Solid wall insulation installers: knowledge, motivation and the role of policy

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Wall insulation: getting it right in old buildings

Wales Traditional & Sustainability Building Skills Advisory Group
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- Context of research
- Research aims + overview
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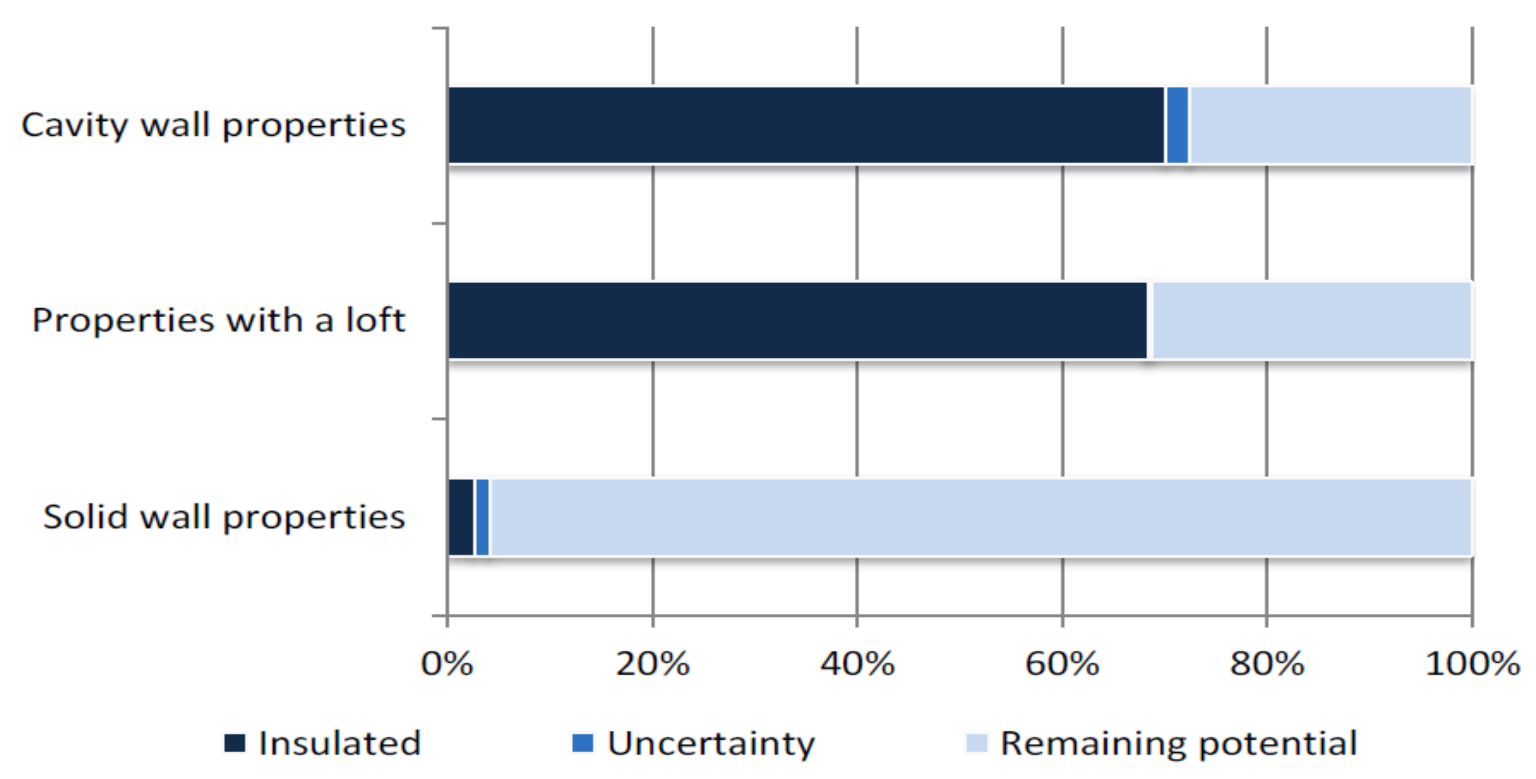
Introduction

- Third-year PhD researcher

- Academic background in architectural science + theory
- Professional background in building trades

- Supervised by Prof. Chris Tweed + Dr. Julie Gwilliam

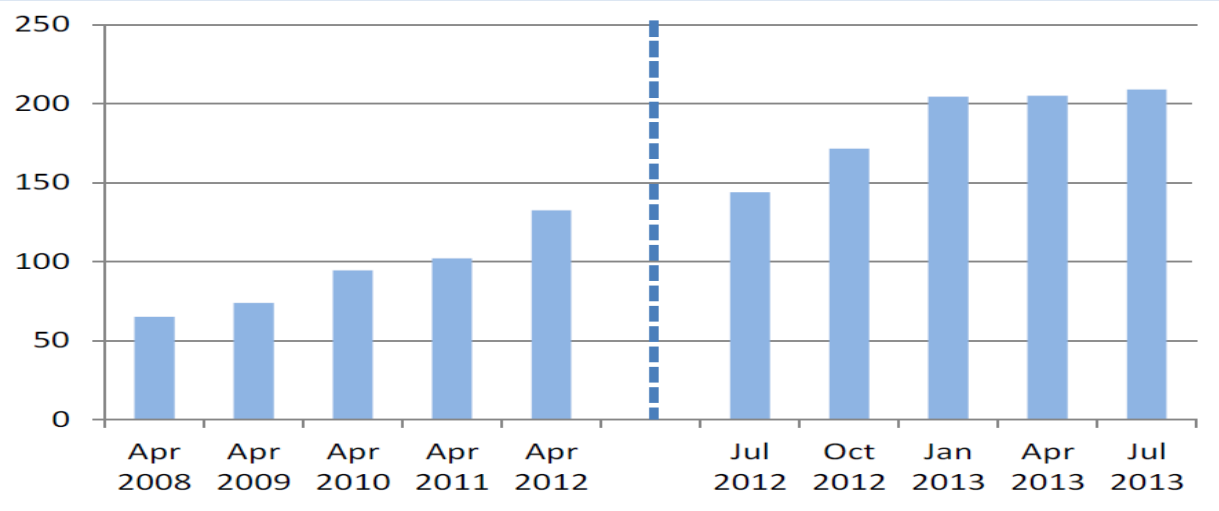
- Research supported by EPSRC and BRE Trust



