

# Efficiency of Using Social Networks in the Period of Library Activity in Remote Mode

Tetiana Yavorska<sup>1</sup>[0000-0002-6070-7425] and Oleksii Prigunov<sup>1</sup> [0000-0003-1440-0809],

Yuriy Syerov<sup>2</sup>[0000-0002-5293-4791]

<sup>1</sup>Vasyl' Stus Donetsk National University, Vinnytsia, Ukraine

<sup>2</sup>Lviv Polytechnic National University, Lviv 79013, Ukraine

t.yavorska@donnu.edu.ua, prigunov@donnu.edu.ua,  
yurii.o.sierov@lpnu.ua

**Abstract.** The article is devoted to the study of the specifics of the functioning of libraries in the remote mode to ensure access to information without compromising the safety of users and employees. The peculiarities of the representation of libraries in the most popular social networks are analyzed, attention is focused on the need to respond quickly to the development of online services, creating chatbots, expanding the presence of libraries in social networks.

**Keywords:** Library, Remote activity of Libraries, Social Networks, Chatbots.

## 1 Introduction

The main trend in the development of the information society is the spread of the network form of social organization of society, where network communication is the most effective in the modern communicative space. The media space reflects and expresses the complex processes of transformation of various spheres of society related to informatization. Its structure is a complex hierarchy of information and communication tools that are constantly changing and differing in diversity, language, symbolism [1] Today, the global deployment of the information and knowledge society is built around electronic networks, which generate network information flows, structures, interactions, communication environments, promote the formation of virtual communities through unique technologies based on globality, interactivity, multimedia, mass, asynchrony, anonymity, etc. [2].

## 2 Literature Review

Studies of domestic scientists I. Vershinska, S. Tsvetkov, K. Shpara, V. Shcherbyna, D. Ivanov, O. Nazarchuk, O. Anisimova and others are devoted to the study of net-

Copyright © 2020 for this paper by its authors. Use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0). COAPSN-2020: International Workshop on Control, Optimisation and Analytical Processing of Social Networks

work development of society. The study of the Internet as a communicative environment, engaged in domestic and foreign scientists, including: M. Kirichenko, O. Sosnina, I. Shavkun, S. Bikbaeva, A. Bikkulov, V. Ivanov, A. Runov and others.

Social networks, as alternative forms of mass communication, are structures of global information exchange, play a significant role in the formation of public consciousness, focused on collective functionality, interaction between participants. The formation of social networks, the main provisions and principles of their use and forecasting their future are the research of foreign scholars, including Joseph B. Walter, D. Westerman, B. Van Der Heide, C. Tong, L. Langwell, J. Kim, J. Anton.

The works of E. Akimova, O. Arestova, L. Babanin, Y. Babayeva, G. Bakulev, O. Belinskaya, A. Voyskunsky are devoted to modern problems of Internet communications, and the relationship of users in virtual communities, the impact of social networks on the identity of users. V. Volokhonsky, A. Zhichkina, D. Ivanov, T. Keller, H. Koskel, D. Kutuyugin, O. Lobovikova, V. Pleshakov, S. Fedushko, Y. Syerov.

Social media is defined as a set of all online platforms that enable online users to communicate with each other and produce user content. In other words, these are web resources designed to communicate with users online. Communication can take different forms - users can share their thoughts, experiences and knowledge, interact with each other, set up contacts, and share news, information, videos, photos, music, and recommendations [3]. With the active entry of Internet technologies in all spheres of human life, in the period of global informatization, rapid growth of information exchange and change of methods, forms and purposes of such exchange, the status of libraries, the specifics of their work has undergone significant changes. The modern user of the library is ready for revolutionary technologies and is integrated into the communication space, where network communications play an extremely important role. The nature, scale and depth of modern change require new approaches and solutions. Such conditions require consolidation and deepening of knowledge about modern ways of organizing cooperation on the Internet, about the formation and functioning of virtual communities, developing web communication skills, orientation in the processes taking place in the modern virtual information space of Ukraine, research of main trends and directions of domestic web organization. -communities [4].

The social network for the library is:

- an additional resource for the library;
- a platform for the implementation of library projects;
- the opportunity to express themselves;
- the opportunity to communicate directly with colleagues, readers, learn about their opinions, wishes, comments;
- the opportunity to inform about the activities of the library; - a tool for marketing research [5].

