

# ENERGY EFFICIENT DESIGN (EED) – A METHODOLOGY APPLIED IN MAJOR INTERNATIONAL PROJECTS

Peter Maagøe Petersen, Viegand Maagøe

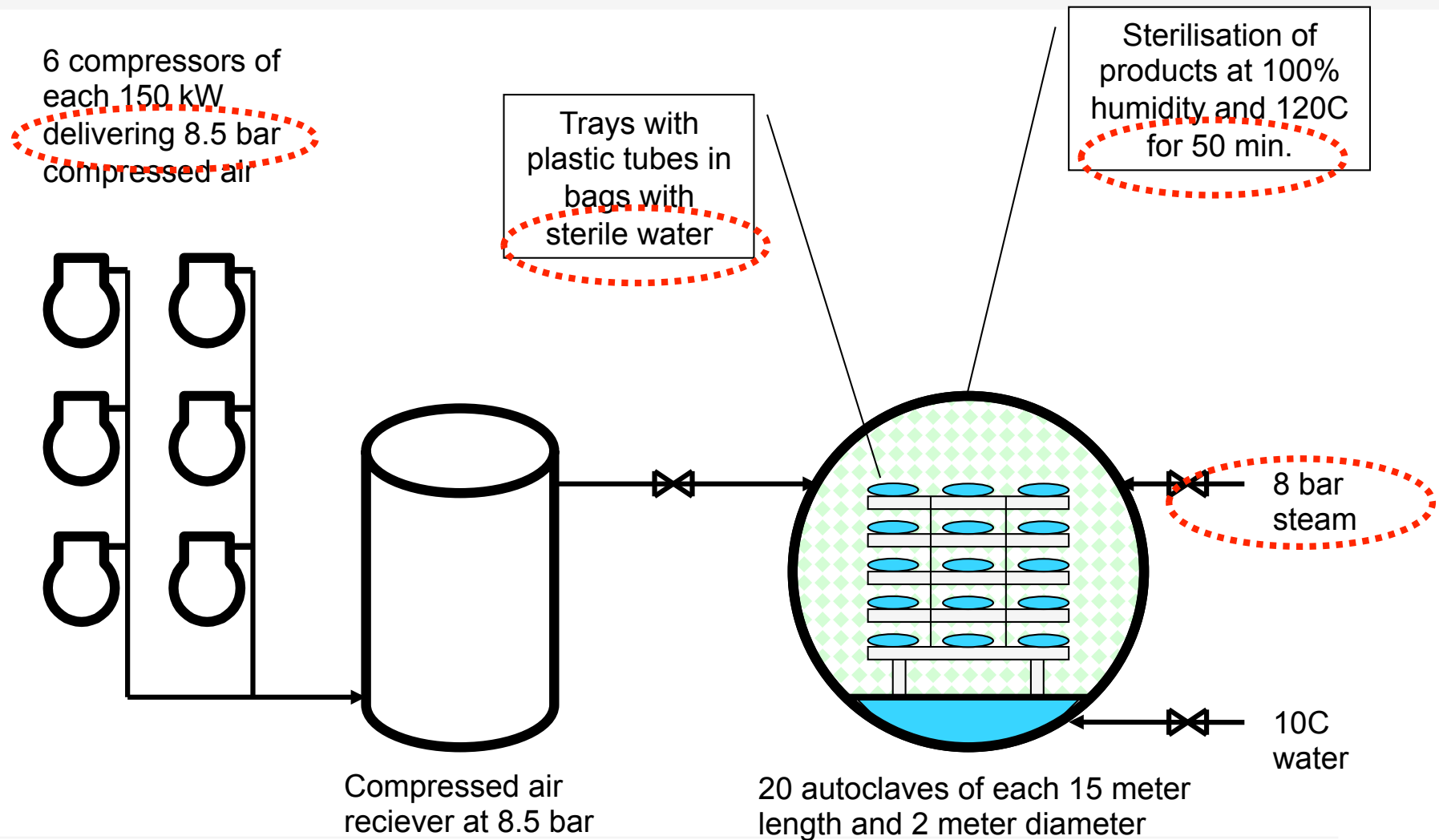
John O'Sullivan, Sustainable Energy Authority of Ireland (SEAI)

