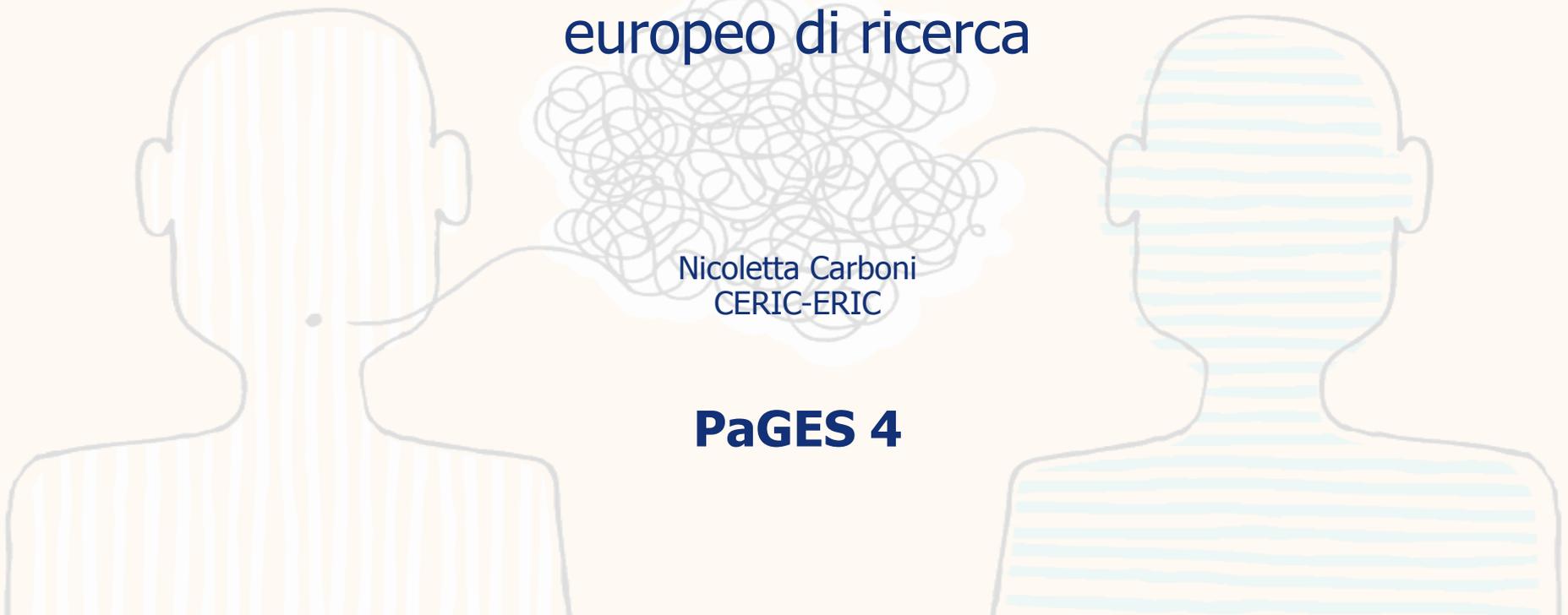


## La comunicazione in un consorzio europeo di ricerca



Nicoletta Carboni  
CERIC-ERIC

### PaGES 4

# Per chi e perché comunicare in un'infrastruttura di ricerca?



RICERCATORI



INDUSTRIE



PARTNERS



FUNDERS



PUBBLICO



MEDIA

# La comunicazione come progetto\*

## QUALI VINCOLI?



\*Un insieme di attività tra loro **correlate e interdipendenti**;

- Finalizzate al raggiungimento di un **obiettivo preciso**;
- Con un **limite di tempo** determinato;
- Con un **budget di risorse** predefinite in partenza;
- Con caratteristiche di **unicità**

