IEA SHC Task 50: Advanced lighting solutions for retrofitting buildings

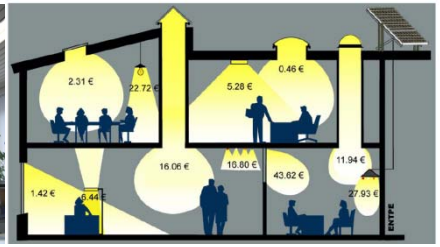
SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

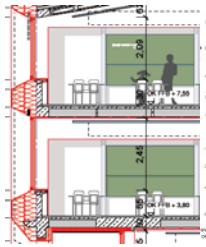
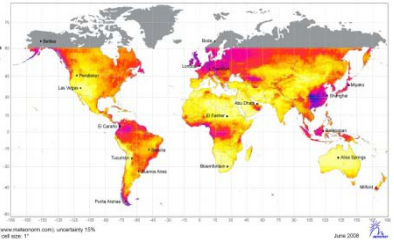
Objectives of IEA SHC Task 50

Jan de Boer, Fraunhofer Institute of Building Physics, Stuttgart, Germany

Fraunhofer IBP

Industry Workshop, Lund, 20.3.2013

Lighting and Energy: Potentials in Retrofitting

Only small volume of new building constructions

Geo-reisecommunity

~3% retrofit rate

(estimation facade and lighting industry)

Wikipedia,. Apfel3748

Marquardt

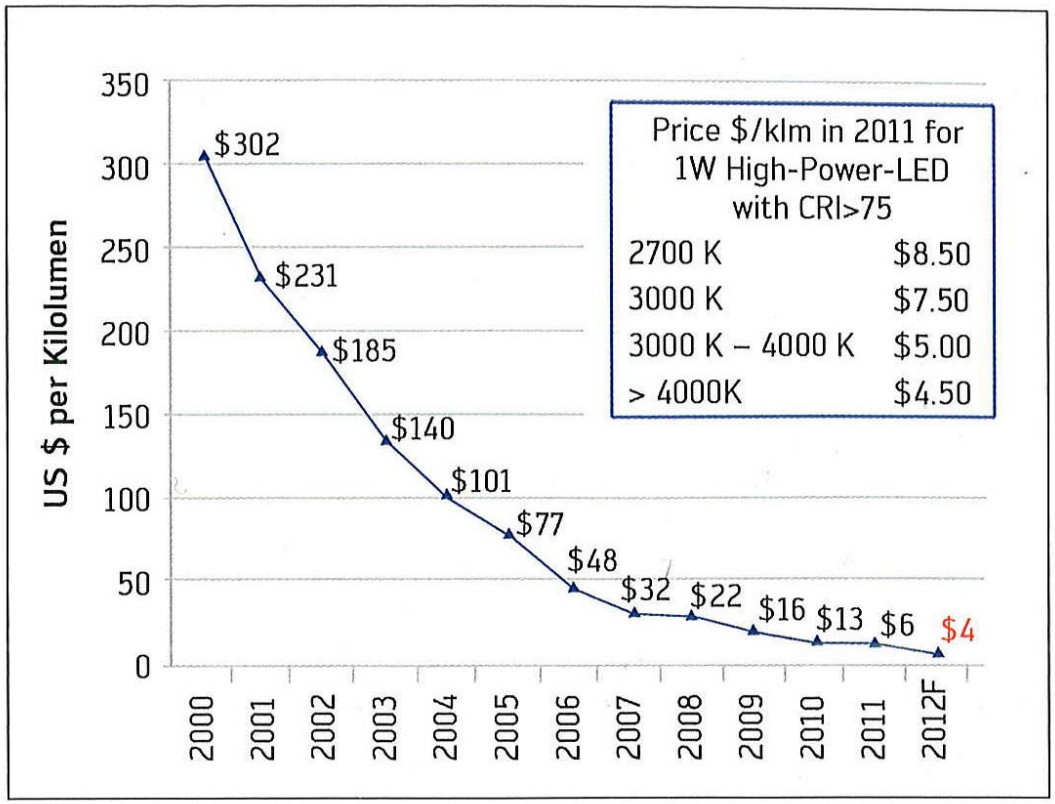
40-50% of turnover of facade and lighting industry in retrofitting

75 % of appliances outdated (older than **25 a**)

"Lighting retrofits can save significant amounts of energy costeffectively"

