

## **SERIES ON DIGITAL IDENTITY AND BIOMETRICS**

### ***Topic 5: Cyber Security and Digital Identity (ID) Management***



**Greater Internet Freedom**

**Centre for Intellectual Property and  
Information Technology Law (CIPIT)  
Strathmore University**

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## **Cyber Security and Digital Identity (ID) Management**

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### **About CIPIT**

**The Centre for Intellectual Property and Information Technology Law (CIPIT) is an evidence-based research and training Centre based at Strathmore University, Nairobi, Kenya. CIPIT was established in 2012 and focuses on studying, creating, and sharing knowledge on the development of intellectual property and information technology utilizing diverse methodological approaches to inform debates on ICT applications and regulation.**

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### **About GIF**

**The Greater Internet Freedom Project (GIF) is a three-year, consortium-based, global program implemented by Internews and the GIF consortium across 39 countries. GIF places regional and local organizations at the forefront of the fight to preserve an open, reliable, secure, and interoperable Internet – and, by extension, protects the citizens, civic actors, journalists, and human rights defenders who rely on it to realize fundamental freedoms.**



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# Introduction

*The CIPIT and the GIF have developed exploratory material relevant to pertinent digital identity and biometrics topics. The ‘Cybersecurity and Digital Identity Management’ topic briefly explores the need to integrate cybersecurity best practices into digital ID management.*

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Technological advancements have played a key role especially in the identification of citizens. As a result of these advancements countries globally are slowly embracing digital IDs. Compared to paper-based IDs, digital IDs can be ‘authenticated remotely over digital channels.’<sup>1</sup> Taking into account that there have been rapid increases in the use of digital services, digital IDs have become fundamental so as to identify, authenticate and verify individuals. Digital ID systems are reshaping the ‘relationship between citizen and state and transforming the way development policies and programs are implemented.’<sup>2</sup>

Although digital IDs have a number of benefits, certain attributes should be taken into consideration to qualify it as “good” digital ID management. Some of these attributes include: uniqueness, established with individual consent, takes account of user privacy by ensuring personal data is protected and meets the threshold of high assurance authentication and verification.<sup>3</sup> One of the main risks associated with digital IDs is the fact that some countries lack data protection laws which play a fundamental role in protecting personal data belonging to data subjects from misuse. Further, many countries have enacted cybersecurity laws, but these are poorly implemented.

Also, rapid developments in technologies call for adequate measures to be put in place to ensure that the cyberspace is secure from malicious external parties.

Cybersecurity is concerned with ensuring that the cyberspace is secure and also that adequate security mechanisms are put in place to protect the personal data of data subjects. A number of countries have even implemented policies and laws that address the issue of cybersecurity. The Balkan region for instance has made considerable steps when it comes to cybersecurity and Digital ID management as discussed in detail below.

## Definition and Explainers

**Data:** Data refers to information that has been translated into a form that is efficient for movement or processing

**Data Subject:** This is any living individual whose personal data is collected, held or processed by an organisation.

**Distributed Denial of Service attack:** This is a form of cybercrime whereby the attacker floods a server with internet traffic to prevent users from accessing online services and sites.

**Hacker:** This is an individual who uses computer programming or technical skills to overcome a challenge or problem. They are mostly associated with cybercrime but there is a good and bad side of hacking.

**Hardware:** This refers to the tangible components of the computer that store and also run written instructions provided by a software.

**Personal data:** This is information relating to an identifiable living individual

**Ransomware:** This is a type of malicious software or malware that locks up a victim's data or computing device and threatens to keep it locked.

**Software:** This is a set of instructions referred to as programs that perform specific tasks based on the commands of the user.

