standards in a changing climate

Jonathan Ashley-Smith

Allowable microclimatic variations for polychrome wood
Oslo 18-19 February 2010

Creating and reviewing standards
Worrying about climate change

UK research cluster EGOR
EC research project “Climate for Culture”

Copenhagen
March 1st 2010

International Symposium on the future of Museum Climate seen in the context of Global Climate Change

How can we create exhibitions and expose our common cultural heritage in a sustainable way which is also acceptable for future generations? How can museums be run in a more CO2 neutral way while simultaneously guaranteeing an adequate indoor climate? These, and other crucial questions and issues, will be discussed and scrutinized during this one day symposium.

CO2 neutral museum

The National Gallery of Denmark will present an inspiring case-history of how regulating their seasonal indoor climate resulted in considerable energy savings as well as minimising their CO2 footprint – with the aim of becoming totally neutral within the near future.

INTERNATIONAL CONFERENCES
Restoration and Building Physics
presented by wta-conferences.org

WTA-International has the honor to announce

WTA-2010 Colloquium

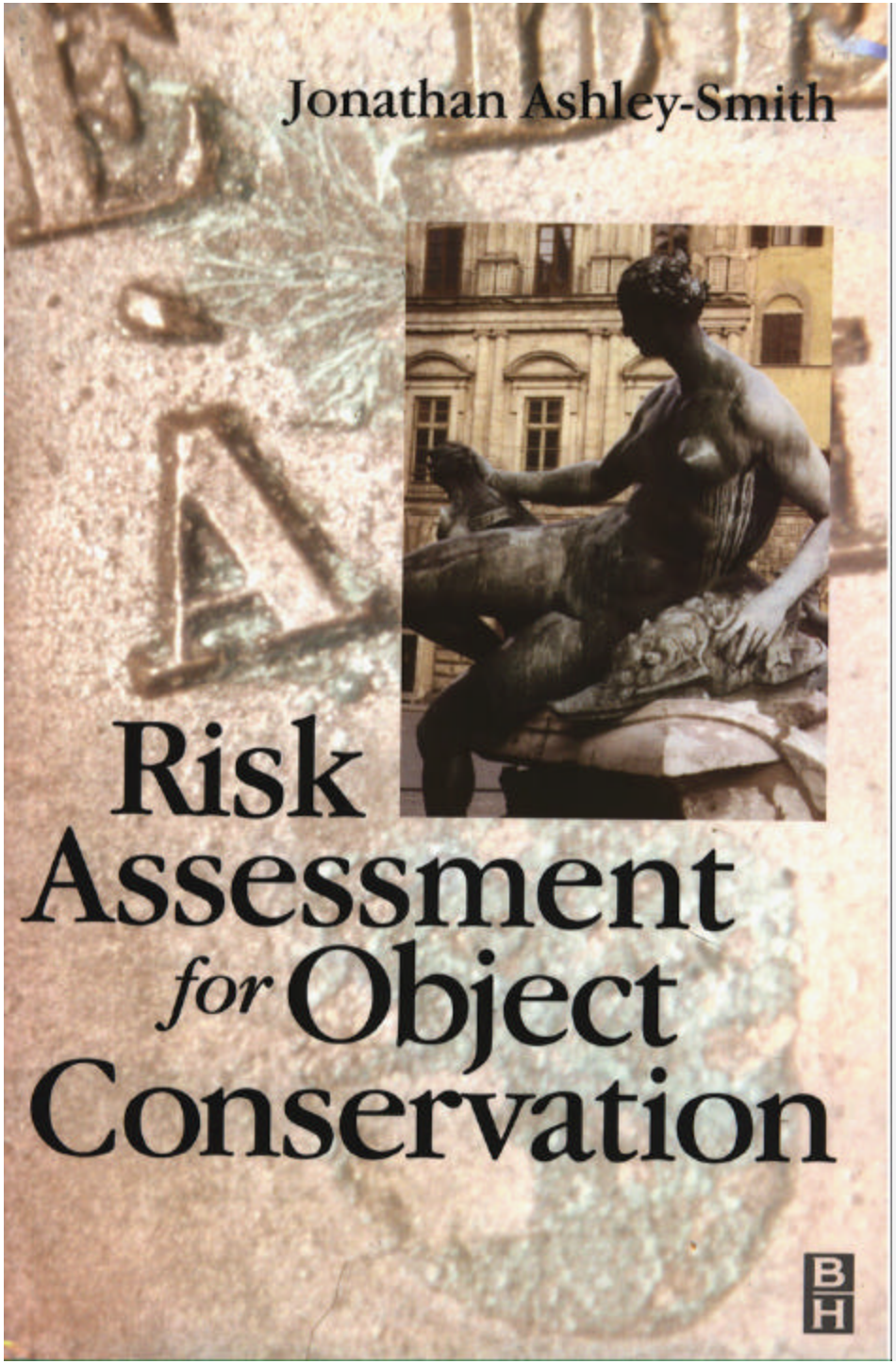
Effect of Climate Change on Built Heritage.