ECEEE Summer Study, Arnhem, September 2012

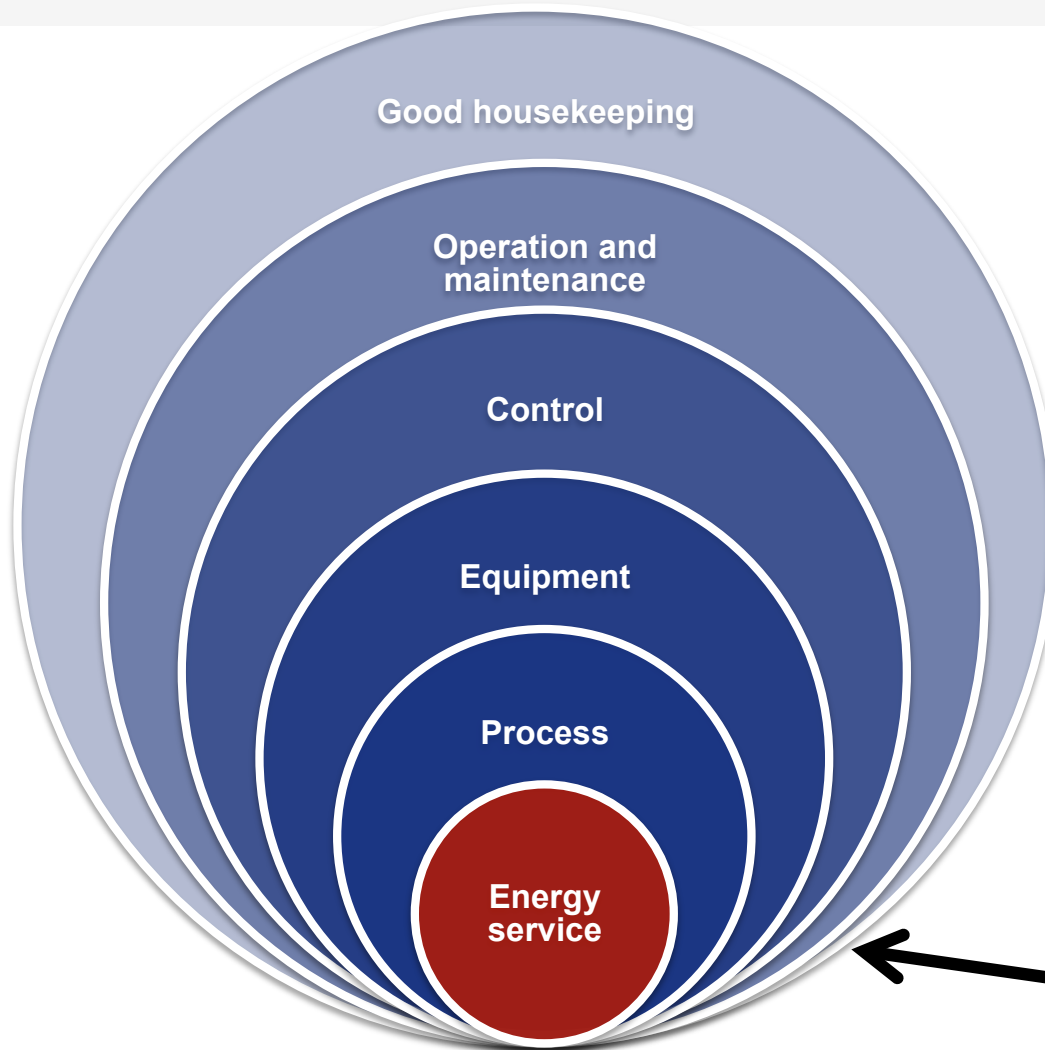
Paper 2-016-12

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# AN EXAMPLE - AUTOCLAVE

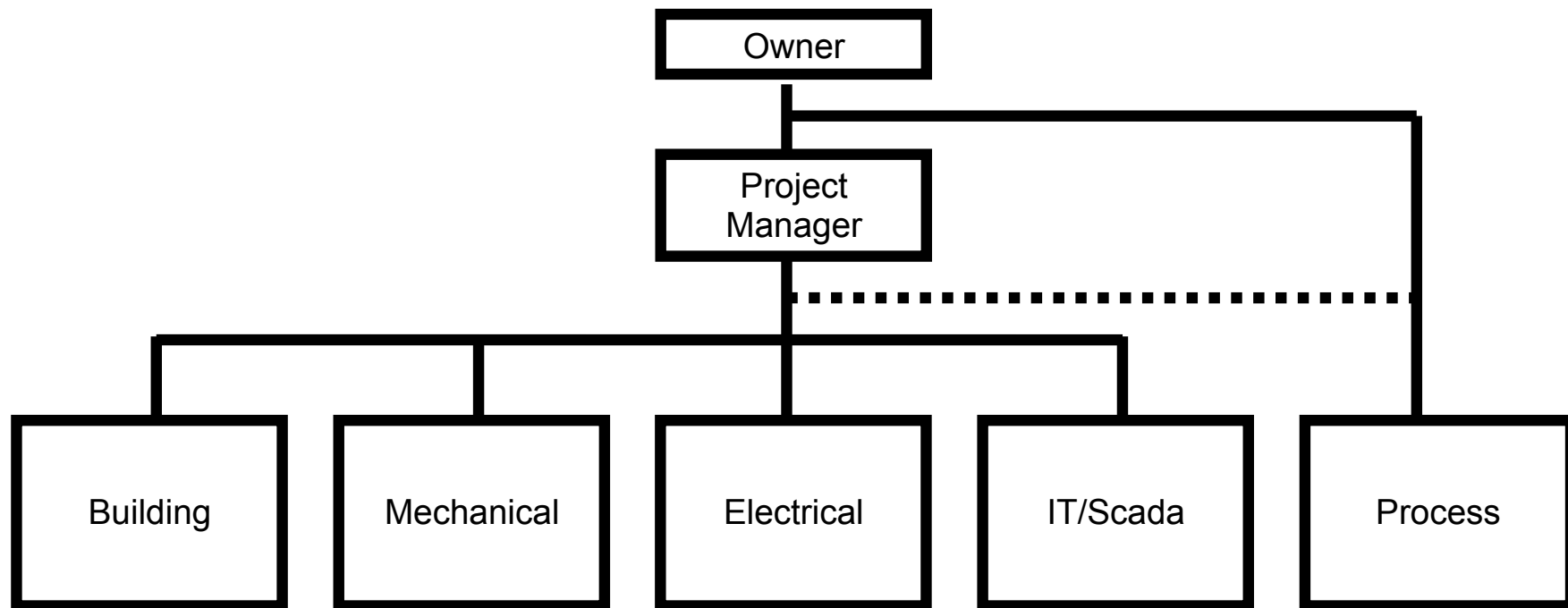


