висвітлюють не лише можливості та механізм застосування методу, а й обговорюють його відповідність міжнародним та національним стандартам та вимогам захисту даних, що застосовуються до методів експертного дослідження.

Ключові слова: судова експертиза, метод судової експертизи, валідація криміналістичного методу, 3D-моделювання, захист даних.

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HANDWRITING EXPERTISE IN THE FORENSIC SCIENCE CENTRE OF LITHUANIA: PRESENT ACTIONS AND FUTURE VISION

Recently, the number of expert investigations in handwriting evidence at the Lithuanian Forensic Examination Centre (LTEC) has significantly decreased. The decrease has been observed for several years already.

The present article analyses possible reasons for the decrease in the number of expert investigations in handwriting in LTEC and the importance of such investigation in the context of judicial research, court proceeding, and criminal investigations. Also, the article deals with the use of electronic signatures and associated security problems in the digital environment.

Key words: *handwriting examination, signature, digital signature, digitized signature, informativeness of signatures.*

Formulation of the problem. In recent years, the Lithuanian Forensic Examination Centre has seen a significant decrease in the number of requests for handwriting examinations (Table 1).

Presentation of the main material. The trends in handwriting investigations make it necessary to assess the present situation, raising concerns of handwriting experts, totalling nineteen in LTEC (in Vilnius, Klaipėda, and Šiauliai branches). A review of the data on handwriting investigations of the recent year allows making the following preliminary conclusions:

– The number of illegal documents of incorporation and financial transactions of businesses, sole traders, and enterprises has decreased significantly (by more than 60 percent according to LTEC statistics). Online registration and online submission of financial reports allow rapid tracking of illegal transactions and impede the establishment and operation of illegal business units;

Table 1

Handwriting investigations at LTEC

Year	Number of investigations	Subjects	Questions	Results delivered within 30 days	Number of conclusions	Number of categorical conclusions	Number of Probability-based conclusions	Addition data requested
2013	815	23825	29779	164	1460	22461	1858	318
2014	756	18383	17946	186	17923	13700	1148	321
2015	757	30917	44021	187	44019	31549	802	316
2016	642	28156	137967	248	137956	111528	914	252
2017	491	14306	21818	318	18244	17147	1018	213
2018	392	6071	8149	298	8035	5606	504	163
2019	411	5542	7504	361	7537	6907	460	189
2020	379	5531	7374	291	7337	6947	363	159
2021	340	5925	9497	306	9513	8941	495	153

– Also, there has been a decrease in the number of investigations in land privatization documents [1, 2]. The majority of Lithuanian residents have repossessed their property and sorted out the property documents therefore, handwriting investigations have become rare in the field. 99.31 percent of the land has already been recovered in Lithuania. Hence, the decrease in the number of surveys in a document of this kind is a logical and natural trend;

– A decrease in motor vehicle documents has also been observed (old-type paper certificates of technical inspections are no longer available and old-generation driving licenses have been replaced with plastic equivalents containing no handwritten records and signatures) (Fig. 1, 2);

– Most documents on banking and financial transactions (payment statements) remain only in digital form;

– Postal documents (acceptance of consignments) are also signed on a touchscreen, which renders the signature unsuitable for handwriting examination (Fig. 3) as it is treated as an electro-photographic copy.

One of the main reasons for the reduced number of orders of handwriting investigation is the digitalization of most documents. However, handwriting experts are skeptical about the recent ideas suggesting that handwriting will disappear from our daily lives and will be completely replaced by printed texts and digital or digitized signatures. Rapidly developing technologies are unlikely to replace handwriting and signatures. Technological advances in modern information systems and software applications, eliminating the need to draft, write and sign documents, are followed by corresponding improvements in hacking tools. Therefore, critical electronic documents may be accessed, modified,

