Appendix 3.1 Code completions

Data for Table 3.1 highlighted in red.

Table 1a Code for Sustainable Homes Statistics: number of certificates issued in month by stage of construction in England, Wales and Northern Ireland from March 2008

Month	Design stage								Post- construction stage							
	Code level								Code level							
	0	1	2	3	4	5	6	All	0	1	2	3	4	5	6	All
Overall TOTAL	**615**	**406**	**997**	**68,944**	**14,915**	**453**	**329**	**86,659**	**304**	**171**	**354**	**37,913**	**4,102**	**160**	**34**	**43,038**
%	*1*	*0*	*1*	*80*	*17*	*1*	*0*	*100*	*1*	*0*	*1*	*88*	*10*	*0*	*0*	*100*
TOTAL 2008-09	**0**	**39**	**4**	**1,156**	**21**	**9**	**0**	**1,229**	**0**	**0**	**1**	**58**	**4**	**2**	**0**	**65**
%	*0*	*3*	*0*	*94*	*2*	*1*	*0*	***100***	*0*	*0*	*2*	*89*	*6*	*3*	*0*	***100***
Apr-08	0	0	0	22	0	0	0	**22**	0	0	0	0	0	0	0	**0**
May-08	0	0	0	0	0	0	0	**0**	0	0	0	0	2	0	0	**2**
Jun-08	0	0	0	6	0	0	0	**6**	0	0	0	0	0	0	0	**0**
Jul-08	0	23	0	184	0	0	0	**207**	0	0	0	0	0	0	0	**0**
Aug-08	0	0	0	10	0	0	0	**10**	0	0	0	0	0	0	0	**0**
Sep-08	0	0	1	127	0	0	0	**128**	0	0	0	9	0	0	0	**9**
Oct-08	0	0	0	19	0	0	0	**19**	0	0	0	12	0	0	0	**12**
Nov-08	0	0	0	198	6	0	0	**204**	0	0	0	6	0	2	0	**8**
Dec-08	0	0	0	187	1	9	0	**197**	0	0	1	0	0	0	0	**1**
Jan-09	0	0	2	48	0	0	0	**50**	0	0	0	0	2	0	0	**2**
Feb-09	0	16	0	209	14	0	0	**239**	0	0	0	5	0	0	0	**5**
Mar-09	0	0	1	146	0	0	0	**147**	0	0	0	26	0	0	0	**26**
TOTAL 2009-10	**174**	**57**	**314**	**14,276**	**1,150**	**95**	**104**	**16,170**	**49**	**34**	**75**	**4,326**	**290**	**37**	**7**	**4,818**
%	*1*	*0*	*2*	*88*	*7*	*1*	*1*	***100***	*1*	*1*	*2*	*90*	*6*	*1*	*0*	***100***
Apr-09	0	29	10	566	3	0	0	**608**	0	0	0	51	6	0	0	**57**
May-09	0	0	0	397	24	0	0	**421**	0	0	10	29	60	0	6	**105**
Jun-09	0	1	1	598	35	6	10	**651**	0	0	12	96	0	0	0	**108**
Jul-09	66	0	79	687	20	0	0	**852**	0	2	0	203	0	0	0	**205**
Aug-09	0	1	2	1,144	55	0	1	**1,203**	0	0	1	203	0	0	0	**204**
Sep-09	0	3	1	674	50	1	1	**730**	0	8	17	236	7	6	0	**274**
Oct-09	28	0	28	1,223	79	10	0	**1,368**	29	0	0	440	33	0	0	**502**
Nov-09	16	0	4	1,353	58	0	1	**1,432**	0	0	0	409	11	7	0	**427**
Dec-09	0	0	42	1738	33	29	91	**1,933**	19	0	5	482	29	0	0	**535**
Jan-10	14	0	0	1323	149	24	0	**1,510**	0	0	0	399	87	0	1	**487**
Feb-10	27	0	76	1567	210	16	0	**1,896**	0	0	21	606	15	24	0	**666**
Mar-10	23	23	71	3006	434	9	0	**3,566**	1	24	9	1,172	42	0	0	**1,248**

TOTAL 2010-11	**156**	**266**	**291**	**34,522**	**5,561**	**295**	**188**	**41,279**	**114**	**54**	**133**	**18,208**	**1,579**	**62**	**24**	**20,174**
%	*0*	*1*	*1*	*84*	*13*	*1*	*0*	***100***	*1*	*0*	*1*	*90*	*8*	*0*	*0*	***100***
Apr-10	0	0	18	2992	44	0	1	**3,055**	0	0	7	839	134	0	0	**980**
May-10	0	55	2	2803	168	3	10	**3,041**	0	1	2	741	1	2	1	**748**
Jun-10	6	3	6	2959	484	4	172	**3,634**	14	0	7	1184	168	0	0	**1,373**
Jul-10	0	35	13	2665	757	5	0	**3,475**	0	0	17	1122	44	8	10	**1,201**
Aug-10	2	2	11	1838	346	96	0	**2,295**	14	9	16	1748	356	27	1	**2,171**
Sep-10	32	8	2	2780	367	11	0	**3,200**	0	5	10	1343	159	3	0	**1,520**
Oct-10	33	1	2	3522	735	6	2	**4,301**	35	9	19	1839	84	0	11	**1,997**
Nov-10	0	23	8	3404	557	0	0	**3,992**	17	1	1	2243	17	0	0	**2,279**
Dec-10	34	34	7	1617	430	0	0	**2,122**	0	0	0	1070	117	0	0	**1,187**
Jan-11	20	0	71	2319	440	101	0	**2,951**	0	26	18	1548	114	12	0	**1,718**
Feb-11	2	92	11	3670	375	41	1	**4,192**	29	0	3	2103	**97**	0	0	**2,232**
Mar-11	27	13	140	3953	858	28	2	**5,021**	5	3	33	2428	288	10	1	**2,768**
TOTAL 2011-12	**285**	**44**	**388**	**18,990**	**8,183**	**54**	**37**	**27,981**	**141**	**83**	**145**	**15,321**	**2,229**	**59**	**3**	**17,981**
%	*1*	*0*	*1*	*68*	*29*	*0*	*0*	***100***	*1*	*0*	*1*	*85*	*12*	*0*	*0*	***100***
Apr-11	221	15	25	3343	879	11	3	**4,497**	24	15	23	2145	230	13	0	**2,450**
May-11	7	0	79	3612	1106	5	6	**4,815**	55	0	8	2060	248	12	0	**2,383**
Jun-11	0	0	31	3086	1831	15	16	**4,979**	0	38	45	2408	341	3	0	**2,835**
Jul-11	8	17	4	3190	1294	1	0	**4,514**	34	11	28	2393	294	13	3	**2,776**
Aug-11	31	2	153	2863	1314	0	0	**4,363**	24	18	21	2714	553	2	0	**3,332**
Sep-11	18	10	96	2896	1759	22	12	**4,813**	4	1	20	3601	563	16	0	**4,205**

1. Code certificates were not issued between April 2007 and March 2008.
2. Certificates are awarded only to homes assessed and certified under the Code assessment process. Certificates can be issued at design stage and post construction stage. Each dwelling assessed may have both a design stage and a post construction certificate. It is also possible to for a dwelling to have only a design stage or a post construction stage certificate.
3. A Code level 0 certificate is awarded to a dwelling that has been assessed against the criteria set out in the Code Technical Guide but that has not met one of the mandatory requirements or obtained the minimum number of points to achieve Code level 1.
4. One assessment report was double counted in error in the October - December 2010 statistics publication. This has now been corrected resulting in the number of Code level 3 dwellings certified at design stage in December 2010 reducing by five (5).