# ...E QUALI OPPORTUNITA' ?

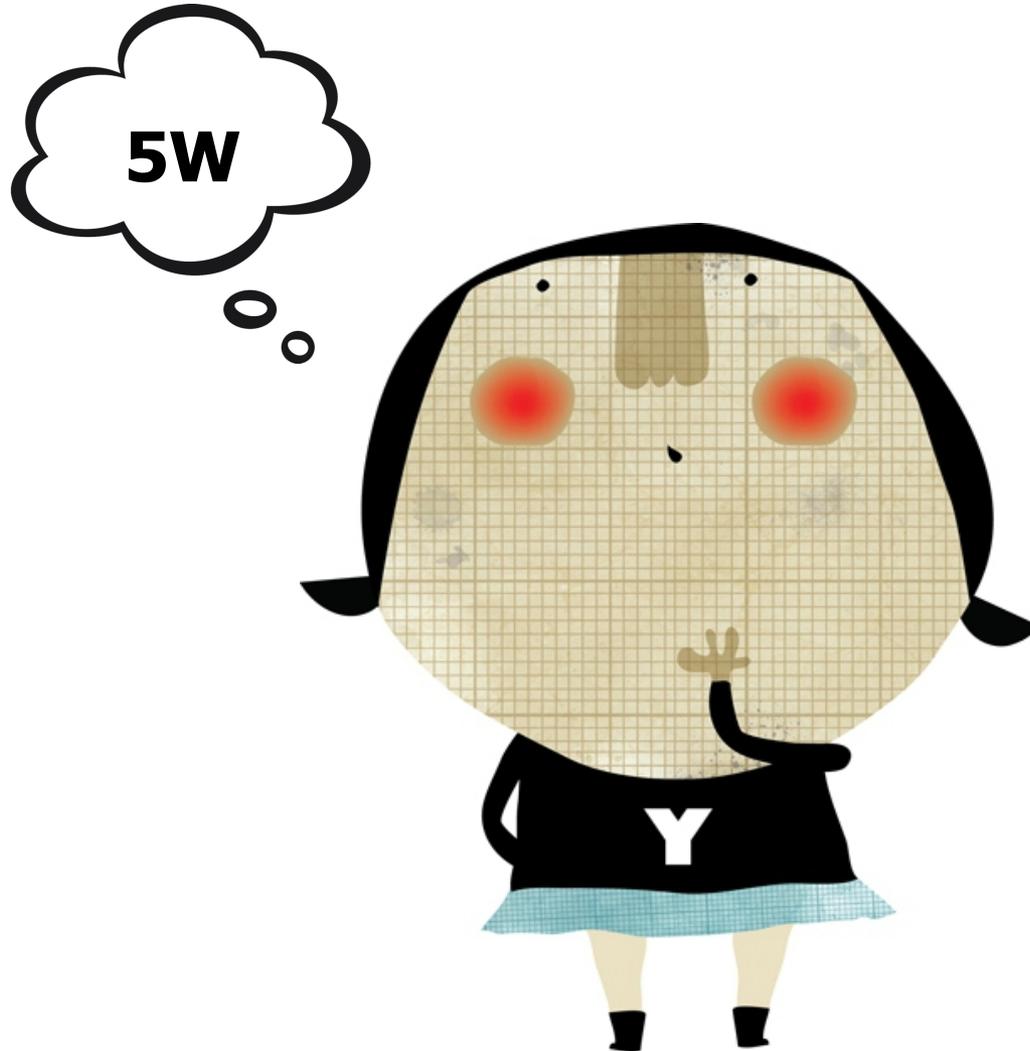
**Unicità  
Innovazione**

**Nuove competenze**

**QUALITA'  
VISIBILITA'**

**Nuovi contatti e  
collaborazioni**

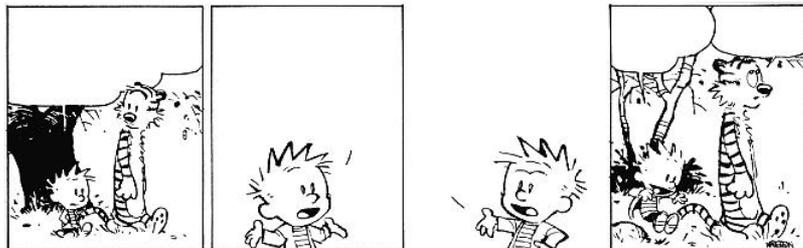
# Quale strategia?



5W



# 1. WHAT Il messaggio



CERIC

# 3. WHY Scopo

Aumentare la consapevolezza  
Informare  
Educare  
Coinvolgere

# 2. WHO Target audience



# 4. WHEN Tempistiche



# 5. WHERE Luogo

# Audience, scopo e messaggio

	Bisogno:	Messaggio:	Scopo:
Professori	<ul style="list-style-type: none"> <li>• Verificare</li> <li>• Valutare ...la conoscenza acquisita</li> </ul>	<ul style="list-style-type: none"> <li>• Le attività svolte</li> <li>• Le nuove conoscenze apprese (project management, sincrotrone, esperimento...)</li> </ul>	<ul style="list-style-type: none"> <li>• Presentare i risultati</li> <li>• Trasmettere il sapere appreso</li> <li>• Buon voto</li> </ul>
Compagni	<ul style="list-style-type: none"> <li>• Conoscere il progetto</li> <li>• Apprendere nuovi concetti</li> <li>• Scoprire percorsi professionali possibili</li> </ul>	<ul style="list-style-type: none"> <li>• Le immagini vissute</li> <li>• L'esperienza nel centro di ricerca</li> <li>• I metodi utilizzati</li> </ul>	<ul style="list-style-type: none"> <li>• Far conoscere il progetto e i suoi risultati</li> <li>• Trasferire conoscenza</li> <li>• Stimolare la curiosità</li> </ul>
Dirigenti	<ul style="list-style-type: none"> <li>• Valutare i risultati del progetto per giustificare la spesa</li> </ul>	<ul style="list-style-type: none"> <li>• Le possibilità professionali nel mondo della ricerca</li> </ul>	<ul style="list-style-type: none"> <li>• Dimostrare l'utilità del progetto</li> </ul>