# THE "ONION" DIAGRAM



**"Energy service" is often determined by "URS - (User Requirements Specification)"**

# TYPICAL DESIGN ORGANISATION



**"Process" is usually input from manufactures or project owners own organisation**

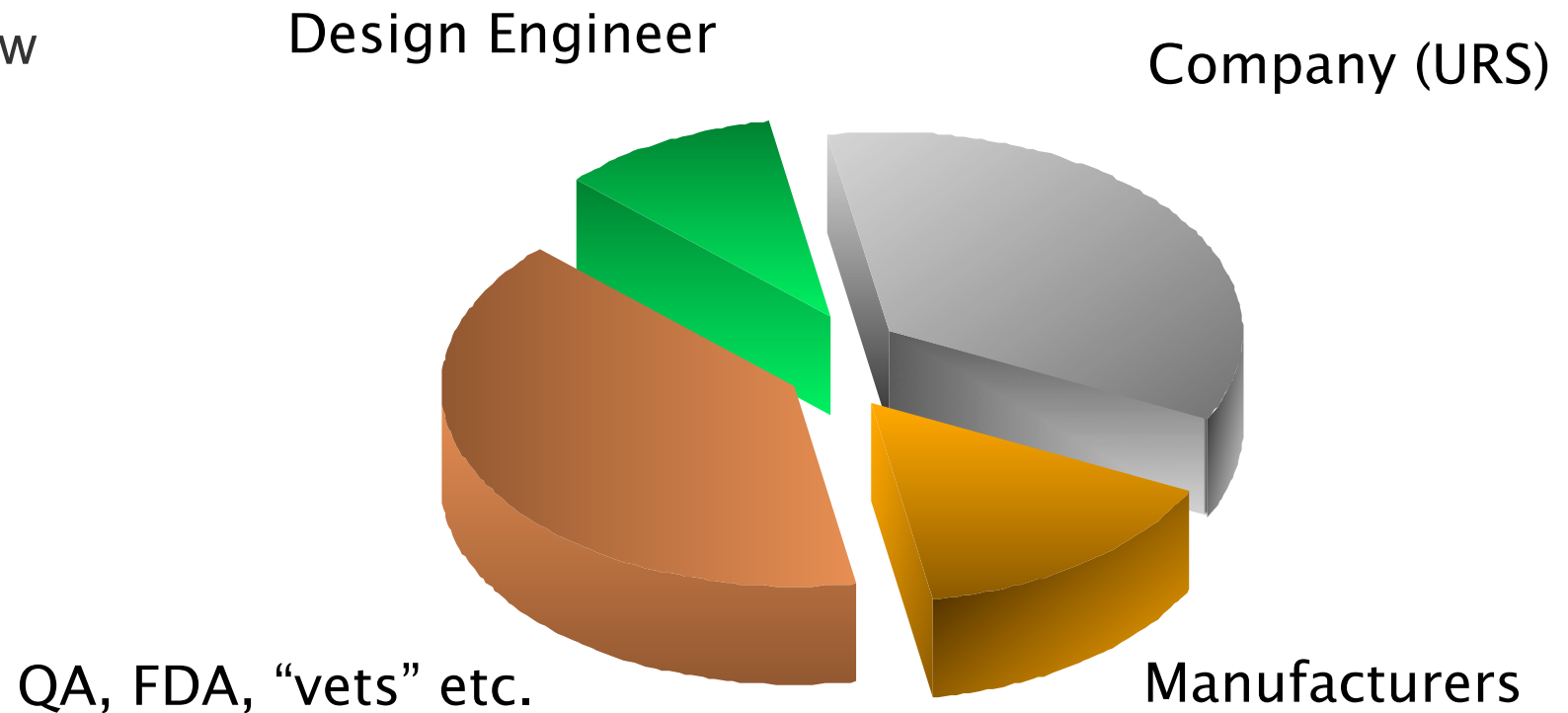
