

# Cloud Communications During the Pandemic From the Perspective of Collaboration Platforms

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Submitted: 20.02.2021 | Accepted: 28.06.2021

## Abstract

**Purpose:** The aim of this research is focused on the identification of communication patterns prior and after COVID-19 was announced and the approach to the choices that end users make in various aspects of life.

**Design/methodology/approach:** The authors decided to execute two-step research including practical use of 4 popular collaboration platforms: Microsoft Teams, Zoom, Jitsi, Google Meet, based on the proved user experience. After a defined focus group of respondents gathered hands-on experience in a controlled manner, using the defined communication platforms, further research was carried out in the form of a survey to assess the change of behavior of respondents, considering IT tools used to support distance learning and collaboration. The research included a comparison of behavior prior the epidemic and during the epidemic period. The research covered the following aspects: how the behavior patterns of UCC use have changed across the identified areas (business, educational, private) and what are the most preferred toolsets. The following structure was applied: a short introduction to the communication platforms, definition of the research method, analysis, and discussion of the identified results.

**Findings:** The conducted survey identified the following elements: the level of digital communication among respondents and the familiarity with different platforms have a significant role in the use and development of UCC platforms. The generic conclusion of the research was that almost all respondents have prior experience using UCC platforms. The survey has proved the 100% use of UCC cross various areas of life. Based on the research, it has been noticed that respondents tend to use one or two UCC platforms as a standard for business and private use. UCC platforms that are more widely used across

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*Suggested Citation:* Kubacz-Szumaska, J. & Szumski, O. (2021). Cloud Communications during the Pandemic From the Perspective of Collaboration Platforms. *Problemy Zarządzania (Management Issues)*, 19(3), 138–149. <https://doi.org/10.7172/1644-9584.93.7>.

different areas of life are rated as the most preferred by the respondents and include Microsoft Teams (30%) and Google Meet (23%).

**Research limitations/implications:** The usage of non-probabilistic sampling, a relatively small sample and the usage of qualitative analysis methods were major limitations of the conducted research. Firstly, the research data was collected from students of one specialty, from one specific university. The research did not find any cultural differences in distance learning and communication. Secondly, the study uses basic statistical measures without cross analysis to enable a deeper analysis of the research.

**Originality/value:** The presented paper is a part of the research area related to communication platforms across various areas of peoples' life. The research was aimed at the identification of the most preferable UCC platforms and features that serve the communication purpose. The cognitive value of the paper might also be seen in the focus on a relatively narrow and homogenous group of respondents (students of e-business and digital marketing).

**Keywords:** user experience, Unified Communication and Collaboration (UCC), collaboration platforms.

**JEL:** M15, O32

## Współpraca w chmurze w pandemii z perspektywy wykorzystania platform komunikacyjnych

### Streszczenie

**Cel:** identyfikacja wzorców komunikacji przed i po ogłoszeniu COVID-19 oraz podejścia użytkowników końcowych do wyboru platform komunikacyjnych wykorzystywanych w różnych aspektach życia.

**Projekt/metodologia/podejście:** autorzy postanowili przeprowadzić dwuetapowe badanie, obejmujące praktyczne wykorzystanie 4 popularnych platform komunikacyjnych: Microsoft Teams, Zoom, Jitsi, Google Meet, oparte na zweryfikowanym doświadczeniu użytkowników. Po wspólnym wykorzystaniu przez grupę studentów na zajęciach zdefiniowanych platform komunikacyjnych przeprowadzono dalsze badania w formie ankiety, mającej na celu ocenę zmiany zachowań respondentów, z uwzględnieniem narzędzi informatycznych wykorzystywanych do nauki na odległość, komunikacji i współpracy. Badania obejmowały porównanie zachowań przed ogłoszeniem epidemii oraz w początkowym okresie epidemii oraz następujące aspekty: zmiana wzorców zachowań, związana z korzystaniem UCC w zidentyfikowanych obszarach (biznesowym, edukacyjnym, prywatnym) oraz identyfikację najbardziej preferowanych platform komunikacyjnych lub narzędzi wspierających komunikację. Zastosowano następującą strukturę: krótkie wprowadzenie do koncepcji platform komunikacyjnych, określenie metody badawczej, analiza i omówienie zidentyfikowanych wyników.