Remaining potential to insulate UK housing stock (July 2013) (DECC, 2013)

- ~7.7m solid wall + ~4.5m hard-to-treat cavity properties without insulation

- Rise in installations:
  - +31% (36,000) Oct 2011 - Oct 2012
  - +45% (65,000) Jul 2012 - Jul 2013



Homes in UK with SWI, Apr '08 – Jul '13 (thousands)

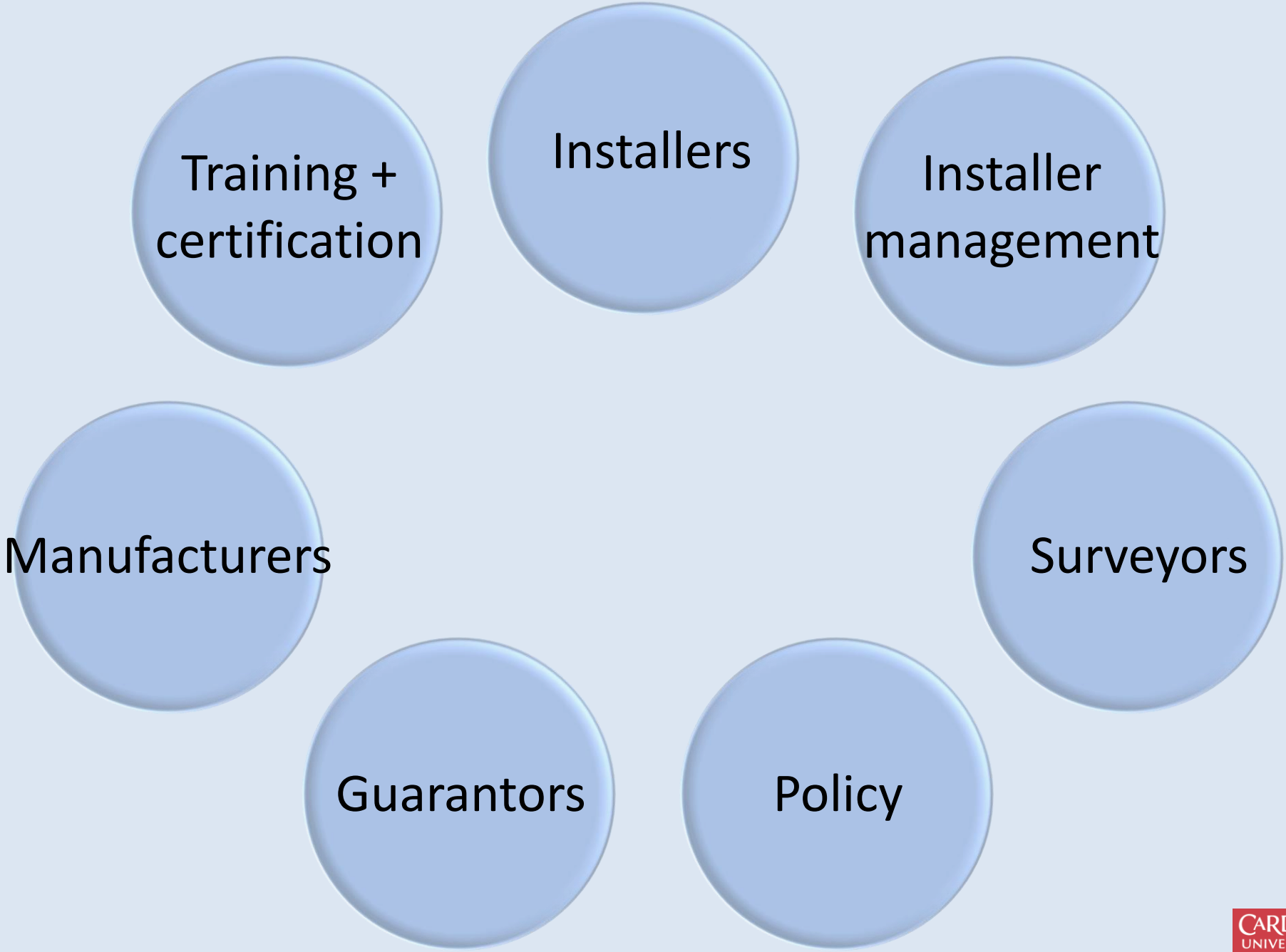
(DECC 2012; DECC 2013)

