

A photograph of a man and two children sitting together on a couch, looking at a tablet computer. The man is in the background, smiling. A young girl with blonde hair is in the foreground, pointing at the tablet. A young boy is leaning over her shoulder, also looking at the screen.

# Let's Play it Safe

Children and Youths in the Digital World

by Jutta Croll



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Assessment of the Emerging Trends  
and Evolutions in ICT Services

*White Paper for the ICT Coalition  
for Children Online*

by Jutta Croll  
Jan. 11th, 2016

# Disclaimer

The ICT Coalition for Children Online was set up to develop the “ICT Principles for the Safer Use of Connected Devices and Online Services by Children and Young People in the EU” launched in January 2012.

The Coalition brought together for the first time many key industry players from across an increasingly wide and converging communication and internet market including connectivity platforms, online services and internet-connected devices.

The ICT Principles were drafted with the aim of being sufficiently broad to deal with a fast-moving context, but ICT Coalition members recognise the need to continually monitor trends and the possible challenges posed by the evolution of technology. In 2015, we therefore commissioned an independent assessment of the emerging trends and evolutions in the areas covered by the services and products of members of the ICT Coalition. This assessment, outlined in this report, was carried out by Ms Jutta Croll, Managing Director of the German Centre for Child Protection on the Internet, and a recognised expert in the field. It should be noted that this report reflects the opinions and findings of the consultant, and does not necessarily reflect the views of the ICT Coalition for Children Online and its Members. Coalition members will now consider these findings, alongside those observed through our own in-house experiences, and input from our partners, in determining the next steps.

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# 0 Preface

The ICT sector is characterised by very fast innovation cycles and technologies with the potential to make a tremendous impact on society. In the ICT Coalition, to date 21 members from industry covering the whole range from providers of Internet services, connected devices and infrastructure to broadcasting companies, search engine providers and producers of content, convene in a self-regulatory initiative. Their objective is to help younger Internet users across Europe to make the most of the online world and deal with any potential challenges and risks.

In 2012, members of the ICT Coalition signed up to a set of six guiding principles to ensure that the safety of younger Internet users is integral to the products and services they develop. The Principles for the Safer Use of Connected Devices and Online Services by Children and Young People in the EU developed by the ICT Coalition encourage best practice in the key areas of content, parental controls, dealing with abuse/misuse, child sexual abuse content or illegal content, privacy and control, and education and awareness.

In 2014 the first report on the Implementation of the ICT Principles assessed the achievements so far and compiled evidence of the progress the members had reached in addressing children's online safety. In its foreword the report announces, *"Nevertheless, it is clear that ICT Coalition members recognise their own responsibilities and will continue to be vigilant in making their products and services as safe as they reasonably can be, while allowing industry to innovate and provide opportunities for society to benefit in both social and economic terms from all that the internet has to offer to young people."*

This White Paper ties up with that announcement in an attempt to shed light on recent developments in technology and in user behaviour. Innovative connected products, services and technologies are its focus. In assessing these it is important to bear in mind that some developments have come down a long road while others occur out of blue and it can only roughly be estimated how long they will last and what impact they may have on children's safety.

Regular assessment of emerging trends and evolutions is an important pre-condition for complete comprehension of their inevitable consequences, and can help to set up programmes and measures for the protection of children.

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# 1 Executive Summary

*Today the digital home is a reality for most young people, and children grow up using a wide range of interconnected devices for various activities, i.e. learning and entertainment, communicating with family and friends, hobbies and pastimes. Their imagination, fantasy and creativity are stimulated, their skills in reading and information retrieval are trained and they thus benefit in all areas of life. Often a seamless integration of online and offline activities supporting each other to the benefit of the child can be observed. But caution is necessary since threats and risks are emerging as a consequence of the all-embracing digital environment.*

There is statistical evidence for children going online at an ever younger age with even toddlers and babies less than one year old using the Internet on a regular basis. This development is spurred on by the usage of online services on mobile devices with touch screens (smartphones, tablets) which is increasing rapidly among the younger age group. As a consequence, a trend of new social media services targeted directly at the age group of younger children with little or no reading skills can be observed. These services gain their attractiveness by simple and intuitive interfaces, easily comprehensible concepts of navigation and colourful icons or buttons. Functionalities like automatic expansion to full screen mode are adapted to children's capabilities, preferences and habits of usage, e.g. repeating a certain video over and over again. Such applications lead to a new, somehow protected, area for this group, but leave open the question how and when children should be entering the less secured open Internet and how the 'forbidden fruit' effect can be avoided for the younger ones. For their older children, parents often rely on a trusting relationship, assuming that they will know if and when their children would need support. But it can be supposed that with younger children going online parents would particularly want to put safety first because for smaller children protection outweighs trust. Thus, the parents' interest in technical tools for the online safety of younger children might be spurred on in the near future by the fast increasing number of very young children going online. The resulting demand for technical instruments for children's safety should be addressed by reinforced efforts to improve the efficiency of parental control tools. Teaching digital literacy is a second strand of measures, but up to now mainly children aged six years and older were addressed, concurrent with the age of first access to the Internet which consequentially leads to a more institutional approach, based on digital literacy as a subject in classes. With ever-younger children being online a new strategy is necessary and

it is recommended that a new concept of 'educational digital literacy' for parents and caretakers be developed. Although many parents apply various approaches to ensure their children's safety, they are not always equipped with the necessary knowledge and they will need effective working tools to rely on.

Smart devices and the Internet of Things (IoT) are meant to make life easier and more convenient for all of us, but their implications for children's safety are obvious. The IoT provides users of all ages with a wide range of interconnected multifunctional devices, some of which are targeted directly at children, like interactive toys. Cameras are now embedded in nearly all devices, therefore always at hand and always connected to the Internet, thus bearing the risk of children taking pictures and publishing them directly. With multifunctional devices, going online does not need to be a conscious decision. Children connect 'seamlessly' and parents are less conscious of their children being online while they are engaged in activities on game consoles, smart devices, and when using apps. All connected devices may have implications for children's safety and privacy as they allow data to be captured on activities and behaviour patterns. As young users are accessing content with various devices it seems reasonable to apply concepts of interoperable age-rating labels that work across devices and applications. Children do not always use devices and applications that are exclusively designed for their age group but also those made for adults, and this often goes unnoticed by their parents or other adults in charge, just as the learning process the children follow is not always observed by those adults. Learning by observation as a kind of informal learning comes naturally along with the use of digital devices, as is the case with any analogue tool or instrument in the domestic and social environment of children.

Live streaming has become very popular in the last twelve months and several services are offered either by new providers entering the market or by

providers of other social media services combining the new services or functionalities with their existing offers. Live streaming has the potential to unleash the creativity of users and empower them to become producers of content. The person streaming a video is acting like someone on a stage in direct contact with the audience. People in the audience comment on the performance and in doing so are entering the stage themselves because all their comments can be read by anyone else. Some live streaming services store the content in order for it to be reviewed by either the producer, or the audience, or both. Thus, the short-lived character of the live performance becomes permanent, at least temporarily. A functionality to allow the producer control over stored content with the option to delete it should be standard for safety. Persistence also results from the possibility of producing a screenshot which is either embedded as a function in the service or which comes from separate software on the device. Images taken from live streams have the potential for misuse and exploitation, especially when the children are enticed to posing and producing sexually explicit imagery. Because most live streaming services are directly connected with other social media services these screenshots are prone to be spread widely amongst users of social networking sites. The immediacy of live video-streaming provides an added level of risk. Safety measures usually applied in chat rooms are less effective on live video-streaming services because there is no time delay and communication flows between the person streaming the video and the audience as if they were in the same room talking to each other face-to-face. Thus, the perception of risks associated with live video-streaming needs a shift of focus from content-related to contact-related risks. Means of addressing these potential risks include automated 24/7 monitoring and moderation, easily comprehensible reporting mechanisms, prompt handling of reports and feedback to the users.

Whilst social media services were previously used autonomously, the social media environment is becoming more convenient for users as the services support combining profiles and data from one service to another. Thus, the socialising effects are multiplied with very little effort and content that is produced or stored on one network is made available to contacts on another service. Unfortunately it is obvious that younger users especially are often unaware of the consequences that the sharing of profile information can have, and they can fail to comprehend the potential loss of anonymity and privacy. Parents are reluctant to use social media with younger children, but teenagers have almost constant access to social media and the frequency of usage is increasingly high, aided by the

convenience of smartphones. Nevertheless, just like youths, young children undertake certain types of usage on their own and this goes often unnoticed by the adults in charge.

Children embrace digital technologies with enthusiasm and pleasure, and they easily adapt to new functionalities. Their habits of content consumption are based on being constantly connected, thus finding their preferred content at the time of their choosing, and in certain cases they respond to potential threats by acquiring skills. A comprehensive safety concept that follows this correlation should be built on the assumption that different degrees of vulnerability in different age groups require different strategies of protection. Online risks do not necessarily lead to harmful consequences, as is revealed when risk exposure is correlated to being bothered on the Internet. Although the threat from the risks of cyber-bullying, access to and sharing of inappropriate content or excessive use and commercial fraud is significant, the probability of confrontation with known threats or with novel ones is somewhat lower. But although children's theoretical understanding of online risks is relatively good and they seem to have learned their safety lessons, this does not necessarily mean that they always act accordingly.

However, it is also necessary to caution against being overprotective. Findings suggest a correlation between supervision and resilience and it can be assumed that more supervision does not generally lead to more safety for the child. In some cases, children that were less supervised demonstrated more self-reliant risk management strategies and better coping. Although there is evidence for the validity of the '*more opportunities, more risk*' hypothesis, this could be opposed by the assumption that more usage leads to more critical understanding.

In order to synthesise safety measures and programmes there is a need for aligning notions of appropriateness and inappropriateness of content and services to children across countries and across stakeholder groups. Alignment would be beneficial esp. to internationally operating companies. Instead of child-specific regulations a multi-stakeholder approach comprising of regulation, self-regulation and co-regulation should be followed.