**Wnioski:** w przeprowadzonym badaniu zidentyfikowano następujące elementy: poziom komunikacji cyfrowej wśród respondentów oraz znajomość różnych platform odgrywają istotną rolę w wykorzystaniu i preferencjach platform UCC. Ogólny wniosek z badania był taki, że prawie wszyscy respondenci mają wcześniejsze doświadczenie w korzystaniu z platform UCC. Badanie wykazało, że podejście wskazuje 100% wykorzystanie UCC w różnych dziedzinach życia. Na podstawie przeprowadzonych badań zauważono, że respondenci zwykle używają standardowo jedną lub dwie platformy UCC w przypadku wykorzystania biznesowego i prywatnego. Platformy UCC, które są częściej wykorzystywane w różnych dziedzinach życia są oceniane jako najbardziej preferowane przez respondentów i są nimi Microsoft Teams (30%) i Google Meet (23%).

**Ograniczenia/implikacje badawcze:** głównymi ograniczeniami prowadzonych badań było wykorzystanie próby nieprobabilistycznej, stosunkowo małej próby oraz wykorzystanie metod analizy jakościowej. Po pierwsze, dane badawcze zostały zebrane od studentów jednej specjalności i z jednej konkretnej uczelni. Badania nie wykazały różnic kulturowych w nauczaniu na odległość i komunikacji. Po drugie, badanie wykorzystuje podstawowe miary statystyczne bez analizy krzyżowej, w celu przeprowadzenia głębszej analizy.

**Oryginalność/wartość:** prezentowany artykuł wpisuje się w obszar badawczy związany z platformami komunikacyjnymi w różnych obszarach życia. Badanie miało na celu identyfikację preferowanych platform UCC oraz funkcjonalności najwyższej ocenianych jako przydatne do celów komunikacyjnych. Wartość poznawczą artykułu można dostrzec także w odniesieniu do stosunkowo jednorodnej grupy respondentów (studentów kierunków e-biznesu i marketingu cyfrowego).

**Słowa kluczowe:** doświadczenie użytkownika UX, komunikacja zintegrowana UCC, platformy komunikacyjne.

## 1. Introduction

The emerging change of human life caused by the global announcement of the COVID-19 pandemic era had a significant impact on business, personal life and education. Rapidly, every aspect of life went to the internet including: remote work, virtual meetings with friends, family and co-workers via various communication platforms, health care in the form of tele (remote) consultancy, and online teaching. Each aspect of life was affected by extended lockdowns, social distancing and global recommendations to “stay at home” forced by national regulators and even penalized in case of breaking the social distancing order. Various research on global levels indicated that nearly two-thirds of educational institutions had planned in-person instruction for the second semester 2020 (Quintana, 2020); similarly, businesses have turned to remote work (PricewaterhouseCoopers, 2021; Global Workplace Analytics, 2020; European Commission, 2020; Gartner, 2020).

This situation has spurred even more dynamic development and improvement of available communication platforms that isolated people might benefit from for various purposes. The new reality means that the direct contact and collaboration is not possible anymore and only electronic communication channels could enable any form of communication between people. The very concept to collaborate remotely has been known for a longer while, where initial attempts at such methods of collaboration in an extended form started in the late 90s and at the beginning the 2000s, when the internet started offering a global network also using the first commonly available communication platforms, known as unified messaging applications. Those platforms were limited by technology only to providing users with non-real-time communication data such as: email, faxes and voice mail across the devices (Burns et al., 2001; Fikry & Mukhtar, 2012; Meske et al., 2018), with further development of such technology called later as Unified Communication and Collaboration (UCC). The concept of UCC rapidly developed, in line with the popularity of the internet, evolving available communication tools to very sophisticated collaboration platforms currently known as cloud-based web conferencing technology. The idea behind the UCC is to ensure interaction between teams, and no matter where you work, you can still access the same secure system, equipped

with at least: messaging, voice and video calling, team collaboration, video conferencing and file sharing (Riemer & Taing, 2009).

