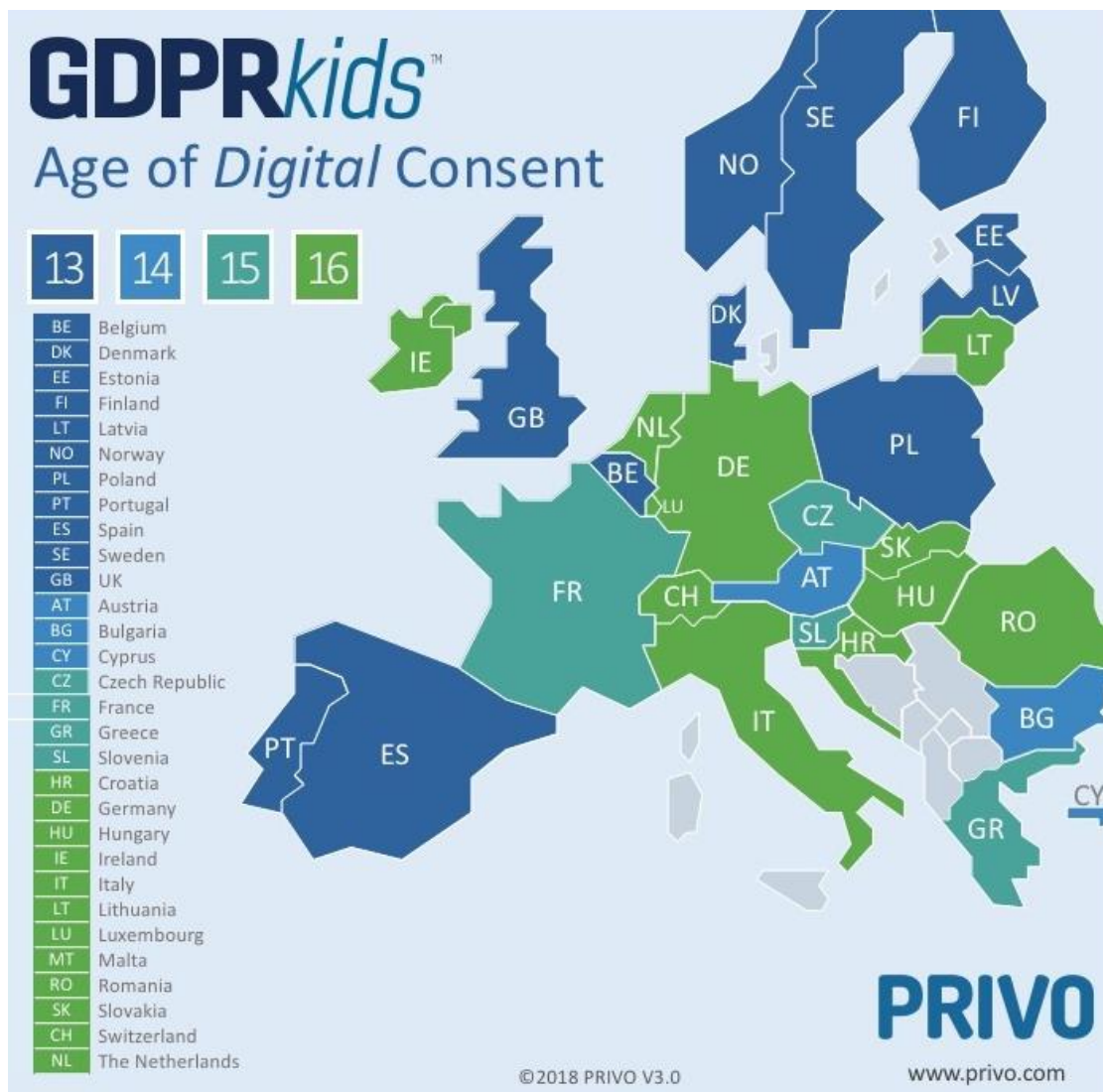
Figure 3: Age of digital consent (Quinn n.d.)

People who are younger than 16 years old - which is the age of consent has been established by the GDPR - need parental consent where online services are available to children. Nonetheless, in Article 8 of the GDPR, it is allowed for member states to define their own age of consent, at which children can provide consent lawfully to the processing of their personal data, at national level down to at least 13 years old (Figure **3**). Users who are younger than the age of consent must be required to provide consent from a person with parental responsibility for processing of the children's data. Every ISS must have implementations of available technology with enough practical efforts to authenticate that the provided consent is legitimate and lawful.

As mentioned in Chapter III and Chapter VIII of the GDPR, all data subjects, which means children share the same rights as adults, have the right to:

- be able to access to a full, transparent, and clear list of the privacy information about how their personal data is used and for what reason;
- obtain a copy of their data;
- data portability;
- request to remove, delete their personal data;
- able to amend, edit, change their inaccurate and incomplete data;
- disapprove or reject to processing for the reasons of direct marketing;
- limit the processing in particular conditions;
- command legal actions against the data controller or processor;
- make a complaint to supervisory authorities;
- make an appeal against a decision of supervisory authorities; and
- be compensated for any costs, negative influences as a result of non-compliance with the GDPR from the data controller or processor.

The rights above apply in all circumstances, which are not excluding online environment. Every person may carry out the above rights on their own behalf, even though the original consent for processing was provided by a parent or guardian, as long as they are competent to do so. Unless a person is authorized by the child to carry out these rights on his or her behalf, when the child is too young to be aware of the implications of their rights.