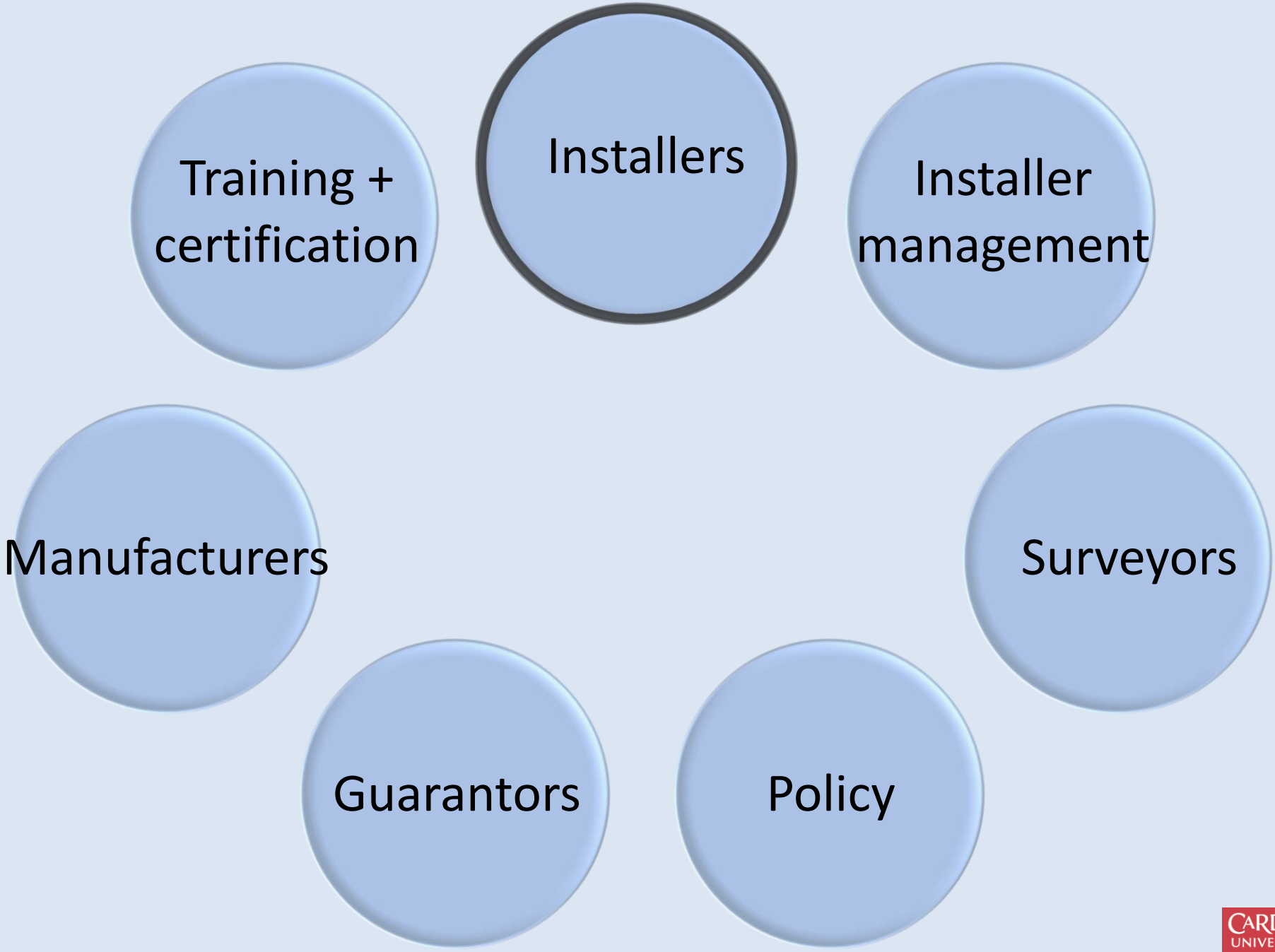
Aims

1. Understand challenges to following best practice guidance
2. Understand how best practice is affected by installer practice (technical knowledge, skills, motivation)
3. Study trends in management, quality assurance, installer practices, technical knowledge, training, government policy
4. Outline opportunities for improving the delivery of SWI, external support and government policy instrumentation

Overview of research

- Mixed-method qualitative work
- Inductive, ‘bottom-up’ approach
- Ethnographic tradition:
  - non-participant observation
  - participant observation
  - informal/formal, unstructured/semi-structured interviewing


Training + certification
Installers
Installer management
Manufacturers
Surveyors
Guarantors
Policy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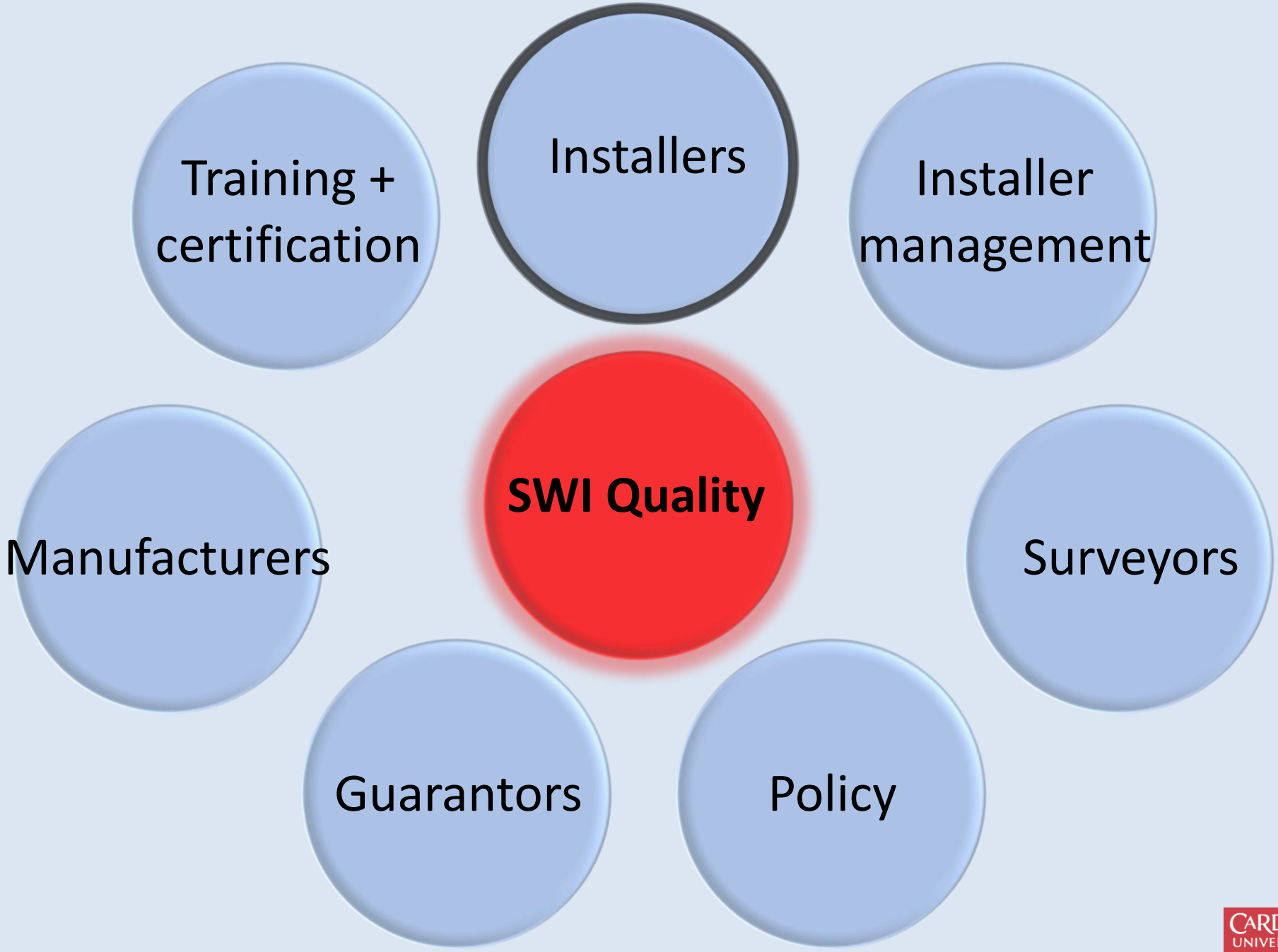