March 11-12,2010

Technical University Eindhoven

1. climatic change and built heritage – generalapproach
2. impact of climate change on materials and buildingconstructions
3. impact of climate change on the indoor environment
4. modelling of climate change effects


CEN 346 2004 onwards
Museum microclimates 2007



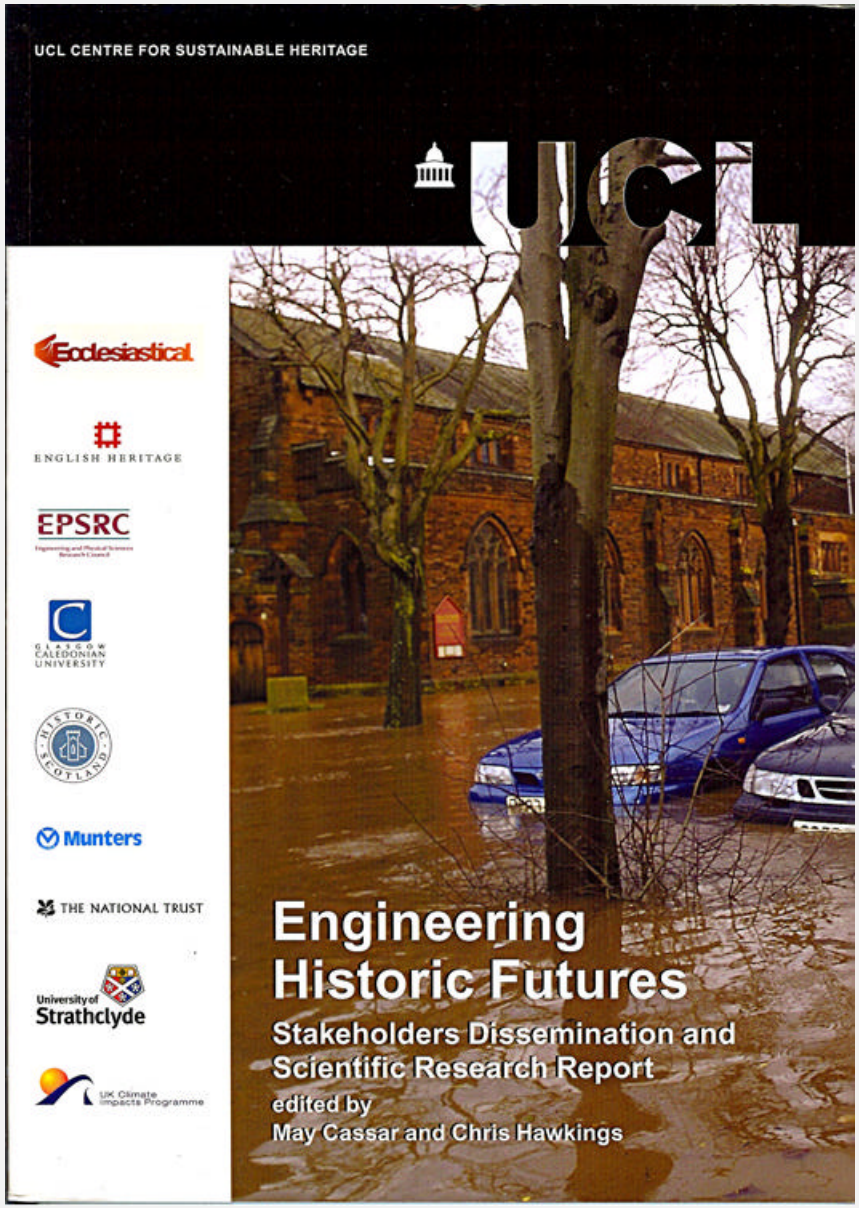
It appears that civilization is responsible for altering the atmosphere in ways that may eventually cause damage in more catastrophic fashion.

Global warming caused by the release of greenhouse gases may affect weather patterns and sea-level in ways that could have a devastating impact

1999


UCL CENTRE FOR SUSTAINABLE HERITAGE
UCL
Climate Change and the Historic Environment

2005


UCL CENTRE FOR SUSTAINABLE HERITAGE
UCL
Ecclesiastical
ENGLISH HERITAGE
EPSRC
GLASGOW CALEDONIAN UNIVERSITY
HISTORIC SCOTLAND
Munters
THE NATIONAL TRUST
University of Strathclyde
UK Climate Impacts Programme
Engineering Historic Futures
Stakeholders Dissemination and Scientific Research Report
edited by
May Cassar and Chris Hawkings

2007

The Getty

Experts' Roundtable on Sustainable Climate Management Strategies

April 2007

A STUDENT JOURNAL OF ART, CULTURE AND POLITICS
fNEWSMAGAZINE
SAIC School of the Art Institute of Chicago