# BARRIERS TOWARDS EED



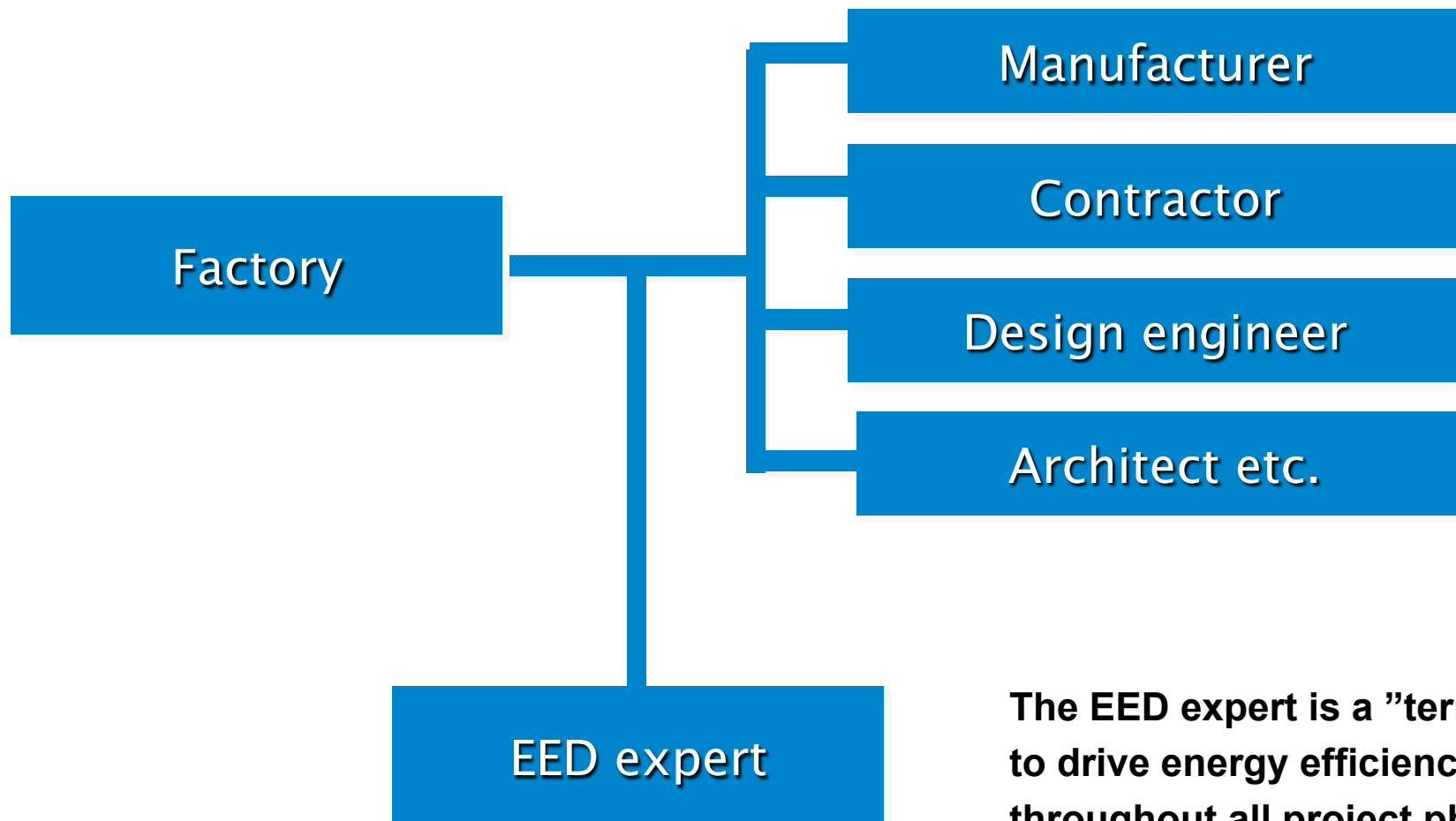
- Increasing pressure to reduce investments
  - Lifetime energy costs still have low priority
  - Projects are in a great hurry
  - There is a lack of data during the design process
  - Limited knowledge in design team
  - Unclear responsibilities
  - Project boundaries and “guarantees” impairs energy efficiency
  - “Value engineering” = don’t engineer - cut costs!
  - Etc.
- 
- ***WHO IS RESPONSIBLE FOR ENERGY EFFICIENCY DURING DESIGN?***

