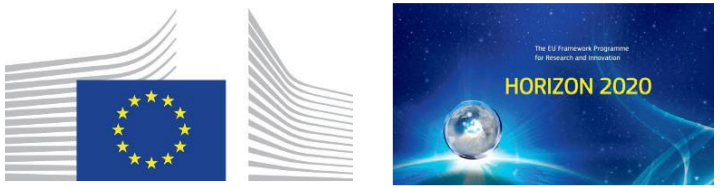


CollectionCare

https://www.collectioncare.eu/

Cecil Krarup Andersen and Daniel Sang-Hoon Lee, The Royal Danish Academy

COLL
ECTION
CARE

Innovation action NUMBER — 814624 — CollectionCare

CollectionCare

Innovative and affordable service for the Preventive Conservation monitoring of individual Cultural Artefacts during display, storage, handling and transport

Aim:

To develop an innovative preventive conservation (PC) **decision support system** targeting the needs of small to medium-sized museums and collections.

- Integrate **IoT monitoring** of the environmental conditions of each cultural artefact individually at any location, whether on display or in **storage, handling or transport**,

- Integrated with **multi-scale modelling** for the different artefact materials while complying with current PC norms and recommendations.

Is this useful for museum objects?

/arkiv/nyheder/2018/11/intelligente-skraldespande-vil-give-mindre-mog-med-affaldet/

DI BUSINESS

Tæt på danske virksomheder - lokalt og globalt

FORSIDE NYHEDER BLOGS LEDER NYT OM NAVNE TILMELD NYHEDSBREV SE FLERE MAGASINET

Dansk Industri / DI Business / Intelligente skraldespande vil give mindre mog med affaldet

Intelligente skraldespande virker ved, at en sensor bliver sat på skraldespandens låg. Sensoren sender signaler til renovationsvirksomheden om, hvor fyldt skraldespanden er.

Foto: Telia

Goal: To minimize degradation and the need for invasive conservation

CollectionCare -18 partners

UNIVERSITIES/RESEARCH INSTITUTIONS
- ❑ UNIVERSITAT POLITECNICA DE VALENCIA (UPV) Spain
- ❑ UNIWERSYTET WARSZAWSKI (UW) Poland
- ❑ UNIVERSITA DEGLI STUDI DI ROMA LA SAPIENZA (URO1) Italy
- ❑ LATVIJAS VALSTS KOKSNES KIMIJAS INSTITUTS (LSIWC) Latvia
- ❑ DET KONGELIGE AKADEMI, Denmark
- ❑ TECHNISCHE UNIVERSITEIT EINDHOVEN (TU/e) Netherlands

COLLECTION MANAGEMENT
- ❑ POSTSCRIPTUM PLIROFORIKI EPIKOINONIAS EPE (PS) Greece

HANDLING & TRANSPORT OF CH
- ❑ VAN KRALINGEN BV (HvK) Netherlands

CONSERVATION AND RESTORATION COMPANY
- ❑ CBC CONSERVAZIONE BENI CULTURALI (CBC) Italy

IoT connectivity
- ❑ SIGFOX WIRELESS SA (SGF) France

BIG DATA
- ❑ ATOS SPAIN SA (ATOS) Spain

MUSEUMS
- ❑ DIPUTACION FORAL DE ALAVA - Servicio de Restauración (DFA) Spain
- ❑ THE ETHNOGRAPHIC OPEN AIR MUSEUM (OAML) Latvia
- ❑ FILMOTECA VALENCIANA (CULTURARTS) Spain
- ❑ KONINKLIJKE MUSEA VOOR KUNST EN GESCHIEDENIS (KMKG) Belgium
- ❑ ISTORIKI ETHNOLOGIKI ETAIREIA ELLADAS (IEEE) Greece
- ❑ THE ROYAL DANISH COLLECTION (RDC) Denmark

Advisory Board

Smithsonian Museum Conservation Institute
The Getty Conservation Institute
Canadian Conservation Institute / Institut canadien de conservation
ICCROM International Centre for the Study of the Preservation and Restoration of Cultural Property
International Council on Monuments and Sites / Conseil International des Monuments et des Sites
HISPANIA NOSTRA Asociación Española para la Defensa del Patrimonio Cultural y Natural
AXA ART