## 2. Literature Review

The area of distance learning and accompanied research is quite reach. Moving the whole area to the remote reality has accelerated defining a new perspective of use of different communication supporting tools and solutions despite the definition of such platforms has been documented well. The authors follow the definition of UCC provided by the Businesswire where “UCC or unified communication and collaboration is the service which delivers multiple communication methods. Such as Business phone system, Voicemail, Instant message, Chat, Fax, Conference call bridge, Video conferencing, IVR and more. Unified communication and collaboration is also capable of integrating e-mail, web applications, social media, and business tools on cloud. Seamless connection of global business locations alongside enabling effective team-collaboration are crucial benefits of UCC tools for organizations. For this reason, UCC is the backbone of team collaboration.

UCC is composed of many benefits such as improved work quality, faster services, enhanced employee flexibility, reduced expenditure, etc. On the basis of services, UCC is categorized into three services: UCaaS, CCaaS, and CPaaS. Unified Communications as a Service (UCaaS) is responsible for cloud based delivery of voice chats, emails, chats, etc. It can be either subscribed or free. Whereas, Contact Center as a Service (CCaaS) offer customer service solutions and Communications Platform as a Service (CPaaS) provide API's and software tools for developers to add real-time cloud” (Businesswire, 2020).

During the global lockdown due to the COVID-19 pandemic, the adoption of UCC and remote video technologies to support remote learning became widespread as virtual communication techniques to facilitate real-time conversation between different end users (Okereafor & Manny, 2020).

The latest research provided by Businesswire in the Global Unified-Communications and Collaboration Industry report (Research and Markets, 2020; Businesswire, 2021) indicates that the COVID-19 crisis is acting as a major accelerator for the UCC market. The market is witnessing a spike in usage of various UCC tools such as Zoom and Microsoft Teams, Google Meet, Slack and other free-of-charge tools. All those are becoming the most important for enterprises and educational institutions for achieving effective communication and collaboration. Initial pre-pandemic worth of the global market for Unified Communications and Collaboration was initially estimated at US\$33.5 billion in the year 2020, and currently is projected to reach a revised size of US\$52.9 billion by 2027, growing at a rate of 6.7% over the analysis period 2020–2027.

Coming further in line with the Gartner report, it is forecasted that, by 2024, in-person meetings will account for just 25% of enterprise meetings, down from 60% before the pandemic, driven by remote work and changing workforce demographics. The forecast is in line with the observation of the authors presented in the first part of this research in 2020, where the authors identified 3 areas of use of UCC where changes in frequency were already noticed during the first quarter of the pandemic era: “The percentage of respondents that have declared the use of UC platforms for professional purposes during working days increased from 69% to 88%. [...] the increase of use of such platforms respectively 50% (23% increase) for work days and 96% (34% increase during weekends) to serve learning needs [...] The percentage of respondents that have declared the use of UC platforms for private purposes, after the lockdown was announced it has been noticed increase of 15%” so the change of behavior towards UCC is already visible and to be monitored and measured at later stages.

### 3. Methodology

The observation of a new reality and challenges with between-people communication and collaboration using digital media has encouraged the authors to carry out an experiment with the use of chosen UCC with various student groups. The aim of the experiment was to move the learning experience from in-person to online reality, involving students and speakers in defining the UCC that fits the purpose from the perspective of various end user needs, with a particular focus on online meeting applications that are easy to implement and have a rich set of features. It allowed the assessment, based on proved user experience, of what tools are identified by students as the most suitable to provide and receive remote lectures and tutorials as well as to be used for private communication and collaboration.