**Worm:** This is a type of malware that can replicate and send copies of itself from one computer to another.

# Cybersecurity

Cybersecurity is the protection of systems including hardware, software and data from cyber-attacks.<sup>4</sup> The International Telecommunication Union (ITU) defines it as the collection of ‘tools, policies, security concepts, security safeguards, guidelines, risk management approaches, actions, training, best practices, assurance and technologies that can be used to protect the cyber environment and organisation and user’s assets.’<sup>5</sup> Cybersecurity is also concerned with preventing unwanted access and alteration of a digital equipment and information that is connected to the internet or a network.<sup>6</sup>

Some of the common cyber threats that are encountered in the field of cybersecurity include:

- **Cyber terrorism**- This entails the innovative use of information technology by terrorists to propagate their political agenda. It may take the form of attacks on networks, computer systems and telecommunication infrastructures.
- **Cyber warfare**- This is a series of cyberattacks against an enemy state thereby causing significant harm.<sup>7</sup>
- **Cyber espionage**- This is a type of cyberattack whose intention is to obtain ‘political, commercial and military information.’<sup>8</sup> Malicious hackers may carry it out against a government entity or even a business.<sup>9</sup>

In discussing cybersecurity, it is also crucial to understand the difference between cybersecurity and cybercrime. While cybersecurity is concerned with the protection of corporate and government networks from potential hackers, cybercrime focuses mostly on protecting individuals and families.<sup>10</sup> The two can be differentiated under the following categories:



- i. Types of crimes- In cybersecurity, the computer network, software or hardware is the target (for instance viruses, ransomware, worms, distributed denial of service attacks) while in cybercrime it entails crimes where the human or human's data is the target (cyberbullying, hate speech).<sup>11</sup>
- ii. Victims- In cybersecurity the victims are mainly corporations and governments while in cybercrime the victims may be families and individuals.<sup>12</sup>
- iii. Academic programs- The academic programs that are concerned with cybersecurity include computer science, computer engineering and information technology while for cybercrime it includes criminology, psychology and sociology.<sup>13</sup>
- iv. Intellectual Focus- Cybersecurity is 'applied science oriented.'<sup>14</sup> This entails practical approaches like coding, networking and engineering strategies. Cybercrime on the other hand is 'basic science oriented.'<sup>15</sup> This involves a theoretical understanding of how and why crime is committed.

## **Digital ID Management**

A digital ID (identity) is an identity that is claimed online by an individual, organization or electronic device.<sup>16</sup> The identity comprises information generated by an individual's online activity and this includes passwords, usernames, browsing history and others. It can also be in the form of a passport, licence or any other printed credential.<sup>17</sup> Digital identity management is the set of 'processes, tools, social contracts and a supporting infrastructure for creating, maintaining, utilizing and terminating a digital identity.'<sup>18</sup> Digital ID management is therefore

fundamental so as to protect organisations and also individuals. It is essential to an individual's security especially when accessing resources belonging to him or her like medical records or bank records.<sup>19</sup> Also through digital ID management an organisation can create a central location that manages 'customer, employee and contractor identity information.'<sup>20</sup> Managing the digital identity involves several processes namely:

- Authentication- This entails verifying the identity of a person so that access to protected resources can be granted or denied. The approaches used to authenticate a user include passwords, digital certificates, biometrics, smart cards and smart tokens.<sup>21</sup>
- Authorisation- This process ensures that users can access applications or resources that they are entitled to review or use.<sup>22</sup>
- Enterprise directory- This is a central data repository for holding and managing user identities and access privileges.<sup>23</sup>
- User management-This includes 'a collection of systems that support the creation, maintenance, suspension, deletion and use of digital identities.'<sup>24</sup>

Some of the risks that users of digital identity may encounter include:

- Identity theft- In this case, an attacker may gain unauthorized access to an individual's personal information or take over their digital identity and commit other forms of cybercrime like financial fraud.<sup>25</sup>
- Privacy- Since digital identities may require users to share their personal information, there may be concerns on how the personal data is secured and also which parties have access to it.<sup>26</sup>
- Inaccurate information-Digital identity may sometimes be based on inaccurate information that may cause problems with identity verification or access to services.<sup>27</sup>

- Cyberbullying- Digital identities may be misused for cyberbullying and online harassment.<sup>28</sup>

## Cybersecurity and Digital ID Management: Use Case in the Balkans

An illustration of digital identities use case is North Macedonia which has teamed up with MasterCard to become first country in the region to implement digital identities. The digital identities initiative by Macedonia will allow citizens to obtain documents from public institutions or also open bank accounts without physically being required to be there.<sup>29</sup>