Contact: Simon Brown
Telephone: 0303 444 1271

Sources: BRE Global Ltd, Stroma Certification Ltd, RDL Ltd

Latest update 12.10.12
Next update Jan 12

Appendix 3.2 Researcher's Smith Lane site photographs (November 2008)

North West to dual carriageway

South West to railway

West to railway

South

Appendix 3.3 Case study protocol

Case study protocol (adapted from Brereton et al., 2008)	
1.0	Background
1.1	Identify previous research on the topic
	The literature reviews review and synthesise previous research on the nature of the relationship between innovation and regulation. A lack of research into early project-based innovation in processes and ways of working in response to regulation was noted.
1.2	Define the main research questions
	1 What is the impact of the Code for Sustainable Homes on the early stages of housing development projects? *2 How do housing development projects innovate to meet the Code for Sustainable Homes?*
2.0	Design
2.1	Identify if single-case or multiple-case, and show logical links to research questions
	Single exploratory case study, using Winch's 1997 CoPS innovation structure, in the context of the given and interaction environments in Sexton and Barrett's model of organisational factors of innovation, as a focus for identifying innovative responses to regulatory drivers.
2.2	Describe the object of study
	The object of study is evidence of innovation in project-based working in the development of homes meeting Code for Sustainable Homes level 4.
3.0	Case selection
3.1	Criteria for case selection
	Project A was selected as a case for study because it is representative of the early design stages of a typical social housing development project.
4.0	Case study procedures and roles
4.1	Procedures governing field procedures
	In line with principles of research ethics and application for Ethical Approval.
4.2	Roles of case study research team members
	Because the research is the basis for PhD study, the researcher designed and carried out the case study. Additional support was provided by the PhD supervisor to provide observer triangulation during the workshops, expert review during the design and process stages and an overall scholarly perspective.
5.0	Data collection
5.1	Identify the data to be collected
	Data collected from semi-structured interview transcripts, preliminary and post-interview workshops, project-specific and general organisational documentation.
5.2	Define a data collection plan
	A series of eight hour-long interviews with organisational key decision-makers for Project A at their offices. Additional documentation was requested in pre- and post- interview e-mails.
5.3	Define how the data will be stored
	Data storage is detailed in the Ethical Approval submission.
6.0	Analysis
6.1	Identify criteria for interpreting case study findings
	Analytic strategy detailed to ensure internal validity.
6.2	Identify which data elements are used to address which research question/sub question/proposition and how the data elements will be combined to answer the question

	Interview questions were designed to capture evidence of innovation in response to the Code for Sustainable homes and analysed in line with data analysis framework.
6.3	Consider the range of possible outcomes and identify alternative explanations of the outcomes, and identify any information that is needed to distinguish between these
	The range of possible outcomes reflects the internal validity of the research design. *Rival theories include the development of improved ways of working at project level without the Code for Sustainable Homes as a regulatory driver.*
6.4	the analysis should take place as the case study task progresses
	6.4 reflects a grounded theory approach, building theory from data, and as this research is based on theory extension, initial coding takes place after data collection.
7.0	Research plan validity
7.1	General: check plan against Höst and Runeson's (2007) checklist items for the design
	The checklist at Table 3.8 reflects evidence for design validity.
7.2	Construct validity - show that the correct operational measures are planned for the concepts being studied. Tactics for ensuring this include using multiple sources of evidence, establishing chains of evidence, expert reviews of draft protocols and reports
	Operational measures to satisfy construct validity include the precise definition of the subject for study, enabling identification and collection of specific data to generate answers to the research questions.
7.3	Internal validity - show a causal relationship between outcomes and intervention / treatment (for explanatory or causal studies only).
	This is an exploratory case study so causal logic is not relevant. Analytic strategy includes ensuring internal validity.
7.4	External validity – identify the domain to which study finding can be generalized. Tactics include using theory for single-case studies and using multiple-case studies *to investigate outcomes in different contexts*.
	As a single case study, this research provides an analytic generalisation to the innovation, management and production theories of construction management, and is replicable using the logic presented by this case study protocol and database.
8.0	Research limitations
8.1	Specify residual validity issues including potential conflicts of interest (i.e. that are inherent in the problem, rather than arising from the plan).
	The research risk analysis has been developed
9.0	Reporting
9.1	Identify target audience, relationship to larger studies (Yin, 2003)
	The contribution to knowledge of this PhD research is an extension of theory on the nature of the relationship between innovation and regulation in early project-based contexts. Although the research is primarily directed at the generation of a PhD thesis, findings and conclusions will be summarised and future research possibilities identified for relevant conference and journal papers.
10.0	Schedule
10.1	Give time estimates for all of the major steps: Planning, Data Collection, Data Analysis, Reporting. Note Data Collection and Data Analysis are not expected to be sequential stages
	The major stages of the PhD process in which the case study data collection and analysis takes place have been formally noted. The semi-structured interviews were carried out over 3 winter months in 2008 – 09 at a crucial time for Project A, during which the Christmas break and bad weather caused operational delays of about 1 month.

Appendix 3.4 Case study design (based on Yin 4th ed., 2009)