2.4   Guidelines for industry on Child Online Protection 2020

One third of more than half of the world's population are children and young people using the internet, around 71 per cent of them are going online frequently (UNICEF's estimation in 2019). The purpose of these guidelines for industry on Child Online Protection (COP) is for industry stakeholders to keep in place between children's right to freely access to information and their right to protection. Respecting to protecting children's rights online, stakeholders have to act as one to establish and provide helpful, valuable framework and resources on COP to protect their internet users who are under 18 years old. Among children and young people, digital citizenship is being promoted, that it is recommended for the private sector of ICT services to prioritize development of their platforms and products which facilitate their young users' harmless usage of the service. By supporting different extents and scopes of stakeholders and businesses, these Guidelines are focusing on improving success of operation to build and maintain a sustainable operation model. (ITU 2020.)

Child Online Protection is initially defined in the document that "Child Online Protection" is the holistic approach to respond to all potential threats and harms children and young people may encounter online. It is everyone's responsibility to protect children from these harms. All relevant stakeholders have their role in helping children and young people benefit from the opportunities that the Internet can offer to them, while acquiring digital literacy and

resilience for their digital well-being and protection." And "While no universal definition exists for child online protection, it aims to take a holistic approach to building safe, age appropriate, inclusive and participatory digital spaces for children and young people, characterized by:

- response, support and self-help in the face of threat;
- prevention of harm;
- a dynamic balance between ensuring protection and providing opportunity for children to be digital citizens;
- upholding the rights and the responsibilities of both children and society". (ITU 2020.)

The document provides the author of this thesis an overall knowledge by outlining five key areas of protecting and promoting children's rights, where businesses react to online safety of the vulnerable ICTs users while promoting the positivity of ICTs. The five key areas, with good practice examples in the document, are:

- Integrating child rights considerations into all appropriate corporate policies and management processes,
- Developing standard processes to handle child sexual abuse material (CSAM),
- Creating a safer and age-appropriate online environment,
- Educating children, careers and educators about children's safety and the responsible use of ICTs,
- Promoting digital technology as a mode for increasing civic engagement. (ITU 2020.)

Preceding by the general guidelines for all related industry, four feature-specific checklists are presenting recommendations with specific features with regard to children's rights online for companies providing services. The four features consist of:

A. Provide connectivity, data storage and hosting services: mobile operators, data storage systems, ISPs, and hosting services;
B. Offer curated digital content: news, media, broadcasting, multimedia streaming services, and gaming industry;
C. Host user-generated content and connect users: social media platforms, user-generated content sharing network platforms, instant messaging platforms, live streaming platforms;
D. Artificial intelligence (AI)-driven systems: machine learning and deep learning processes. (ITU 2020.)

2.5   Moderation

Over the years, abuse, self-harm, hate-speech, racism, inappropriate contents and CSAM that happen online have been strongly relied on report from users. The procedure of manual moderation consumes a lot of resources – mostly from expenses of moderation teams. Moderation of a single platform is required around the clock, because sometimes reports contain time-sensitive content (terrorism, war, violence, child abuse, etc.), which need to be reviewed and act immediately until it is out of control or too late (Phippen 2017).

2.5.1   Age ratings

One of the most popular initial level of safeguarding is having a method to limit users' age before reaching main contents of an online service and goods across multiple industries. For gaming content, there is a range of different age limits which were built to prevent or protect children from inappropriate content, undesirable impacts for each specific age.

Figure 4: How IARC works (IARC n.d.)

The International Age Rating Coalition, also known as IARC system, is a coalition of rating authorities from around the globe, whose aim is to deliver global verification solution for thousands of new products and applications every day on digital storefronts. The system helps application developers to comply with legally mandated age classification standards by

reflecting the distinction among countries and regions. In Figure 4, it demonstrates the flexible and thorough methodology of obtaining ratings for a digital product.

Most online game stores and publishers will not release games that their content have not been rated and suitability for certain age groups by PEGI system (within the European Union) or ESRB (in the United States). Within the European Union, PEGI is used in more than 35 countries, even though it is not always required by law, several countries have been forcing the system enforceable. PEGI integration into law is required in France, Italy, the United Kingdom, Netherlands and Switzerland, or the countries' responsible ministries have authorized the system. While in Germany, a legislation has been created by its own authority on a stricter ratings system. (UNICEF 2019.)

Because of the differences in verification parameters and categories among countries and regions, age ratings of a game may differ on different platforms in each country. Due to the fact that there are a few authorities worldwide, they all facilitate an essential tool to consumers, parents in particular, to help them assess whether or not a product is suitable for children. The two most popular rating authorities of IARC are:

- PEGI

The Pan European Game Information age rating system is the regional system that has been widely used to replace a quantity of national systems in more than 35 nations of Europe. The Figure below demonstrates the PEGI labels and their meanings.

Rating	Description
3	**PEGI 3** The content of apps with this rating is considered suitable for all age groups. Some violence in a comical context (typically cartoonlike - Bugs Bunny or Tom & Jerry - forms of violence) is acceptable. A child should not be able to associate the character on the screen with real life characters, they should be distinctly fantasy. The app should not contain any sounds or pictures that are likely to scare young children. No bad language should be heard.
7	**PEGI 7** Any app that would normally be rated at 3 but contains some scenes or sounds that can possibly be frightening for children may be considered suitable in this category. There can only be very mild violence in a PEGI 7 app, like implied violence or non-detailed, non-realistic violence.
12	**PEGI 12** Games or apps that show violence of a slightly more graphic nature towards fantasy characters, or non-graphic violence towards human-looking characters or animals would fall in this age category, as well as nudity of a slightly more graphic nature and simulated gambling. Any bad language in this category must be mild and fall short of sexual expletives.
16	**PEGI 16** Once the depiction of violence or sexual activity reaches a stage that looks the same as would be expected in real life, this rating is applied. Stronger inappropriate language, encouraging the use of tobacco or drugs and depicting criminal activities can be content of apps that are rated 16.
18	**PEGI 18** The adult classification is applied when the level of violence reaches a stage where it becomes a depiction of gross violence and/or includes elements of specific types of violence (motiveless killing, violence towards defenceless characters or sexual violence). It may also include graphic sexual content, discrimination or the glamorisation of illegal drugs use.
!	**PARENTAL GUIDANCE RECOMMENDED** Apps do not always have predefined content that can be classified beforehand. Certain apps function as portals (e.g. to stream content), offering a broad, variable range of content from which consumers can choose. For these apps, we use the parental guidance icon, alerting parents that the app may provide access to content that is not appropriate for their child, although other, age-appropriate content may also be available, depending on the selection of the user.

