

MetalPAT

Newsletter 2 – November 2020

The MetalPAT project involves a wide range of professionals spread over the Interreg France-Switzerland region and committed to the success of the project through the exchange of knowledge and experience. Thanks to everyone for their contribution.

The project partners

A succession of lockdowns that had little effect on the progress of the project...

MetalPAT is a multidisciplinary project. We had the chance to meet all of us before the 1st lockdown. The setting up of videoconferences from March to June 2020 allowed the continuation of exchanges and the progress of the project. The face-to-face meetings resumed in the summer, although everyone's agenda was full. As the second lockdown began, our virtual exchanges resumed.

• COLLABORATION BETWEEN METALPAT'S PARTNERS

The project partners have been exchanging a lot since spring 2020 in order to better integrate the different communities potentially interested in the MiCorr+ application. As a reminder, the first version of the application mainly met conservators' needs. Our wish is to integrate other needs such as those of collection managers and specialists in historical and archaeological metals, their manufacture and the corrosion mechanisms they develop.

As far as collection managers are concerned, we remember that in our first newsletter, we presented the idea of setting up a new search engine using a general description of heritage metals in order to identify them. Based on a decision tree made up of successive and oriented questions, the user is given proposals for families of metals. HE-Arc CR experts have selected from among the key characteristics of metals (magnetism, density, hardness, brightness, etc.) and their deterioration (partial or total, artificial or natural, localised or developed corrosion) those that allow the user to be guided towards proposals that are meant to be relevant. The tools developed have been validated by conservators before we optimise them with collection managers, the real recipients of the search engine.

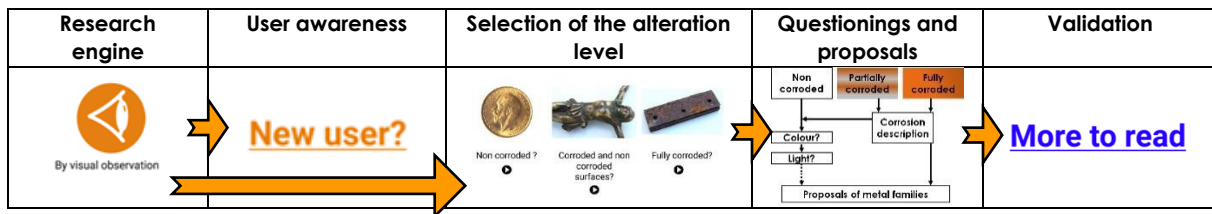
Partenaires :



Co-financeurs :



This work was carried out in several stages and made possible thanks to the financial support of *Communauté du Savoir* (www.communautedesavoir.org/) resulted in a prototype in 4-5 successive stages:

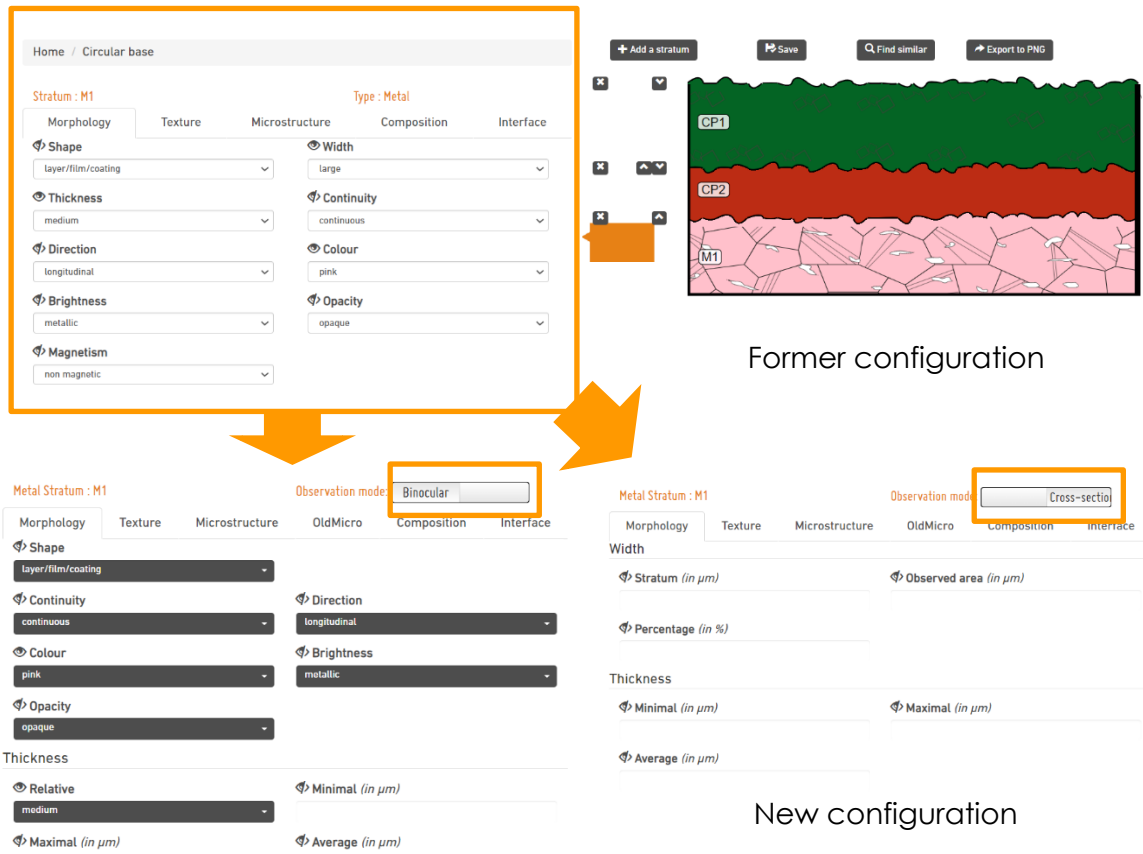


Collection managers are not necessarily specialists in heritage metals. This is why they have expressed the wish that some reminders be made on how to approach a metal object or metal elements in a composite object. Where to observe, how to correctly apprehend the specificity of each heritage metal, how to distinguish between corrosion and exogenous elements (deposit, dust) and how to appreciate the alteration levels within the same metal are notions necessary for the best use of the developed search engine. The "New user?" stage, which allows you to begin observing heritage metals, is not compulsory and the experienced user will start his query on the basis of the surface appearance of the metal being studied. The following questions are logical for a conservation professional, but their order has been discussed at length. The terminologies used are agreed upon, as are the visuals illustrating the options offered at each stage of the questioning and providing the user with the best possible guidance. The user can go back at any time to modify his or her path which, in the end, leads to proposals for families of metals. If doubts persist, the user can consult information sheets on the proposed families of metals, summarising the main knowledge about them and enabling him to validate or reject the proposal made.

This new search engine complements those already existing and contributes to the best diagnosis of the metal under study: the one based on key words characterising the object, its manufacturing technology, its dating, its environment, etc., and the second one developed in the following, which aims to build digital stratigraphies reflecting the corrosion structures present on the surface of metals.

Also in the 1st newsletter of the MetalPAT project, we mentioned the fact that the latter search engine needed to be subdivided into two observation modes in order to better meet the needs of future MiCorr+ users. The "binocular" mode is adapted to the methodology followed by conservators who, after an overall assessment of the objects and their surface, move on to a microscopic scale (under binocular) to study the arrangement of the strata constituting the corrosion structures in place, based on punctual scalpel soundings. This tactile approach to the material is not the one used by conservation scientists, archaeometallurgists and corrosion scientists, who have techniques for studying the physico-chemistry of materials and work rather on cross-sections. These two modes of observation, "binocular" and "cross-section", are naturally complementary. Experts from HE-Arc CR, LMC-IRAMAT (UTBM) and LAPA (CEA) had to select, from among the characteristics and sub-characteristics of the current stratigraphic representation tool, those that can be filled in by binocular and/or cross-section observation.

The compiled data was transmitted to the HEG Arc experts, who rearranged it so that it could be integrated into the new fields created according to the observation modes under consideration. The following figure shows the modifications made to one of the characteristics (morphology) of a stratum (here the stratum M1 for metal) of the search engine.