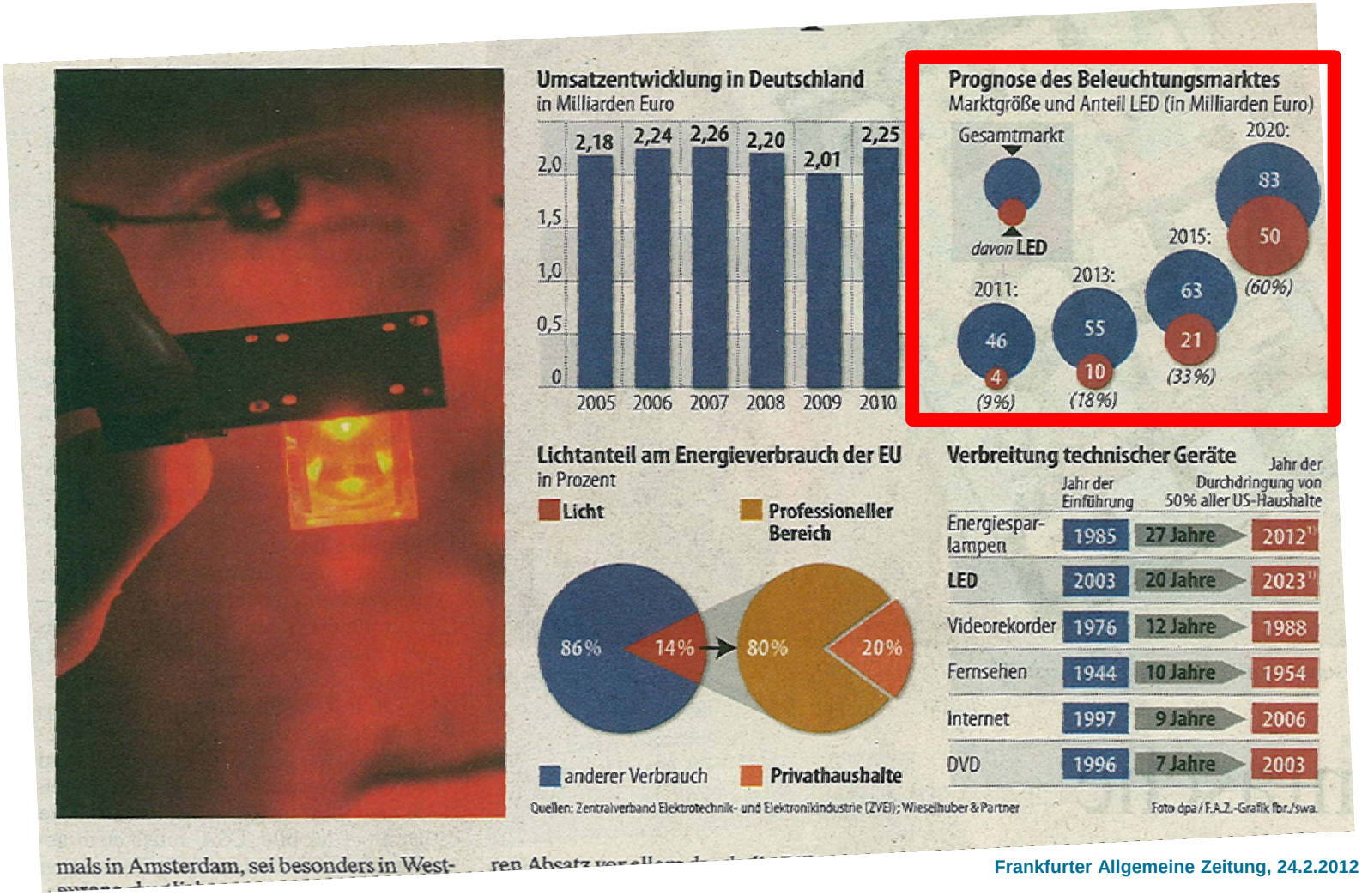
LIGHT'SLABOUR'S LOST, Policies for Energy-efficient Lighting, IEA, 2006

Lighting and Energy: Major changes & chances in the market



LED prices over time (Source Strategies unlimited)

Lighting and Energy: Major changes & chances in the market



Frankfurter Allgemeine Zeitung, 24.2.2012

Objective

The objective is to accelerate retrofitting of daylighting and electric lighting solutions in the non-domestic sector using cost - effective, best practice – approaches, which can be used on a wide range of typical existing buildings.