The works of domestic and foreign scientists are devoted to the study of the functioning of libraries in social media, their role in improving the information support of users through the use of social networks: O. Onishchenko, V. Popyk, V. Horovy, T. Granchak, Y. Polovynchak, K. Lobuzina, L. Chuprina, O. Goroshko, V. Bondarenko, T. Kolesnikova, O. Lavryk, O. Maryina, T. Yavorska, O. Prihunov, V. Stepanov,

A. Kaplan, D. King, S. Kuntz, L. Mont, M. Hanlain, T. Swanson, S. Agae, M. Casey, J. Davis, D. Fichter, J. Fournier, S. Pandey, R. Holly, P. Hollanty, N. Varier.

### **3 Basic points statement**

Modern libraries play the role of educational, informational, cultural, educational and social community centers. Confirmation is the Strategy for the development of librarianship for the period up to 2025 «Qualitative changes in libraries to ensure sustainable development of Ukraine», approved by the Order of the Cabinet of Ministers of Ukraine dated March 23, 2016 № 219-r. The authors of the document clearly point to the role of libraries in «the development of information and language culture of society, patriotic, legal and environmental education, the formation of a lasting interest in the study and understanding of national history and culture» [6].

Libraries around the world, like the rest of the world, are faced with the challenge of the COVID-19 pandemic, facing a difficult choice: how to act in a given period, what services to provide and how to offer them, from minimum restrictions to complete closure. library institutions. It is known that governments of different countries independently make different decisions about the functioning of libraries during the pandemic. In order to protect their employees, funds and users in the conditions of quarantine imposed in the countries, library institutions are closed, remote work is organized. The International Federation of Library Associations and Institutions (IFLA) monitors the state of libraries around the world during this period and informs about the closure of a significant number of public libraries in most countries of the world. Libraries of many countries in the world Libraries of higher and secondary education institutions decide on the functioning in accordance with the mode in which the educational institution operates [7].

Governments in countries with a small number of reported coronavirus infections have not taken special action on libraries but offer standard guidelines for hygiene in the service of their users. Obviously, any decision to limit services or close libraries is complex and is made after assessing all available risks. After all, the safety of library users and staff is a major condition during a pandemic.

In general, libraries around the world organize the remote work of all employees whose presence in the library is not critical. According to IFLA, if employees come to work, the library must ensure that they can work in accordance with the rules of social distancing:

- Refer employees to other positions in other departments within the same municipalities, for example, use their information management skills to support medical and social services;
- Provide constant interaction with users, talking about the possibilities of using library resources or services;
- Organize reading of books in online format in compliance with copyright laws;
- Encourage the use of electronic libraries and other services, in particular, invest in increasing content and purchasing licenses;

- Exempt from fines for failure to submit printed materials and increase the number of e-books that users can take in the library;
- Provide library facilities and equipment for other activities, such as the manufacture of personal protective equipment [7].

So, to continue to work in the new environment, the library must become a place where people of all ages will have the opportunity to read, study, communicate and develop at a better and, most importantly, safer level. Unpredictability during the pandemic put the libraries of the world and Ukraine in a situation of rapid response and development of online services. Library associations in many countries are developing advice on epidemic safety in libraries, looking for opportunities to continue to support their members. Thus, the Latvian Library Association has organized its annual conference in an online format and conducts a series of virtual events and a campaign on social networks. The New Zealand Library and Information Association (Te Aotearoa) and the Australian Library and Information Association hold virtual meetings with colleagues. The ENSSIB Association in France has prepared a series of webinars on various aspects of the impact of the crisis on libraries [7].

In the first three months of 2020, when the COVID-19 pandemic affected almost all aspects of human life, society underwent significant changes. These changes have been evident in the world of digital behavior, especially as billions of people turn to connected devices to help them cope with new challenges and work remotely. Social networks as a means of communication in world practice is a special phenomenon that expresses such intersubjective relations as communicative interaction, exchange of meanings in time and space, cognition, construction and constitution of social and interpersonal relations.