Figure 5: PEGI age labels and their meanings (PEGI n.d.)

- ESRB

While PEGI is commonly recognized and used in Europe and Middle East, the Entertainment Software Rating Board has been adopted by game developers and publishers, retailers in North America in general, in the United States in particular. The Figure below demonstrates each ESRB's label and how they differentiate from the other regional system.

Rating	Description
E	**EVERYONE** Content is generally suitable for all ages. May contain minimal cartoon, fantasy or mild violence and/or infrequent use of mild language.
E	**EVERYONE 10+** Content is generally suitable for ages 10 and up. May contain more cartoon, fantasy or mild violence, mild language and/or minimal suggestive themes.
T	**TEEN** Content is generally suitable for ages 13 and up. May contain violence, suggestive themes, crude humor, minimal blood, simulated gambling and/or infrequent use of strong language.
M	**MATURE** Content is generally suitable for ages 17 and up. May contain intense violence, blood and gore, sexual content and/or strong language.
A	**ADULTS ONLY** Content suitable only for adults ages 18 and up. May include prolonged scenes of intense violence, graphic sexual content and/or gambling with real currency.

Figure 6: ESRB age labels and their meanings (ESRB n.d.)

2.5.2   Content moderation

The larger user-generated contents are hosted on an online platform, the more online content moderators are required. People cannot rely on automation moderating tools completely when it comes to content uploaded by an online community of contributors from around the globe. Moreover, the user-generated contents can be in any forms that require constant development in automation technology in order to cover everything from violent and harmful videos, images to hate-filled messages due to the complexity and diversity of different languages. That means moderators being employed to manually monitor and make decisions on vast amounts specific content of user-to-user communication. But considering the human cost of online content moderation, companies have been mostly recruiting employees of overseas subcontractors to optimize the efficiency with reasonable budget.

Another factor that contributes to the increasing cost of moderation practices and moderating tools is the mental health problems rising among moderators. As part of the manual job and depending on user-generated content, a number of moderators have been exposed to child sexual imagery, child pornography, and other types of objectionable material. Technology companies (such as Apple, Amazon, Google, Microsoft, Facebook, Twitter, Snapchat, etc.) are advised by The Technology Coalition to identify potential solutions through communications, training programs and improvement in working conditions (Arsht & Etcovitch 2018).

2.5.3 Parental control

Parents and guardians play the most important role in the online safety of their children when they go online for a gaming experience. Risks usually occur to kids when they are out of their parents' sight, even in an online environment. Having frequent conversations with children to help them to understand the online risks they may run into is vital, even in gaming experience. In order to let them play responsibly and safely, the person with parental responsibility should decide what their children can and cannot play. To support that, parental control systems are integrated and installed in all gaming devices (computers, smartphones, tablets, consoles, and handhelds) with different operating systems to help parents and guardians manage their children's video game use. The software allows parents and caregivers to: (PEGI n.d.)

- block inappropriate contents based on specific age ratings;
- control and monitor the spending on digital products;
- control and schedule the amount of time spend on online activities;
- enable communication restrictions (verbal chat, text messages, user-generated content); and
- apply filters to limit access to internet browsing.

The power of these functions of the parental control system is to limit their children's play time for specific applications or the whole device. On the other hand, depending on each child's maturity and development, they can particularly enable different restricting access levels, which seems to be challenging and complicated for legislation to resolve. (UNICEF 2019.)

2.6 Case study: Habbo Hotel paedophile incident

Many children nowadays have early access to mobile devices such as mobile phones and tablets. Due to the emerging of mobile gaming platforms, the world has seen many incidents that are related to children's safety from virtual world. One of the biggest and most viral cases relating to children's online safety was Habbo Hotel paedophile incident a few years ago, in 2012 (Itv 2012).

Habbo Hotel was a social networking game and online community designed and targeted users who are between the age of 13 and 18. The company of the Habbo Hotel's development and creation is Sulake. The game started in 2000 and has expanded to nine Habbo language communities. The service allows users design their own Habbo character, hotel rooms, open their own virtual trade shops and cafes, chat with other players, or even look after virtual pets in a massively multiplayer experience (Sulake n.d.).

According to Channel 4 News in June 2012, with around ten million unique visitors every month, Habbo Hotel was considered to be loaded up with pornographic, sexual abuse even though it was "the world's largest social game and online community for teenagers" during that time.

The incident happened only four months after Sulake had announced in February 2012 of its rehabilitation in finance with a large-scale redundancies and worldwide office closures. In showing the door to a quarter of its number of employees, the company will be withdrawing several its manual processes and country offices from 11 countries (Mäki-Panula, 2012). According to Channel 4 News in August 2012, in their investigation with evidence, there was a plunge in moderation to no moderation even though Sulake explained that it strongly prioritized user safety with the game's moderation and safeguarding procedures. But, as a result to the grooming reports about the site, an immediate solution was implemented that users of Habbo Hotel were blocked from chatting in an online chatting game. By the end of the year, it was also announced a second wave of a greatest extent of two thirds of the positions to be made redundant and the company's Chief Executive Officer, at that time, leaving his responsibility at the company.