This can be subdivided into the following specific objectives:

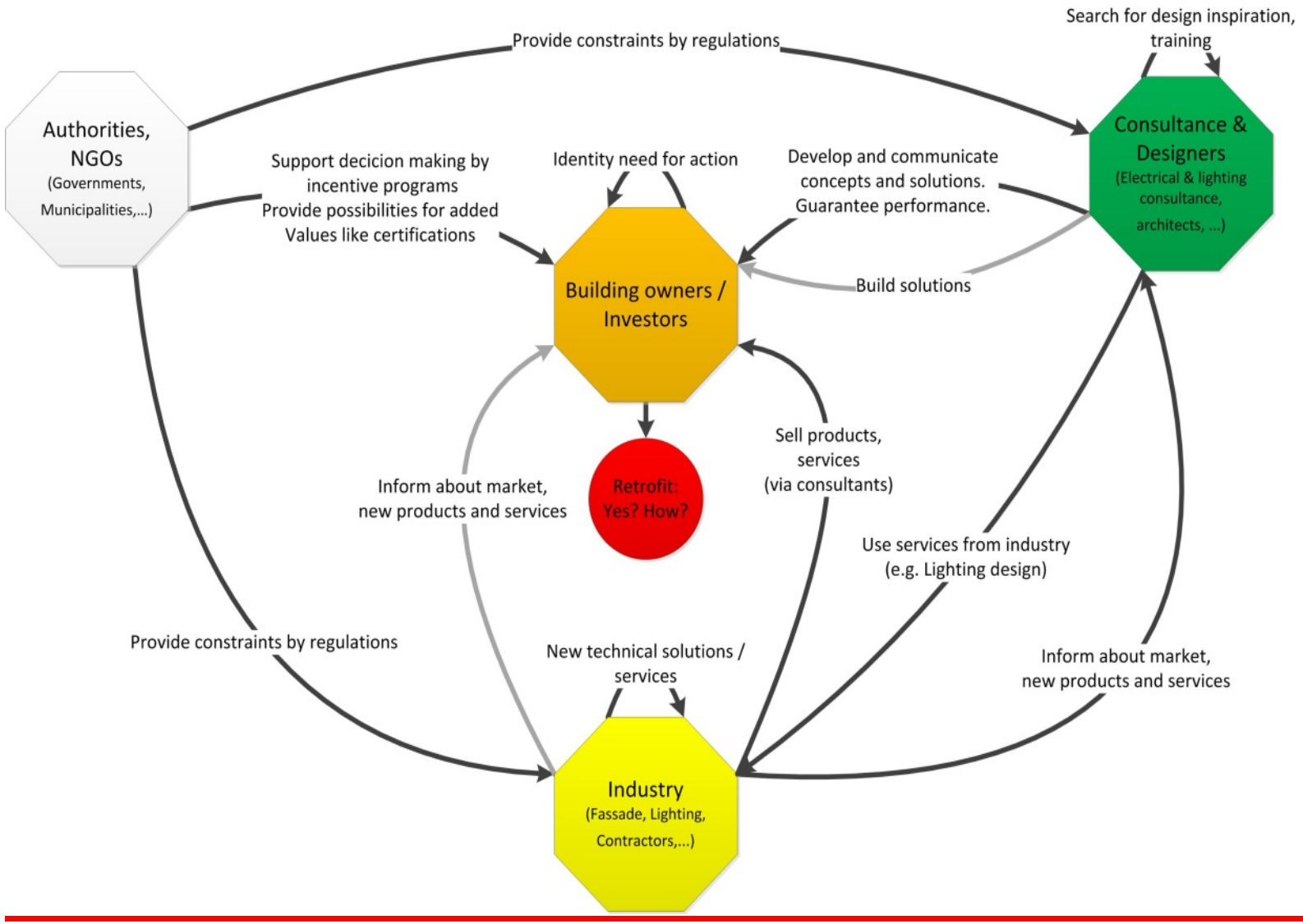
- Develop a sound view of the lighting retrofit market.
- Trigger discussion, initiate revision and enhancement of local and national regulations, certifications and loan programs.
- Increase robustness of daylighting and electric lighting retrofit approaches.
- Increase understanding of lighting retrofit processes by providing adequate tools for different stakeholders.
- Demonstrate state of the art lighting retrofits.
- Develop as a joint activity an electronic interactive source book.