## 2 Analysis of Products and Services in Relation to Young Users' Behaviour and Usage Habits

*Innovative connected products, services and technologies with regard to evolving challenges, threats and opportunities are the focus of this analysis. While some developments have come down a long road, others occur out of the blue and it can only roughly be estimated how long they will last and what impact they may have on children's safety. In order to ensure that the safety of young users is integral to products and services a close look at the usage habits and behaviour of children is necessary.*

### 2.1 Internet Access, Children's Ownership of Portable Devices and Usage Habits

Towards the end of the first decade after the turn of the millennium, Internet penetration amongst the young generation approximated 100 per cent in the northern European countries, but in countries where Internet diffusion throughout the general population was low children were less likely to be online, a divide that still persists. Notable differences were also revealed when EU Kids Online compared children's Internet use at home by country in 2011. Access tended to be increasingly private, unrestricted and unsupervised with 'media-rich bedrooms' as the predominant place of Internet usage, a trend observed all over Europe, particularly in Scandinavian countries but less obviously in Turkey and Belgium. Data showed that differences in age, and cross-national disparities in online experience, frequency of use and amount of time spent online still persisted, while gender gaps seemed to be closing. The second trend was towards a deeper incorporation of the Internet in children's everyday lives, with the majority using it on a daily basis for a broad variety of online activities thus increasing their digital literacy and promoting safer and more skilled use (cf. Mascheroni et al. 2012, p. 59 ff).

Recent studies on children's and adolescents' online behaviour like *Net Children Go Mobile*, *EU Kids online* and research at a national level reveal two further trends in young people's Internet usage. Firstly, children of today are going online at an ever younger age, with even toddlers and children of less than one year using the Internet on a regular basis, a development that was already foreshadowed in 2011 but came into full bloom recently. Secondly, the usage of online services on portable devices with touch screens (smartphones, tablets) is increasing rapidly

among the younger age group but has also changed the usage of children who had previously been used to going online with desktop PCs and laptops.<sup>1</sup>

Internet usage by toddlers and pre-schoolers increases steadily from 2 per cent of children aged one year, 9 per cent of children aged two years and 11 per cent of children aged three years, 16 per cent of children aged four years, 24 per cent of children aged five years to 26 per cent of children aged six years. These are the results of a study carried out by the *German Youth Institute* who interviewed 4,800 families in 2014. As children reach reading age, a surge of 20 per cent per age cohort can be seen which leads to 80 and 85 per cent in the age groups of 9 and 10 year olds and a plateau of around 92 and 100 per cent for the age cohorts of 11 to 15 years (see Fig. on p. 2, Grobbin & Feil 2015).

With two quantitative and qualitative studies published in 2014 and 2015 by Ofcom, similar findings in regard to access to the Internet and usage of tablets are reported for the UK. For children between 5 and 15 years the 2014 study said they were twice as likely to go online using a tablet in 2014 than in 2013 (42 per cent / 23 per cent) (cf. Ofcom 2014, p. 5). In 2015 the study again reports an evident increase across all age groups from 64 to 75 per cent for 5–15 year olds, with the biggest rise among 5–7 year olds, increasing by 15 per cent to now 69 per cent. In 2015 over half of children aged 3 to 4 (53 %) use a tablet to go online according to the study (Ofcom 2015b, p. 6). "Tablets had a growing popularity and importance in young children's lives, particularly for leisure. The touch screen interface means that young children were able to access tablets more independently at an earlier age than technologies such as laptops. [...] Parents

<sup>1</sup> For more detailed statistical findings please refer to Annex B Analysis of User Behaviour in Regard to New Products and Services, Taking into Account Changes in Age Groups, etc., Annex B.1

tended to focus explicitly on deliberate uses of digital devices for learning or fun, but they recognised that these devices were also used to fill the gaps in daily life when parents were busy and children need to be occupied or entertained.” (Livingstone 2014b, p. 3) Portable digital devices especially were regarded as time-fillers in boring situations, i.e. long lasting car journeys or waiting in supermarket queues (p. 29).

Results from the German *KIM*, *JIM* and *FIM* studies from *MPFS*<sup>2</sup> suggest the same as for example *Net Children Go Mobile* (cf. NCGM 2014, p. 10): the tablet is a family device while the smartphone is a personal one. This is corroborated by the findings of Livingstone et al. stating that “smart phones were generally regarded as personal property, though many children would confidently ask their parents when they wanted to use them. Laptops and tablets varied – they could be defined as personal or shared property, depending in part on how many the household possessed.” (Livingstone 2014b, p. 28).

Once they own them, smartphones are seen as the most personal device by children and adolescents. In the *Net Children Go Mobile* study children perceived them as “an extension to their body”, easily to be carried around all day and providing full-time access to their peers and family (cf. NCGM 2014, p. 34). This is confirmed by the outcome of *Ofcom* in which children reported portable devices felt more personal to them because they enable high levels of interaction (*Ofcom* 2015a, p. 18).

Usage of digital devices and accessing the Internet are time-consuming activities. In the *JIM* study a continuous increase of the amount of time spent online is reported over the past ten years from 99 minutes per day in 2006 to 192 minutes in 2014 (cf. *JIM* 2014, p. 24). Most studies confirm that parents as well as children underestimate the time they spend online. In *Ofcom* 2015a this was seen as a result of children going online nearly unaware of doing so and with no need for a conscious decision to “go on the Internet” (*Ofcom* 2015a, p. 19). Particularly with tablets, smartphones and connected game consoles, but also with smart TVs, neither parents nor children could answer correctly whether they were online when performing a certain activity.<sup>3</sup>

One great concern to parents is the risk of becoming unable to maintain social relationships without using social media. They are also alarmed by over-dependence and harm to well-being, which is confirmed by a high percentage of children and

youths (50 per cent) reporting in *Net Children Go Mobile* that they very often or fairly often felt a strong need to check their phone in order to see if anything new had happened (cf. NCGM, Fig. 24, p. 35).

In addition parents are afraid of eyestrain, the disruption of bedtime or sleep (Livingstone 2014b, p. 31) and too little physical exercise. “Parents saw risks largely in terms of amount of use and the other activities that were displaced, rather than dangers of content or contact. [...] A sense that this technology was somehow out of one’s control was foremost in their minds” (Livingstone 2014b, p. 27).

## 2.2 Innovative Products, Services and Functionalities

The review reveals an accelerated growth of a range of innovative products, platforms and functionalities within platforms available for children and youths, and a rapidly increasing interconnectivity of devices and platforms. What are known as ‘all-age platforms’ addressing adults as well as younger users, and platforms targeted directly at children and youths were taken into account. Portable devices and even toys labelled in the category ‘Internet of Things’ have been examined as well as the availability of more bandwidth and subsequently greater provision of respective services e.g. live streaming, etc., that have the potential to be either beneficial or detrimental to children and youths.

### 2.2.1 Smart Devices – the Internet of Things

With regard to devices reference must be made to two general aspects recently driving developments in the area of information and communication technologies, the Internet of Things (IoT), and the interconnectivity of devices. Labelled with the term ‘Internet of Things’ two categories of devices need to be assessed with regard to children’s safety: family devices that are also used by children, and devices made especially for children, e.g. interactive toys. Due to their interconnectivity both bear the potential risk of surveillance that can also turn out to be a benefit when parents are able to monitor their children’s activities.

While it is unquestionable that remote access to devices enabling monitoring and timing of home appliances makes life easier for all of us, there are some concerns about becoming vitreous and losing control and autonomy of our own data when these are automatically uploaded to the cloud by the device

<sup>2</sup> For more detailed findings refer to Annex B Detailed Analysis of User Behaviour in Regard to New Products and Services, Taking into Account Changes in Age Groups, etc., Annex B.1

<sup>3</sup> For more detailed findings refer to Annex B Detailed Analysis of User Behaviour in Regard to New Products and Services, Taking into Account Changes in Age Groups, etc., Annex B.2.5

in use, where the provider of the tool might analyse the data and draw useful conclusions on users' habits and behaviour and where it cannot absolutely be guaranteed that user data are secure against hacking attacks and 'back door' risks (cf. Cooper 2015, Lonoff Schiff 2015 and Klimt 2015). Moreover the error-proneness of technology based on its permanent interconnectivity causes concerns.

Apprehensions are voiced that "anything that is controlled by a computer can be maliciously controlled by somebody who has compromised that computer, or, in many cases, is simply able to interact with it." (Cooper 2015). With numerous devices connected to each other via networking infrastructures the network is put in jeopardy and may become vulnerable and porous. For her article "3 reasons to be wary of the Internet of Things" Jennifer Lonoff Schiff has discussed why companies and consumers alike should be careful about deploying 'smart' appliances and devices that connect to the Internet, and offer steps to protect against security and privacy threats with IT and security experts. She quotes Daniel Dimov, a security researcher from the InfoSec Institute, "The Internet-connected modules installed on various devices (e.g., cars, toys, home appliances, etc.) can be used for unlawful surveillance. [...] For example, an Internet-connected door lock can be used to monitor when a person enters or leaves their home." (Lonoff Schiff 2015) She cautions about smart TVs and child monitors that can watch the users and refers to vulnerabilities found and documented in Internet-connected cars, medical devices and children's toys. (cf. Lonoff Schiff 2015).

So far entertainment technology seems to be closer to the realisation of the IoT than household appliances (cf. Klimt 24.02.2015). Inexpensive storage and better chipsets for connectivity spur the IoT and this development extends far beyond computers, smartphones, and tablets (cf. Cooper 2015). Therefore experts stress that although the great advantages of IoT are welcomed enthusiastically the protection of privacy must not be neglected, and they emphasise the need for transparency in regard to the collection of personal data (cf. eco News 27. 05. 2015). When Samsung warned customers using a smart TV to "please be aware that if your spoken words include personal or other sensitive information, that information will be among the data captured and transmitted to a third party through your use of Voice Recognition" the South Korean company's privacy policy came under harsh criticism (cf. Ribeiro 2015).

As reported by *Ofcom* smart TV is becoming more relevant as a device enabling access to the Internet for children and adolescents in the UK: while only 13

per cent of the 5 to 15 year olds could use a smart TV in 2013, in 2014 it was 39 per cent (cf. *Ofcom* 2014, p. 6) and in 2015 41 per cent of children aged 8–15 (*Ofcom* 2015b, p. 27). With regard to children's safety and privacy the greatest solicitude must be shown for the risk of involuntary disclosure of private data. Furthermore the risk of being exposed to unwanted advertising needs to be mentioned. The former can affect children through any device equipped with a microphone, either a family device like a smart TV or a device designed specifically for children like a smart toy. Microphones on smart devices are meant to minister to the user's interaction with the device. Voice control can be very beneficial to the user, offer a much better user experience, and can enable children and adults without reading skills to operate the device. Nonetheless, users need to be aware of potential side-effects of voice recognition and of the possibility of recording. In regard to children it cannot be expected that they are aware of potential risks like unwanted disclosure of information probably to an audience much broader than they are able to grasp.

