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# **Different quality assurance concepts for Deep Energy Renovation The role of EPC**

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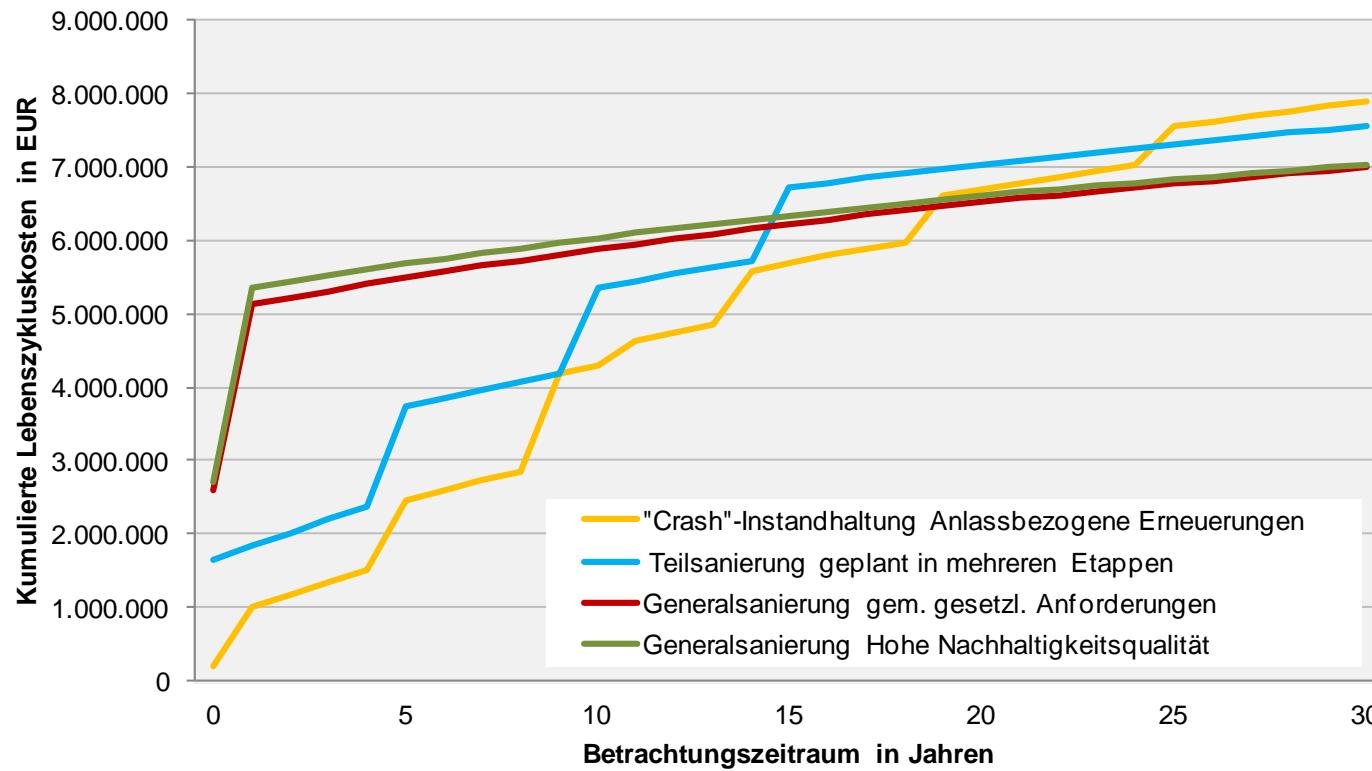
# Starting point: Renovation backlog in public buildings

Crash-Maintenance	step-by-step renovation	comprehensive refurbishment according to legal requirements	comprehensive refurbishment with high energy and sustainability targets
replacement only if required because of urgent repair need (= unplanned stepwise renovation)	subsequent renovation of parts of the building; longer time-periods between each refurbishment step	complete renovation of envelope and building systems according to required engineering practice	complete renovation of envelope and building systems with high energy and sustainability performance