Scope

The scope of the Task is on general lighting systems for indoor environments. The focus is laid on lighting appliances in non-domestic buildings. Technically the task deals with

- daylight utilization by better facade technologies and architectural solutions,
- electric lighting schemes addressing technology and design strategies,
- lighting control systems and strategies

Target audiences



Benefits for target audiences

The envisaged main results will enable

- **building owners** (public and private sector) to benchmark and compare their buildings, to get cost indications and hereby prepare and initiate retrofit decisions,
- **authorities** to initiate and / or improve regulations, incentive programs and certification procedures based on for instance detailed data on the building stock with its typical lighting configurations and related energy efficiency and monetary potentials,
- **designers and consultants** to get validated design solutions, to obtain energy efficiency and economic design parameters, to employ appropriate technologies and to benefit from tailored design tools,
- **lighting and façade industry** to adapt their products and services according to market figures, identified market barriers and opportunities, developed retrofit strategies, and evolving new technologies.

Task Structure

SHC SOLAR HEATING & COOLING PROGRAMME INTERNATIONAL ENERGY AGENCY

Subtask A: Market and Policies

[Coordination: M. Fontoynont, SBI, DK]

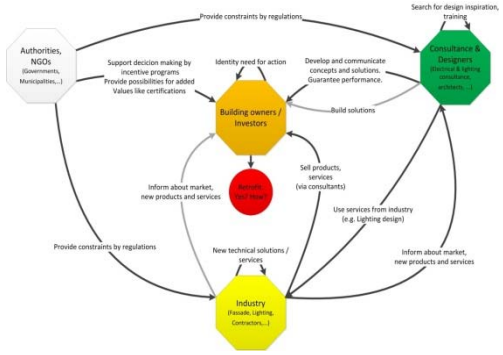
Objective: To understand, and model, the financial and energy impact associated to retrofitting daylighting and electric lighting of buildings.

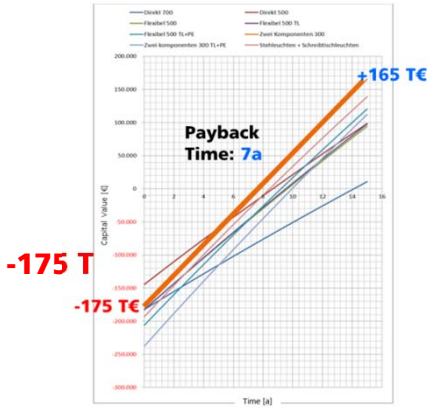
A.1. Global economical models

A.2. Barriers and benefits

A.3. Building Energy regulation and certification

A.4. Proposal of action concerning value chain





Main Result
Report: *"Lighting retrofit market. Including policy issues and proposals of action"*

Subtask B: Daylighting and Electric Lighting Solutions

[Coordination: M. Knoop, TUB, Ger]

Objective: To assess quality of existing and new solutions in the field of façade and daylighting technology, artificial lighting and lighting controls. To identify and structure existing and develop new lighting system technologies.

B.1. Definition - system characterization

B.2. Definition of (regional) baseline conditions

B.3. Review of state of the art technology and architectural solutions

B.4. New technical developments

B.5. Measurements of selected state of the art and new technologies

B.6. Source book

Main Result
Source book: "*Daylighting and electric lighting retrofit technologies. From low budget to new advanced retrofit solutions*"

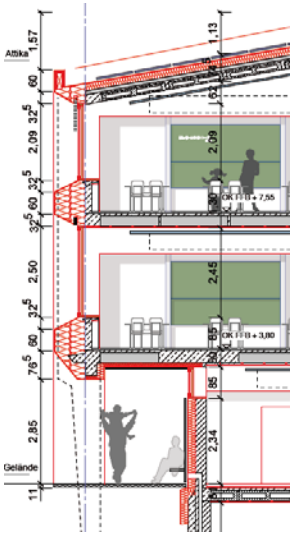
B2: Rating the existing installations

Where is the baseline ? – Reference for analysis of energetic and economic potentials.

B3-B5: State of the art & New Developments

Daylight

Architectural Solutions



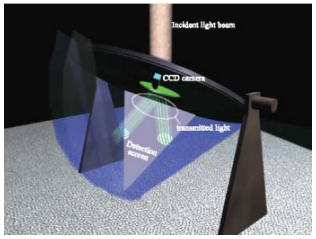
Components


© Indulight


© Uni Stuttgart IKB2


© LESO-EPFL


© EControl-Glas GmbH & Co. KG



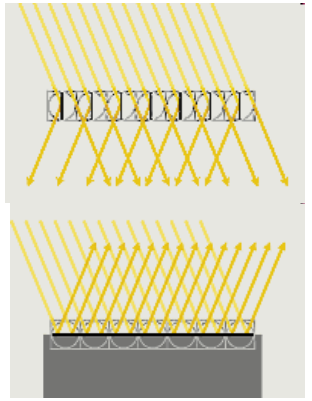
© LESO-EPFL

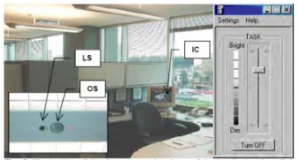
Electric Lighting

Retrofit Components

New Luminaires

Lighting Controls





© NRC

Subtask C: Methods and Tools

[Coordination: Jérôme Kaempf, EPFL, Bernard Paule, Estia, CH]

