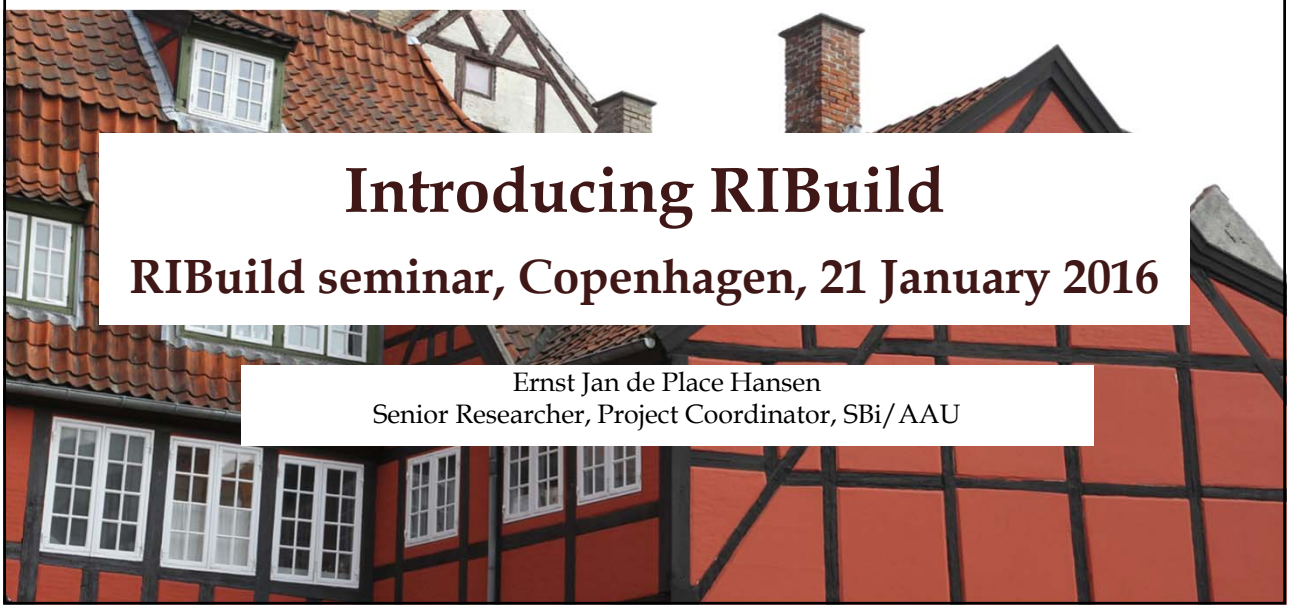
RIBuild

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 637268



# Introducing RIBuild

## RIBuild seminar, Copenhagen, 21 January 2016

Ernst Jan de Place Hansen
Senior Researcher, Project Coordinator, SBi/AAU

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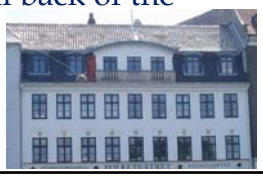
## Visions

RIBuild = Robust Internal Thermal Insulation of Historic Buildings

- Strengthen the knowledge on how and under what conditions internal thermal insulation is to be implemented in historic buildings
  - without compromising their architectural and cultural values
  - with an acceptable safety level against deterioration and collapse of heavy external wall structures.
- Contributes to sustainable historic buildings with improved energy efficiency implying an easier conversion of energy supply from inefficient fossil fuels to efficient renewable energy sources.
- Assesses the hygrothermal performance of the building construction, thus no collateral damage occurs; in case of failure an easy roll back of the measures is possible.



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# Objective

- Develop or improve effective, comprehensive decision guidelines to optimise the design and implementation of internal insulation in historic buildings across EU, e.g.
  - Suitability for internal insulation
  - Standardised simulation and testing methodology
  - Catalogue of possible renovation measures
  - Evaluation of energy saving potential and environmental impact
- Focus on heavy external walls made of stone, brick and timber framing
- Determine conditions under which different internal insulation measures are reliable and affordable measures
  - based on probabilistic modelling of the hygro-thermal performance, the environmental impact and the cost/benefit



