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

IASA/JTS Joint Workshops – Oct 3
Hilversum, Netherlands

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The Nemosine improvements. Learning from the Users Requirements Questionnaire.

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The questionnaire (1)

- To enrich the requirements pointed out by the Nemosine final user partners.
- Only about film collections
  - Filmoteca Valenciana (Institut Valencià de Cultura), Spain
  - OESTERREICHISCHE AKADEMIE DER WISSENSCHAFTEN (OEAW), Austria
  - Deutsches Filminstitut & Filmmuseum, Germany
  - Other SSCH partners: Fratelli Alinari (Italy); CNRS (France)
- Focused on
  - Quantity and composition of holdings
  - Packages
  - Environmental Assessment and storage concepts
  - Collection Assessment Movies (preservation status)
  - Preservation Problems and measures
  - Needs to improve the long-term storage

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The questionnaire (2)

- Circulated to 256 institutions and experts
  - Film Archives
    - ACE and FIAF members
    - Regional film archives
  - Private collections, foundations, universities, film schools, museums, film festivals, stock footage and commercial film libraries
  - Television archives
  - Experts & service providers
  - results, points to consider

The questionnaire (3)

- Respondants
  - Representativity & heterogeneity
    - 79 of 256 institutions and experts
    - 1 with more than 1 million reels.
    - 80% from Europe, running low temperature vaults.
    - Different geography, different clima problems and resources
    - Not all fullfill the questionnaire at 100% + technical errors.
  - Contributions, more rellevant than answers limitations
    - Important Statements and considerations from film archives with important collections, resources and great technical experience
    - General conclussion: Scepticism facing innovation

The questionnaire (4)

- The questionnaire introduced the idea of the project and the improvements to achieve
- Neither there is a prototype, nor a implementation or working model.
- It resent to www.nemosineproject.eu for more information
- Questions are thought to know the actual practice and problems in film conservation
- Ask respondants about the Nemosine proposals.
- Nemosine proposed features
  - Smart Packages as a core element of a long-term conservation management workflow
  - Integrated adsorbants and sensors for monitoring reels conservation and to prevent their degradation
  - Curative solution for moulds
  - Energy saving

The questionnaire evaluation and conclussions will be published in october on https://nemosineproject.eu/index.php

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Scepticism facing innovation (1)

- Filmarchives already have an effective conservation system. A model in which we trust
  - Based on environmental control: T + RH + air renovation
  - Preservation based on duplication and digitization
  - Conservation improvement: new vaults or good maintenance of them and its climatization
  - Monitoring:
    - periodic film inspection (mainly for nitrates) as FIAF recommends
    - Environmental conditions
    - Pollutants
  - Packages are not considered as an active storage conservation tool (except in the case of ventilated cans)
    - function is to handle, to storage and to protect the reels against blows;
    - It is a current practice, even between the best equiped filmarchives, to reuse the containers

Scepticism facing innovation(2)

- Main objections to Nemosine smart package
  - The current system is enough for preventing degradation.
  - The smart package is not necessary
  - It requires large efforts to introduce it: money, workforce and time, available space
    - Change of thousands of reels
    - Energy saving only in vaults with Nemosine packages
  - Costs unpredictability: high cost is assumed due to its sophistication
    - Reusing of containers means cost 0
  - Not useful for nitrate films: when decomposition starts it requires more frequent inspections and the change of the box each time.

Learning from answers

- Prototype definition
  - 35mm x 270mm or 370mm diameter are the most common size in film collections
  - Round shape
  - Made of plastic: highly appreciated material for packages in filmarchives.
    - It is to be selected a low cost thermoplastic that matches the requirements: resistence, stability...
- The current conservation system it is not implemented integrally in many cases
    - Lack of adequated vaults and budgets
    - No climatization or no control of it
    - No control of pollutants
    - No isolation of materials: nitrate films, vinegar syndrom damaged, separated magnetic reels
- Gas dissipation is a need: ventilated cans or film inspection
- Periodical Film inspection is necessary in the whole process, but it is extremly difficult to apply (time and workforce)
- Moulds are a hugh problem and it is very difficult to deal with.

Nemosine improvements (1)

- The smart package does not replace the current system, just improve it
- Sensors monitoring is a great improvement for the collections conservation management.
  - Very frequent check without time and workforce efforts, between periodical reels inspection
  - Through Gas identification sensors alert archivists of degradation when it starts.
  - Alert allows a sooner decision making
  - Films inspection could be better organized, prioritizing risky materials
  - Sensors will detect Acetic Acid and NOx
  - Following the survey, it is under study the implementation of the detection of:
    - Gasses from magnetic tapes
    - Ozone
    - Nitrate degradation stages
- Sensors life depends on their batteries: punctual and regular activation will prolong their duration to coincide with the regular film inspection time and the replacement of MOFs foam.
- Sensors size could advice to allocate them out of the package, monitoring a whole shelf, not reel by reel

Nemosine improvements (2)