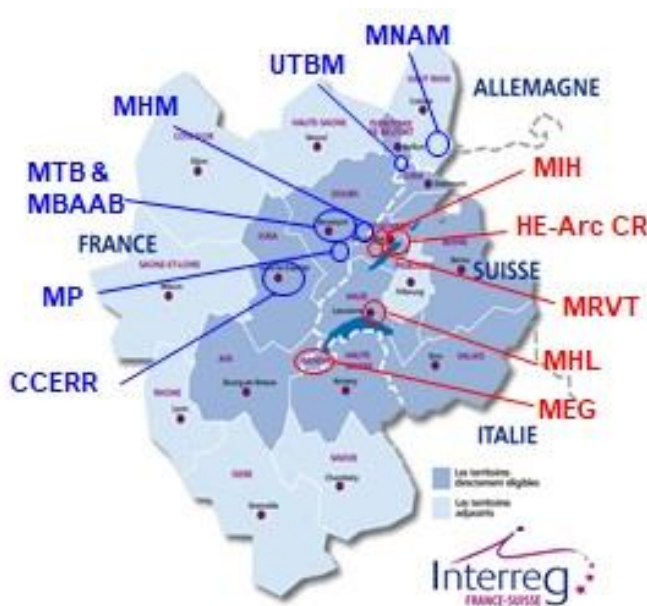
The main changes here concern the width and thickness of the stratum. Indeed, under binocular, the thickness of the stratum is a rather relative data, even if sometimes it can be specified, whereas in cross-section, this thickness is characterized quantitatively. The width of the stratum under the binocular lens does not really make sense. We refer more to its continuity, whereas in cross-section this width at the level of the corrosion structure studied can be determined. The approach will be refined throughout the MetalPAT project and bridges will be created between the two modes of observation.

Once the fields have been implemented, experts from HE-Arc CR, LMC-IRAMAT and LAPA will have to validate them through tests on existing stratigraphies in the MiCorr database. Adaptations are expected at this stage. The next step will consist in modifying all the existing stratigraphies according to the new observation modes selected and in giving a specific weight to each sub-characteristic so that the comparison between a digital stratigraphy of an unknown corrosion structure and those of corrosion structures in the database is relevant. This work should be finalised by the end of 2020. It will only be finalised in the spring of 2021.

The work of enriching the database can then be set up. Valentina Valbi, post-doc at UTBM's LMC-IRAMAT, will be working from January 2021 on certain issues raised by end-users (see below). The analyses carried out will be shared between the LMC-IRAMAT sites and the CEA's LAPA.

- **COLLABORATION WITH END-USERS – COLLECTIONS MANAGERS**

The collections managers (see their distribution on the map below) are actively involved in the development of the search engine by general description of heritage metals in order to identify them. Three meetings (two face-to-face and the third will be by videoconference) funded by the Communauté du Savoir have enabled the prototype described above to be set up.



Distribution of collections managers (blue: French and red: Swiss) on the Interreg territory



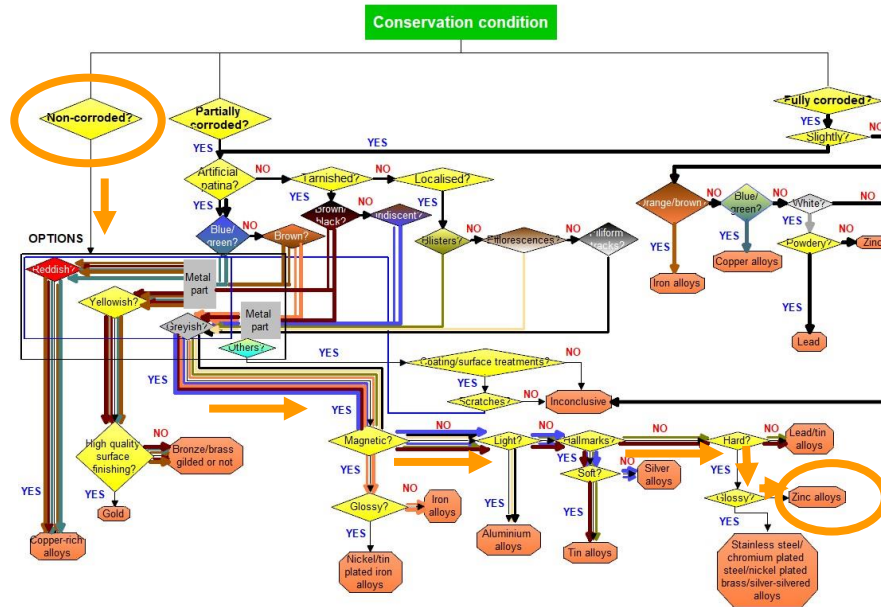
Meeting 8.09.2020 at MIH – Chaux-de-Fonds