Copenhagen, Denmark,

The Royal Danish Akademy

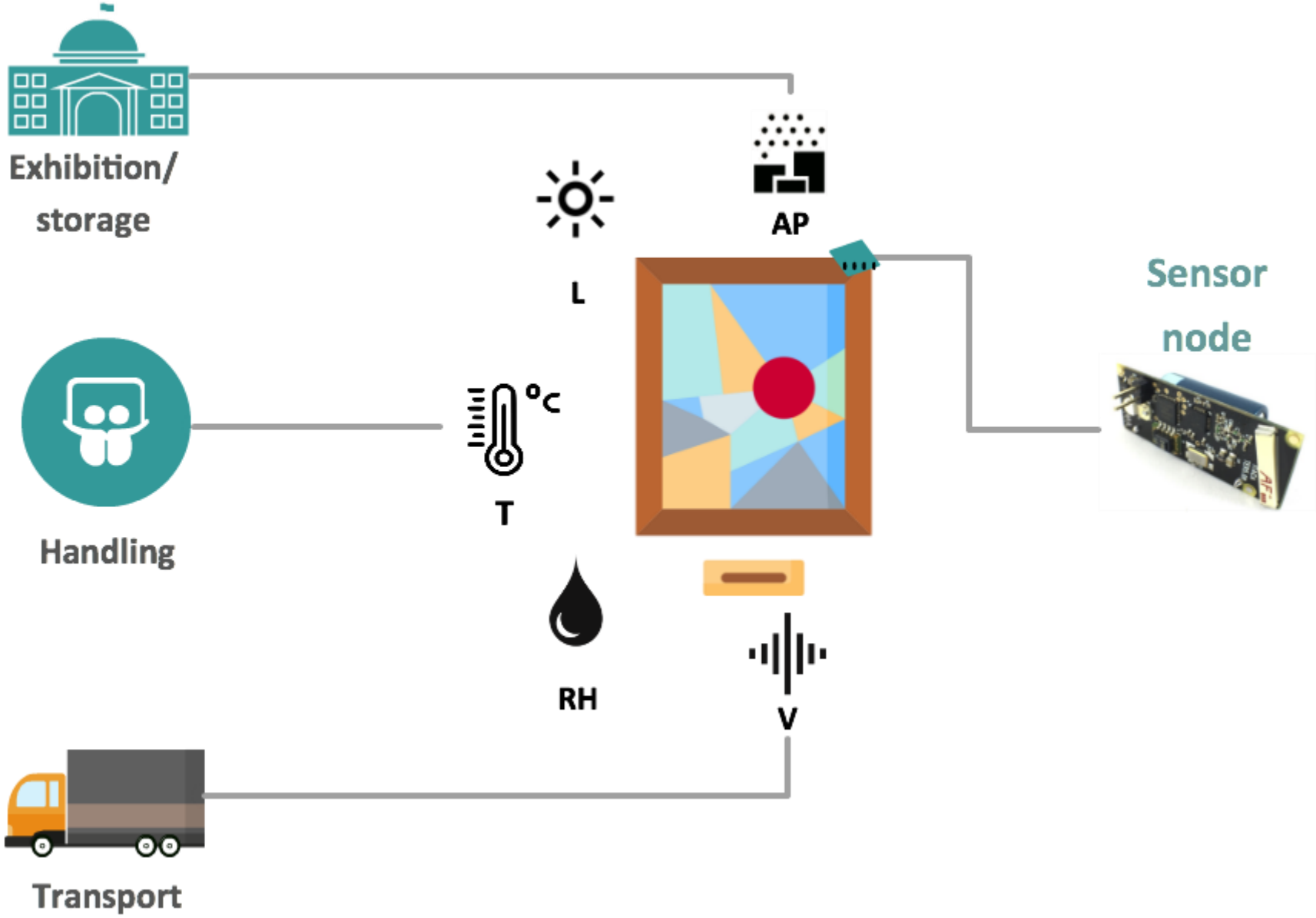
30th - 31st July 2019

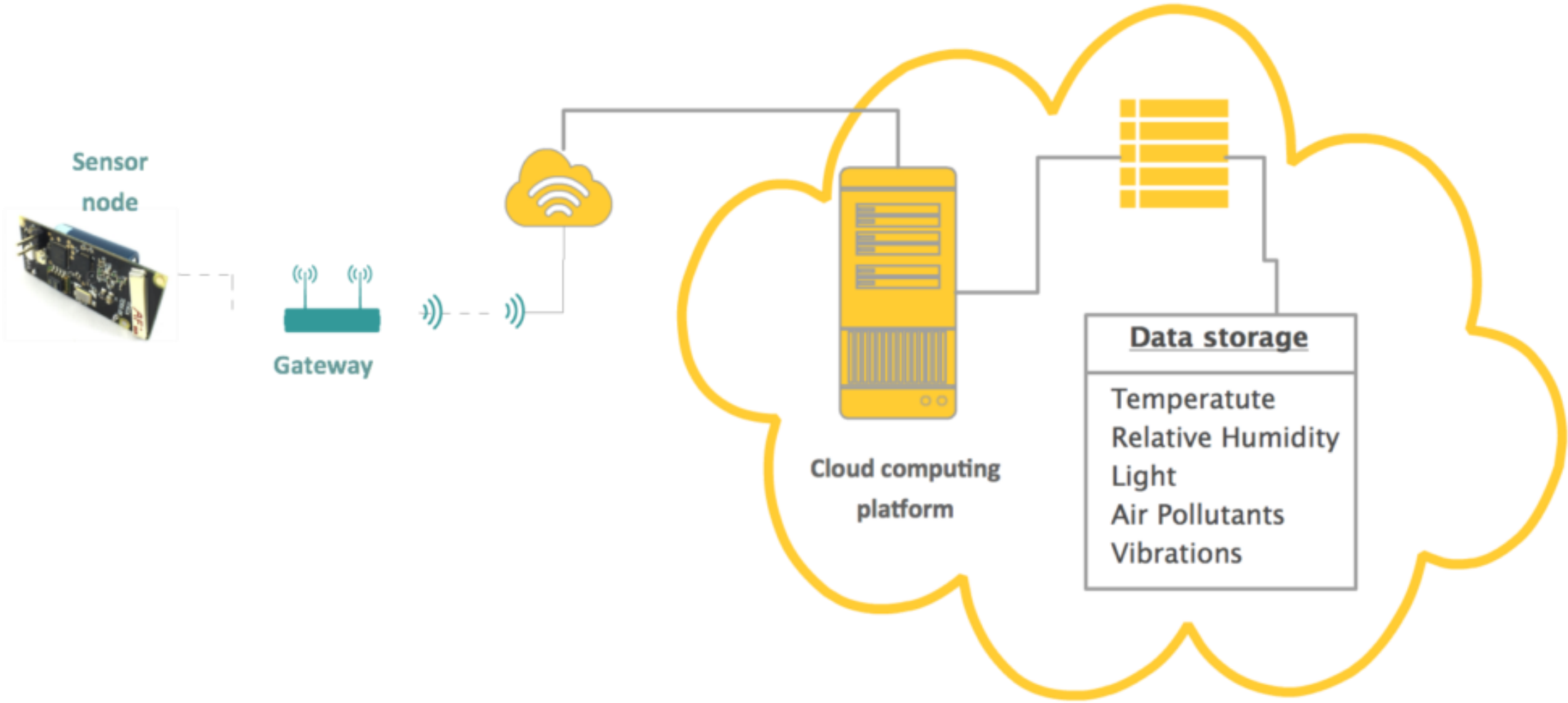
Discussion

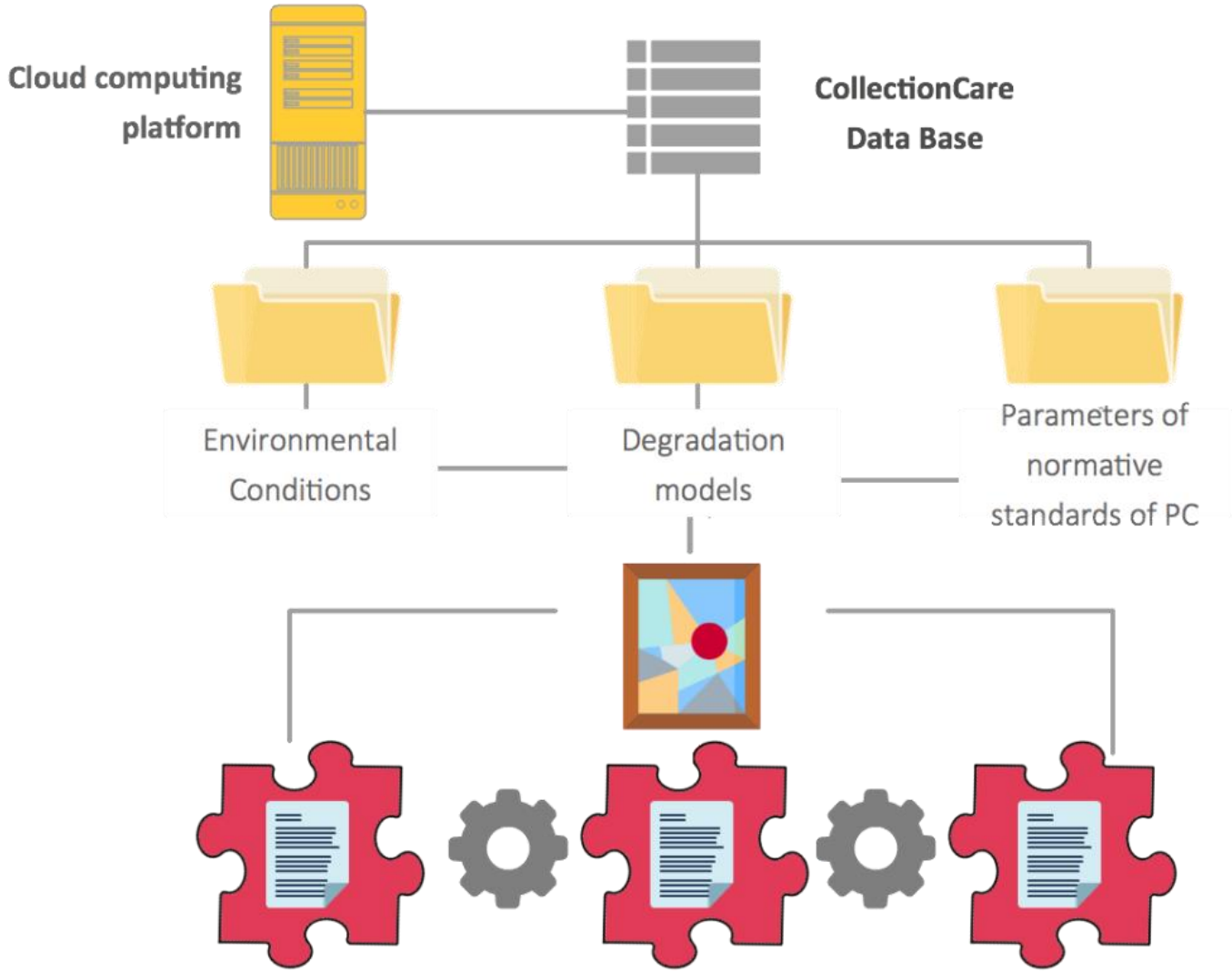
Interaction with end-users:

The system uses damage functions, but it is difficult to translate “damage” to loss of value for the object. We can give a “scientific measure” of damage, but user needs to interpret that. Some damage parameters (e.g. color change) not immediately translate into information on the life-time.