Training + certification
Installers
Installer management
Manufacturers
SWI Quality
Surveyors
Guarantors
Policy

Siting and participants

- Research sited in England and Wales
- Extended study of leading SWI installation firm

- 100 professionals
- 1000 properties: primarily non-traditional in area-based programmes

- Purposive sampling

Identified problems

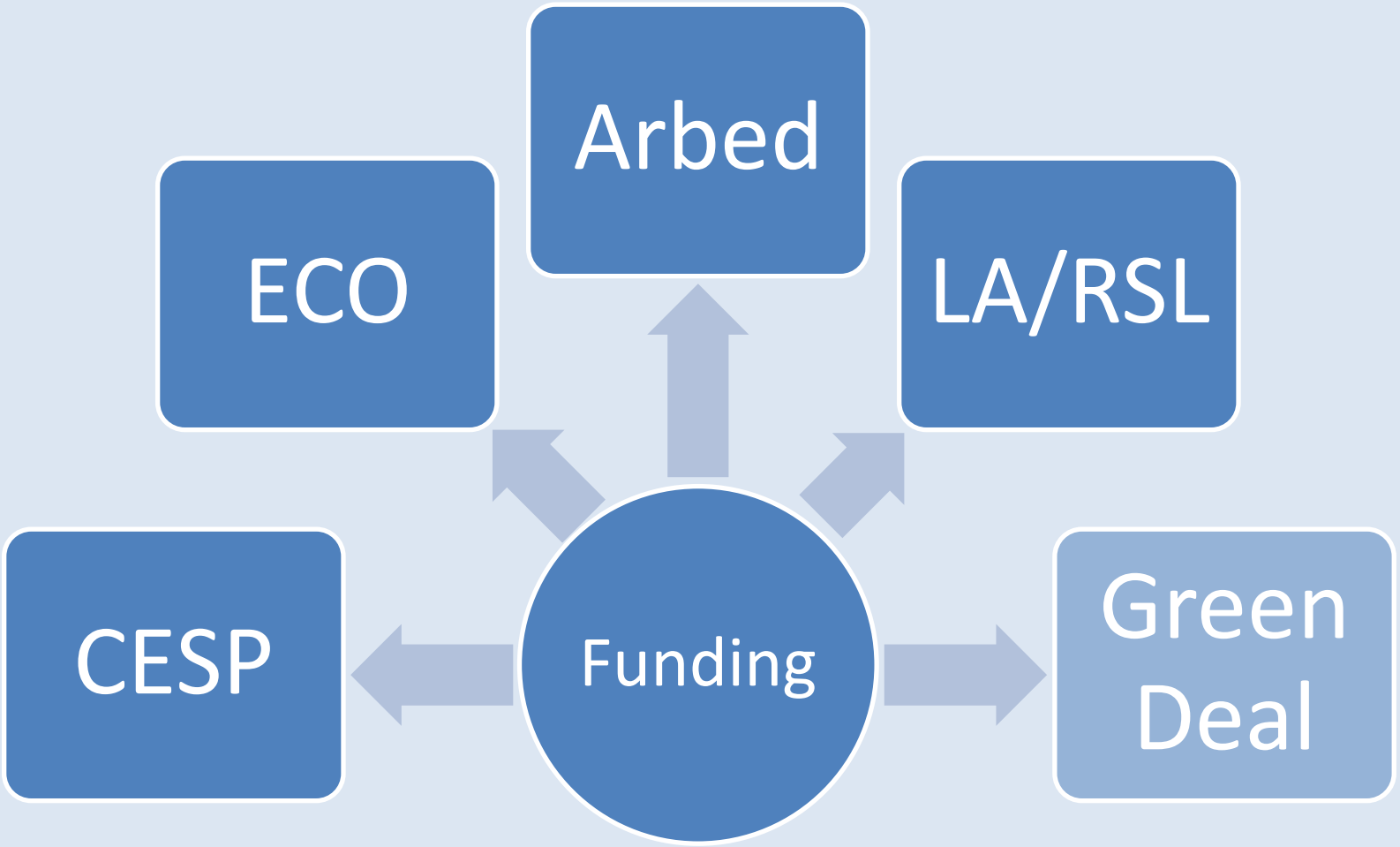
External

- Inconsistent identification/removal of areas of delaminated render (pre-installation)
- Limited assessment of characteristics of building and siting prior to specification
- Signs of movement in building ignored
- Parge coating essentially never undertaken, regardless of wall surface
- Gaps left between boards and void at bells
- Reveals not insulated
- Weep holes/channels of windows covered by oversills
- Gaps between boards, at times up to 10-15mm
- Mesh not fully embedded
- Stress patches of inadequate size
- Bond pattern of boards not in line with spec
- Fixings: specified pattern not followed, overdrilled, oversunk, etc.
- Adhesive (where specified) not applied consistently to board
- Inconsistency of pattress placement for hanging baskets, etc.
- No insulation below DPC (often starts 50mm above)
- Reveals not insulated
- Sills, verge trim, etc. not adequately sealed, or mistakenly left unsealed
- Capillary grooves on sills compromised
- System stops, base rail, trim etc. not firmly fitted
- Poor/no ground clearance, particularly around doorsteps, ramps, etc.
- Meter boxes left in place, services boxed around rather than moved to outside of system
- Spill of verge cap and window sills often inconsistent (e.g. verge cap tilted in toward house)
- Top coat missing in small areas of wall (seen in two instances)
- Significant thermal bridging left at eaves – both with soffit and without. Heads of top-floor windows often left uninsulated if at roof level
- Thermal bridge at area over porch roofs, etc. (often >100mm left uninsulated)
- Flashing over conservatories, shed roofs, etc. not boarded over with insulation
- No clearance left at gas shut-off valves
- Service penetrations not adequately sealed
- Inadvertent blocking of direct air vents for gas fires and back boilers
- Blocking of drains, poor routing of rainwater goods and wastes to drains (causing splashing or flooding)
- Brick slips or high durability finishes not specified in high traffic areas
- Silicone render not specified over acrylic when climate conditions dictate
- Embodied impact of materials is not a factor in specification
- Penetrations of system (e.g. satellite dishes, hanging baskets, rainwater goods) insufficiently robust, may allow rain penetration over time
- Silicone sealant applied to dusty or unclean surfaces
- Renders and adhesives applied and/or stored in unsuitable weather conditions (cold, rain, heat)
- QA processes relegated to 'tickbox exercise'. Individual properties not adequately tracked
- No commissioning or handover process