# METHODOLOGY

- Organisation
- Project phases
- Workflow

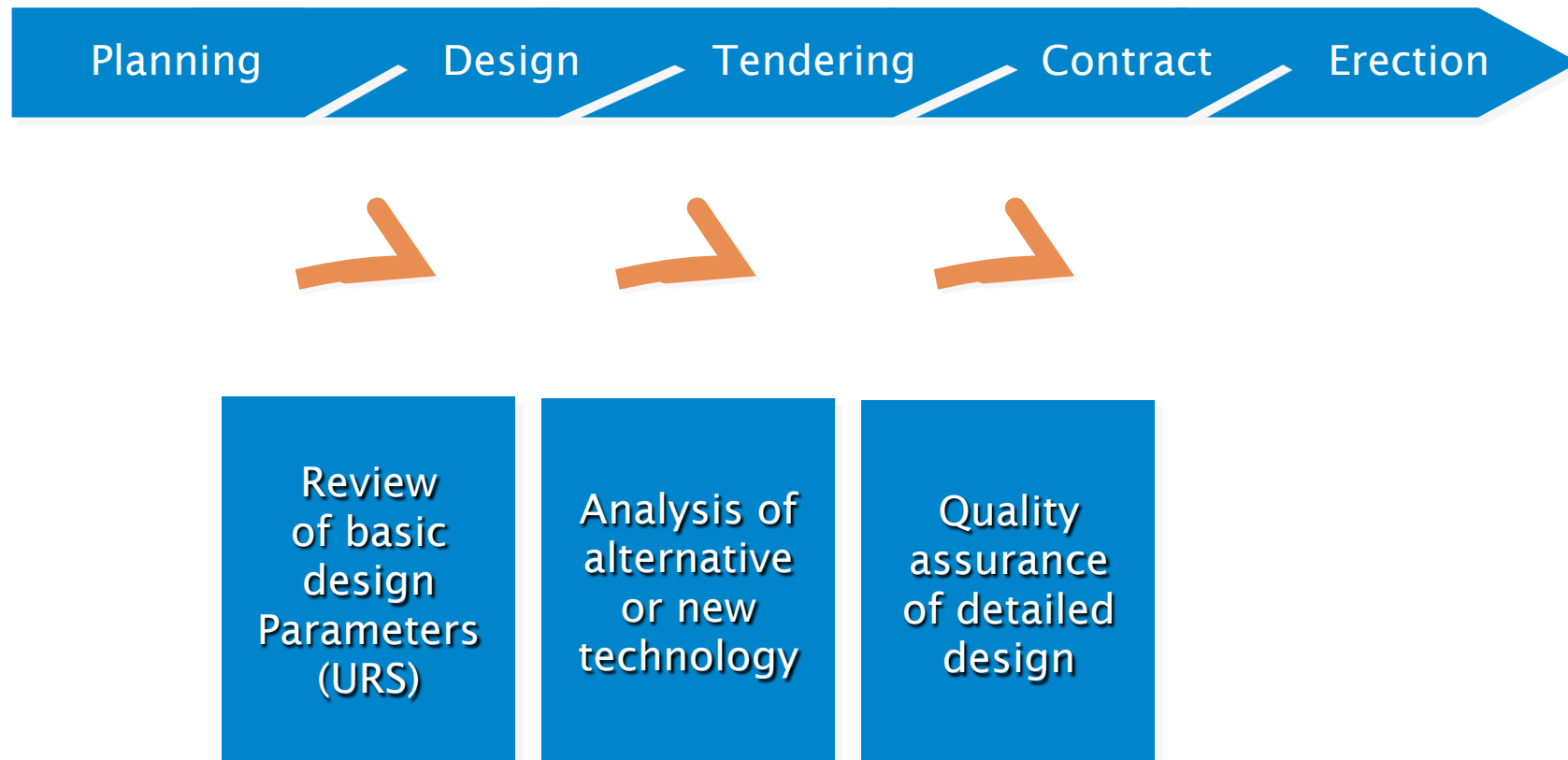


# ORGANISATION WITH EED



**The EED expert is a "terrier"  
to drive energy efficiency  
throughout all project phases**

# DESIGN PROJECT PHASES





# EED WORKFLOW



Construction Phase	EED-Activity
Basic design/ Conceptual Design	<p>Enforced data collection for energy usage in new facility (pie-charts)</p> <p>Analysis of project organization and identification of responsibilities</p> <p>Review of basic design parameters (URS) influencing energy consumption</p> <p>Challenge and minimization of energy services</p> <p>Identification of Best Available Technology (BAT)</p> <p>Top-5 priority of EED-focus areas</p>
Detailed design	<p>Design of optimal process plants and utility systems (composites)</p> <p>Analyse potential for Best Available Technology (BAT)</p> <p>Process Integration/heat recovery systems (Pinch Technology “light”)</p> <p>Assessment of needs for control and instrumentation (M&amp;T)</p> <p>Minimization of pressure losses, temperature losses etc.</p> <p>Selection of efficient motors, drives, pumps, ventilators etc.</p> <p>Provide specifications to tendering material regarding energy efficiency</p> <p>Hand-over of EED-projects to design engineers</p>
Tendering process	<p>Ask tenders and manufactures for more energy efficient solutions</p> <p>Quality control of plant designs and specifications in tenders</p> <p>Performance guarantees</p> <p>Assistance in contract formulation</p>
Construction and Erection	<p>Quality control of specifications for installed equipment</p>
Commissioning	<p>Optimization of processes and utilities according to specifications</p>
Operational phase	<p>Energy audits</p> <p>Energy management</p> <p>Etc.</p>