## 5. HOW

### Con quali risorse e modalità?

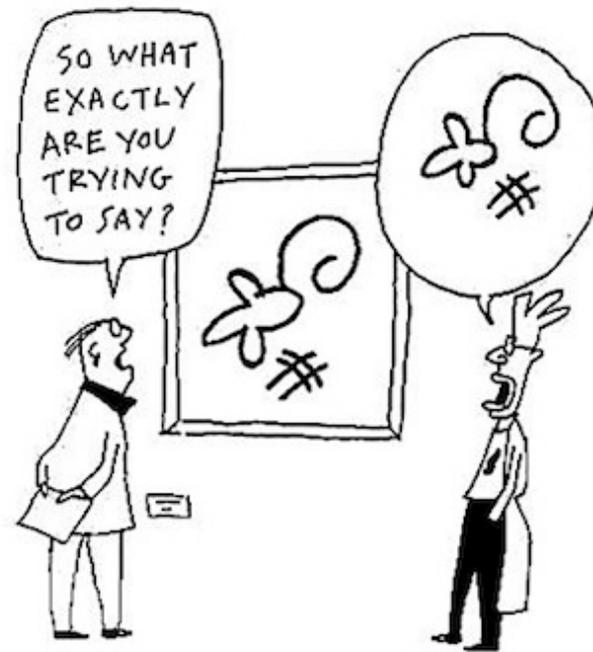


# Che strumenti abbiamo a disposizione?



- ✧ Cosa c'è nella mia cassetta degli attrezzi?
- ✧ Facciamo un brainstorming...che risorse e competenze abbiamo?
  - Planning, branding, copywriting, editing, designing, printing, filming, blogging...*
- ✧ Come possono aiutarmi i miei partner?
- ✧ Quali strategie adottare?

# Trasmettere l'informazione vs. Comunicare efficacemente



**MAKE THINGS  
AS SIMPLE AS POSSIBLE  
BUT NOT SIMPLER**



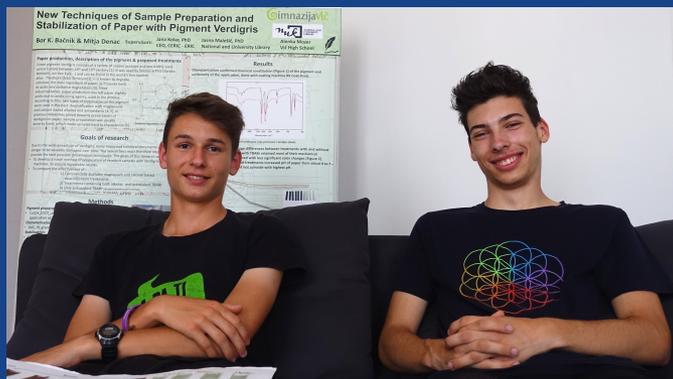
...and don't miss  
the chance to  
practice!

RILEVANZA



SCIENZA

LA NOSTRA  
VITA

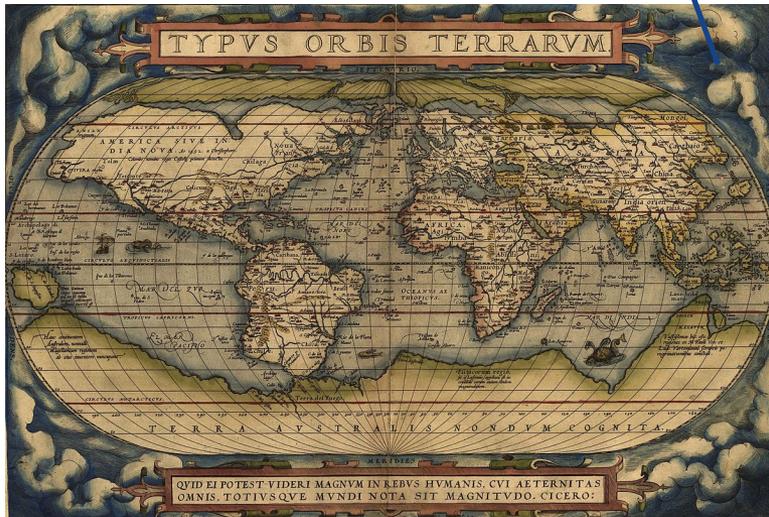
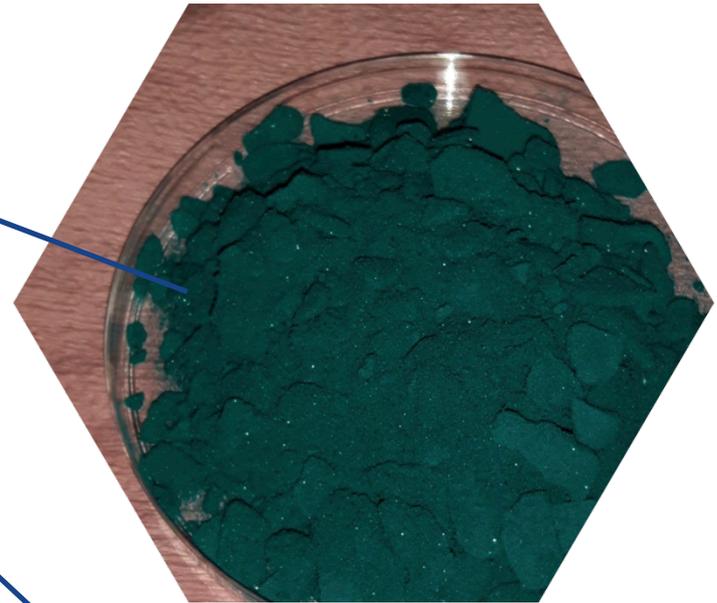


# La ricerca sul Verdigris dei due giovani studenti del Gimnazija Vič (Lubiana): Mitja Denac e Bor Kolar Bačnik



# Verdigris\*

\*Pigmento verde composto da una varietà di acetato di rame, usato in tutta Europa tra il XIII e il XIX secolo in documenti, mappe e dipinti



Nel corso del tempo, si annerisce e danneggia la cellulosa, mettendo a rischio un grande numero di documenti e dipinti antichi.