The method employed for this research was fully online teaching for various types of students of the Faculty of Management, University of Warsaw with a moderate class size of 25 people. The two-step research included practical use of 4 popular collaboration platforms: Microsoft Teams, Zoom, Jitsi, Google Meet. After the group of students jointly used the defined communication platforms, further research was carried out in the form of a survey to assess the most suitable communication platforms. A survey was done at the end of the semester to probe how the students felt about the proposed UCCs and their usefulness for various types of learning. The research covered the following aspects of the user experience: ease of use, provided functionality and work comfort.

The authors analyzed communication and collaboration aspects using different cloud-based platforms across target student groups. The aim of the research was to identify the change in frequency of use as well as suitability of various UCCs based on the type of communication and collaboration, thus

three types of usage were defined as the baseline of this research: business, educational and private. The authors decided to execute the research within the focus group coming from the 2020 award winning E-Business and Digital Marketing in Eastern Europe studies (Eduniversal Group, 2020) to enable the best possible understanding and perception of the researched aspects. The approach taken consisted of several steps that allowed for collecting realistic data based on validated user experience related to hands-on practice in using the identified communication platforms. The authors decided to take this approach to mitigate the research limitations related to the number of respondents, at the same time engaging in the research the whole group of students of the mentioned e-business specialization. The total number of final-year students during academic year 2019/2020 in the assessed specialization counts 39 individuals. The identification of the respondent group was not accidental, the authors took the convenience sample approach, benefiting from the profile of e-business students seen as the most advanced users and practitioners in IT.

This article is complementary to the authors' article from 2020 that was focused on the enrichment of educational experience through the use of collaborative platforms. Due to a different scope of analysis, a similar database was analyzed to achieve additional or extended conclusions. The composition of 34 research questions allowed the authors to formulate the conclusions on the following two research questions:

- Q1. How have the behavior patterns of UCC use changed across the identified areas (business, educational, private)?
- Q2. What are the most popular UCC platforms across the tested group of end users?

The group of students that participated in the research had previous experience with platforms other than those analyzed so it allowed a subjective assessment of the analyzed platform on top of other well-known and used UCCs.

The authors have used following approach to the research:

- theoretical research in the area of UCC used in online learning,
- definition of elements under research to support suitability for cloud communication use,
- identification of features to support communication and collaboration,
- preparation of an online survey,
- hands-on experience of installing and configuring the indicated communication platforms,
- deployment of the online version of the survey on the target survey platform sited on the Faculty of Management of the University of Warsaw native permits/servers,
- verification of the survey and its functionality by the focus group of end users,
- distribution of an active link to the survey and setting up the time window for the research,

- collection of survey data using a questionnaire hosted on the online survey platform, analysis and discussion of results,
- conclusion from the results obtained from the survey.

The questionnaire comprises a number of ratings and scales, represented online via individual or matrix style layouts including: radio buttons, drop-down menus, rating lists or free text entry.

The report utilizes the data from the survey conducted in May 2020. There were a total of 43 answers, from which 26 were fully answered, and thus are the baseline of the analysis presented in this paper. All the respondents who took part in the experiment had previous experience with various communication platforms and as least a basic level of experience with the 4 targeted platforms.

All respondents declared full-time employment, so it was assumed that the majority of students had to use communication platforms within all three areas of use: professional, educational and private.

The most frequent age of the respondent was in the range 24–25 (42% of all respondents). The average age of 27 years indicates the age of typical students of the second cycle (the first cycle has been completed). Gender distribution of respondents is as follows: 65% of male and 35% of female respondents. Distribution of place of living: cities with over 100,000 residents – almost 46%, towns/cities with 10,000–100,000 residents – 35%, 19% from rural areas and towns up to 10,000.

In order to analyze the change in the use of UCC tools, questions were formulated concerning the periods before and during the initial COVID-19 pandemic:

- December 2019 – February 2020 (3 months before the start of the epidemic in Poland),
- March 2020 – May 2020 (from the moment when remote work was recommended by the government / employer / client / educational sector).

The research was designed in such a way as to investigate initially the frequency of use of UCC tools and platforms and then to make the assessment of particular features and conditions that affect wider and more often use of the analyzed platforms.