Also, in 2022, the Greece government rolled out the Gov.gr Wallet for Android and Apple devices which enabled citizens to generate digital documents that can be used in Greece in a similar manner like physical ID or driving licence.<sup>30</sup> The digital identity wallet will also enable Greek citizens to ‘create, store and present digital versions of their national identity card and driving licence.’<sup>31</sup>

In terms of cybersecurity, Greece has also encountered a number of cyberattacks and one of the measures the Greek government took was the establishment of the National Cyber Security Authority (NCSA) whose purpose is to safeguard the digital transformation of the country from cyber threats.<sup>32</sup> Also the Greek government came up with the National Cyber Security Strategy which determined the main principles for the creation of a safe online environment in Greece.<sup>33</sup> Some of the objectives of the strategy include national risk assessment, national cyberspace contingency plan, determination of basic security requirements and cyber security incident handling.<sup>34</sup>

Another region in Balkans which has made considerable steps in the sphere of cybersecurity is Montenegro. The country has a number of legislations in place that

play a key role in cybersecurity. Some of these legislations include: Law on Information Security 2010, Law on Amendments to the Law on Information Security 2016, Regulation on Information Security Measures 2010, Cybersecurity Strategy(2013-2017) and CyberSecurity Strategy (2018-2021).<sup>35</sup>

When it comes to digital ID, the Republic of Slovenia launched a new national identity card with biometric security features in 2022.<sup>36</sup> The security features contained in the new identity card include: a chip that contains the holder's fingerprints and photograph, biometric data, the European Union mark and a QR code and other elements to enable e-commerce transactions.<sup>37</sup> The new ID enables citizens to access online government services, store electronic signatures and use it as a substitute for their government health insurance card.<sup>38</sup>

Also, Moldova was among the first countries in the world to implement mobile eID.<sup>39</sup> Mobile eID is also known as mobile signature that works as an ID in the virtual world thereby enabling users to authenticate themselves in cyberspace.<sup>40</sup> This is made possible through the help of a cellphone or by electronically signing a legally binding transaction or document.<sup>41</sup> The legal and regulatory framework created a favorable environment for the implementation of the mobile eID system.<sup>42</sup> For instance, the law on electronic document and digital signatures that was approved in 2004 created a foundation electronic documents and digital signatures exchange.<sup>43</sup> In 2014, a new law on electronic signatures and electronic documents came into force. Also in the same year, the government started issuing electronic identity cards.<sup>44</sup>

## **Emerging Technology**

The emerging technology in the sphere of digital ID management and cybersecurity will likely shift from usability and convenience to user privacy and data

protection.<sup>45</sup> Data subjects will be interested in how their personal data can be protected while companies may focus more on ensuring that technologies being used have robust data security measures in place. Some of the emerging technologies include:

- **Facial Recognition-** This form of digital ID verification uses biometric data to efficiently verify individuals. The facial recognition software is likely to advance to the point that its accuracy and speed will also improve.<sup>46</sup>
- **Machine Learning based Authentication-** This technology uses sophisticated algorithms and data analysis to identify patterns that belong to a user.<sup>47</sup> The analysed data is used to detect instances of theft or unapproved access hence providing added protection against fraud and identity theft.<sup>48</sup>This mode of authentication can also be used in passwordless authentication.<sup>49</sup>
- **Block chain-based identity solutions-** This form of technology enables users to 'store and track information about themselves on distributed ledgers.'<sup>50</sup> It provides data subjects with an increased control over parties they can share their personal data with and also who can access their data.<sup>51</sup> This technology also provides a secure method of authentication and verification.<sup>52</sup>
- **Artificial Intelligence (AI) and Machine Learning-** The advancement of AI worldwide will also influence the evolution of cybersecurity. Internet of things (IoT) ecosystems will also rely on AI and the machine learning line of defense to assess data reliability.<sup>53</sup> Machine learning algorithms can continue developing so as to improve spam and malware detection thus making it possible to identify fraudulent transactions quickly.<sup>54</sup>
- **Predictive Defense-** Through the aid of AI technologies, cybersecurity may also evolve and become capable of analyzing signals that anticipate an

attack.<sup>55</sup> As cybercrime continues to be more sophisticated, it follows that the cybersecurity defense mechanisms should also evolve at a similar rate.<sup>56</sup>

- **Hybrid Cloud-** This is an emerging aspect in the digital world that many companies across the world have embraced.<sup>57</sup> A hybrid cloud is a ‘computing environment that combines an on premises datacenter (also known as private cloud) with a public cloud allowing data and applications to be shared between them.’<sup>58</sup> The emergence of the hybrid cloud environment also calls for new cybersecurity approaches to be utilised that involve machine learning and autonomous systems.