The effects of grooming incident are enormous not only to business of the creator of Habbo Hotel, but also to the victims – whose gender does not matter for being groomed. The influence of grooming can continue both short and long-term or even a lifetime. The injured party of grooming might encounter anxiety, depression, feelings of shame and guilt, post-traumatic stress, drug and alcohol problems, self-harm, suicidal thoughts, and more (NSPCC n.d.).

3   Methodology

The selected methods are illustrated in this chapter. Because game streaming is new in the industry, desk research (another name for secondary research) is chosen to review previous findings of the relevant topics, following by a case study.

3.1   Literature review

First and foremost, the use of desk research in this thesis is to build the literature review. The research questions are formulated to identify and limit the area of research for a review of available relevant literature. By the reason and not to mention that the author was working in the game streaming service provider (the case company), this method is undertaken to be the most suitable method to create the theoretical foundation for the thesis. A process (Figure **8**) has been created, in order to perform the research properly. As said, it is a fundamental understanding in advance before accessing the data collection and analytics for the topic. The chosen method, which is a sensible and balanced method for this purpose, helps to crucially assess the author's findings. (Efron & Ravid 2018.)

Identifying
key words, terms and definitions relating to children and online risks

Literature review
to create the theoretical foundation based on the previous step

Findings
to present what is the relevant information to the topic.
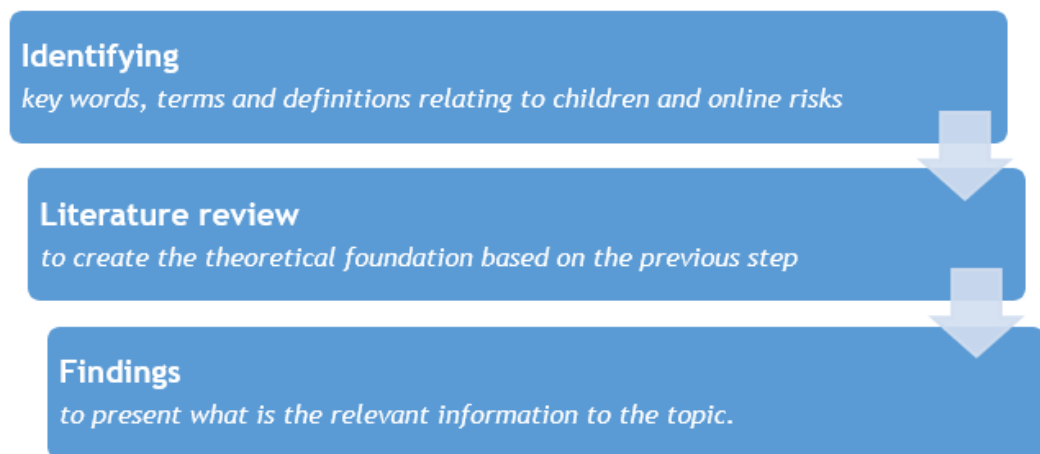
Figure 7: Thesis research process

In order to support the credibility of the process above, there are many valuable methods to validate and legitimate of the found sources. One of the ways to evaluate where and what was searched, which is called CRAAP Test is used throughout the process due to its efficiency and easy to execute. It is vital to evaluate every information whether its credibility is correct or not. According to Research Guides: Evaluating Sources: The CRAAP Test (2019), the CRAAP Test was developed by the Meriam Library at California State University, Chico, which contains five parts (also CRAAP is an acronym for) for the credibility evaluation of the author's sources: Currency, Relevance, Authority, Accuracy, and Purpose. Figure **9** describes each step of the process of evaluating a source.

Currency relates to the timeliness of the resources

- When was the information published or posted?
- Has the information been revised or updated?
- Is it important to have current information, or will older sources work as well?
- Are all the links working?

Relevance relates to the importance of the information to you

- Does the information relate to your research or answer your question?
- Is the information at an appropriate level, i.e., not too simple or too advanced for your needs?
- Have you looked at a range of other sources? This will help you to decide whether the source you are using is relevant.
- Are you comfortable citing this as a reputable source for your research paper?

Authority relates to the source of the information

- Who is the author/publisher/source/?
- What are the author's/organisation's credentials?
- Is the source trustworthy or qualified to write on the subject?
- Is there contact information and is it easy find out more about the author/organisation?
- If it is a website, what does the URL (.com .ac .gov .org .net) say about the source?

Accuracy relates to the reliability of the resource

- Where does the information come from?
- Is the information supported by correct evidence?
- Can you verify any of the information in another reliable source?
- Does the language or tone seem balanced, unbiased and free from errors?