- **What is risk?**
- **What is damage?**
- **What information do collections need from CollectionCare?**


Exhibition/
storage
AP
L
Sensor
node
Handling
°C
T
RH
V
Transport


Sensor node
Gateway
Cloud computing platform
Data storage
Temperatute
Relative Humidity
Light
Air Pollutants
Vibrations



Outputs for each cultural artefact individually

CollectionCare
OUTPUTS

Owners and managers of cultural artefacts

Transport and handling companies of cultural artefacts

Reasearchers and scientists

Historical data and degradation predictions

Live and direct data of climate parameters

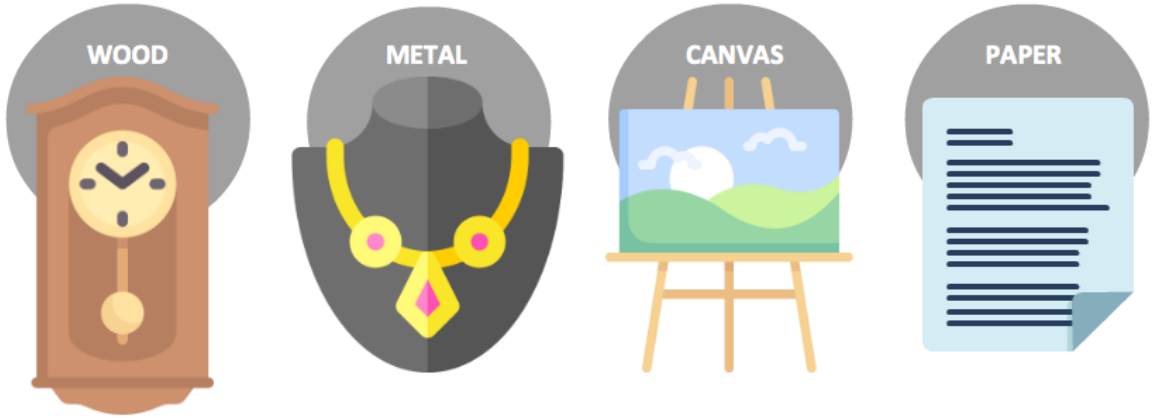
Database with analyse and raw data

Real-time alarms

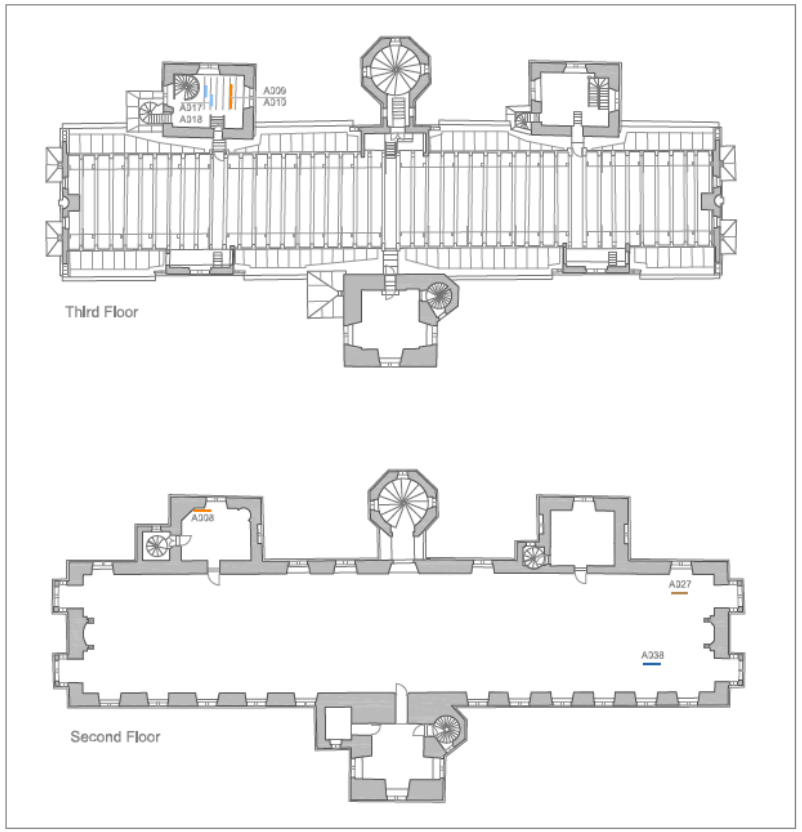
Visualization through Web browser of CollectionCare management software

Censors on or next to objects will monitor:

Focus on these objects:



❖ Selection of artworks.

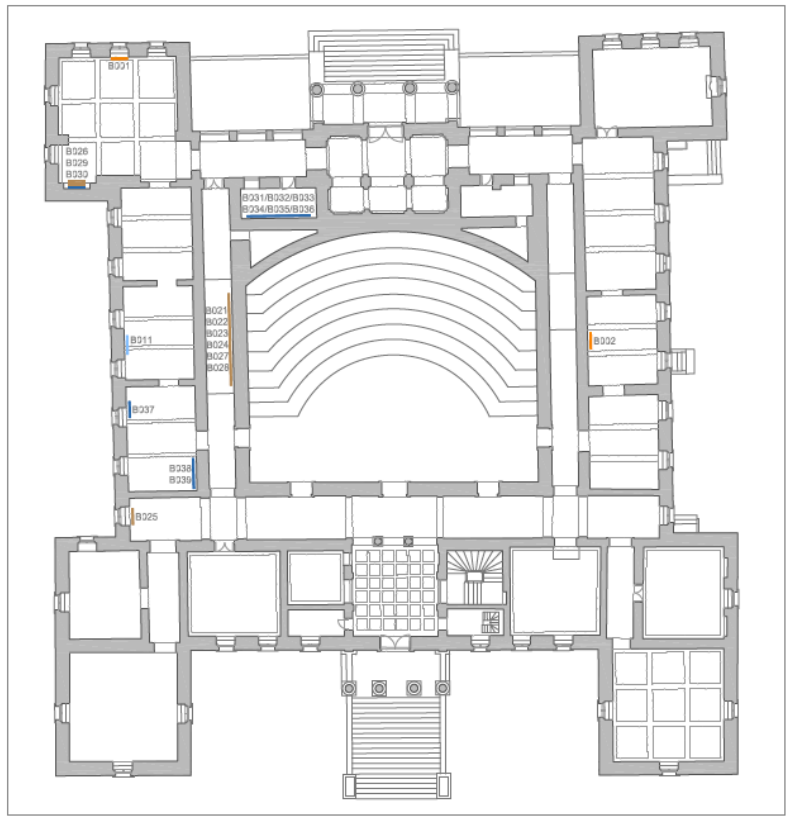


LEGEND
- painting on canvas (CODE X000)
- wooden object (CODE X000)
- metal object (CODE X000)
- paper object (CODE X000)

Kongernes Samling

The Royal Danish Collection
Rosenborg Castle
RDC 1.3

COLL ECTION CARE



LEGEND
- painting on canvas (CODE X000)
- wooden object (CODE X000)
- metal object (CODE X000)
- paper object (CODE X000)