↑  
**prevailing maintenance strategy**

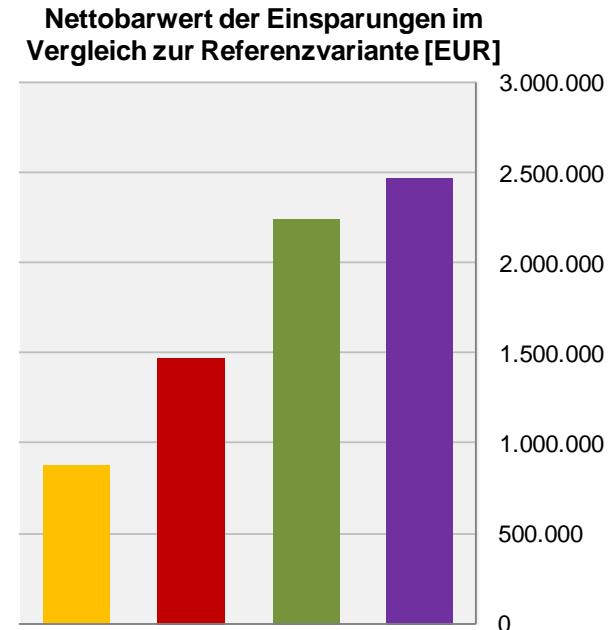
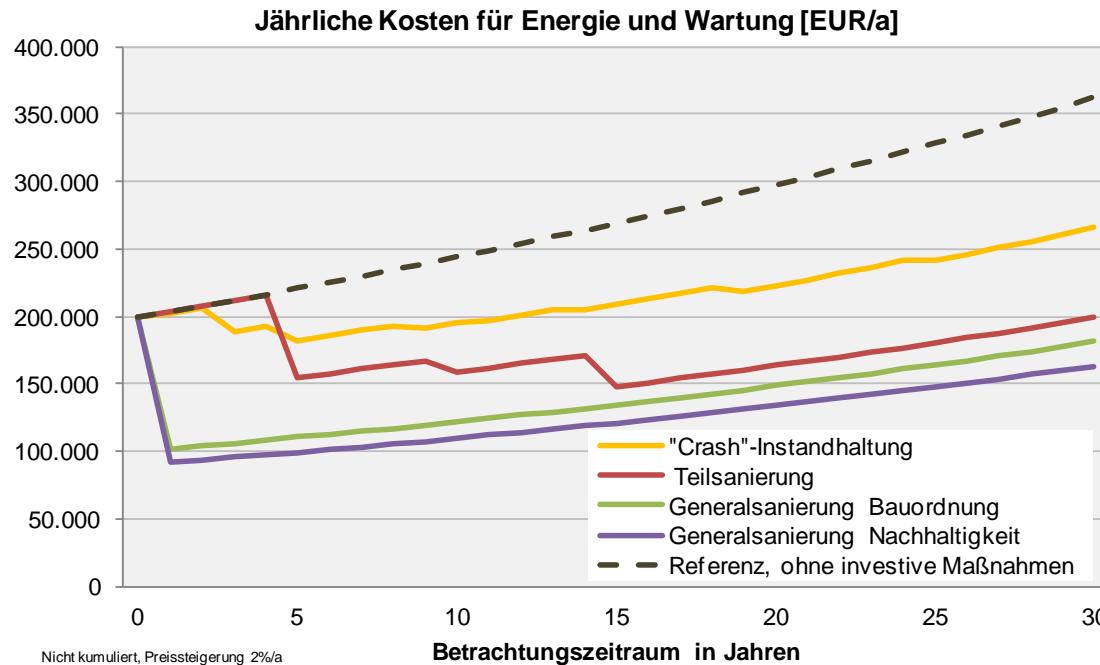
**mainly if functional changes are required; 1-2% per year?**

# Economic reasons for renovation backlog? (1)



- LCCA for several example buildings → typical result
- economic effectiveness of comprehensive refurbishment is highly probable
- energy savings and maintenance savings

# Economic reasons for renovation backlog? (2)



- higher (discounted) savings at comprehensive refurbishment approach
- higher investment potential: approx. € 1,7 mln. for this example

