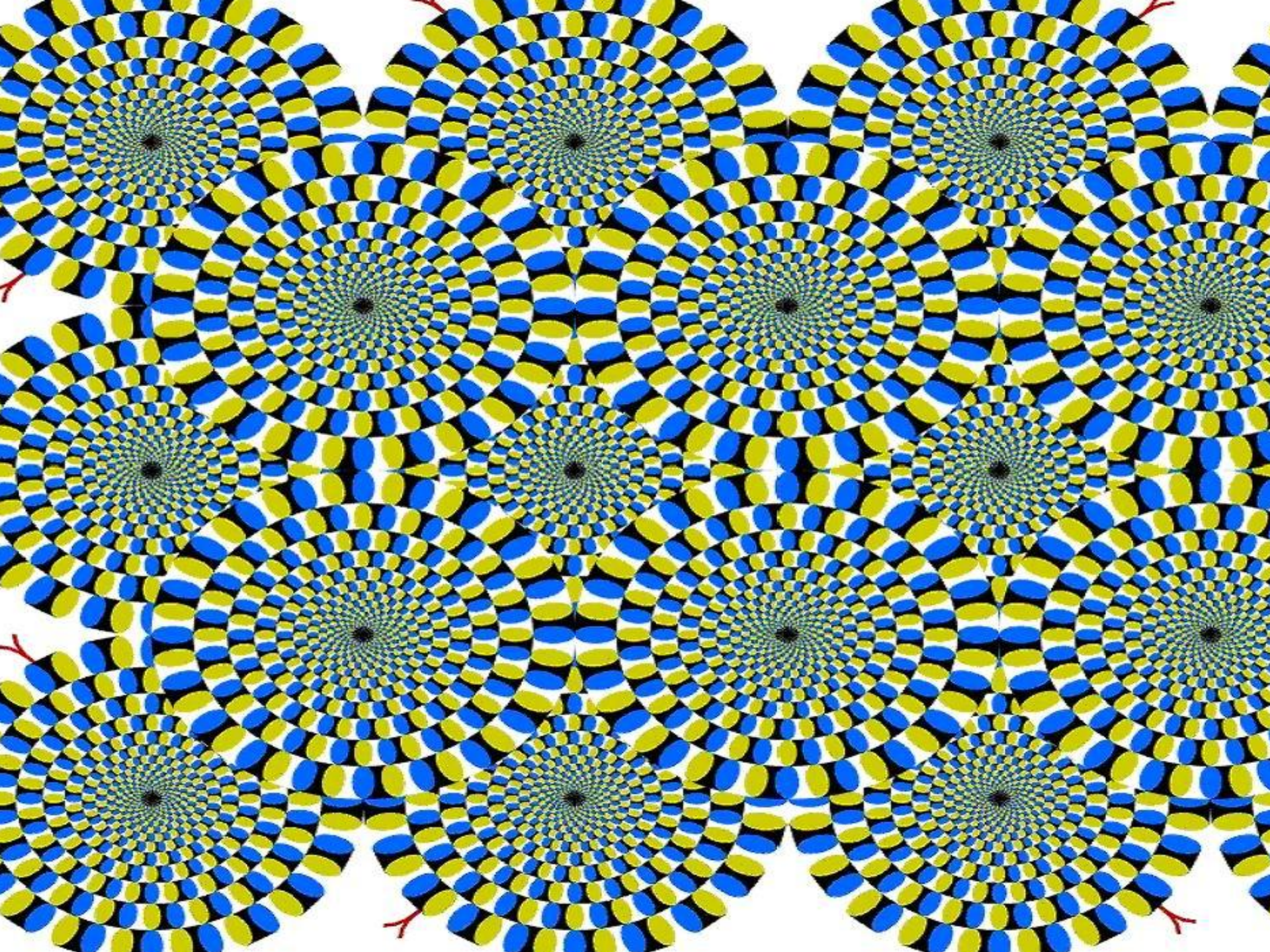


# **Snagging and Defects in New Homes in the UK Private House Building Sector**



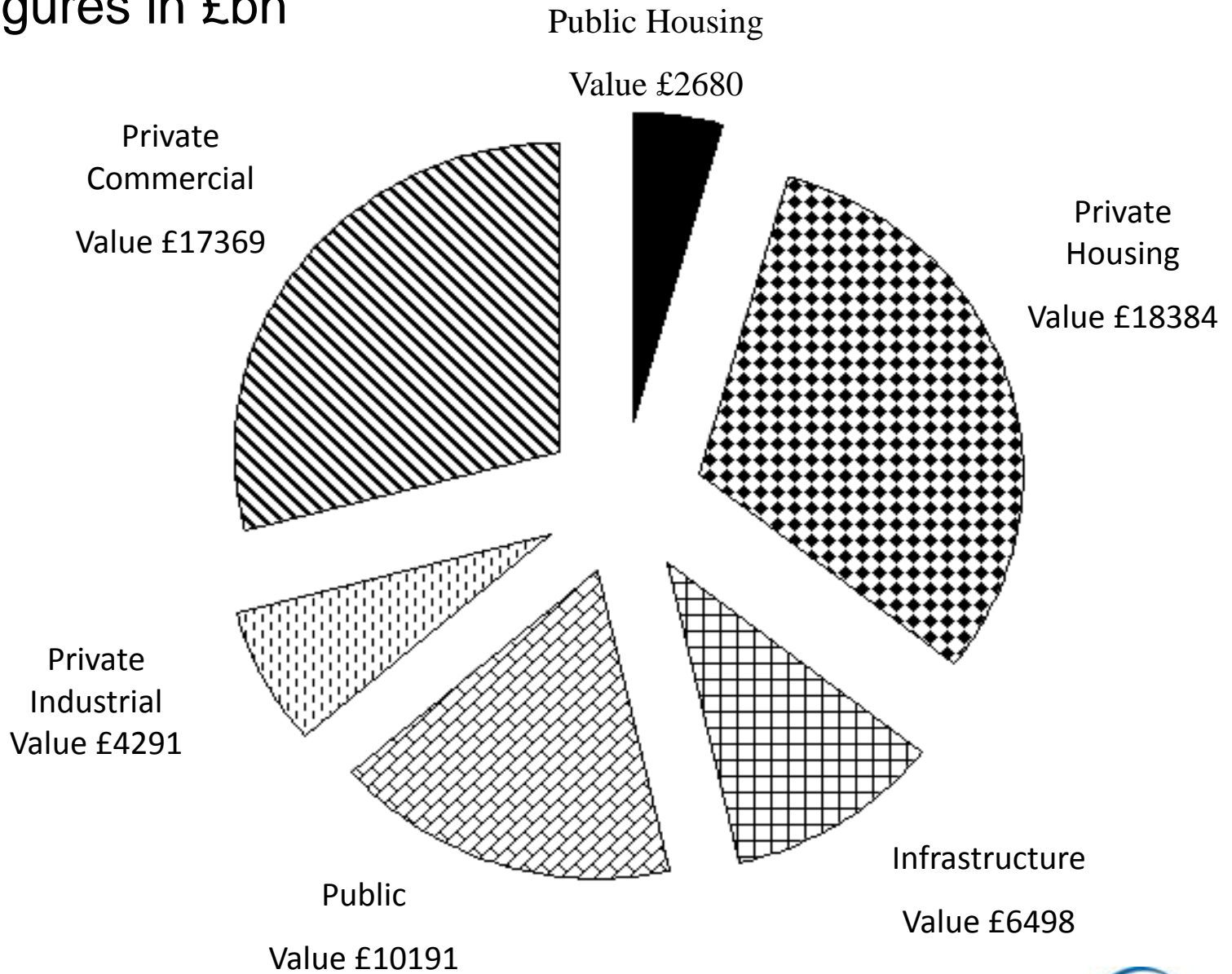
**Dr Nigel Craig, Glasgow Caledonian University;  
Professor James Sommerville, Glasgow Caledonian  
University**







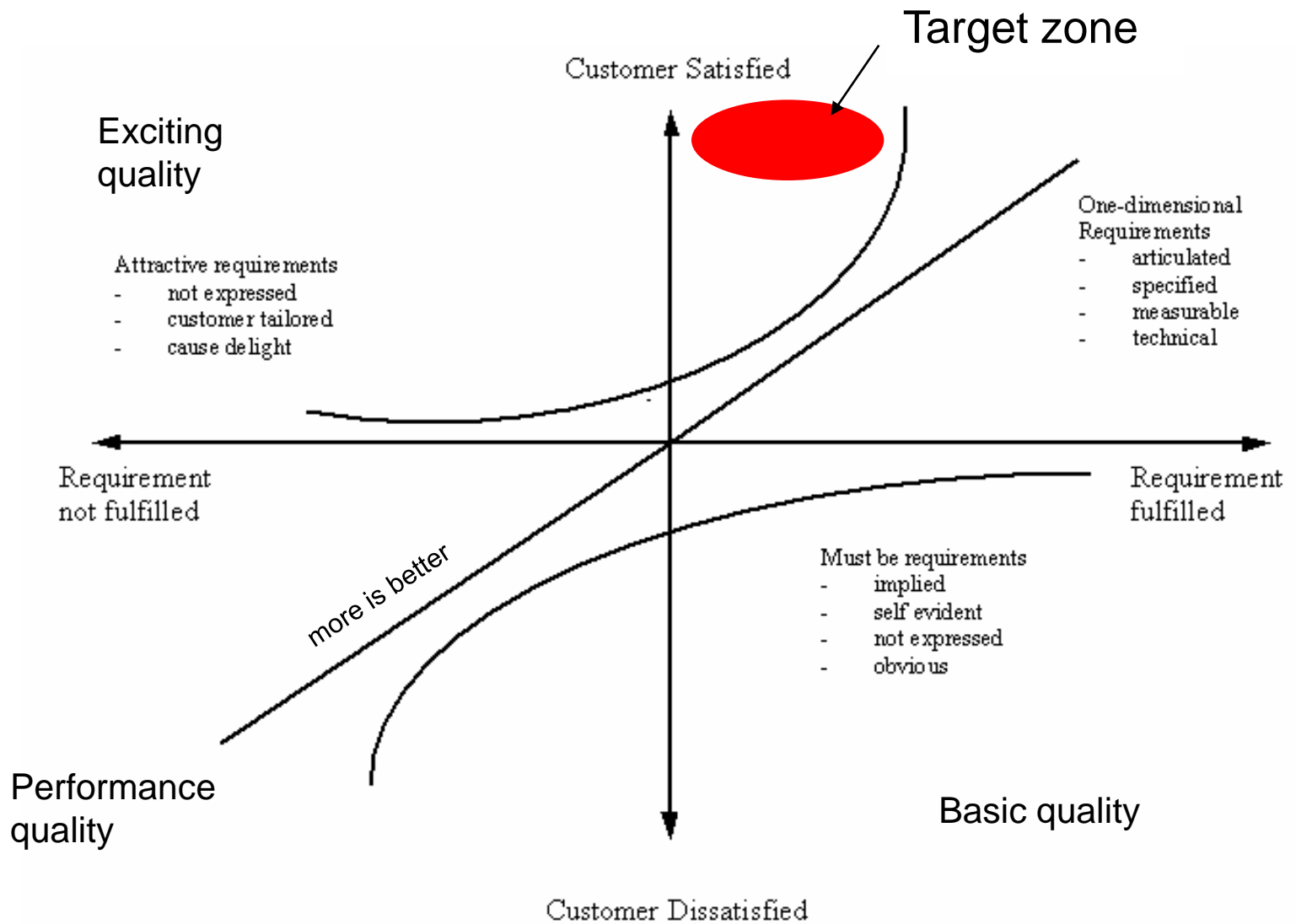
# Figures in £bn



Source: DTI: 2007

# NHBC Statistics - housing Completions

<b>Year</b>	<b>Completions</b>	<b>Year</b>	<b>Completions</b>
1987	188,000	1999	157,100
1988	209,200	2000	152,000
1989	191,800	2001	148,500
1990	159,700	2002	160,800
1991	150,100	2003	173,600
1992	146,200	2004	170,100
1993	154,000	2005	172,100
1994	166,500	2006	185,000
1995	169,000	2007/8	184,819 (est)
1996	168,400	2008/9	80,000 (est)
1997	163,100	2009/10	114,000 (est)
1998	155,000		