NATIONAL HISTORICAL MUSEUM

Historical and Ethnological Society of Greece
IEEE 1.2
Ground Floor

COLL ECTION CARE

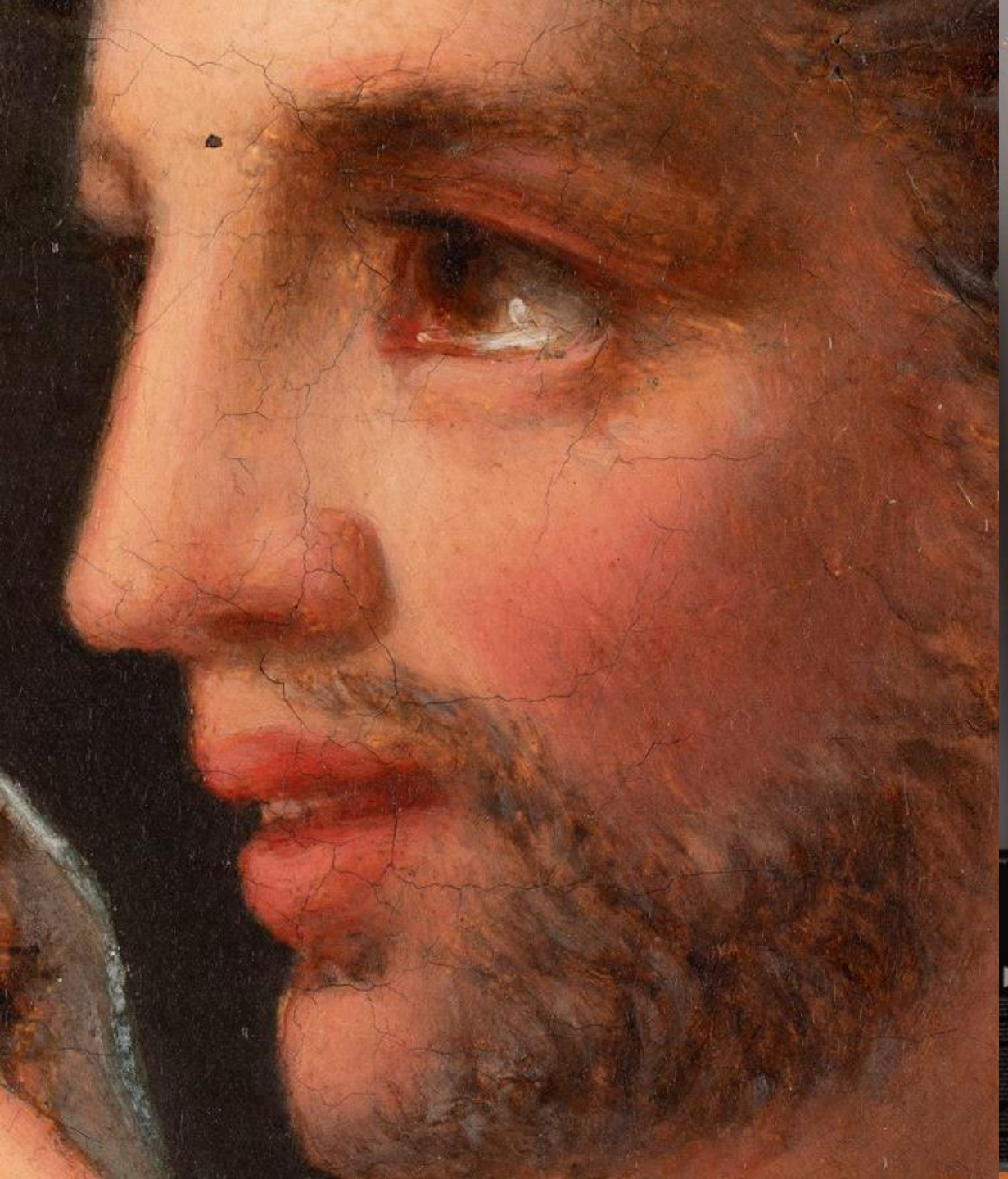
Test sensor installed
Alava Museum of Art

Modelling

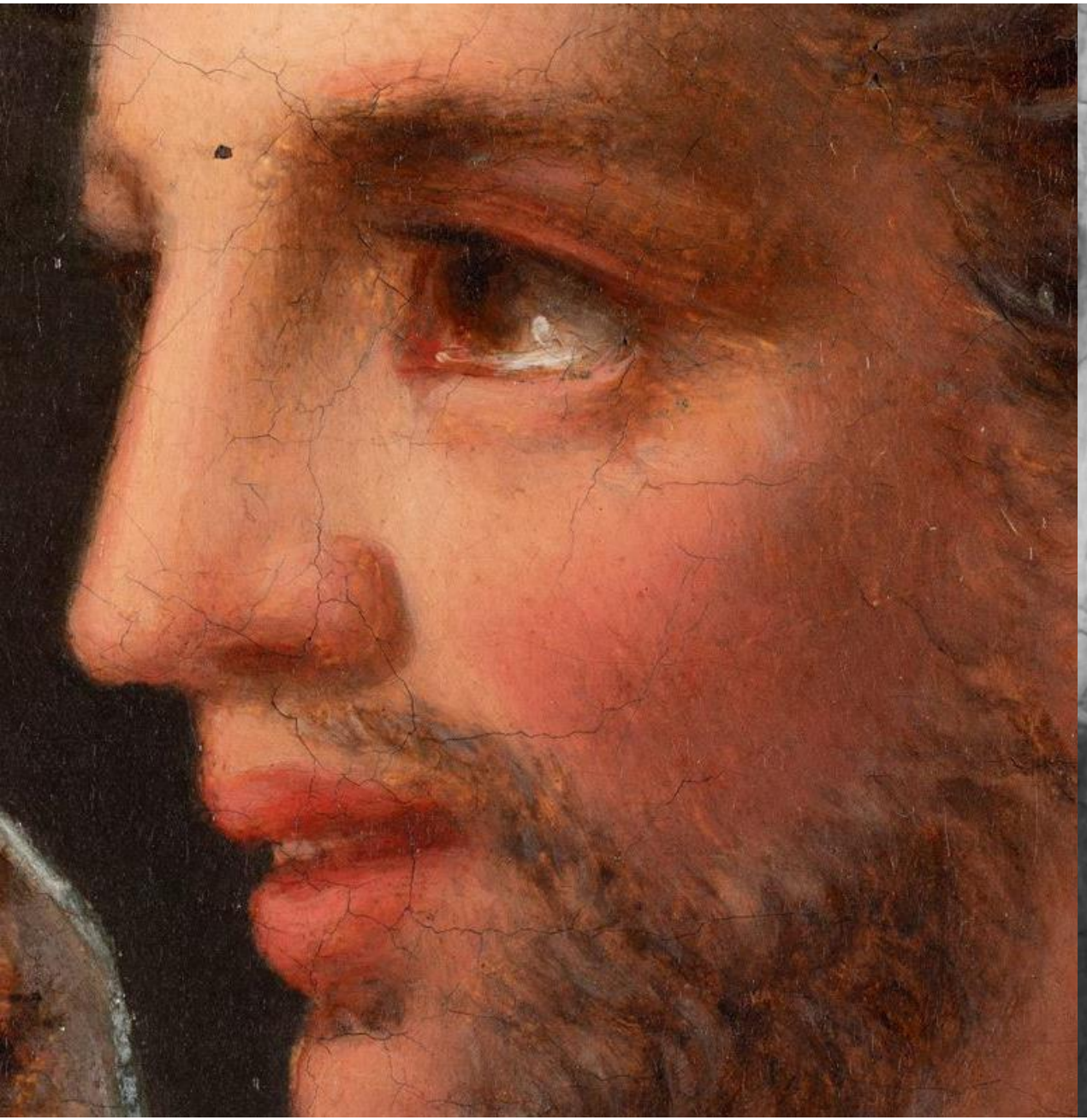
Prediction of the extent of degradation by means of predictive models.

- *Identification and tailoring of material-based degradation models for…*

Canvas Paintings (KADK, UPV, JHI, TU/e)
Wooden objects (LSIWC)
Paper objects (TU/e)
Metal objects (UW)



Kunstakademiet: Küchler, Tobias hjemkomst, 1825

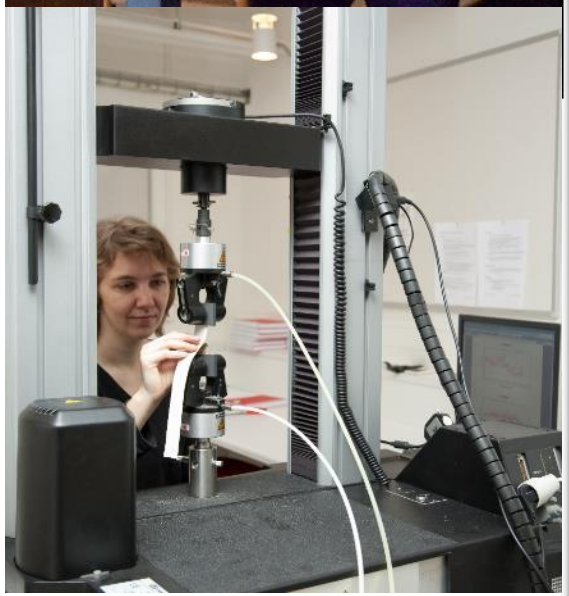


Kunstakademiet: Küchler, Tobias hjemkomst, 1825

Approach

1. Identify the problem (e.g. cracks in paint layers)
2. Formulate hypothesis for the phenomenon
3. Find ways of testing / falcifying hypotheses
4. Lab-tests/modelling/monitoring to test hypoteses
5. Deduce equations/algorithems, to integrate in the system