DataReportal analysis shows that 4.57 billion people currently use the Internet, which is 7% more than last year. Although the global use of social networks has not yet reached the 50 percent penetration mark, since April 2019, the number of social network users has increased by more than 8% and today reaches 3.81 billion [7]. Almost half of Internet users (47%) in the countries surveyed say they spend more time using social networks, while about half of these users (23%) say they spend "significantly" more time using social networks, compared to the previous period. This is evidenced by the announcement of Mark Zuckerberg at a press conference on March 18 on the growth of calls through WhatsApp and Facebook Messenger in 2 times the usual level. According to a GlobalWebIndex study, during a pandemic, people around the world spend much more time on their digital devices. Thus, more than three quarters (76%) of Internet users aged 16 to 64 in the surveyed countries say that in recent times they have spent more time using their smartphones compared to their behavior before the pandemic [8].

One of the most striking trends of recent times has been the sharp increase in communication through digital platforms, whether with family, friends, colleagues, or business partners. After all, to cope with the unique problems caused by the pandemic, digital platforms in a period of social isolation are increasingly becoming the only opportunity to communicate with the outside world. In particular, video conferencing applications have quickly moved to the center of many people's professional lives,

with many users using these platforms to stay in touch with friends and family. Thus, the Zoom teleconferencing service has become the most popular, where the number of active users has reached 200 million, which is 20 times more than at the pandemic level. Google Meet and Houseparty app downloads have increased. The latter has become especially popular among young users. Thus, the number of downloads of the Houseparty application in Spain jumped 2,360 times a week from March 15 to 21. In Italy, there was an increase of 423 times, while in the UK downloads increased 17 times [8].

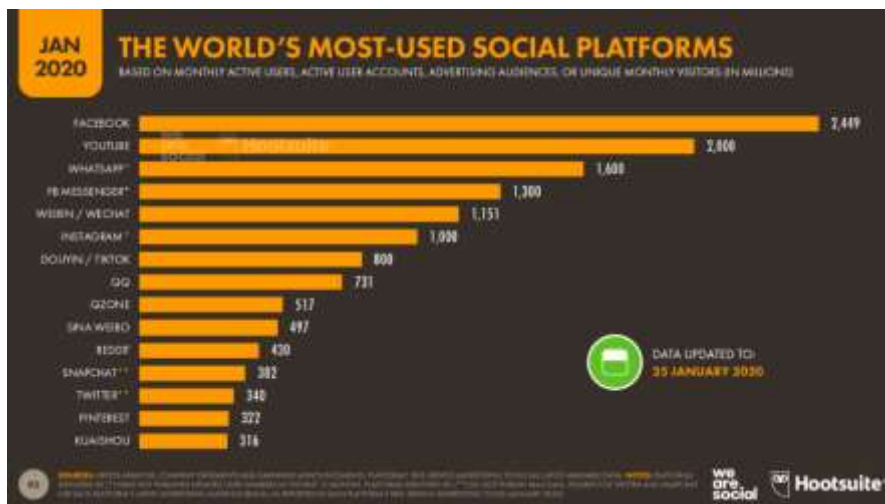
So, as we can see, the number of users of social networks in the world tends to grow steadily. Significant growth and recovery are observed during the global pandemic. Therefore, within the framework of our research, it is important to update the effectiveness of the use of social networks by libraries, to review the format of presence, content in order to attract a wider audience of virtual users. Social networks have an appropriate range of opportunities for this, allow you to quickly receive and share news, opinions, engage in discussions and engage in discussions of acute and urgent issues in the professional field. We can state that the platforms of social networks in the period of libraries in the remote mode have become for librarians the main link with users.

Among the main functions performed by library pages prevail: first, representative, is a presentation of the successful functioning of the library in terms of intensification of information flows; secondly, informational - is to provide the user with information about new arrivals, presentation of meaningful information and analytical materials; thirdly, communicative and navigational is to provide the ability to connect between the document and the user, provides the necessary information through the implementation of certain forms and tools using electronic technology; fourth: the study of the social structure of users, aimed at studying the information requests of different categories of library users in order to optimize the process of information selection; fifth: corrective, is to analyze the functioning of the site and develop proposals for changes aimed at improving its efficiency [9]. Currently, one of the most popular and accessible social networks in the world is Facebook, which confirms the results of the report [8]. The Facebook social network platform is most widely used in the professional communication of the library community. As a means of organizing information and communication space, libraries use Facebook for the purpose of formal and informal communication, discussion of professional problems, expression of proposals and initiatives aimed at the development of corporate relations and librarianship in Ukraine. It is known that the official page of the library in the network is created for the promotion and advertising of activities, own services and resources, communication with users. We analyzed the domestic segment of Facebook in relation to the representation of regional universal scientific libraries. The analysis showed that of the 21 regional research libraries, all have an official Facebook page (except for libraries located in the temporarily occupied territory of Ukraine), which confirms the maximum presence of libraries on the Facebook social network.