# EED PILOT PROJECTS

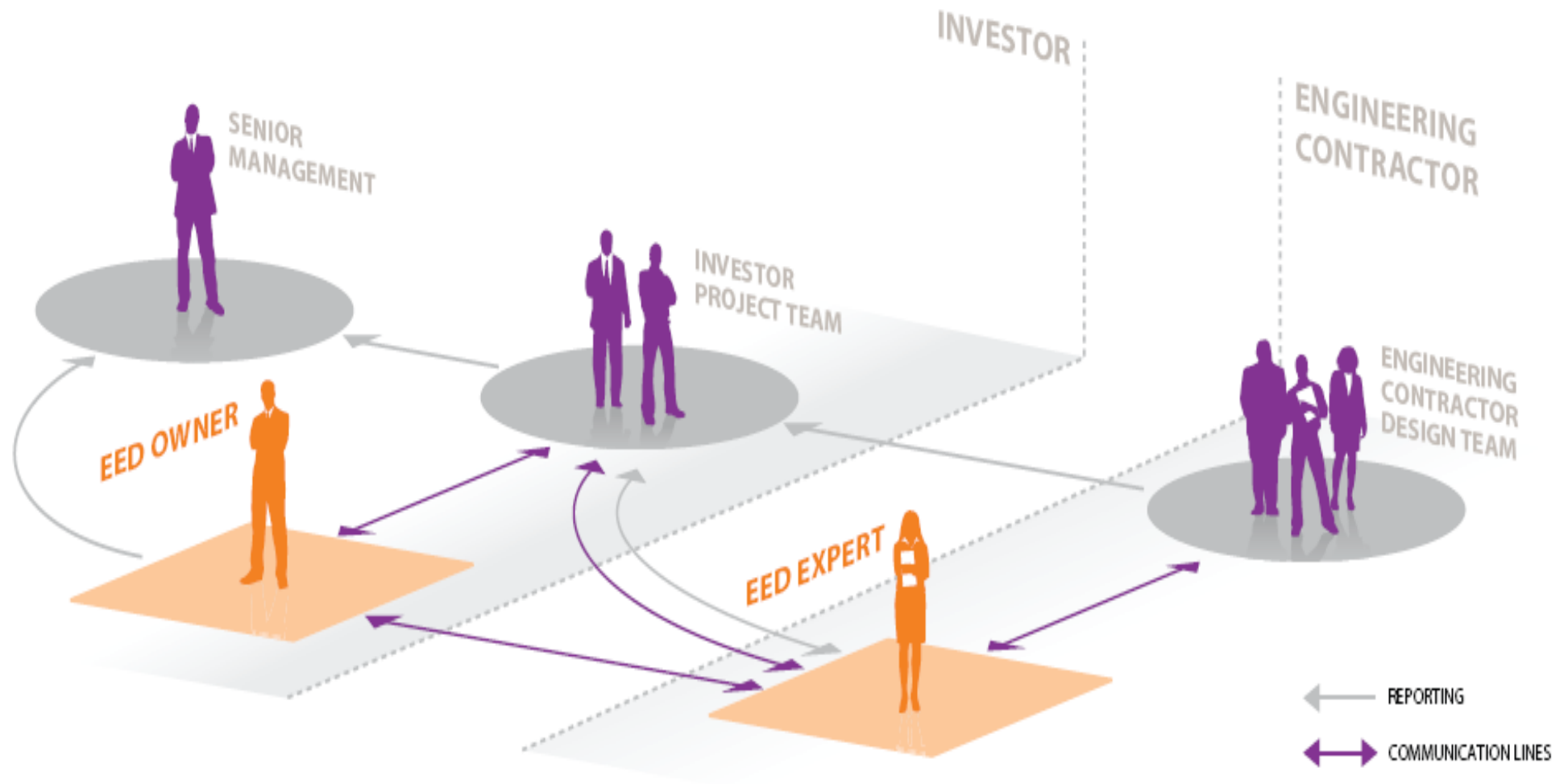
Company	Saving (Euro/ year)	Saving vs. URS/ baseline (%)	Payback (years)
Pharma	300,000	30	1
Pharma	600,000	35	Negative
Abatoir	2,000,000	30	2½
Ready Meals	1,000,000	50	2½
Laboratory	500,000	40	1½
Ready Meals	20,000	20	4
Laboratory	40,000	35	~ 0

# PITTFALLS



- EED is not just a technical discipline - interpersonal skills and “drive” to hunt better solutions from bare ground is crucial for success
- Hand-over of “good ideas” from EED expert to design engineers responsible for solutions is critical (ownership)
- Ownership to EED-process at project owner is important and should be at high level and ready to conclude actions
- The EED expert should be involved in early project phases to challenge user requirements (URS)
- Corporate standards (“how we do...”) a significant barrier – it takes years to influence and change - but it is possible

# EED OWNERSHIP (SEAI)



# FRAMEWORK



- IPCC BAT-note about EED from 2006 should be consulted in major new construction and design projects in industry
- Recent status from Environmental Protection Agency in Denmark re. IPCC BAT-note shows low awareness towards EED
- In Ireland, a NSAI-standard for EED is agreed to be launched in 2013
- EED-guidelines and materials targeting SMEs, hospitals and commercial buildings under development in Denmark in co-operation with building- and project owners