When looking at digital toys one example can highlight both benefits and risks: the *Barbie digital make-over* app allows children to turn the iPad into a mirror and apply make-up to themselves, decorate their faces virtually, and take pictures with the camera icon. There is no in-app functionality to share the pictures, but they can be shared via other applications available on the same device. The use of a digital toy such as this touches on several aspects of children's privacy, although reviewer Amanda Bindel positively emphasises the educational benefits such applications can provide, "Families can talk about how some people use makeup to change their appearance and how sometimes marketers use computer software to change models' appearances. Let kids know that what they see on-screen or in images may not always be what people really look like." The example also shows that the camera built in to the device and used by the app can pose a risk to children who are unaware of the consequences of publishing photos online.

Another example is *Teddy the Guardian*<sup>4</sup> a cuddly bear equipped with digital technology to monitor heart rate, body temperature, and oxygen saturation of the child's blood. Although it does not give the child access to the Internet the child's health data are transmitted to the parent's smartphone thus bearing the risk of interception and misuse.

All devices categorised as the IoT or smart devices may have implications for children's safety and privacy as they allow the capturing of data about children's activities and behaviour patterns, e.g. how long and

4 s. [www.teddytheguardian.com](http://www.teddytheguardian.com)

when the device was in use by the child, which is not noticed by either the child or their parents.

Along with the Internet of Things comes the opportunity of a general turnaround in technology development. Smart devices and the IoT are made for users. The more they are adapted to the needs of users the more market success they gain and thus guarantee return of investment for the company that has invented them and brought them to readiness for marketing. Risk-based and future-oriented approaches to child safety policies and strategies are essential because of the speed of innovation cycles. Implementation of these policies and strategies calls for smaller steps instead of just one 100% solution. The concept of Safety by Design offers a reasonable answer to the speed of innovation. Users' needs should be considered in the development of products and services from the very beginning of the process, with safety ranking first on the list.

## 2.2.2 Platforms and Applications

### 2.2.2.1 All-Age Platforms and Applications

Nowadays social media are an integral part of nearly everybody's life and they have become substantial to social well-being not only for children but for all age groups. Nevertheless social media are still not as ubiquitous for the younger ones and only a few families with small children were likely to strengthen family bonds with the help of social media. Livingstone et al. point out that "parents aimed to introduce cognitive uses of digital devices early but to delay social uses as long as possible" (Livingstone 2014b, p. 12).

Despite this, two obvious trends can be observed over the last few years. The first is a kind of market concentration that is both beneficial and detrimental to users at the same time. When social media platforms became popular a lot of different applications were catering to the same purpose – the facilitation of social contact and communication. Now only a handful of internationally operating companies remain, a fact that has led to reduced choice for users but which at the same time multiplies the networking effects within each service. This is reinforced by the companies' strategy of expanding their portfolio through the acquisition of platforms previously provided independently. Users benefit from this development by the convenient option of linking their profiles and data across various platforms.

The second trend began its successful rise with the introduction of the first smartphones and by now has a history stretching back several years: the provision of applications or apps that function either

as a stand-alone or in addition to existing websites and platforms. As these apps are used on mobile devices it is not always transparent to the user when and how the application connects to the network infrastructure. Several new social media platforms are based on contact and group communication via mobile phone numbers. Here, the privacy of this data has become a more relevant issue and the question is not only to whom the number is disclosed but also who might be able to disclose the telephone number to others. In *Net Children Go Mobile*, children across Europe report being contacted via such platforms when they could not understand how the people concerned got their numbers (cf. NCGM 2014, p. 31). Instant messenger applications and platforms catering for group communication, e.g. *WhatsApp*, facilitate the distribution of information – data and images – to a whole group of contacts and thus support the socialising of their users. Screenshots can preserve snippets of conversations meant for private communication, which can then easily be transferred into group chat windows and thus made public to others.

"According to children, increased communication opportunities and the possibility to send free messages have led to impulsive, even aggressive communication." (cf. NCGM 2014, p. 28). Previous financial constraints in sending SMS made them think about what they text and what they do not. This is corroborated by findings from the Pew Institute which state that messaging apps have increased the frequency of texting via cell phones, the typical number of messages being 30 per day. They also state differences in gender, with girls being more likely to receive and send up to 50 messages per day (cf. Lenhart 2015, p. 19). Ofcom studies also confirm a continual increase in text messages over recent years and show huge differences both between age groups and according to gender. In 2014, children aged 8 to 11 years sent about 42 messages per week, while adolescents aged 12 to 15 sent 137 messages on average (113 messages sent by boys and 163 messages sent by girls) (cf. Ofcom 2014, p. 63). Messaging applications and communication on social networking sites make the phenomenon that children describe as '(social) drama' easier in several countries. Although it does not have the continuous and repetitive character of cyber-bullying it is characterised by aggressive messages with the intention to hurt the recipient (cf. NCGM 2014, p. 28).

As awareness of the persistence of data on the Internet has been raised over the past years and portability of data has become a matter of concern to many users, platforms that adhere to such concerns have become

popular. These apparently ephemeral platforms, e.g. *Snapchat*, react to users' apprehensions and provide shared information for a limited time span only. But users need to be cautioned that the content they upload to the service is not always completely deleted from the server of the provider after that time span. Again, these and similar platforms do not prevent users from taking screenshots and thus making the content persistent again.

### 2.2.2.2 Social Media Platforms Targeted at Younger Children

Social media platforms are mostly offered by international companies based in the United States and usually have an age threshold of 13 in respect to the US Child Online Privacy Protection Act (COPPA). In recent months a change could be observed, and platforms addressing smaller children, aged 0 to 6 years, with little or no reading skills have been launched. As the market for platforms aiming at this target group is regulated differently in countries in Europe and throughout the world, most of these platforms are published as localised platforms in line with national regulations. Like *YouTube Kids* and *Vine Kids* these platforms are often spin-offs of social media platforms for users aged 13 and above.

Age classification of the content is a pre-condition for these platforms to ensure that no age-inappropriate content is accessible to young users. Advertisements and sponsored content within such platforms are the subject of much controversy. Although they allow the applications to be provided free of charge it is questionable how and at what age children are able to comprehend the concepts of advertising.<sup>5</sup> The avoidance of interactive functionalities that could prompt young users to give away data without the consent of their parents is also regulated in reference to COPPA. Typically, sharing of content is not possible and a timer can be set by parents to prevent extended use.

Social media services targeted at younger users gain their attractiveness by simple and intuitive interfaces, easily comprehensible concepts of navigation and colourful icons or buttons. Functionalities like automatic expansion to full screen mode are adapted to children's capabilities, preferences and habits of usage, e.g. repeating a certain video several times. As *Ofcom* studies revealed, children are capable of managing these functionalities at a very early age, often surprising their parents by the intuitiveness they demonstrate in their appropriation of the service.

Strategies to find what they are looking for are based on a trial-and-error method. Most often their viewing is highly repetitive and they enjoy repeating just a handful of activities like watching a video or playing a particular game over and over again (cf. Livingstone 2014b, p. 24). In families with more than one child, an older/younger sibling's effect was observed, with acquired skills and knowledge being transferred to the other sibling(s) (cf. Livingstone 2014b, p. 28).<sup>6</sup>

### 2.2.3 Audio-Visual Content

#### 2.2.3.1 Viewing of Pre-Produced Content

Although the TV set is still the family device, all research carried out recently gives evidence that viewing of audio-visual content is shifting from linear consumption to viewing on-demand. In 2015 *Ofcom* states that "traditional TV is challenged by other types of audio-visual content" (*Ofcom* 2015b, p. 7). For the first time among 12–15 year olds who watch both TV and *YouTube* content, more say that they prefer *YouTube* videos (29 %) than TV programmes (25 %). This trend is particularly obvious in the viewing habits of younger children who are growing up with the use of smartphones and tablets connected to the Internet, where they find their preferred audio-visual content always and everywhere at hand (cf. *Ofcom* 2015a, p. 6). As the study *Children's Media Lives* puts it, "Being able to watch their [the children's] preferred content at the time of their choosing was important to them." (*Ofcom* 2015a, p. 24). Content providers are reacting to the phenomenon, as evidenced by *Sesame Workshop* which announced in August 2015 that the streaming and on-demand service provider HBO "is right up their alley". Chief executive Jeffrey Dunn says "two-thirds of pre-schoolers watching *Sesame Street* for the first time are doing so on demand, not over traditional broadcasts" (Bond 2015, p. 1).

Comparison of adults' and children's strategies and habits of information retrieval reveals another surprising effect. Audio-visual content on services like *YouTube* turns out to be the most common source of information for children and adolescents nowadays, be it for improving their gaming, looking for new styles or finding out about creative hobbies. "The exception to this was when they needed to search for information for school work or if they were researching a purchase. In these situations they were more likely to use a traditional search engine like Google." (*Ofcom* 2015a, p. 22)

<sup>5</sup> For *Ofcom* findings with regard to children's perception and comprehension of funding mechanisms of content please refer to Annex B Detailed Analysis of User Behaviour in Regard to New Products and Services, Taking into Account Changes in Age Groups, etc., Annex B.2.6.

<sup>6</sup> For more detailed findings please refer to Annex B Analysis of User Behaviour in Regard to New Products and Services, Taking into Account Changes in Age Groups, etc., Annex B.3.1

### 2.2.3.2 Live Video-Streaming

Live streaming has become very popular in the last twelve months and several services are offered either by new providers entering the market or by providers of other social media services combining the new service or functionalities with their existing offers. Although there are no reliable data on the number of active users available so far, it is obvious that only a few are producing content, that is to say they stream audio-visual content to their audience. The number of Internet users watching the content is a hundredfold if not a thousandfold and out of these a certain number is engaged in interaction with the person streaming the video, usually via the chat functions.

Live streaming has the potential to unleash the creativity of users and empower them to become producers of content. The person streaming a video is acting like someone on a stage in direct contact with the audience. People in the audience comment on the performance and in doing so are entering the stage themselves because all their comments can be read by anyone else. The immediacy of live video-streaming provides an added level of risk. Safety measures usually applied in chat rooms are less effective on live video-streaming services because there is no time delay and communication flows between the person streaming the video and the audience as if they were in the same room talking to each other face-to-face. Thus, the perception of risks associated with live video-streaming needs a shift of focus from content-related to contact-related risks.