## Resources and Reading List

### Guides and Policy on Digital ID and Biometrics

The Emerging Era of Digital Identities: Challenges and Opportunities for the G20 (policy brief) < <https://www.adb.org/sites/default/files/publication/822681/adbi-brief-emerging-era-digital-identities-challenges-and-opportunities-g20.pdf>>

Policy Model for Digital Identity and Electronic Know Your Customer (E-KYC) < [https://www.afi-global.org/wp-content/uploads/2021/09/AFI\\_GSP\\_digital-ID\\_eKYC\\_PM.pdf](https://www.afi-global.org/wp-content/uploads/2021/09/AFI_GSP_digital-ID_eKYC_PM.pdf)>

Guidance on Digital Identity <<https://www.fatf-gafi.org/content/dam/fatf-gafi/guidance/Guidance-on-Digital-Identity.pdf.coredownload.pdf>>

Guidelines on National Digital Identity < <https://rm.coe.int/prems-010823-gbr-2051-national-digital-identity-final-web-2762-4423-83/1680aa6b24>>

National Digital Identity Programmes: What's Next? <  
<https://www.accessnow.org/wp-content/uploads/2019/11/Digital-Identity-Paper-Nov-2019.pdf>>

Digital Identity: The Essential Guide <  
[https://www.id4africa.com/main/files/Digital\\_Identity\\_The\\_Essential\\_Guide.pdf](https://www.id4africa.com/main/files/Digital_Identity_The_Essential_Guide.pdf)>

Digital Identity Roadmap Guide < [https://www.itu.int/en/ITU-D/ICT-Applications/Documents/Guides/Digital\\_Identity\\_Roadmap\\_Guide-2018-E.pdf](https://www.itu.int/en/ITU-D/ICT-Applications/Documents/Guides/Digital_Identity_Roadmap_Guide-2018-E.pdf)>

Biometrics: A guide <  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/715925/biometrics\\_final.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/715925/biometrics_final.pdf)>

Global Biometrics Guide < [https://us.eversheds-sutherland.com/portalsresource/Global\\_Biometrics\\_Guide\\_2022.pdf](https://us.eversheds-sutherland.com/portalsresource/Global_Biometrics_Guide_2022.pdf)>

A Blueprint for Digital Digital Identity <  
[https://www3.weforum.org/docs/WEF\\_A\\_Blueprint\\_for\\_Digital\\_Identity.pdf](https://www3.weforum.org/docs/WEF_A_Blueprint_for_Digital_Identity.pdf)>

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Law on Information Security 2010 (Montenegro)

Law on Amendments to the Law on Information Security 2016 (Montenegro)

Regulation on Information Security Measures 2010 (Montenegro)

Cybersecurity Strategy 2013-2017 (Montenegro)

## Websites and Blogs

Sushma Rao, Sandeep Nair and Moly Joseph, *Cybersecurity: What Everyone needs to know*

<[https://www.researchgate.net/publication/354907006\\_Cybersecurity\\_What\\_Everyone\\_needs\\_to\\_know](https://www.researchgate.net/publication/354907006_Cybersecurity_What_Everyone_needs_to_know) Cybersecurity What Everyone needs to know >

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Jennifer Gustavson, *Digital Identity (Digital ID): The Complete Guide* (3 March 2022) <<https://www.notarize.com/blog/digital-identity-digital-id-the-complete-guide> >

Elisa Bertino and others, *Digital Identity Management and Trust Negotiation* (1 January 2009) <[https://link.springer.com/chapter/10.1007/978-3-540-87742-4\\_5](https://link.springer.com/chapter/10.1007/978-3-540-87742-4_5) >

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Elias Peminidis, *Digital Identity Management* <[https://www.academia.edu/21122975/DIGITAL\\_IDENTITY\\_MANAGEMENT](https://www.academia.edu/21122975/DIGITAL_IDENTITY_MANAGEMENT) >

