CENTRE FOR RESEARCH INTO
ENERGY DEMAND SOLUTIONS

Deep retrofit approaches: Managing risks to minimise the energy performance gap

ECEEE 2019 SUMMER STUDY

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Deep retrofit definition…

UK

80% reduction in emissions from an average UK (RfF programme)

(roughly 17 kgCO2/m2/year or 115 kWh/m2/year primary energy consumption)

EU

minimum of **75% energy savings** (GBPN)

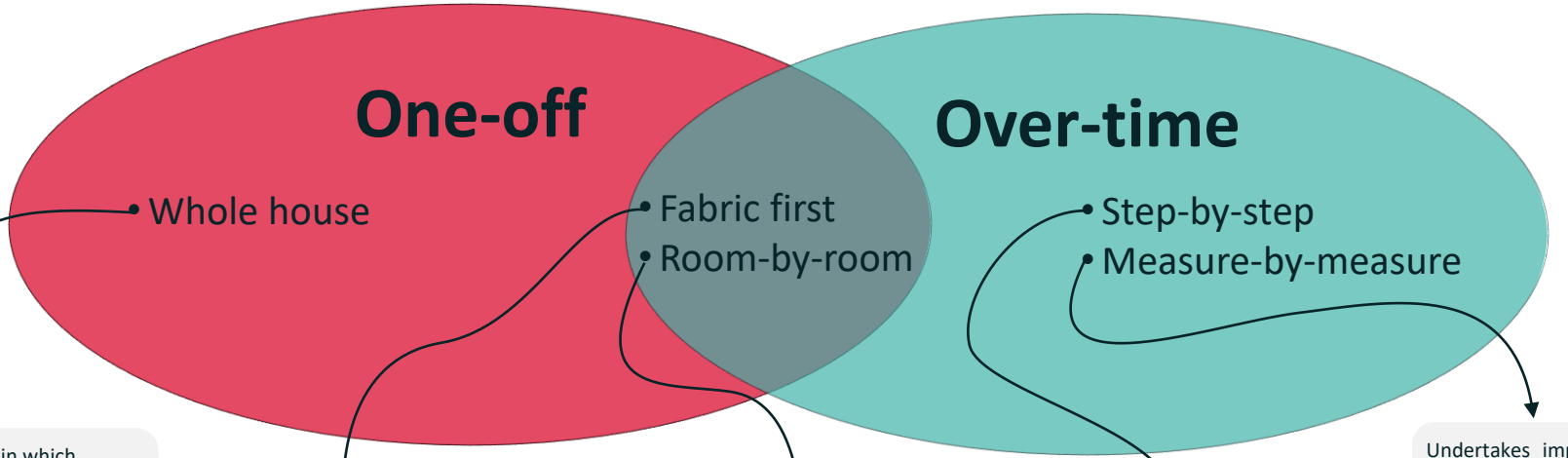
Or 'significant (**typically more than 60%)** efficiency improvements' (European Commission)

US

energy savings of 30%-50% (GBPN)

…no common definitions in India and China

Five approaches to deep retrofit



Interventions in which elements & interfaces and users that interact with each other as a whole

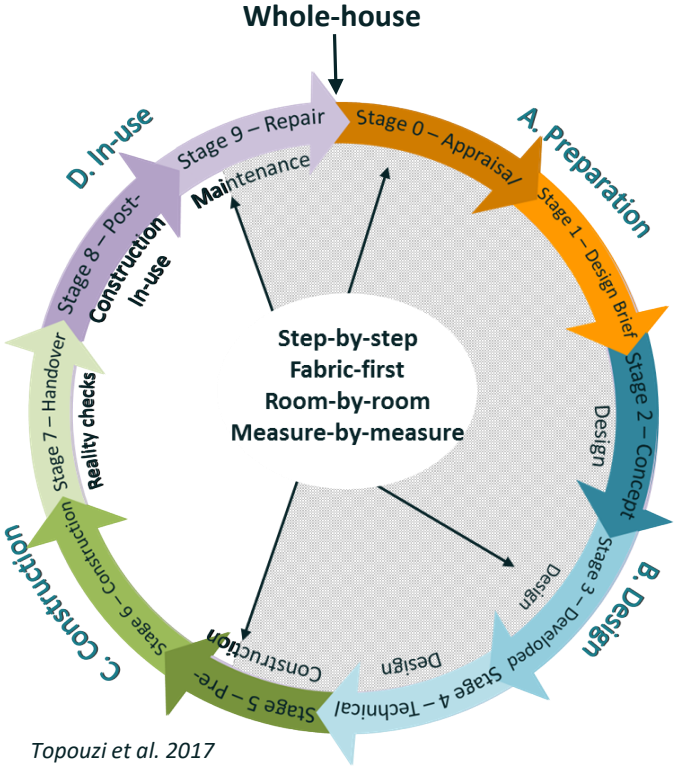
Prioritises interventions that **maximise the performance** of components and materials of the **building fabric**