Instruments to address these potential risks include automated 24/7 monitoring and moderation, easily comprehensible reporting mechanisms, prompt handling of reports and feedback to the users. Some live streaming services store the content in order for it to be reviewed by either the producer, by the audience or by both. Thus, the short-lived character of the live performance becomes permanent, at least for a certain amount of time. A functionality to allow the producer control over stored content with the option to delete it should be safety standard. Persistence results also from the possibility to produce a screenshot either embedded as a function in the service or with a separate software on the device. Because most live streaming services are directly connected with other social media services these screenshots are prone to be spread widely amongst users of social networking sites.

Although not a mass phenomenon so far, at least in Europe, the risk that children are enticed or even coerced into sexual activities on live stream services needs to be mentioned. So-called posing and modelling images are often taken from live streams and used in the process of grooming, thus threatening not only the child depicted but also other children who are enticed to behave in the same way. Therefore it is necessary to mention the potential risk of children being deliberately confronted with sexually explicit images with the purpose of engaging them in sexual activity either online or offline. Images play a significant role in the process of grooming and this has been confirmed by research on victims of cyber-grooming and offenders (cf. Briggs et. al. 2011; Katz 2013). Children reported to Katz how they received images and were enticed to send indecent images to the offender. Images of nude people were sent as part of the grooming that takes place in chat rooms in order to "normalize sex between adults and children" (Briggs 2011, p. 75).

In a study carried out by the *Internet Watch Foundation* in partnership with Microsoft in 2014, what they called 'youth-produced sexual content' was analysed with regard to the age of the children, the type of device and the services used to produce the content, and the explicitness of sexual activity depicted. Their *Emerging Patterns and Trends Report #1 Youth-Produced Sexual Content* states that "[...] sexually explicit content depicting children aged 15 years or younger assessed during the study had apparently been created using live video chat sites which enable users to connect with a random stranger." (IWF 2015, p. 18). Although it must be questioned whether the term 'self-produced' sexual content is adequate to describe this type of content, it is very likely that such videos and still images are used in an exploitative and abusive way.

Confrontation with sexual content online and offline is reported by 28 per cent of children in the *Net Children Go Mobile* study in the twelve months before they were questioned, although only 17 per cent report having come across sexual images on the Internet (cf. NCGM 2014, p. 32). It can be upsetting, but children and youths are more concerned about the risk of sexting. What bothers them most is so called 'revenge sexting', where nude or nearly nude images that have been sent during a relationship by mutual consent are sent to a larger group of peers or made public via social networking sites after the relationship has ended.

## 2.3 Competences, Coping, Creativity and Education

Children embrace digital technologies with enthusiasm and pleasure and they easily adapt to new functionalities. Their habits of content consumption are based on being constantly connected, and in certain cases they respond to potential threats by acquiring skills.

### 2.3.1 Skills and Competences

Today the digital home is a reality for most young people, and children grow up using a wide range of interconnected devices for various activities, i.e. learning and entertainment, communicating with family and friends, hobbies and pastimes. Their imagination, fantasy and creativity are stimulated, their skills in reading and information retrieval are trained and they thus benefit in all areas of life. Amongst young children especially tablets are highly popular and are used for entertainment, specifically games, and sometimes also for learning software. Contrary to their expectations Livingstone et al. found a surprising lack of explicitly educational apps and games on the tablets used by smaller children (cf. Livingstone 2014b, p.32). But they also found that, according to parents' observations, gaming provides a learning benefit even for very young children by training their hand-eye coordination (cf. *ibid.*, p. 23). Even 3 year olds who would usually struggle with the use of a mouse easily adopt the skills to navigate a touch screen. While pre-schoolers made use of the educational content their parents curated for them, older children saw the tablet as part of leisure time and tried to avoid educational products (cf. *ibid.*, p. 32).

An example of acquisition of skills to cope with potential threats is described in *Net Children Go Mobile* where 63 per cent of young smartphone users aged 9 to 16 years claimed they know how to deactivate location-tracking features (cf. NCGM 2014, p. 37). This adaptability can function as a self-protective shield embedded in a broader concept of protection.

When children are taught safety messages they can usually repeat what they have learned at home or in school. But they do not always understand the reasons behind those messages and thus come to false conclusions why they should not behave in a certain way or should avoid acting in a particular way. They conceptualise the danger in an offline context as that is more tangible for them (cf. Ofcom 2015a, p. 8). Younger children especially rely on their parents to set up or initiate the usage of digital devices and to take on the role of a facilitator if problems with the

device or application occur (cf. Livingstone 2014b, p. 25). Although younger children count on their parents and/or elder siblings to support them in their appropriation of digital devices they often develop skills and competences in parallel unnoticed by their companions or tutors. Thus, they may cause much surprise, for example when they are able to unlock a device by typing in the security code while their parents had taken for granted that their child would not be able to do so because they kept the PIN secret from their children.

Although stressing that more use leads to more risk of harm, the *EU Kids Online* study concluded in 2014, "The more children use the internet, the more digital skills they gain, and the higher they climb the 'ladder of online opportunities' to gain the benefits." (EU Kids Online 2014, p. 9)

### 2.3.2 Creativity

Previous studies like *EU Kids online* showed that children, especially those with a poor educational and social background, tended to use digital devices like PCs and laptops predominantly for entertaining or socialising purposes, or, as the report puts it, "(m)any children enjoy the Internet but most do not climb far up the 'ladder of opportunities'" (Livingstone 2014c, p. 10). Meanwhile, a rise of creativity can be seen accompanying tablets, their touch screen surface and intuitive handling routines.

Recent qualitative research reveals a growing number of children that produce photos and videos, frame them and put them in albums or upload them to social media platforms to entertain their friends and family members. Digital devices like smartphones or tablets seem to become just another tool for children to perform activities they usually did in an analogue way, for example drawing or building with toy blocks. Even role-playing is further developed with smartphones or tablets used as video cameras in order to make the role-play persistent and reviewable. But at the same time children interviewed in *Livingstone 2014b* reported enthusiastically about playing with friends, engaging in sports or playing outside (p. 25) and they mostly ranked these activities higher than time spent with digital devices (p. 29).

Concepts of Safety by Design could build on this interrelationship between the online and the offline world, for example by prompting children to do something else after a certain time spent with the application or device. In addition, children's creativity could be furthered by suitable applications composed for children's interests and hobbies.

### 2.3.3 Education and Mediation

For families across Europe the *Net Children Go Mobile* study states that, "Parents try to deal with the complexity of a convergent and mobile media environment, which apparently is no longer 'under control', by adopting multiple strategies of mediation." (NCGM 2014, p.38)

Technical restrictions are the least popular instruments for mediation amongst parents, especially for smartphones (cf. NCGM 2014 fig. 30 and 31, p 43.) Based on their qualitative interviews with parents in Germany the Hans-Bredow-Institute states that parents want to trust in their children and not to control them. Also, they do not consider technical tools to work efficiently and to be easy to handle on different devices, and they lack knowledge both about the tools and about their functionalities (cf. Rechlitz/Lampert 2015). This is confirmed by the results of Livingstone et al. where only a few families had installed filter software on some of the digital devices in use, and the others stressing that as long as they were able to supervise their children's usage there was no need for technical tools, but they would definitely install them once the children grew older and went online on their own (cf. Livingstone 2014b, p. 30). In the qualitative study recently carried out by Ofcom, parents judged technical tools as "not flexible enough" to balance protection of their children and the benefits digital media can offer (Ofcom 2015a, p. 8).

Supervision is the other most commonly used strategy for children's online safety, with various approaches ranging from "sitting nearby and checking", "asking what they are doing", "watching and helping them" to "checking the browser or device history". But these approaches are applied in different manners across age groups and more likely to be used for younger children. 95 per cent of parents of children aged 3–4 do this, compared to 70 per cent of parents with children aged 12–15 (cf. Ofcom 2015b, p. 193).

For those children who are not likely to talk with anyone about what bothers them on the Internet, which is one-third of 9 to 16 year olds according to *Net Children Go Mobile* (cf. NCGM 2014, p. 37), it is necessary to provide anonymous online counselling services. In general, empowerment through the provision of information for coping and self-help strategies is to be recommended.

Parents also express their wish for a stamp or seal of positive content that helps them and other adults in charge of minors to identify appropriate and satisfying content for their children (cf. POSCON 2014, p. 74–75). Even those who sometimes rely on parental control tools that support them in restricting their children's access to age-appropriate content additionally ask for age labels readable for themselves – not only for machines – to make their own decisions on what is appropriate for their own child at a certain age. The Industry's reaction to these wishes is to start initiatives like the *Internet Age Rating Coalition (IARC)*, which provides a globally streamlined age classification process for digital games and mobile apps. The system is now compulsory for apps offered in the *Google Play Store*. Another example is *Google's family discovery experience* which is arranged to help parents find content designed for their children by age rating and organising content into categories in the *Google Play Store*.

Children take up smartphones and mobile devices very easily and at an ever younger age, while at the same time parents consider them more complicated and harder to handle (cf. NCGM 2014, p 39), a phenomenon that illustrates a generation gap. In parallel, parental control tools work less efficiently on mobile devices, but are easier to install, configure and use. It can be assumed that with younger children going online parents would particularly want to put safety first because for smaller children protection outweighs trust. Thus, the parents' interest in technical tools for the online safety of very young children might be spurred on in the near future by the fast-increasing number of very young children going online.

# 3 Assessment of the ICT Coalition Principles and Messages to Stakeholders

## 3.1 ICT Coalition Principles

New technology developments and changes in user behaviour also respond to the ICT Coalition Principles. The general structure of the six principles remains fit for purpose and covers the whole range of topics that must be addressed, though updating details could increase the principles' impact and strengthen their sustainability in the future. With regard to the findings in chapter 2.2.2.2 of the assessment presented here, *Principle 1: Content* would benefit from mentioning content targeted at younger children. They are a fast growing group of users and a vast amount of high quality content is already provided that may help reduce the risk of confrontation with inappropriate content for the smallest children. *Principle 2* addressing parental controls gains further importance from the increased number of younger children going online, as parents especially want to protect their smaller children by use of effective and easy to handle safety tools. *Principle 3* remains fundamental, addresses contemporary instruments for dealing with abuse and misuse reasonably, and does not need amendment. The relevance of recommendations as laid down in *Principle 4* is underlined by a steadily growing number of various types of child sexual abuse content on the Internet. Cooperation with law enforcement, notice and take down procedures, but also reporting mechanisms for users remain adequate means to achieve reduction of any kind of abusive content. Compliance with data protection and advertising rules as addressed in *Principle 5* will become more important in the future driven by the extensively growing penetration of family households with smart devices and the risks that may come along with further interconnectivity. *Principle 6* refers to education and awareness-raising, both remaining extremely important in the future with a special focus on parents and other adults in charge of minors, who must continuously be enabled to protect the youngest group of Internet users.

