

Usage of insecure E-mail services among researchers with different scientific background

Krešimir Šolić¹, Krešimir Grgić², Vesna Ilakovac¹, Drago Žagar²

¹Department of Biophysics, Medical Statistics and Medical Informatics, School of Medicine; University J.J. Strossmayer Osijek, Osijek, Croatia; ²Department of Communications, School of Electrical Engineering; University J.J. Strossmayer Osijek, Osijek, Croatia

ABSTRACT

Aim Free web-based e-mail services are considered to have more security flaws than institutional ones, but they are frequently used among scientific researchers for professional communication. The aim of this study was to analyze frequency of usage of the insecure free e-mail services for professional communication among biomedical, economical and technical researchers, who published papers in one of three different journals: Croatian Medical Journal, Automatika and Economic Research.

Methods Contact details of the authors who provided their e-mail address from the papers published in those three journals during one year period were collected. These e-mail addresses were collected from the electronic archive of the journals in question. The domains of all e-mail addresses were assessed and contacts were categorized into three groups according to the following types: world-wide known free web-based e-mail services, national Internet Service Provider (ISP) e-mail services, and institutional or corporate e-mail addresses.

Results The proportion of authors using free web-based e-mail services, the least secure group type, was highest among biomedical researchers (17.8%) while every e-mail address collected from the technical journal belonged to the secured institutional e-mail group type.

Conclusion It seems that all researchers from the technical scientific field and most of the researchers from the economical field value good security practice and use more secure systems for professional communication. High percentage of the biomedical researchers who use insecure e-mail services may mean that they need to be warned of the possible security disadvantages of those kinds of e-mail addresses.

Key words: E-mail, security, free e-mail, web-based e-mail.

Corresponding author:

Krešimir Šolić

Phone: +385 31 512 809;

fax: +385 31 512 866;

Department of Biophysics, Medical Statistics and Medical Informatics, School of Medicine,

University J.J. Strossmayer Osijek,

J.Huttlera 4, 31000 Osijek, Croatia

E-mail: kresimir.sollic@mefos.hr

Original submission:

12 January 2011;

Revised submission:

15 March 2011;

Accepted:

29 June 2011.

INTRODUCTION

E-mail service has become widely accepted and is nowadays being frequently used for both professional and private communication. It represents a fast and convenient communication method, and is at the same time disturbance-free for the recipient (the recipient chooses the convenient moment to read the e-mail and answer it).

However, the security level of the e-mail service used primarily depends on the service provider. Currently, there are lots of web-based e-mail services that are free of charge. Although such services (for instance gmail, yahoo and hotmail) have become very popular, world-wide known and used, recent studies showed some of their security weaknesses (1-5).

There are many reasons why free e-mail services are considered to be less secure than institutional e-mail services. The possibility of losing private data is higher, because users are normally not aware who the people who have control over the system are, where the e-mail server itself is located, how safe it is (this concerns both the software and hardware part of email clients), where the backups are situated and who else has access to the user data (6). Also, due to the fact that this service has been widely used among people around the world it can be assumed that it is of increased interest to hackers and spammers. Users really read carefully the "Terms of Service Usage" when opening this kind of e-mail accounts and do not know the details regarding the security of data kept on e-mail servers of a certain e-mail provider. Opening an e-mail address under a false or somebody else's name has also proven not to be problematic, as well as sending e-mails on behalf of other people (3, 5).

Institutional e-mail systems, on the other hand, are under control of the company, and the history of the official e-mail correspondence and the user's entire official data is being backed up, saved and secured inside of the company. People also tend to look more professional when they use institutional e-mail addresses for professional communication (7).

Previous studies have proven that awareness and knowledge about security issues is rather inadequate among well-educated university employees and found an increasing trend in usage

of the free e-mail services among researchers in biomedical fields (8, 9). The aim of this study was to analyze and compare the frequency of the usage of free web-based e-mail services among authors that published papers in one of three journals from different scientific fields: biomedical, economical and technical.

MATERIALS AND METHODS

There was contact information of all authors that provided their e-mail address of the papers published in the Croatian Medical Journal (CMJ), *Automatika* or *Economic Research* during 2008 collected from the electronic archives of the journals in question (10-12). The reason for choosing these journals over international ones was that they are Croatian and are keeping a current database of indexation in their field (CMJ in the Current Contest, *Automatika* in the Science Citation Index Expanded and *Economic Research* in the Web of Science). The e-mail addresses collected were categorized into three group types, regarding their domain (3): free web-based e-mail services known world-wide, national Internet Service Provider's (ISP) e-mail services and institutional or corporate e-mail addresses.

For determining the domain's group type the Alexa service "who-is-who on the Internet" was used (13).

