



NEMOSINE - The Future of Media Storage

Innovative packaging solutions for storage and conservation of 20th century cultural heritage artefacts based on cellulose derivative

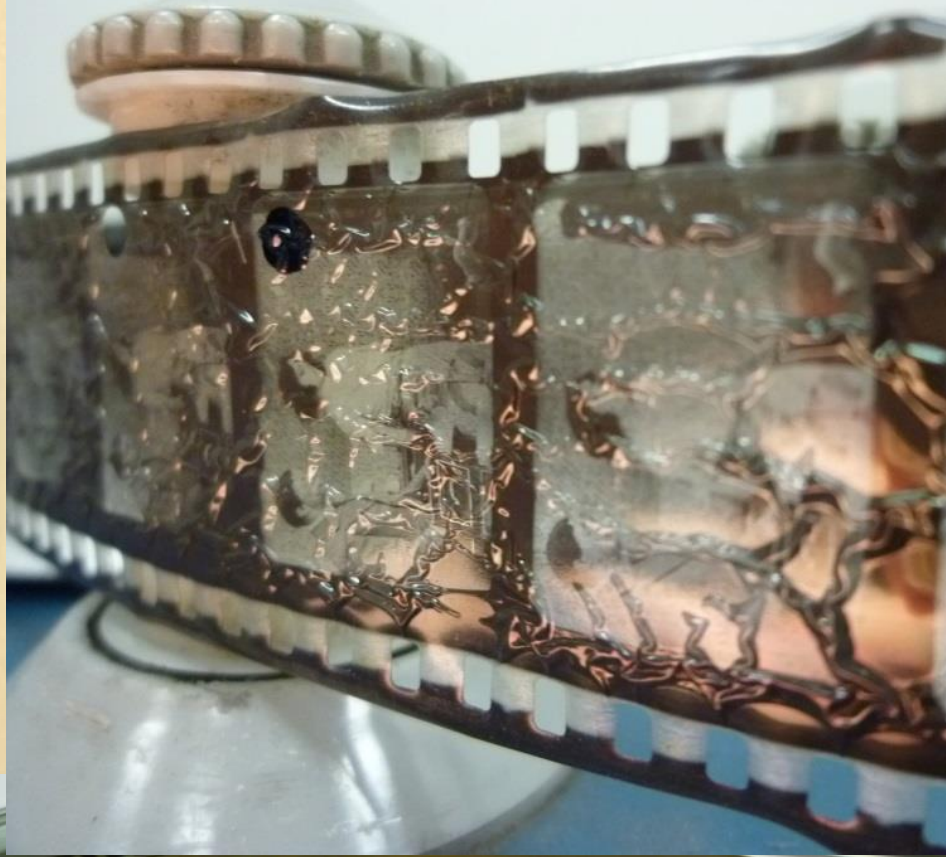
IASA / JTS 2019, Hilversum

Kerstin Herlt (DFF - Deutsches Filminstitut & Filmmuseum), Juan Ignacio Lahoz Rodrigo (IVAC CulturArts), Nadja Wallaszkovitz (Phonogrammarchiv ÖAW),



ABOUT

- Nanotechnology project to conserve cultural heritage objects
- Funded by Horizon 2020 Research and Innovation programme; EYCH 2018
- Duration: Feb 2018 - Jan 2022
- Project goal: develop smart packages for cellulose-based cultural heritage material: film, audio, photos
- Issue: 5% of 18 Mio film rolls on cellulose acetate show signs of acetic acid syndrome (study OEAW/PhA 2012)





Preservation issues in film archives

- Chemical deterioration / damage
- Insufficient prevention of chemical deterioration - lack of cold / subzero storage
- Chemical deterioration that causes mechanical damages - e.g. to perforations
- Biological damages (bacteria, funghi)



Condition Assessment - Film (to date)

Acetate (Triacetate, Polyester etc)

- by (light/medium/strong) vinegar smell & visible deterioration symptoms
- by use of acid detection strips (5 or 7 values, IPI or Dancan)