Purpose relates to the reason the information exists

- What is the purpose of the information? (i.e. inform, argue, teach, sell, entertain, persuade)?
- Is the purpose clear and the point of view impartial or are there biases?
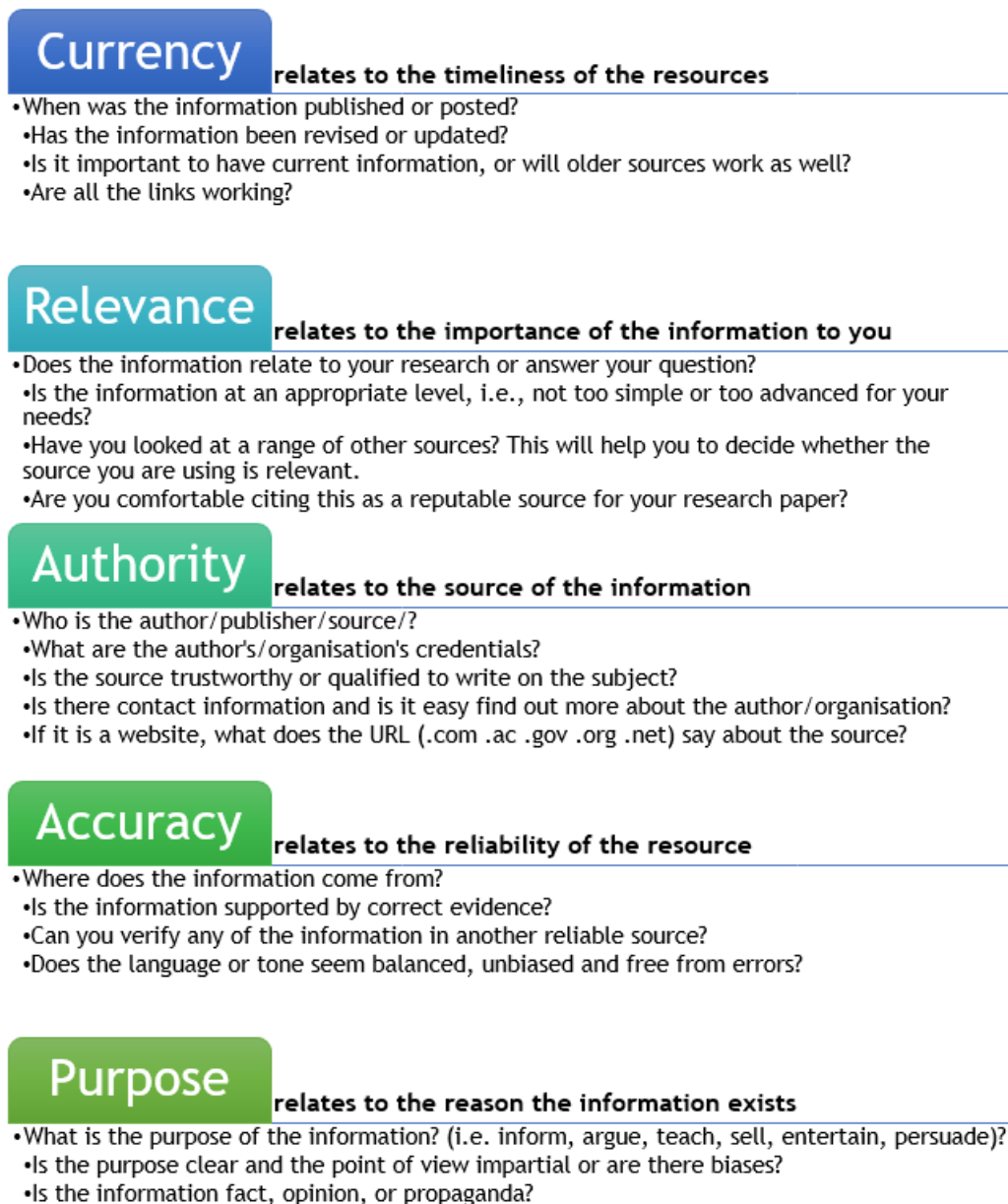- Is the information fact, opinion, or propaganda?

Figure 8: Evaluating Sources: The CRAAP Test (2019)

3.2   Case study

When asking for an approval to work on a thesis for Hatch Entertainment, the author was recommended by the Director of Customer Service of the company to use the Habbo Hotel paedophile incident as a contextual example and a quality reference and in-depth knowledge for the children's safety topic. The phenomenon was well-known by many people working in the gaming industry in 2012. Moreover, the event became a case study for the industry not only because of its media coverage but also the severity of its financial loss. According to Shona McCombes (2019), a case study is "detailed study of a specific subject, such as a person, group, place, event, organization, or phenomenon", which the author think it is

valuable to understand various aspects of the grooming scandal of that social mobile platform. The steps of how to do a case study that the author has followed are:

- Step 1 - Select a case:

  The particular case study is used to deliver new insights into the real-world subject. It also helps to expand and complicate different directions for the theoretical research. Also, it provides several ideas about practical solutions of the problem.

- Step 2 - Build a theoretical framework:

  Whilst overall theories are not the aim of the case study, it aims to specific details. The author conducts a literature review of sources based on the existing key concepts and theories, and develops a theoretical framework based on the new concepts and ideas which need to be integrated.

- Step 3 - Collect relevant data:

  The phenomenon happened in 2012, the author decides to use analysis of secondary sources as a form of qualitative research method. The purpose is to have a complete understanding of the case and what happened in detailed.

- Step 4 - Describe and analyze the case:

  The case study is described in a way where all the relevant information is covered to comprehend the subject, including numerical information.

Understanding how to do a case study helped the author to not only know clearly about the problem but also comprehend the big picture surrounding it. From there, it was a lot easier for him to conduct secondary research about the main topic.

3.3   Secondary Analysis

Since literature review and case study are the main search methods to collect secondary data, secondary analysis is involved to conduct a study based on the collected data. Another reason to rely on secondary analysis is because many secondary data resources and data sets are public and easily accessible. This method is usually contrasted with primary analysis. This method contains analysing data collected by other people instead of analysing data individually collected by researchers. (Crossman 2019.)

The case study happened in the past and a technology was introduced some years ago, which were hardly possible to conduct primary research about them. There are several disadvantages when performing this method on secondary data. The collected data may be not up-to-date, not applicable anymore or biased. The author of the thesis had to always validate it by spending a large amount of time determining the credibility and credentials of the data resources. The author could analyze the collected information by following the four steps for doing secondary analysis, which are:

- Step 1: Develop the research question.
- Step 2: Identify secondary data resources and data set.
- Step 3: Evaluate the identified data.
- Step 4: Prepare and analyze secondary data.