CW-5200



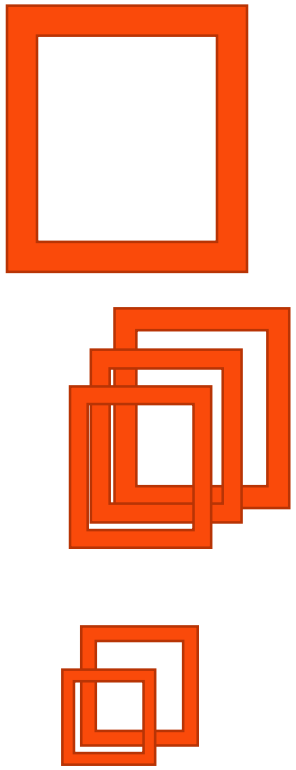
Modelling

CANVAS PAINTINGS (KADK, UPV, JHI, TU/e)

Cross-section of Stretcher

Photography by Mikkel

Stretcher Scale



Large

Case 1 – 2000mm x 2500 mm

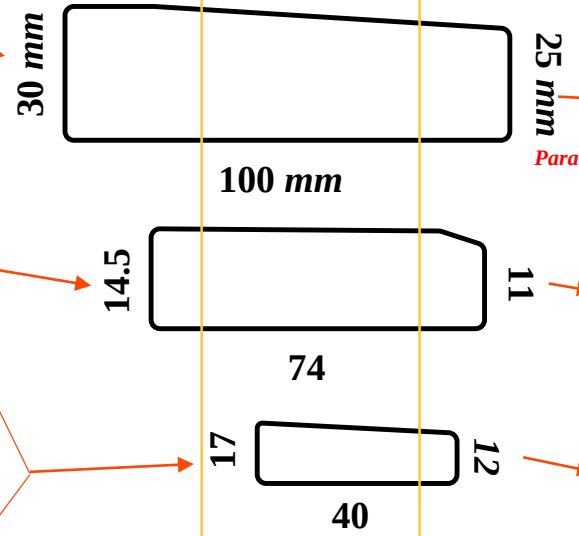
Medium

Case 1 – 1500 mm x 2000 mm
(59′ x 79′)
Case 2 – 635 mm x 762 mm
(25′ x 30′) Artical model
Case 3 – 500 mm x 670 mm
(20′ x 26.5′)

Small

Case 1 – 450 mm x 600 mm
(18′ x 24′)
Case 2 – 300 mm x 400 mm
(12′ x 16′)

Real section

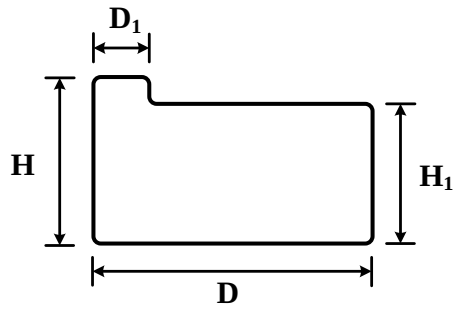


Model section
(Uniform Cross-section)

100 x 30 (10 x 25)
D x H (D_1 x H_1)
Parameters H = 30, 40
D = 100
D_1 = 10, 5

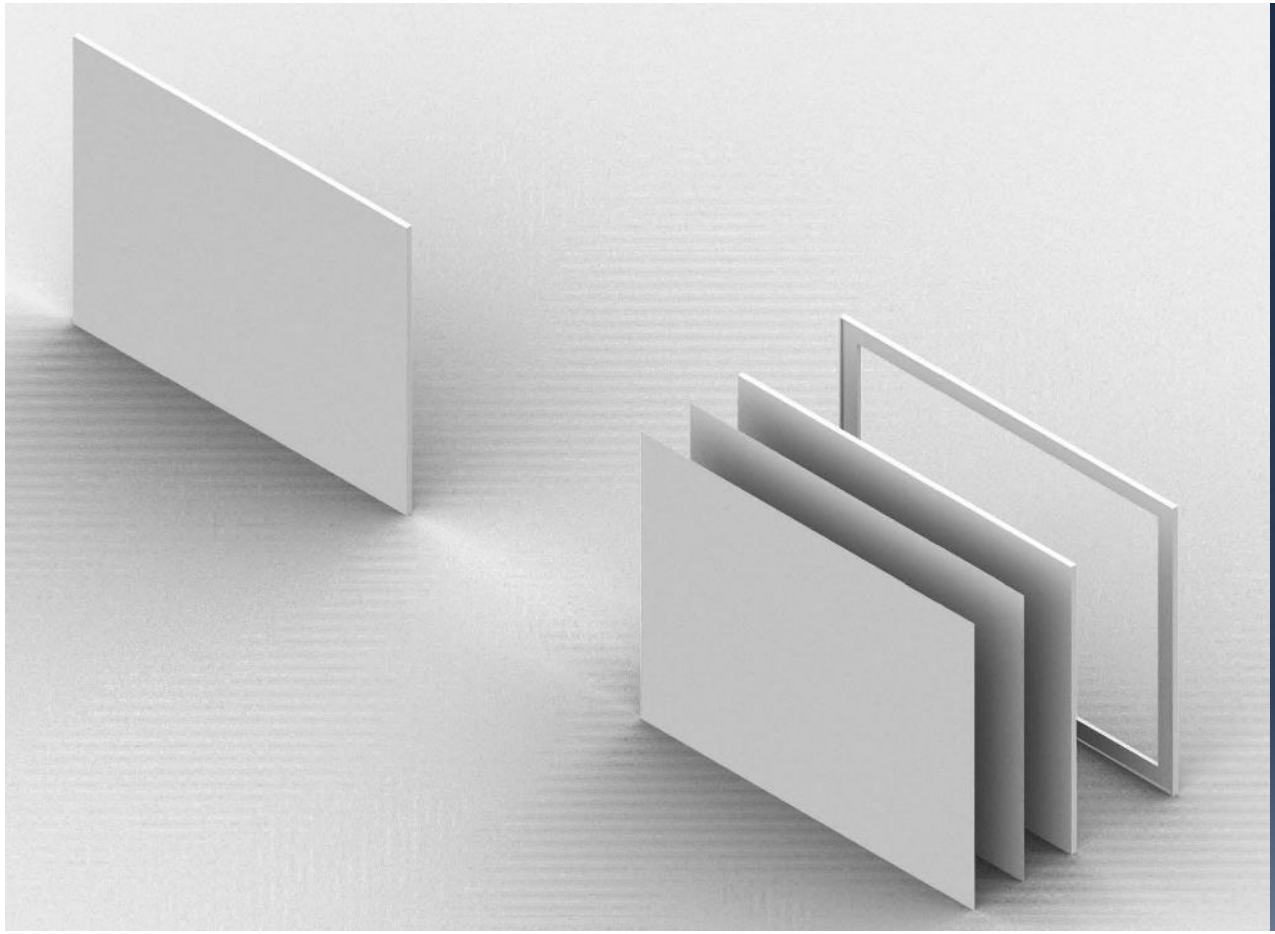
75 x 15 (5 x 12)
Parameters H = 15, 18, 20
D = 75
D_1 = 5, 2

