

How were apps developed during, and for, COVID-19?

An investigation into user needs assessment and testing

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Abstract—In the following paper, I present through four practical examples how the development of mobile applications changed during the COVID-19 pandemic 2020 springtime. To what extent was the work of designers-developers determined by the quarantine, and by the possible time constraints? Which part of their work did they reduce most, and what could go on unchanged? The BPXV app was developed at the request of the 15th district of Budapest to help the district residents to shop and get their medicines during the confinement. A refreshing exception among the examples is the app created to replace Easter watering, Locsolkodj.hu. I also present two solutions suitable for contact tracking, the Virus Radar created in Macedonia, which became the official Hungarian contact tracking app, and the Austrian STOPP CORONA interface/platform? In order to find out the answers to the above questions, I conducted written and telephone interviews with the owners, designers, developers, or researchers of each site. Learning about design and development, I was interested in how the development of these apps, designed and developed at the time of the confinement, differed from the usual process – what the designers reduced, where were the „cuts” made. Based on the experience with the small sample, I found that the possibilities were typically limited in the user needs assessment and testing, but the Austrian example is a refreshing exception: it was tested by different methods, with the participation of the greatest number of real users (and not official employees or internal team members). It is a general experience that in the case of researched and introduced apps and websites designed and developed during a pandemic typically decreased the amount of classic user and usability tests. It is also characteristic that to the west of Hungary, the apps are tested by users, to the east by offices / officials / developers.

Keywords—User eXperience, UX research, user test, COVID-19

I. INTRODUCTION

Since the beginning of the concern about the coronavirus (In Hungary, there were confinement restrictions between March 27 and May 4, (in the countryside) and May 18 (in Budapest), 2020 [1, 2]. At the time of writing (2020 April-May), these were lifted in Hungary, but the public discourse is preparing for a second, more dangerous pandemic. Several developments, a website put together with an extra short deadline, and a mobile application appeared on the net. Most of them reflected specifically on the actual situation, their content had to be up-to-date, therefore their development was fast. The

circumstances were rather unusual: the designers-makers were not only short of time, more than usual, but they also had to avoid face-to-face meetings, and at the same time they tried to be very effective [3].

How did these developments take place and what was the design and development process of these surfaces which were typically managed and made from home due to access restrictions? How were they different from the usual cases? Which parts received less attention due to the short deadline and possibly lower budget? I conducted written and telephone qualitative interviews [4, 5] about the development of the apps.

In the case of web interfaces – websites, apps –, due to lack of time, lower budget and movement constraints, it was the testing and the user needs assessment that received less attention, but not in all cases.

In the following paper, I present four methods of developing an app and website that reflect on the virus, with particular reference to user needs assessment and user testing.

Although the publication was made in May 2020, I updated it in 15th of September 2020 before the last release with rating and download data. In the spring of 2020, only a few apps were available, but by 15th of September, more than 15 could be downloaded from the Google store.

II. CASE STUDIES

In the following section I present four case studies. The first one was developed at the request of the 15th district of Budapest (“Budapest Tizenöt”), the second one was created on a sudden impulse, after a family discussion (“locsolkodj.hu”). In parallel development, in several countries, with or without centrally, or in the absence of a government decision, a number of companies individually set out to develop applications that notify their users by saving and using mobile location data or Bluetooth connections if a person they previously encountered was diagnosed with coronavirus (VirusRadar, STOPP CORONA). The apps were developed separately, not in a coordinated way. So much so that at the time of writing, there was already a Wikipedia page where these separately developed solutions were collected and listed [6].

A. "Budapest Fifteen": development at a tense pace

"In Budapest, in the 15th district, you can ask for online help if needed, because of the pandemic"

On May 8, 2020, a few days after the COVID-19 pandemic peaked, only one mobile application was available in the Google Play web store for "COVID," and that was "Budapest Tizenöt" (Budapest Fifteen).

1) For what purpose?

Budapest Tizenöt is an online interface and mobile application (please see Fig 1.) developed by the Hungarian Cheppers development & design company at the request of the 15th district of Budapest, which allows "residents of the district to indicate if they or a partner need help with shopping, medicines, getting food, or in any other activity that cannot be performed alone due to the coronavirus pandemic and the outbound restrictions imposed against it. "After the notification, the municipality will contact the resident.