With the secondary analysis method, the author was able to answer the research question and all sub-questions.

4 Discussion

After working at Hatch Entertainment for more than a year with continuous discussions with responsible people about the topic, there was a lot of information gathered to support the analysis. The research falls into basic analytical research category based on the topic and current development of the case company. In this section, the author is going to demonstrate the findings of online safety measures of Hatch Entertainment's streaming service, including Hatch and Hatch Kids applications, based on the original research question: *"How to protect children from online risks while using Hatch's mobile game streaming service?"*.

4.1 Matters carried out by the company

Primarily, the case company has publicly published its Terms of Service and Privacy Policy which are being shared to both of its products (Hatch and Hatch Kids). Privacy Policy is where all data subjects (both children and adults) have the same rights (see section 2.3 of the thesis). It is to let users know what and why data that the company collects in the service, and how users can be affected. Moreover, Terms of Service meets all recommendations of Guidelines for industry on Child Online Protection with the assist from its Legal Department (see section 2.4 of the thesis). It is to govern people's use of the service. It also clearly states what are their rights to use, prohibitions of the service. In order to start using the service, everyone must agree to the Terms of Service and Privacy Policy of the service from the case company.

Hatch Entertainment completely understands the online risk, and its consequences might bring to the company if it happened. Taking the Habbo Hotel incident as a learning example, every company that is providing services to children must be careful in online safety of its users. A company might lose its tangible and intangible assets if there was even one problem to the vulnerable user group because of online safety. In parallel, the customers will gain more trust and maintain their satisfaction through reliable policy enforcement of the service. Thus, there is always a budget that is specifically intended for online safety measures from the company.

Even more, regulations concerning reports that containing time-sensitive content are changing constantly. They are the reasons that the case company has implemented technical measures to its platform from the starting point. With the support of technical measures, online safety is being taken more efficient. The company can:

- Make consistent decisions,
- Review and take action on the critical and abusive reports,
- Automate many time-consuming parts of the moderation process,
- Triage reports that require manual review, and
- Comply with global regulations concerning reported content.

Additionally, people at Hatch Entertainment have been trying to prevent and mitigate risk factors coming from real-time human interactions, the user-generated content, to be a safer platform for children and young people. They came up with a solution that an independent product eliminates almost all user-generate content features. That product is an absolutely safe platform for kids. The Hatch Kids application is created for users who are underage. As a result, the company's solutions have been recognized for its online safety by not only local organizations concerning children's rights such as Save the Children Finland (Pelastakaa Lapse try) and Mannerheim League for Child Welfare (Mannerheimin Lastensuojeluliitto), but also international organization like UNESCO (Hatch Entertainment n.d.). Those are concrete verifications for the service being safe to use for children and young people.

4.2   Online safety through Hatch Entertainment's measures.

Hatch Entertainment has a dedicated team for moderating all contents from games that have been carefully hand-picked to user-generated content, such as comments, username, profile picture. Every game and content must be checked by a strict and continuously developing procedure, which operates to ensure that every released game and content meets safety requirements and criterion. The team also has applied precautions for user-generated content by predictive moderation. The team has been efficiently classifying and filtering predicted negative content, actions and context with new and supporting technologies.

Besides having the moderation team, which is mandatory for companies that are enabling access to digital content, the case company also has implemented artificial intelligence and automation technology from Two Hat (as of June 2020) to cover moderation practices around the clock even when manual processes are unavailable.

Two Hat is a company providing AI-powered content moderation platform that tackles, filters, accesses and removes negative social interactions from online services and communities. In order to establish a safe streaming platform, both Hatch and Hatch Kids applications are

facilitated by Two Hat's "Five Layers of Community Protection for online safety". Figure 9 explains each layer in author's expression for easier understanding.
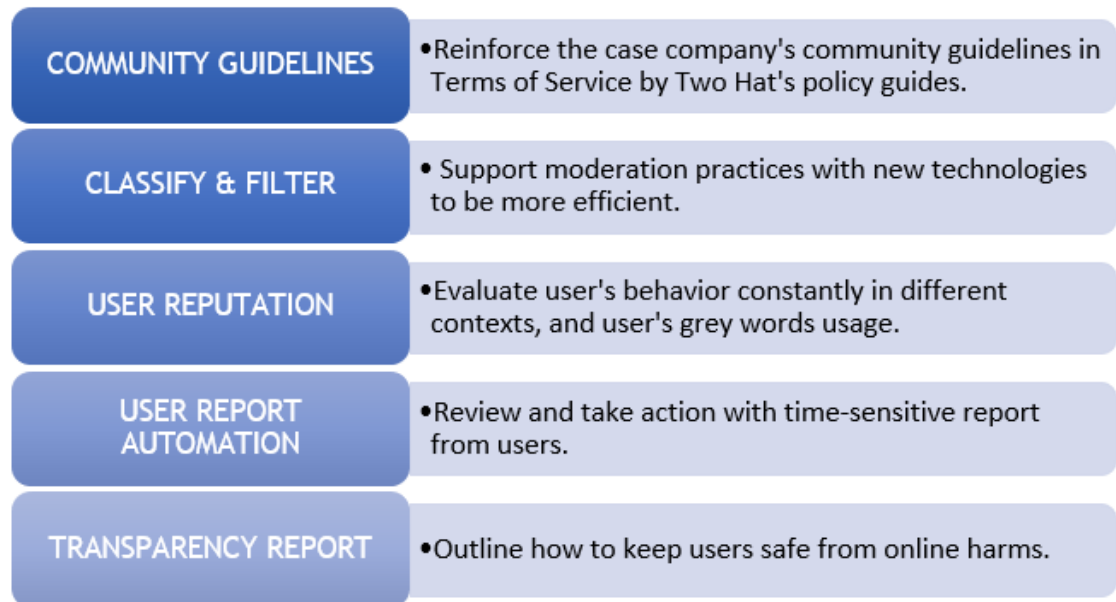

COMMUNITY GUIDELINES	• Reinforce the case company's community guidelines in Terms of Service by Two Hat's policy guides.
CLASSIFY & FILTER	• Support moderation practices with new technologies to be more efficient.
USER REPUTATION	• Evaluate user's behavior constantly in different contexts, and user's grey words usage.
USER REPORT AUTOMATION	• Review and take action with time-sensitive report from users.
TRANSPARENCY REPORT	• Outline how to keep users safe from online harms.