I trattamenti disponibili sul mercato non sono efficaci.

Si è voluta comparare un nuovo metodo di trattamento della carta contenente **antiossidanti**, con i trattamenti deacidificanti già in commercio.

**In questo studio si è testato il TBABr – Bromuro di Tetrabutylammonio**

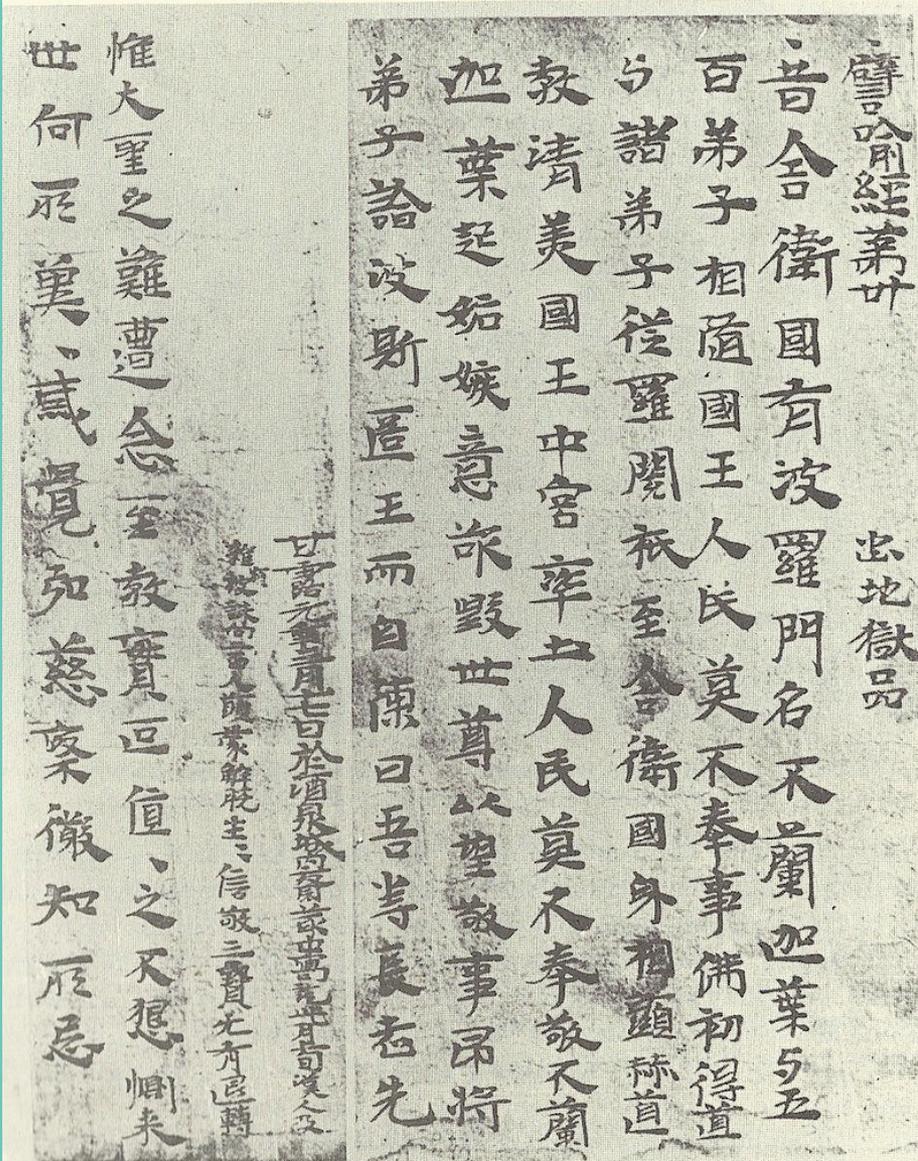


Un nuovo prodotto (contenente l'antiossidante TBABr) efficace per preservare la carta con Verdigris

Il trattamento testato si è dimostrato migliore di quelli disponibili sul mercato, poiché questi contrastano solo l'acidificazione della carta, che è un problema nel caso di molti inchiostri e pigmenti, ma non del Verdigris.

Si è inoltre identificata la sostanza marrone in cui si decompone il Verdigris: **ossido di rame**.

L'ossido di rame può provocare irritazione agli occhi, alla pelle e alle vie respiratorie, e può essere fatale se ingerito.



## 1. Ricerca bibliografica

## 2. Preparazione e sintesi del colore

- Solfato di rame
- Ammoniaca
- Acido acetico
- Idrossido di sodio

## 3. Analisi del colore con spettroscopia IR

Ha confermato che si tratta di acetato rameico = Verde di Grecia



## 4. Applicazione del colore sulla carta



## 5. Misurazione delle concentrazioni di rame sulla carta (e quindi la sua distribuzione) con l'AAS – Atomic Absorption Spectroscopy