Internal

- No vapour control installed
- Poor butting of insulation boards
- Assessment of suitability of IWI for building is inadequate, no consideration of 'breathable' wall construction and specification of 'vapour permeable' IWI systems
- Embodied impact of materials is not a factor in specification
- Wallpaper, wainscoting, organic material not removed prior to installation
- Large gaps (10-150mm) left between boards and walls/ceilings/floors/sills – often coving is not removed and boards stop short of this height
- No insulation installed in floor/ceiling voids
- No insulation continuity between wall element and loft insulation
- Cheeks/reveals not insulated
- Window sills not insulated (including bow windows, etc.)
- No inspection of exterior of wall to determine weather-tightness, rising damp, etc.
- No consideration of ventilated cavity behind insulation or vents through wall, even in areas of high exposure of likely interior damp
- Window trickle vents covered by insulation
- Cupboards, meter boxes, in-built furniture etc. left in situ and no insulation placed behind
- Where floor-ceiling voids are not insulated, ceiling and floor penetrations are not sealed to reduce vapour transport
- Joists not protected from condensation risk (particularly relevant where joist space is not insulated)
- Insulation not returned along partition walls (thermal bridge)
- Service penetrations not adequately sealed
- Inadequate fixings
- Pattresses not provided
- Insulation left outside in rain on installation day (wet insulation installed)
- No QA process in place whatsoever
- No commissioning or handover process

What drives SWI?



Policy instruments: common denominators

- Pay by carbon savings (installers by £/m^2)
- Remuneration based on notional improvement
- ‘Displaced accountability’

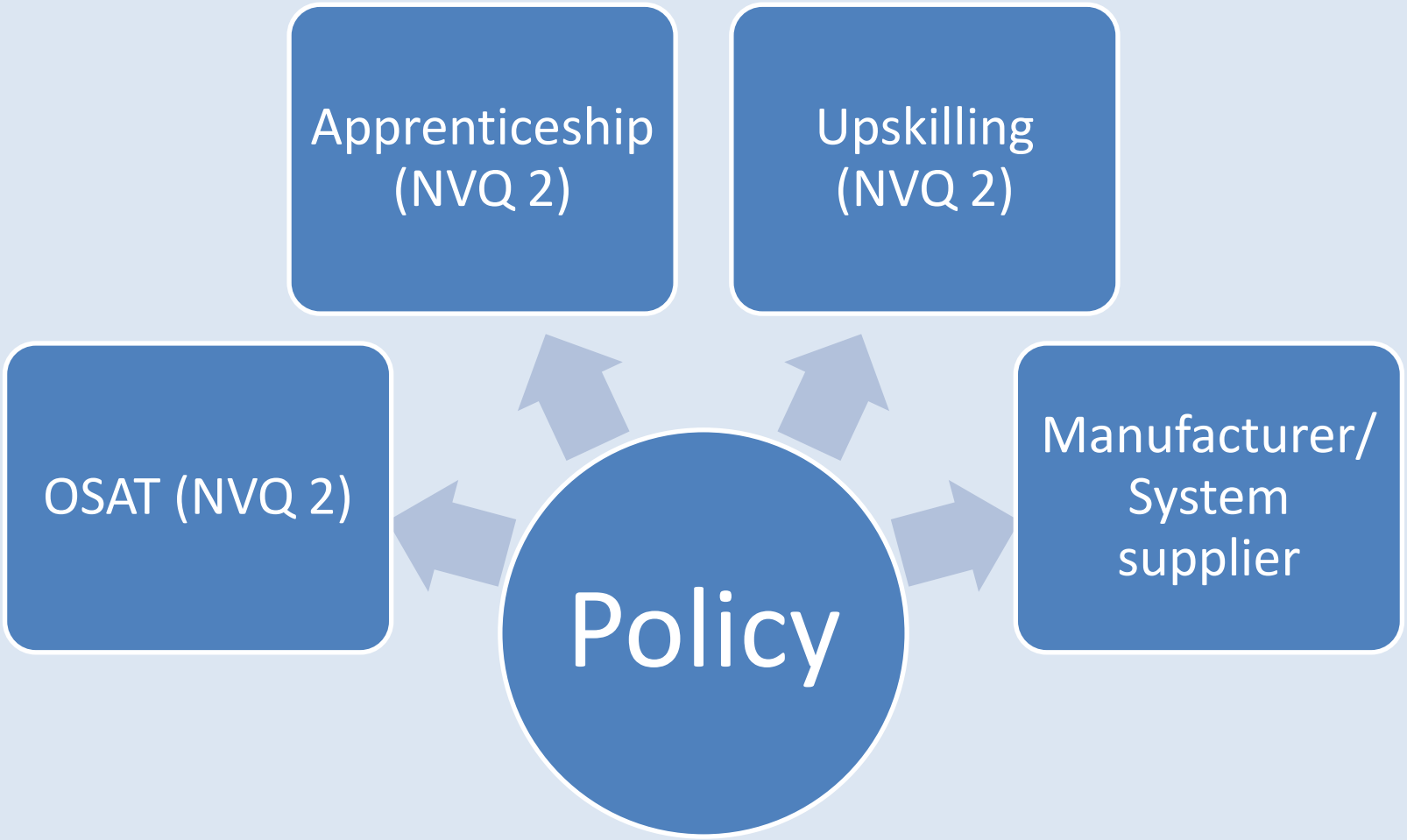
- ‘Siloed’ framework: disjoined initiating, funding, training, certification and regulatory bodies