Nitrate

- visual assessment most common, but challenging in practice
- usually classified into 5 deterioration stages (by FIAF), chemical assessment possible





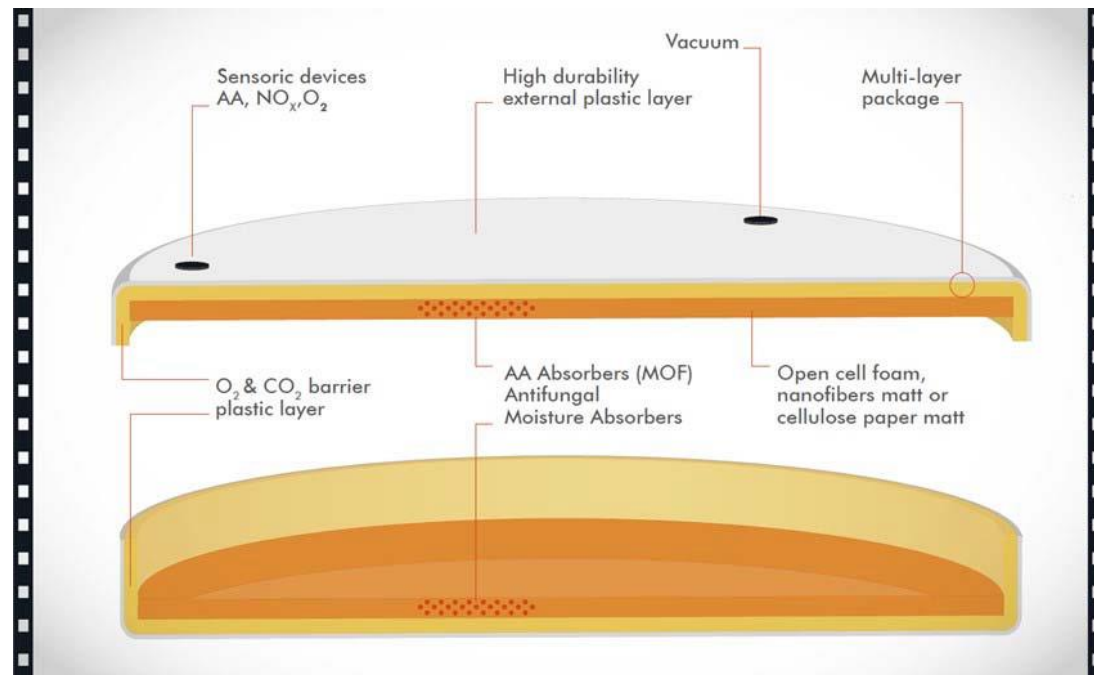
NEMOSINE Objectives

- Compensate the lack of cool and freeze storage for cellulose based CH material
- Increase life expectancy of cultural heritage objects when storage conditions are insufficient (too warm, too humid)
- Monitor systematically the chemical condition of the cultural objects
- Precise knowledge of the condition of the collections
- Develop a prediction model for deterioration

What is „smart“ about NEMOSINE packages?