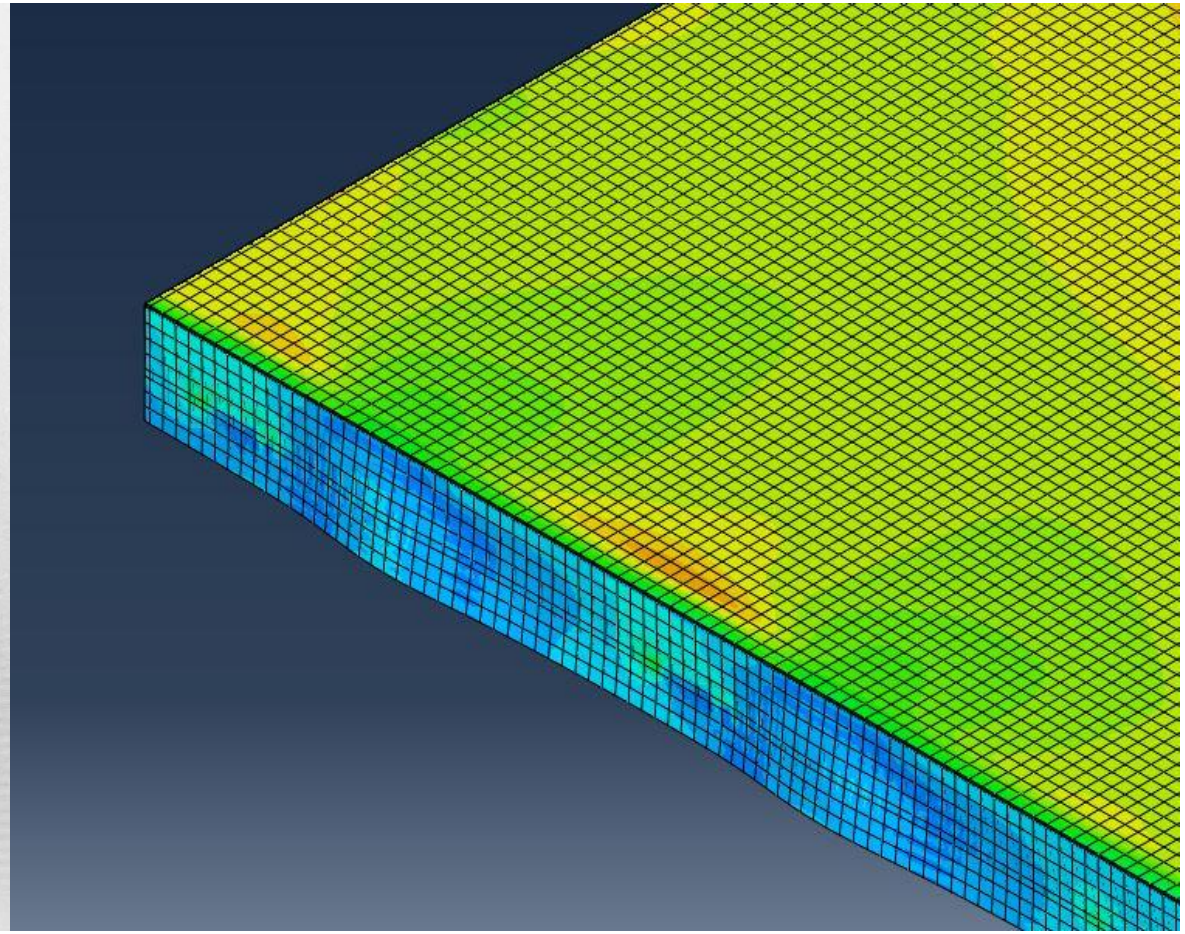
40 x 15 (5 x 12)
Parameters H = 15, 18, 20
D = 40, 45
D_1 = 5, 2



Modelling

CANVAS PAINTINGS (KADK, UPV, JHI, TU/e)

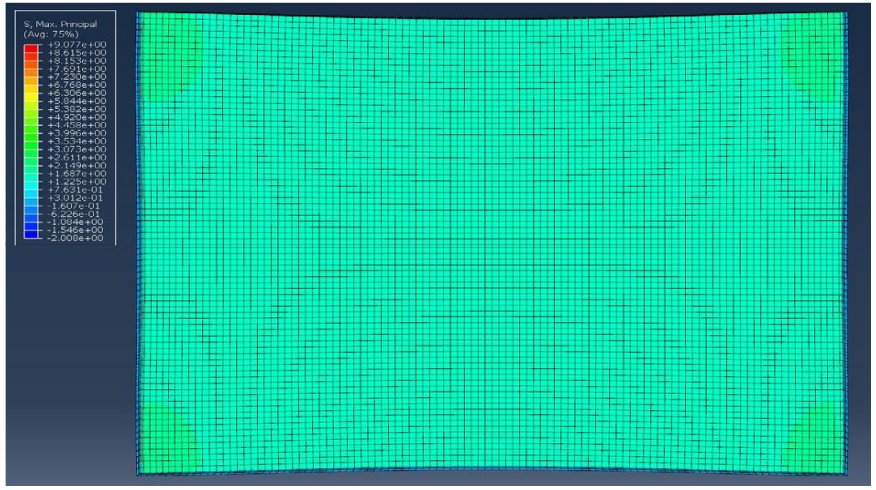


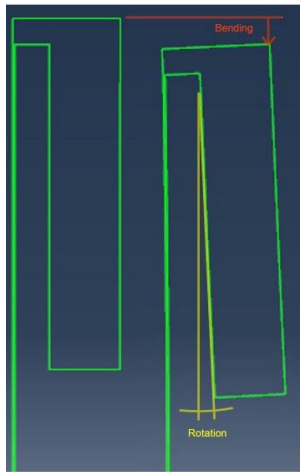


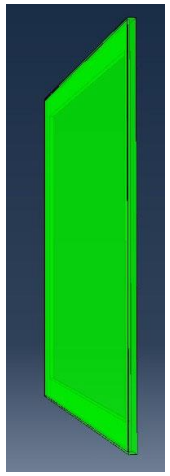
Modelling

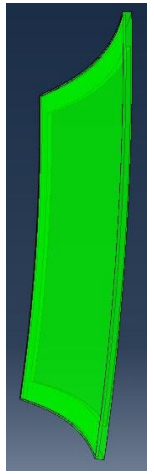
CANVAS PAINTINGS (KADK, UPV, JHI, TU/e)