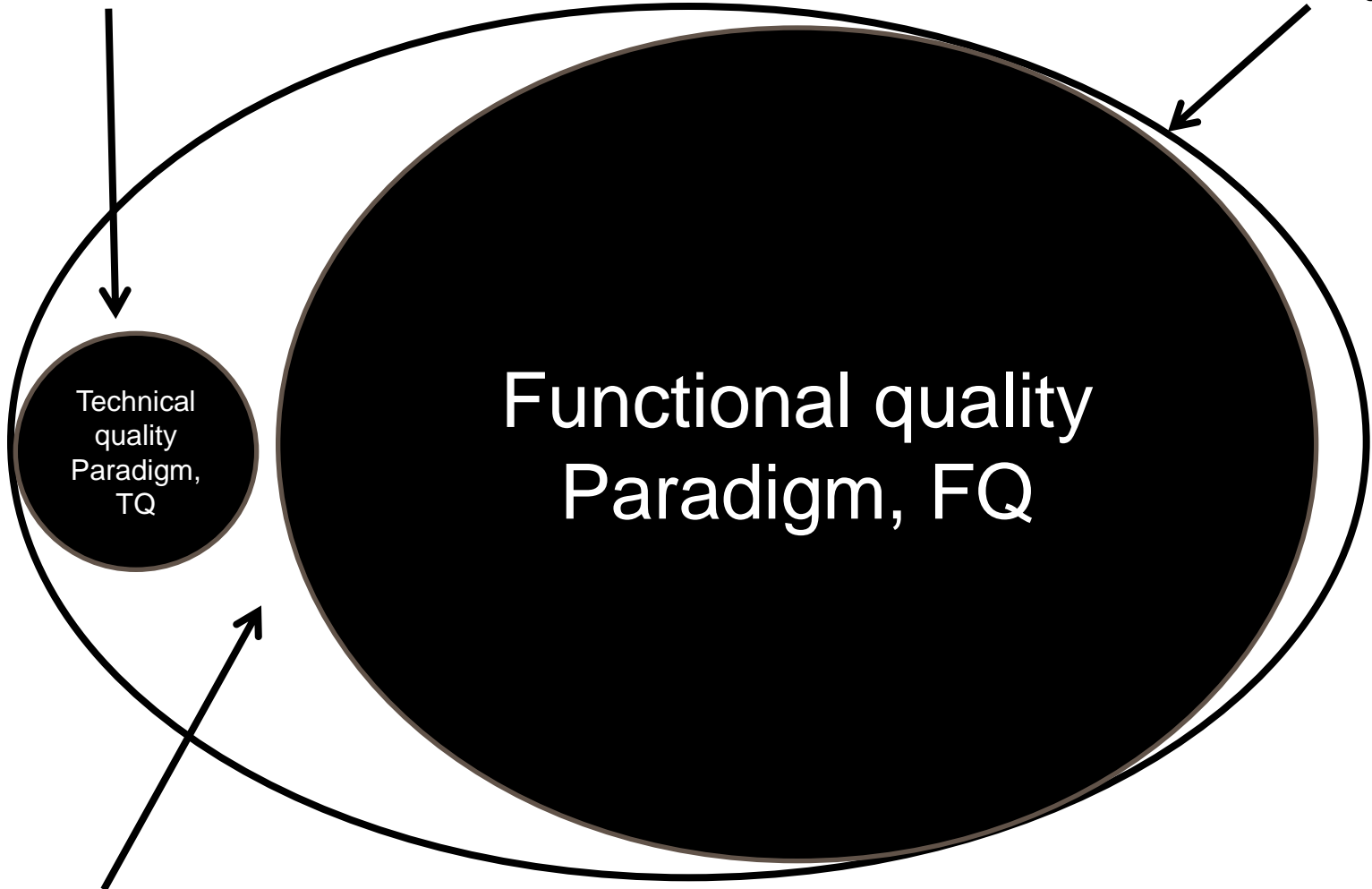
**Kano's model of customer satisfaction (Sauerwein et al., 1993)**

<b>External Elevations</b>	<b>All rooms</b>
Missing or broken roof tiles	Chipped or split window frames
Incomplete pointing	Incomplete skirting boards
Mortar splashes on brickwork	Insufficient pipe clips
No mastic around frames	Damaged socket plates or light switches
<b>Around the dwelling</b>	Missed coats of paint
Incomplete paths	Paintwork not touched up
Soil banked around house	Missing floor tiles
Rubble not cleared from site	Loose balustrades and newels
<b>In the roof space</b>	<b>Kitchen and Bathrooms</b>
Torn or loose underlay	Damaged sanitary ware
<b>Roof insulation incomplete</b>	Inadequately fixed kitchen fittings
Tank cover not provided	Incomplete plaster around pipes
<b>Pipes not lagged sufficiently</b>	Cracked wall tiles

**Selection of frequent defects (adapted from NHBC, 1984).**

This aspect of quality is a 'given' as far as customers are concerned

The customer's perceived view is that  $F_Q$  is more important and thus a larger factor in overall satisfaction than  $T_Q$



This is the actual size of the problem with  $T_Q$  relative to  $F_Q$  due to the number of defects currently being found in new houses



**131 F/**  
**£260**

## Sold: £500,000

# one-bed flat ...

**Couple b**  
A SURGEON claims her £260,000 luxury home has turned into a living hell. Dr Jane Knight has lived 120 nights at the four-bedroom home built by Kier Homes, 2005, in the village of ...

# Quality with 8

# patchy – that's

# the snag

Houses of all ages, styles and design experience problems, but new homes have recently come under scrutiny as experts assess residential snagging ...

### HOUSING ADVICE

made by the Barker Report take note of the findings and act upon them." Nigel Craig, research fellow in housing at Glasgow Caledonian University, said: "Research into quality problems with new homes has never been done on this scale before."

# But there's a snag...

FOR CONTRACTORS and employers defective works are a pain – especially when they crop up after practical completion when the contractor has left the site.



Contracts often set out procedures for identifying and claiming for defective work but confusion still reigns when it comes to determining who has the responsibility to correct problems and when damages can be awarded, writes Lindy Patterson

### Key points

- 1 The contract should have a procedure for defects.
- 2 The procedure generally differs prior to and post practical completion.

defect and then charge that cost to the contractor. Under ICT '98 (clause 41), the architect or contract administrator must issue a written notice certificate of practical completion followed, failed to pay the ...



NIKI MURRAY, CONSTRUCTION LECTURER... AND HOUSE BUYER?

## Housebuilders just don't care

LAST MONTH'S ISSUE in CM entitled 'Home Truths' illustrated that too many housebuilders have too little control over their supply chain. I saw it during my apprenticeship in the 1980s, I saw it having purchased two new homes in the last six

purchasing, not because of efficiency in the process. Thus there is little need for further research on defects. Housebuilders know all about them but choose to ignore the root cause because current margins can be maintained.

directors, exacerbate the problem by dictating when properties will be made available for moving in. Site agents have only partial control of scheduling production, as often as not, planning constant dictates output, leading to production spurs – and defects.

The latest debate about poor quality building was triggered by the Barker Review in 2003-4, which appeared to give the Government a go-ahead to increase over large areas of southern England to boost housing supply. But the snag in Barker's tail was aimed at bad building. Unless customer satisfaction levels among housebuyers rise within three years, it warned, the Office of Fair Trading would investigate builders and force them to

covered by another report on the subject by the consumer group, Inspector Home, set up in 2001 to 'seek' new leads on behalf of buyers, in a project with Glasgow Caledonian University. The Glasgow academics have carried out an in-depth analysis of Inspector Home's findings – and are likely to report in three weeks just how serious the problem has become. Vanessa Ambler, spokeswoman for Inspector Home, says "Many problems are in decoration, dry-lining and plastering. With all much work contracted out for the lowest possible price, painters come along and paint poor plasterwork – so eventually it is necessary to get both of these back to out-

standards, exacerbated the problem by dictating when properties will be made available for moving in. Site agents have only partial control of scheduling production, as often as not, planning constant dictates output, leading to production spurs – and defects. This year, February came – and went – without a mention of the survey which had become something of an annual ritual of claim and counter-claim. Builders doubtless heaved a sigh of relief – while the Housing Forum has been absorbed into yet another quango, the Government's Constructing Excellence Organisation. But there is little doubt the issue of poorly finished homes is causing more aggravation than ever.

## earths shocking

## s in new-build

## tell me about it

## Snags everywhere in

## my home are testament

## to findings that

## standards are diving

Editor

# cowboys

champion the idea of pre-fabricated methods of construction to reduce the number of bodgie-ops on site. Inspector Home claims the average number of defects in each new house rose in 2004 from 71 to 74. These figures were compiled on properties passed as ready for occupation by warranty providers such as NHBC. One six-bedroom house in Essex produced 319 defects. Vanessa Ambler says: "A major problem is the legal position regarding the sale of a new home. Buyers have no legal right to set foot inside a home until they have paid their money. Inspector Home has highlighted the fact that new homes are systematically exempt from the 1994 Sale of Goods Act – leaving buyers in a weaker position to win redress. Of course, the NHBC warranty is intended to cover major and minor defects in new homes for the first 10 years. In its latest annual report, NHBC said it paid £30m on



# Key Performance Indicators (KPI's)

“**Definition:** Condition of the facility with respect to defects at the time of handover (point of handover is the time when ownership is transferred to the commissioning client), using a 1 to 10 scale where:

10 = apparently defect-free.

8 = Some defects with **no significant impact** on the client.

5/6 = Some defects with **some impact** on the client.