Arts & Culture

October 30th, 2009

Bizot

Birds of a feather

International Group of Organizers of Large Scale Exhibitions

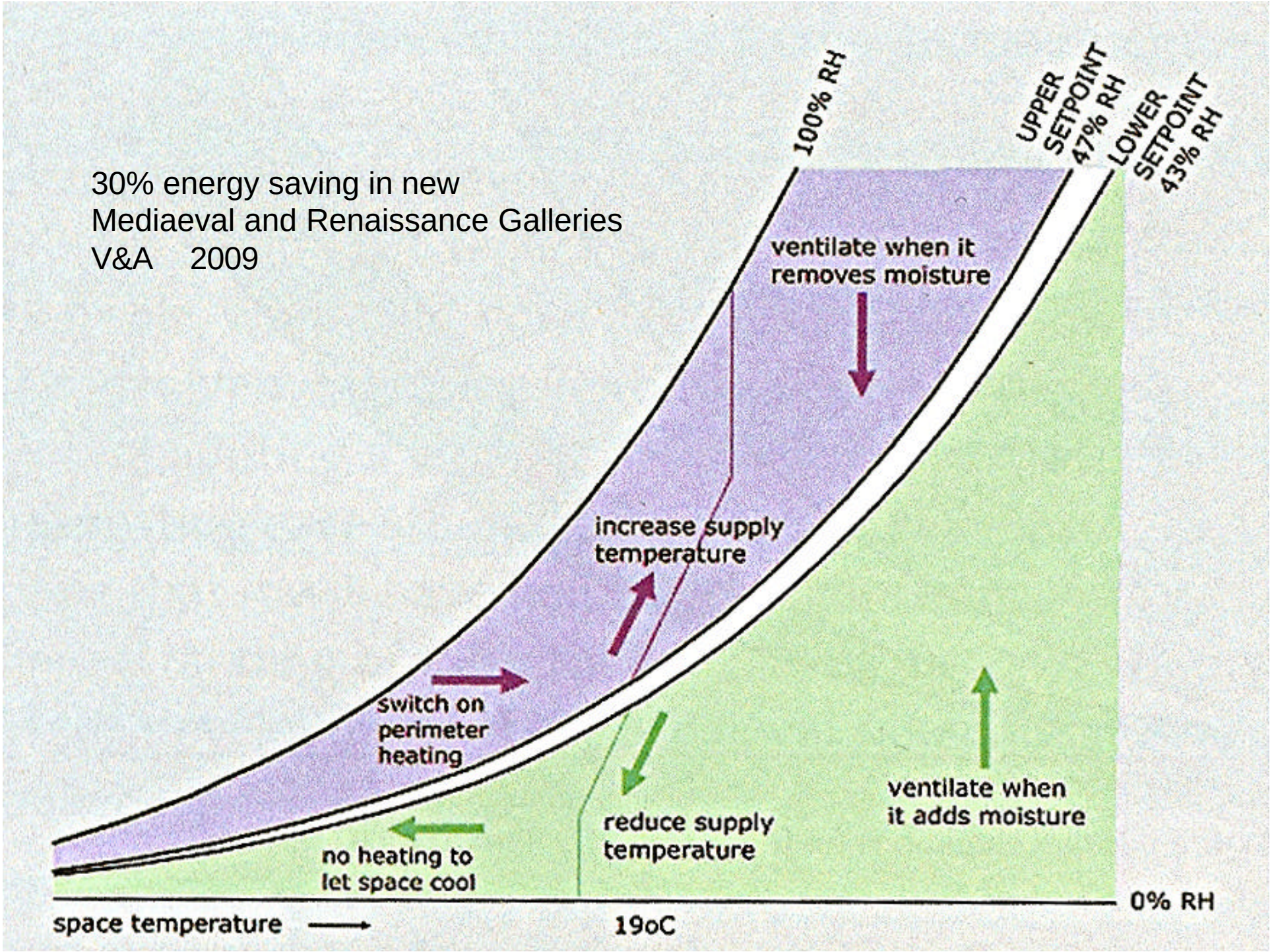
nmdc national museum directors' conference