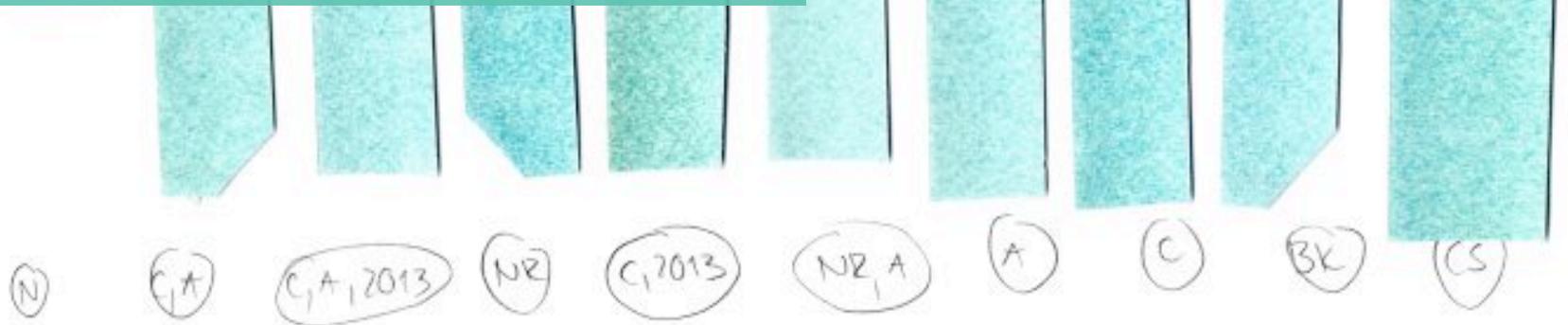
Ha confermato l'omogeneità dell'applicazione del colore



# METODO – Le fasi dell'esperimento

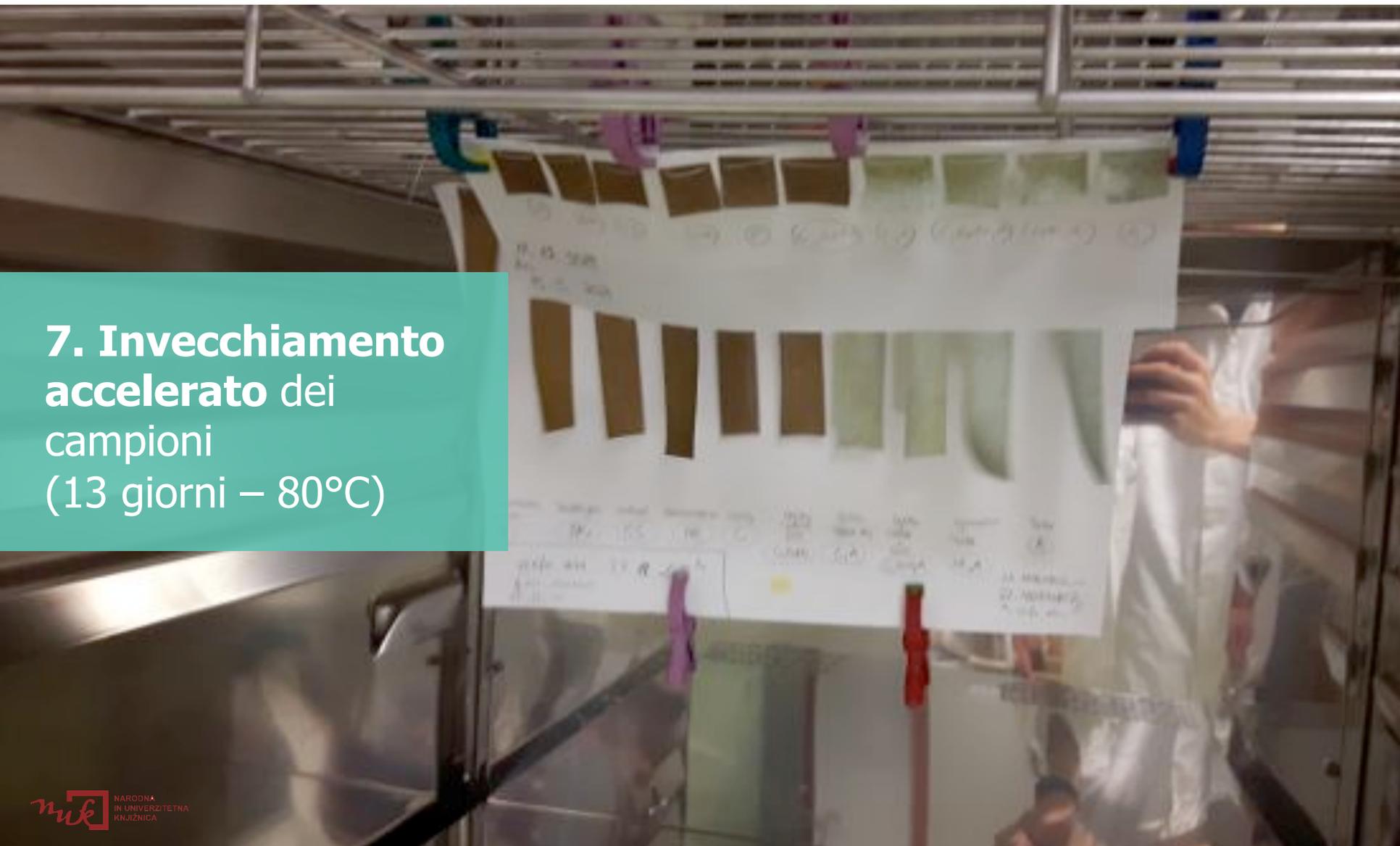
## 6. Preparazione e applicazione di diverse sospensioni per la stabilizzazione della carta con:

- Antiossidante TBABr (A)
- Nanoparticelle di carbonato di calcio (C)
- Agenti deacidificanti già in commercio (BK, CS, NR)
- N=non trattata