The number of users (subscribers) on the pages has different indicators, we have divided it into three groups: low (from 1-1000 users) - 6 libraries; average (from 1000 - 2000 users) - 6 libraries; high (from 2000-5000 users) - 9 libraries.

At the same time, libraries of different systems and departments need to constantly monitor social media and expand their presence on the platforms of those social networks where users spend more time and use more often. It is worth noting that young people and students are increasingly leaving Facebook because they see the network as a platform for the older generation and less relevant to their communication needs. Researchers point out that "students and young people first look for images and then text, believe that visual channels have become the most popular means of communicating with younger users, which is why Instagram's audience is growing rapidly [10].

The popularity of Instagram is due to the fact that the modern user is increasingly becoming a «visual». This social network fully meets his needs: a minimum of text, a maximum of photos. The number of subscribers to this platform is growing, registering an increase of 4.5 percent since the beginning of the year. According to the report Digital 2020: Global Digital Overview (Fig.1), Instagram today ranks 6th among social networks in the world by number of users [8].



**Fig.1.** Ranking of social networks in the world by number of users

Analysis of the presence of regional research libraries on the social network Instagram showed that only a third have profiles with a small number of subscribers.

#### 4 Our approach

Therefore, one of the most promising, in our opinion, social media for use by libraries in the near future is the platform of the social network Instagram, which is the most effective platform for attracting audiences and has significant advantages, including: a large youth audience, visualization of information messages and clip art. thinking of modern youth, the creation of a specific information message with a specific purpose, the possibility of filling with multimedia elements, thematic distribution

of material, integrative a system of links to other profiles of the institution in social networks. Among the many benefits, Instagram provides the ability to use analytical tools without implementing third-party programs and services.

For libraries, as well as for many information structures, the strategic development of activities in social networks in the future is of great importance. The main vector of strategic development of library institutions is the integration of activities in social networks with other communication channels, their relationship with information services and products at a qualitatively new level. New creatives arouse interest. It should be noted that the key issue is how the development of social networks and information and communication technologies will specifically affect the role of libraries in society and their functions. It is obvious that today social media has become a central part of everyday communication and services to library users, and one of the areas of work in an interactive environment and one of the main tasks is the formation of media and digital culture of information consumers.

It is important to consider the fact that in conditions of constant growth of the total amount of information there is a real danger of information overload of the human psyche. Therefore, creating content that would take into account this statement is one of the main tasks of administering library web pages.

So, the active development of social networks as a mechanism of information exchange has recently got the new growth rate. Libraries that are working in the telecommuting mode have especially intensified this development. As a result, there is a question of interaction of the library workers with existing or potential readers for the effective solving of the objectives which are set to the library by means of communicative possibilities of social networks. It is possible to define such possibilities among them:

- attracting new readers;
- encouraging the reader to use regularly different library services;
- providing an effective feedback mechanism. Particularly, it is about the formation of an objective opinion concerning the quality of the offered services and receiving ideas for their improvement;
- popularization of the libraries.

The main goal of the library can be achieved in such way - to be accessible to society. As a rule, it is proposed to create thematic pages (channels) or groups (communities) which take into account the interests of their users. Such pages and communities form an informal space for communication between the librarian and the reader and provide the traditional opportunity to interact via chat.

Pages and groups on different social networks have approximately the same set of features.

The thematic(topic) page is a free way to reach the target audience (a certain social group of people) who are using computers and mobile devices. Comprehensive search engines index them for quick and easy finding the information that you need.