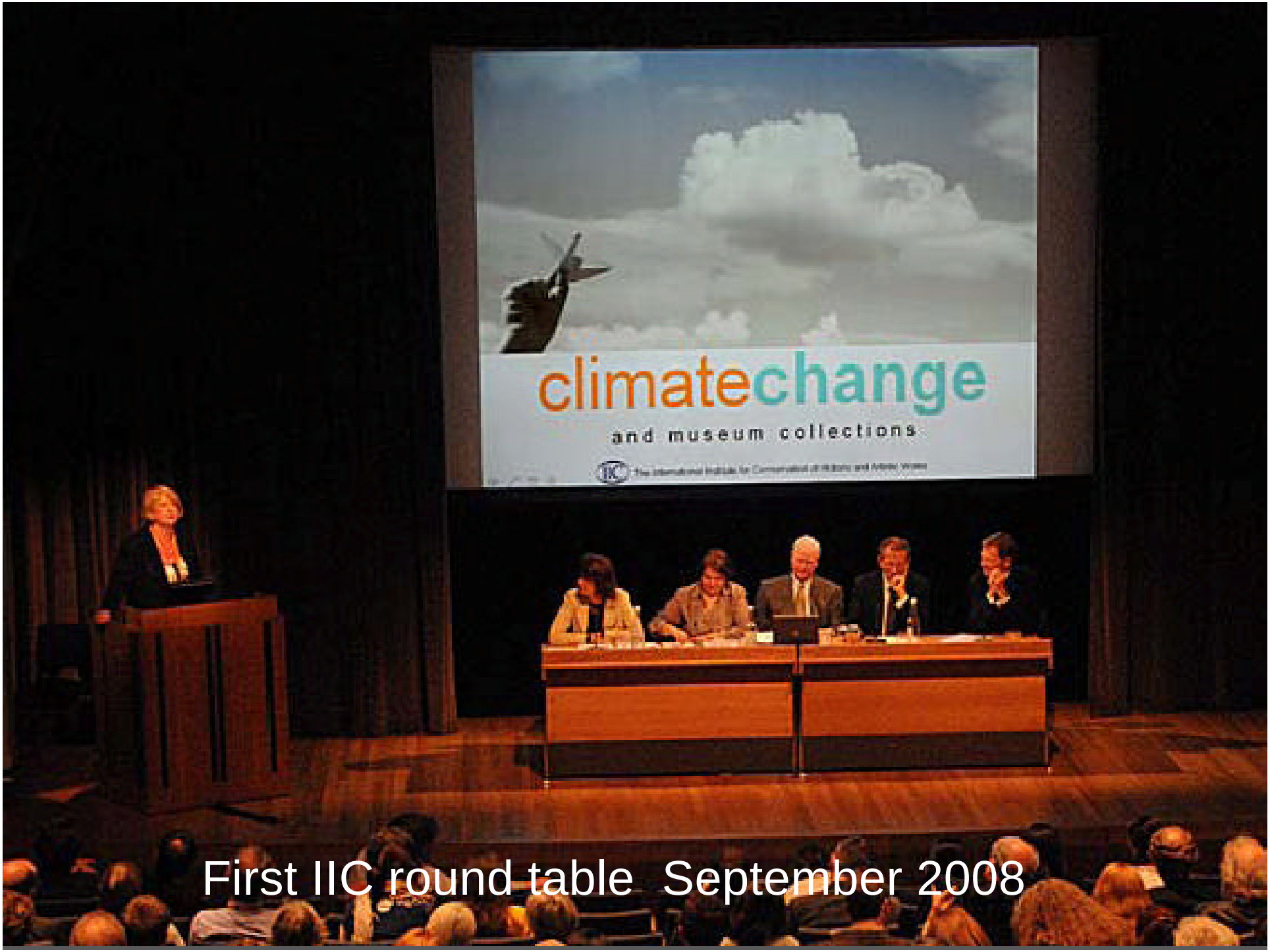
Reviewing environmental conditions

NMDC guiding principles for reducing museums' carbon footprint

Following discussions at the Bizot Group (which comprises directors of the world's leading museums and galleries) meetings in May and October 2008, Sir Nicholas Serota, Tate, and Mark Jones, V&A, convened a group of UK conservators and other stakeholders to review museums' environmental conditions in an era of energy constraint, in response to feedback at the Bizot Group meetings.

30% energy saving in new
Mediaeval and Renaissance Galleries
V&A 2009





First IIC round table September 2008

AIC

AMERICAN INSTITUTE FOR CONSERVATION OF HISTORIC AND ARTISTIC WORKS

ANNUAL MEETING

CONSERVATION CONTINUUM

examining the past & envisioning the future

3rd IIC Round Table

The Plus/Minus Dilemma:

The Way Forward in Environmental Guidelines

Given the looming energy crisis, the global economic downturn, and a rising awareness of green technology that equates to good stewardship of our natural resources, an insistence on environmental control has become increasingly important.

Budgets are tight, and museums often depend upon loan exhibitions to keep their audience support. Internationally, the standards do not maintain cohesive strength under scrutiny and are weakened by daily compromises.

Science and Heritage Programme

Research clusters

EGOR

Environmental Guidelines Opportunities and Risks

UK Heritage Science research cluster 2009

EGOR outcomes

Priorities for Research

1. Science of material tolerances
2. Modelling the built environment
3. Energy use
4. Biodeterioration
5. New Technologies
6. Values and human adaptation

A British Standards Institute Publicly Available Specification on environments for collections

Review of BS5454

Building simulation and energy monitoring at TNA

PAS 197:2009

Code of practice for cultural collections management

Status : **Current** Published : **January 2009**

A Publicly Available Specification (PAS) is a sponsored fast-track standard driven by the needs of the client organisations and developed according to guidelines set out by BSI. Key stakeholders are brought together to collaboratively produce a BSI-endorsed PAS that has all the functionality of a British Standard for the purposes of creating management systems, product benchmarks and codes of practice. After two years the PAS is reviewed and a decision is made as to whether it should be taken forward to become a formal British Standard.

Climate for Culture

EU PROJECT 2009 - 2014

"Damage risk assessment, economic impact and mitigation strategies for sustainable preservation of cultural heritage in the times of climate change"

Grant agreement No. 22 6973

Main questions

- What will be the effects of climate change on cultural heritage in Europe and Mediterranean?
- What mitigation strategies are necessary to prevent damage to movable and immovable cultural heritage?
- What will it cost us, if we do not react in time?

GLOBAL CLIMATE CHANGE IMPACT ON BUILT HERITAGE AND CULTURAL LANDSCAPES

CNR – ISAC (Italy)

UCL (UK)

UEA (UK)

KIMAB (Sweden)

ICSC (Poland)

ITAM (Czech Rep.)

CSIC (Spain)

NILU (Norway)

EIG (UK)