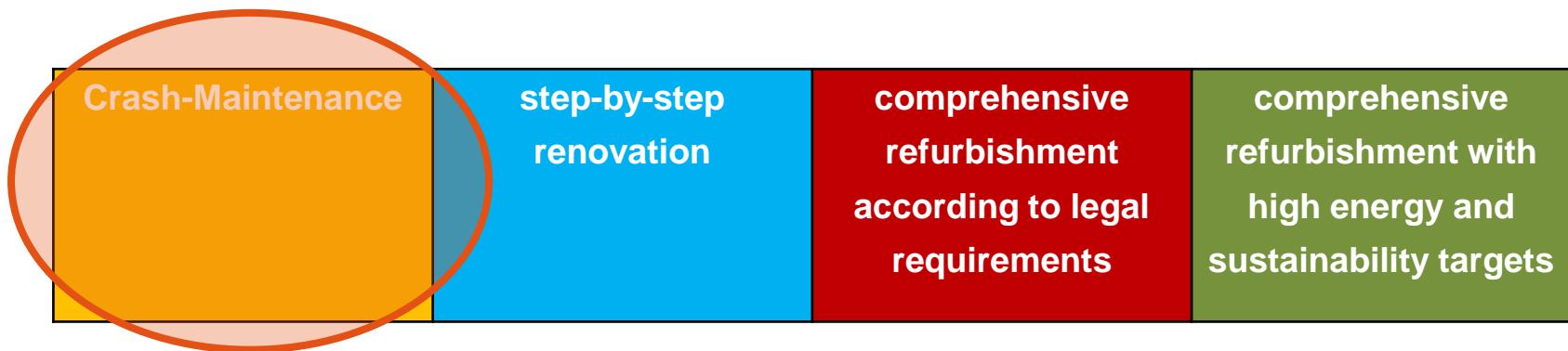
# Barriers and approaches for increasing „activity levels“



- lack of staff for the preparation of comprehensive refurbishment projects
  - outsourcing to external experts
  - BUT:** strategic project management needs to remain at the side of the client
- financing limits for public bodies
  - PPP-models / Third Party Financing as part of EPC
  - BUT:** high uncertainty
  - Eurostat guidance notice** reduces uncertainty but restricts the potential application fields

# Approach A: Energy Performance Contracting

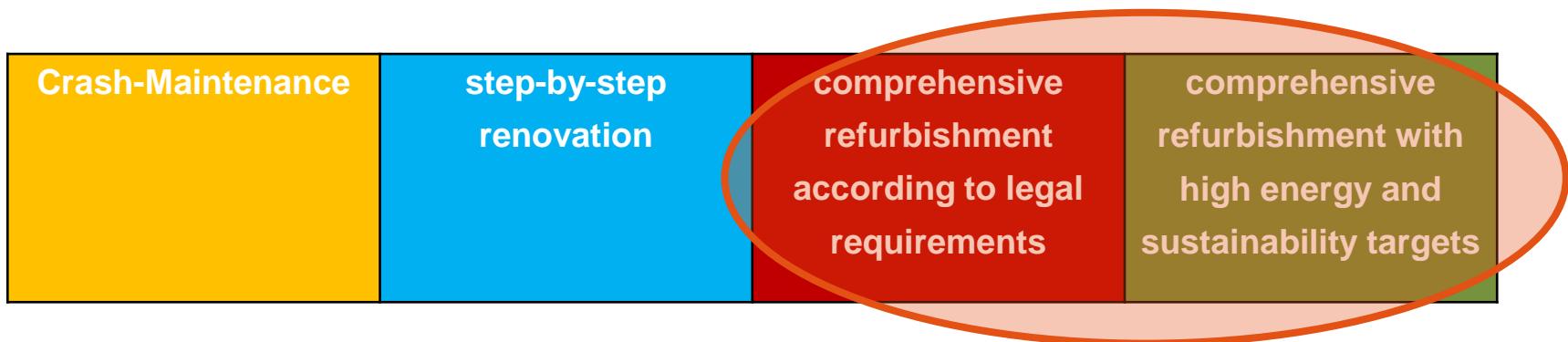
- successful approach in many EU countries for energy optimisation



- improvement of strategy of crash-maintenance
- little success in boosting EPC towards comprehensive refurbishment – WHY?