2) Design and development: rapid needs assessment, simpler documentation

According to the design and development agency, the design and development was different from normal in that they wanted to get a solution very quickly because of the importance of the municipal development and the app. However, the restriction imposed on movement because of the COVID-19 caused several problems for the development team. Recalling the events, the Cheppers managing director, Péter Oroszvári, said that one Sunday morning the developer received a request from the municipality. The district government wanted to reach out to local volunteers through a mobile app and connect them with people who need or may need help in the coming months. Already that afternoon, they started to specify and design the application. The planning and development process was similar to the usual one, but, given the situation, the work was going at a rather tense pace.

There was only time for a rapid needs assessment without workshops, and due to the very tight deadline, they could not consult as much as usual with the client. Documentation, beside the sitemap (style guide, design specification), was also omitted or shortened. On business matters, they used a specific channel of Slack for communication. They were in (meetings, regular workshops) constant contact with the client and continued to agree on the needs and functions. In addition to the app, the microsite was also designed and developed with a similar methodology as the app.

The web interface of the service and the first version of the mobile app were completed in just two weeks. In the end, the emphasis was put on asking for help and information rather than volunteering. The news is updated by the municipality with varying frequency.

The service is available and can be used on segitunk.bpxv.hu. In addition to asking for help, it also contains the most important information about the pandemic. The interface of the mobile app and the information available on it are similar to the web. "In addition to helping residents, the service also simplifies municipal administration: through it, they can also administer requests for help received through

other channels, such as the green number or email, and follow the assistance process."

3) Testing: between four walls, with family members

Tight deadlines and quarantine were rapid needs assessments only; a standard UX testing could not be performed. Therefore, György Réka, the company's UX researcher, solved the problem by testing the surface under construction alone and with three people in quarantine with him.

Testing was followed by modifications and iterations before the app was finalized.

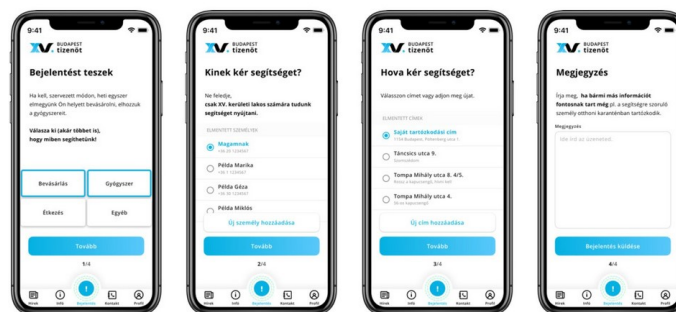


Fig. 1: Budapest Fifteen (Budapest tizenöt), screenshots.

As of June 12, 2020, more than 500 people from the Google Play web store have downloaded the app (in September: more than 1000+ download, no rating available), and no reviews have been received so far. The website has not been updated since 11 May.

B. A lovely solution for Easter-time: Locsolkodj.hu

"The aim is a little smile and some feeling of "we do it"

This app, developed in Hungary and presented before Easter, also responds to confinement due to the coronavirus. It allows those who wish to follow this Easter custom in spite of the confinement.

1) For what purpose?

Tamás Gábor Juhász, the developer of the app, said that the Locsolkodj.hu project (please see Figure 2.) was created on a sudden impulse, after a family discussion. After a quick survey, all they found was an online solution for sending poems and pictures. The small, funny gifts and the "watering money" for the gesture are important parts of the tradition, but it has been missing from all existing online solutions.

The development came about because the developer's partners found the project very exciting, and some people joined in immediately.

The launch of the project and its implementation also had some emotional content: "We wanted to find a solution for families isolated due to the pandemic situation, to support our tradition. A little smile and some feeling of «we do it»."

"While it was being made, graphic designers also joined the development, designing traditional eggs and watering animations"— added Tamás Gábor Juhász.

2) Testing, needs assessment

The needs survey was conducted among a narrow family and client base, with roughly ten people. Two people worked on the project and later 15-20 people saw, commented on and five number tested it. "During limited testing, we found that the system is clear even after the first use. We have sacrificed many features and ideas for ease of use." Since the project took 2 weeks to complete, there was simply no time for more in-depth testing. Despite the rapid development, the designers see the project as successful and are happy to be able to bring some color to the users' Easter holiday, defined this time by the confinement.

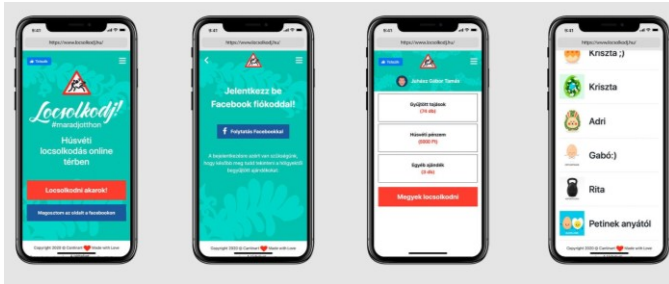


Fig. 2: Locsolkodj.hu, screenshots.