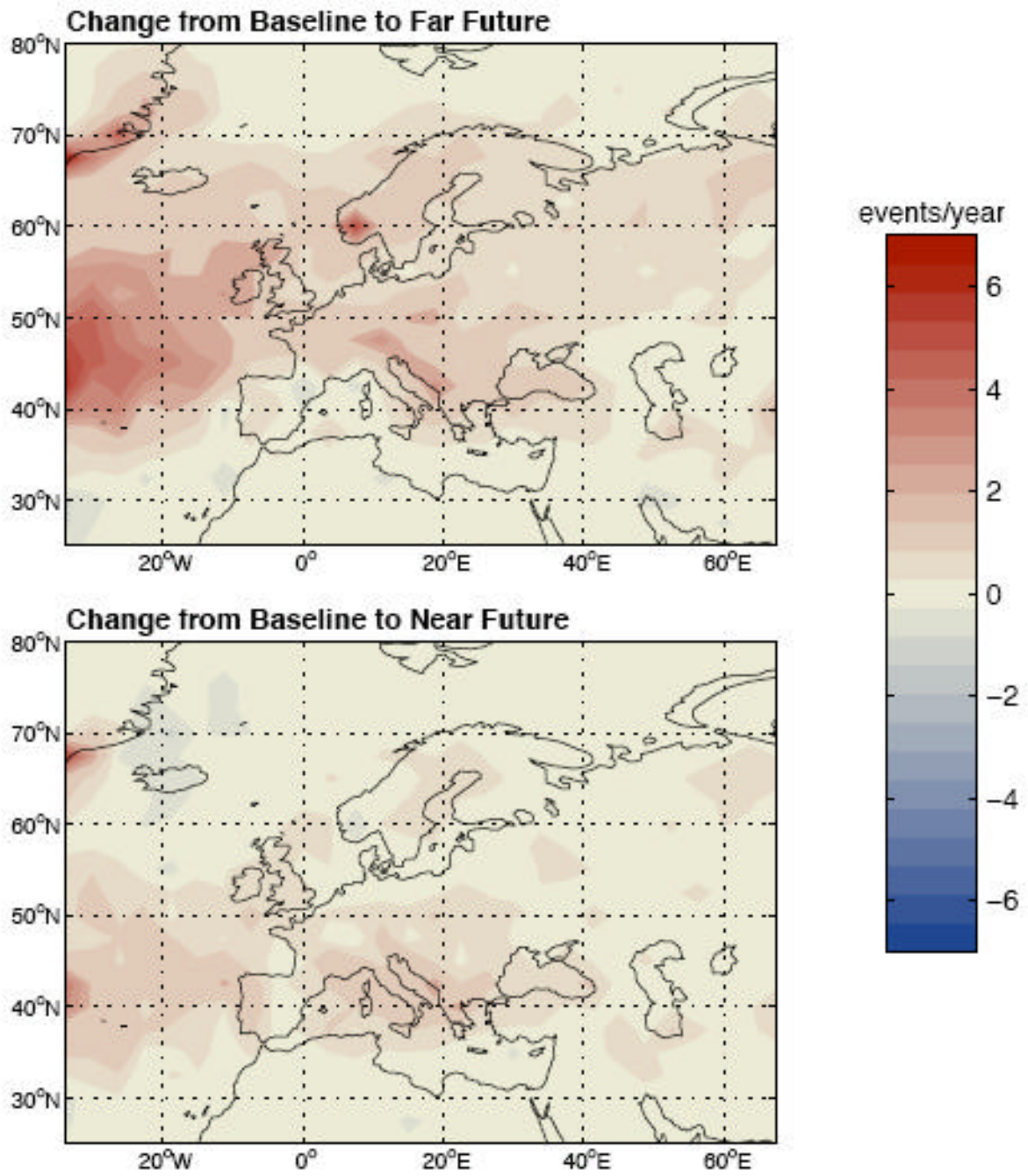
BMA (Spain)

http://noahsark.isac.cnr.it

Project duration: 1 June 2004 – 31 May 2007


NOAH'S ARK TEAM
Institute of Atmospheric Sciences and Climate, CNR, Bologna, Italy
Centre for Sustainable Heritage, University College of London,UK
School of Environmental Sciences, University of East Anglia, Norwich, UK
Corrosion and Metal Research Institute (Sweden)
Institute of Catalysis and Surface Chemistry, Polish Academy of Sciences, Poland
Institute of Theoretical and Applied Mechanics, Czech Academy of Sciences,Czech Republic
Istituto de Recursos Naturales y Agrobiologia, CSIC, Sevilla, Spain
Norwegian Institute for Air Research, Norway
Ecclesiastical Insurance Group, UK
Biologia Medio Ambiente Ltd., Barcelona, Spain

>20mm rain days



Climate for Culture

- High resolution climate modelling on regional scale
- Development of hygrothermal building simulation software
- Establishment of new damage functions
- Economic impact report
- Mitigation, adaptation and preservation strategies
- Contribution to IPCC and Sustainable Development Strategy
- Political dissemination board
- Training activities

Climate for Culture

- **Large scale integrated project**
  overall budget 6,55 Mio €, EC contribution: 5 Mio €