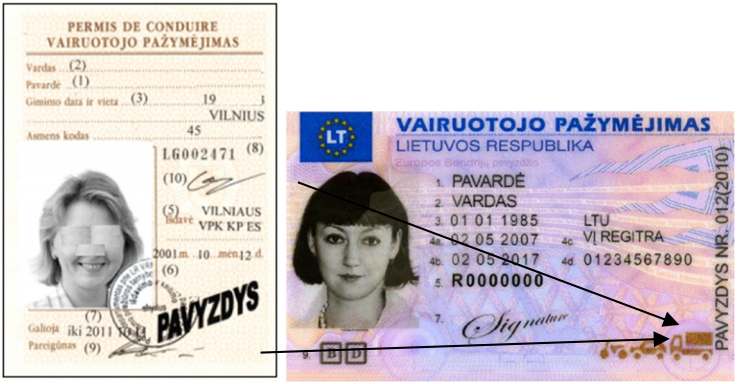

Fig. 1. Instead of two handwritten signatures, the contemporary Driving licence contains only a digitised signature, which is treated as a copy of the signature

Fig. 2. Certificates of motor vehicle technical inspections contain no handwritten inscriptions

Fig. 3. A device for a digital signature

deleted, or stolen by qualified offenders (*hackers*). According to the data of the National Cybersecurity Centre, over 500 cyber-incidents were registered in 2017, including 8 high-risk and 528 medium-risk events. Most of the medium-risk attacks were launched by means of malicious software. Meanwhile, the record for 2016 was 489 high and medium risk incidents [3].

Thus, the e-signature is not a hundred percent safe means of signing documents. Protection of computers, smartphones and smart gadgets used for electronic signature (numerical sequences) takes sophisticated security software (antivirus programs). Safe and reliable applications are expensive and not affordable to every user, both individual and corporate. Thus, protection against cyber attacks is not an easy task and is often simply impossible. Malicious applications may be used to discover and collect banking codes and passwords without the owner being aware. Even big corporations quite often undergo cyber attacks [4, 5].

According to the report of the National Cybersecurity Centre of 2017, 52 percent of the websites of Lithuania's public sector institutions are unsafe (Fig. 4).

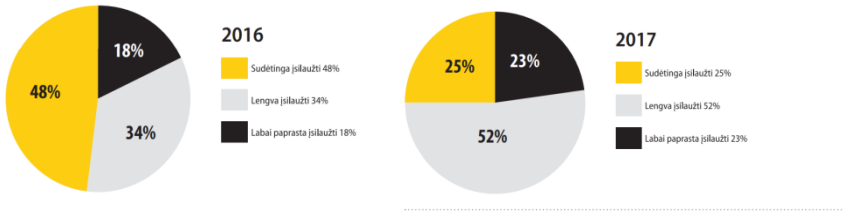

Fig. 4. Cyber security of public sector websites in 2016-2017 (Report on National Cybersecurity 2017).

Use of online services sometimes requires special devices, such as code generators or card readers. Aging, memory loss, motor disorders, deterioration of sight or age-related vision problems make digital tools (computers, smart phones, code generators, etc.) difficult to use . Abolition of the handwritten signature, would make it difficult for older people to take part in public life, e.g. voting, problems in banking and difficulties in notarial acts. On the other hand, sharing code generators or disclosure of passwords raises a high risk of illegitimate acts, deceptions, or criminal fraud [6].

Handwriting experts acknowledge that the digital signature is a really good solution in cases of particularly urgent transactions, and digital technologies are critical in modern business allowing immediate transactions between companies located in different countries or even on different continents. However, where documents are highly sensitive, handwritten signatures are recommended. Thus, international agreements are always signed physically. With the access to the latest technologies, leaders of nation-states still prefer handwritten signatures when international agreements have to be signed. The decrease in the

number of written documents predetermines not only a significant drop in the number of handwriting investigations but the shortage in comparative material necessary for the ordered investigations as well. Also, the transposition of most documents to the digital environment significantly limits the amount of handwritten evidence: a signature and sometimes the date and name are often the only handwritten artifacts in printed documents. Since the tradition of signature design is absent in our education system (students are rarely instructed that the signature is one of the means of personal identification), signatures are often unsuitable for the identification of the signatory and it is often impossible to identify who signed the document. Therefore, handwriting experts recommend schools encourage their students to carefully consider the transcription, the length, and the content of the signature – a system of characters for their identification – before adopting one. An informative signature is able to protect individuals against illegal transactions, unauthorized loans, and fake business entities. A difficult-to-fake signature can secure a safe and trouble-free life.