Prioritises interventions addressing upgrading guidance of energy efficiency measures **based on occupants' occupancy and lifestyle priorities**

Prioritises improvements in a **sequential order over years** depending on financial, building & systems lifespan, lifestyle changes **'trigger points'**

Undertakes improvements as arise from an **isolated measure or system failure** or life span replacement

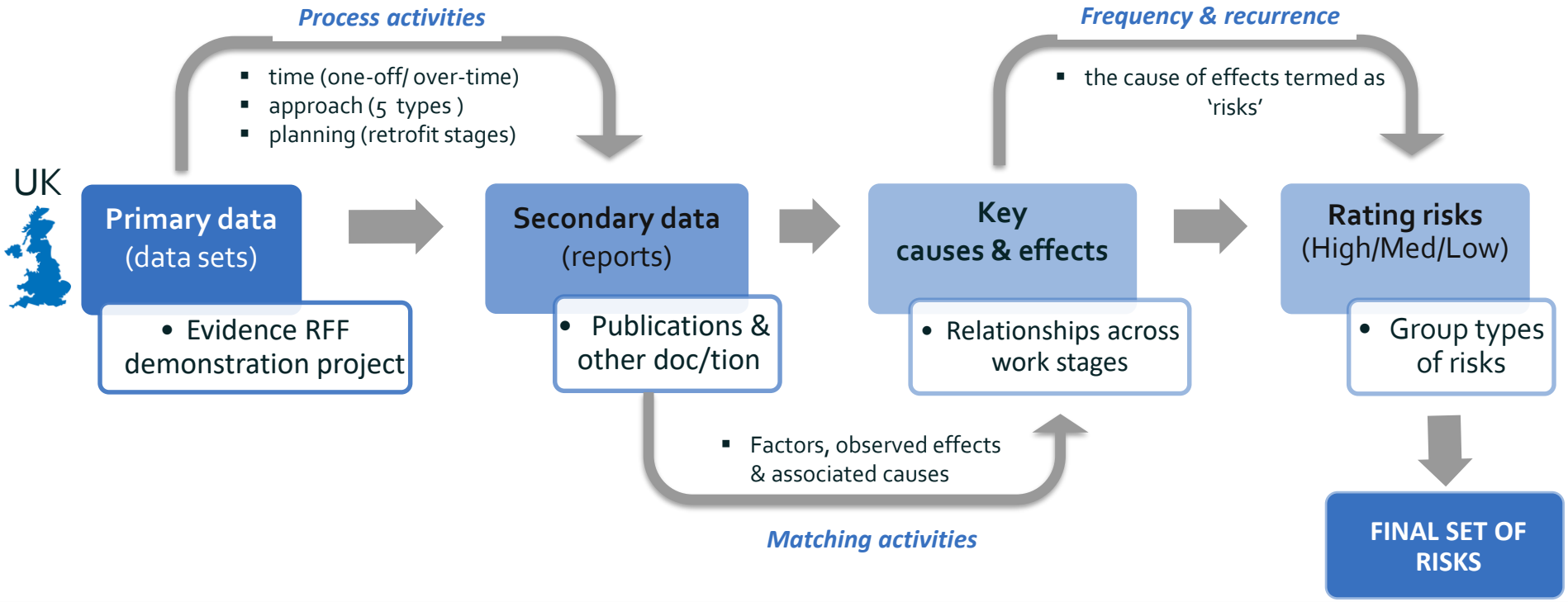
Retrofit process: Stages & approaches



Topouzi et al. 2017

- **10 work plan stages** within a retrofit process
- **Start point varies** depending the approach
- Retrofit projects **do not finish** at the **delivery** stage

Analysis of process risks



Retrofit process: 3 Risks in managing & planning

Assessment risks:

- **type** of diagnostic techniques used to understand the building performance
- **skills** of people undertaking assessment
- **time** when assessments are carried out