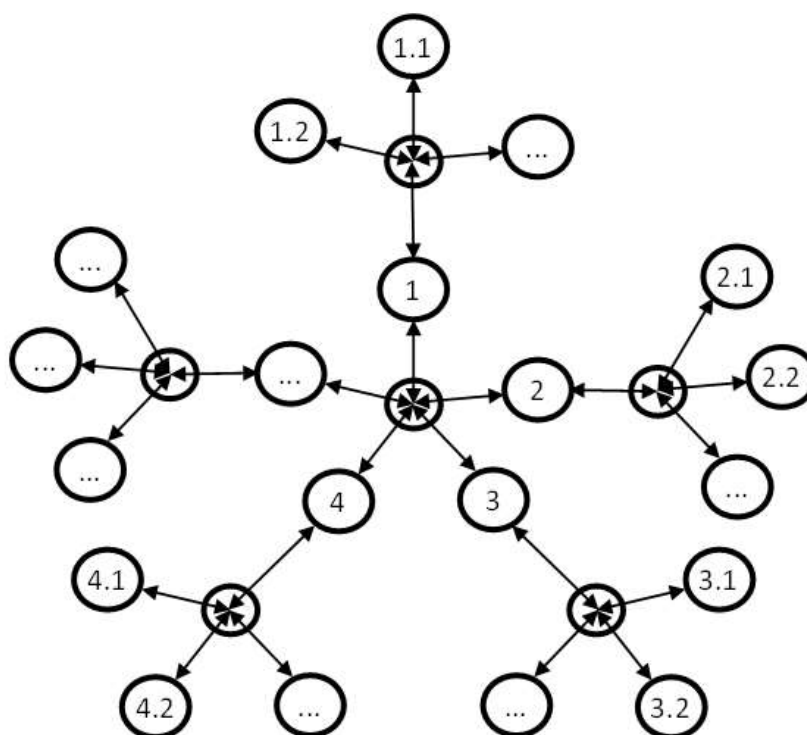
There are such advantages of the pages:

- free creation and ease of publishing content.

- variety and access to a number of free tools that can help to achieve specific goals depending on the chosen information and behavioral model.
- increase the loyalty of existing and new readers.
- available «incorporated» advertising tools which make it possible to increase the user audience [11].

But this approach has significant drawbacks. Thematic pages cannot provide sufficient information to the readers because they form an almost one-way flow of information, and the second thing, they do not provide a full list of publications of the library fund. Too many pages with even useful information can decrease the reader's curiosity and make the librarian's efforts futile.

Therefore, the publication of materials requires special approaches to their classification. The problem is partially solved by creating a system of related pages of specially focused topics. This system is built as a model of a bidirectional semantic network (Fig. 2). The units in the system are corresponded to literary genres and links - to possible address transitions between pages. It is better to note that such a network may have a more complex architecture, but in such way the control of the information resource will be lost.



**Fig. 2.** Model of a bidirectional semantic network

In addition, solving one problem in such way leads to another one: the clarity of the resource can be lost and the intensity of work increases in order to support it. It is



so because the time for maintaining the current condition of the topic pages increases significantly.

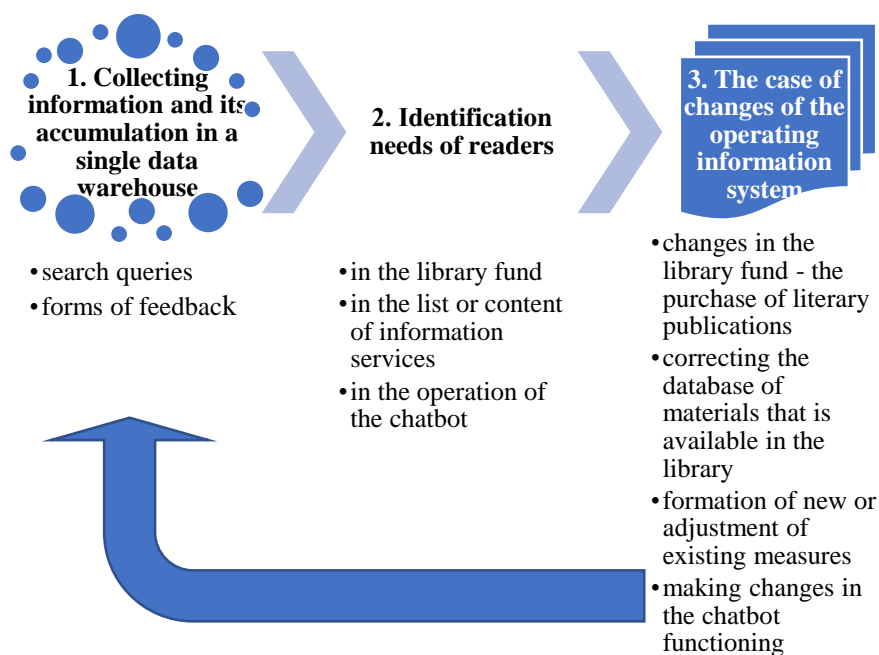
Groups can become a platform and a means for the formation of an interested literary community. They create opportunities for discussion of works between readers and workers of the libraries. This approach should also be used for the rapid exchange of information between libraries.