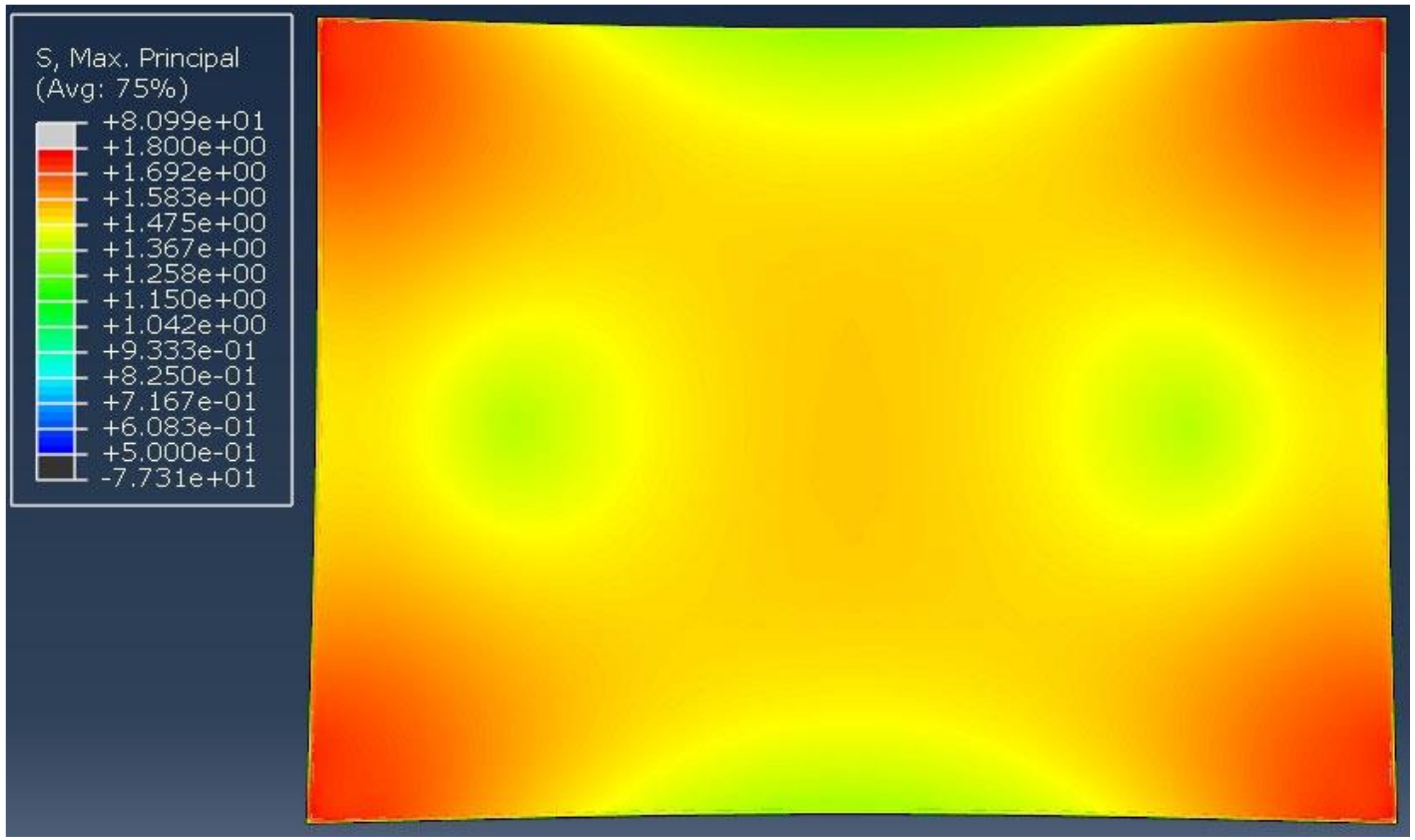
Influence of stretcher

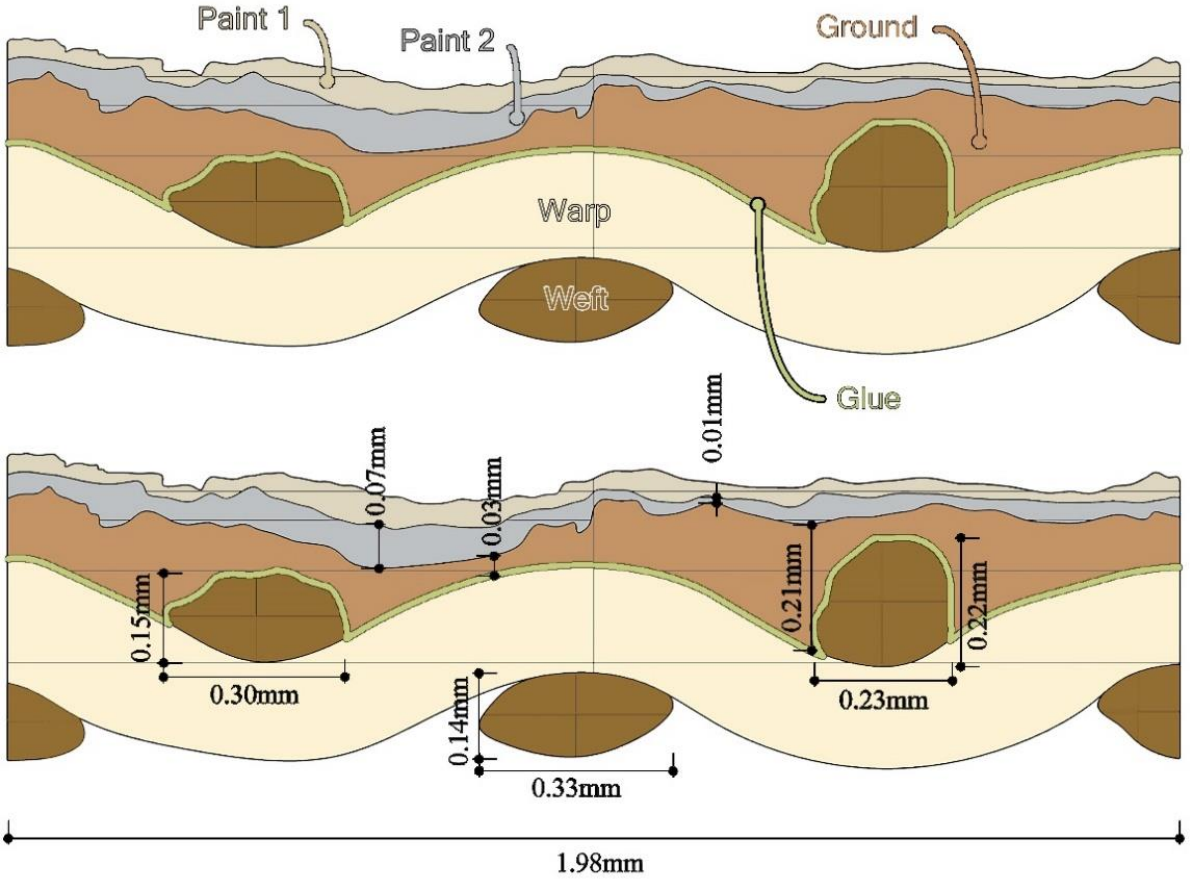


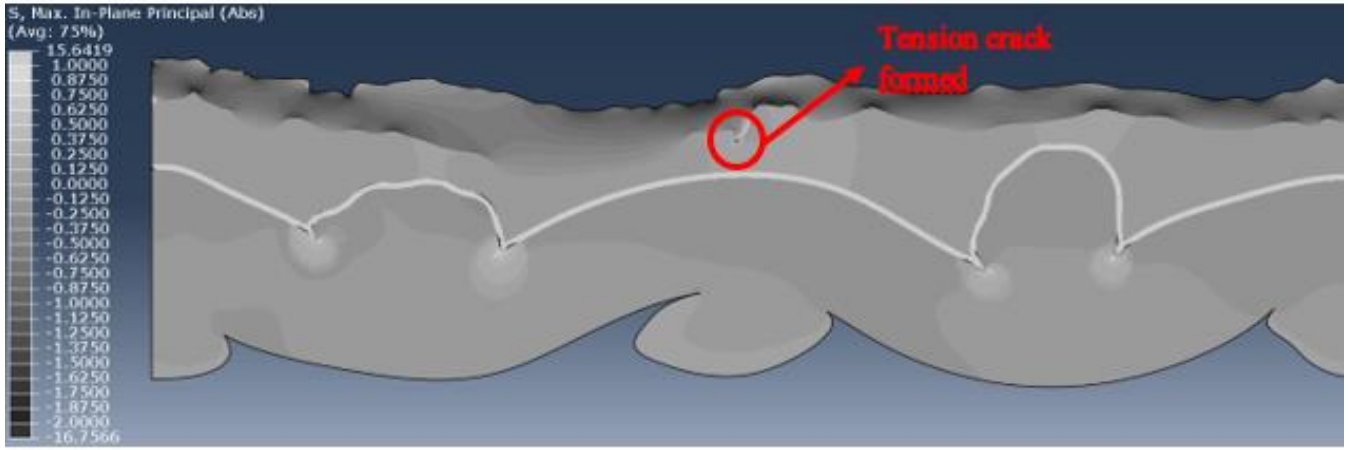


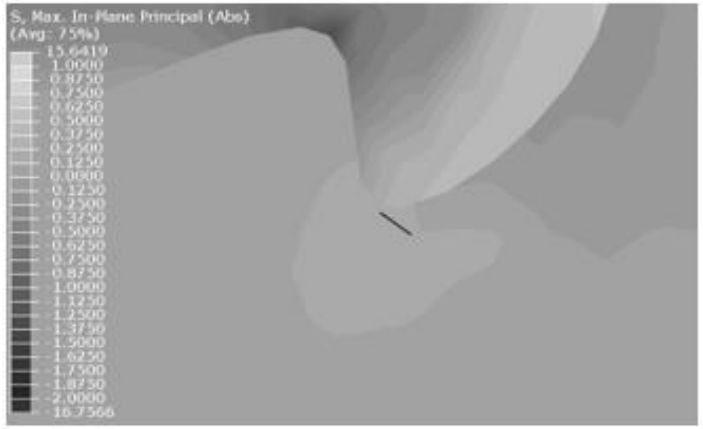







Paint 1
Paint 2
Ground
Warp
Weft
Glue
0.01mm
0.07mm
0.03mm
0.15mm
0.30mm
0.21mm
0.22mm
0.23mm
0.14mm
0.33mm
1.98mm


S, Max. In-Plane Principal (Abs)
(Avg: 75%)
15.6419
1.0000
0.8750
0.7500
0.6250
0.5000
0.3750
0.2500
0.1250
0.0000
-0.1250
-0.2500
-0.3750
-0.5000
-0.6250
-0.7500
-0.8750
-1.0000
-1.1250
-1.2500
-1.3750
-1.5000
-1.6250
-1.7500
-1.8750
-2.0000
-16.7566
Tension crack
formed