## 3.2 Messages to Parents and Policy

- A new concept of 'educational digital literacy' should be considered for parents and other adults in charge of minors to address the needs of younger children appropriately. While 9 to 16 year olds become more and more prudent about social media this cannot be expected from younger ones aged up to 6.
- With ever-younger children using the Internet the focus of education needs to be shifted to parents and other family members rather than to schools. Although education in pre-school and kindergarten can play a certain role, parents, grandparents and siblings become more important.
- Parents need to understand the consequences of involuntarily and / or deliberately disclosing information about their children.
- Children easily adapt to new functionalities and respond with the acquisition of skills to handle potential threats. This adaptability can function as a self-protective shield embedded in a broader concept of protection with supervision and education being balanced.
- There is a gap of comprehension between the 'What' and the 'Why' among children. Although children have learned their digital literacy lessons, they do not always understand why they should avoid certain types of usage or behave in a certain way when online. Digital literacy education should therefore address the 'Why' and explain age-appropriately why they should avoid certain types of usage or behave in a certain way when online.

### 3.3 Messages to Policy

- Risk-based and future-oriented approaches are necessary in child safety policies and strategies because of fast innovation cycles. The implementation of such approaches and strategies calls for smaller steps instead of just one 100% solution.
- Instead of child-specific regulations, a multi-stakeholder approach comprising of regulation, self-regulation and co-regulation should be followed.
- The correlation between supervision and resilience needs to be researched further and subsequently addressed appropriately.

### 3.4 Messages to Policy and Industry

- In order to synthesise safety measures and programmes there is a need for aligning notions of appropriateness and inappropriateness of content and services to children across countries and across stakeholder groups. Alignment would be beneficial esp. to internationally operating companies.
- Parents need support to fulfil their role as the central agency in child safety for the youngest group of users (0 to 5 years).
- With mobile devices equipped with a camera always at hand, the risk of deliberately taking indecent images of children in an unnatural, sexually suggestive posture and the risk of children being coerced to do so is increasingly high. Those images are exploitative and at the same time deeply disturbing. They are spread throughout the Internet and are much easier to find than CSAI. Therefore politics and industry should intensify their already promising efforts and expand their priorities to include fighting such images.
- Advertisements of popular and well-known brands are seen as a sign of trustworthiness by many children, therefore advertisement should be banned on websites that are potentially capable of copyright infringement.

### 3.5 Messages to Industry

- Content classification based on clear and consistent standards needs to be applicable regardless of the platform for providing access to content, including mobiles devices as well as PCs and smart TVs.
  - Machine-readable labels should be applied for user-generated content as well as other types of content operating with interfaces on various devices.
  - Apps and websites targeted at small children should provide an interface for parental control software.
  - Parental control software should be easy to handle and work efficiently across operating systems and devices.
  - Smart devices / IoT (i.e. smart TV and smart toys utilising interactivity, voice recognition, connectivity, camera, etc.) need to ensure the privacy of their users and provide transparency of data collection and transmission. Equipping smart devices with a hard-wired 'switch' to disconnect immediately from the Internet in certain situations to avoid malicious attacks and / or privacy infringement should be considered.
  - Built-in features of devices and services that are not threatening as a stand-alone feature may become threatening when another feature is added to the same device. The option to disable either one or the other feature could help solve the problem where the threat results from the combination of both.
  - Concepts of Safety by Design should take into account which risks may occur from adding new features and functionalities to a device previously held to be non-harmful.
  - Services should provide a consistently designed user interface for both desktop and mobile devices.
  - For services that allow immediate interaction between public users to an audience, either reasonable age limits should be set and strictly controlled, or else 'safer areas' for younger users should be provided with 24/7 monitoring and reporting mechanisms.
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- The volatility of live streams can be overcome by screenshots and video recording 'on screen', therefore
    - users should be clearly warned about such risks,
    - concepts of Safety by Design should be applied to counteract unwanted replication and persistence of the imagery.
  - Concepts of Safety by Design should also rely on artificial intelligence in exercising monitoring functions with regard to inappropriate content and communication.
  - The development of devices labelled as the Internet of Things should take in consideration the safety needs of users and pay specific attention to children as a special group of users.
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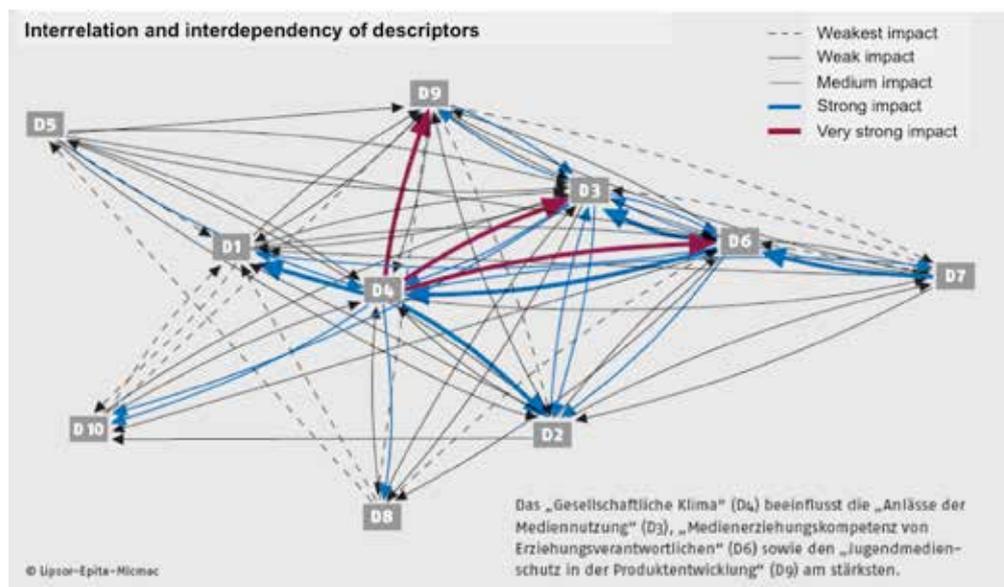
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## Annex A: Methodology

The guiding purpose of the assessment of emerging trends and evolutions in ICT services used by children and youths was to identify evolving challenges, threats and opportunities and to draw conclusions in regard to possible future actions of stakeholders in politics and industry. The methodology is based on previous findings from a technology assessment study carried out in 2014<sup>7</sup> and comprises of three steps.

An analysis of products and services with regard to evolving challenges, threats and opportunities was the first step towards a review of available products, services and functionalities within services, optional features of future products and services available for children. Secondly, user behaviours were analysed with regard to new products and services taking into account changes in age groups as desk research based on available studies on children's and youths' online behaviour f. e. EU Kids online and Net Children Go Mobile studies complemented by national research findings. A special focus was be given to the usage of online services on portable devices with touch screens (smartphones, tablets) by an ever younger age group including children aged less than one year and older. Albeit increasing mobile usage in all age groups mobility of Internet access was not regarded as an emerging trend in this White Paper but as a fact that reveals its impact in the analysis of users' behaviour. The analysis was structured by the following research questions: What benefits may come from using new services, e.g. educational software training the skills and competences of small children? What harm could result from children's potential confrontation with content, contact or advertisement not appropriate for their age group? What risk would involuntary disclosure of private data pose to children and their parents? What would that mean for industry and which further strategies and concepts could be applied for children's safety online? What would that mean for the role of the parents and their parental skills in guiding their children's Internet usage? Eventually findings from the analysis of research towards children's usage of the Internet and their behaviour online were then set in relation to the findings on emerging trends in services and products. A synthesis of the outcome conclusions were drawn in regard to the possible future actions of stakeholders in politics and industry, civil society and child welfare organisations and messages were phrased how to address the benefits and challenges resulting from the evolution of Internet products and services.



<sup>7</sup> In 2013 and 2014 the German Centre for Child Protection on the Internet – I-KiZ applied the methodology of technology assessment to review and gauge the impact of mobile online usage of children and youths within the next three to five years. As a result, ten factors were prioritised with regard to their impact on the development of a competent Internet society. The most impact was seen with the social climate and the attitudes of society towards increasing Internet usage on all age levels. The second major influence comes from the parents' own digital literacy and their ability to educate their children and teach them digital literacy. Nonetheless the availability and the efficiency of parental controls and other technical tools for youth protection were judged as powerful factors. Thus, the concept of Safety by Design was described as a means to achieve both: technological advancement of products and services and the promotion of educational measures for digital literacy and awareness raising. See [http://www.i-kiz.de/wp-content/uploads/2015/01/I-KiZ\\_Jahresbericht\\_Download.pdf](http://www.i-kiz.de/wp-content/uploads/2015/01/I-KiZ_Jahresbericht_Download.pdf)

## Annex B: Detailed Analysis of User Behaviour in Regard to New Products and Services, Taking into Account Changes in Age Groups etc.

Recent studies on children's and youths' online behaviour like *Net Children Go Mobile*, *EU Kids online* and research on national level reveal two trends in young people's Internet usage. Firstly, children of today are going online at an ever younger age, with even toddlers and children of less than one year using the Internet on a regular basis. Secondly, the usage of online services on mobile devices with touch screens (smartphones, tablets) is increasing rapidly among the younger age group but has also changed the usage of children who had previously been used to going online with desktop PCs and laptops.

### Annex B.1 Internet Access, Ownership of Devices and Usage Habits

Internet usage by toddlers and pre-schoolers increases steadily from 2 percent of children aged one year, 9 percent of children aged two years and 11 percent of children aged three years, 16 percent of children aged four years, 24 percent of children aged five years to 26 percent of children aged six years. These are the results of a study carried out by the *German Youth Institute* who interviewed 4.800 families in 2014. As children reach the reading age a sudden increase by 20 percent per age cohort can be seen which leads to 80 and 85 percent in the age groups of 9 and 10 year olds and a plateau of around 92 and 100 percent for the age cohorts of 11 to 15 years (s. fig on p. 2, Grobbin & Feil 2015).