- MOFs adsorb gasses
  - It slows down degradation because the film is not damaged by their own emissions.
  - It satisfies the need of periodic ventilation
  - Diminishes the risk of films *infection* (acetic acid degradation)
- Curative package is intended for mould elimination
  - It works in non conditioned spaces (the best prevention is low RH and T)
  - It is planned also for high acetic acid levels
- Energy saving (and costs)
  - Nemosine Smart packages need conditioned vaults
  - Nemosine packages will allow more relaxed environmental conditions, then less consumption
  - It is not yet known which will be the new parameters (the project is still in month 18 of 48)

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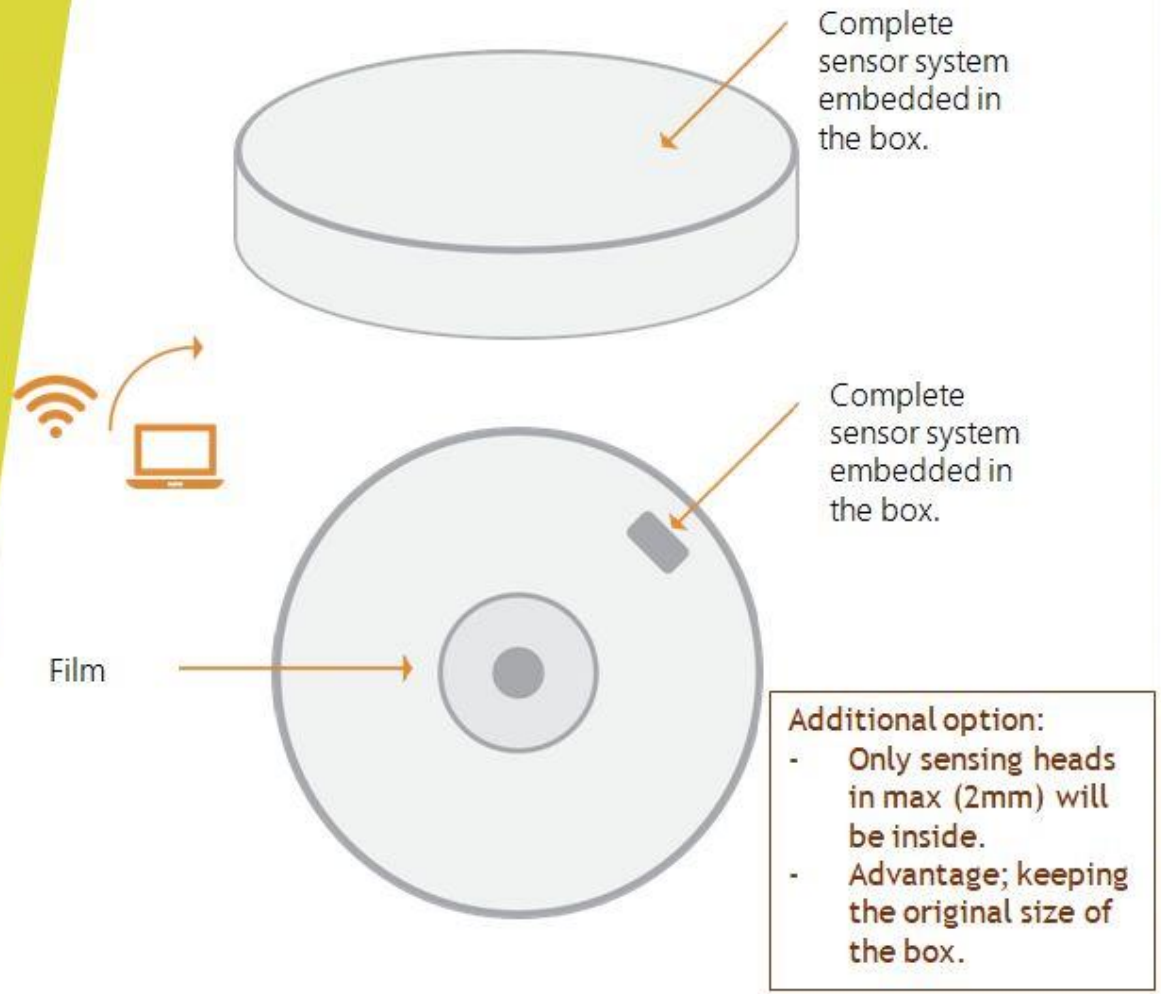
Nemosine MODULARITY

- It is not necessary to integrate all the features in every package (as it was the original idea)
  - It could there be different combinations for different needs
  - Lower costs (end users requirements)
  - Solution for technical limitations (sensor size)
- Sensors differencied by gasses: acetid acid, NOx (or magnetic tapes, if possible)
- Sensor for RH – T distributed by zones and levels, better than in each package:
  - Less amount of almost equal data to analyze
- Curative package and package with MOFs

1. SMART & CURATIVE BOX



Additional option:
- **Only sensing heads in max (2mm) will be inside.**
- **Advantage; keeping the original size of the 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.