Three key principles

P1 Multiple sources of evidence

P2 Case study database

P3 Chain of evidence from conclusions to questions

Five key components

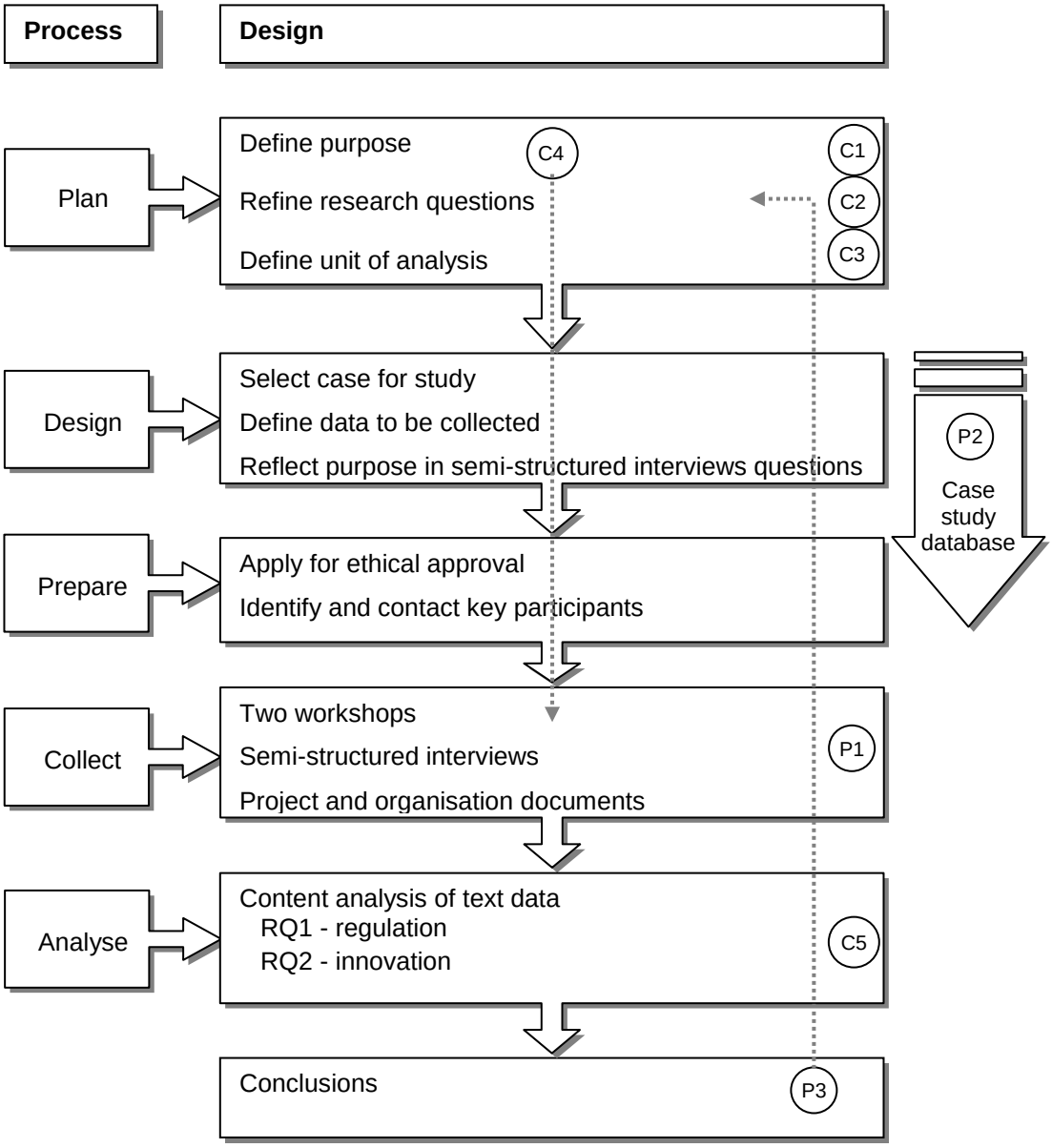
C1 Purpose

C2 Research questions

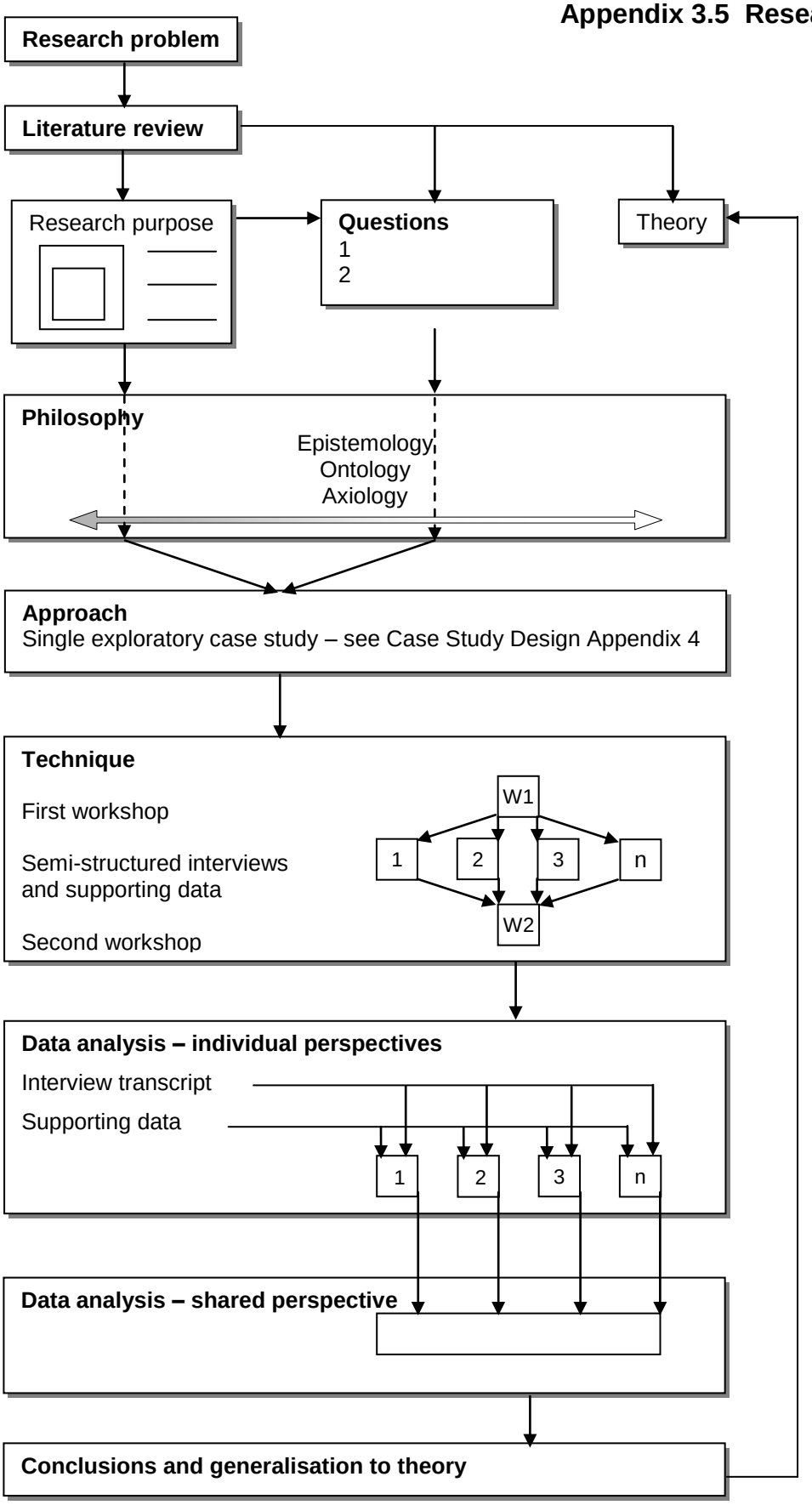
C3 Unit of analysis

C4 Logic linking data to purpose

C5 Criteria for interpretation of findings



Appendix 3.5 Research design



Appendix 3.6 Semi-structured interview questions

Part	Question
1. Introduction	Your name
	Your job title
	Tell me about Furnace Lane
	What is the purpose of your organisation's involvement in Furnace Lane
2. Procedures	What are your organisation's processes / stages that Furnace Lane needs to go through
	What are the timescales
Decisions	What are the main points in the process where decisions are made
	What are the decisions
	Who makes them
	Why do they make them
Risk	What are the risks financial or other) associated with Furnace Lane
	Who has the risk? How is the risk managed?
Performance	What are the internal / external key performance indicators associated with Furnace Lane
	What are the economic KPIs
	What are the environmental KPIs
	What are the sustainability KPIs
	How does you organisation measure / report against the KPIs
3. CfSH	What do you understand by the Code for Sustainable Homes (CfSH)
	What impact will the CfSH have on your organisation
	What is its importance to your role
	What is your role / organisation response to the CfSH
	What is your / your organisation's experience and knowledge that will feed into the CfSH
	How will your organisation identify and fill any training / capability gap
	Does your organisation have an explicit strategy for the higher levels of the Code (4 and above)
	How will the CfSH affect your organisation's business strategy / market positioning
	What are the cost implications of the CfSH for your organisation
	What is the cost "trade-off"
4. Innovation	What do you understand by "innovation"
	Where do you think innovation comes from / how do you think it is generated
	What does your organisation understand by "innovation"
	How does your organisation foster innovation
	How do you think innovations has affected your organisation's procedure for Furnace Lane
	How do you think innovation is relevant to your organisation / your business sector
5. Anything else	Is there anything else to add that we might have missed

Appendix 3.7 Representative interview transcript

Part 1. Introduction

CB	Tell me about Smith Lane
XX	It's an old allotment site that hasn't been used for about 10 or 12 years as allotments, so it's been vacant for a long time. It's overgrown with shrubs – part of the site was a depot of some sort, no-body seems to know at Town BC what the use was – certainly it's been fenced off there is some hard paving – there were some buildings there. The site is bounded on the North by a dual carriageway – the A43 – and on the West by an elevated railway, about 4 to 5 metres above the top of the site. To the South is a lane, the ownership is not known – this is Smith Lane, which presumably used to run from Town into the furnaces of the ironworks. British Steel – whatever they're called now – have some land at the other side of the railway. There is new housing beyond that – (contractor)-built and they have a ransom strip over access to the site. And to the East of the site, on the other side of the brook, is a development by Barretts, relatively new housing in the last 6 or 7 years. The site slopes from the North West down to the East by about 5 or 6 metres – quite significant falls. Vehicle access is limited in the corner – the South East corner – and that is a constraint on the development of the site. The Highways (engineer) required a loop road because they were restricted to 52 dwellings on the site originally – they wanted a loop road because a cul-de-sac would be too long and therefore if there was any emergency or blockage of the road there would be alternative means of exit. So that describes the site, the planning of the site plus the constraints of the noise from the dual carriageway and the perceived noise from the railway which didn't actually materialise – it's not a great problem. Vibration was thought to be a problem from the railway but it isn't – we've tested for that. There's no flooding on the site because of the slope down into the brook and the flood plain is below the boundary of the site.
CB	Can you tell me about the purpose of your involvement in Smith Lane?
XX	We get paid! More importantly, we get the satisfaction of designing a scheme for social housing. The original brief, subsequently changed, was for housing for rent – two-thirds, some for shared ownership and 8 dwellings for sale – because of the economic climate they're going to be for shared ownership – I'm not sure if that's been determined yet – (client) have actually advised us that it will change. But the specification for all of the houses is exactly the same – there's no difference in the facilities that are being provided, except some of the fittings. There'll be a difference in the specification of some of the kitchen units, probably.
CB	Have you done other, similar, schemes?
XX	We mainly do social housing schemes – the practice started in 1950, we started with social housing and we've done social housing all my life here – some smaller, some larger. And the basis was that this was going to be a Code 4 scheme, designed to high sustainability levels.
CB	So previous schemes have been in line with the EcoHomes standard?
XX	Yes….
CB	…so this is the first Code 4?
XX	No…we've designed another one to Code 4, and I've designed another one to Code 5 – small almshouses for elderly people, but this is the most advanced one…we have done EcoHomes Excellent on 3 or 4 schemes, so we're used to it! And back in the 90's, we did work with Hastoe Housing Association on two halves of one project, in Saffron Walden and Milton Keynes. The development was part-funded by the European Union under their Thermie programme. There were about 36 houses there which were the

	precursor of this – they had insulation levels in the walls that were a lot higher than the ones at Smith Lane will be – they were lower in the roof and lower in the floor – they had one boiler for four dwellings, because it was perceived that the heating requirements would be less – and they were. The problem was management of the boiler!

Part 2. Procedures: processes

CB	Can you talk me through the stages that Smith Lane goes through for with Architects – what happens first?
XX	I got a call from Client, from to say they had a site in Smith Lane in Town, can you do me a sketch – had she got a plan – no she hadn't, so I looked on Google Earth and couldn't find Smith Lane – eventually we found it and enlarged it on our Ordnance Survey facility and did a freehand sketch – I can show you if you're interested – just to check the feasibility of whether the brief they gave me – and it was a brief brief, just houses, so many 1 bed, so many 2-bed – could I give them a mix of houses with percentages of 2s, 3s & 4s, whatever – and there were 12 flats required, I think. And that came from the brief from Town BC's housing department – so they established the requirements. We do a feasibility study and discuss that, firstly with Client because of their client involvement, as to whether that's what they want – and whatever you do first time is going to be wrong, but it's something to talk about, something to think about – because there are lots of things that have to come in – the Highways, the sustainability. I don't really think sustainability is important in itself, I think it should be integrated into the design, but there are other constraints that come in like the orientation, the noise from the road and the railway are very important and the highway constraints of getting physical access to the site. So that's the first stage, the inception. That is passed around and maybe a month goes by – or more like two for this one – and then we get comments back from various people and we revise and refine the scheme…
CB	Why do you think it was 2 months for this scheme, rather than the month you mentioned for other schemes – is it the nature of the site and the constraints you've already identified?
XX	No…I think that if you're buying the site there's an incentive to move faster. This is a local authority site, and I think (and I shouldn't criticise people) there are people in the local authority who've got to protect – protect is an unfair word - consider all the requirements of their organisation – and it seems to be that that process is slower because there are so many people within the organisation to consult – so things come back - people are a bit more cautious about making decisions, whereas housing associations are not as cautious because they don't have as many people to consult - theirs is a small development team …and at that stage nobody is involved apart from ourselves, Client and Town BC housing department. We then designed the second stage – refined it from the brief, we thought about the content of the scheme, did a second sketch which goes again through a similar sort of processes. At that stage we were talking to the planners at the concept stage from Town BC about what their ideas were as well – it's a gathering of information stage, really, because it's almost a blank sheet of paper. You know you've looked at the site, been to the site, got photographs of it, but you don't know precisely the levels of the site, the noise levels – so there are all these constraints that you've got to gather together and get the detailed requirements of all the various people – environmental health, highways and so on. As you develop the scheme you gather more information and refine the scheme down to incorporate the