NESTARANI VORCI

## 7. Invecchiamento accelerato dei campioni (13 giorni – 80°C)





## 8. Misurazione del pH

Tutti i trattamenti hanno aumentato il pH della carta, incluso quello con il solo TBABr



## 9. Misurazione delle proprietà meccaniche

La riduzione della robustezza delle fibre della carta è maggiore nei campioni trattati con soli alcali, in assenza di antiossidante

Adamel Lhomargy – dispositivo di misurazione della resistenza alla trazione @ Pulp and Paper Institute - Lubiana



## 10. Analisi con luce di sincrotrone

X-Ray Absorption Spectroscopy beamline

Si è identificata la sostanza marrone in cui si decompone il Verdigris:

**ossido di rame**, che deriva dal progressivo degradamento dell'acetato di rame.

L'ossido di rame può provocare irritazione agli occhi, alla pelle e alle vie respiratorie, e può essere fatale se ingerito.



Elettra Sincrotrone Trieste

La procedura e il trattamento sviluppato possono essere utilizzati per la conservazione dei beni culturali (in archivi, biblioteche, musei, ecc.) e in prodotti commerciali.

Il trattamento può essere utilizzato anche nella preparazione di souvenir, fac-simili di libri, ecc.

# LE PATRIMOINE CULTUREL

Comment éviter que nos anciens livres et dessins se détériorent ?

J. Maledić et al.,  
Restaur. 36, 283 (2015)



De nombreux documents, dessins et cartes sont menacés par le caractère hautement corrosif du pigment de cuivre vert-de-gris, qui est composé de tout un panel d'acétates de cuivre largement utilisés du 13e au 19e siècle.

Des chercheurs ont reproduit des modèles de papier contenant du vert-de-gris, sur lesquels ils ont appliqué une solution de stabilisation.

Des analyses chimiques des échantillons, après un vieillissement accéléré, ont montré la capacité de stabilisation de l'antioxydant choisi et d'éléments associés sur la dégradation du pigment et du papier.

# CERIC

Central European  
Research Infrastructure  
Consortium

Central European  
Research  
Infrastructure  
Consortium

Austria, Croatia,  
Czech Republic, Hungary,  
Italy, Poland, Romania,  
Serbia and Slovenia



CERIC-ERIC is a multidisciplinary research infrastructure providing access to some of the best facilities in Central and Eastern Europe to help science and industry advance in all fields of materials, biomaterials and nanotechnology.

It enables the delivery of innovative solutions in the fields of energy, health, food, cultural heritage and more, letting the best global researchers realize their ideas in a multicultural environment with a worldwide reach.

# L'ENVIRONNEMENT

Comment protéger notre environnement et nettoyer les sources d'eau polluées par les déchets miniers ?

G. De Giudici et al.,  
Appl. Geochem. 76, 124 (2017)

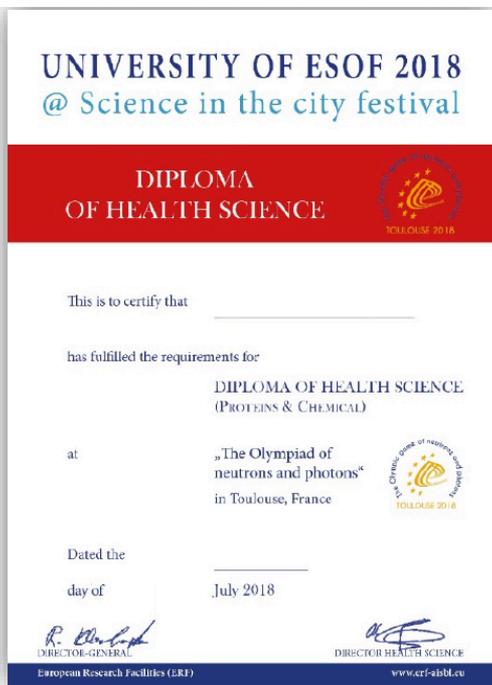


Les déchets miniers sont des minéraux réactifs qui viennent polluer les rivières et les sources d'eau.

Afin de comprendre pourquoi ils ont un effet positif ou négatif sur l'environnement, des scientifiques ont étudié les processus derrière les interactions entre les plantes et les organismes d'une part, et le sol et l'eau d'autre part, sur les déchets miniers de Rio San Giorgio (Italie).

En associant différentes techniques à l'aide d'un synchrotron, ils ont constaté que certaines plantes locales à la fois recelaient des métaux lourds toxiques dans leurs racines, tiges et feuilles, mais étaient également capables d'influer sur l'environnement chimique autour, agissant comme un filtre et efficace dans les zones polluées.

# Materiale per il festival



## Cultural heritage

How to preserve our ancient books and drawings from deterioration?

J. Malešič et al., Restaur. 36, 283 (2015)



Many important documents, drawings and maps are in danger, due to the highly corrosive Verdigris green copper pigment, consisting of a variety of copper acetates widely used from the 13<sup>th</sup> to the 19<sup>th</sup> century.

Researchers reproduced model papers with Verdigris and applied a stabilising solution.

Chemical analysis of the samples after accelerated ageing revealed the stabilising power of the elected antioxidant and allies on degradation of pigment and paper.