The last post on the locsolkodj.hu Facebook page has done in June 2020.

C. VirusRadar: the official Hungarian app

"Detect danger based on distance from other mobile devices"

1) What is VirusRadar?

VirusRadar is a mobile application (please see Figure 3.) that can be installed on Android and iOS to help anonymously record users who have been within a meter of a user for an extended period of time (20 minutes). If any of them are diagnosed with a coronavirus infection within 14 days, they can notify the others of the potential risk.

The app uses Bluetooth technology and stores the data on the user's phone for two weeks. The data is only transferred to the central system if the user indicates that his coronavirus test has been positive and presses the "Send Data" button in the app. In this case, all recorded appointments are instantly transferred to the system, and contact researchers can check the list of appointments and send a notification to others that it might be worth staying home for a while because they may be infected.

2) Development in 10 days

A company in Northern Macedonia, Nextsense Contact Tracing Technology, with an extremely short deadline of ten days, developed VirusRadar app. During this time, not only the mobile app but also the website and its background system were created. From the beginning of the outbreak of the coronavirus, developers began to think about how to help society fight the virus.

They were looking for a solution that was able to manage the appointments that had taken place in the last two weeks, including their duration. The goal was also to make the application's user interface simple and easy to use for the general public.

The app was offered free of charge to other countries, and the code of the application underwent a full national security screening in Hungary as well to make sure it was secure.

In fact, the mobile application for detecting the spread of COVID-19 is a tool. It aims to support and complement the actions of health authorities in detecting contact with infected individuals, thereby helping to stop the spread of the virus more quickly.

3) Tested with twenty people

Nextsense's Chief Executive Officer Vasko Kronevski said the developer commissioned classic usability tests during the development of VirusRadar, which focused on simplicity and ease of use.

Based on these results, Nextsense Contact Tracing technology has been continuously developed and upgraded with new features. The tests they conducted had twenty participants. Ten people came from the quality assurance team, five from other Nextsense teams, their family members, and another five from their affiliated institutions (Ministry of Health and the Ministry of Information Society and Administration). So the application was partially tested with real users and prospective users, among other things, it was also sent to the family members of the employees.

Normally, it is recommended to work with external testers, real citizens (i.e. prospective users), those who do not know the interface to be tested, i.e. not "internal" people.

The app was translated into Hungarian, so it can be accessed and used there.

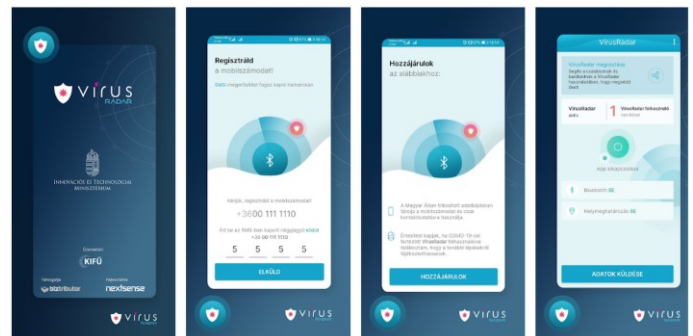


Fig. 3: VirusRadar, screenshots.

The app can be downloaded from the Google Play web store. By September 15, 2020 (the second wave of COVID is just ascending), just over 15,000 people have downloaded the app (with 3.5 ★★★★★), a fraction of the domestic smartphone user base. Yet the app could work effectively, i.e. it could help contact research effectively if it were be used as widely as possible and as many people as possible. (By comparison: In northern Macedonia, which has a population of roughly two million, it has been available since mid-April, there is Stopkorona! has been downloaded from the Play Store by more than fifty thousand people so far, and the App Store has a selection of software.) [8]

More than 3,500 reviews have been received on the app's download interface in the Google Play web store. The vast

majority of them also complain that the app doesn't get any kind of advertising, so very few know and use it, hence it can't help with contact research. The developer's response to almost all user feedback is the same: "Thank you for your feedback, we're constantly working to improve the app!"

D. The Austrian example: STOPP CORONA

"Care for you. Care for me. This is how we protect ourselves"

1) For what purpose?

The Austrian-developed STOPP CORONA mobile app (please see Fig. 4.) undertakes to help you keep track of the encounters with friends, family and co-workers where the app went anonymously. If a user is found to be infected with the coronavirus, they will notify anyone they have encountered in the last 48 hours and warn them of a possible further infection. The reverse is also true. If one of the previously saved encounters indicates that it has been found infected, the user will be notified anonymously.