	information. A larger play space, for example, which was down here at the bottom of the site at one stage – because we knew there was going to be a drainage problem and we wanted to gather surface water at the bottom of the site, but because of planning constraints they wanted us to overlook the valley and the houses opposite, rather than having backs of houses facing down the valley – and the main constraint was the road access which should have come from here, should have come from the other side,. And at about this stage the council controlled the land here for Contractor but hadn't maintained the rights to access so there was a bit of a ransom strip there – Contractor didn't build up to the end of the site, so that meant that potentially there could be a further value in the ransom strip that goes to Contractor…… But then at that stage Client get involved with the solicitor to ascertain who owns what, and they found a ransom strip a metre wide down the Eastern boundary….the red line there used to be a track to the end of the field before the ….was built, apparently owned by the Highways Agency and I learned at the planning meeting that there's some bit of land here that is owned by the Highways Agency but doesn't …that's a 3 metre wide into the field, through into that field, and then there's a bit down here – when Highways build the road they bought up to that line, we were told - there might be an error there and there might be an error there – but that's all got to be sorted out by the solicitor checking the land registry drawings. We had great problems at that stage trying to find alternatives to the access problems here with Contractor – one solution was to come up Smith Lane but that isn't owned by anybody – so can you purchase and build on something that you don't know who owns it? There's another ransom strip up the side so you can't widen it and the ditch down this side is owned by the houses here – so there's lots of constraints.
CB	So it's gone through the stages of identifying the various constraints with the various agencies. So what stage are you at now – are there any other significant stages?
XX	The third stage is the revised sketch scheme – I can't remember how many sketch schemes we've done – it goes into the hundreds because of the ..the original sketch schemes are just plans – they're freehand - I just draw them out, sketching over an enlarged layout. Eventually the survey was done to check the levels – that's an important constraint, as is the noise survey – this was undertaken fairly early on to see what the implications would be for the site, so in March 2007 we had an acoustic survey of the noise from the road, railway noise and vibrations as well. It was perceived that there would only be vibration problems from the railway but at the council planning meeting someone said that there were huge problems from the road – at the council meeting yesterday engineers employed by the team both said no, they didn't think there were, but they'd do another test – so it's away from the railway but near the road. Once we had the surveys and all the information we refined the scheme and we started preparing elevations and sections and more detailed drawings – the house plans – these were prepared originally in August 07 and been revised 3 or 4 times because the needs change, people have refinements - and the location of the houses on the site has changed, therefore we've done another variety of house with doors in the front rather than on the side, for example. So things change, and you have to look at the individual house, and rather than have a standard that fits around the site, and see if there are any variations and in fact there are a lot of variations on this. One of the constraints that was imposed by Town BC was that they wanted a gold standard Building For Life – an environmental award - and to achieve that we have to put some character into the scheme – not that we wouldn't anyway – character and individuality – that's been a major constraint, something that other members of the team don't appreciate and are maybe not aware of – and certainly the Highways. So we prepared a more detailed plan

	with elevations and we talk to the planners for about the 4th time and discuss that with them, and listen to ideas that they have, which are important, and the constraints – we talk to Highways about parking requirements and keep gathering and refining as more information comes in. We prepare the plans, we prepare the sections, then we get a request from Town to change the brief to fulfil their need for bungalows – take out the 12 flats which aren't very land-hungry and try and maintain the numbers and put in 4 bungalows, which are obviously land-hungry – so we had that constraint coming in and that's when the play space down here was omitted – they wanted 2 wheelchair bungalows in and they're fairly large and 2 other bungalows as well – and no flats – so we managed to get 51 dwellings in, instead of the original 52 with 12 flats which was a lot easier – so we've done brilliantly, I think.
CB	So are there any other stages?
XX	The final stage is the planning application stage, when we finalise all the designs and gather together the information from the (engineer), the highways, the acoustic report – and there is this great big series of reports – these are the appendices that go in, and that box is full of all the things that make up the appendices.
CB	I had a look at the reports that are already on the Town planning website – I noticed the reptile report…
XX	…there are none – though we are putting some reptile refuges into the scheme - 2 or 3, one behind 23 and 1 by the scrubland – those are the Rs (on the plan) and the Bs are bat boxes. We go into great detail on the layout of the site – I don't know how many versions of the layout plan there are – there must be about 8 – there's the hard surfaces layout, this is the fencing layout and the tree layout, the shrub layout, there's roof finishes and they all have to co-ordinate, so if someone makes a minor change they all have to be updated. Certainly the roads have changed 3 or 4 times which is a bit awkward – my colleague now has a master plan which changes everything – she's very clever……
CB	So is that the stage we're at at the moment, with the detailed plans finalised…….?
XX	Yes, and submitted as a planning application, and that was submitted in March and didn't go to committee until the start of October for various reasons, one was that the 1st planning officer who did all the consultations, allegedly – he was obviously very busy and he was only part-time and didn't get them all back from the other agencies, didn't come back with their reports – and he left and the new chap who came in doesn't know the scheme and had to go through the process of learning about it. It was due to go eventually to the September committee meeting but that was cancelled because there were no applications going to the Committee - and they didn't want to put this on because they didn't get all the consultations back so it had to go to the October meeting – that was when it was recommended for approval by the officers but rejected by the councillors. And I am still confused – you'll see from my notes – as to why – I don't think it was purely because of noise, I think it was because of flooding off-site, but I can talk about this another time…..We're now at the stage, now it's been rejected…we had a meeting yesterday to talk about the strategy for addressing the problems of the planning refusal.
CB	Are the problems surmountable – is it just a tweak and a resubmission?
XX	The Planning Officer was there yesterday, as was the Environmental Health officer from the council – he was upset, he was angry that they hadn't taken any notice of his report – this is the councillors – and the basic fact is we've got to do something to appease the councillors, to settle their fears and concerns – so what we're doing is addressing a number of problems and probably putting a list of actions we've taken that will reduce the noise not only within the dwellings – the scheme has been designed with a terrace

	to protect the site – that was the basic premise was that we would have plots 23 to 35 that would act as a wall protecting the rest of the site – obviously you can't stop noise going at an angle – the further away it is the better it is - and the external noise as well, so we have a bund & we'll slightly raise the bund with a fence on top, so the gardens are all ok – the concern is that the noise level is affecting the 1st and 2nd floors on plot 35 – this isn't really doing anything at all – it's protecting the ground floor and the garden so what we'll try and do is raise that a bit – this is the top of the site where the road is in a cutting, effectively under the railway bridge and a bund and the fence will deflect the sound so those will be ok – that's plot 24 – this is an old provisional plan – 30 is ok and 32 becomes a problem so we have to look at those – this is where the road is level with, above the site, in fact, and the height of the – PB at Engineer wants to raise the properties up because of the road engineering constraints and geometry and we don't want to do that because of noise…so we have a conflict between the 2 of us….
CB	…so the collective view is that you can overcome the problems?
XX	Yes, I think so. There was a full recommendation for approval from the planning officers anyway on the previous scheme, so anything we do now should improve it even more – and the recommendation would be for approval.
CB	And then after approval, then what happens for you?
XX	Well, as soon as that happens - that's in a bit of doubt – in theory what would happen is that we'd start the working drawings, but at the moment we're employed by Client and at that stage we then transfer to Contractor and there's a doubt as to whether we'll be transferred across, so we may not be involved after the planning agreement.
CB	So they'd get a different architect….
XX	They'd get a different architect to undertake the job – a cheaper one because they're a commercial organisation. Speaking to Client, they wants us to be novated – passed across
CB	Novated…?
XX	It's a legal agreement……..