Usage of somebody else's e-mail address (different name/surname in the body of e-mail address), the e-mail address named after department or containing senseless combination of letters and numbers (those looking like spam or virus) were considered to be in irregular usage.

The data which will be presented here will be reduced to absolute and relative frequencies, due to the constraints of this paper. Difference between the three journals regarding e-mail group types was tested by χ^2 test. Statistical analyses were conducted using the SAS software (version 8.02, SAS Institute Inc., Cary, NC, USA) with significance level set at $p < 0.05$.

RESULTS

Out of 175 collected e-mail addresses in all three journals, 124 (70.8 %) were institutional e-mail addresses which are considered to be the most secured group type. 29 (16.6 %) were national ISP's e-mail addresses and 22 (12.6 %) were free

Table 1. Distribution of e-mail group types according to journals

| E-mail group types* | No (%) of e-mail addresses collected per journal | | |
|--------------------------------|--|-------------|-------------------|
| | CMJ | Automa-tika | Economic Research |
| Institutional e-mail addresses | 58 (57.4) | 25 (100) | 41 (83.6) |
| National ISP's e-mail services | 25 (24.8) | 0 (0) | 4 (8.2) |
| Free web-based e-mail services | 18 (17.8) | 0 (0) | 4 (8.2) |
| Total | 101 (100) | 25 (100) | 49 (100) |

* According to a previous study the three groups were defined regarding the security level (3)

world-wide known web-based e-mail addresses considered the least secure group type.

The distribution of the e-mail group types among the three journals differed significantly (χ^2 test, $p < 0.001$). All contact e-mail addresses of researchers published in the technical journal *Automatika* were institutional ones, while only slightly more than half of researchers from the biomedical field provided e-mail address from the same group type, as can be seen from Table 1.

There were totally 8 (4.6%) cases of an irregular usage of e-mail addresses. The distribution is shown in Table 2.

DISCUSSION

According to the results of the study researchers from the technical field were using the most secure institutional e-mail addresses only, while one of six biomedical researchers were using less secure free web-based e-mail services for professional communication with other colleges and journal editors.

Table 2. Distribution of irregular e-mail addresses according to journals

| Usage of irregular e-mail addresses | No (%) of irregular e-mail addresses per journal | | |
|--|--|------------|-------------------|
| | CMJ | Automatika | Economic Research |
| Somebody else's e-mail address | 2 | 0 | 1 |
| Departmentally named e-mail address | 3 | 0 | 1 |
| Senseless combination of letters and numbers | 0 | 1 | 0 |
| Total | 5 | 1 | 2 |

REFERENCES

- Noiumkar P, Chomsiri T. Top 10 free web-mail security test using session hijacking. *Proc IEEE ICCIT 2008*; 2:486-90.
- Chomsiri T. A comparative study of security level of Hotmail, Gmail and Yahoo mail by using session hijacking hacking test. *IJCSNS 2008*; 5:23-6.

The percentage of the irregular e-mail addresses found in this study was not as high as expected; nevertheless, this kind of e-mail addresses should be avoided by all means.

Lots of scientific papers as well as everyday newsletters have been discussing privacy issues regarding the usage of the e-mail services for correspondence (5). The debates range from questions if employees in public services should use free e-mail services (7), to who can access e-mail server in a company, whether it is legal to backup an employers' e-mail and if employees know that their e-mail correspondence in a company is controlled and may be scanned (14). That is the reason why many companies and institutions have a management policy regarding legacy and security issues with a tremendous part on the usage of the institution's e-mail address (15).

Apart from looking much more professional when using the institutional e-mail service, the security issues regarding particular institutional e-mail service is also under control: the e-mail server is usually situated physically within the institution and under the supervision of the ICT professionals.

In the last couple of years it was exactly the e-mail that was most frequently misused for spreading all kinds of malicious software. If the users are not careful enough, they can undergo many mistakes and compromise their own security and that of their e-mail communication (16, 17).

In most cases it has been proven that the institutional e-mail services are more secure and resistant to different types of attacks than the other two types of e-mail services mentioned. Therefore, it should always be a good security practice not only for scientific researchers, but for other e-mail users to choose, if they can, the institutional e-mail address over the free web-based e-mail service for professional communication.

ACKNOWLEDGMENT/DISCLOSURES

Competing interests: none declared.

- Solic K, Grgic K, Galic D. A comparative study of the security level among different kinds of e-mail services – pilot study. *Teh vjesn – Stroj fak 2010*; 4:489-92.