Bojan Stokjkovoski, *Digital Identities: Why this Balkan country aims to match Estonia's successes* (12 March 2020) <<https://www.zdnet.com/article/digital-identities-why-this-balkan-country-aims-to-match-estonias-successes/>>

Leandros Maglaras and others, *Cybersecurity in the Era of Digital Transformation: The case of Greece* <<https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9312297&tag=1>>



## Organisation Materials

International Telecommunication Union, *Cybersecurity* <<https://www.itu.int/en/ITU-T/studygroups/com17/Pages/cybersecurity.aspx>>

Techtarget, *What is Cyberwarfare?*  
<<https://www.techtarget.com/searchsecurity/definition/cyberwarfare>>

Cyber Risk GmbH, *Cyber Espionage* <<https://www.cyber-espionage.ch/>>

TechTarget, *What is Cyber Espionage*  
<<https://www.techtarget.com/searchsecurity/definition/cyber-espionage>>

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Notarize, *Digital Identity Management: Why it's essential for business* (21 October 2022)  
<<https://www.notarize.com/blog/digital-identity-management-why-its-essential-for-business>>

Adnovum, *Digital Identity: The Complete Guide to Digital Identification* <<https://www.adnovum.com/blog/digital-identity>>

MDI, *Greece Rolls Out Digital ID Cards and Driving Licence* (1 August 2022) <<https://dukakis.org/shaping-futures/greece-rolls-out-digital-id-cards-and-driving-licences/>>

International Trade Administration, *Greece CyberSecurity Strategy* <<https://www.trade.gov/market-intelligence/greece-cyber-security-strategy>>

DCAF, *National CyberSecurity Strategies in Western Balkan Economies* <[https://www.dcaf.ch/sites/default/files/publications/documents/NationalCybersecurityStrategiesWB\\_2021.pdf](https://www.dcaf.ch/sites/default/files/publications/documents/NationalCybersecurityStrategiesWB_2021.pdf)>

World Bank Group, *Moldova Mobile ID Case Study*

<<https://documents1.worldbank.org/curated/pt/279851545919735993/pdf/Moldova-Mobile-ID-Case-Study.pdf> >

Azure, *What is a hybrid cloud?* <<https://azure.microsoft.com/en-us/resources/cloud-computing-dictionary/what-is-hybrid-cloud-computing/?cdn=disable> >

NetQuest, *What is the Future of Cybersecurity? Trends and Emerging*

*Technologies*<<https://netquestcorp.com/what-is-the-future-of-cybersecurity-trends-emerging-technologies/> >

## Reports

Report on Identifying Key Enablers on Digital Identity <

<https://web.kominfo.go.id/sites/default/files/Report%20on%20Identifying%20Key%20Enablers%20on%20Digital%20Identity.pdf>>

Cybersecurity Ecosystem Report < [https://www.isac-fund.org/wp-](https://www.isac-fund.org/wp-content/uploads/2022/04/PwC-Cybersecurity-Ecosystem-Report-WB.pdf)

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<sup>45</sup> Science Digest, *Digital ID: The Game-Changer That Will Transform How You Manage Your Personal Information*( 15 May 2023) <<https://sciencedigest.org/digital-id/>> accessed 22 May 2023

<sup>46</sup> *Ibid*

<sup>47</sup> *Ibid*

<sup>48</sup> *Ibid*

<sup>49</sup> *Ibid*

<sup>50</sup> *Ibid*

<sup>51</sup> *Ibid*

<sup>52</sup> *Ibid*

<sup>53</sup> NetQuest, *What is the Future of Cybersecurity? Trends and Emerging Technologies*<<https://netquestcorp.com/what-is-the-future-of-cybersecurity-trends-emerging-technologies/>> accessed 22 May 2023

<sup>54</sup> *Ibid*

<sup>55</sup> *Ibid*

<sup>56</sup> *Ibid*

<sup>57</sup> *Ibid*

<sup>58</sup> Azure, *What is a hybrid cloud?* <<https://azure.microsoft.com/en-us/resources/cloud-computing-dictionary/what-is-hybrid-cloud-computing/?cdn=disable>> accessed 22 May 2023