This paper is focused only on chosen aspects of spanned research and remaining data will be used in complementary papers. The reader should also bear in mind that the question wording and practical difficulties in conducting surveys can introduce error or bias into the findings of opinion polls.

## 4. Results

The authors analyzed the most favorite UCCs from the perspective of the surveyed respondents. Apart from the defined 4 platforms, respondents were requested to provide information about additionally used tools (Figure 1).

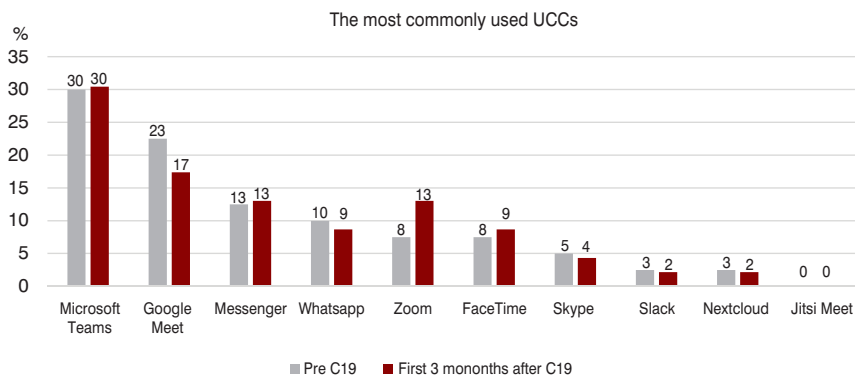


Fig. 1. The most preferable UCC platforms (pre-COVID-19, first 3 months after COVID-19). Source: Own work.

Considering the confidence in the use of such platforms and subjective choice of respondents, Microsoft Teams is rated the highest, with 30% of respondents choosing this platform, the next rate with the result of 23% is given to Google Meet, and the next place is taken by FB Messenger. This rating might suggest that social media are seen as an important channel for communication and collaboration by young adults.

Analyzing the pre-COVID-19 period and the first 3 months of COVID-19, it is noticed that the Microsoft Teams platform is seen as the most convenient and popular communication and collaboration channel. Also Google Meet seems to be as popular as prior to COVID-19. A small change is seen in the rating at the third position, where Zoom has got a higher rate with the same share as Messenger (13%), whereas the remaining applications remain at the same positions.

To identify the change in the UCC pattern, the authors analyzed both the level of digital communication among respondents and their familiarity with different platforms.

The initial finding indicates that only 1 respondent was not using UCC for any of 3 given reasons prior to the COVID-19 period, yet the pandemic reality changed that and 100% of respondents indicated that UCC is currently used either for business, educational or private communication.

Based on the feedback received, the authors collected data on the number of UCCs used for the defined purposes (Figure 2).



| <b>Pre-COVID-19</b>                  |     |     |     |     |     |
|--------------------------------------|-----|-----|-----|-----|-----|
| No. of UCCs used                     | 0   | 1   | 2   | 3   | >=4 |
| Professional                         | 19% | 38% | 27% | 12% | 4%  |
| Educational                          | 27% | 15% | 8%  | 8%  | 42% |
| Private                              | 15% | 54% | 23% | 8%  | 0   |
| <b>First 3 months after COVID-19</b> |     |     |     |     |     |
| No. of UCCs used                     | 0   | 1   | 2   | 3   | >=4 |
| Professional                         | 12% | 38% | 46% | 0   | 4%  |
| Educational                          | 0   | 4%  | 4%  | 12% | 81% |
| Private                              | 8%  | 50% | 12% | 23% | 8%  |

*Fig. 2. Number of UCC used for business, education and private connectivity (pre-COVID-19, the first 3 months after COVID-19). Source: Own work.*

Looking at the statistics, all respondents indicated that in majority, they used 1 or 2 UCCs both for business and private purposes while for educational needs, they indicated 4 or more platforms used. This might highlight the diversity of available UCCs within the educational area that are chosen by providers of training, lecturers, providers of workshops to meet particular needs. This also highlights the lack of a unified approach across educational institutions. Such an approach, despite expanding students experience with various tools, platforms and interfaces, might also assume a lack of user confidence caused by the need for continuously testing new and unknown tools. And on the other hand, this might indicate that educational institutions will not create a global trend as regards the used communication channels and platforms and that the rate of faults might be higher due to limited and isolated testing of the population as well as a lower level of adaptability to end users' needs.