The advantages of groups in social networks include:

involvement of people with similar interests in the discussion of issues that can help support the dynamic development of the community;  
creating an environment for quick feedback [12].

Groups are usually created in addition to existing pages, but they can exist as a separate information resource. Their presence reduces the actual workload on the library staff, because some questions will be answered directly by readers who are participants in this community. But they are unable to provide professional and personalized customer service which include:

- meeting the information needs of the reader.
- promoting the level of reading culture and information culture of the reader.
- organization of cooperation between the reader and the librarian during the whole time of the reader's usage of the library's services.



**Fig. 3.** Enlarged diagram of the library information system that uses a chatbot

Individual conversation, individual information and individual recommendation are the most effective forms and methods of individual library services [13]. So, the key

among the issues of professional customer service is the word «individual». If we assume that individual reader service takes about 10 minutes, the maximum possible number of such users per day will not exceed 50 people per one library employee. This fact requires finding more effective approaches to solving problems or their transformation in the context of development modern technologies [14].

Specialized intelligent chatbots is the current trend in the development of social networks. They can already be developed even without special knowledge in the field of information technology at the current stage. They can be developed with the help of custom design services. The introduction of such a bot in the workflow automates the actions of the librarian and solves the problem of individual reader service 24 hours a day. Chatbots will provide readers with interactive access to the library. Moreover, they will give recommendations and different pieces of advice. They will increase the number of possible interactions and at the same time unload library staff. Figure 3 shows an enlarged diagram of the library information system that uses a chatbot.

At the first stage, based on the actions of readers or data forms, there is a process of collecting information and its accumulation in a single data warehouse. The user search log generates a semantic core for further identification of their information needs. The chatbot interface should offer the reader a choice of how to search for materials according to predefined characteristics that correspond to the materials available in the library: authors, genres, years, types and titles of publications, etc. This simplifies the further analysis of information that was accumulated over a certain period of time. Moreover, it might narrow the process of inputting information to certain values. An additional option is to search using any phrase.

The analysis of the obtained semantic core takes place directly in the second stage. In order to do this, it is enough and quite simple to form and use the lists of frequencies of words or phrases, as it is shown in Table 1.

**Table 1** Lists of frequencies of words or phrases

<b>Author</b>	<b>Frequency</b>	<b>Genre</b>	<b>Frequen- cy</b>	<b>...</b>
Khrystyna Alchevska	872	comedy	481	...
Mykola Babak	642	tragedy	246	...
Mykola Chaban	352	melodrama	1021	...
Daniel the Traveller	561	tragicomedy	456	...
...	...	...	...	...

The frequency indicator makes it possible to understand exactly what readers are interested in generally and to identify their information needs.

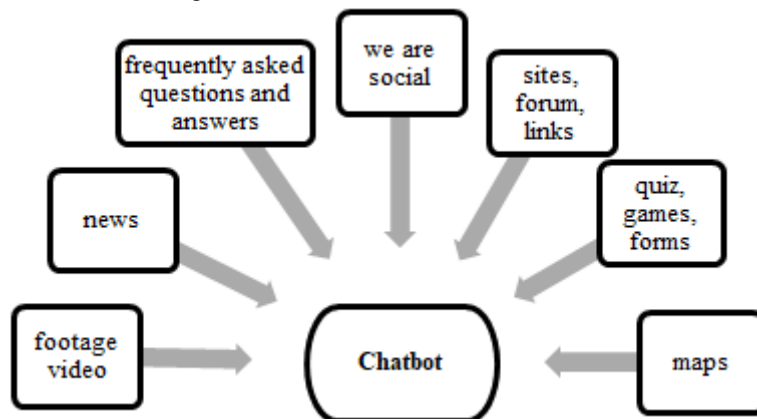
There is an analysis of materials available in the library and the case of changes of the operating information system is formed on the basis of the received data at the second stage:

1. Changes in the library fund - the purchase of literary publications.
2. Correcting the database of materials that is available in the library.
3. Formation of new or adjustment of existing measures.