A considerable amount of public information about handwriting examination also hinders the work of handwriting experts. Document forgers are often aware of signatures unsuitable for identification and just use several uninformative elements to sign the forged document. Experimental handwriting samples are often distorted by using a completely unnatural handwriting pattern or sometimes combining characters into drawings. Also, there are frequent cases of refusal to provide experimental samples of signatures or handwriting patterns. The purposeful misrepresentation of samples aimed at misleading the expert makes handwriting investigation extremely difficult and sometimes may lead to a false conclusion. Being aware of handwriting expertise techniques, the suspects often attempt to falsify the samples. Even spare samples of signatures and handwriting patterns may be falsified by, for example, retroactively drawing up false documents (applications, statements, notebooks), inventing ad hoc versions of signatures, or changing general features of handwriting. The authenticity of spare samples must be confirmed by the investigator, the judge, and the expert examination commissioner, but this is a very complex task. When spare samples are submitted voluntarily, authentication of the samples is practically impossible for a non-specialist. In such cases, the author of the samples should be questioned about when, in what manner, and under what circumstances the documents were drafted, who is able to testify the fact of drafting, and if there are any witnesses able to confirm the origin of the documents and the inscriptions. However, such a practice is still absent in Lithuania.

Another very important reason for the decrease in the number of handwriting investigations is that most handwriting research laboratories refuse to examine copies of documents (i.e. inscriptions and signatures). Expert bodies explain their refusal by the fact that modern advances in printing, scanning, and photocopying technologies preclude accurate identification of the possible document montage of individual segments taken from several sources. Handwriting experts are able to examine the record or signature on the copy, but cannot decide if the signature actually belongs to the same document. The same problem

arises in signatures made on touch screens. Their analysis is similar to that of printed copies whereas the question of their origin should be dealt with by IT specialists. Recently, a considerable number of studies have been done on the digitized signature (made on a touch screen) in terms of the research feasibility, the expert qualifications needed, and the role of handwriting experts in the field.

A contemporary handwriting expert must also have the qualifications of the document expert, i.e. the ability to distinguish the copy from the original, identify features of a facsimile (print), and foresee the possibilities of the document montage. Where document authenticity is doubted, handwriting experts are often assisted by document experts. As the number of handwriting investigations decreases, handwriting experts could extend their qualifications by, for example, acquiring the competencies of document experts or competencies of IT experts. It would be appropriate for the future handwriting expert to study for additional qualifications of the document researcher as soon as their training starts. However, such training would require specialists in exact sciences, e.g. mathematics or information technology. Language specialists could seek the qualifications of a forensic handwriting expert or a linguist.

Conclusions. The decrease in the number of handwriting investigations allows experts to broaden their practice of handwriting investigations beyond the limits of forensic research. For example, the Lithuanian forensic examination center has recently been carrying out investigations into historical artifacts and museum collections. The collections include documents drafted by Lithuania's post-war partisan commanders, notebooks of the herbarium legends by Stanislovas Batys Gorskis (1821-1864), and letters of Konstantinas Sirvydas (1617), the micro-text of the Basel track as the oldest evidence of the Prussian language, dated 1369 [7]. Handwriting experts take part in numerous international events, conferences, and qualification courses. The reduction of the workload allows experts to take a broader look at innovations in handwriting research, to search for new ways of researching in particularly complex objects, and to better explore theoretical aspects of handwriting expertise.

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ПОЧЕРКОЗНАВЧА ЕКСПЕРТИЗА У ЦЕНТРІ СУДОВОЇ ЕКСПЕРТИЗИ ЛИТВИ: СУЧАСНІ ДІЇ ТА МАЙБУТНЄ БАЧЕННЯ

Р. Тамошюнайте

Останнім часом у Литовському центрі судової експертизи (ЛЦСЕ) значно зменшилася кількість експертних розслідувань почеркознавчих експертиз. Зниження спостерігається вже кілька років.

У цій статті аналізуються можливі причини зменшення кількості експертних досліджень почерку в ЛЦСЕ та важливість такого розслідування у контексті судового дослідження, судового процесу та розслідування злочинів. Також у статті розглядаються питання використання електронного підпису та пов'язані з цим проблеми безпеки в цифровому середовищі.

Ключові слова: почеркознавча експертиза, підпис, цифровий підпис, оцифрований підпис, інформативність підписів.