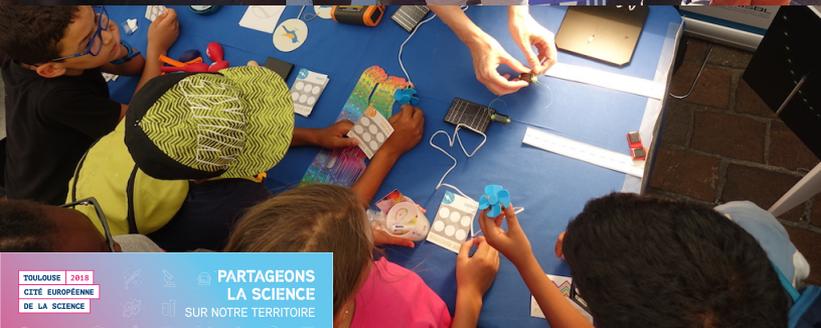
## THE OLYMPIC GAMES OF NEUTRONS AND PHOTONS





# THE OLYMPIC GAMES OF NEUTRONS & PHOTONS

CERIC



TOULOUSE 2018  
CITÉ EUROPÉENNE  
DE LA SCIENCE

PARTAGEONS  
LA SCIENCE  
SUR NOTRE TERRITOIRE

7-15  
JUILLET  
2018

+120  
ÉVÉNEMENTS  
POUR TOUS  
+50 LIEUX

FESTIVAL  
SCIENCE  
IN THE CITY

tolousciences2018.eu

VILLAGE DES  
SCIENCES  
14h - 19h  
PLACE DU CAPITOLE  
TOULOUSE

FESTIVAL ORGANISÉ PAR TOULOUSE MÉTROPOLE ET L'UNIVERSITÉ FÉDÉRALE TOULOUSE 300-PIYENNES



**ESOF**  
EUROSCIENCE OPEN FORUM

**TOULOUSE 2018**

Nicoletta Carboni

[www.ceric-eric.eu](http://www.ceric-eric.eu)

# Sito web

## News

How to preserve our ancient books and drawings from deterioration? Results of the study answering to such questions were presented at the Science in the City Festival – ESOF 2018

### Location

9-15 July 2018, Place du Capitole, Toulouse - France

09.07.2018



Many important documents, drawings and maps are in danger, due to the highly corrosive Verdigris green copper pigment, consisting of a variety of copper acetates widely used from the 13th to the 19th century.

The two youngest CERIC users, **Mitja Denac** and **Bor Kolar Bačnik**, from the high school **Gimnazija Vič**, conducted a research to evaluate existing and new stabilization treatments for ancient documents where **historical green pigment Verdigris** was applied, in order to equip conservators with superior treatment solutions. To evaluate these treatments, they developed a new application technique that would yield a facile and fast method to create reproducible model samples, needed for evaluation of the treatments.

Chemical analysis of the samples after accelerated aging revealed the stabilizing power of the elected antioxidant and allies on degradation of pigment and paper.

The results of their research were presented at the **Science in the City Festival** at **ESOF 2018** at the interactive exhibition "the Olympic games of neutrons and photons" organized by CERIC and the other members of the European Research Facility Association **ERF-AISBL**, from 9 to 15 July in **Place du Capitole** in **Toulouse, France**.

CERIC's youngest users awarded with a gold medal for their research

15.05.2018

On Monday, May 14, 2018, the **52nd Meeting of Young Researchers of Slovenia** took place in Ljubljana. Elementary and high school students showcased their research projects and knowledge in 20 different fields, spanning astronomy, physics, biology, ecology, mathematics, ethnology, chemistry, ICT, and many more.



The evaluating Commission awarded up to two gold prizes per field. **Two high school pupils, who have been recently granted fast track access to the CERIC facilities, won the gold medal in the field of chemistry.**

CERIC research awarded the silver medal in Chinese science contest

### Location

14-20 August 2018, Chongqing - China

17.09.2018



Research in the field of cultural heritage conducted by the youngest CERIC users landed to the other side of the globe, at the 33<sup>rd</sup> China Adolescents Science & Technology Innovation Contest.

# Materiale stampato

**CERIC** What do you know about the "Green of Greece"?

**What was it used for?**

Verdigris was widely used across Europe from the 13th to the 19th century in documents, drawings and maps. Famous artists such as Sandro Botticelli and Jan Van Eyck used it, and it can be found also in the world's first modern atlas - *Theatrum Orbis Terrarum* (Theatre of the World).

**What is Verdigris?**

Verdigris, also called "Green of Greece", is a dominant green pigment, which consists of a variety of copper acetates.

**What are its negative effects?**

Verdigris is known for its negative effects on paper, resulting in its darkening, cracking and fragility. The pigment degrades both cellulose and itself, turning from green to dark brown. That's why in historical maps forests are brown, which is the result of the pigment's change from green hue into brown.

**CERIC** How have problems with Verdigris been addressed?

A novel method of preparation of reproducible model samples was developed, which could be used in the assessment of various treatments, i.e.

- 1) commercially available magnesium and calcium based deacidification treatments,
- 2) treatments containing both alkalies and antioxidant TBABr (tetrabutylammonium bromide),
- 3) only antioxidant TBABr.

After pigment preparation and applications, Mitja Denac and Bor Kolar Bačnik characterized and stabilized the samples. They then performed the pH study and exposed the samples to accelerated ageing. Finally, they evaluated the treatments and analyzed the samples at the Elettra synchrotron in Trieste, to investigate whether toxic copper oxide is formed from Verdigris over time. The use of synchrotron light for the analysis of the samples was useful to identify what is the source of colour change from green to dark brown.