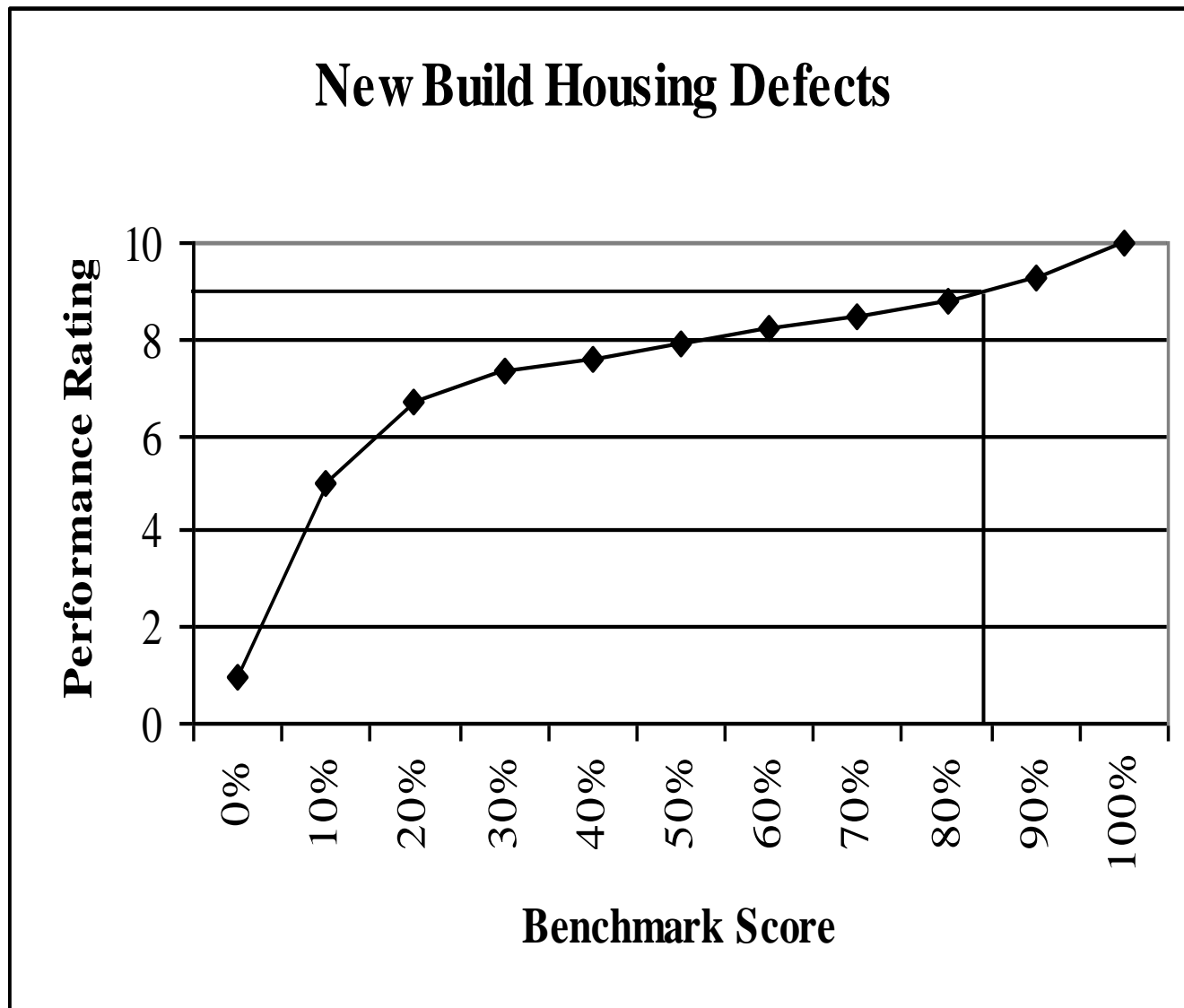
3 = Major defects with **major impact** on the client.

1 = Totally defective.

# KPI year on year comparisons

<b>KPI</b>	<b>Measure</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
Client Satisfaction – product	8/10 or better	63%	69%	82%	83%	88%	78%
Client Satisfaction - service	8/10 or better	59%	58%	70%	72%	78%	76%
Defects	8/10 or better	50%	53%	72%	73%	76%	78%

Source: Constructing Excellence 2006.



KPI graph indicating the benchmark score for defects within new homes in the UK (Adapted from Constructing Excellence, 2006)

# The Barker Report 2004

- Recommendation 32: that housebuilders should develop a strategy that will increase the proportion of homeowners recommending their builder from 46% to 75% before 2007 and over the same period levels of customer satisfaction with overall service are to rise from 65% to 85%
- If progress is unsatisfactory then the OFT will conduct a wide ranging review into the new build housing market



# Annual Housing Questionnaire

7 Questionnaires since 2000

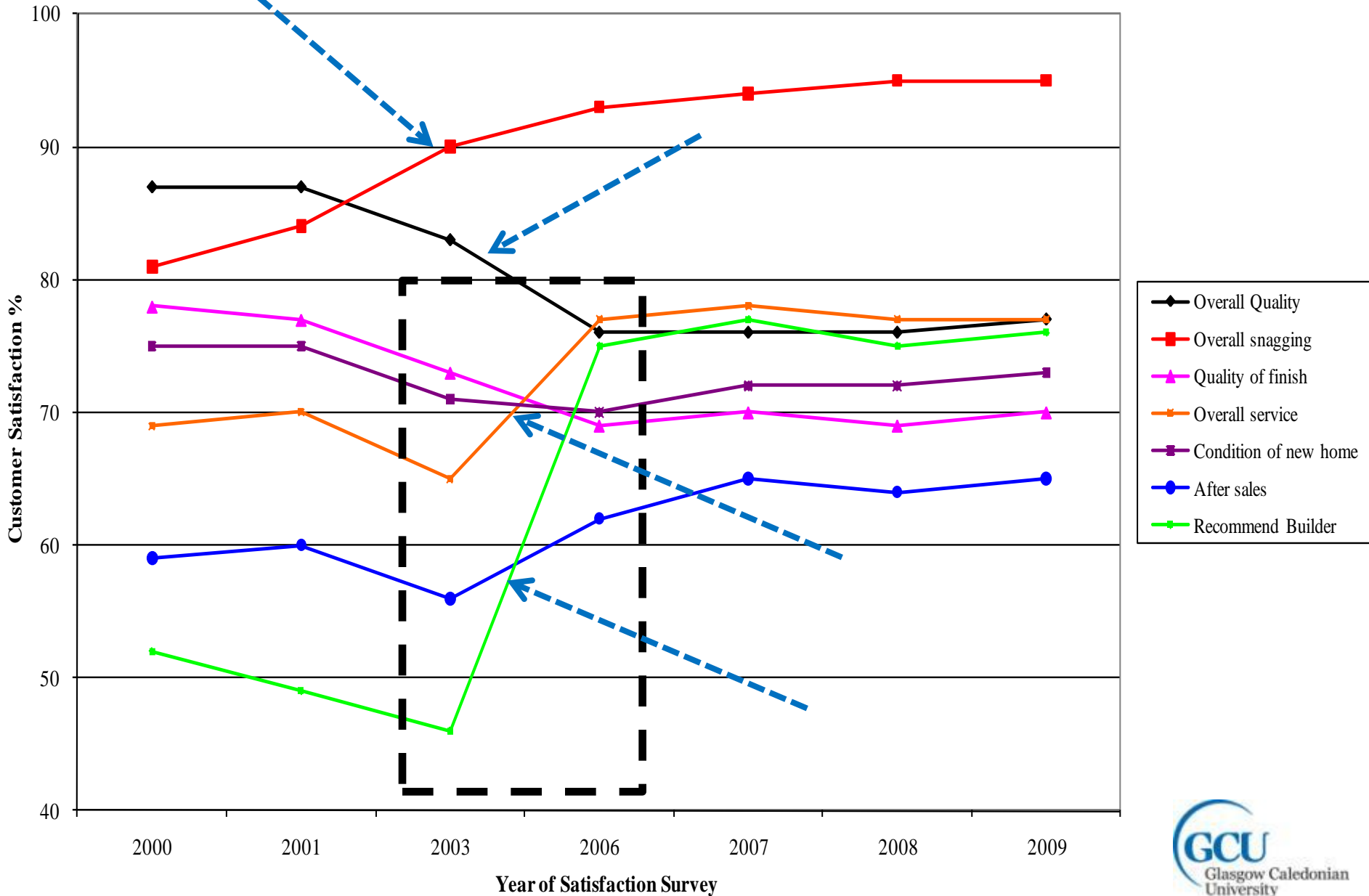
First three were carried out by Constructing Excellence and MORI

Since 2006, the House Builders Federation have undertaken the survey

However, the survey is financed by the NHBC so a conflict of interest

Each year a return rate of around 40% is achieved

# Overall levels of customer satisfaction in new homes



# Section 1 (1994 c.35) of Sale and Supply of Goods Act 1994 (HMSO, 1994)

The Act states that 'the quality' of goods includes their state and condition and the following are in appropriate cases aspects of the quality of goods:

- fitness for all the purposes for which goods of the kind in question are commonly supplied;
- appearance and finish;
- freedom from minor defects.

*New build houses are exempt from the Sale and Supply of Goods Act*

In Scotland, the purchase of new build property has traditionally been governed by the common law of 'caveat emptor' which means buyers take the responsibility for the quality of goods they are buying. However the Scottish Executive, (2003) state that:

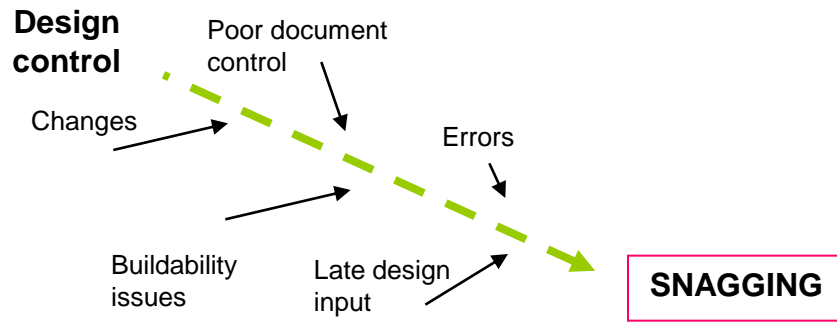
*“We believe that caveat emptor may need to be qualified in respect of new build developments where the sale is not between two private individuals and where the builder is in a similar position to other commercial providers of goods and services who are expected to comply with consumer protection regulation”*