S, Max. In-Plane Principal (Abs)
(Avg: 75%)
15.6419
1.0000
0.8750
0.7500
0.6250
0.5000
0.3750
0.2500
0.1250
0.0000
-0.1250
-0.2500
-0.3750
-0.5000
-0.6250
-0.7500
-0.8750
-1.0000
-1.1250
-1.2500
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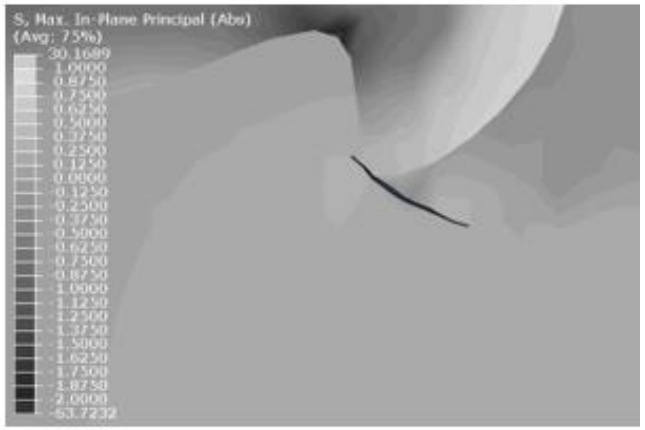
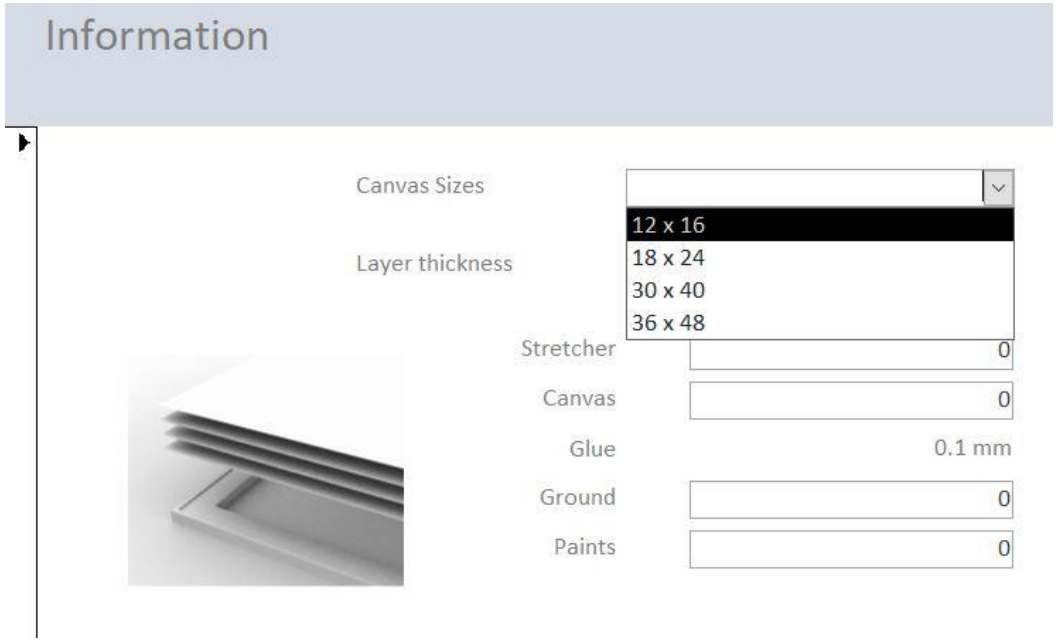
-1.7500
-1.8750
-2.0000
-16.7566


S, Max. In-Plane Principal (Abs)
(Avg: 75%)
30.1689
1.0000
0.8750
0.7500
0.6250
0.5000
0.3750
0.2500
0.1250
0.0000
-0.1250
-0.2500
-0.3750
-0.5000
-0.6250
-0.7500
-0.8750
-1.0000
-1.1250
-1.2500
-1.3750
-1.5000
-1.6250
-1.7500
-1.8750
-2.0000
-63.7232

Back-bone Equations and Graphical User Interface

input

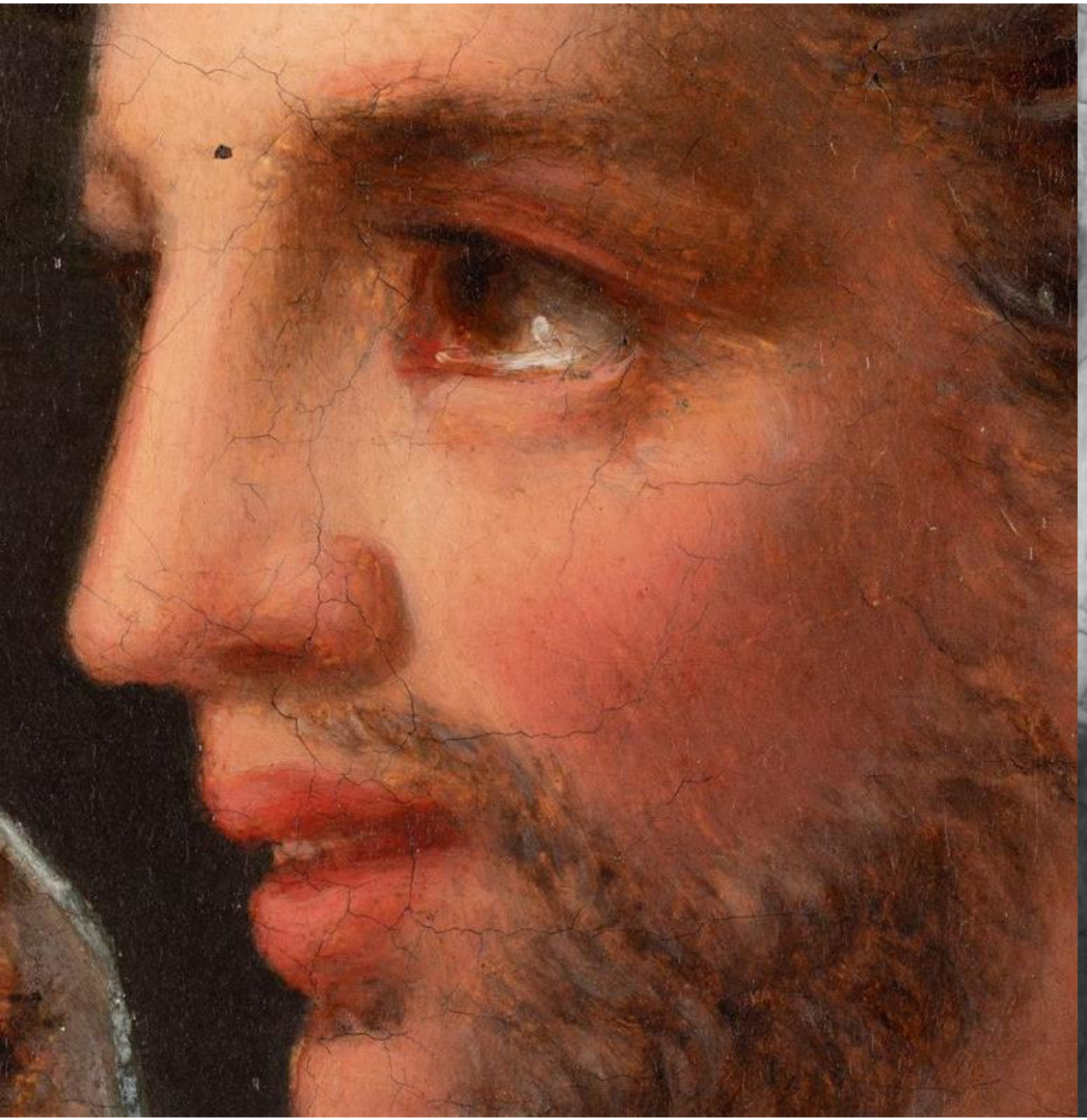


Source code

```
module constants
implicit none

   real, parameter,private :: pi = 3.1415926536
   real, parameter, private :: e = 2.7182818285

contains
   subroutine show_consts()
      print*, "Pi = ", pi
      print*, "e = ", e
   end subroutine show_consts

   function ePowerx(x)result(ePx)
   implicit none
      real::x
      real::ePx
      ePx = e ** x
   end function ePowerx

   function areaCircle(r)result(a)
   implicit none
      real::r
      real::a
      a = pi * r**2
   end function areaCircle

end module constants


program module_example
use constants
implicit none
```

Output

*Note: At different stages of development, the current knowledge is continuouly checked against the standards including CEN (european standards).



Questions


SIGILLUM REGIÆ ACADEMIÆ PICTOR: SCULPTOR: ARCHITECTORUMQVE