The final product of degradation of green copper acetates is black copper oxide, which can cause irritation of eyes, skin, and respiratory tract, and which is harmful or fatal if swallowed. Such information is important for conservators and librarians handling historical artefacts.

**CERIC** What solutions have been found?

After the evaluation of several non-aqueous stabilization methods of paper with Verdigris, it was found that the mixtures prepared in the frame of the research, which contain alkalies and the antioxidant TBABr, or even the antioxidant alone, induced a far superior stabilization, than the commercially available treatments. Therefore, results indicate that commercial treatments need to consider the use of antioxidants, in addition to alkalies.

**What the developed procedure can be used for?**

For cultural heritage preservation (archives, libraries, restoration departments of museums) and in commercial treatments. The process of pigment application could also be exploited for preparing souvenirs, book facsimiles etc.





## New techniques of sample preparation and stabilization of paper with pigment Verdigris

0:00 / 5:20

Interview with CERIC users Mitja Denac and Bor Kolar Bačnik at ESOF 2018

CERIC

CERIC-ERIC @CERICnews · 11 Jul 2018

The #research was conducted by Mitja Denac and Bor Kolar Bačnik, with the collaboration of CERIC, @knjznicnaUK, @GimVic, Pulp & Paper Institute, and with the support of the #H2020 project #ACCELERATE2020 2/2 #HeritageScience #ESOF2018



2 6

CERIC

CERIC-ERIC @CERICnews · 10 Jul 2018

The ERF team from @CERICnews @SKA\_telescope @ESO @MAXIVLaboratory @HZBde @FusionInCloseUp @NeutronSources is ready to answer to your #science questions in the heart of #Toulouse. #ESOF2018 #Scienceinthecity



4 13

CERIC

CERIC-ERIC @CERICnews · 14 Jul 2018

We couldn't miss the chance to talk about #science here in #France on #BastilleDay at the #scienceinthecity festival in #Toulouse. #ESOF2018



1 12

CERIC

CERIC-ERIC @CERICnews · 17 Sep 2018

At #ESOF2018 we interviewed CERIC users Mitja Denac & Bor Kolar Bačnik, holders of #science contests in Slovenia, China & USA for their #research on evaluating stabilization treatments for #paperconservation. Watch the video > [goo.gl/Wv3qjN](https://goo.gl/Wv3qjN) #culturalheritage



EU Neutron, GIMNAZIJA VIČ, elettrasinicrotrone and 2 others

1 7 9

## EuroScience Open Forum: sharing science, and a bit of career advice

A physics PhD's experience of a week at the largest  
science meeting in Europe.

Emma Winkels  
Sat 18 Aug 2018 09:15 BST



The City of Space, model of the Ariane 5 rocket. Photograph: Emma Winkels



▲ Two young high school students, Mitja Denac and Bor Kolar Bačnik, present their research on preservation of ancient books and drawings at the 'Science in the City' fair. Photograph: Emma Winkels



"Adhering to the ESOF 2018 motto 'Sharing science: towards new horizons', the host city Toulouse organised events for the locals to join in on all the science fun. A fair was set up in the main square of the city with lots of interesting stands aimed at teaching young kids about the magic of science, using interactive exhibits and games"

# Una soluzione per i documenti messi a rischio dal verde di Grecia

La carta antica è minacciata dall'azione corrosiva del Verdigris, un pigmento verde molto usato in passato. Una ricerca svolta da due studenti sotto la supervisione del CERIC-ERIC potrebbe mettere in salvo molti documenti antichi.



Vincenzo Senzatela

15 Maggio 2018 alle 11:00

Abbiamo intervistato i due giovani ricercatori per farci raccontare come hanno affrontato la loro ricerca e che modo hanno trovato per risolvere il problema del Verdigris.



**Nomi:** Mitja Denac, Bor Kolar Bačnik.

**Nati a:** Lubiana, Slovenia.

**Formazione:** studenti alla scuola superiore Gimnazija Vič a Ljubljana.

**Gruppo di ricerca:** Mitja Denac, Bor Kolar Bačnik, sotto la supervisione della dottoressa Jasna Malešič della National and University Library, Slovenia, del mentore scolastico Alenka Mozer e della dottoressa Jana Kolar del CERIC-ERIC.

**Cosa amiamo del nostro lavoro:** il pensiero critico e il tentativo di dare un contributo per risolvere i problemi rilevanti per tutti. Essere quella piccola parte di un domani migliore.

**La sfida maggiore nel nostro campo di ricerca:** Capire i

trattamenti chimici che permettono di conservare i documenti cartacei nel modo migliore.



**oggiScienza**  
la ricerca e i suoi protagonisti

**Ci sarete anche voi?**

**CERIC**

**ESOF2020**

The logo for ESOF2020 features the letters 'ESOF' in a bold, blue, sans-serif font, followed by '2020' in a bold, light green, sans-serif font. The letter 'O' in 'ESOF' is replaced by a stylized globe with two intersecting orbital rings, one blue and one light green.

**EUROSCIENCE OPEN FORUM**

**TRIESTE**

# Grazie

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**[nicoletta.carboni@ceric-eric.eu](mailto:nicoletta.carboni@ceric-eric.eu)**