Decisions

CB	This section concerns decisions, the decision processes. If it was a flow chart, what are the key points where decisions are made? It sounds as if the whole process is a series of decision loops….
XX	Every time someone else sees the drawings, then there's something coming in so it's a continuous process – PB (Engineer) would say he's got a problem with CC Highways and I think he did about 20 sketches of the entrance to the site – and that delayed the project for a couple of months because if we couldn't agree that, then there's no development. And then there's a call out of the blue – the refuse man, or lady in this case – we need 3 bins on the sites - yes, we've incorporated that, where are they – they're by the front doors, how big are they - they're not all bins, there's 2 bins and some trays – so we need to consider the details – we think there's enough space. Then we have to consult Secure by Design - the police – so there's no rat runs. This is a bit of an awkward scheme – but that's a constraint put on by Highways. They don't normally like cars at the back, but that's prescribed by Building for Life requirements – you either put all the cars on the road or take them out, and our view, with the Strategic Planning Officer, was that we didn't want cars to be parked on the road, we were going to put bollards around the road so people won't park on the pavements.
CB	So these are the parking spaces round the back?

XX	Yes, you go through an arch to get to your parking space and this is a house that goes over the top - that's a first floor living room – a kitchen-dining room here with a garden, and a couple of bedrooms as well. You can't bring lorries onto the scheme …and we have bollards around here so hopefully people won't park on the footpaths. One of the other constraints is that I, and Town BC, wanted to have roads that were going to be used by people – so they become Home Zones which is a scheme for existing housing areas where you reduce the number of cars so children can actually play somewhere – it was made for Victorian streets – we were trying to recreate that here – our view was that we didn't want to have any footpaths. Highways' view was for footpaths on both sides of every street in the normal way – unfortunately we haven't got quite what we require either way – we've got a single footpath going all the way round and some speed tables to slow traffic down – but the idea is to try and get children to play on the street, so we're stopping cars parking on the pavements – the roads in my view are too wide, I don't think they should be as wide as they are for a one way system but that's different regulations, so the roads are very wide so cars can pass a dustbin lorry…
CB	..I saw the detailed drawings, the calculations for this yesterday…
XX	…should a dustbin lorry design a scheme?! And that's not really where – but Highway engineers have a different view of life and County are very strict in what they want – we've done very well to get to this stage. I wanted to have sharp corners so people had to slow down – these are very tight and he's eventually gone along with that – chicanes just give it a bit of interest and we haven't got straight roads anywhere…...if we restrict visibility we slow vehicles down, again going back to Victorian areas of towns, if there's a sharp corner you have to slow down because it's a junction – whereas if you have long views, you can go at any speed, so there's a lot of those constraints coming in.
CB	So it sounds like an ongoing series of decisions – all minor – but very important to the design….with planning as the major decision point.
XX	Planning is the major point - and you have all these constraints – and on the appendices list there are all those points that have come in, such as the cycle strategy, the walking strategy, the safety audit….
CB	…so the main decisions are made by people that are external to you, to Architects?
XX	Yes, we just interpret those decisions – we're not geniuses – well, obviously we are as we have the ideas -
CB	And other people make decisions based on your genius!
XX	It's gathering all those other factors in the system and trying to get a reasonable compromise across the whole field, a whole plethora of regulations and requirements for each individual site – so yes, it is a constant, changing thing – and it will change - most drawings have amendments on them.
CB	Is this standard for all the schemes you do – is this a normal way of working?
XX	Oh yes – I can remember working a long time ago, 40 years ago, when I was in the London Borough of Merton, I worked on a drawing amendment with over 40 revisions...
CB	..so it's just the nature of the process?
XX	Yes, you have an idea and it has to be refined - you have to think about the details, how it's going to be constructed…the roads, the noise, the drainage, the slope, so we don't flood the houses down-site, which is what the planning committee talked about for a long time…..

Risk

CB	For you, for Architects, what do you think the risks are with Smith Lane? I suppose the

	main one is the possibility that you may not get to be Contractor's architect?
XX	Yes, that's a concern, certainly because once you've designed a scheme, you want to continue and see it through, because design is a full package – I don't like the idea of design and build, where someone designs it and someone else builds it – that just takes control away from the building owners, the project leaders, Client, in effect – because it's changing priorities, and the priorities of the builder, whoever it is, will be different to the priorities of the housing association, in this case.
CB	….if that was the case, you'd be paid for the work you've done. Is there a financial risk?
XX	There often is a financial risk to us – I don't know how much time we've spent on it but I suspect the fees that we're getting in are less, honestly – we're getting less than we've actually done. We always seem to be in business, but we don't make the level of profit that we ought to do, I don't think and that relates to my fee, my income – as a partnership, fee is profit.
CB	So the risk is a personal one?
XX	Yes, indeed. And sometimes, some housing associations – not Client, thank goodness – there's one locally here – they wouldn't pay…you do a sketch, you do a scheme, you go for planning and they won't pay you unless you get planning permission, which is out of our control, unless they purchase the land, which is out of their control and unless they get Housing Corporation grant, which is out of our control – so the only one we have a bit of influence over –and we don't set the brief - is the planning application, and again we can't guarantee that. We can guarantee to get Building Regulations approval because that's a set procedure, we can go onto the Code for Sustainable Homes…
CB	Are there other risks associated with Smith Lane, do you think?
XX	I don't think so…..
CB	It sounds as if you know about the risk and manage it accordingly…
XX	..I wouldn't say we manage it very well. Now times are hard, and I've got staff to employ, and if I lose a job which is a large job, and the working drawings are done, which mostly they do rather than myself, it puts our viability into doubt, obviously – so there is a concern in that way and that is a big risk – so we try to get the whole process, we want to design the whole process….
CB	Is that to do with the current climate, the economic climate?
XX	It changed a while ago, it's to do with the design and build process, it changed 10 or 15 years ago – whereas before the (architects) dealt with everything, the whole job to working on site, managing the contract, the administration of the project, and then wound it up at the end. Now, with design and build, there is a designer and then that's where the employer's agent comes in – the Quantity Surveyor has really had his nose pushed out of joint because his role doesn't exist any more, they've moved out of the architect's role of managing the job – do you have them down on the list?
CB	Do you think I should?
XX	It'd be interesting to get their viewpoint – Baily Garner, in Birmingham – the employer's agent.
CB	It may be useful to see them along with this secondary tier of actors, all with the same focus on Smith Lane…
XX	Baily Garner are acting on behalf – in the past housing associations used to have that role, employing an architect, I suppose – the architect oversaw the construction – now with design and build, certainly in the housing field it's changed – the client employs a managing agent who then manages the project all the way through.

Performance

CB	Performance indicators looks at any quantitative measures that firms have for Smith Lane – what are the measures that Architects look at
XX	That's a downfall because we haven't actually set any KPIs as such, except to that we're going to achieve Code level 4 – we're going to achieve the specification of the number of shared ownership for sale, and we're going to get Building for Life – we have a number of things but not specific KPIs – we haven't sat down and said these are the KPIs for the job – we ought to have done that ….
CB	..so there's the Code for Sustainable Homes, Building for Life, Secure by Design…
XX	That's in the scheme development standards – called HQIs now, the Housing Corporation's Housing Quality Indices – they have a list, a schedule of facilities that you must incorporate within the scheme, and they have a large brief as well which presumably you can get a copy of…make sure you're looking at the right one – we're working off the previous, not the current edition, because this has been going since 2005…
CB	..and presumably there have been revisions. So you're designing in all the requirements for these standards
XX	Yes – we ought to have a list of KPIs because some members of our team don't understand the Code for Sustainable Homes, for example, some don't understand Building for Life, certainly or Secure By Design. There are noise and vibration considerations that we have to put in,
CB	Are those designed by the council?
XX	No, they're designed for the site – there are national policies which they have to design to - there's a BSA233, which they're working to and PPG24 – that all comes within the planning – so no other specific ones, I don't think.
CB	The Code sounds as if it's just one of a range of specifications – is it an important one, given that the government are wanting all new homes to be zero carbon by 2016?
XX	It is important, but I don't think it should have any greater importance than serving the needs of the residents who need to live in the dwellings – we're building houses, after all – and new buildings equate to 5% of all the buildings in the country – and we're trying to get excellent on 5% - why? What about the other 95%, why don't we upgrade those – so that's my bugbear with the Code – but that's no reason not to try….