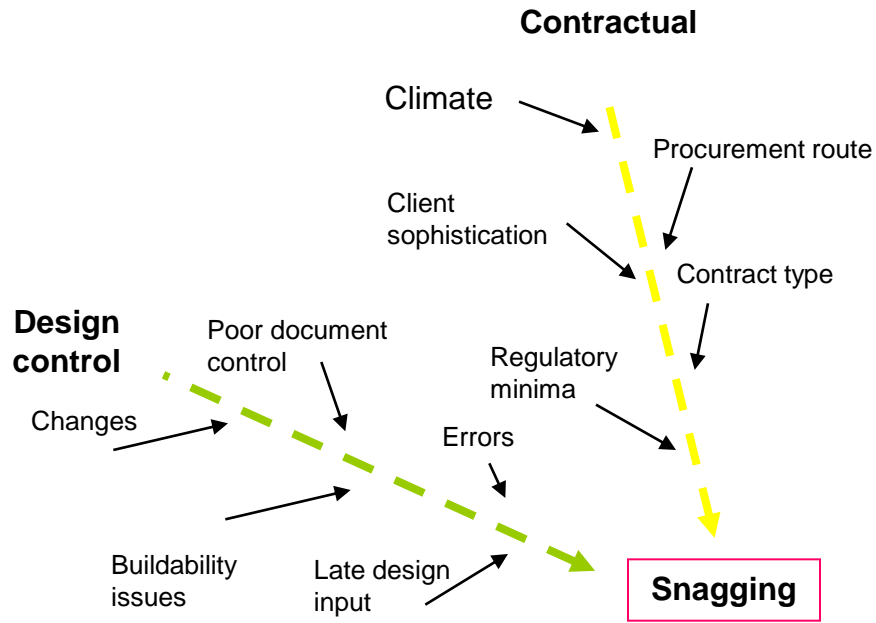


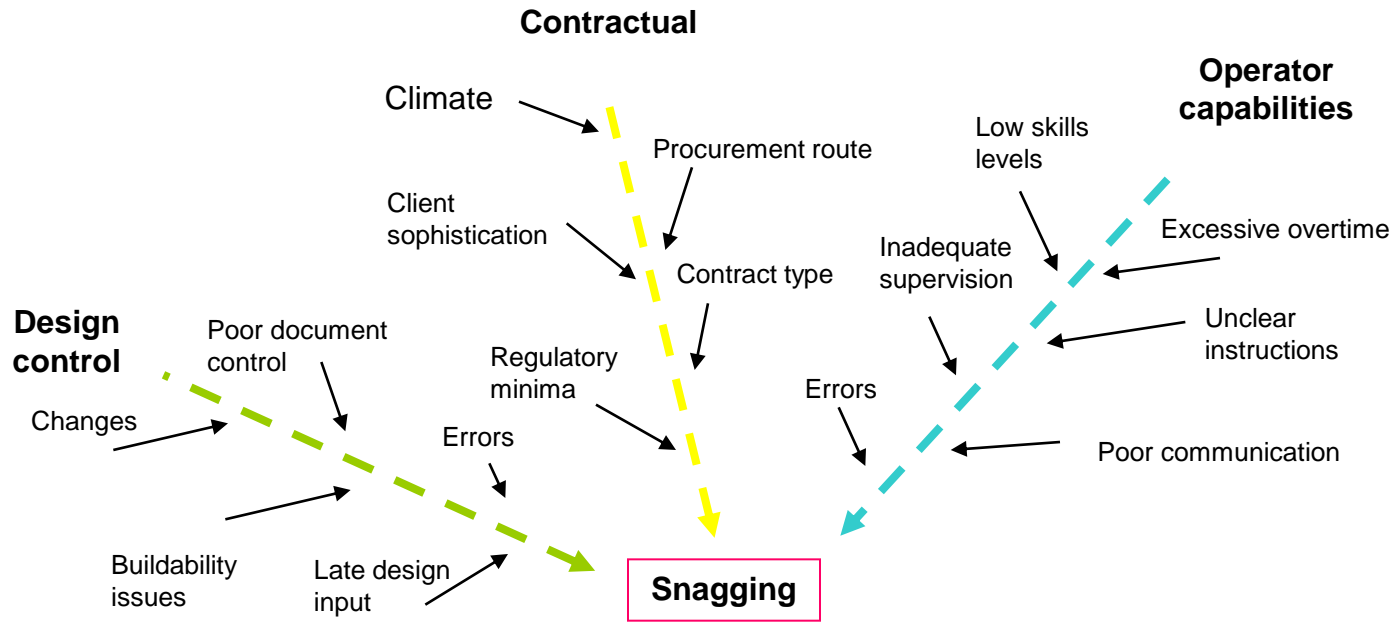
# Typology of snags/defects

A definition of snagging that may be more acceptable in relation to house building is the identification and rectification of errors, defects and omissions (Sommerville *et al.*, 2005).

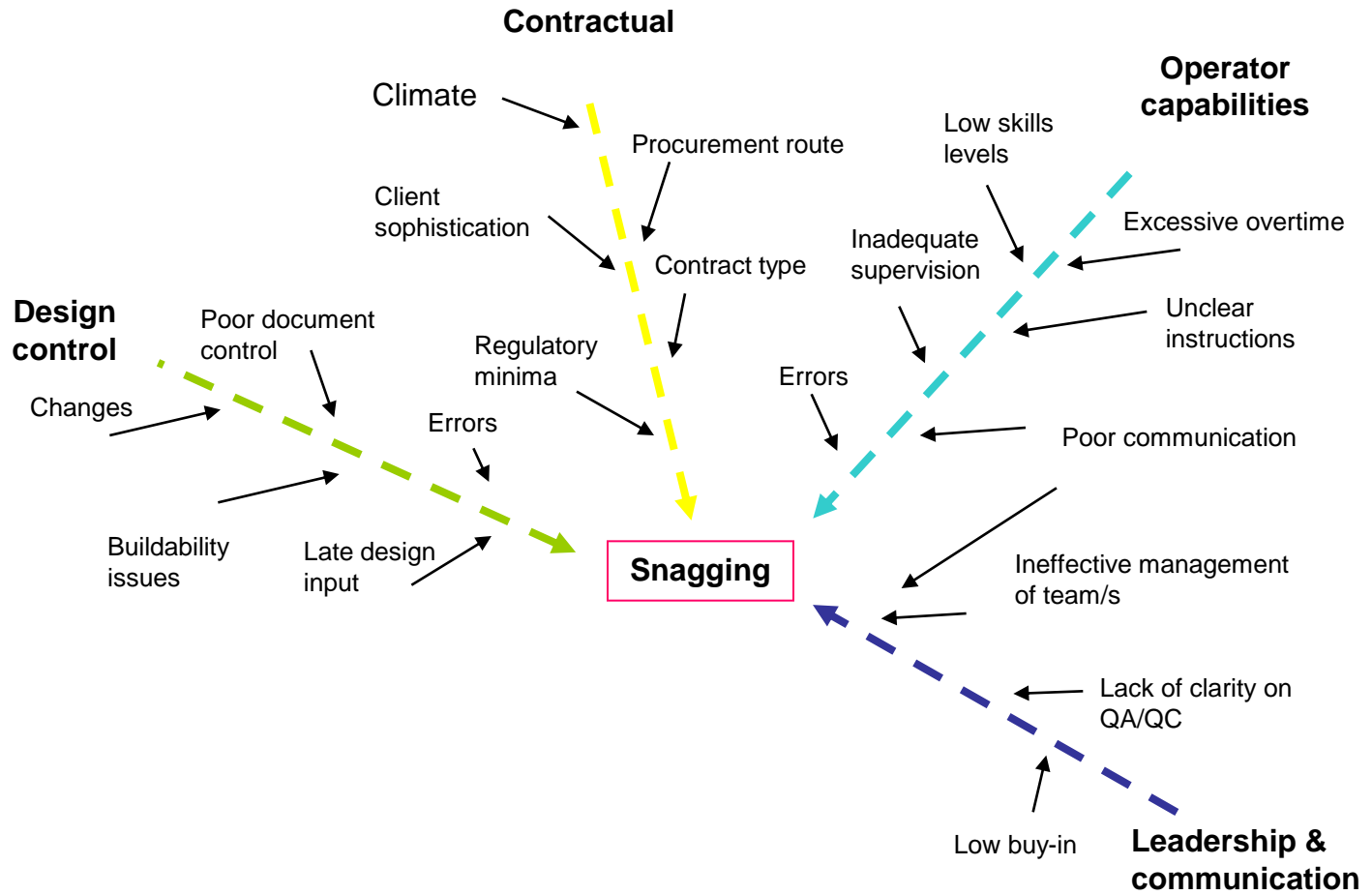
- Technical, when workmanship, materials or design elements of a building reduce its ability to function.
- Omissions, parts or features of a home that are simply left out.
- Aesthetic, when the appearance or finish of a building is adversely affected.