Objective: Provide methods and tools to make energy efficiency and economics of lighting retrofits transparent to stakeholders.

C.1. Analysis of workflow and needs

C.2. State of the art review

C.3. Development of a simple integrated rating model

C.4. Energy audit and inspection Procedures

C.5. Advanced and future simulation Tools

Main result:
Webbased survey & toolbox:
"Set of (simple) energetic and economic rating and calculation methods and tools."

Subtask D: Case Studies

[Coordination: Marie-Claude Dubois, LTH, Sweden]

Objective: Perform building stock analysis including generation of a building typology for lighting retrofits. Based on this deliver proven and robust evidence on achievable savings and show integrated retrofit strategies for representative Case studies

D.1. Building stock / typology (selection, classification)

D.2. State-of-the-art (literature, e-info)

D.3. Assessment and Monitoring Procedure

D.4. Case Study assessment

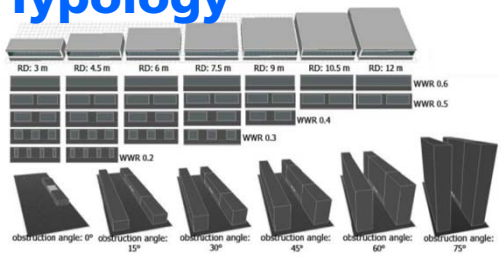
D.5. Overall conclusions, lessons learned

D.6. Case Study book / e-documentation

Main result:
Source book:
"*Applied (Advanced) lighting retrofits - realised projects and case studies for different building types* "