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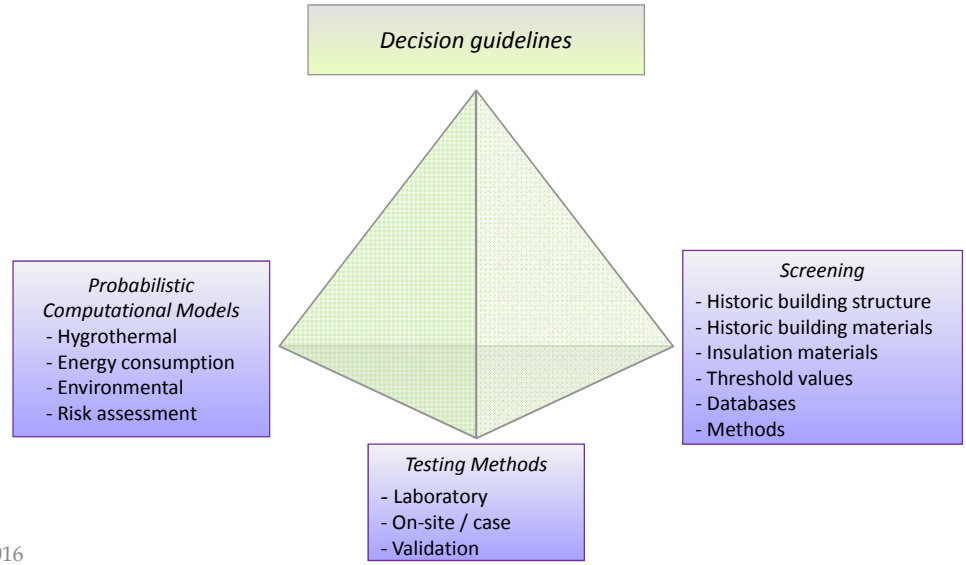
# Overall approach and methodology



## Related national and international research

- $Co_2$ol Bricks
- RAP-RETRO
- National renovation roadmaps
- E2ReBuild
- INSUMAT
- HAMSTAD
- ECO-RENO
- …




## Advance beyond state-of-the-art

- Application of internal thermal insulation
  - Focus on *robust* solutions respecting building physics
- Probabilistic modelling in a building physic domain
  - Enhancing existing 1- and 2-D hygrothermal simulation environment
  - Methodology for the efficient probabilistic evaluation of building performance
- Probabilistic modelling in an environmental domain (LCIA, LCC, CO)
  - Improvement in the prediction of energy performance, environmental impact, and cost benefits

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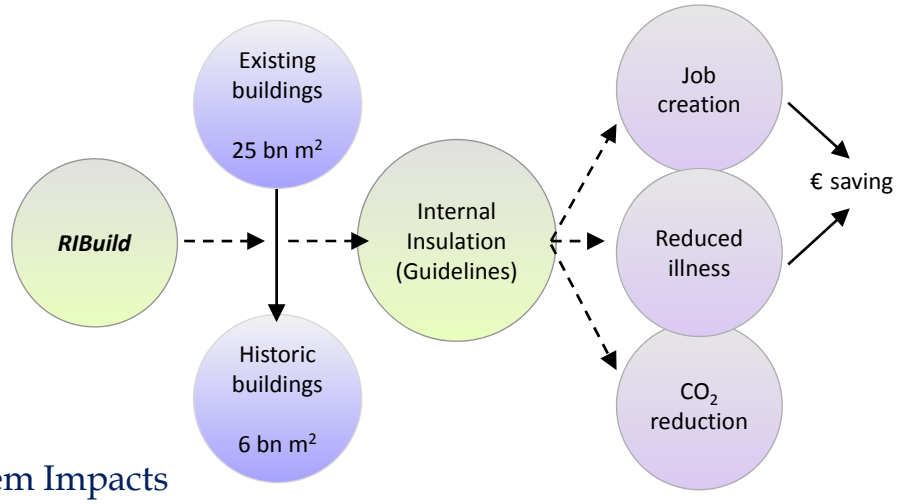
# Impact




- Energy System Impacts
- Economic Impacts
- Societal and Environmental Impacts



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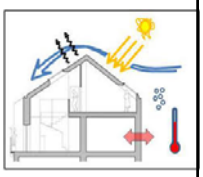
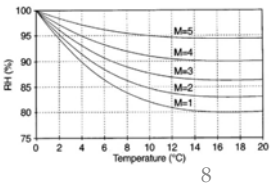
# Challenges

- Several factors to be investigated to enhance knowledge of internal insulation measures suitable for historic buildings
  - Building practice
  - Properties of building materials used in historic buildings
  - Properties of insulation materials, existing and upcoming
  - Threshold values for failure when adding internal insulation
  - Climatic conditions





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## Challenges

- Bring together the many different disciplines involved in this consortium, e.g.
  - Building physics and material characterisation
  - Measurements in lab and on-site
  - Modelling, statistics, validation
  - Sustainability, LCA, energy saving potential
  - Practical use of the results
  - Dissemination of the output
  - Project management



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## List of partners

- Aalborg University (AAU) (Coordinator) (DK)
- Riga Technical University (RTU) (LV)
- Katholieke Universiteit Leuven (KUL) (BE)
- Technische Universität Dresden (TUD) (D)
- Università Politechnica delle Marche (UNIVPM) (IT)
- Technical University of Denmark (DTU) (DK)
- SP Technical Research Institute of Sweden (SE)
- Haute Ecole Spécialisee de Suisse Occidentale (CH)
- INTRO FLEX Aps (DK)
- Erik Møller Architects (DK)