#### 4. Making changes in the chatbot functioning.

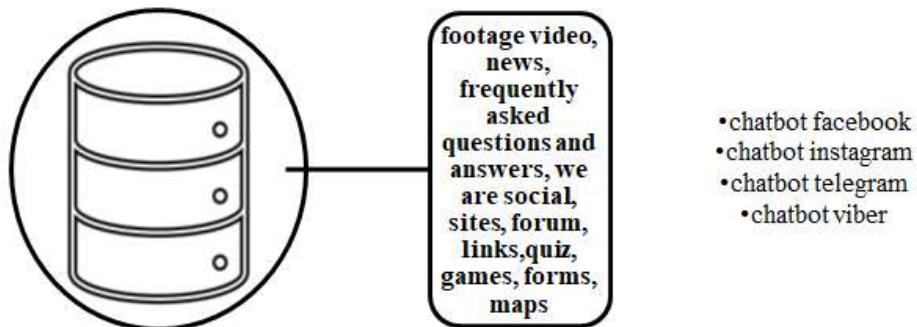
Then the process is repeated.

The transitions and links defined in the chatbot form a single architecture of different materials and resources. We include here videos (including YouTube), news, reference and survey forms, forums, contacts (phone numbers and messengers), locations, useful links, etc. (Fig. 4).



**Fig.4.** Single architecture of different materials and resources

The development and usage of a network of chatbots for different messengers can be an additional opportunity to find an effective solution to the problems of individual customer service but designed to use the same architecture (Fig. 5).



**Fig.5.** A network of chatbots that are configured to use the same architecture

This allows you to create within different messengers' entire systems, with which it is possible to effectively meet the information requests of library users. And all this is available without going to a third-party application.

## 5 Conclusions

The active usage of chatbots by the libraries in social networks and messengers will solve the problem of individual customer service and significantly improve the organization of cooperation between readers and librarians over the entire time of reader's usage of library services. The functioning of the library information system using a chatbot is especially relevant during the period of libraries in remote mode.

## References

1. Glazyrina, L., Kolbysheva S.: Fundamentals of mediation: the importance of media in the sociocultural space. Management issues 3. pp. 215-223. (2009)
2. Strungar, V.: A library component in the social media use system. dissertation for a science. Degree in Candidate of Science in Social Communications (Ph.D), Ukraine (2018)
3. Yavorska, T, Prihunov, O, Syerov, Y.: Libraries in Social Networks: Opportunities and Presentations Proceedings of the 1st International Workshop on Control, Optimisation and Analytical Processing of Social Networks (COAPSN-2019) pp. 242-251, (2019).
4. Research of the efficiency of using social networks in the scientific and technical library in the conditions of information society, <http://elar.nung.edu.ua/bitstream/123456789/4566/1/socmerezhi.pdf>
5. On approval of the Library Development Strategy for the period up to 2025 «Qualitative changes of libraries for ensuring sustainable development of Ukraine, <https://zakon.rada.gov.ua/laws/show/219-2016-%D1%80#n8>
6. The International Federation of Library Associations and Institutions (IFLA), <https://www.ifla.org/>
7. Fedushko, S., Melnyk, D., Syerov, Y. Analysis of the function and organization of virtual communication environments of Ukrainian scientists [http://ena.lp.edu.ua/bitstream/ntb/14929/1/43\\_Fedushko\\_293\\_305\\_732.pdf](http://ena.lp.edu.ua/bitstream/ntb/14929/1/43_Fedushko_293_305_732.pdf) Lviv Ukraine (2012)
8. DIGITAL 2020: APRIL GLOBAL STATSHOT, <https://datareportal.com/reports/digital-2020-april-global-statshot>
9. Strungar, V.: Library projects in social media as sources of library research. Scientific works of the National Library of Ukraine. V.I. Vernadsky. pp. 371–381. (2015).
10. Heijden, M. Social media in libraries, <https://www.slideshare.net/mheyden/social-media-in-libraries>.
11. Facebook for Business. Business Help Center / About Facebook Pages Access mode: <https://www.facebook.com/business/help/461775097570076?id=939256796236247>. The title from the screen.
12. Facebook for Business. Business Help Center / About Facebook Groups Access mode: [https://www.facebook.com/business/help/786348878426465?id=939256796236247&help\\_ref=typeahead\\_suggestions&sr=1&query=%D0%B3%D1%80%D1%83%D0%BF%D0%BF%D1%8B](https://www.facebook.com/business/help/786348878426465?id=939256796236247&help_ref=typeahead_suggestions&sr=1&query=%D0%B3%D1%80%D1%83%D0%BF%D0%BF%D1%8B). The title from the screen.
13. Individual library service: information letter (Series «To help a librarian»). Vinnytsia, Ukraine. (2011).
14. Neural-like Structure for Environmental Monitoring Tasks In: Hu, Z.B., Petoukhov, S., (eds) Advances in Computer Science for Engineering and Education. ICCSEE2019. Advances in Intelligent Systems and Computing. Springer, Cham, 2019, pp. 142-151

