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PROGRAMMED IMPROVEMENT OF mHEALTH SERVICES IN UKRAINE

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Анотація
У даній роботі проаналізовані підходи до впровадження m-Health сервісів в Україні та окреслені недоліки та перспективи програмних рішень для їх покращення.

Ключові слова: *eHealth; m-Health; програмування мобільних додатків; гаджети; контроль функцій.*

Abstract
This research discusses the approaches of m-Health services implementation in Ukraine; their drawbacks and perspectives to improve their programming are mentioned as well.

Key words: *eHealth; mHealth; mobile application programming; gadgets; control of functions.*

Last decade was characterized by the explosive development of the health issues and conditions using personal electronic devices. This stimulated development of the electronic health or eHealth. The latter implies the use of computers as well as networks, for example, the Internet for managing and storing medical records without using paper files. The part of it is mHealth, which refers to mobile health as well as the practice of medication plus healthcare using mobile devices, computers, PDAs, and tablets. Recently the mHealth field has witnessed fantastic growth as an industry mainly because of widespread usage in the advanced countries plus easily accessible mobile technology. As a matter of fact, lots of individuals are acquainted with eHealth which happens to be the branch of medical care that employs emails, computers, monitors as well as satellite communications. Similar functions are also performed by mHealth technology, for example, delivering info to medical practitioners and allowing remote tests on cell phones, tablets and other portable gadgets[1].

Being a part of the civilized world, Ukraine is not an exception – both eHealth and mHealth programs became popular here too. Different mobile applications either for smartphones or smartwatches became a very popular tool, which allows control of health functions in a 24/7 mode. Programs of these applications let control personal data and interpret it.

However, in case of prediction the impact of environmental factors on human health situation looks different. It does not depend on personal data only but on the environmental changes, too, and needs therefore more complicated approaches to assess the value of these factors and predict the risk of their impact on human health.

For example, the mentioned case pertains to air quality forecast, which includes predicting the risks of pollen allergy, asthma and other respiratory diseases based on the presence of organic and non-organic components in the ambient air. Their list includes, but is not limited, by the particulate matters of 2.5 and 10-micron sizes, pollen grains of various plants and fungal spores. The former cause asthma mostly and two latter are responsible for the exacerbation of a seasonal allergy symptoms.

The assessment of the environmental risk is based on the complicated models, which use monitoring data of air quality by itself obtained by different monitoring devices – meteorological, ecological and biological ones. To gather and take all the data into consideration the complicated models were programmed in the Europe. One of them is a System for Integrated modeLing of Atmospheric coMposition (SILAM), which was developed by the Finnish Meteorological Institute. SILAM is an open-code system, global-to-meso-scale dispersion model developed for atmospheric composition, air quality, and emergency decision support applications, as well as for inverse dispersion problem solution (Figure 1).
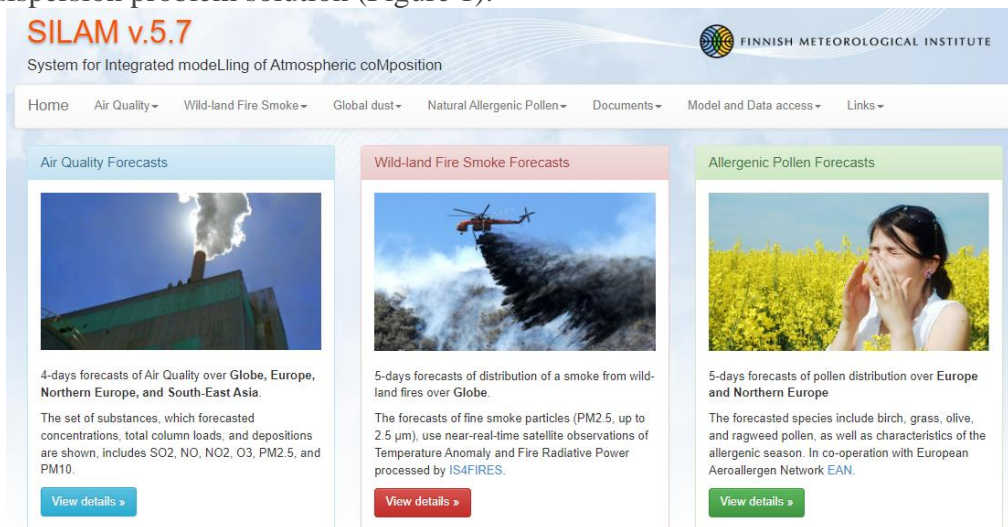

Figure 1. Services of modelling of the atmosphere, provided by the SIALM model

The model incorporates both Eulerian and Lagrangian transport routines, 8 chemico-physical transformation modules (basic acid chemistry and secondary aerosol formation, ozone formation in the troposphere and the stratosphere, radioactive decay, aerosol dynamics in the air, pollen transformations), 3- and 4-dimensional variational data assimilation modules.

SILAM source terms include point- and area- source inventories, sea salt, wind-blown dust, natural pollen, natural volatile organic compounds, nuclear explosion, as well as interfaces to ship emission system STEAM and fire information system IS4FRIES[2].

Due to the active involvement of the Ukrainian scientists, namely aerobiologists, who provide data into the European Aeroallergen Network (EAN)[3], SILAM pollen information is also available for the territory of Ukraine.

However, data for the inorganic air contamination is not available so far as Ukraine lacks the high-quality air monitoring stations.

Another problem is a high-quality mobile device, which can display correct data on allergenic pollen levels in the ambient air during the pollen season. Lack of software solutions, which implicates data collection not just for Ukrainian stations, is also a problem. The solution of this problem is important indeed, as it is considered that pollen allergy is common for the at least 30 % of European population including the Ukrainian one. Up to 10 % are suffering from asthma.

Even though Ukrainian pollen data can be found in the Pollen forecast for Ukraine[4], this service by itself does not enough satisfy users' instant interest in allergen levels in the air.

Figure 2. Service of pollen forecast for Ukraine at the allergy.org.ua website

In addition, one should not forget that symptoms of both allergy and asthma depend on the current air quality. The issue of air quality is especially important now, when Ukraine experiences war with Russia. Various destructions, caused by bombing and fires, aggravate air quality not just in the areas of active hostilities, but in other regions too and lead to the worsening of the human symptoms. Thus, problem remains unsolved; due to the absence of robust models and mobile applications people in different areas do not have appropriate and timely information about the current health risks.

Conclusion
So, it is important to provide Ukrainians with timely and exact pollen information on air quality. However, the analysis has shown the lack of program solutions in this field in Ukraine.

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