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# List of work packages (WP) and WP leaders

| | |
|---|---|
| • WP1: Pre-renovation assessment | • Andra Blumberga, RTU |
| • WP2: Material characterization coupled with eligible renovation measures | • Eva Møller, AAU |
| • WP3: Case studies and laboratory measurement | • John Grunewald, TUD |
| • WP4: Probabilistic modelling of interior insulation solutions | • Hans Janssen, KUL |
| • WP5: Development of cost/benefit and environmental impact assessment methodology | • Marco D'Orazio, UNIVPM |
| • WP6: Application and evaluation of assessment tools | • Søren Peter Bjarløv, DTU |
| • WP7: Communication and dissemination | • Maja Skovgaard, AAU |
| • WP8: Project Management | • Ernst Jan de Place Hansen, AAU |



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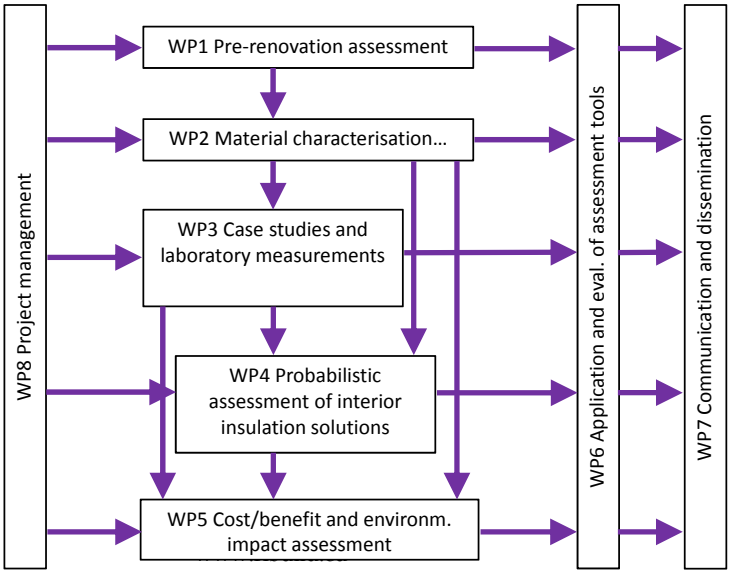
# Work packages and how they interrelate

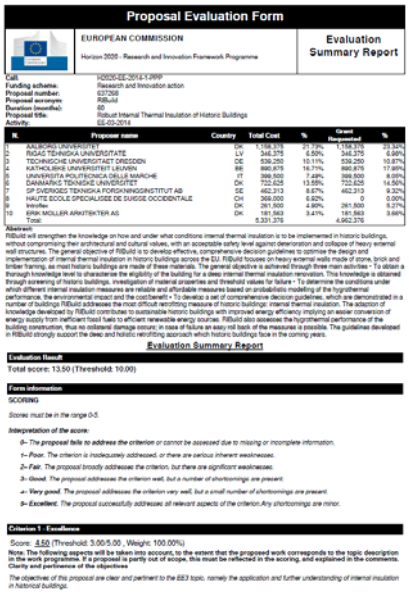
- 5 mio €
- 5 years



# EU evaluation of application

- Well structured
- Ambitious
- Credible approach
- Well described impact and output
- Good composition of the consortium

- 31 other applications for this call – none of them received funding



Proposal Evaluation Form

EUROPEAN COMMISSION

Evaluation Summary Report

Horizon 2020 - Research and Innovation Framework Programme

Call: H2020-EE-2014-1-2015

Funding scheme: Research and Innovation action

Proposal number: 637268

Proposal acronym: RIBuild

Duration (months): 60

Proposal title: Robust Internal Thermal Insulation of Historic Buildings

Activity: EE-03-2014

| N. | Proposer name | Country | Total Cost | % | Grant Requested | % |
|---|---|---|---|---|---|---|
| 1 | AALBORG UNIVERSITET | DK | 1.108.313 | 20.73% | 1.108.313 | 22.32% |
| 2 | RIGAS TEHNISKA UNIVERSITATE | LV | 346.375 | 6.50% | 346.375 | 6.98% |
| 3 | TECHNISCHE UNIVERSITAET DRESDEN | DE | 539.250 | 10.11% | 539.250 | 10.87% |
| 4 | KATHOLIEKE UNIVERSITEIT LEUVEN | BE | 890.875 | 16.71% | 890.875 | 17.95% |
| 5 | UNIVERSITA POLITECNICA DELLE MARCHE | IT | 398.500 | 7.48% | 398.500 | 8.03% |
| 6 | DANMARKS TEKNISKE UNIVERSITET | DK | 722.625 | 13.55% | 722.625 | 14.56% |
| 7 | SP SVERIGES TEKNISKA FORSKNINGSINSTITUT AB | SE | 462.313 | 8.67% | 462.313 | 9.32% |
| 8 | HAUTE ECOLE SPECIALISEE DE SUISSE OCCIDENTALE | CH | 368.000 | 6.90% | 0 | 0.00% |
| 9 | Introtex | DK | 261.500 | 4.90% | 261.500 | 5.27% |
| 10 | ERIK MOLLER ARKITEKTER AS | DK | 181.563 | 3.41% | 181.563 | 3.66% |
| | Total: | | 5.331.376 | | 4.962.376 | |