# Approach B: Integrated Design (ID) for comprehensive refurbishment projects

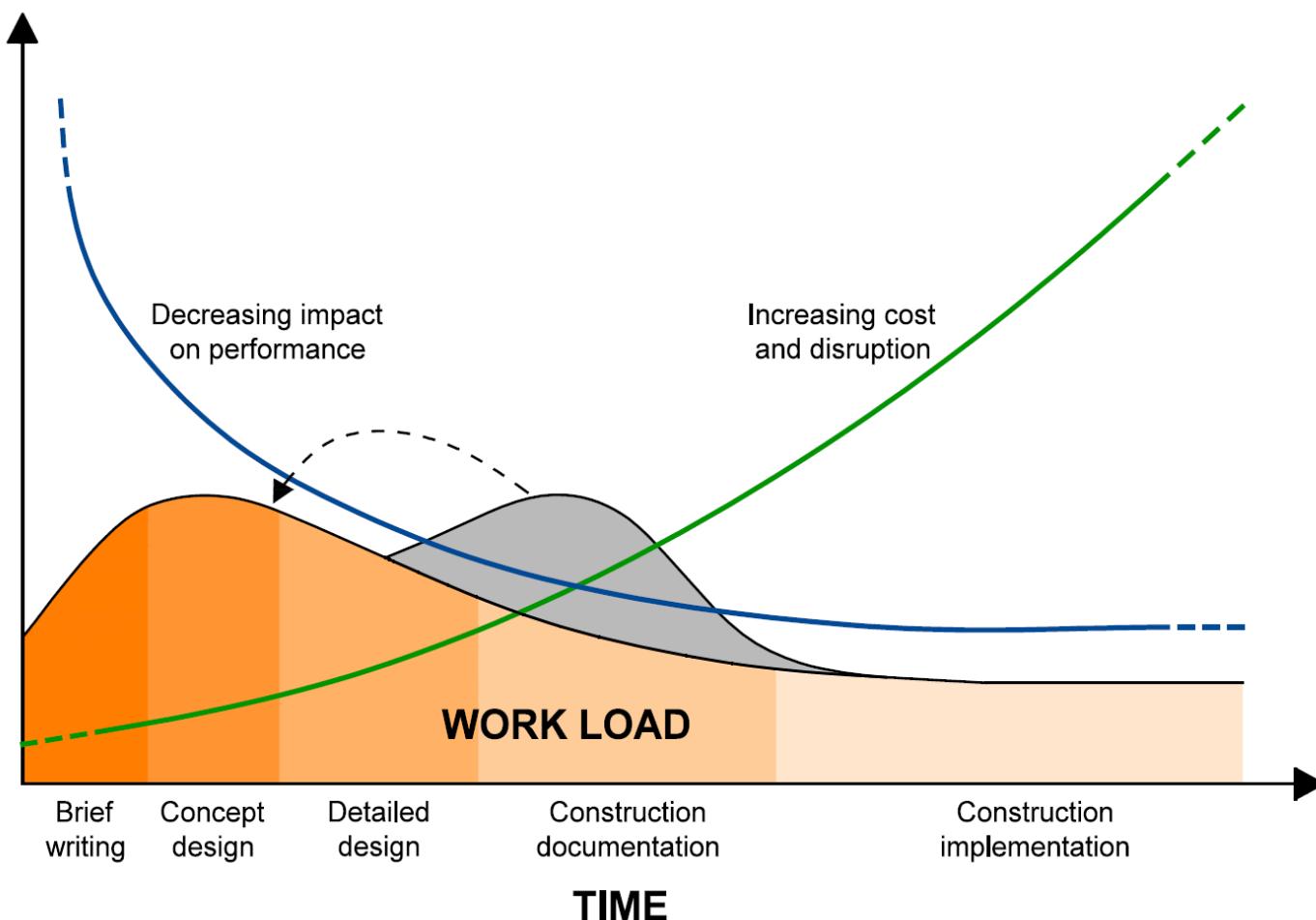
- If a client decides to implement a comprehensive refurbishment project (usually) a design process is initiated
  - well-defined structure of design processes
  - clients' organisations are used to implement design process