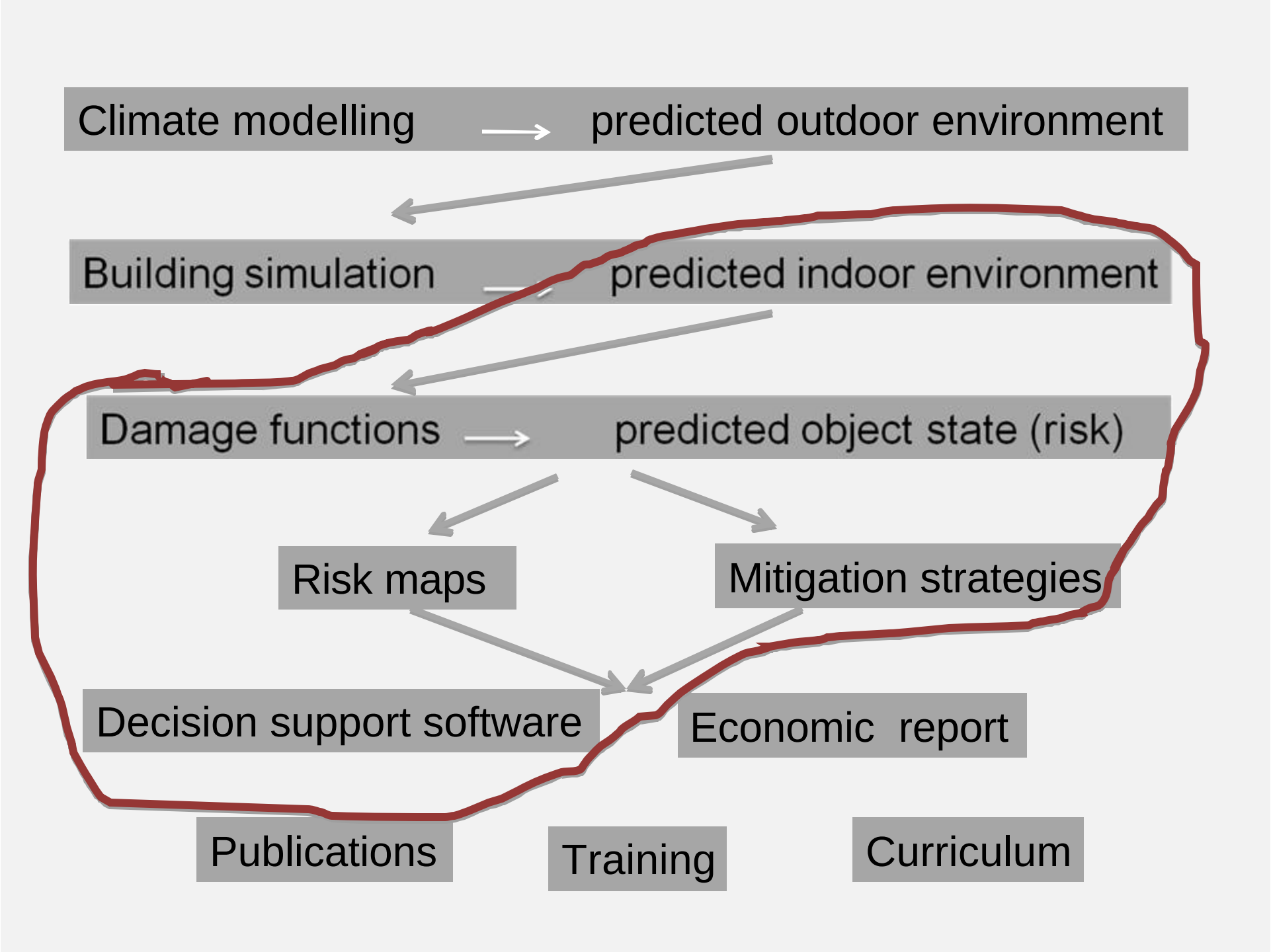
- **Duration**
  November 2009 - October 2014

- **27 Partners from Europe and the Mediterranean**
  (Austria, Croatia, Czech Republic, France, Germany, Greece, Italy, Netherlands, Poland, Slovenia, Spain, Sweden, United Kingdom; Egypt)

- **Subcontractors**
  (Romania, Israel, Morocco)


Roch Payet
Susana Mourato
Marie-Christine Papillon
Martin Krus
Claudio Cocheo
Ágnes Bálint, M.A
Hind Mostafa
Paul Baker
Tina Naumović
Christian Nippert
Katy Lithgow
Prof. Dr. Daniela Jacob
Klaus Häfner
Tina Naumović
Oto Sládek
Melanie Eibl
Jan Holmberg
Jonathan Ashley-Smith
Monika Fjaestad
Prof. Dr. Andreas Burmest
Magdalena Rozanska
Tor Brostrom

ready! fire! aim!


Climate modelling
predicted outdoor environment
Building simulation
predicted indoor environment
Damage functions
predicted object state (risk)
Risk maps
Mitigation strategies
Decision support software
Economic report
Publications
Training
Curriculum

Canadian Conservation Institute
Institut canadien de conservation

instituut collectie nederland

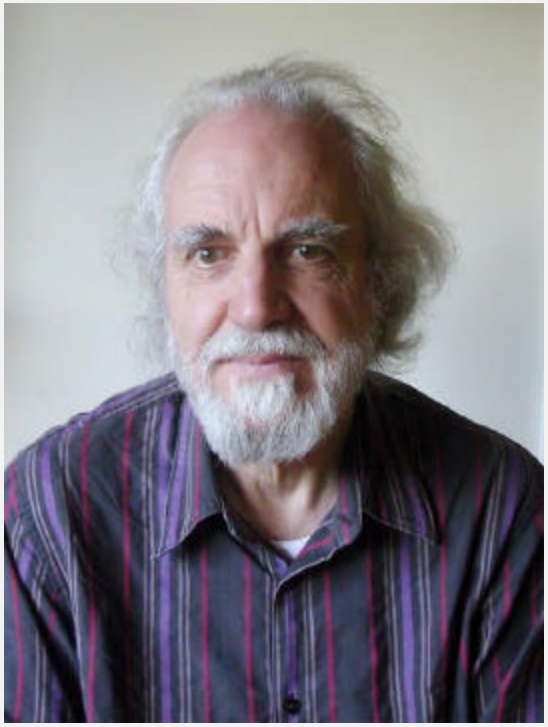
Onderzoeksinstituut Cultuurwetenschap

Canadian Museum of Nature
Musée canadien de la Nature

Rome March 2007

ICCROM

Climate for Culture



Jonathan Ashley-Smith

SME UK

Independent collections risk consultant
teacher and researcher

WPL for WP4 (Damage Assessment)
member of Core Group, WP2 core group
WP5, WP6, WP8

Author of
Risk Assessment for Object Conservation

former Head of Conservation
V&A Museum, London

Chartered Chemist
Accredited Conservator

Climate for Culture

Main tasks of CFC work package 4

- Find relevant damage functions (probabilistic cause-effect relationships)
- Determine tolerable ranges
- Develop and validate sensors and measurement techniques

Climate for Culture

Find relevant damage functions (cause-effect relationships) by:

- looking at the literature and talking to researchers
- measuring changes *in situ* at historic sites
- looking at the present state of objects
- laboratory tests on token objects
- defining ‘relevance’ and ‘damage’