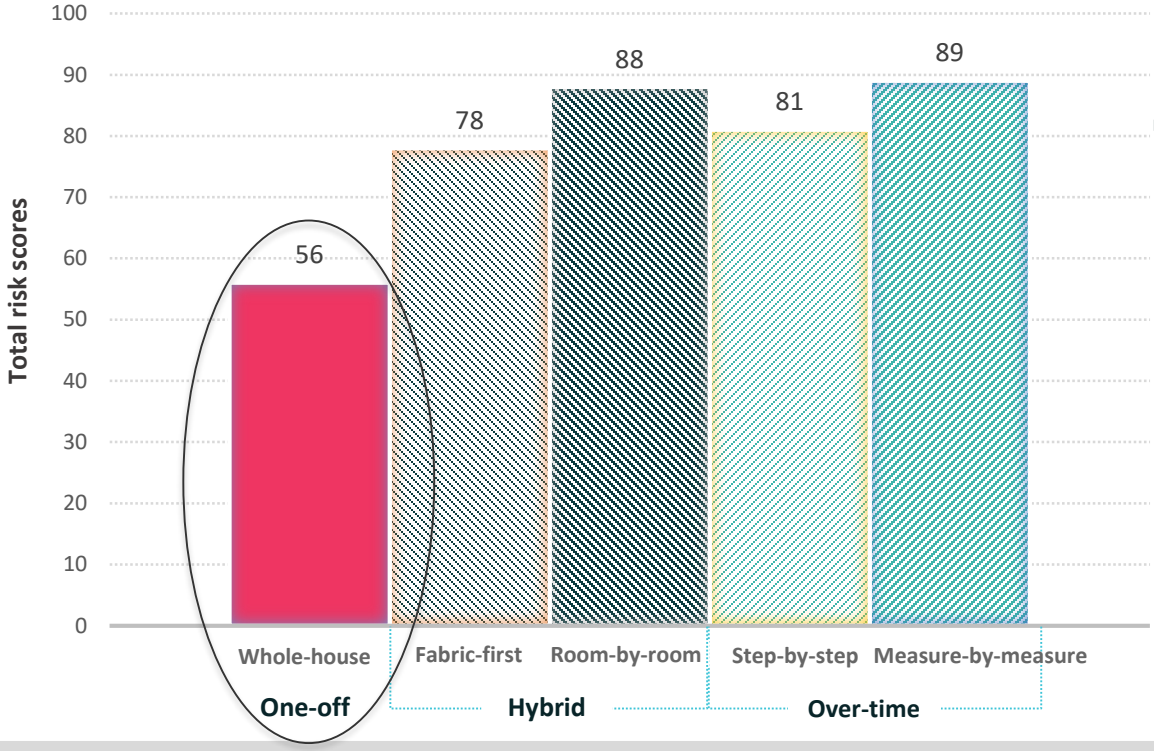
Sequence risks:

- choice of managing the **order** of retrofit works in long and short term planning

Communication risks:

- **type, level / purpose, timing** of communication methods used by different actors/roles