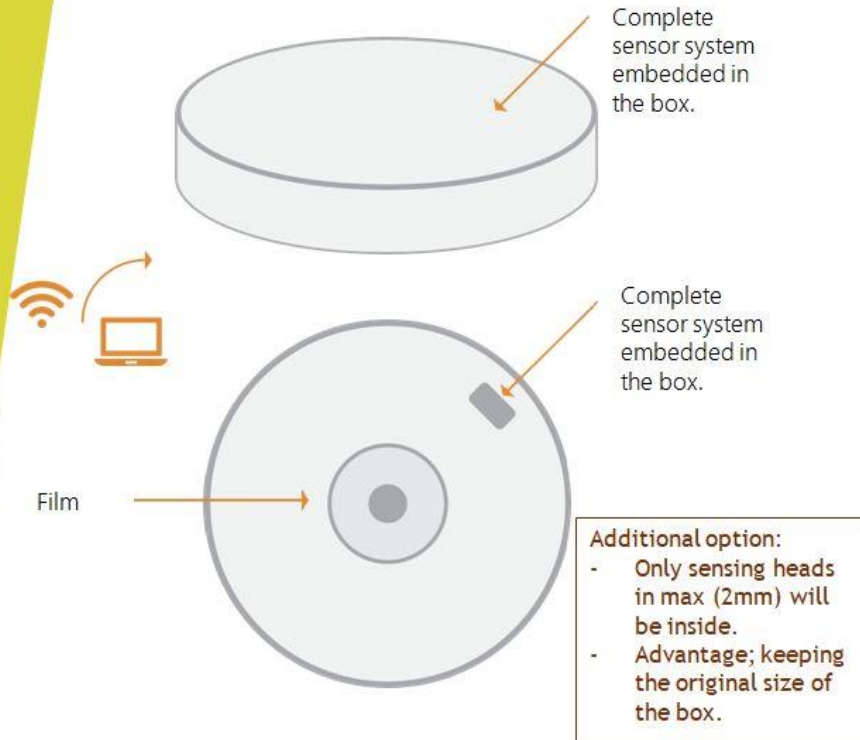
Integration of

- Active acetic acid absorbers based on MOFs (Metal Organic Frameworks)
- MOFs integrated in innovative structures (e.g. nanofibers, paper mats)
- Sensor technology to detect outgassing of AA, O₂, NO_x
- To be designed as modular system system



Modular Solutions

1. SMART & CURATIVE BOX



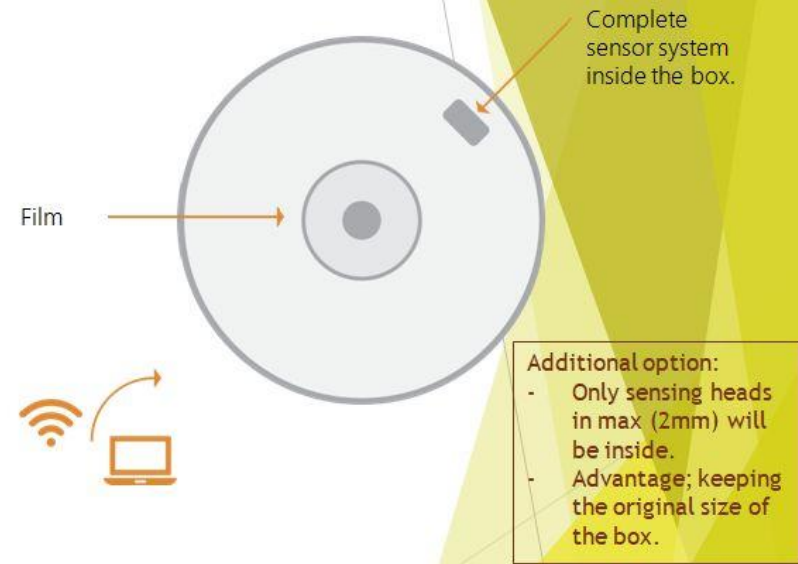
Advantages:

- Integrated solution with MOFs, antifungals and sensors.
- Useful for curative actions, data collection and prediction modeling.

Main restrains:

- State of the art for sensors autonomy and selectivity among NO, NO₂ and AcAc.
- Bigger size compared to current boxes.