These data are sustained by findings from *miniKIM* for 2014, a quantitative German research study conducted bi-annually by *Medienpädagogischer Forschungsverbund SüdWest – MPFS*. Since the last survey was conducted in 2012 a huge increase of usage, either alone or together with their parents, was stated for 2 to 5 year old children. While in 2012 only 4 percent of the children made use of a tablet, the number was 15 percent in 2014, for usage of tablets together with the parents the increase was even higher with 32 percent in 2014 compared to 23 percent in 2012. Nonetheless, in the very young age group tablets were seldom used to access the Internet according to *miniKIM*. Overall, only 7 percent of parents said that their children are using the Internet, only 5 percent on a regular basis, and they report an average age of 3.8 years for first time of Internet usage (cf. *miniKIM*, p. 21 – 25).

With two quantitative and qualitative studies published in 2014 and 2015 by *Ofcom*, similar findings in regard to access to the Internet and usage of tablets are reported for the UK for children between 5 and 15 years. The 2014 study says that they are twice as likely to go online using a tablet in 2014 than in 2013 (42 percent / 23 percent), for children aged 3 to 4 the likeliness to use a tablet for online activities rose from 12 percent to 20 percent (cf. *Ofcom* 2014, p. 5). In 2015 the study states again an evident increase across all age groups from 64 to 75 percent for 5-15 year olds, with the biggest rise among 5-7 year olds, increasing by 15 percent to now 69 percent. In 2015 over half of the children aged 3 to 4 (53 %) use a tablet to go online according to the study (*Ofcom* 2015b, p. 6).

"Tablets had a growing popularity and importance in young children's lives, particularly for leisure. The touch screen interface means that young children were able to access tablets more independently at an earlier age than technologies such as laptops. [...] Parents tended to focus explicitly on deliberate uses of digital devices for learning or fun, but they recognised that these devices were also used to fill the gaps in daily life when parents were busy and children need to be occupied or entertained." (*Livingstone* 2014b, p. 3) Especially portable digital devices were regarded as time-fillers in boring situations, i. e. long lasting car journeys or waiting in supermarket queues (p. 29).

As confirmed by these findings, tablets are nowadays an important device for accessing the Internet from a very early age on. A continuous increase over the years is validated by data for German children aged 6 to 13 years and their usage habits. With 27 percent a little more than a quarter of children aged 6 to 7 years are using a tablet on a regular basis. Once these children have acquired noteworthy reading skills at an age of 8 to 9 years the tablet usage increases significantly with 7 percent using it nearly every day and 45 percent using it at least once a week. Usage increases uniformly and continuously in the age group 10 to 11 with 17 percent using it nearly daily and 48 percent at least once a week. But at the age of 12 to 13 there is a slight decrease to be noted with 23 percent using it nearly

every day but only 38 percent who use it at least once a week (cf. KIM S. 43). This can easily be explained by looking at the number of children who own a smartphone in those age groups. While only 29 percent of children aged 10 to 11 years own a smartphone, 55 percent among children aged 12 to 13 years own their own smartphone. Out of these children 47 percent in the age group 10 to 11 access the Internet via smartphone while 66 percent of the children aged 12 to 13 are doing so. Compared to the 2012 study the percentage of children using the Internet and apps on their smartphone has doubled (cf. KIM, p. 47). Data from recent studies in UK confirm these findings with a significant increase of smartphone ownership at the age of 13 years: Figures jump from 41 percent of children aged 12 years to 67 percent of children aged 13 who own a smartphone (cf. Ofcom 2014, p. 5)

The results from *MPFS* suggest the same as for example *Net Children Go Mobile* (cf. NCGM 2014, p. 10): The tablet is a family device while the smartphone is a personal one. This is corroborated by the findings of *Livingstone at. al.* stating that "smart phones were generally regarded as personal property, though many children would confidently ask their parents when they wanted to use them. Laptops and tablets varied – they could be defined as personal or shared property, depending in part on how many the household possessed." (Livingstone 2014b, p. 28). Also, the qualitative *Ofcom* study found "Portable devices also appealed because they felt more personal to the children, enabling high levels of individual interaction and contact" (Ofcom 2015a, p. 18).

Coming along with the increasing availability of tablets a slight decline in devices dedicated to gaming was observed by *Ofcom* for children in the UK from 81 percent in 2013 to 77 percent in 2014 (cf. Ofcom 2014, p. 6). In addition, gender differences can be observed with boys being more likely to use gaming devices, a preference gap that widens as age increases with 30 percent of boys and 21 percent of girls aged 3 to 4, but 52 percent of boys and only 17 percent of girls aged 12 to 15 years. In each age group boys are over five times as likely than girls to say they would most miss a games console or player, while girls would rather miss their mobile phones and reading.

Also, social gaming is very popular amongst girls aged 8 years and up to their early teens, f. e. *Animal Jam* or *Farmville*, where the purpose of the game is socialising and interacting with others (cf. OFCOM 2015a, p. 6).

Once they own them smartphones are seen as the most personal device by children and youths. In the *Net Children Go Mobile* study children perceived them as "an extension to their body", easily to be carried around all day and providing full-time access to their peers and family (cf. NCGM 2014, p. 34). This is confirmed by the outcome of *Ofcom* in which children reported portable devices felt more personal to them because they enable high levels of interaction (OFCOM 2015a, p. 18).

With mobile devices comes along a greater privatisation of Internet access and usage. The most up-to-date findings from *Net Children Go Mobile* show that smartphones head the list of devices children aged 9 to 16 years own themselves (46 percent). Astonishingly the number of children that use a laptop on a daily basis is, with 46 percent, a little bit higher than those who daily use a smartphone (41 percent) although the number of those who own them themselves is lower with 43 percent. For the time being, desktop PCs and tablets remain a family device rather than a personal one, with 33 percent of children and youths who daily use a desktop PC and 24 percent who own one themselves and 23 percent who use a tablet on a daily basis and 24 percent who own one themselves (cf. NCGM fig 3, p 5).

Smart TV becomes more relevant as a device enabling access to the Internet for children and youths in the UK as stated by *Ofcom*, while in 2013 only 13 percent of the 5 to 15 year olds could use a smart TV, it was 39 percent in 2014 (cf. Ofcom 2014, p. 6).

Teenagers have almost constant access to social media and the frequency of usage is increasingly high, aided by the convenience of smartphones with a penetration rate of around 50 percent among youths in Europe and 73 percent in the US. (c.p. Lenhart 2015, p16). In 2014 the annual *Ofcom* study found out that teenagers spend more time on the Internet (17.2 vs. 15.7 hours) and prefer going online and socialising with their peers rather than watching TV, the percentage being 33 percent vs. 20 percent (cf. Ofcom 2014, p. 6).

In Spain, based on a study by *Protegeles*, 76 percent of the children between 11 and 14 years used *WhatsApp* on a regular basis in 2013 already (cf. Cánovas 2013) although the service has an age threshold of 16 years.

## Annex B.2 Certain Aspects of Risks and Threats with Regard to User Behaviour and Conduct

### Annex B.2.1 Cyberbullying and 'Social drama'

A significant rise in cyberbullying since 2010 was reported in *Net Children Go Mobile*, (cf. NCGM 2014, p 27, fig. 21): "According to children [aged 9 to 16], the rise in cyberbullying is associated with new communicative practices and opportunities. Some children believe mobile devices facilitate online bullying, because these devices allow them to be constantly online and available. According to children, increased communication opportunities and the possibility to send free messages have led to impulsive, even aggressive communication." (ibid. p 28). Previous financial constraints in sending SMS made them think of what they text and what they do not. This is corroborated by findings from the Pew Institute which state that messaging apps have increased the frequency of texting via cell phones, the typical number of messages being 30 per day. They also state differences in gender with girls being more likely to receive and send up to 50 messages per day (cf. Lenhart 2015, p. 19).

*Ofcom* studies also confirm a continual increase of text messages over the past years and show huge differences between age groups and according to gender. In 2014, children aged 8 to 11 years sent about 42 messages per week, while youths aged 12 to 15 sent 137 messages, with 113 messages on average sent by boys and 163 messages on average sent by girls (cf. *Ofcom* 2014, p. 63).

Messaging applications and communication on social networking sites ease the phenomenon that children describe as "(social) drama" in several countries. Although it does not have the continuous and repetitive character of cyberbullying it is characterised by aggressive messages with the intention to hurt the recipient (cf. NCGM 2014, p. 28). The increase in accessing the Internet with mobile devices makes it more likely that the device is taken away from the child and misused by its peers, f. e. to send rude messages or forward images the child would not like to be published (cf. NCGM 2014, p. 29)

Even if the following risks might only affect a small proportion of children and youths, parents, teachers and educators should be aware of them.

Services catering for group communication – f. e. *WhatsApp* and others – are very popular among young people, but they bear the potential risk of a new mode of exclusion via 'groups within groups', often leading to bad-mouthing excluded peers.

It has become a normal state to always be online which may cause some kind of social pressure. In cases where children are not online for a certain time, f. e. due to technical problems or during a holiday in a very rural area where they do not have broadband access, their peers, not knowing this, may badmouth them behind their back.

Furthermore, the ease of taking (compromising) pictures with mobile devices in combination with being online at all times and wherever one goes makes it more likely that those pictures are published against the will of the depicted child. This trend can be intensified by live streaming applications that allow to take screenshots and store them for potential misuse (s. also chap. 3.1.3.2).

### Annex B.2.2 Inappropriate Content, Behaviour or Contact

The risk of being confronted with inappropriate content and / or behaviour increases with age. This was confirmed by studies like *Net Children Go Mobile* and *Ofcom*. While approx. one in ten children aged 8 to 11 years who go online reported having seen something online that was worrying, nasty or offensive, the number was 18 percent for children aged 12 to 15 years (cf. *Ofcom* 2014, p. 9).

The *Net Children Go Mobile* research states the same saying that "exposure to risks increases with age and among smart phone and tablet users. This supports the so-called 'more opportunities, more risks' hypothesis: older users and mobile Internet users benefit from more online opportunities, but are also exposed to more risks." (NCGM 2014, p. 25).

In the interviews conducted by *Livingstone et. al.* in 2014 little feedback about contact or conduct risks was heard from children or parents and even when something was reported parents were not overly concerned (cf. *Livingstone* 2014b, p. 27).

### Annex B.2.3 Access to and Sharing of Sexual Content

The protection of children against access to and unintentional confrontation with nudity and pornography has been an objective of parents' and children's welfare advocates ever since the early days of the Internet. So called parental control tools, specifically developed for this purpose, are generally working quite efficiently on this type of content (cf. SIP Benchmark). But today parents are much more concerned about violent, scary or gory content or strong language than about their children having access to sexual content. (cf. Livingstone 2014b, p. 27)

Confrontation with sexual content online and offline is reported by 28 percent of children in the *Net Children Go Mobile* study during the past twelve months before they were questioned, although only 17 percent report to have come across sexual images on the Internet (cf. NCGM 2014, p. 32). It can be upsetting, but children and youths are more concerned about the risk of sexting. What bothers them most is so called "revenge sexting", where nude or nearly nude images that have been sent during a relationship in mutual consent are sent to a larger group of peers or made public via social networking sites after the relationship ended.