15. Ivan Izonin, Michal Greguš, Roman Tkachenko, Mykola Logoida, Oleksandra Mishchuk and Yurii Kynash SGD-based Wiener Polynomial Approximation for Missing Data Recovery in Air Pollution Monitoring Dataset In: Rojas I., Joya G., Catala A. (eds) *Advances in Computational Intelligence. IWANN 2019. Lecture Notes in Computer Science*, vol 11506, 2019, Springer, Cham, pp 781-793
16. Boyko N., Pylypiv O., Peleshchak Y., Kryvenchuk Y., Campos J.: Automated document analysis for quick personal health record creation. 2nd International Workshop on Informatics and Data-Driven Medicine. *IDDM 2019. Lviv*. p. 208-221. (2019)
17. Kryvenchuk Y., Mykalov P., Novytskyi Y., Zakharchuk M., Malynovskyy Y., Řepka M.: Analysis of the architecture of distributed systems for the reduction of loading high-load networks. *Advances in Intelligent Systems and Computing*. Vol.1080. p.759-550. (2020)
18. Neural-like Structure for Environmental Monitoring Tasks In: Hu, Z.B., Petoukhov, S., (eds) *Advances in Computer Science for Engineering and Education. ICCSEEA2019. Advances in Intelligent Systems and Computing*. Springer, Cham, 2019, pp. 142-151
19. Hryshchuk, R., Molodetska, K., Syerov, Y.: Method of improving the information security of virtual communities in social networking services. *CEUR Workshop Proceedings*. 2392, pp. 23-41 (2019)
20. Korobiichuk I., Syerov Y., Fedushko S. (2020) The Method of Semantic Structuring of Virtual Community Content. In: Szewczyk R., Krejsa J., Nowicki M., Ostaszewska-Lizewska A. (eds) *Mechatronics 2019: Recent Advances Towards Industry 4.0. MECHATRONICS 2019. Advances in Intelligent Systems and Computing*, vol 1044. Springer, Cham. pp 11-18. [https://doi.org/10.1007/978-3-030-29993-4\\_2](https://doi.org/10.1007/978-3-030-29993-4_2)
21. Fedushko S., Ustyianovych T. (2020) Predicting Pupil's Successfulness Factors Using Machine Learning Algorithms and Mathematical Modelling Methods. In: Hu Z., Petoukhov S., Dychka I., He M. (eds) *Advances in Computer Science for Engineering and Education II. ICCSEEA 2019. Advances in Intelligent Systems and Computing*, vol 938. Springer, Cham. pp 625-636. DOI 10.1007/978-3-030-16621-2\_58 [https://rd.springer.com/chapter/10.1007/978-3-030-16621-2\\_58](https://rd.springer.com/chapter/10.1007/978-3-030-16621-2_58)
22. Fedushko S., Syerov Yu., Skybinskyi O., Shakhovska N., Kunch Z. (2020) Efficiency of Using Utility for Username Verification in Online Community Management. *Proceedings of the International Workshop on Conflict Management in Global Information Networks (CMiGIN 2019)*, Lviv, Ukraine, November 29, 2019. *CEUR-WS.org*, Vol-2588. pp. 265-275. <http://ceur-ws.org/Vol-2588/paper22.pdf>
23. Fedushko S., Syerova Yu. (2020) Classification of Medical Online Helpdesk Users. *CEUR Workshop Proceedings*. – 2020. Vol 2544: *Proceedings of the International Conference on Rural and Elderly Health Informatics (IREHI 2018)*. <http://ceur-ws.org/Vol-2544/shortpaper6.pdf>