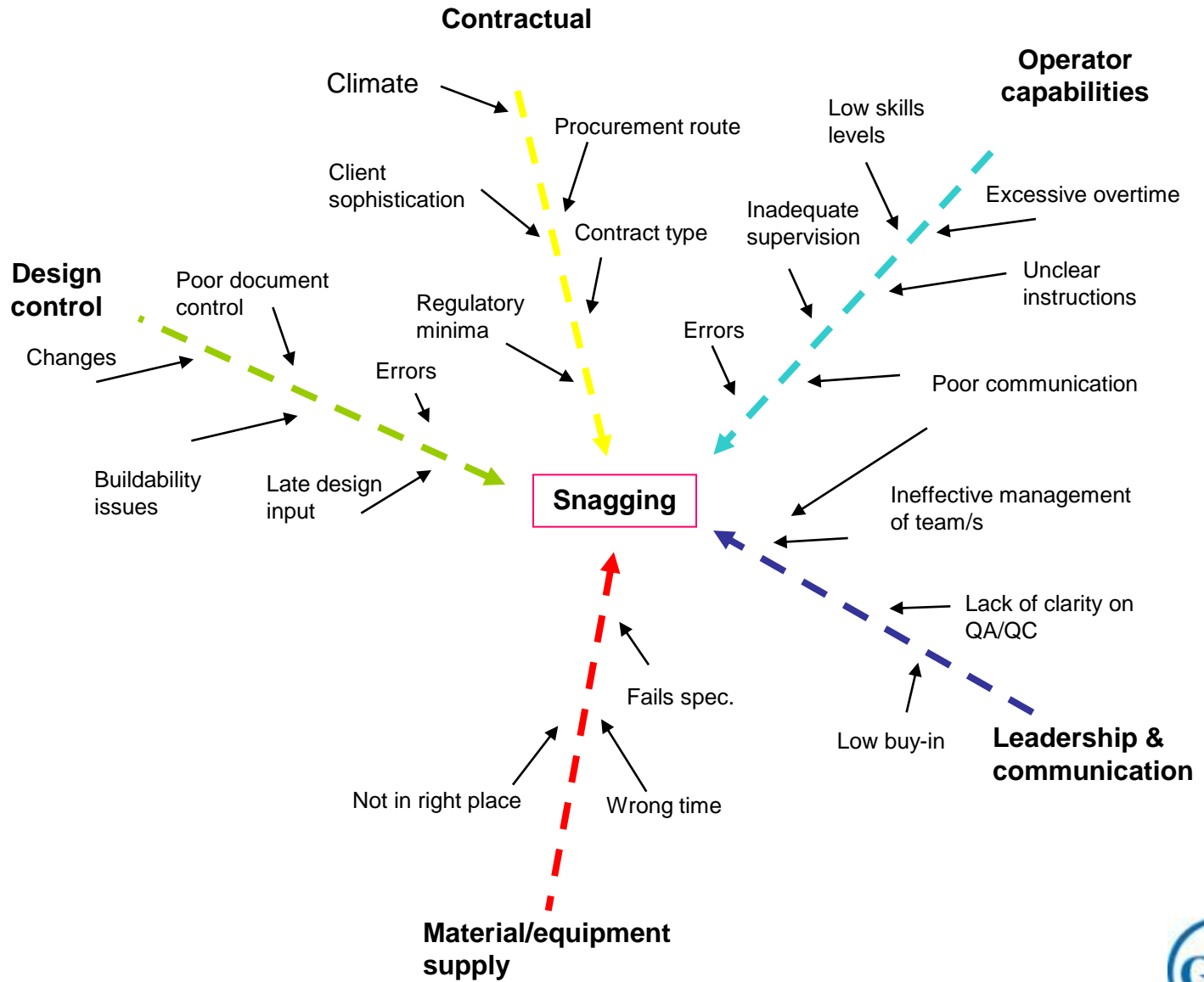


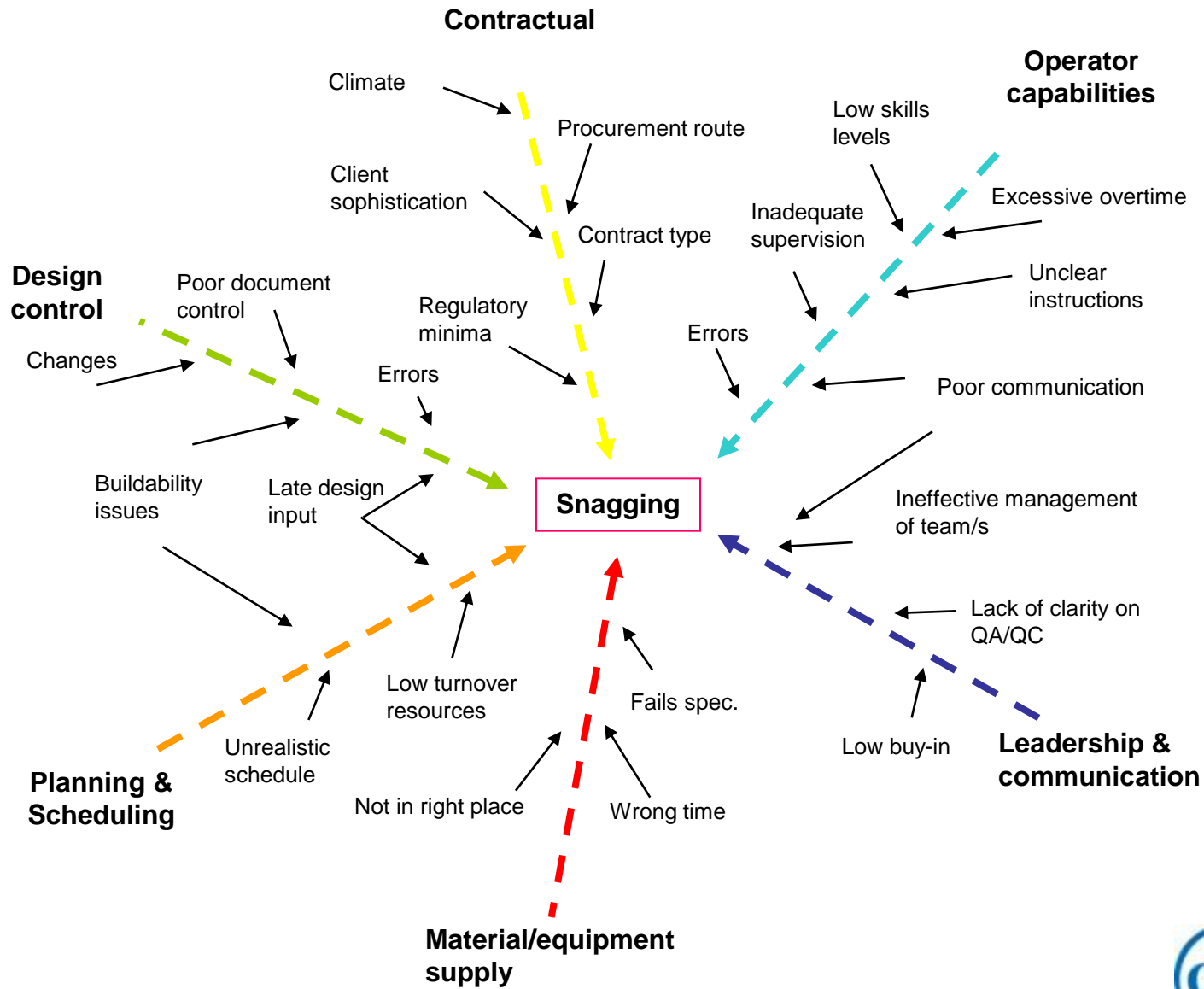












# What is the problem?

“The complexity is that the customer in the vast majority of cases is not the one who actually defines the original house specification, it is the house builder who does so”

“This practice however leads to future problems because prospective house buyers believe they are investing in top quality homes only to discover they are riddled with faults”

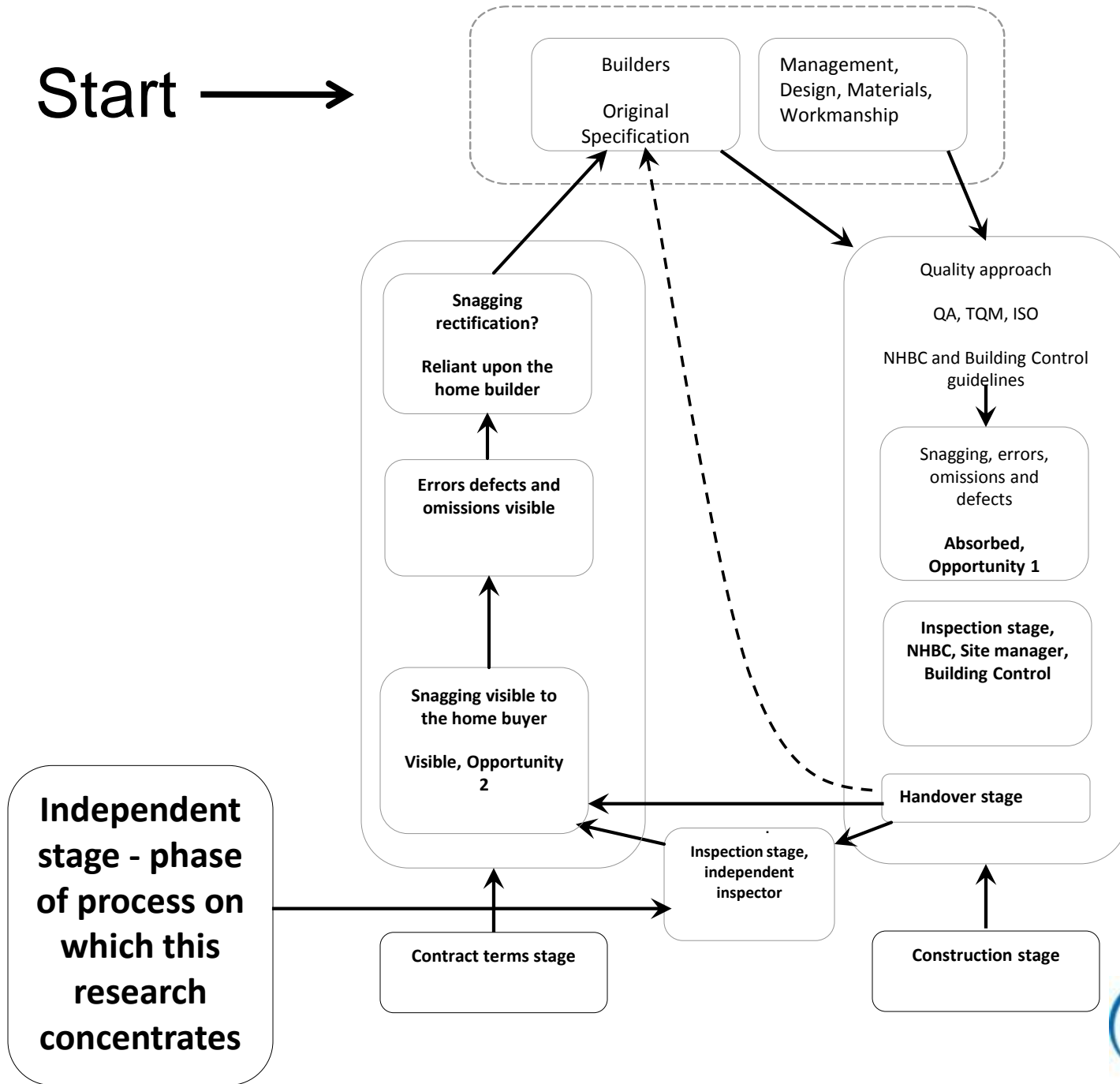


# Contractual Issues

## Major UK house builders contract

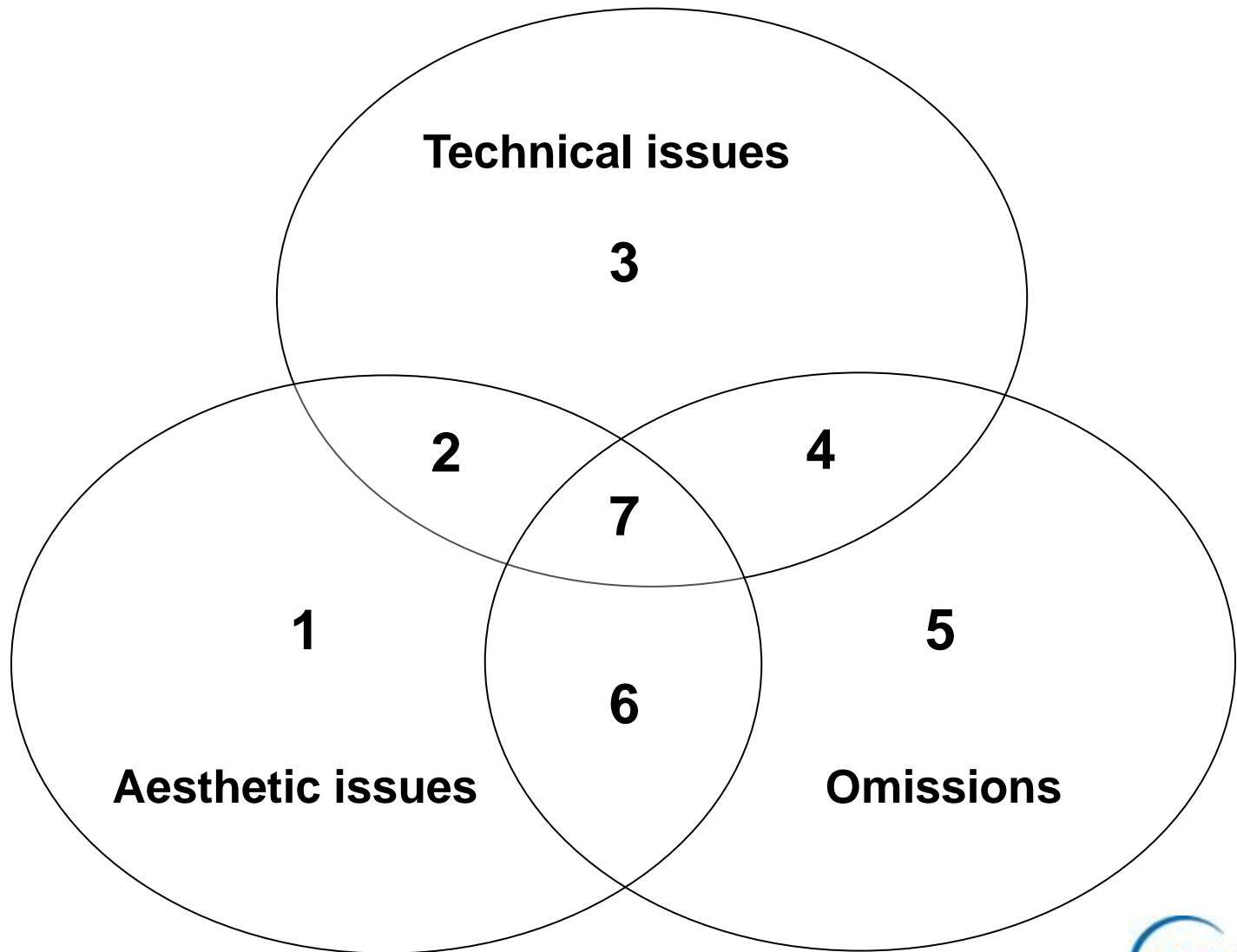
In the event that the garage or private parking space is incomplete or for any reason not available for the Purchaser's use at the date of settlement, the Purchaser understands that no retention from the purchase price will be permitted and full settlement of the total purchase price will be made in terms of condition 1 hereof.