Process risks in different retrofit approaches



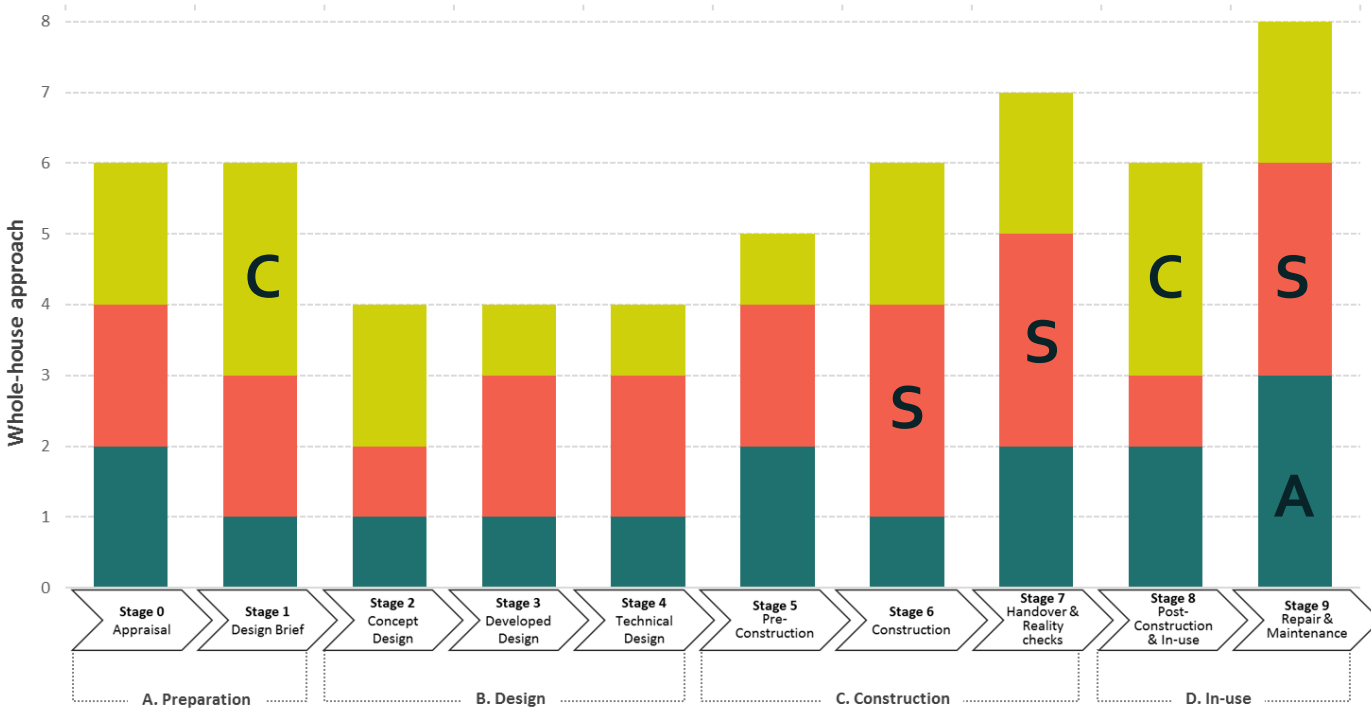
- Process risks are always present and **not restricted to just one type or in specific work stages**
- Even the least risky **whole-house approach, involves significant risk**

One-off : Whole-house approach

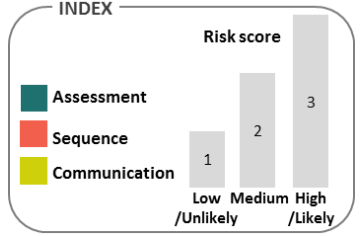
Assessment: overlooking final performance & not feeding back into the project team for future learning

Sequence: 'wrong' order due to insufficient management; structural damage from installation at later stage of one measure over another

Communication: leading to inappropriate choices of technology, installation failures or on-site problem solving be disconnected from other building components, design and usability principles