4. Arrington M. Gmail disaster: reports of mass email deletions. TechCrunch [Online] <http://techcrunch.com/2006/12/28/gmail-disaster-reports-of-mass-email-deletions/> (24 May 2009)
5. Stewart J. Private email accounts go public watch. DeathByEmail [Online] <http://www.deathbyemail.com/2007/08/private-email-a.html> (14 May 2009)
6. Sullivan F. I wandered lonely as a cloud. Comput Sci Eng. IEEE 2008; 1521-9615:88.
7. Demer L. Governor's two e-mail accounts questioned. Anchorage Daily New [Online] <http://www.adn.com/2008/09/14/526281/governors-two-e-mail-accounts.html> (21 August 2009).
8. Solic K, Ilakovac V. Security perception of a portable PC user (The difference between medical doctors and engineers): a pilot study. Med Glas Ljek komore Zenicko-doboj kantona 2009; 2:261-4.
9. Solic K, Ilakovac V, Marusic A, Marusic M. Trends in using insecure e-mail services in communication with journal editors. Proc PRC poster 2009:50.
10. Croatian Medical Journal. Online archive. <http://www.cmj.hr> (2 April 2009).
11. Automatika journal. Online archive. <http://hrcak.srce.hr/automatika> (2 April 2009).
12. Economic Research journal. Online archive. <http://hrcak.srce.hr/ekonomska-istrazivanja> (2 April 2009).
13. Alexa the Web Information Company. Site info service. <http://www.alexa.com/data/details/main/caucasus.net> (13 May 2009).
14. Agarwal R, Rodhain F. Mine or ours: email privacy expectations, employee attitudes, and perceived work environment characteristics. Proc IEEE Hawaii Int. Conf. Syst. Sci 2002; 35:2471-80.
15. Park E.G, Zwarich N. Canadian government agencies develop e-mail management policies. Int J Inform Manag 2008; 28:468-73.
16. Spam Gourmet. Spam Blocker. <http://www.spamgourmet.com> (August, 13th, 2009).
17. The 25 most common mistakes in email security. ITSecurity [Online] <http://www.itsecurity.com/features/25-common-email-security-mistakes-022807/> (23 March 2009).

Korištenje nesigurnih e-mail servisa među istraživačima iz različitih znanstvenih polja

Krešimir Šolić¹, Krešimir Grgić², Vesna Ilakovac¹, Drago Žagar²

¹Katedra za biofiziku, medicinsku statistiku i medicinsku informatiku, Medicinski fakultet Sveučilište J. J. Strossmayer u Osijeku, Osijek, Hrvatska; ²Katedra za komunikacije, Elektrotehnički fakultet, Sveučilište J. J. Strossmayer u Osijeku, Osijek, Hrvatska

SAŽETAK

Cilj Besplatni web bazirani e-mail servisi imaju više sigurnosnih nedostataka od institucijskih e-mail sustava, međutim istraživači ih ipak u određenoj mjeri koriste u službenoj komunikaciji. Cilj ovog istraživanja je ispitati kolika je frekventnost korištenja ovakvih e-mail servisa u službenoj komunikaciji među istraživačima iz područja biomedicinskih, tehničkih i ekonomskih znanosti, a koji su objavljivali u jednom od tri slijedeća znanstvena časopisa: *Hrvatskom medicinskom časopisu*, *Automatici* i *Ekonomskim istraživanjima*.

Metode Prikupljeni su kontakt podaci s e-mail adresama svih autora koji su unutar godinu dana objavili članak u nekom od tri analizirana časopisa. Podaci su uzeti iz elektroničkih arhiva pojedinih časopisa. Nakon analize domene pojedine e-mail adrese, one su kategorizirane u tri grupe prema slijedećim tipovima: svjetski poznati besplatni web bazirani e-mail servisi, nacionalni pružatelji Internet usluga (ISP), te institucijske ili korporativne e-mail adrese.

Rezultati Proporcija autora koji su koristili svjetski poznate besplatne web bazirane e-mail servise, tip adresa najniže razine sigurnosti, bila je najviša među istraživačima iz biomedicinskog polja (17.8%) dok su sve e-mail adrese prikupljene iz tehničkog časopisa pripadale grupi e-mail adresa visoke sigurnosne razine.

Zaključak Čini se kako svi istraživači iz tehničkog znanstvenog polja, te većina istraživača iz ekonomskog znanstvenog polja slijede dobru sigurnosnu praksu i koriste sigurnije sustave za službenu komunikaciju. Visoka proporcija biomedicinskih istraživača koji koriste e-mail sustave slabije sigurnosti upućuje na zaključak kako ih je potrebno upozoriti na moguće sigurnosne propuste ove vrste e-mail adresa.

Ključne riječi: e-mail, sigurnost, besplatni e-mail, web bazirani e-mail.