

SUM: Save the Ukrainian Monuments The 4CH European Competence Centre action to save Ukrainian Digital Heritage

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Abstract. On February 24th, 2022, Ukraine was shocked by the invasion of the Russian forces. Besides the unacceptable losses of human lives and the distress of the population causing millions of refugees, the invasion of Ukraine by Russian troops and the ongoing war put at risk the cultural heritage of this country. They may irreparably destroy monuments, artworks, remnants of the past, and with them cancel the history and identity of the Ukrainians. Immediately after the invasion, the European project 4CH, whose goal is to design and build an European Competence Centre (CC) for the Conservation of Cultural Heritage, launched the initiative SUM – Save the Ukraine Monuments to save the digital documentation of Ukrainian cultural heritage. INFN, the 4CH coordinating institution and in charge of devising the CC cloud, set up the necessary cloud service and storage system, paralleled by a similar one in Poland at the Poznan Supercomputing Centre, and by analogous provisions at the University of Luxembourg. We report on the current status of the SUM-4CH initiative, while hoping for a prompt end of this heinous conflict.

Keywords. Use and data sharing on network infrastructures and services, Strategies and policies for the development of e-infrastructures, Long Term Preservation and accessibility, Enhancement of cultural heritage

Introduction: what is 4CH

4CH started on the 1st January 2021 for a duration of three years. The project aims to set up the methodological, procedural, and organisational framework of a Competence Centre (CC), an infrastructure dedicated to knowledge organisation and transfer through means such as training, standardisation and inter-disciplinary collaboration. This European Competence Centre will need to address many topics, such as how cultural heritage is managed, the risks it may be exposed to, the technologies that can be used for its conservation and how it may be valorised. Using a holistic and multidisciplinary approach to the safeguard of cultural heritage, it will facilitate coordination between cultural heritage Institutions across Europe and provide services and tools to enable preservation and conservation of historical monuments and sites using the latest, most effective technologies with special attention to 3D. Further information on 4CH and its activity is available at <https://www.4ch-project.eu/>.

On the digital side, one of the main goals of the 4CH project is to devise the CC cloud platform, offering big data services, HPC infrastructures provided by EU institutions, a Cultural Heritage Cloud for accessing a CH knowledge base and delivering digital technologies, with a focus on the most advanced 3D and semantic technologies for monuments and sites, with the goal of building their Digital Heritage twins based on platform tools.

1. The “Save the Ukrainian Monuments” initiative

On 24 February, the news of the Russian invasion of Ukraine raised strong reactions from all over the world. Among them, the cultural heritage community strongly condemned this attack and expressed its concern for the threats to Ukrainian cultural assets. Cultural heritage is the patrimony of a community, it preserves and perpetuates its memory, values, and identity. 4CH reacted rapidly and, after receiving a hearty approval from the European Commission, started an action to save the digital documentation of Ukrainian cultural heritage. Such digital documentation, consisting of digital texts, images, drawings, and 3D models, would be extremely useful to restore or reconstruct damaged cultural property and to preserve and transmit to future generations the Ukrainian culture and history. Considering the difficulty of operating in a war zone, we started setting up a network of direct personal contacts among members of EU heritage institutions and Ukrainian colleagues, still at home or in the EU, to overcome the difficulty of operating in institutions temporarily closed or busy with the physical preservation of artefacts and monuments. We also wanted to avoid adverse interference in the data transmission and to protect the individuals involved in the action, both in Europe and in Ukraine. A Ukrainian researcher working at INFN-CHNet in Florence helped manage language issues.

On March the 3rd, the network was operational, a cloud service for secure data storage deployed, and the first transfers could start. Security system and a robust uploading procedure were in place. The Florence and CNAF sections of INFN (Italian National Institute of Nuclear Physics), the 4CH coordinating institution and in charge of devising the CC cloud, set up the necessary storage system, paralleled by a similar one in Poland at the Poznan Supercomputing Center and by analogous provisions at the University of Luxembourg.

At the same time, 4CH set up an international task force, in direct and continuous contact with the 4CH coordinator, with people from Italy, Belgium, Ireland and Lithuania, supervised by PIN, an Italian research agency in charge of technology within 4CH, and coordinated by a Belgian partner.

2. Save the Ukrainian Monuments - INFN Cloud set up

Immediately after the start of the SUM action, INFN readily deployed an owncloud instance, modified and adapted to ensure secure connections and a steady upload of data, creating an ecosystem for data mirroring and safe, on-tape multiple copies of data. Access to the system from Ukraine was granted to trusted individuals operating in heritage institutions, directly contacted by them or previous Ukrainian contacts. The whole operation was kept strictly confidential in the beginning to avoid any malicious interference, and public notice was given only when - at the end of March - the whole procedure was verified

as reliable and secure.

The names of participants are still undisclosed to avoid any retaliation.

The first server was set up in the INFN Florence Section, and the service was deployed in a docker container. An NGINX reverse proxy handling connections was also containerised and deployed. After that, a second, larger, faster server was set up at INFN CNAF section, in Bologna, to periodically copy and synchronise the files from the Florence server.

A third server is currently under deployment, again at the INFN Florence node, to add resilience to failures.

INFN provided a user guide to the service, both in English and Ukrainian language, a set of contact people for guiding users in case of issues with uploads, and a service for data downloading from Ukrainian servers, if needed. Every single file is present on INFN servers in at least two copies.

To upload their data, users may either use the web browser user interface, the desktop software for repository synchronisation, or the command line interface.

3. The endorsement of the European Commission

The Unit “Interactive technologies, Digital for Culture and Education” of the Directorate-General Communications Network, Content and Technology of the European Commission, in charge of 4CH, was informed of the SUM initiative from the beginning, approved and endorsed it.

News about SUM have recently appeared on the Commission’s website:

<https://digital-strategy.ec.europa.eu/en/news/european-competence-centre-cultural-heritage-creates-initiative-save-ukraine-monuments-sum>.

4. Conclusions

The Ukrainian datasets started being transferred using the offered services, and safely stored on our servers. At present, there are about tens of Terabytes in the queue, or already transferred, involving large institutions and organisations or relatively small museums outside of the major centres. The transfer procedure requires time due to the unimagined difficulty on the Ukrainian side in collecting the datasets and using an Internet connection subject to the issues of wartime.

All the data collected will be accurately preserved and returned to the legitimate owner when the situation will improve with the end of this terrible war. 4CH will also offer its competence and services pro bono, assisting Ukrainian institutions in any task required for the restoration of their digital archives and supporting the physical restoration of the monuments of this historically significant country.

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