Meeting 7.10.2020 at MTB - Besançon

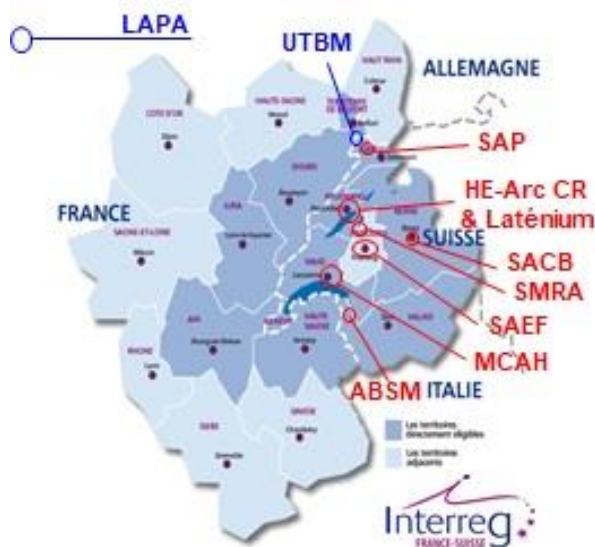
The information obtained from the questioning (identification of the family of metal, or even of the metal itself) will be integrated into the sheet of the object studied. Collections managers would also like the selected interrogation steps to remain accessible. Here, we can imagine referring to the decision-making chain, made dynamic and allowing, as in the case of digital stratigraphy, to return automatically to the corresponding search engine and the path followed.

It was hoped to be able to insert this prototype into the MiCorr+ application during the year 2020. It will be in 2021 instead. New submissions to the Communauté du Savoir should also allow the current interrogation to be optimised, in particular with regard to archaeological metals and those found on technical and scientific objects with numerous surface treatments that can distort the reading of the surface of the objects.



• **COLLABORATION WITH END-USERS – CONSERVATORS**

This other collaboration took the form of exchanges on the problems of alteration of heritage metals, whether they belong to historical and/or archaeological objects. The actors involved (see their distribution on the map below) are mainly Swiss.



Distribution of conservators (in red) on the Interreg territory

Participants in the videoconference of 5.11.2020

At present, the issues on which there is a consensus are: the search for the original surface on objects made of horn silver (chloride), the microstructure of medieval silver, copper-based archaeological objects disintegrating during drying, copper-based lake objects and their long-term evolution, the alteration of iron/wood archaeological composites at the metal-wood interface. Our objective is to gather bodies of objects presenting forms of corrosion representative of these problems and on which invasive sampling (cross-section) can be carried out. These samples will be transmitted to the

UTBM for study and will eventually enrich the MiCorr+ database. We are currently thinking about the agenda for the work to be carried out.

At the same time, students from HE-Arc CR, already aware of the MiCorr application during their training course, have contributed to enriching the MiCorr+ database. This is particularly the case for Elodie Granget, who was interested in aluminium alloys from cooling systems at the Mulhouse National Automobile Museum, an external collaborator of MetalPAT. Several forms of corrosion were described and enriched the family of aluminium alloy objects, under-represented in the database. Dr. Stavroula Golfomitsou from the Conservation Department at the University of Göteborg in Sweden also carried out a short-term mission at HE-Arc CR, financially supported by the European COST PortASAP action (portasap.eu), in order to raise awareness of the MiCorr application. This collaboration between training schools for future heritage conservators shows the didactic interest of the MiCorr+ application. It also contributes to the dissemination of the application beyond the borders of the Interreg France-Switzerland territory.

• COMMUNICATIONS

The article submitted to the journal Conservation 360° for its 2nd issue on the issue of "Diagnosis": "Exploitation and dissemination of MiCorr as a diagnostic support tool for heritage metals" will be published in the spring of 2021. A second publication ("Open access and participatory digital tools as a support for the analysis and diagnosis of heritage metals: possibilities and limits") for the DigiArch2020 conference to be held on 24-25 March 2021 has also been accepted. A paper will also be proposed for a new book of Work package 21 (Corrosion of Archaeological and Historical Artefacts) of the European Federation of Corrosion to review the progress in the field of conservation and research on heritage metals, to be published in 2021.

Partenaires :



Co-financeurs :