2. SMART BOX



Advantages:

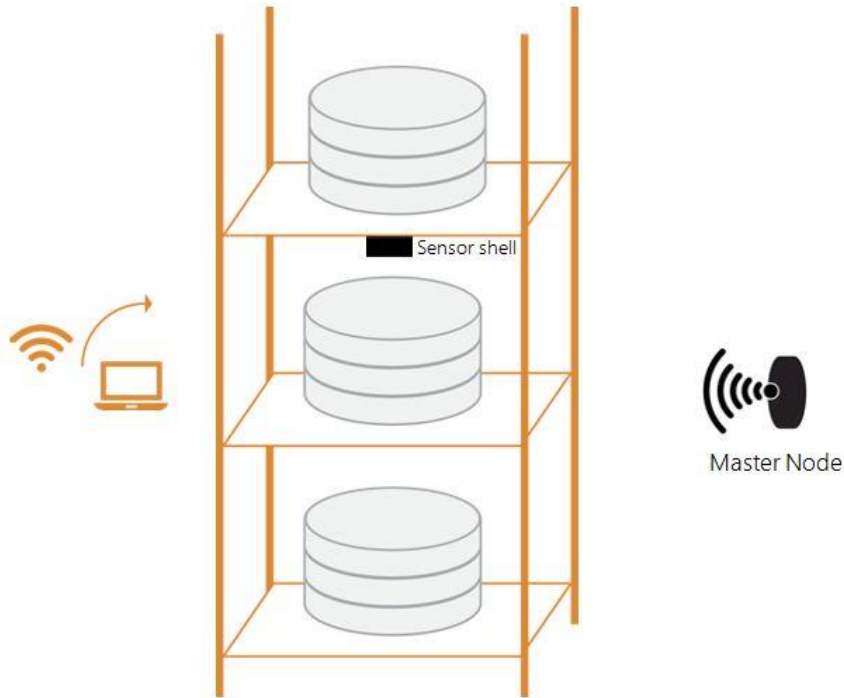
- Data collection system for automatically register new films degradation status.
- To allow to the archivists having a control of reference samples to predict degradation level per areas.

Main restrains:

- Data collection outside the storage rooms (to be done by the archivist).

Modular Solutions

3. SENSING FOR AMBIANCE CONDITIONS



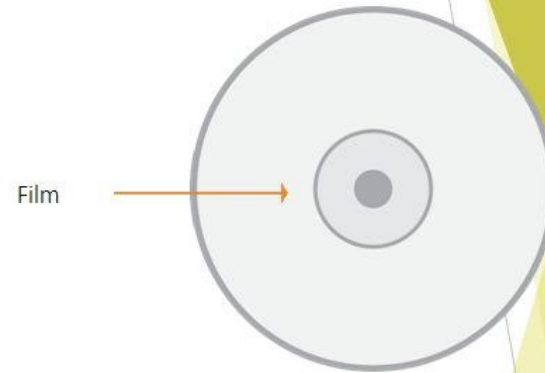
Advantages:

- Data collection of level of AA, NOx per Shell.
- Useful for curative actions and data collection.
- Higher life expectancy and minor need for adaptation.

Main restrains:

- Lack of individual data for each film.
- No prediction modeling would be available.

4. MAINTENANCE / CURATIVE BOX



Characteristics:

- Including MOFs, antifungals.
- For curative actions over films.

Advantages:

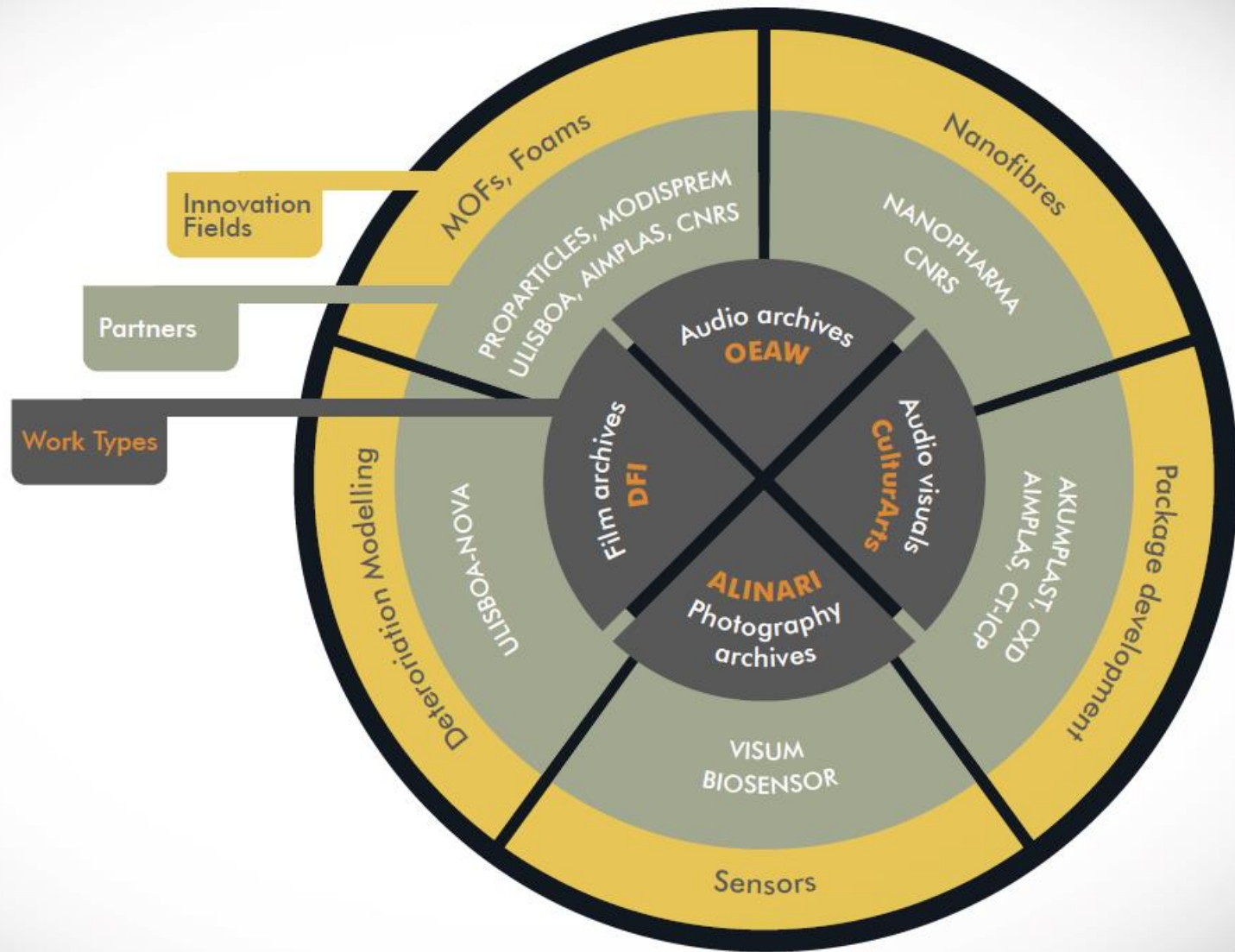
- The archives only will need some of them for helping in their maintenance activities.
- Less cost than the "complete box" due to the fact that this option won't have sensing functionalities.



Concerns and questions

- Are the products /components long lasting or do they harm the film material in the long run?
- Will the components harm chemicals with a positive effect on the material, e.g. plasticizers?
- How often do we have to change MOFs or any of the components of the packages?
- To which degree of degradation can intervention be curative?
- Will NEMOSINE measure NO_x or the degradation of nitrocellulose accurately?
- What are the costs of the packages?

Consortium





Survey on conservation practices and needs for preserving cellulose based film (incl. SepMags)

- Feb-July 2019
- Target group: film archives (FIAF/ACE), TV archives, smaller regional archives, private collectors, foundations, universities, restoration experts and service providers, commercial film libraries



Survey on conservation practices and needs for preserving cellulose based film (incl. SepMags)

QUESTIONS

- Quantity
- Package / Boxes
- Environmental Assessment
- Collection Assessment
- Problems
- Needs

Results: https://nemosineproject.eu/project_activities.php





Thank you !

herlt@dff.film

<https://nemosineproject.eu/>