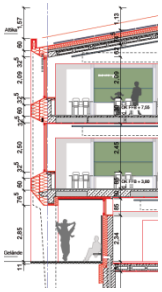
Subtask D: Case Studies

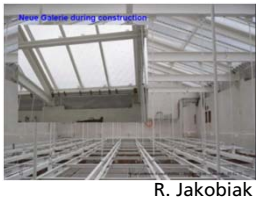
Building stock, Typology



A. Pellegrino

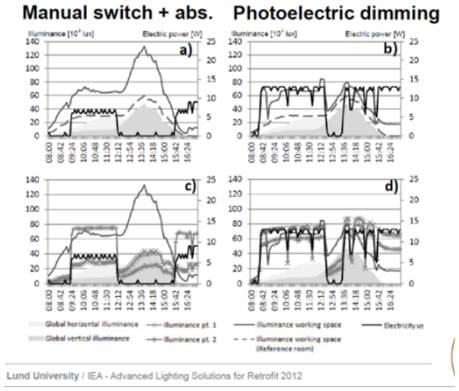
R. Jakobiak



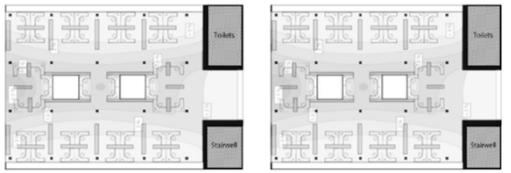


R. Jakobiak

Monitoring



M.C. Dubois



M. Fontoynont

Architectural Solutions

LESO-EPFL

C. Fildhuth

Facade components

R. Jakobiak

TU-Berlin

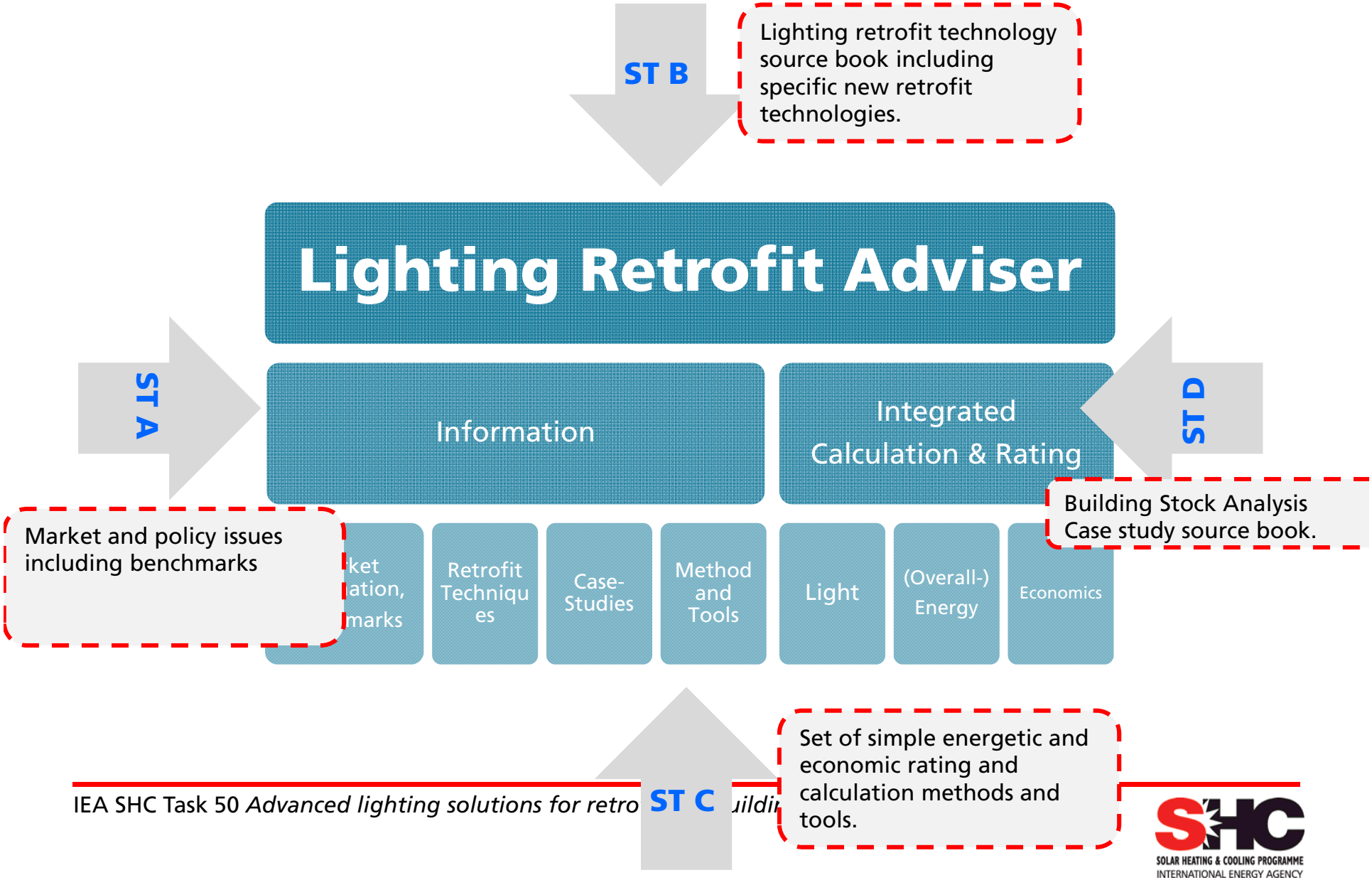
Electric Lighting

Joint Working Group: Lighting Retrofit Adviser

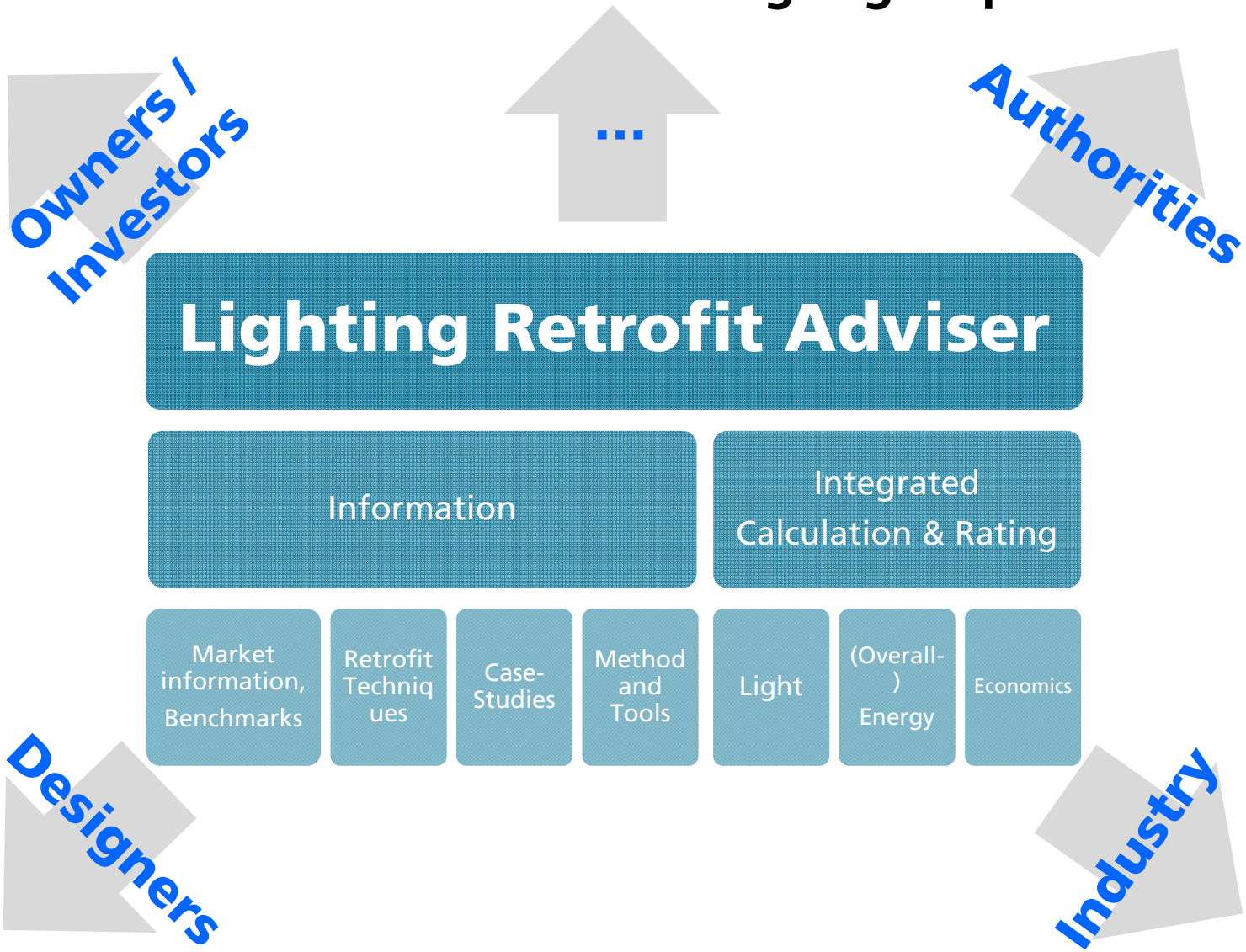