Start →





# Possible Snagging Scenario's

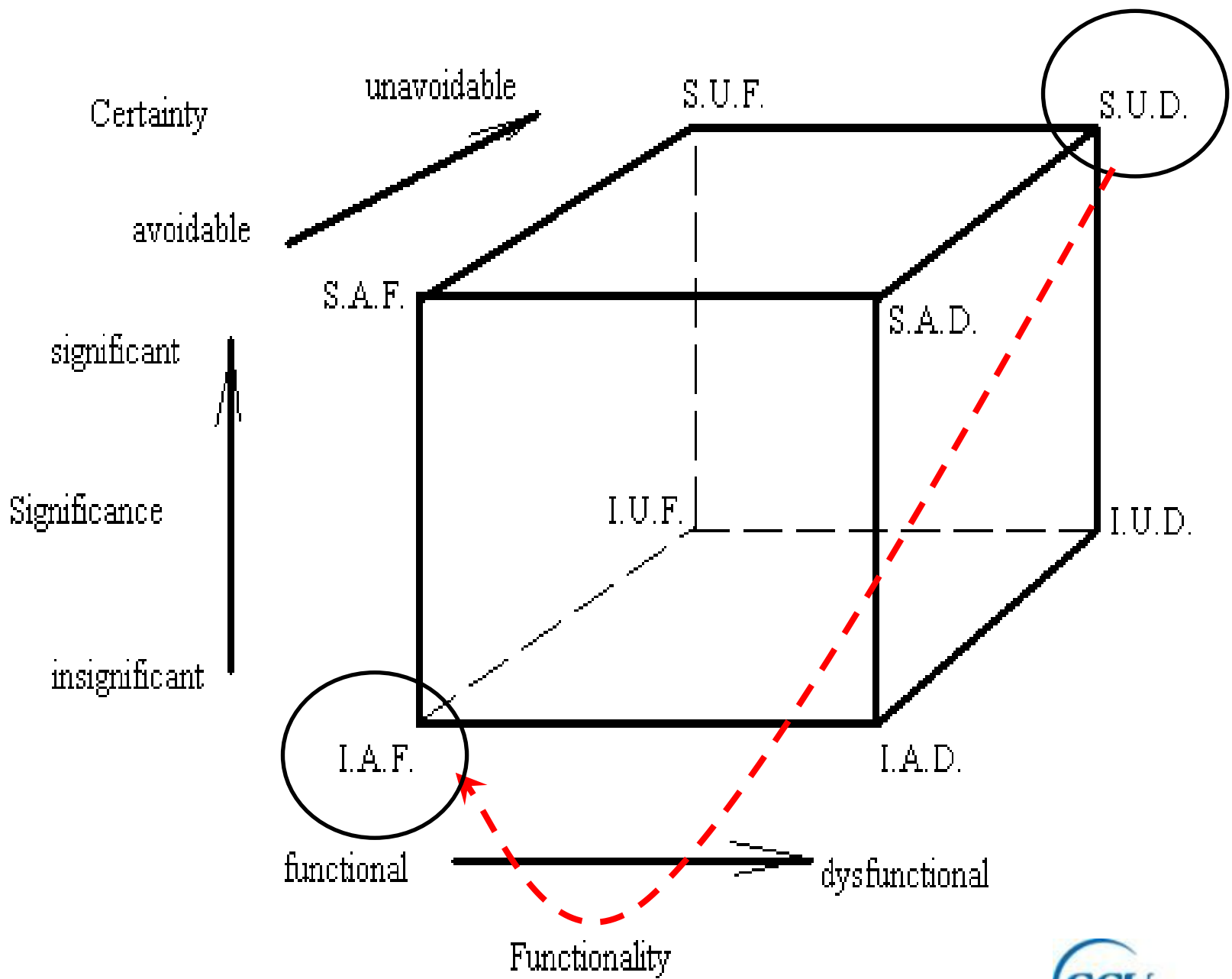


# A Missing Airbrick

1. **Aesthetic** – because the air brick is missing the building is unsightly.
2. **Aesthetic/technical** - because the air brick is missing the building is unsightly and the issue is technical because it does not comply with building regulations.
3. **Technical** - the issue is technical because it does not comply with building regulations.
4. **Technical/omission** - the issue is technical because it does not comply with building regulations and is an omission because the brick is “not there”.
5. **Omission** – it is an omission because the brick is “not there”.
6. **Omission/aesthetic** - it is an omission because the brick is “not there” and because the brick is missing the building is unsightly.
7. **Aesthetic/technical/omission** – a combination of all three aspects.

# Importance of snag factors to respective parties

Snag Factor	Home Buyer	Builder	Inspector	
			Compliance	Independent
1 - Aesthetic	IH	IL	IL	IH
2 - Aesthetic/technical	IL	IL	IH	IL
3 - Technical	IL	IH	IH	IL
4 - Technical/Omission	IL	IH	IH	IL
5 - Omission	IH	IH	IL	IH
6 - Omission/Aesthetic	IH	IL	IL	IH
7 - Combination of 3	IH	IH	IH	IH



Snagging Classification Mapping (adapted from Sommerville, 1992)

# The research so far

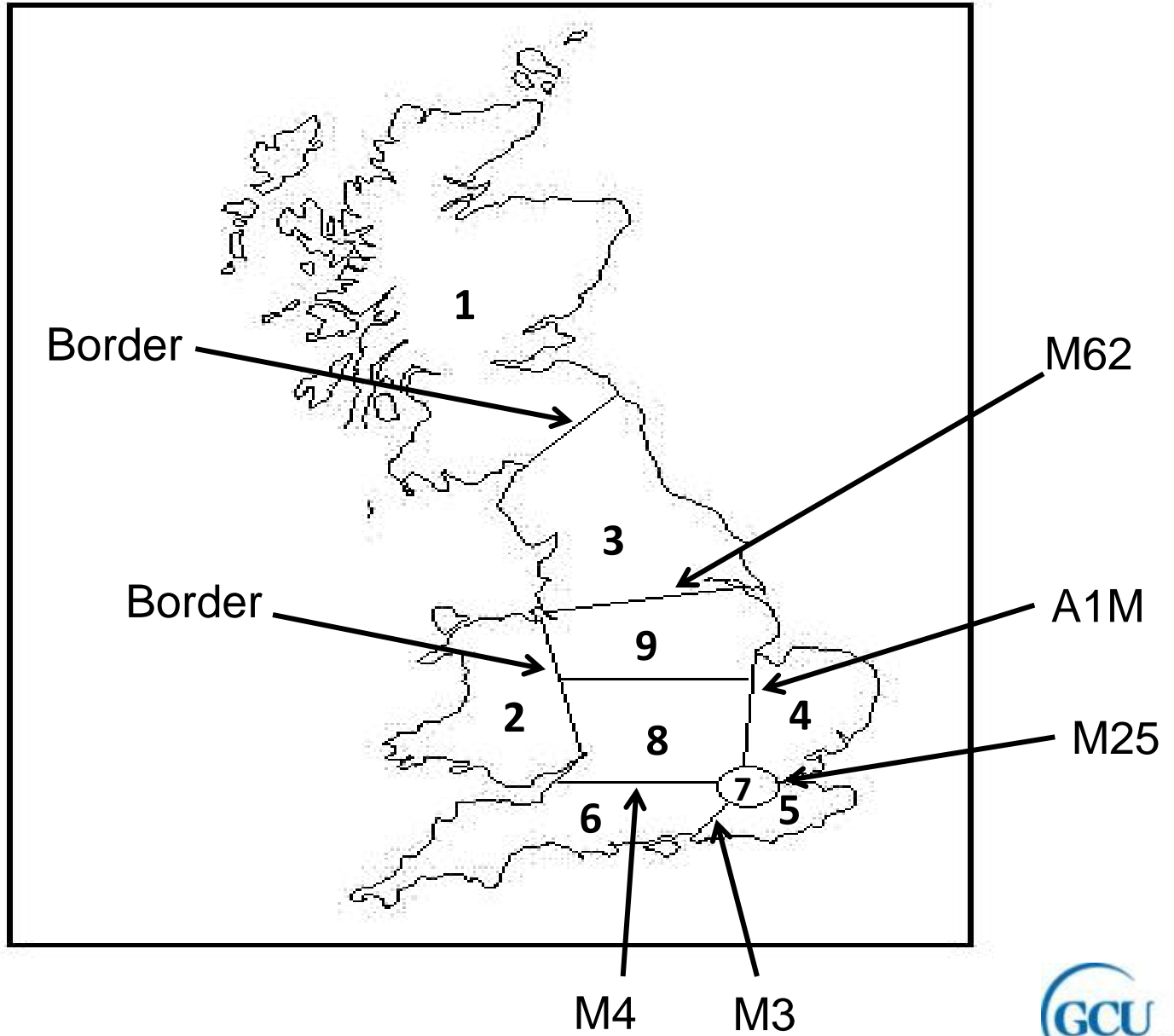
Data was provided by an independent company and was the only dataset available for this research domain.

The only other database that could be used for analysis is held by the NHBC who for obvious reasons will not release the data set.

# The Research so far and the database

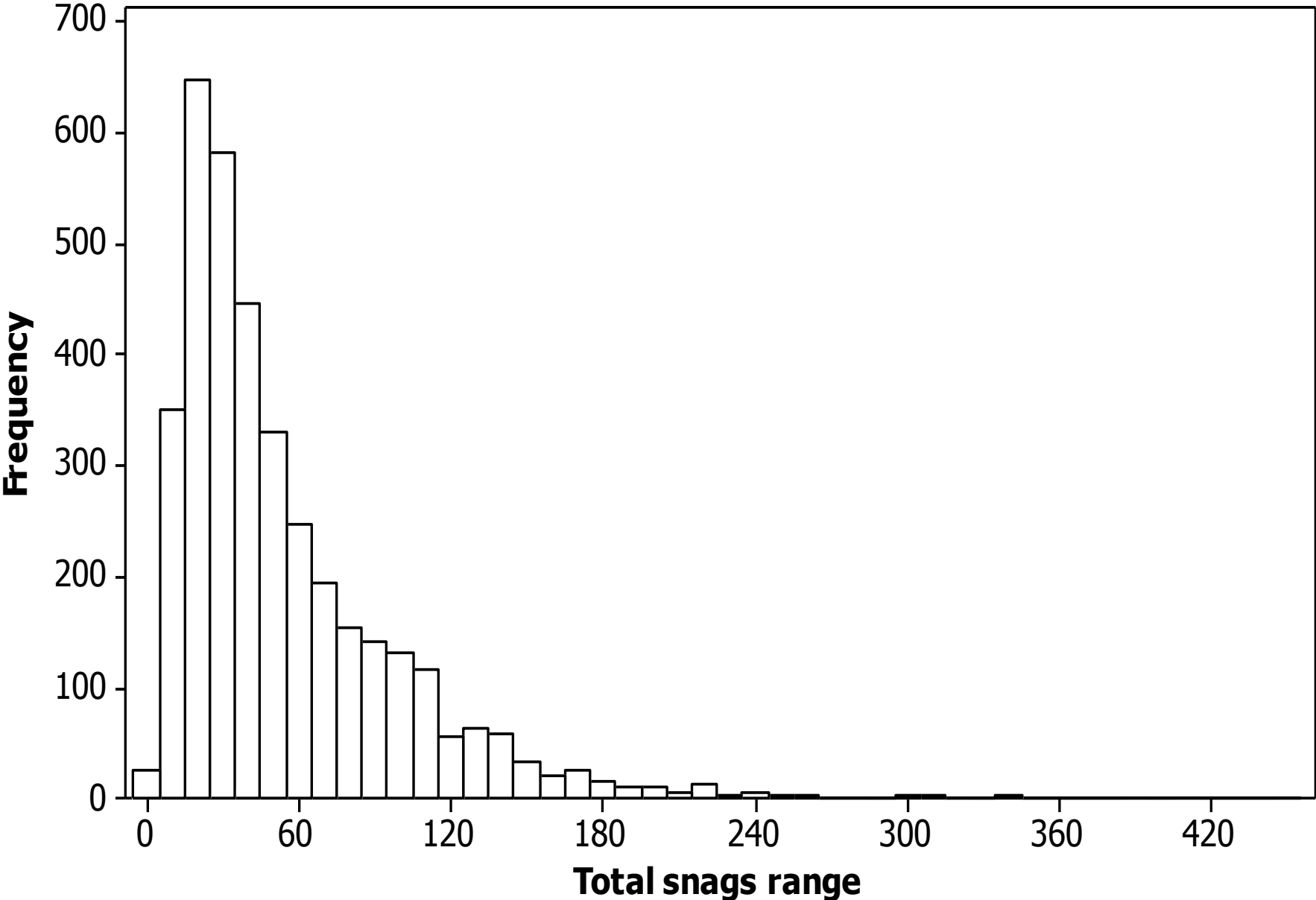
- Constructed from independent inspections of 3696 new homes 2002-2007 across the UK
- Contains 199,095 snagging items:
  - Coding and analysis of circa 2.5m data cells
- End database includes available statistics on:
  - Defect levels in new build housing
  - Defect levels by house type/number of bedrooms
  - By inspector and location codes
- Up to date analysis taking place from 2007-2009 which involves the same amount of data as these results are based upon