Figure 9: Five Layers of Community Protection (Two Hat n.d.)

From the definitions of different types of online risks, most of the root causes come from real-time human interactions, including text messages, images, video and also username. It is less complicated for a moderation team or a moderation tool if a platform has less or limited features which enable users to have live communications in the platform's community. That will unquestionably reduce the chance of children exposure to inappropriate materials or CSAM. Additionally, it will also decrease manual moderation workload and potentials of being exposed to those materials.

4.3   Online safety in Hatch Entertainment's mobile applications.

Hatch Entertainment has been providing a mobile streaming service through Hatch and Hatch Kids mobile applications. Each of them has a different games catalogue and user interfaces that are suitable for its own purposes and target audience. On the other hand, each application has differences in its catalogue of games, design and target audience. Key differences are shown in the Table 2 below based on the research topic of this thesis.

Difference	Hatch	Hatch Kids
Age rating	PEGI Parental guidance recommended	PEGI 3
Target group	Everyone	2 to 8 years old children
Game catalogue	Variety of curated games for all ages. Some titles are not suitable for underage children. There are multiplayer games.	Carefully hand-picked games that must be suitable for underage and preschool children. There are no multiplayer games.
Application Design	Users can see, search for and connect with other users. Easily access to Settings (change username, private information, etc.).	Users cannot see, search for or connect with other users. Only parents can sign up an account and access to Settings.

Table 2: Key differences between Hatch and Hatch Kids

Although the age rating is different between Hatch and Hatch Kids, in order to sign up with Hatch and provide personal information to Hatch, people must be at least 13 years old (or under the applicable age of majority in their country of residence). With Hatch Kids, parents and guardians are the primary users who are responsible for account registration and billing matters (i.e. buying subscription), however, their children are the ones who use it most of the time.

4.3.1 Hatch – the application for everyone

As of June 2020, Hatch is available in Japan, the Republic of Korea, the United States, the United Kingdom, and selected European countries (Hatch Entertainment n.d.). In Hatch, each listed game has its own age rating from its developer or publisher. The application offers a wide range of game titles as a portal from which users can select to play depending on their favorite. That is the main reason for *PEGI Parental guidance recommended* being the most suitable age rating for the entire application. It informs users that the application contains some content which may not be appropriate depending on the age of specific users or groups.

In the application, there are not many features that allow users to generate their own content. Before the update in June 2020, there were some features that need to be considered, which were: creating username, profile picture, comment. After the major update:

- Username is an introduction of a user to an online community. Username is usually persistent that users do not change it frequently. Once a bad username was allowed to appear, more users will follow to create similar or even "better" ones in the community. So, username classification requires a real-time and accurate detection and removal of inappropriate and the most important point, unnatural language. Unnatural language includes leet speak (i.e. 1337 5P34k), misspellings, upside down characters, adding punctuation, Unicode, acronyms, capital letters, vertical chat, emojis, and more.

- Beside username, people always want to have a unique profile picture alongside with their username. But it might contain offensive, disturbing or unwanted content, including violence, abuse, pornography, nudity, gore, drugs, smoking, racism, terrorism, weapons. That was the main reason why profile picture creation was replaced by a set of standard profile pictures designed by the company for users to choose. That helps reducing the cost of manual moderation in terms of removing inappropriate and harmful images. Its main purpose is to reduce unwanted exposure of those listed content to children and young users. The tool is continuously scanning profile pictures of users who had created them before the major update.

- Comments are no longer visible to users. The service has been provided to many countries where English is not widely used. In order to mitigate the risk of unnatural language through comment sections, which is extremely complicated to handle, the company decided to remove it.

No tool is perfect. According to Two Hat (2020), the tool's accuracy is up to 98.97%. Human factor plays a significant role in content moderation when some unwanted content went through the classified filters. In that case, users can report any profile which they think that is violated Hatch Entertainment's community guidelines (also known as Terms of Service), including username, profile picture and comments. The reports are sent to the moderation team for review and to make decision, most of them can be closed immediately.

4.3.2 Hatch Kids – the suitable application for kids

As of June 2020, Hatch Kids application is available in the Nordic countries (Denmark, Finland, Norway, Sweden), the United Kingdom, and selected European countries (Hatch Entertainment n.d.). According to Hatch Entertainment, the application is "a fun and safe, family-friendly app, containing all the best kids games from the world's best kids game developers in one place" and "with no ads or in-app purchases, no product placement, no sketchy content, instant, easy, inclusive, accessible, care-free, conflict-free".

In Hatch Kids, every single selected game is meant to support every child's developmental goal and it must be suitable for the target user group (2 to 8 years old) without horrible or

scary content. All games follow a strict curation process from early childhood education plan in Finland to appear in the collection of games in Hatch Kids. Those games come from verified and globally well-known game publishers for kids (for example Aardman, Sago Mini, Toca Boca, Dr.Panda, Rovio, Studio Pango, etc.). That explains why the application's age rating is *PEGI 3*. Hatch Kids is exceptional in that it has verified by and confirmed in collaboration with UNESCO Mahatma Gandhi Institute of Education for Peace and Sustainable Development (MGIEP) (UNESCO 2019). One goal is to promote more attentive, empathic and compassionate individuals through quality screen time. Additionally, as of June 2020, they are also in partnership with Save the Children Finland and Mannerheim League for Child Welfare.