Objective: Develop as a joint activity an electronic interactive source book including design inspirations, design advice, decision tools and design tools

- Key role in Dissemination of Task results
- Adaptable international, multilingual framework
- Support of mobile computing: e.g. App (Android), HTML 5
- Compare to IEA-ECBCS Annex 36 “Concept Adviser”, Annex-ECBCS 46 “IT-Toolkit”

Lighting Retrofit Adviser: Link with other subtasks



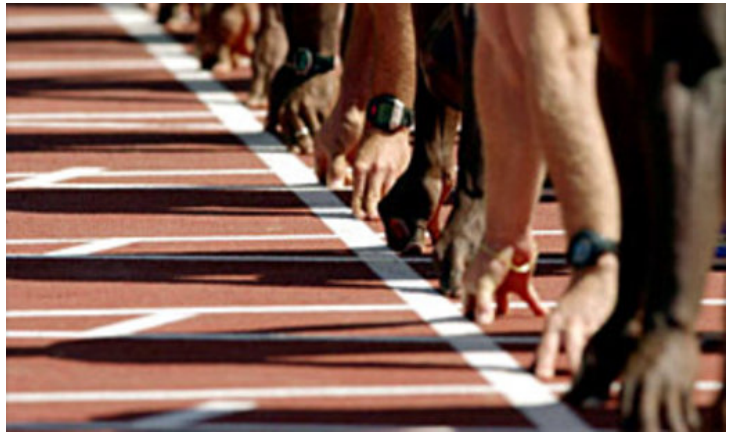
Provide tailored information to target groups



Who is behind the activity …

25 participants from 9 countries.