- ‘Artificial’ pressures

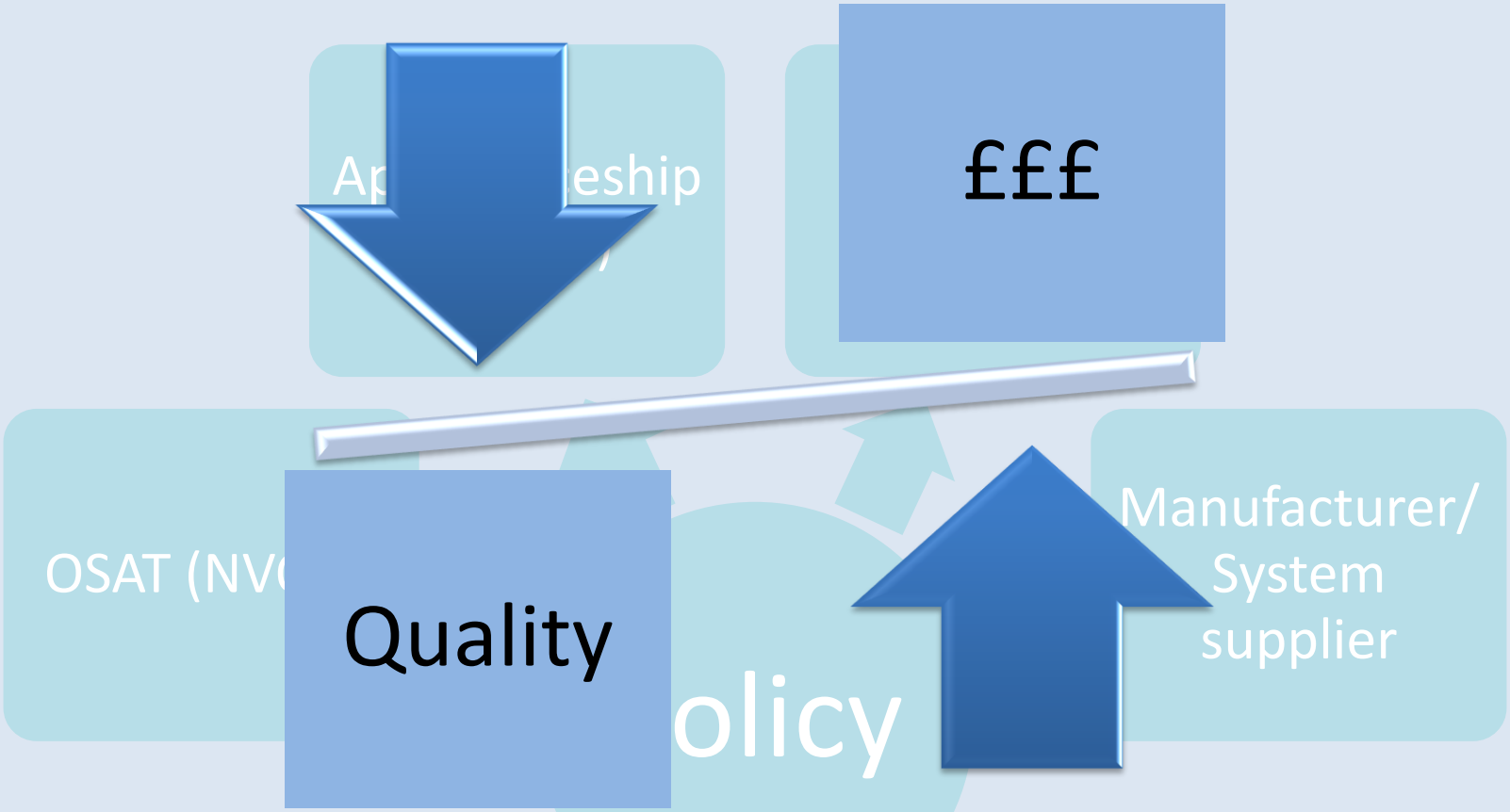
Policy instruments: common denominators

- Single measure/whole house improvement
- Varying degrees of robustness in QA + auditing
- Who do we rely on for specification? Who do we trust to certify installers + sign off installations?
- *Where are the experts?*