# The Regions of the UK



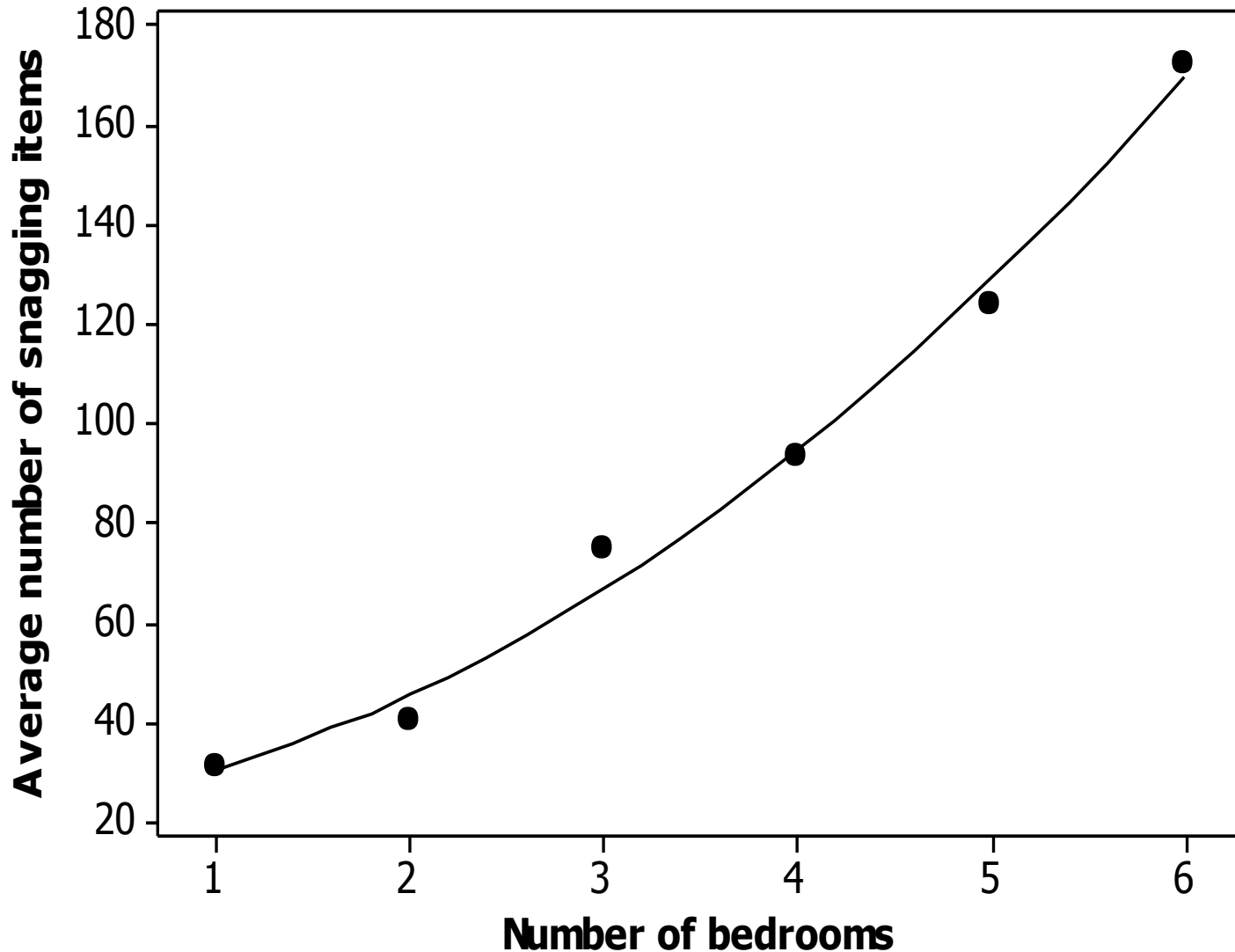


# Histogram of total snags by frequency



# Fitted line plot of average snagging items by number of bedrooms

$$\text{Average} = 22.31 + 5.042 \text{ Bedroom} + 3.257 \text{ Bedroom}^{**2}$$

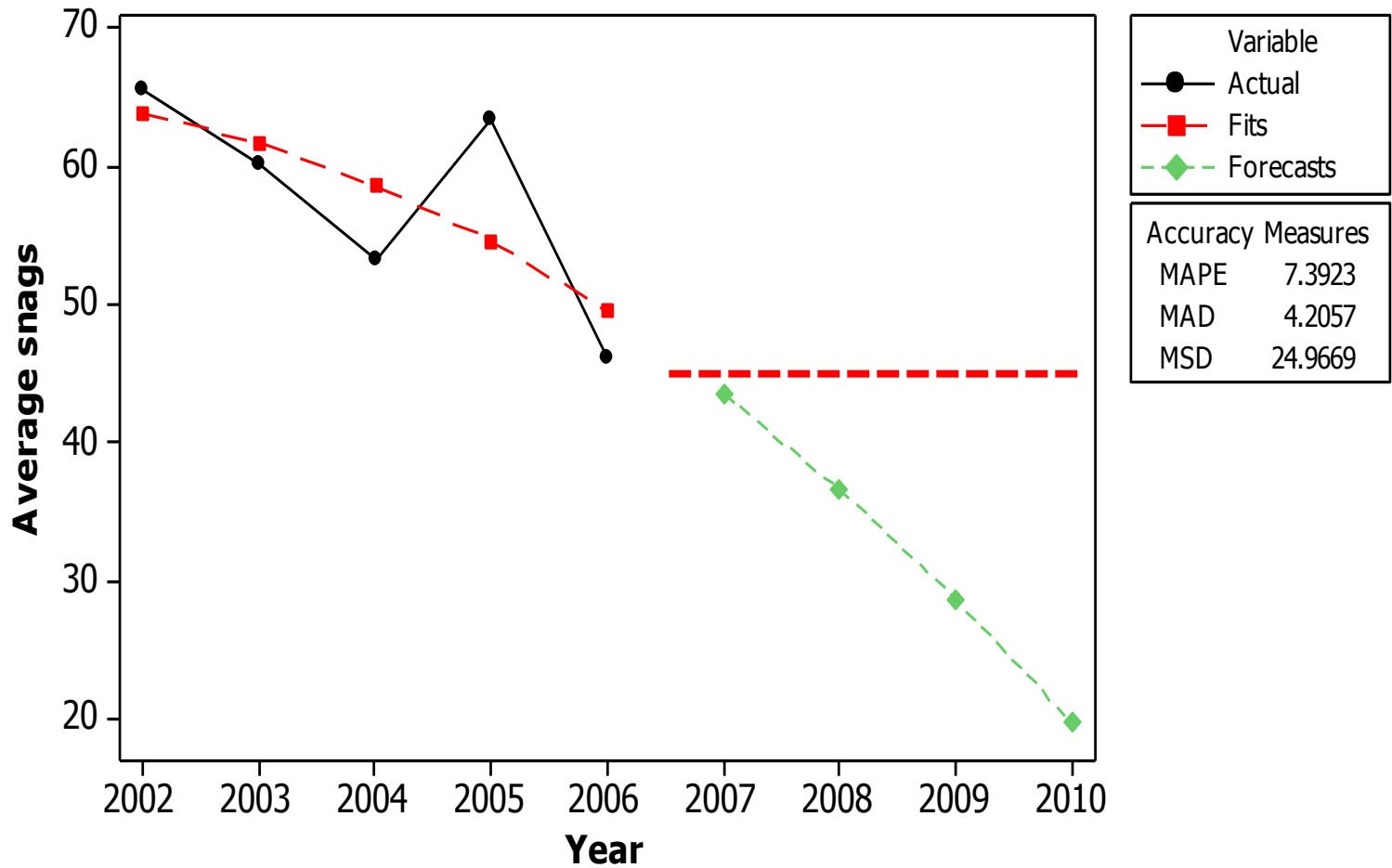


S	6.58213
R-Sq	99.1%
R-Sq(adj)	98.5%

## 6.4 Trend analysis plot for average snags 2002-2010 forecasted

Quadratic Trend Model

$$Y_t = 64.9 - 0.7*t - 0.49*t**2$$



# Average Snagging Items

<b>House Type</b>	<b>Sample Size</b>	<b>Average Snagging items</b>	<b>Minimum snags</b>	<b>Maximum snags</b>
<b>Code 1: One bed</b>	618	31.3	1	198
<b>Code 2: Two bed</b>	1986	40.4	1	195
<b>Code 3: Three bed</b>	434	74.7	8	307
<b>Code 4: Four bed</b>	435	92.9	6	405
<b>Code 5: Five bed</b>	165	124.3	23	389