Abstract:

RIBuild will strengthen the knowledge on how and under what conditions internal thermal insulation is to be implemented in historic buildings, without compromising their architectural and cultural values, with an acceptable safety level against deterioration and collapse of heavy external wall structures. The general objective of RIBuild is to develop effective, comprehensive decision guidelines to optimise the design and implementation of internal thermal insulation in historic buildings across the EU. RIBuild focuses on heavy external walls made of stone, brick and timber framing, as most historic buildings are made of these materials. The general objective is achieved through three main activities - To obtain a thorough knowledge level to characterise the eligibility of the building for a deep internal thermal insulation renovation. This knowledge is obtained through screening of historic buildings, investigation of material properties and threshold values for failure - To determine the conditions under which different internal insulation measures are reliable and affordable measures based on probabilistic modelling of the hygrothermal performance, the environmental impact and the cost benefit - To develop a set of comprehensive decision guidelines, which are demonstrated in a number of buildings RIBuild addresses the most difficult retrofitting measure of historic buildings: internal thermal insulation. The adaption of knowledge developed by RIBuild contributes to sustainable historic buildings with improved energy efficiency implying an easier conversion of energy supply from inefficient fossil fuels to efficient renewable energy sources. RIBuild also assesses the hygrothermal performance of the building construction, thus no collateral damage occurs; in case of failure an easy roll back of the measures is possible. The guidelines developed in RIBuild strongly support the deep and holistic retrofitting approach which historic buildings face in the coming years.

Evaluation Summary Report

Evaluation Result

Total score: 13.50 (Threshold: 10.00)

Form information

SCORING

Scores must be in the range 0-5.

Interpretation of the score:

0- The proposal fails to address the criterion or cannot be assessed due to missing or incomplete information.

1- Poor. The criterion is inadequately addressed, or there are serious inherent weaknesses.

2- Fair. The proposal broadly addresses the criterion, but there are significant weaknesses.

3- Good. The proposal addresses the criterion well, but a number of shortcomings are present.

4- Very good. The proposal addresses the criterion very well, but a small number of shortcomings are present.

5- Excellent. The proposal successfully addresses all relevant aspects of the criterion.Any shortcomings are minor.

Criterion 1 - Excellence

Score: 4.50 (Threshold: 3.00/5.00 , Weight: 100.00%)

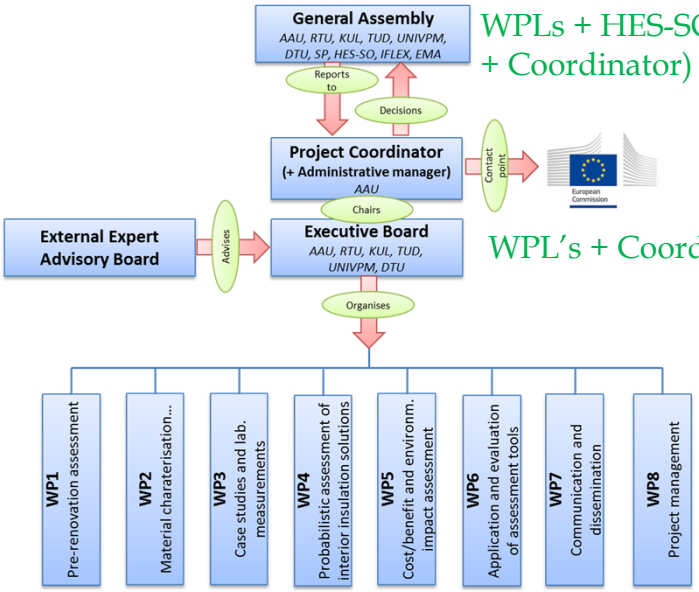
Note: The following aspects will be taken into account, to the extent that the proposed work corresponds to the topic description in the work programme. If a proposal is partly out of scope, this must be reflected in the scoring, and explained in the comments.

Clarity and pertinence of the objectives

The objectives of this proposal are clear and pertinent to the EE3 topic, namely the application and further understanding of internal insulation in historical buildings.



# Management and decision making structure




WPLs + HES-SO, IFLEX, EMA + Coordinator)

WPL's + Coordinator