Part 3. Code for Sustainable Homes

CB	No, it isn't. So, what do you understand by the Code for Sustainable Homes?
XX	I'm a Code Assessor at the moment, but I will not be qualifying next year, because I don't think it's the right way to go.
CB	Why?
XX	Because it's reactive rather than prescriptive – I think it should be more prescriptive. Some of the elements in here could easily go into the planning system – if you want a garden - planning, drying spaces - planning system, lighting levels - planning system, cycle storage - planning, home office – planning, water butts - planning. Most of these things – you can go down the list and some of them go into building regulations, such as the thermal energy efficiency levels. And if you say, we want our dwelling efficiency rating to be 50% lower than the target emission rate, well that's it, you can design that in – doing it afterwards isn't the right way to go about it
CB	So if you were to put all these things in to the planning process, which already seems

	quite complex and long-winded anyway, would it just add an additional burden to that process?
XX	I think we should review the planning process - I've just written a letter to Hazel Blears criticising the Code. Yes, you're right, it does make it a long process but it is just a tick box, isn't it – so what is the difference between the Code for Sustainable Homes and the HQIs of the Housing Corporation, or the Building Regulation requirements for drainage.
CB	So you could add all those to existing documents that people already work with, and take that as an opportunity to review and revise those documents as a whole process, rather then just add on an extra one. And talking to people yesterday mentioned another couple of documents - it would seem that the Code as just another set of requirements…
XX	It is another constraint – an essential one, an important – I'm not trying to belittle it – there's too much legislation at the moment and we're working and constantly reviewing…if we had one document which said, this is what you've got to do, this is the way we go - one would be nice – we're not ever going to achieve it, I know – but why do we need another process, why do we need all these different processes to go through to achieve…and this one is retrospective, in effect – you either pass or fail at the end, because of air pressure testing or sound testing - and that's not the way - you say this is the way we should build, this is what the sound levels, the noise between dwellings should be, or this is what the air pressure should be – you choose 10 which is a minimum requirement for air changes, you choose 7.5 – you won't actually get a better score on the Code for Sustainable Homes….
CB	What about building…specifically…Smith Lane to Code 4?
XX	I don't think there are any great problems – the constraints are coming from the cost of providing the various facilities mainly to achieve mainly the 44% improvement on the TER…and that is whether we put in ground source heat pumps or photovoltaics or air source heat pumps or whatever – and that selection is quite complex because there's a cost involved, and there are so many variables – should we improve wall insulation…?
CB	What are the cost implications for Smith Lane for Code 4 houses?
XX	They haven't actually been evaluated – we haven't actually got a cost for the job yet, which I think is a bit negligent really – there should be a cost available – the employers agent has done a cost and (contractor) haven't done a cost yet – I think they ought to have done by this stage, because it's still a bit vague. But certainly putting photovoltaics in – they're hugely expensive, we've just done them on a scheme which we're hoping is going to achieve EcoHomes excellent in Bedford and the cost for a small area was £10,000, which is only going to provide 40% of the electricity for lighting for the communal areas for 33 flats – the balance there is enormous. We got a bit of a grant, but it's still £10,000. The cost of the Code is estimated to be something like £10,000 a property.
CB	So the council want to build this exemplar development at Smith Lane and the cost is borne by other organisations….
XX	There's some Housing Corporation grant, Client will borrow money for the remainder, the shared ownership will get mortgages to pay back the money to Client fairly quickly, the rent will be capital costs …..and the sales payback will be even quicker, so there's a range in the matrix to fund this particular project – unfortunately some of those have gone out now.
CB	…and that's the bottom line, isn't it
XX	…yes, it has to be viable, you can't just pay money because in 20 years' time the

	tenants, residents are going to gain 5p a pound off their electricity bills – it doesn't come back to Client and the system seems to be a bit strange in that regard. When we were doing the work in the 90's, the cost of the insulation we were putting in – half the cost went onto the resident and half the cost went to the housing association, but all of the benefits, all the reduced costs in electricity and gas went to the tenant – who actually paid a slightly higher rent – which you can't do now – to offset insulation costs
CB	So what impact will the Code for Sustainable Homes have on you – it sounds as if it will be negligible because you've been working to EcoHomes standards….?
XX	It doesn't have much impact on what we're doing, except on the designing in of photovoltaic and solar panels, which ought to be on the drawing for the planners because they need planning approval so a decision has to be made early and it hasn't been – we've incorporated them in the drawings - so that's about the only impact it will have. I did a schedule of the way we thought the design should go – a chart – this is what I put forward to say this is the way we can design this and these are the features we can incorporate – though they're probably going to change. The design concept was for the majority of the houses to face north/south – all these houses could have solar panels, certainly get passive solar increase from the sun coming into their living rooms and rooms on the south side and smaller windows on the north side – though it doesn't quite work like that because people like their living rooms to overlook their gardens, so on the northern side it's a bit more difficult. On the east/west ones which we've tried to keep to a minimum, a pre-conception of ours - we suggested they should be heated by ground source heat pumps.
CB	So it's the solar panels and the photovoltaic panels…
XX	..these are what influence the design…and passive solar design as well – you can save 5 or 10% on heating costs with larger windows in the living rooms – we've incorporated that a little bit, although as I say we don't take too much cognisance of the north face because if people have north facing living rooms, you can't restrict the size of north-facing windows…..again, in the Code for Sustainable Homes there are minimum lighting levels for rooms that are facing north and that's a conflict, it's a nonsense.
CB	Yes, Martin talked yesterday about re-designing the standard house type…because the lighting measurements are taken in the middle of the room
XX	Why? – It's to save electricity, that's the idea!
CB	So you reckon that, at Architects, you have the experience and knowledge to deal with the Code?
XX	Yes!
CB	Is there a training gap?
XX	I'm an EcoHomes assessor and a Code assessor, but as I said I'm not going to continue that – I think it's doing the wrong things, creating a lot of work for little or no benefit, but you get a certificate – it's not the way we should be going – getting better at building accommodation is the most important thing, and I don't really want to be involved in that assessment process. I've got the knowledge….
CB	The certificate – who's interested in that, is it the builders, the construction community, the client, the purchasers, the tenants?
XX	I believe it's only the Housing Corporation – it's on their HQI checklist –
CB	..and is that the same for the Code for Sustainable Homes?
XX	I'm sure it's exactly the same - it's just another box to tick., because the government have said we've got to achieve level 3 now for everybody – so why have levels 1 & 2?
CB	For you here, is there an explicit strategy for higher levels of the Code, carry on designing at the higher levels?

XX	Yes, we have – I don't think there's any point in going for zero energy – I'm not sure what the aim of that is – you need energy, you've got to have it – we need to generate it in a better way – I don't think it's for the site to generate, personally.
CB	So you think it's the way forward to design to the higher levels?
XX	Oh, definitely – we're very concerned about global warming and pollution, and we've certainly got to …(architects) are a bit late coming on board, I think – but we're catching up.
CB	Is there a cost implication for the business in working to the higher Code levels?
XX	There's more time ……but that will level off. I'm a SAP assessor as well, and that's where most of the work is done – Martin Wright has asked me to look at alternatives for Energy 1 in the Code, and seeing which is most efficient as far as we're concerned, and which is most economical as far as he's concerned. There's a lot of work there which I wouldn't normally do at this stage.
CB	If it costs more in your time, what does the business not spend that money on – what's the opportunity cost?
XX	It's absorbed into the cost, and the profit margin goes down accordingly – (architects) are socially aware, generally – and will absorb that sort of thing within their fee.
CB	Is you practice ahead of the game, do you think?
XX	I think so, yes. I think people are catching up now, but yes, we have been ahead of the game.

Part 4.Innovation

CB	What do you understand by innovation?
XX	I've read the Egan report! And I'm not sure that was very helpful, bringing a man from the car industry in to talk about the building industry – I think that was Prescott who said what we really want is cheaper housing at any cost – the £60,000 house competition and all this sort of nonsense is not the quality that we want – and I believe that innovation has come in, in general, to every scheme we've worked on, where we've done some innovative thinking – timber framework, timber panels, lightweight steel frame buildings, flats and houses – every one of them has cost more than the traditional build, financially and in time – very few of them have saved time overall because there's a greater lead-in period with panel-frame or whatever construction before they can go on site. The benefits are certainly a tidier site – because things come in larger panels and certainly there was a health and safety benefit on that particular site – a very good box to tick – although that particular contractor hasn't had any serious accidents yet – it's obvious that a tidy site must be a safer site, and it certainly looked good, and went up in reasonable time, except that the panel manufacturer made errors and to rectify those on site took longer to do. Timber frame, you can get a carpenter in to alter it very quickly, steel frame is a bit more difficult. Having said that, the steel frame is a far better construction than traditional and timber frames.
CB	How do you think innovation is generated ….in the housebuilding industry.
XX	It's a very conservative industry – I think it's been generated by dictat, from John Prescott really…build more houses – I think for the wrong reason he's probably brought innovation into the industry – I'm not sure it's necessarily better, but it's certainly helped health and safety – that's one of the best benefits, although having said that there are more crane collapses now, people die because of crane collapses, there are more vehicle …more lifting regulations, more forklift trucks and other machines on site – and people have been killed and injured by machinery more than