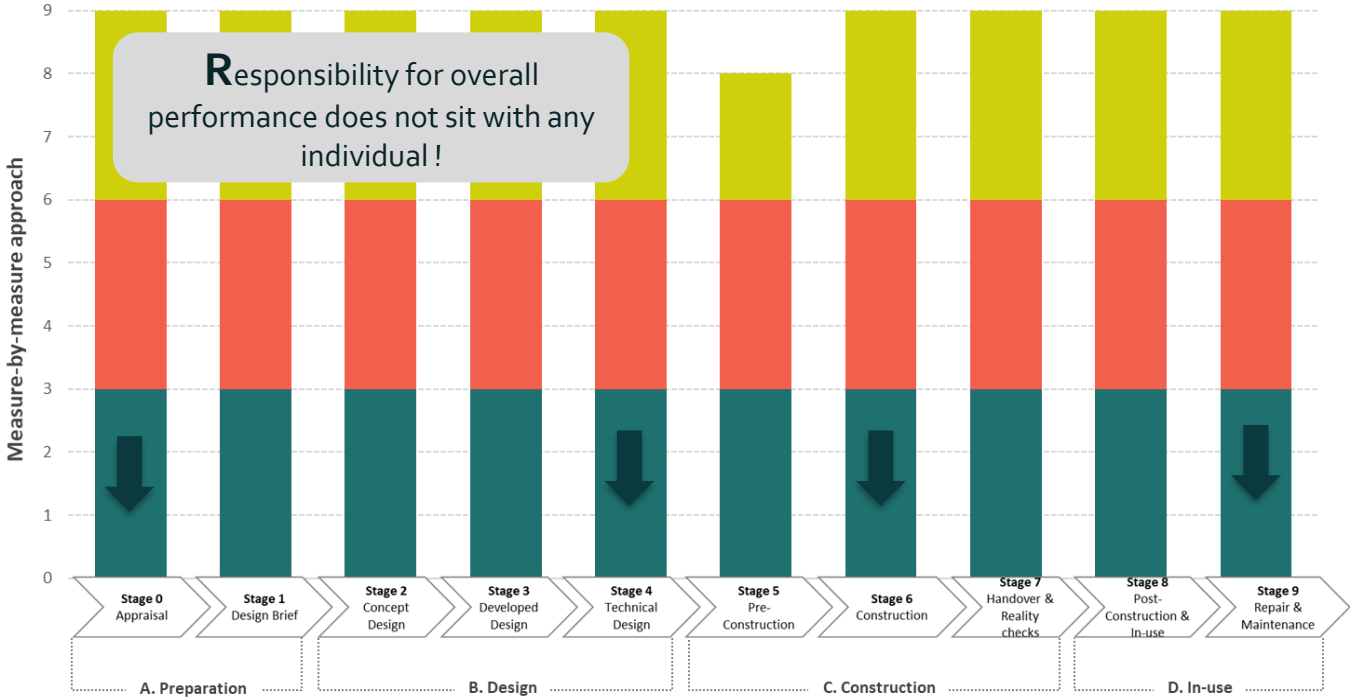
Over time: Measure-by-measure approach



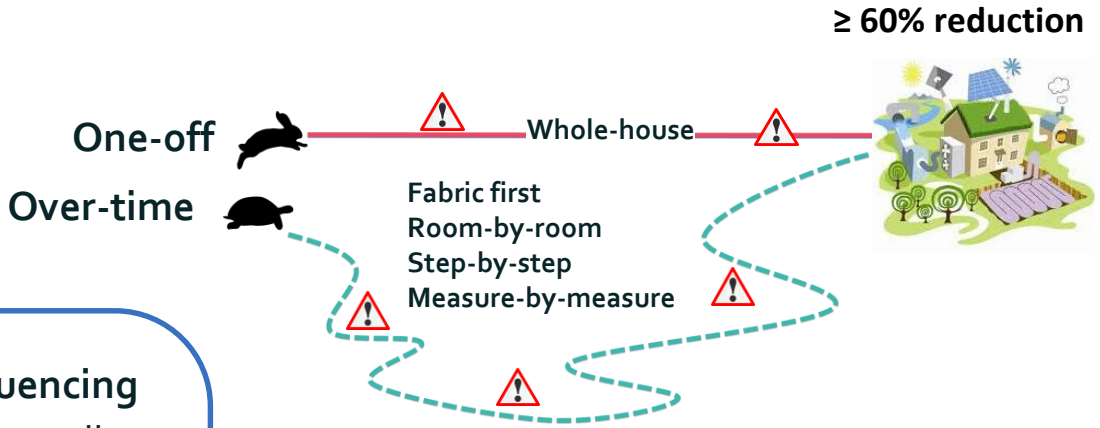
Assessment: diagnostic technique type or timing not be part of project planning and budget; or a lack of skills in the people carrying out the assessment process

Sequence: short term managing missing long term planning- incompatibility between measures

Communication: missing assigned responsibilities & co-ordination of actors by subcontracting measures/systems over time affects decision-making, construction project planning and management



Conclusions



Either approach carries **assessment, sequencing** and **communication** risks distributed among all work stages and not restricted to only a sub-set

Original goals can get lost, subverted, forgotten or mis-remembered when **assessment, sequencing** and **communication** aspects are not integrated into retrofit planning and management

Little evidence on:

- **planning and management processes** of retrofit projects, and the impact of planning and management decisions and behaviours on the energy performance of a building

Towards 'Making building policies great again'

Profound change of culture in **planning, managing** & **documenting** building works

Risk management strategies integrated into retrofit works

Continuity
personnel, planning, management & aftercare support

new documents

to fill in some of the gaps of institutional memory (e.g. Building Passports)

new project teams dynamics

towards the unity of a single project (e.g. BRPs LOGBOOK working with a common goal moving from individual tasks to a building's performance as a whole at all stages)

new practices

with implications for education and training (e.g. UK's PAS2035 Retrofit standard focus on quality of management, and the qualification and skills needed at different project stages)

Thank you for listening!

evidence from Projects or Case studies of deep retrofit

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