# Average Snagging Items by Inspector

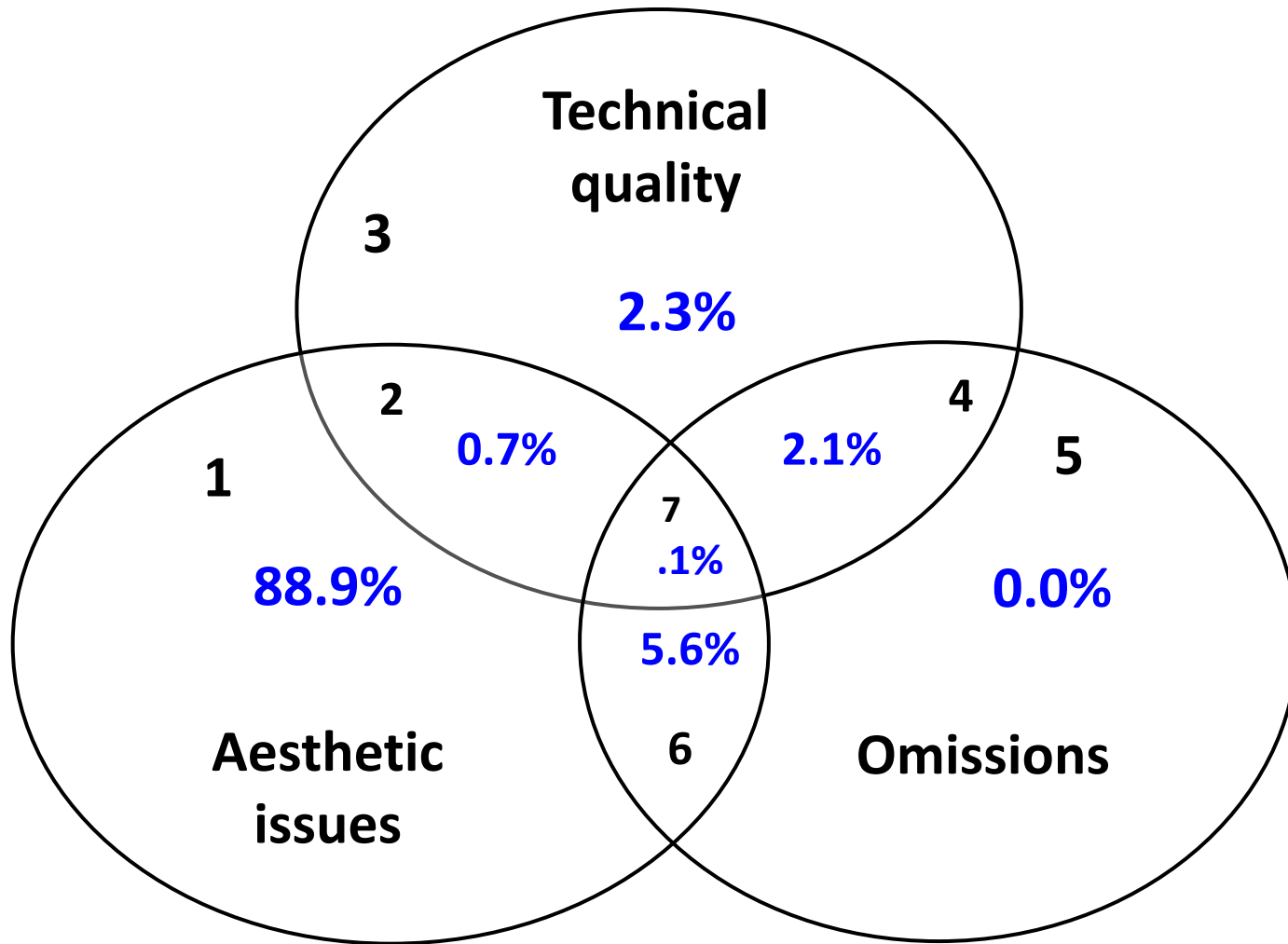
<b>Inspector</b>	<b>No of Inspections</b>	<b>Average</b>	<b>Minimum</b>	<b>Maximum</b>
3	1698	52.15	1	452
6	651	43.40	1	247
22	285	49.14	3	344
10	81	70.46	12	137
2	74	67.53	16	166
1	62	68.90	4	205
11	59	49.61	2	184
41	59	46.78	10	129
21	52	107.23	11	307
40	51	46.20	14	121

Address	Data	Total	Address	Data	Total
1	Average of Total Snags	<b>57.4</b>	6	Average of Total Snags	<b>60.9</b>
	Min of Total Snags	4		Min of Total Snags	3
	Max of Total Snags	205		Max of Total Snags	318
	Count of Properties	222		Count of Properties	253
2	Average of Total Snags	<b>65.5</b>	7	Average of Total Snags	<b>45.0</b>
	Min of Total Snags	1		Min of Total Snags	1
	Max of Total Snags	255		Max of Total Snags	452
	Count of Properties	98		Count of Properties	845
3	Average of Total Snags	<b>48.0</b>	8	Average of Total Snags	<b>56.5</b>
	Min of Total Snags	3		Min of Total Snags	1
	Max of Total Snags	389		Max of Total Snags	307
	Count of Properties	360		Count of Properties	536
4	Average of Total Snags	<b>61.4</b>	9	Average of Total Snags	<b>49.2</b>
	Min of Total Snags	7		Min of Total Snags	2
	Max of Total Snags	343		Max of Total Snags	405
	Count of Properties	559		Count of Properties	582
5	Average of Total Snags	<b>65.9</b>	Average snagging items		<b>53.6</b>
	Min of Total Snags	2	Lowest amount of items		<b>1</b>
	Max of Total Snags	314	Maximum Amount of Items		<b>452</b>
	Count of Total Snags	192	Total count of properties analysed		<b>3647*</b>

Snagging Item	Total	%	Snagging Item	Total	%	Snagging Item	Total	%
Make good/making good	20752	10.4	Lock	645	0.3	TRV missing	215	0.1
Paint/painting	19347	9.7	Square/not square	613	0.3	Key	209	0.1
Clean/cleaning			<b>Snagging Item</b>	<b>Total</b>	<b>%</b>	<b>Snagging Item</b>		
Plaster/plastering/tape/taping			Make good/making good	20752	10.4	Lock	209	0.1
Re mastic/paint/decorate			Paint/painting	19347	9.7	Square/not square	207	0.1
Fit/fitted/fitting			Clean/cleaning	12240	6.1	Uneven/un-even	193	0.1
Level/not level			Plaster/plastering/tape/taping	11580	5.8	Pipes/pipe/pipes	189	0.1
Seal/sealed/sealing			Re mastic/paint/decorate	7846	3.9	Poor/poor room	185	0.1
Damage/damaged			Fit/fitted/fitting	7425	3.7	g/isolators	184	0.1
Mark/marked			Level/not level	7210	3.6	Clip wiring/wiring	181	0.1
Missing			Seal/sealed/sealing	5766	2.9	Split	178	0.1
Scratch/scratched			Damage/damaged	4747	2.4	Sand/ridge/joint	174	0.1
Touch up			Mast/masted	4476	2.2	Cupboard/cabinets	171	0.1
Grinning			Missing	4302	2.2	Plumb/not plumb	168	0.1
Loose			Scratch/scratched	4212	2.1	Latching/locking	166	0.1
All other items			Touch up	4122	2.1	Touch-up/outlet/loft hatch	165	0.1
Door/doors			Grinning	3774	1.9	Rail/rails	162	0.1
Mastic/masticing			Loose	3536	1.8	Radiator/boiler	160	0.1
Crack/cracked/cracking			All other items	3221	1.6	Wall/walls	159	0.1
No - miscellaneous			Door/doors	2854	1.4	Caulk/caulking	158	0.1
Adjust/adjusting			Mastic/masticing	2813	1.4	Silicone	138	0.1
Grout			Crack/cracked/cracking	2706	1.4	Toilet/WC	133	0.1
Chipped/chips			No - miscellaneous	2526	1.3	Remove	132	0.1
Window/windows/sill/cill			Adjust/adjusting	2160	1.1	Shower	130	0.1
Gap/gaps			Grout	2136	1.1	WHB/Sink	129	0.1
Hole/holes/dent/dents			Chipped/chips	2030	1.0	Glazing/glass	128	0.1
Tidy up/tidying			Window/windows/sill/cill	1795	0.9	Mortar/cement	122	0.1
Poor finish			Gap/gaps	1710	0.9	Nail/nails	121	0.1
Secure/securing			Hole/holes/dent/dents	1701	0.9	Mites	120	0.1
Décor/decorate/decoration			Tidy up/tidying	1580	0.8	guttering	120	0.1
Paint runs/flaking/under/run			Poor finish	1530	0.8	Replace	118	0.1
Pointing			Secure/securing	1463	0.7	Dig in	104	0.1
Not working			Décor/decorate/decoration	1398	0.7	Extract/extractor	102	0.1
Ceiling/ceilings			Leak/leaks/leaking	702	0.4	fects	94	0.0
Earthing/earth bonding			Broken	678	0.3	bles	90	0.0
Nail pops/popped								
Lighting/light switch								
Door stop								
Floor/flooring								
Needs attention								
Skirting/architrave								
Tile/tiles/tiling								
Rough								
Excess/excessive								
Front/rear/elevation/elevations								
Dirty/debris								
Screw/screws/screwed								
Stain/stained/staining								
Leak/leaks/leaking								
Broken	678	0.3	Heater/heating	220	0.1	Communal	16	0.0
		86.6	Bracket/brackets	216	0.1	<b>Total snagging items = 199095</b>		<b>3.2</b>
					10.2	<b>Total Percentage</b>		<b>100.0</b>



# Possible Snagging Scenario's



Snagging Item	Example Item	Group	Code	Number of potential s	% of overall
<b>Earthing/earth bonding</b>	<b>Earth bonding to sink not connected</b>	9	3r	945	<b>36.7</b>
No - miscellaneous	No guttering to dormer roof	2	1j	577	<b>22.4</b>
Fit/fitted/fitting	Manhole cover not fitted	7	2y	252	<b>9.8</b>
Lag/lagging	Fully lag primary in airing cupboard	1	1d	180	<b>7.0</b>
<b>TRV missing</b>	<b>No TRV on radiator – Supply and fit</b>	1	1b	144	<b>5.6</b>
Isolating valve/isolators	No isolating valve to toilet cistern	11	4l	131	<b>5.1</b>
Missing	Cavity vent missing over kitchen door	2	1i	122	<b>4.7</b>
Ventilation	No ventilation to gas meter cupboard	12	5e	82	<b>3.2</b>
<b>Straps</b>	<b>No roof straps or ties fitted</b>	1	1c	53	<b>2.1</b>
No shelf/jacket/loft hatch	No jackets on tanks	2	1l	32	<b>1.2</b>
Label valves	Lag pipe work to cupboard and label valves	11	4m	21	<b>0.8</b>
<b>Bracing</b>	<b>No diagonal bracing on trusses</b>	1	1f	7	<b>0.3</b>
Clip wiring/wire	Extractor fan not wired to light	9	3v	5	<b>0.2</b>
Flue	No boiler flue	11	4q	5	<b>0.2</b>
Radiators/boiler	Provide TVR to radiator.	11	4j	5	<b>0.2</b>
Defects/no defects	There is no finished path around the house	16	6o	4	<b>0.2</b>
WHB/Sink	Sink top not bonded	12	4u	3	<b>0.1</b>
Glazing/glass	No fibreglass in ceiling	12	4v	3	<b>0.1</b>
Stain/stained/staining	Stainless steel sink top not bonded	4	2i	2	<b>0.1</b>
Power	Consumer unit reported to be tripping	9	4b	1	<b>0.0</b>
Door stop	Door stops non compliant with fire proofing	2	1k	1	<b>0.0</b>
Flash/flashing	No weep holes at bottom of flashing	13	5l	1	<b>0.0</b>
Rail/rails	No railings fitted to front door steps	14	6d	1	<b>0.0</b>
				<b>2577</b>	<b>100</b>

**No of units built per  
annum**

**Notional cost per snag item £**

	10	20	30	40	50	60
10	6500	13000	19500	26000	32500	39000
20	13000	26000	39000	52000	65000	78000
30	19500	39000	58500	78000	97500	117000
40	26000	52000	78000	104000	130000	156000
50	32500	65000	97500	130000	162500	195000
60	39000	78000	117000	156000	195000	234000
70	45500	91000	136500	182000	227500	273000
80	52000	104000	156000	208000	260000	312000
90	58500	117000	175500	234000	292500	351000
100	65000	130000	195000	260000	325000	390000
200	130000	260000	390000	520000	650000	780000

Loss

based on average of 65 snags per house per annum















Top tread with 10mm lip from landing:



# Conclusions

- Despite 10 years of surveys, overall quality of new homes in the UK has fallen
- Over the same period, the amount of new homeowners reporting snagging has risen to over 95%
- This is further backed up by the independent data which demonstrates that in a new 3-bedroom home you can expect to find an average 75 snagging items
- Snagging must be perceived as damaging. Surely by improving snagging levels then the other targets and criteria within the satisfaction surveys will rise



# Thank You For Your Time

## Questions

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