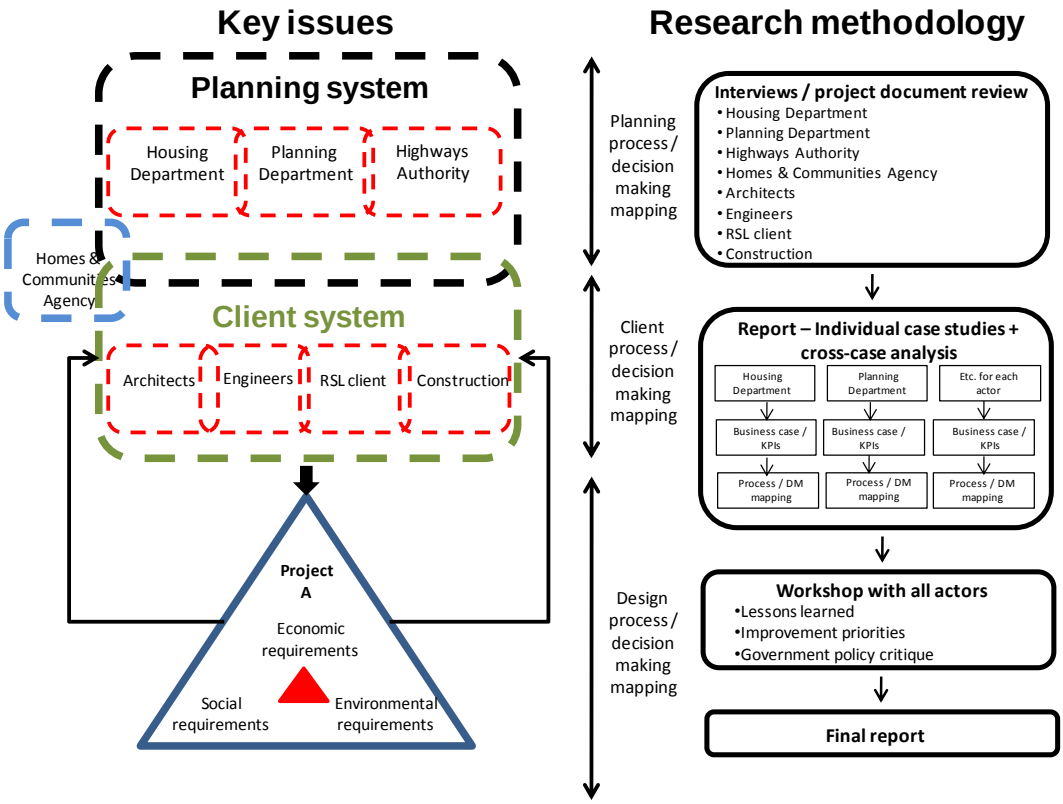
	there use to be – and I don't believe a chap walking up a ladder with a hod of bricks is any worse, in health and safety terms, than a crane or scaffolding – and there are more scaffold collapses recently – so yes, it has its advantages, prefabrication you have to erect so scaffolding goes up before the building so you have free-standing scaffolding which looks very insecure and you need barriers on both sides of it because people can lean and fall over on either side, in effect. It has advantages – some types are better – panels give a better quality finish and in terms of sustainability, reducing maintenance is important – and I don't think that's been consider data ll. Timber frame shrinks and moves about tremendously and there is lot of maintenance needed – there's a fire risk as well.
CB	What about the supply chain – the businesses providing the ..things that make the houses – are they innovative?
XX	There's a great reluctance ….sometimes they are – there are new products coming onto the market that are of benefit.
CB	And is the construction industry prepared to risk using largely untested products?
XX	There's a great deal of conservatism – we in this office say have you got a quality testing certificate …whatever the testing regime is, although the performance requirement, specification of that material or that product, we don't just take anything – we have to think about it.
CB	And people developing the new products will have an eye to those requirements...
XX	…but that's product selection and that's often the whim of the architect who chooses, or the client says we've used this before, we want to use it again on this job.
CB	Does price make a difference?
XX	Very much so – it depends on who's driving the project, and this is a design and build project so (contractor) are driving the price down and are not really concerned by the quality of the product, whereas Client want a quality product because they have to maintain it, so the two are in conflict – and if you talk to the maintenance department at Client, they will always criticise their development colleagues – whatever housing association they're in – they want things that are easy to maintain – they want plastic windows, plastic fascias and soffits.
CB	How do you think innovation is relevant to your business sector – you may already have answered that….
XX	It builds new ways of thinking – innovation is always good – we employ – though we haven't done this year – architecture is a 5 year course and after 3 years you come out for a year and go back for 2 years before your part 3 exams – we have in the past taken in people after year 3 with a degree and that's good, because it brings people in who haven't actually worked in the constriction industry, but they've gone through school and university and got the degree and come out to do a job that they've got a vocation that they're training for, and really it's the first time they've worked – they often have good ideas and to us that's innovation coming in through the back door to us – it may not be the sort of innovation that you're talking about but it keeps us on our toes about the way people are thinking – and we ….get feedback, tell them the processes, how things are put together. In terms of innovation – how is it relevant? I think it is in a conservative way – I think we've got to be aware of innovation, of ways of constructing in a better, more appropriate way and achieve the performance that's required – it's setting out performance requirements…
CB	…in, for example the Code for Sustainable Homes….
XX	Yes – the problem with innovation, going back to the work we did in the 90s, the Thermie programme I mentioned earlier, they based everything on passive solar – we did some work in the 1980s in Milton Keynes on that, with big windows on the south

	and small on the north – we had thermal mass in dwellings – innovation's always seemed to me to mean to the developers, the employers agents, the housing association – the timber frame, that's going against, counter to the thermal mass scheme – if you look on my chart. We did a scheme for Client in Town and there we were going to construct the flats with thermal mass and the houses in panels – in the end it all went to a panel system so thermal mass has been lost in that project, other than the ground floors which have concrete floors, which goes against the Code for Sustainable Homes – ground floors in screed and concrete isn't liked in the materials section…the green guide rating is ok for what it does, the sustainability of materials – it ignores other aspects – it's blinkered views – each section is a blinkered view, it's racing towards one goal and ignoring other goals – there are conflicts within the Code, I think.
CB	…all those people looking in on Smith Lane are all driven by a range of different ….and then in the end we're going to get Code 4 houses on quite a challenging site…
XX	It is a challenging site, there a lot of constraints on it – and then planning system is wrong because we go along and say we want to develop this site for housing and the planning application to he local authority says - this is for housing, what constraints are you going to impose on the site – there's a noise problem, a flooding problem – and they can put on constraints that are fairly detailed – and they can gather together at that stage, the Highways and the other people – we then could design it, the principles have been established for the site, you could then design it and go for technical planning approval and incorporate those aspects into it – they could say they want 50% …and they could include most of the Code for Sustainable Homes items within those – they could be set for almost every site, I guess – there are going to be different influences for every site.
CB	That's something we can explore for the project, as part of the final report – as a recommendation from any critique of the Code.

Part 5. Anything else?

CB	Is there anything else you'd like to add that we haven't covered already?
XX	No, not really…nothing I've written down, anyway
CB	Thanks and close.

Appendix 3.8 Case study plan from First Workshop



Appendix 3.9 Data for triangulation

Transcript	Own triangulation evidence	Other triangulation evidence
Local Authority Housing team	Transcript check KBC Improvement Plan 07 – 08 KBC Housing Service Plan 08 – 09 KBC Housing Strategy 05 - 08	LA Sustainable Place Making Aims and Objectives
Client - RSL	Development Risk Assessment Global Development Process Map Scheme Approval Process Map Sustainability Checklist Transcript check	Transcripts: Developer HCA
Homes and Communities Agency	HCA NAHP guidance and spreadsheets (on website) Transcript check	Client's Global Development Process Map
Local Authority Planning team	Planning process map Transcript check	LA Sustainable Place Making Aims and Objectives
County Council Highway team	Transcript check	Architect's Project A plans Client's Design Brief Engineer's Project A plans
Architect	Letter to developer Letter to Planning Team Practice website Project A construction checklist Project A drawings and plans Project A energy options schedule Project A schedule for Code levels Transcript check	Client's Design Brief Maps Photographs Planning application reports (on LA website) Planning submission report Researcher's photographs Transcripts: Client Developer Engineer Highway Authority
Contractor	Transcript check	Architect's Project A construction checklist Architect's Project A energy options schedule Architect's Project A schedule for Code levels Architects' Project A drawings and plans Client's Design Brief Planning application reports (on LA website) Planning approval document
Engineer	Project A site plans Transcript check	Planning application reports (on LA website) Planning submission report Researcher's photographs

Appendix 3.10 Final NVivo nodes list

- Q1 Regulation
  - Code for Sustainable Homes
    - Construction
    - Costs
      - End user
      - Sector
    - Impact
      - Organisations
      - Projects
      - Sector
      - CO_2 reduction
    - Negative
    - Positive
    - What it is
    - What it does
  - Other regulation
    - Building for Life
    - Home Zone
    - Housing Quality Indicators
    - Manual for Streets
  - Performance
  - Prescriptive
  - Regulatory tension
- Q2 Innovation
  - Exploitative
  - Explorative
  - Housing
    - Housing consumers
  - Define innovation
    - Adds value
      - Monetary
      - Social
    - New idea
    - Successful application
  - Innovation & regulation
    - Barrier
    - Driver
    - Code
    - Other regulation
  - Innovative organisation
  - Interaction environment
    - Compromise
    - Iterations
    - Negotiation
    - Solution
    - Teamwork
      - Relationship - positive
      - Relationship – tension
  - Non-Code non-regulation innovation