Although cyber-grooming is not a mass phenomenon for children it is necessary to mention the potential risk of children being deliberately confronted with sexually explicit images with the purpose of engaging them in sexual activity either online or offline. Images play a significant role for the process of grooming which has been confirmed by research on victims of cyber-grooming and offenders (cf. Briggs et. al. 2011; Katz 2013). Children reported to Katz how they received images and were enticed to send indecent images to the offender. Images of nude people were sent as part of the grooming that takes place in chat rooms in order to "normalize sex between adults and children" (Briggs 2011, p. 75).

### Annex B.2.4 Privacy Issues

With mobile devices being used more often in public spaces than in private rooms several threats to children's privacy can be observed.

Platforms catering for group communication can facilitate the distribution of screenshots of private chats into group chat windows. *Ofcom* (2015, p. 21) has found that many children were not aware of the potential threat to privacy caused by screenshots taken of images they thought to be ephemeral and short-lived because they shared them on services like *SnapChat*. Being confronted with this eventuality it was regarded as a fact that did not much concern the children. Children reported being annoyed by their parents' behaviour of publishing images of them on Facebook against their will which much more bothered them (cf. OFCOM 2015a, p. 21).

In *Ofcom* studies one of the parents' top concerns in regard to their children's online activities was "giving out details to inappropriate people" (34 percent) (*Ofcom* 2014, p. 10). Approx. one third was concerned about their child being bullied or confronted with inappropriate content, while only about 20 percent thought their child might become a cyberbully, share inappropriate personal photos or access copyrighted material. Parents with children aged 5 to 15 most often expressed conduct-related concerns (50 percent), followed by contact-related concerns (45 percent) and content-related concerns (36 percent).

A number of less common risks need to be mentioned and addressed appropriately in regard to privacy. When images and messages are not secured by a password losing the mobile device could have extremely stressful consequences for the child as the owner. As children are usually not as aware of the necessity of privacy as adults their privacy could be infringed by peers standing nearby seeing private images or messages on their smartphone. Last but not least family members could also violate the child's privacy by taking the phone away from the child for inspection, which is more likely to be done by parents, or spying which might be done either by parents or by siblings.

### Annex B.2.5 Excessive Use and Overuse

Usage of digital devices and accessing the Internet are time-consuming activities. In the *JIM* study a continuous increase of the amount of time spend online is reported over the past 10 years from 99 minutes per day in 2006 to 192 minutes in 2014 (cf. *JIM* 2014, p. 24). Excessive use or overuse becomes more likely with constantly available mobile devices. "Across countries, social networking and message notifications on mobile devices are often mentioned by children as distractions from focusing on homework. Therefore, even without parental pressure, some children prefer to do their homework first before using their smartphones – even turning these off so that they cannot be disturbed by incoming messages." (NCGM 2014, p. 35).

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A great concern to parents of children is the risk of becoming unable to perform social relationships without using social media. They are also alarmed by over-dependence and spoiled well-being which is confirmed by a high percentage of children and youths (50 percent) reporting in *Net Children Go Mobile* that they felt a strong need to very or fairly often check their phone in order to see if anything new has happened (cf. NCGM, fig 24, p. 35).

In addition parents are afraid of eyestrain, the disruption of bedtime or sleep (Livingstone 2014b, p. 31) and too little physical exercise. "Parents saw risks largely in terms of amount of use and the other activities that were displaced, rather than dangers of content or contact. [...] A sense that this technology was somehow out of one's control was foremost in their minds" (Livingstone 2014b, p. 27).

As in other areas of education parents respond to these apprehensions by setting rules for their children's online activities. Ofcom studies report percentages of well over eighty for parents with children aged 3 to 11 years, decreasing only slightly to 72 percent of parents who set rules for their children aged 12 to 15 years (cf. Ofcom 2014, p. 166). However, it cannot be denied that children tend to flout educational rules in family and school which is confirmed by *Net Children Go Mobile Studies*, where children reported that their smartphone is such an integral part of their social wellbeing that they even take it to bed although their parents had forbidden them to do so (cf. NCGM 2014, p. 34). Further and more elaborated aspects of parenting strategies are to be found in chapter 4.4.

Most studies confirm that parents as well as children underestimate the time they spend online. In *Ofcom 2015a* this was seen as a result of children going online nearly unaware of doing so and with no need for a conscious decision to "go on the Internet" (OFCOM 2015a, p. 19). Particularly with tablets, smartphones and connected game consoles, but also with smart TVs, neither parents nor children could answer correctly whether they were online when performing a certain activity.

#### Annex B.2.6 Commercial Risks

Some parents are afraid of charges and costs caused by their children's online activities. When asked about potential commercial risks they expressed their worries about hidden costs, deceit, their children buying products and services on the Internet without their consent and the possible financial consequences of infringement of copyrights. In the DJI study approx. 12 percent of parents stated such fears (cf. Grobbin / Feil 2015) and in *Ofcom* studies about 20 percent reported that in order to address commercial risks they have rules in place about not buying from websites (cf. Ofcom 2014, p. 191).

Children have little knowledge about funding of content and they usually do not understand the role of advertising. Mostly, advertisement is annoying for children and puzzles them. It is better understood and recognised in traditional media, while new types of targeted and personalised ads, product placement and innovative types of advertising on websites, in apps, and games often leave the children mystified. They simply do not understand why a certain content is offered to them or do not recognise advertisement disguised as game content. On the other hand, in a qualitative study *Ofcom* found out that advertising is seen as a mark of credibility and trustworthiness. "Particularly online, sites displaying advertising by familiar brands that were popular among their friends and family were most trusted. If a site had lots of adverts it was seen as a sign that those brands considered the site trustworthy and the children could do so too." (OFCOM 2015a p. 7)

Children, even the younger ones, were annoyed by advertisement in the games or applications they use. They understood the functioning of pop-ups and tried to get rid of them (cf. Livingstone 2014b, p. 27). This is confirmed by *Ofcom* findings which state that in 2014 significantly more children said they were annoyed by too many adverts online (age group 8 to 11 from 22 percent on 2013 to 31 percent in 2014; age group 12 to 15 from 35 percent in 2013 to 46 percent in 2014). As it is unlikely that the amount of adverts has increased proportionately the figures might give evidence of a greater awareness of advertisement among children. This could either be a result of good media literacy education or be caused by a more distinct labelling of adverts by industry thus preventing children from mistaking adverts for edited content.

Pop-up blockers were welcomed but younger children needed support from their parents or elder siblings to make them work (Livingstone 2014b, p. 27).

By referring to recent qualitative research, a trend can be observed of parents tending not to purchase apps for their children's learning and entertaining activities but instead favouring free apps. "This may impose children to in-app purchases and targeted advertising, which are less prevalent in paid-for digital products" (Livingstone 2014b, p. 3).

## Annex B.3 Opportunities, Benefits and Coping

### Annex B.3.1 Skills and Competences

Children embrace digital technologies with enthusiasm and pleasure, especially tablets are most popular with young children and are in use for entertainment, specifically games, and sometimes also for learning software. Against their expectations *Livingstone et. al.* found a surprising lack of explicitly educational apps and games on the tablets used by smaller children. But they also found that, according to observations of parents, gaming provides a learning benefit even for very young children by training their hand-eye coordination (cf. *Livingstone 2014b*, p. 23). Even 3-year-olds who would usually struggle with the use of a mouse easily adopt the skills to navigate a touch screen.

Strategies to find what they are looking for are based on a trial-and-error method, most often their reception is highly repetitive and they enjoy to repeat only a handful of activities like watching a certain video or playing a particular game over and over again (cf. *Livingstone 2014b*, p. 24).

In families with more than one child an older/younger sibling's effect was observed, when acquired skills and knowledge were transferred to the other sibling(s) (cf. *Livingstone 2014b*, p. 28). In contrary, parents rather dutifully shared activities on digital devices with their children for learning or teaching purpose than doing so for pleasure and fun, an effect that was well sensed and seldom appreciated by the children (*ibid*, p. 29).

Children develop their own usage strategies for playing together even when they only have one device at hand. In the qualitative research done by *Livingstone et. al.* it was observed that children played Minecraft together, creating their individual worlds with one child playing at a time and the others watching and giving advice and then changing roles. It can be assumed that such playing strategies not only train the gaming skills of the children but also strengthen their social skills and ability to agree on the "terms and conditions" of playing together as described above. (*Livingstone 2014b*, p. 32)

But sharing could also lead to another threat described in the *Ofcom* study, when siblings sync their identical devices to the same *iCloud* account and the younger brother thus gained access to the content that was age appropriate for his older brother but not for himself. (*OFCOM 2015a*, p. 38).

While pre-schoolers made use of the educational content their parents curated for them, older children saw the tablet as part of leisure time and tried to avoid educational products (*Livingstone 2014b*, p. 32).

The *Ofcom* study *Children's Media Lives* names three purposes of children's media activities: "Entertainment and distraction", "Substitution" and "Augmentation", the latter being the most relevant one in regard to skills and knowledge. Many children who were interviewed in the study accessed media content that enabled them to enhance their knowledge and skills to complete a task, hobby or activity (cf. *OFCOM 2015a*, p. 20). Again, a seamless integration of online and offline activities supporting each other to the benefit of the child can be observed here.

*Livingstone et. al.* "... observed more diversified skills and knowledge in those families where parents or older siblings spent time with the younger child explaining or playing on a device" (s. *Livingstone 2014b*, p. 4)

Children easily adapt to new functionalities and in certain cases they respond with the acquisition of skills to potential threats. For example, 63 percent of smartphone users aged 9 to 16 years claimed they know how to deactivate location-tracking features in *Net Children Go Mobile* (cf. *NCGM 2014*, p. 37). This adaptability can function as a self-protective shield embedded in a broader concept of protection.

In 2015 the *Ofcom* study states for 50 percent of search engine users aged 12 – 15 at least some type of critical understanding. Half of the children believed that some of the sites suggested as search results will be truthful while others may be not. On the other hand one in five still thought that when a search engine lists information then it must be true. In 2015 seven in ten 12 – 15 year olds agreed "that most people behave in a different way online to when they talk to people face to face," thus critically questioning the accurateness of self presentation (*Ofcom 2015b*, p. 7).