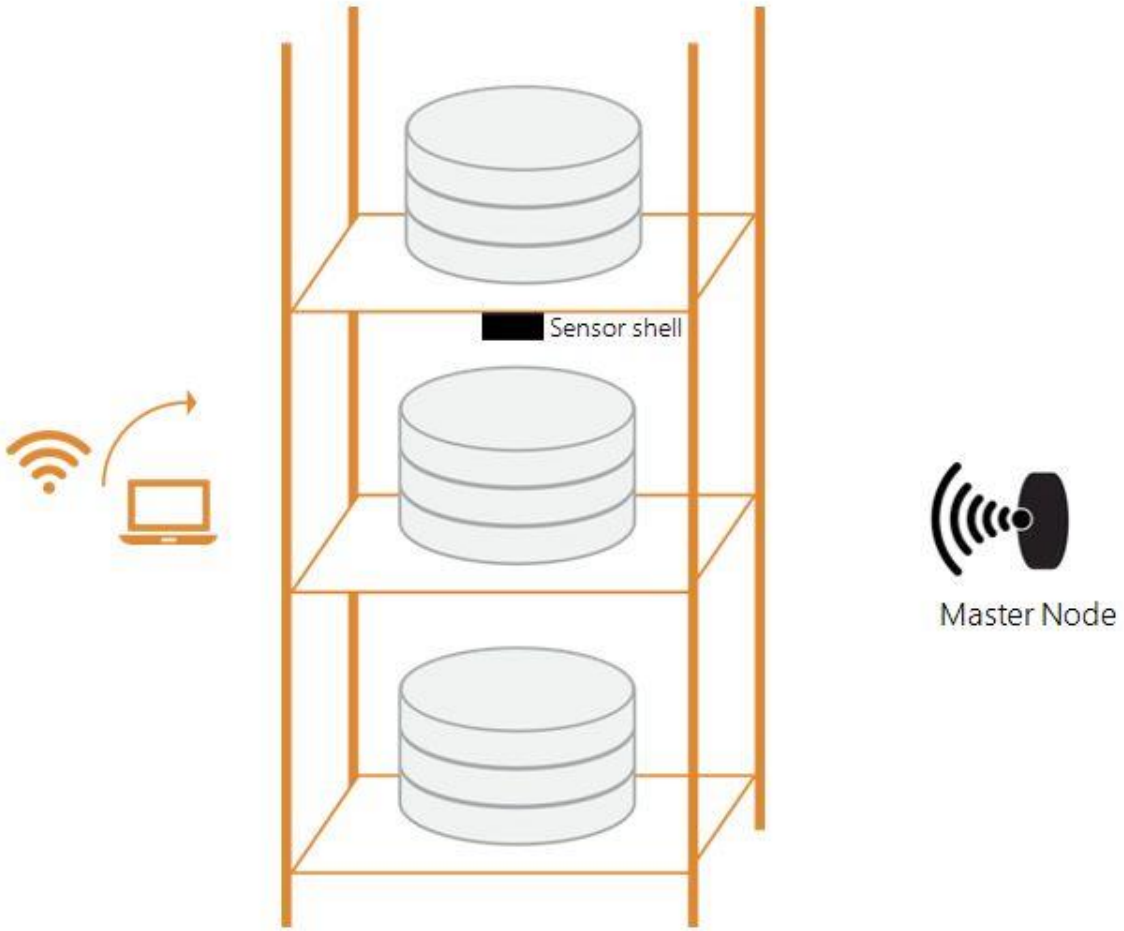
2. SMART BOX

Additional option:
- **Only sensing heads in max (2mm) will be inside.**
- **Advantage; keeping the original size of the 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).

3. SENSORING FOR AMBIANCE CONDITIONS

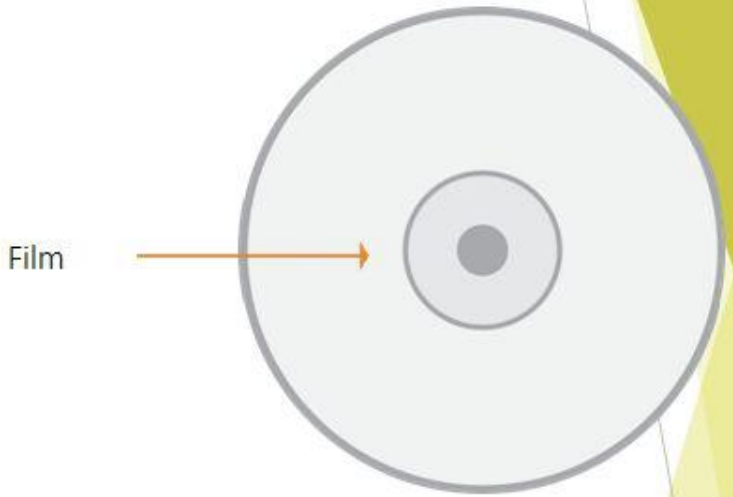


Master Node

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



Caracteristics:
- 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 sensoring functionalities.

Nemosine implementation

- It is not necessary to implement the smart package by changing the containers of complete collections or a whole vault
- The Nemosine system can work from only one package
- In this case, it is not achievable the energy saving, but it is not the only advantage of the Nemosine Smart Packages.

Thanks for your attention

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