On the other hand, a high rate of single UCC use for business and private needs might indicate that respondents chose one but well-known communication platform rather than experimented with new ones.

Another finding from the answers is that the business use of UCCs has shifted from the use of 2 UCCs in favor of none or 3 ones, while in 10 cases remaining the same as pre-COVID-19, namely 1 UCC being used.

Also single UCC use remained at the same level in private use, but users indicated a shift towards 3 and more UCCs while communicating remotely for private use. The reason for this situation might be the diversity of platforms that respondents were pushed to use after the pandemic was announced also due to a higher rate of distance communication between friends and family. This aspect might be investigated further in other papers.

The generic conclusion from this finding is that users tend to use one standardized UCC platform that allows them to feel the confidence of use as well as to benefit from more advanced options that are learnt thanks to longer and more extensive use of IT systems.

## 5. Limitations

Although the executed research and its findings are generic and comprehensive, there are some limitations to this study. Firstly, the research data was collected from students of one specialty, from one specific university. The research did not find any cultural differences in distance learning and communication. Secondly, the study uses basic statistical measures without cross analysis to enable a deeper analysis of the research. Future research might employ a wider group of respondents including Polish and foreign respondents. Thirdly, the study took the snapshot research approach within a short period of time, thus longer research would be beneficial for a better picture of the area.

## 6. Conclusions

The group of respondents represents working students who are familiar with various UCC platforms used for professional, educational and private purposes. Their possibility to gain hands-on experience prior to commencing the survey was to define the baseline for the research. Such an approach allowed the authors to draw conclusions on the features that experienced respondents value the most from the perspective of communication and collaboration, indicating the most preferable approach and UCC platforms in the common use.

The generic conclusion of the research was that almost all respondents (96%) had prior experience using UCC platforms. The announcement of the pandemic and recommended distancing and lockdown approach of governments pushed the whole society towards digital methods of communication. The survey has proved the almost 100% use of UCC across various areas of life.

Based on the research, it has been noticed that respondents tend to use one or two UCC platforms as a standard for business and private use. The rationale for that is in the general learning ability of end users to gain confidence and achieve fluency in features offered by those platforms.

Educational institutions tended to use a wide diversity of UCC platforms both prior to COVID-19 and during the first 3 months of COVID-19. Respondents highlighted the need to use at least 4 different UCC platforms, thus there is no single and unified approach across educational institutions, causing issues with building up the confidence in usability of those platforms. And on the other hand, it might indicate that educational institutions would

not create a global trend on the used communication channels and platforms and that the rate of faults might be higher due to limited and isolated testing of the population as well as a lower level of adaptability to end users' needs. The question that might need further investigation is why educational institutions in Poland prefer to choose non-standardized solutions to ensure cooperation and collaboration in the academic community. This is the question to be answered in upcoming research.

The single UCC use seems to be the most common approach and remained at the same level in private use. In opposition to business, where unification of UCC platforms was identified (1 or 2 platforms are commonly used), a change in pattern was observed in private use where the majority of respondents indicated a shift towards 3 UCCs. The reason for this situation might be the diversity of platforms that respondents were pushed to use after the pandemic was announced. Also, due to a higher rate of distance communication between friends and family, respondents needed to adjust to tools preferred by others including older representatives of the society who have a lower level of IT understanding and experience. The situation might have pushed experienced users to choose and identify other channels that are slightly less complex but at the same time easier for use for those less experienced in IT. The area should be investigated further.

UCC platforms that are more widely used across different areas of life and are rated as the most preferred by the respondents are Microsoft Teams (30%) and Google Meet (23%).

#### **Acknowledgements**

*This research received no funds.*

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