### Annex B.3.2 Coping Strategies of Children and Youth

When children are taught safety messages they can usually repeat what they have learned at home or in school. But they do not always understand the reasons behind those messages and thus come to false conclusions why they should not behave in a certain way or avoid acting in a particular way. They conceptualise the danger in an offline context as that is more tangible for them (cf. OFCOM 2015a, p. 8). For example, for a nine-year-old girl the only reason she could think of why her mum had told her she should not show too much skin in the Youtube videos she produced was that she might be judged by other people for her skin colour (OF COM 2015a, p. 32). In another study done by *Ofcom* it is stated: "Our qualitative research shows that children's theoretical understanding of online risks is relatively good, and stems mainly from parents and school. Contact risks were perceived to be the most serious, particularly to younger children. However, while children tended to know the sorts of action they should avoid online, they did not necessarily act accordingly" (Ofcom 2014, p. 9).

Especially younger children rely on their parents to set up or initiate the usage of digital devices and to take on the role of a facilitator if problems with the device or application occur (cf. Livingstone 2014b, p. 25). Although younger children count on their parents and/or elder siblings to support them in their appropriation of digital devices in parallel they often develop skills and competences unnoticed by their companions or tutors. Thus, they may cause much surprise, for example when they are able to unlock a device by typing in the security code while their parents had taken for granted that their child would not be able to do so because they kept the PIN secret from their children.

"In the [Ofcom] research there were children with very little supervision and others who were heavily supervised by parents. Both these approaches seemed to have some potential risks associated with them. For those children with very little supervision it was easier to access inappropriate content. The children who were heavily supervised by parents were more naïve about the dangers online and lacked experience of and confidence in how to deal with potentially risky online situations." (OF COM 2015a, p. 33)

Although children seek support from family members when problems occur, online usage is usually a more individual activity and less a part of shared family life (cf. Livingstone 2014b, p. 28).

### Annex B.3.3 Creativity

In general, a rise of creativity can be observed to come along with tablets, their touch screen surface and its intuitive handling routines. Previous studies like *EU Kids online* showed that children, especially those with low educational and social background, tended to use digital devices like PCs and laptops predominantly for entertaining or socialising purposes, or, as the report puts it, "(m)any children enjoy the Internet but most do not climb far up the 'ladder of opportunities'" (Livingstone 2014c, p. 10).

Recent qualitative research reveals a growing number of children that produce photos and videos, frame them and put them in albums or upload them to social media platforms to entertain their friends and family members. Digital devices like smartphones or tablets seem to become just another tool for children to perform activities they usually did in an analogue way, for example drawing or building with toy blocks. Even role-playing is further developed with smartphones or tablets used as video cameras in order to make the role-play persistent and reviewable. But at the same time children interviewed in *Livingstone 2014b* reported enthusiastically about playing with friends, engaging in sports or playing outside (p. 25) and they ranked these activities mostly higher than time spent with digital devices (p. 29).

Concepts of Safety by Design could build on this interrelationship between the online and the offline world, for example by instigating that children do something else after a certain time spent with the application or device. In addition, children's creativity could be furthered by suitable applications composed for children's interests and hobbies.

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## Annex B.4 Education and Mediation

For families across Europe the *Net Children go Mobile* study states: "Parents try to deal with the complexity of a convergent and mobile media environment, which apparently is no longer 'under control', by adopting multiple strategies of mediation, including:

- Active mediation of Internet use, where parents engage in activities such as talking about Internet content while the child is engaging with it, and sharing the online experience of the child by remaining nearby;
- Active mediation of Internet safety, where the parent promotes safer and responsible uses of the Internet;
- Restrictive mediation, which involves setting rules that limit and regulate time spent online, location of use and online activities." (NCGM 2014, p. 38).

In UK the number of parents who are aware of any available technical tool ranging from filtering on ISP level to parental control software, safe search modus, PIN/passwords or time-limiting software is exceedingly high with 84 percent saying that they are aware of these options, and over half (56 percent) using any of them. Awareness of ISP level filters has increased from 50 percent in 2014 to 57 percent in 2015, in parallel usage increased from 21 to 26 percent. With 97 percent almost all users of ISP level filters think they are useful (Ofcom 2015b, p. 11). But there is certainly less awareness and knowledge about technical tools for mobile devices to go online, with three quarters of the parents being unaware of the technical tools for mobiles the researchers asked for and 52 percent unsure if the bar on adult content was in place on their children's mobile phones. (Ofcom 2014, p. 11f).

Technical restrictions are least favoured among instruments for mediation by parents, especially for smartphones (cf. NCGM 2014 fig. 30 and 31, p 43.) Based on their qualitative interviews with parents in Germany the Hans-Bredow-Institute refers to the following reasons in their results:

- parents want to trust in their children and not to control them,
- parents do not consider technical tools as working efficiently and being easy to handle on different devices,
- parents lack the knowledge, both on the tools and on their functionalities (cf. Rechlitz/Lampert 2015).

This is confirmed by the results of *Livingstone* where only a few families had installed filter software on some of the digital devices in use and the others stressed that as long as they are able to supervise their children's usage there is no need for technical tools, but they would definitely install them once the children grow older and go online on their own (cf. Livingstone et.al. 2015, p. 30).

In the qualitative study recently carried out by *Ofcom* parents judged technical tools as "not flexible enough" to balance protection of their children and the benefits digital media can offer. (Ofcom 2015a, p. 8). In the 2014 quantitative *Ofcom* survey 77 percent of parents with children aged 5 – 15 years who go online agreed that they know enough to help their child manage online risks, and most parents (83 percent) agreed with the statement "I trust my child to use the Internet safely", a number that went down to 78 percent in 2015 (Ofcom 2015b, p. 11). Mediation strategies were applied broadly with more than nine in ten parents (96 %) saying they do so, mostly employing a combination of approaches consisting of "using technical tools, regularly talking to their children about managing online risks, supervising their child and having rules (about access to the Internet and/or behaviours while online)." (Ofcom 2015b, p. 11)

Supervision is the other most often applied strategy for children's online safety, with various approaches ranging from "sitting nearby and checking", "asking what they are doing, "watching and helping them" to "checking the browser or device history". But these approaches are applied in different manners across age groups and more likely to be used for younger children. 97 percent of parents of children aged 3 – 4 are doing so compared to 72 percent of parents with children aged 12 – 15 (cf. Ofcom 2014, p. 12).

The study thus comes to the conclusion: "With the increase in children's use of mobile devices to go online, and the preference of older children to use mobile phones for social networking and activities with friends, some technical tools and some forms of supervision may have limited usefulness if the child is going online outside the home." (Ofcom 2014, p. 11)

Usage of technical tools and supervision are accompanied by the setting of rules, which 82 percent of parents in the *Ofcom* study stated to do for their children's Internet usage (*Ofcom* 2014, p. 11). Many parents rely on ad hoc observation and only apply patchy strategies to protect their younger children. Both the skills of the young children and their limitations often go unnoticed by their parents. Once their children grow older and expand their online activities parents believe that robust strategies need to be developed (cf. Livingstone et al. 2015, p. 4).

Parents also express their wish for a stamp or seal for positive content that helps them and other adults in charge of minors to identify appropriate and satisfying content for their children (cf. POSCON 2014, p. 74-75). Even those who sometimes rely on parental control tools that support them in restricting their children's access to age-appropriate content additionally ask for age labels readable for themselves – not only for machines – to make their own decisions on what is appropriate for their own child at a certain age. The Industry's reaction to these wishes is to start initiatives like the *Internet Age Rating Coalition – IARC*, which provides a globally streamlined age classification process for digital games and mobile apps. The system is now compulsory for apps offered in the *Google Playstore*. Another example is *Google's family discovery experience* which is arranged to help parents find content designed for their children by age rating and organising content into categories in the *Google Playstore*.

In *Livingstone 2014b* researchers found that parents set rules to restrict times of usage to a certain amount but at the same time feel extremely guilty about allowing their children to use the digital device to entertain themselves when they are just too exhausted to supervise what they are doing. But parents were also quite creative in reasoning with their children why at some times the use of computers was not allowed, f. e. telling the younger ones that the Internet shuts down at 6 o'clock on Sunday (cf. Livingstone 2014b, p. 30).

People still tend to be more worried about girls' safety than boys' on the Internet, same as in the offline world. Accordingly, parents mediate their daughters' online access more strictly than their sons'. They are more likely to check social media activity and state more often that they supervise their female child's online activities by asking what they have been doing and talking about being in contact with people they only know online, about being bullied online or about sending inappropriate personal pictures (cf. *Ofcom* 2014, p. 13).

Parents are also multipliers because one of their main sources of information about youth protection is talking to other parents (53 percent mothers / 45 percent fathers) and friends or relatives (53 percent mothers / 46 percent fathers). This was recently revealed by a study from the *German Youth Institute – DJI* (cf. Grobbin / Feil 2015). In *Ofcom* studies four in ten parents said they received information on technical tools from ISPs and from friends and family (cf. *Ofcom* 2014, p. 12). UK parents also confirmed that they would welcome advice on promoting children's safety, particularly in regard to encountering violence and strong language, sexual content or unwanted contact, although the latter two were of less concern for the parents (cf. Livingstone 2014b, p. 4). In the same study many parents felt that they would welcome guidance on managing children's online safety and technology use (cf. Livingstone 2014b, p. 28).

Children take up smartphones and mobile devices very easily and at an ever younger age, while at the same time parents consider these more complicated and harder to handle (cf. NCGM 2014, p 39), a phenomenon that illustrates a generation gap. In parallel, parental control tools are working on mobile devices less efficiently, but are easier to install, configure and use. It can be assumed that with younger children going online parents would particularly want to put safety first because for smaller kids protection outweighs trust. Thus, the parents' interest in technical tools for the online safety of very young children might be spurred on in the near future by the fast increasing number of very young children going online.

Parents also need to be informed about the consequences of involuntary and deliberate disclosure of information about their children. Their children often have digital footprints beginning at birth, some scholars tend to call them a digital tattoo due to their lifelong persistence compared to a footprint in the sand that is washed away easily by the sea waves (cf. Blum-Ross, 2015).

For those children who are not likely to talk with anyone about what bothers them on the Internet, which is one third of the 9 to 16 year olds according to *Net Children Go Mobile* (cf. NCGM 2014, p. 37), it is necessary to provide anonymous online counselling services. In general empowerment through the provision of information for coping and self-help strategies would be recommendable.

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