Determine tolerable ranges by:

- looking at the literature and talking to researchers
- measuring changes *in situ* in historic sites
- looking at the present state of objects
- laboratory tests on token objects
- defining ‘tolerable’ and ‘acceptable’ and of course ‘allowable’

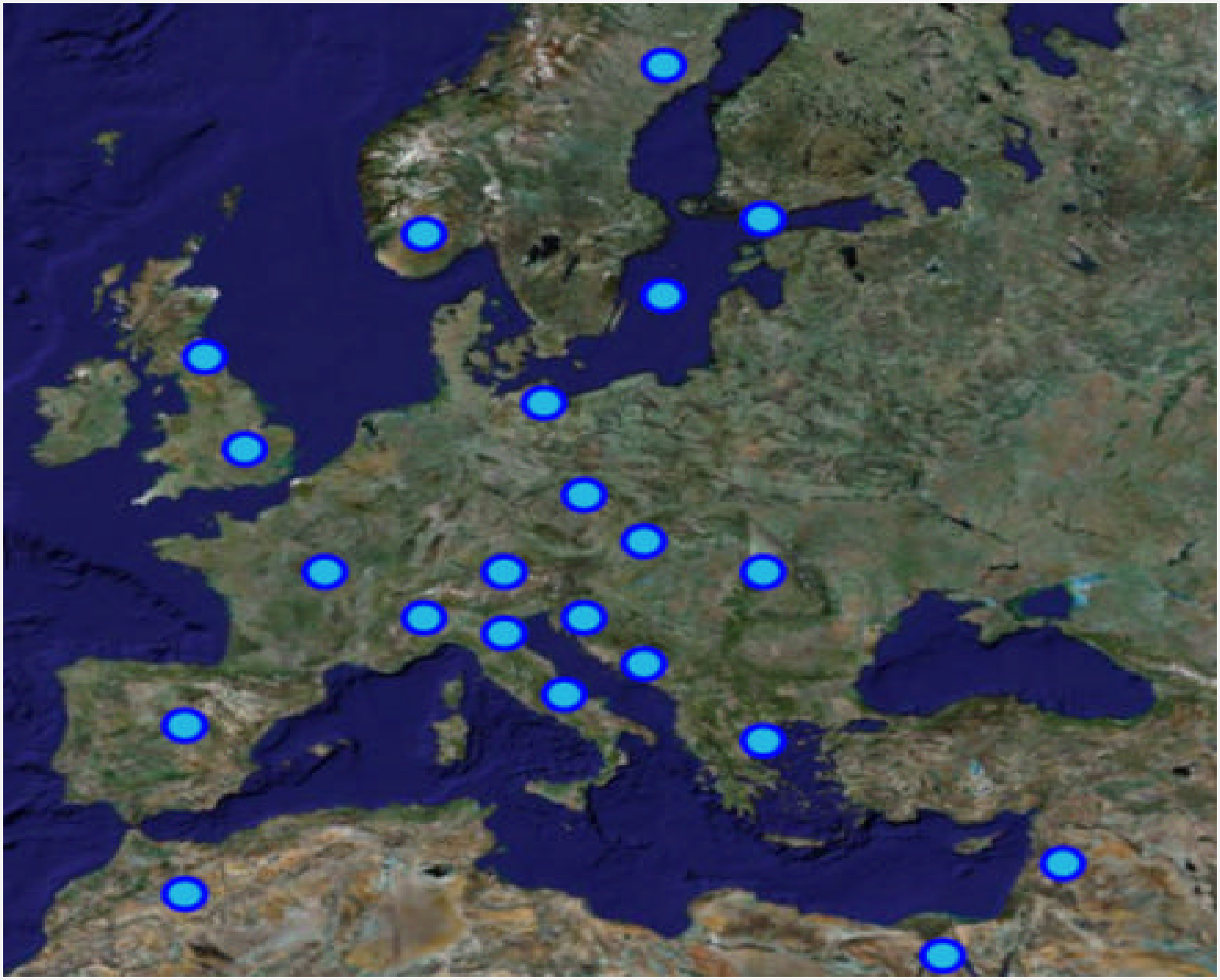
Going beyond the analysis of mechanical behaviour of painted wood

- analysis of historic climate - the acclimatisation or 'proofed-fluctuation' concept
- direct tracing non-recoverable micro-changes to objects to determine object-specific safe microclimates with a high precision
- attempts at a generalisation – 'population studies'

Climate for Culture

Analysis of outstanding historic buildings in different climatic zones (Selection), to be defined at start

- Alkmaar, Laurens church
- National Trust Property
- Bergen, Mecklenburg West Pomerania, St. Mary`s Church
- Vienna, Schönbrunn Castle UNESCO World Heritage Site
- Munich, Pinakotheken Museums
- Linderhof Palace
- Würzburg, prince-bishop`s residence UNESCO World Heritage Site
- St. Gallen, Abbey Library UNESCO World Heritage Site
- Karlštejn castle chapel, UNESCO World Heritage Site
- Cesky Krumlov, Castle UNESCO World Heritage Site
- Riga, Latvia, Dome Cathedral, UNESCO World Heritage Site
- Skokloster Castle
- City of Visby, Gotland,UNESCO World Heritage Site
- Dubrovnik, Rector's Palace UNESCO World Heritage Site
- Brežice Castle
- Epidaurus, Ceramic Museum
- Royal Monastery of San Lorenzo de El Escorial UNESCO World Heritage Site
- North Saqqara,
  UNESCO World Heritage Site