- ID is a way
  - to foster collaboration between stakeholder of design processes
  - to overarch the interfaces between design, implementation and operation

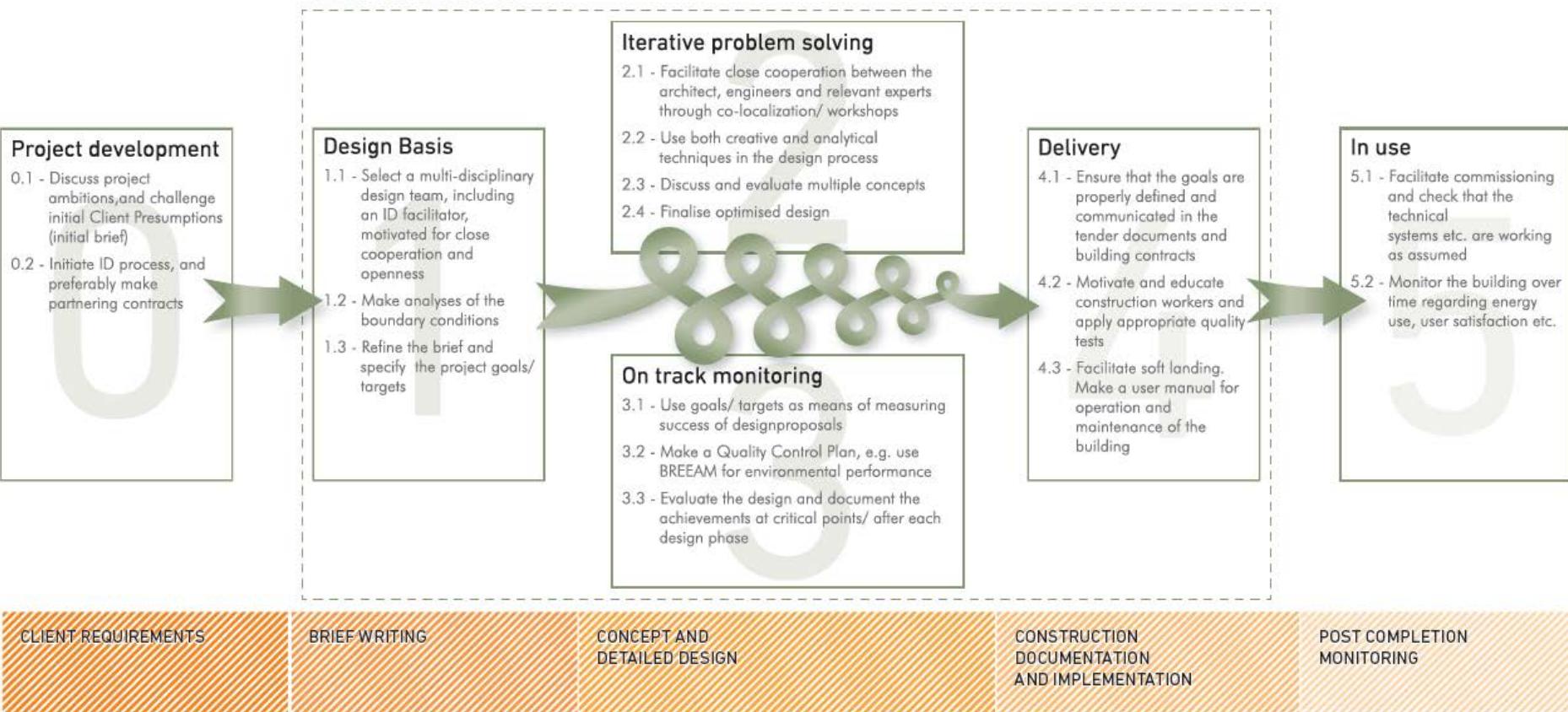
# Approach B: Integrated Design

## Focus on early design phases



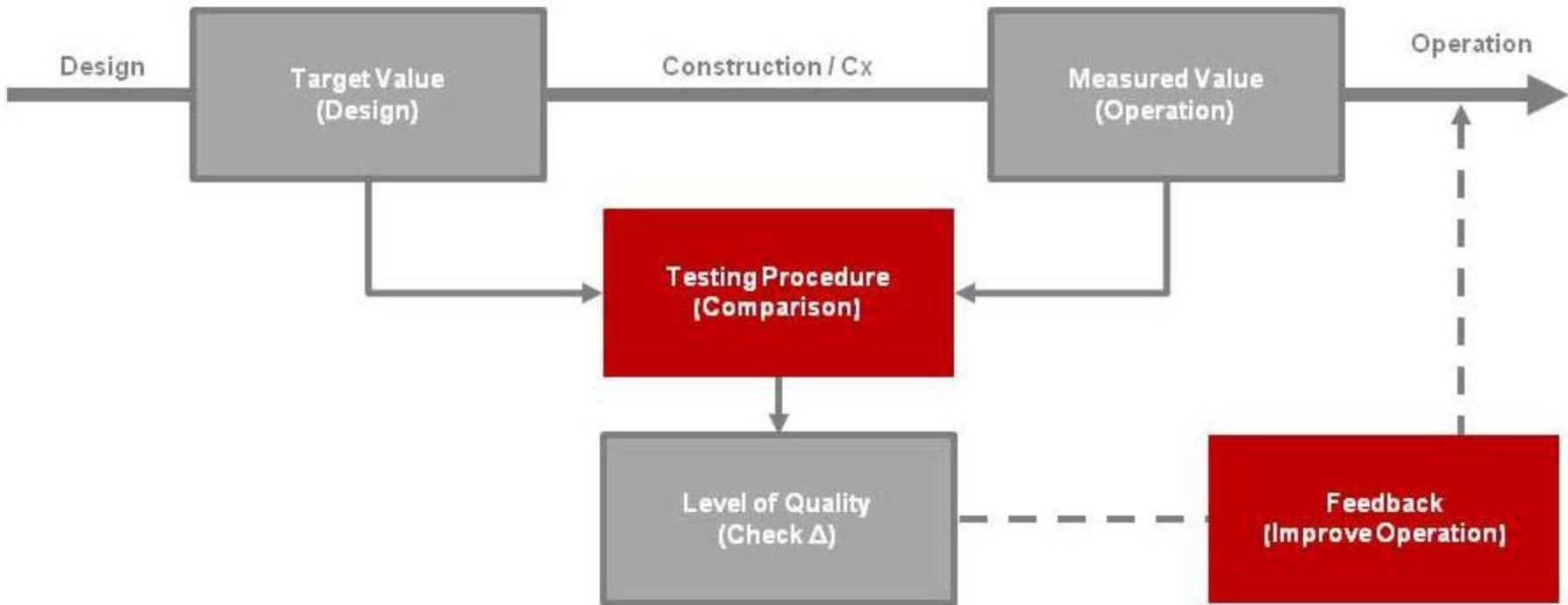
# Approach B: Integrated Design Overview of the ID process

## THE ID STEPS



The creative problem solving process (2) runs parallel in time with monitoring the progress according to the goals (3). This is rarely a straightforward process, and the phase should be kept open long enough for all necessary information to be integrated in the design.

# Approach B: Integrated Design Linking ID to the operation phase



- Implementation of a quality management feedback loop
- Ensuring commissioning of system operation as planned
- clear target values for regular operation

# Conclusions for discussion

- Both EPC and ID are approaches that rather improve the quality of comprehensive refurbishment projects than the activity level
- ID is closer to standard processes of comprehensive refurbishment projects → higher probability of application
- When applied to comprehensive refurbishment EPC resembles to the model of “total contractor”
  - commissioning of design, implementation and operation (potentially including financing) to 1 single contractor
  - very little experience → little probability of application

**Thank you for your attention!**

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