The app's recommendations [7] also help the user follow the appropriate behavior:

- Keep a safe distance (1-2 meters) from others,
- Avoid social contact,
- As a precaution, stay in voluntary quarantine.

2) Ingenious extras: digital handshake and self-monitoring

Since we can still wait a long time for shaking hands in reality, the app also encourages users to greet each other with a digital handshake, namely using the "STOPP CORONA" digital handshake. These handshakes are automatically saved by the app so you can send a notification if one of the users is found to be infected in the meantime.

By answering a questionnaire, the app also allows the user to check if any symptoms they are experiencing are specific to the coronavirus. If these are the same as the symptoms of a COVID infection, the user will notify everyone whom he has encountered in the last 28 hours. You can do the same if it has been officially tested and confirmed as suspected of being infected. Notifications are anonymous in all cases. So, if the user gets such a notification, he will only know that he has been found to be infected with coronavirus.

3) Development, testing: as would be suggested in the "big book"

In connection with the development of STOPP CORONA Karina Fedorovskaia told, that the app was developed in an agile mode, using DevOps, involving a remote cooperation with Rotes Kreuz and other NGOs, but not a multidisciplinary team.

The first release took two and a half weeks. The further release developments are happening in a one and a half until 2 weeks release cycles.

About the development process developers said that basically UX driven testing methodology was used. Developers used the following testing methods: rapid prototyping, classic user tests and think aloud tests through interviews, in order to testing wireframes.

Developers and the project management took part at wireframes & rapid prototyping tests. At user tests and think aloud tests took part internal staff and external app users too.

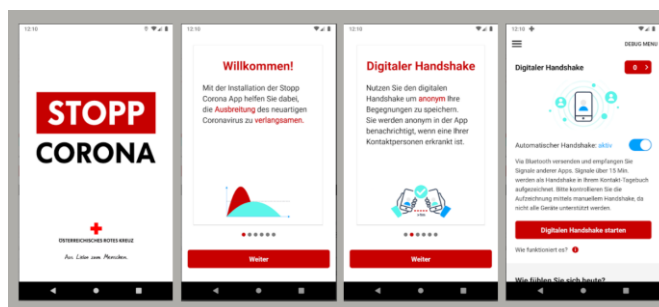


Fig. 4: STOPP CORONA, screenshots.

The Stop Corona! app was downloaded to their phones by more than 100,000 people by September 15th. Ratings are available (with 3.5 ☐ ☐ ☐ ☐ ☐), without any reviews.

III. FURTHER AND OTHER CASES OF COMMUNITY SUPPORT

The Hungarian "Miutcánk" movement in Hungary also tries to support community assistance, in which citizens can offer one-to-one help with shopping, getting medicine and dog walking by placing posters and sharing the information on them.

According to this, Facebook is also working on a similar new feature, which aims to allow people living close to each other to help each other with shopping and running errands, dog walking, etc. during the pandemic, and to start raising money on the interface.

IV. SUMMARY

As you can see, the COVID-19 virus, and the quarantine that comes with it, brought forth the creativity of enterprising designers and developers. Most of the apps presented were designed and developed in an average of two weeks, and it can also be seen that if the designer-developer feels the need of testing and of needs assessment, he can solve it, usually with internal people, family members, the development team or office staff (pls see Table 1.).

TABLE I.

How were surfaces tested		
Surface	Used testing method	Participants
Budapest Fifteen	Rapid UX test Done by the UX researcher	- 3 person - Family members
Locsolkodj.hu	Usability test Done by the owner	- 5 person - Family members
VirusRadar	Classic usability tests Done by the developer	- 20 person - Team members - Family members - Colleagues
STOPP Corona	Classic user tests Think aloud test Rapid prototyping	- Nr.: n/a - Internal staff external

How were surfaces tested		
Surface	Used testing method	Participants
	Done by the developer	– App users

Although the researched sample is minimal and no far-reaching conclusions can be drawn from this, it is instructive that to the west of Hungary, in Vienna, during the development of the STOPP CORONA app it was completely natural to iteratively apply multiple UX tests with real users. There were tests conducted in the Hungarian examples also, with acquaintances and family members. They have also been tested during the development of the Macedonian VirusRadar, but only with internal, professional participants and people involved in the development. However, this practice can be problematic because whoever is involved in the development, even for the sake of the organization that represents it, thinks differently [9, 10] about its content than citizens / users / users.

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