In terms of safe environment for children and young people, Hatch Kids has been providing a better one than Hatch. From the beginning, when Hatch Kids was on paper, it has always been "a safe place to play, create, and learn through games. There are no ads, shocking content or in-game purchases. There are no external profiles nor features that enable interaction with strangers, such as chat function and location sharing." (Hatch Entertainment n.d.).

Despite the fact that Two Hat's tool is being used for Hatch Kids as well, almost all user-generate content features are eliminated from the application. Username is the only feature remaining, whose merely purpose is for parents to create a lovely profile for their boys and girls. With everything has been taken into account, Hatch Kids is a secured and safe place for all children to simultaneously learn and experience game streaming.

4.4   Future development

The case company has been working satisfactorily and expertly on protecting its users concerning online safety. Constant maintaining already implemented measures and updating required policies are crucial right now and in any future developments to make the service safer. In this section, there are fields that the author of the thesis thinks they can be done better or considered in future developments. The recommendations are:

- Because both Hatch and Hatch Kids are being accessed from many countries, the moderation practices should cover as many languages as possible. As of June 2020, inappropriate usernames and texts are hardly moderated in other languages, excluding English.
- The digital world is changing every day. Technical measures such as AI-powered tools and systems should be frequently updated to the newest version or the latest-recommended technology.
- When new features, functions are implemented or new designs are changed in the mobile applications, if they allow users to generate their own, they must be safe for

user's online experience. To ensure those features, functions or designs are safe to use, the company should have a process or a procedure for how to handle them. It can be simple, but it helps not to forget about the important factor to the company's success.

- Similar to the above recommendation, bringing back old features (share, comment, interaction, friend feature, etc.) should follow a process or a procedure for user's safety implementations.

- Last but not least, this should be considered when the company wants to provide the service to more countries. Every country might have its own law enforcement or follow the global organization's suggestions (e.g. EU, ITU, etc.) regarding Child Online Protection. Every time expanding the service to a new market, the company must comply with different guidelines and regulations from its policy makers and law enforcement.

5 Conclusion and Recommendation

Throughout the time at the case company with hands-on experience and a further research on the topics, the research questions have been answered. This research is a combination two modern concepts, game streaming experience and online safety. This final section will sum up how all questions have been answered. Furthermore, recommendations for future research subjects will be also stated.

5.1 Conclusion

The case company, Hatch Entertainment, has been learning from the previous experience of Habbo Hotel paedophile incident. From the case study, it helps many people understand the impact of online risks when they influence children and young people. It set a milestone for the author of the thesis to start his research from there. Expanding from the case study, the author of the thesis conducts the literature review initially to collect all relevant information for the topic before analysing it. Those are the important methods that were used to conduct secondary research for the main research question.

It is clear from the introduction that, game streaming is an innovative technology in the gaming industry. The author wants to establish an initial research of online safety on this specific platform. Before going further to a narrowed group of internet users about online safety, the author of the thesis wanted to understand the risk of online abuse. It is also the answer to what online risks and child online protection in online gaming environment are. Then, policy makers, such as General Data Protection Regulation (GDPR) from European Union and Guidelines for industry on COP from International Telecommunication Union (ITU) have

supported thesis framework. In GDPR, it clearly mentions that both children and adults share the same rights when going online. Also, digital consent must be provided lawfully by children depending where they come from. ITU gives further recommendations with four feature-specific checklists consisting of streaming services and gaming industry. The information has provided clear direction and answers for the sub-questions of the research.

On the other hand, there are essential layers of systems which are available for children's safety when they go online. Hatch Entertainment has expertly followed and constantly maintained the fundamentals of COP system, which contains age ratings, content moderation and parental control. The matters have been carried out by the case company through organizational and technical measures. To govern people's use of the service, the company has publicly published its Terms of Service and Privacy Policy, which satisfactorily meet the recommendations of COP system. The policies and products have been developed by following the above-mentioned regulations and guidelines to establish a safe place for everyone in different age groups

Online risks have more potential to occur on social platforms and services that have real-time communications and human interactions than the ones have limited access to those or do not have them whatsoever. All content and information which are uploaded to a platform by users must be classified and moderated. Therefore, the case company came up with the best solution that a separately independent product eliminates all risk factors, which are mostly from user-generate content features. Hatch Kids is the product that is suitable and completely safe for underage users. The product has been recognized for its online safety by local and global organizations concerning children's rights.

For future development of the case company, there are fields that the author of the thesis thinks they can be done better or considered. Beside continuous maintenance of implemented measures, the company should keep frequently updating required policies and protocols to make the service safer. Other fields consist of moderation practice's language coverage, technical upgrade, procedures for user's safety implementations, so on.

5.2   Recommendation for further research subjects

It is the opinion of the author that this research should be covered with a wider research. To restrict access to potentially harmful material by children and young people and to improve their resilience, families, service providers, policy maker in the public and third sectors need to share a culture of responsibility all working their role to cut the availability of exposure to negative content. There are more aspects that would be valuable to undertake a research on. A bigger research involving all relevant sectors – such as ISPs, mobile operators, hardware manufacturers, applications store, and law enforcement – is believed to be a decent one. The author also has confidence in that it would be worthy to conduct a comparative analysis of

different countries, international unions on how they have been working on online safety of all ages. Different online and virtual products or services have different features on respecting and supporting children's rights online. Therefore, they should be approached and considered to have altered research subjects, which would be extremely beneficial for businesses.

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Figures

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