Climate for Culture

damage function

sufficient information about the relationship between indoor climate and unwanted irreversible change in objects to help decision support module and economic impact report

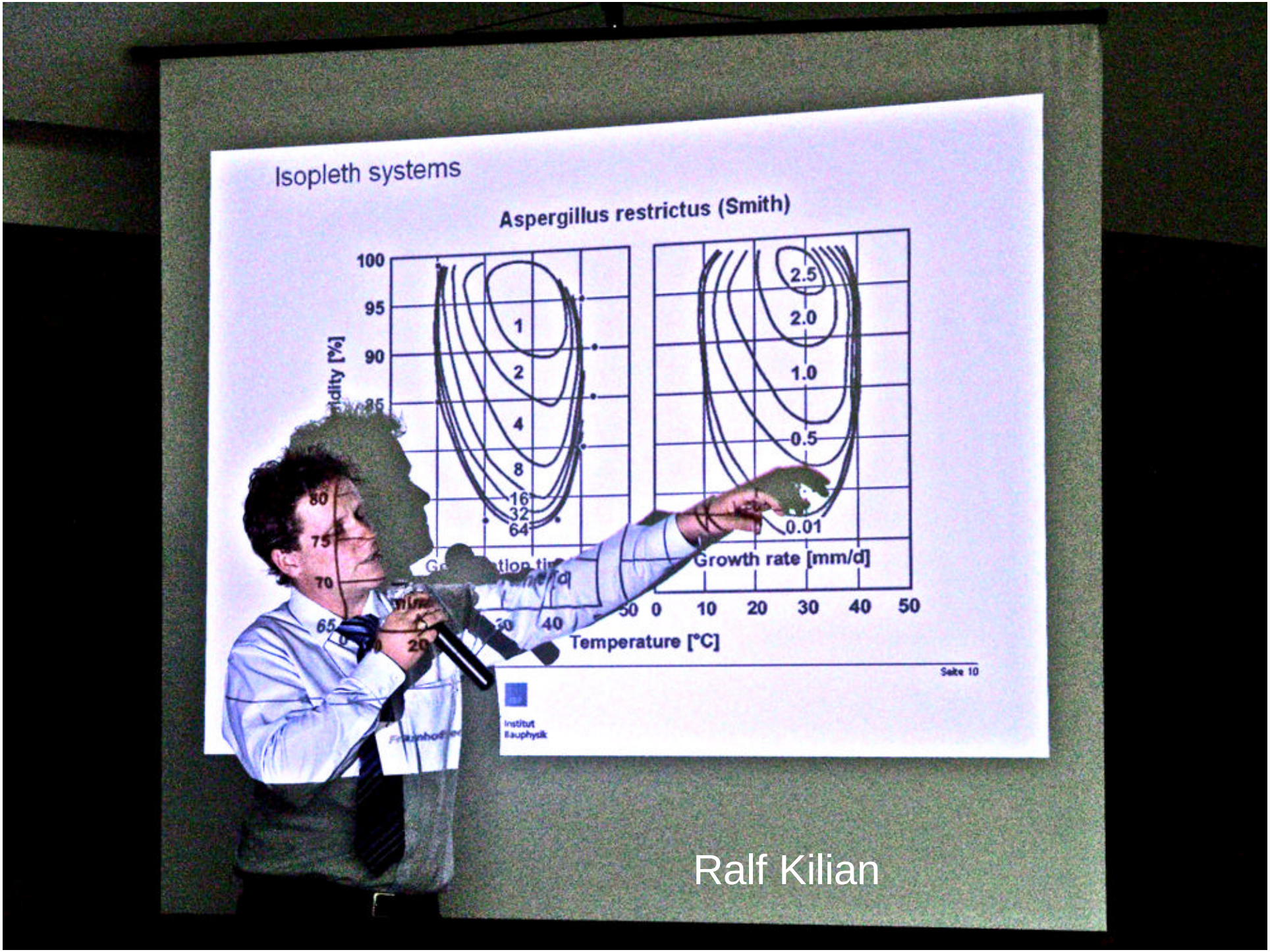
static conditions (permanence)
changing conditions - frequency, speed and amplitude
combinations and synergies

Climate for Culture

Enhance existing knowledge in the field by further research on the response of the most endangered cultural heritage fabrics (movable and immovable) with respect to biological growth rates

includes building fabric rots, algae

includes insect pests


Isopleth systems
Aspergillus restrictus (Smith)
100
95
90
1
2
4
8
16
32
64
2.5
2.0
1.0
0.5
0.01
Growth rate [mm/d]
0
10
20
30
40
50
Temperature [°C]
Seite 10
Institut
Bauphysik
Ralf Kilian

Climate for Culture

limits of the work package

types of risk-
those where climate change might make a difference
RH/T, salts, pollution, pests, natural light

types of object - books, complex structures
(eg furniture, paintings, polychromy)
wall paintings, textiles, metal, stone

Climate for Culture

Collection and validation of the latest research results in preventive conservation in a European context, in close cooperation to the relevant task groups of CEN/ TC 346

EC projects - since 1986

Noah’s Ark

Recent work by ICSC, Polish Academy of Sciences

North America - IPI, Smithsonian, CCI

eea grants iceland liechtenstein norway	niku Norsk institutt for kulturminneforskning	**ICSC** **Institute of Catalysis and Surface Chemistry, Polish Academy of Sciences**	**COST ACTION IE0601** **Wood science for conservation of cultural heritage**

Allowable microclimatic variations for polychrome wood

International Workshop, 18 - 19 February 2010

PROGRAMME

jonathan@jonsmith.demon.co.uk