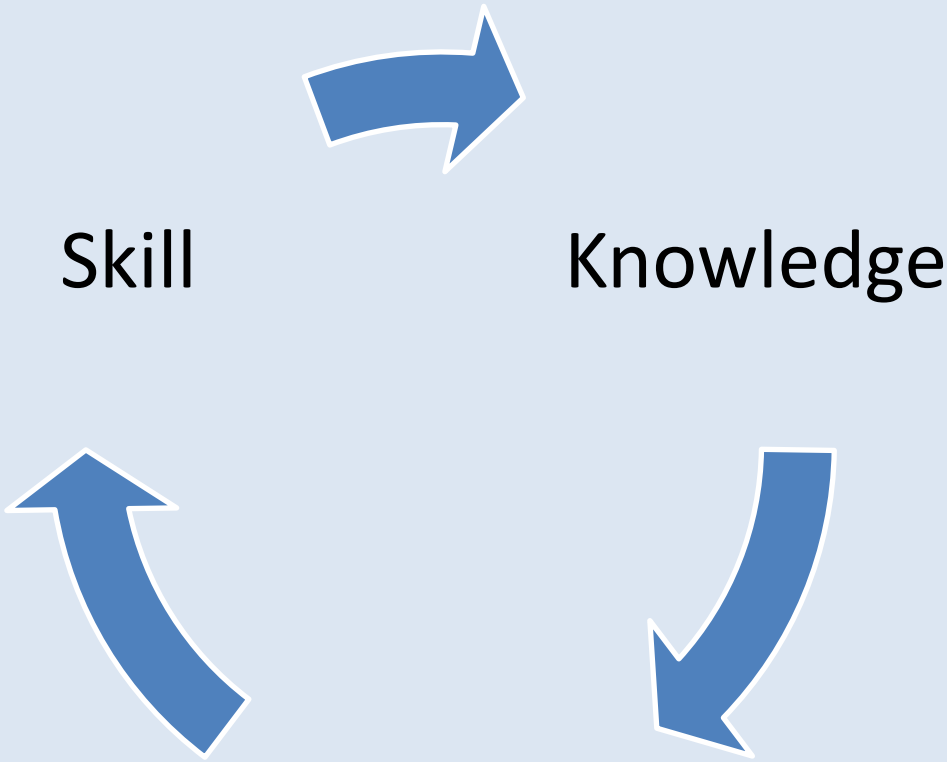
Training

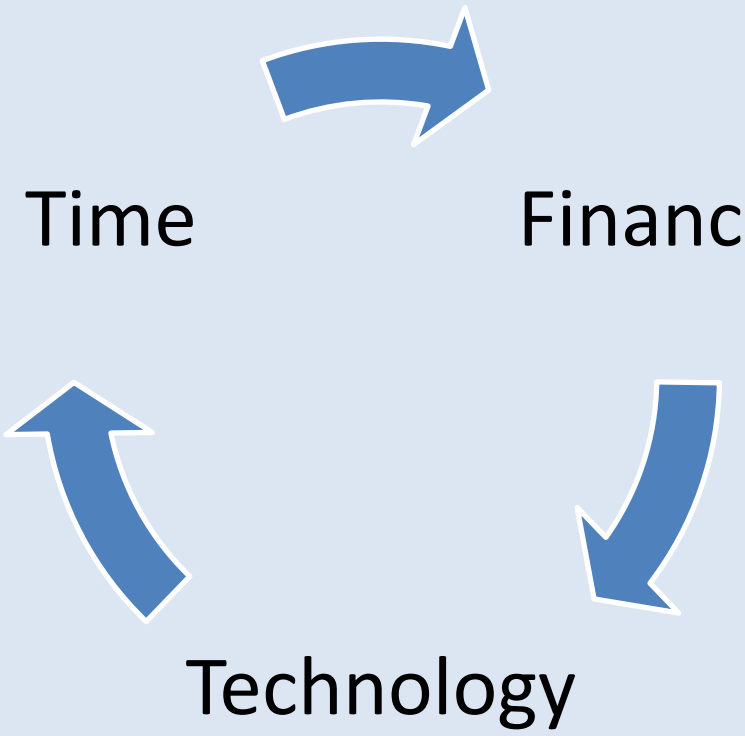

Apprenticeship (NVQ 2)
Upskilling (NVQ 2)
OSAT (NVQ 2)
Manufacturer/ System supplier
Policy