We are at the beginning…

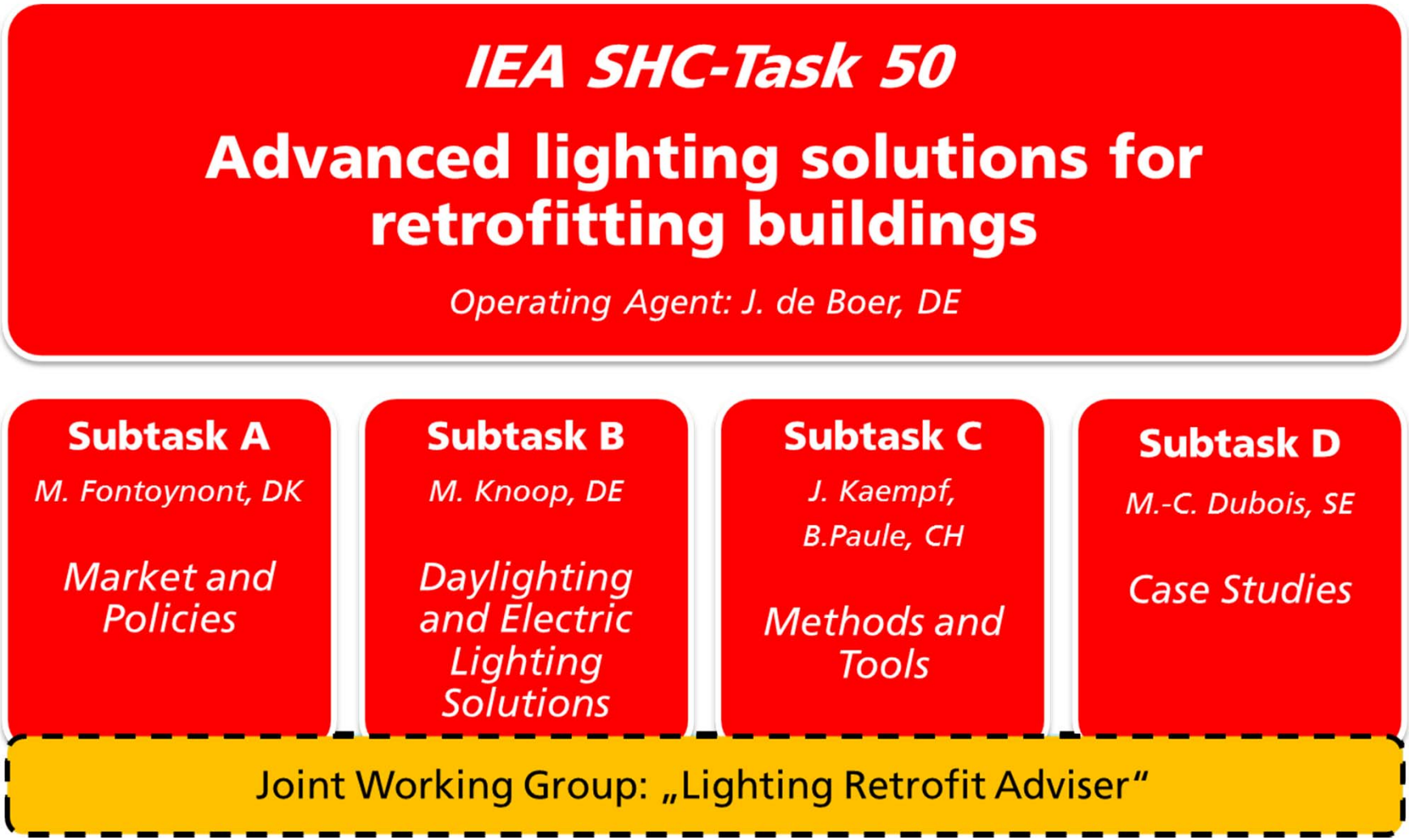


…and…

…eager to hear your opinion

- Task experts will inform about general lighting retrofit issues and possible solutions
- General experience exchange between industry and research
- Obtain feedback of industry and practitioner needs to initiate development of IEA Task 50
- Follow us:
  - http://task50.iea-shc.org/
  - http://www.iea-shc.org/newsletters
  - https://twitter.com/ieashc

IEA SHC Task 50, Duration: *2013-2015*



SHC SOLAR HEATING & COOLING PROGRAMME INTERNATIONAL ENERGY AGENCY

…eager to hear your opinion

- Do we understand the problems right?
- Do we address them properly?
- Use the opportunity to discuss
  - In the session
  - In the breaks
- Follow us:
  - http://task50.iea-shc.org/
  - http://www.iea-shc.org/newsletters
  - https://twitter.com/ieashc