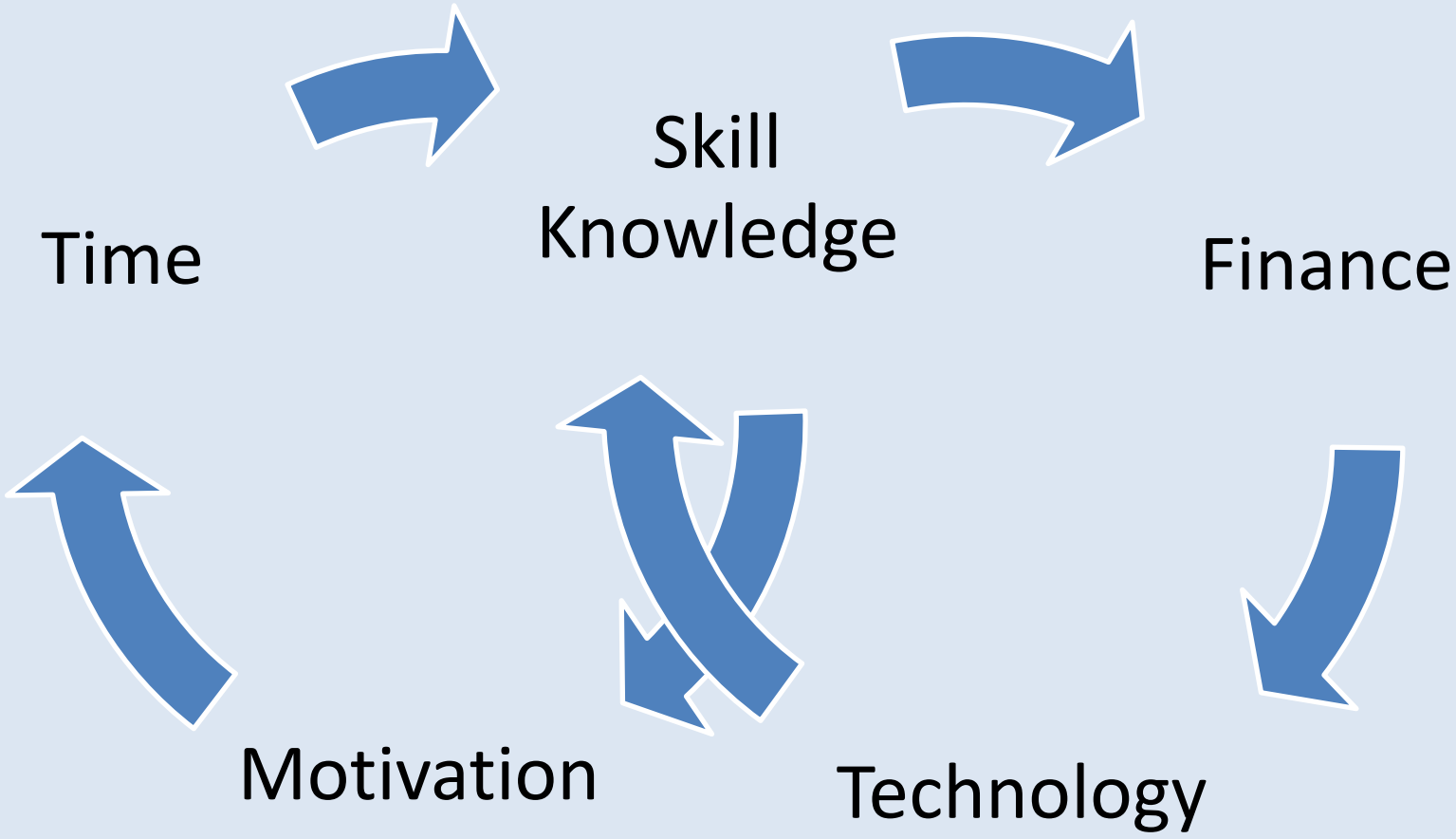
Training



Quality training = Ability + Motivation


Skill
Knowledge
Motivation


Time
Finance
Technology


Skill
Knowledge
Finance
Technology
Motivation
Time

Skill, understanding and motivation

Skill, understanding and motivation

Skill, understanding and motivation

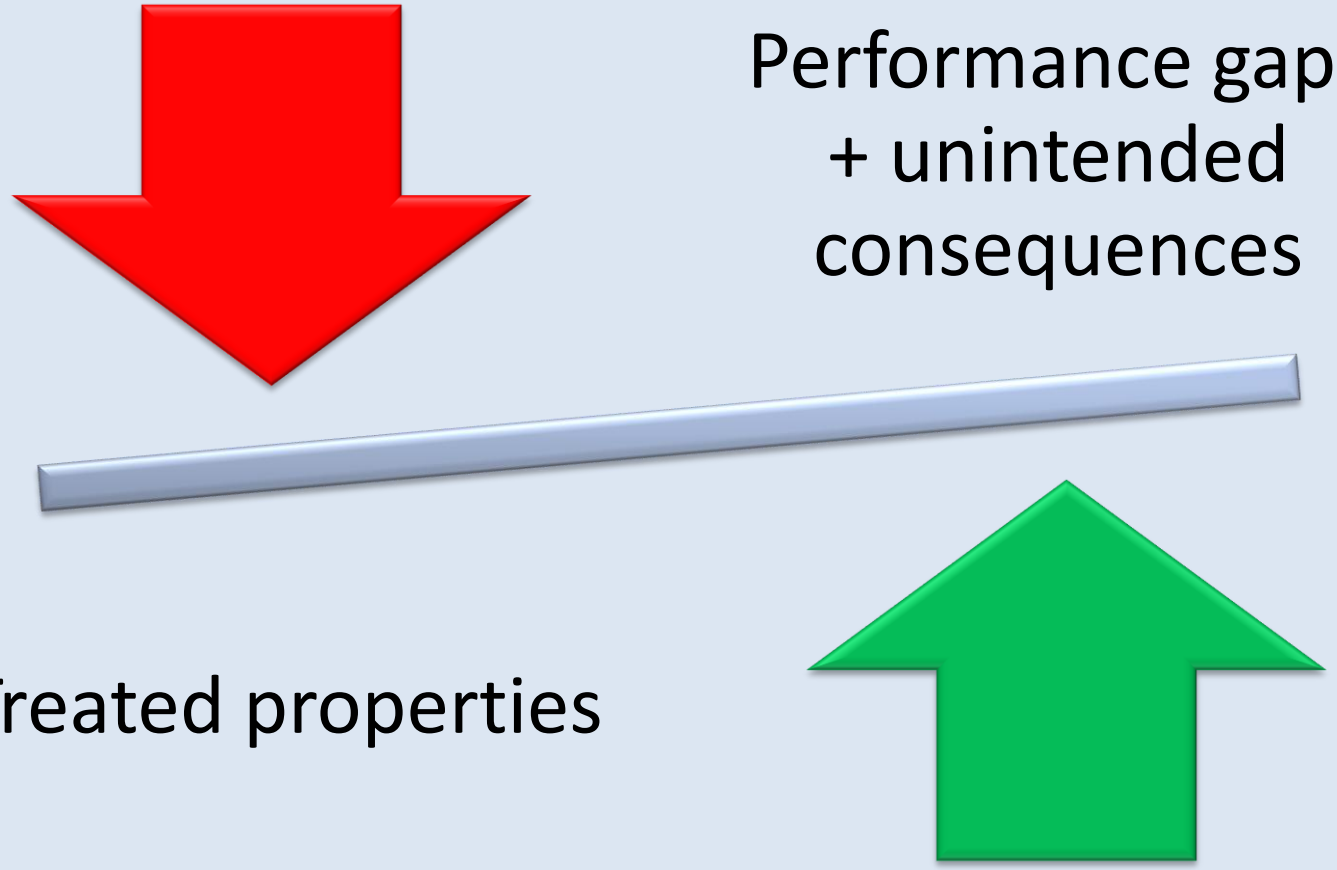
“Quality”

- **“Workmanship”**
- **Training**
- **Understanding**
- **Management**
- **Finance**
- **Technology**

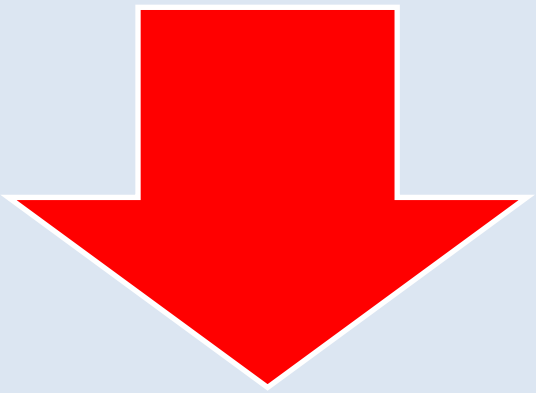
Policy

Performance gaps + unintended consequences

How can we mitigate?


Performance gaps
+ unintended
consequences
Treated properties

Treated properties



Performance gaps + unintended consequences

Key findings

- Technical understanding is inconsistent
- Knowledge exchange is generally ineffective (+ typically informal)
- Nascent professionalisation, 'short-termism', cultural acceptance of poor build-quality
- QA and construction management processes immature
- Policy drives the industry, so industry responds to policy

Opportunities

- Training (vocational + professional)
- Certification (broader + more meaningful)
- Management
- Integration of experts
- Accountability
- Control ‘gold rush’ effect

Conclusion

- Key challenge is to improve without scaling back
- Cost must be balanced with quality
- Need to enable all professionals to work collaboratively
- Easy wins must be done well to improve confidence in meeting challenges of traditional constructions, ‘one-offs’ and hard-to-treat properties

Thank you for listening

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Citations:

- DECC, 2012. Estimates of Home Insulation Levels in Great Britain: October 2012 Statistical release: experimental statistics. London: Department of Energy and Climate Change.

- DECC, 2013. Estimates of Home Insulation Levels in Great Britain: July 2013 Statistical release: experimental statistics. London: Department of Energy and Climate Change.