Appendix 4.1 Summary of the impact of Code 4, from Second Workshop

Participant	Response	Comment	Code Element
Client	As a social housing provider, we have no choice. The HCA grant system allows for funding. Ongoing maintenance of the solution to meet CO_2 target for Code 4 presents long-term management and maintenance issues, as yet untested.	For Smith Lane, the client was required to deliver a Code 4 development in return for the gift of the land, and successfully applied for additional grant funding from the HCA to support this. Maintenance is a concern, noted further in Section 4.7.1.	
CC HA	Need to ensure the provision of cycle storage, which is reflected in the county council's Supplementary Planning Guidance and would have been included anyway.	Cycle storage is incorporated within the architect's external design.	Ene 8
Architect	Layout and design of houses on site to optimise south-facing roofs and main windows for solar gain. Need to design in high insulation standards, higher than normal wall thickness, internal recycling space, cycle storage, home office, private outside sitting areas and Secure by Design standards. Need to carry out detailed options analysis with developer [contractor] for solar and additional energy sources. Traditional rather than timber frame construction. Material selection and Green Guide to Construction are relevant.	Orientation and roof pitch of the houses is reflected in the architect's plans for the site. These are Code criteria, expressed as design elements with implications for both cost and space within HCA grant levels and standards. Secure by Design is a local authority requirement The detail noted here is a significant feature of the case study and is considered in detail in Sections 4.12.1 and 4.12.2. The construction and material details were not critical within the case study.	Ene 2 Ene 8 Ene 9 Was 1 Ene 7 Mat 2 Mat 3
Contractor	The cost of meeting Code 4 is expressed as a high risk in Smith Lane's financial appraisal. The barrier is the cost of implementing Code, not the regulation itself.	The cost of meeting Code 4's CO_2 improvement target was significant within the case study.	
Engineer	Criteria at SUR1 and SUR2 are directly relevant, though these do not present problems because this is the area of expertise and they are applicable to all new housing contracts.	SUR1 defines management of surface water run-off and SUR2 defines flood risk protection. Both have been included by the Engineer, and need to be operational before 60% of the homes are complete.	Sur 1 Sur 2

Appendix 4.2 Architect's Code credit checklist for Smith Lane

Code for Sustainable Homes - Checklist . Project . . . . . ne V1

	Subject Code Level	Easy 3	Difficult 4	Expensive 5	Max Points	Total	%
Ene 1	DER over TER 25% improvement 3	* 5					
	44% improvement 4		* + 3				
	100% improvement 5			* + 6			
	True Zero Carbon 6			or * + 7	15		
2	Building Fabric - HLP	1	1		2		
3	Low Energy Lighting	2			2		
4	Drying Spaces	1			1		
5	White Goods Energy Labelling	1			2		
6	Lighting Space	1			1		
	Security	1			1	20 of	
7	Low Carbon Technologies		1	1	2	29	
8	Cycle Storage	2			2		36.4
9	Home Office	1			1		
Wat 1	Water Conservation levels 3 & 4 = 3	* 3		+2-levels 5 & 6	5	4 of	
2	Water Butts	1			1	6	9.0
Mat 1	Green Guide Rating	* 8			15	12 of	
2	Key Building Elements		3	3	6	24	7.2
3	Finishing Elements		1	2	3		
Sur 1	Water holding/ SUDS Hard surfaces	* 1			1	3 of	
	Roofs			1	1	4	2.2
2	Flood Risk of Site	2			2		
Was 1	Refuse Storage	* 4			4	7 of	
2	Site Waste Management	* 2			2	7	6.4
3	Composting	1			1		
Pol 1	GWP Global Warming potential	1			1	4 of	2.8
2	NOx emissions	3			3	4	
Hea 1	Daylighting	1	1		3		
2	Sound Insulation	3		1	4	6 of	
3	Private Space	1			1	12	14.0
4	LifeTime Homes				4		
Man 1	Home User Guide	3			3		
2	Site Management	1		1	2	8 of	
3	Construction Site Impacts	2			2	9	10.0
4	Secured by Design	2			2		
Eco 1	Site of Low Ecological Value				1		
2	Ecological Enhancement	1			1	6 of	
3	Protection of Ecological Features	1			1		
4	Improvement of ecological Value	2	2		4	9	12.0
5	Building Footprint				2		
	TOTALS	57	70	87	104	70	100

CODE LEVELS	Level 3	Level 4	Level 5	Level 6
Ene 1 - C02 %age improvement	25%	44%	100%	Zero CO2
Wat 1 - Water Consumption	105 litres	105 litres	80 litres	80 litres
Mat 1 - Green Guide Ratings	At least 3 of the five criteria			
Sur 1 - Surface Water Runoff	Run off should not increase after development			
Was 1 - Household Waste Storage	Waste storage should be able to accommodate the all LA bins.			
Was 2 - Site Waste	2 Credits	2 Credits	2 Credits	2 Credits
Total Points Required			84	90

Appendix 4.3 Architect's layout

Appendix 4.4 Additional innovation identified from case study data

Four additional innovations were identified from case study data on the early stages of Project A. These are captured below.

Innovation 5	**Giving away council land**
Brief description	Giving the land for Smith Lane in return for Code 4 exemplar housing project.
Regulation	None
Key organisation(s)	Local authority
CoPS role(s)	Superstructure
P/P/P/P	Process improvement
I/M/A/R	Incremental
This idea originated in the Local Authority housing team as a way of levering in an exemplar Code 4 development on land previously identified for social housing. The value added is reflected in the addition to local housing stock, however the definition of this idea as an innovation is limited to a single, exploratory instance for a specific purpose. The process of giving the land is one of the key features of the Smith Lane research case study, however this does not extend the generalisability of the research.	

Innovation 6	**Approach to the issue of the ransom strip**
Brief description	The client invited the contractor to build Smith Lane, in return for purchase of the ransom strip. They had to think “outside the box” (client) of normal procurement and delivery, to work with the ransom strip owners to make progress with the scheme and to keep the costs down.
Regulation	None directly relevant, though cost model is a primary consideration.
Key organisation(s)	Client, contractor
CoPS role(s)	Both
P/P/P/P	Process
I/M/A/R	Incremental
This approach to addressing the issue of the Smith Lane ransom strip is a solution to a project specific problem generated by the client in agreement with the contractor and can be defined as an incremental exploratory innovation, extending the client’s detailed development flow-chart.	

Innovation 7	Round-table meeting to push progress to achieve planning permission
Brief description	Unique step within normal planning permission process, proposed by LA Housing manager and attended by a representative from the Housing Strategy team, the Development Control Manager, the Planning Manager, the architect, an acoustic specialist, the engineer and the client's Head of Construction.
Regulation	Not in response to regulation
Key organisation(s)	LA Housing and project participants
CoPS role(s)	Superstructure
P/P/P/P	Process
I/M/A/R	Incremental
This event is assessed as innovative because it was new and unprecedented within the normal planning permission process and would be defined as an incremental innovation to the process. The main driver for the meeting was to speed up the process of achieving planning permission for Smith Lane following refusal of the first application.	

Innovation 8	Arrangement to ringfence sales proceeds
Brief description	Arrangement with the client so that sales proceeds (from sale of LCHO homes) would be ringfenced into spending on housing in rather than into general local authority fund.
Regulation	None apparent
Key organisation(s)	Local authority
CoPS role(s)	Superstructure
P/P/P/P	Process improvement
I/M/A/R	Incremental
This arrangement is defined as innovative by the local authority housing team. It concerns the destination of funds generated by the sale of LCHO (Low Cost Home Ownership) homes on the Smith Lane development by the client. As such, it would add social value to the financial framework for the scheme, however the details were not captured and confirmed during data collection and the innovative financial details are not explored as part of this research.	

In addition to four innovations that adds direct value to the Smith Lane development, a further seven examples were identified from case study data, included here to demonstrate that project teams, in working together, generate and apply ideas that add value within the project and for their organisations that can be defined as innovative.

Innovation 9	"Unbundled parking"
Brief description	Promoted in Northants for private new housing that buyers can choose to buy land where they would park as car parking or as garden, but if they buy it as a garden they cannot park on it. Controlled by restrictions and land-owning covenants.
Regulation	None
Key organisation(s)	County Council Highway Authority
CoPS role(s)	Superstructure
P/P/P/P	Product
I/M/A/R	Incremental
Notes to self	Not directly relevant to Smith Lane, but innovative nevertheless.
"Unbundled parking" can be defined as a product that introduces changes to the way purchasers of new, private homes make choices about their car use, and because this has a significant impact on the future use of land, may be assessed as modular or architectural. This was not an option for the social housing at Smith Lane and the innovation was not explored during data collection for the research.	

Innovation 10	Provision of less road and more private drive
Brief description	Reduction of street area. The urban design is in line with regulations applies, but driveways are longer.
Regulation	Falls within the county's design guide and Manual for Streets
Key organisation(s)	Highway Authority, contractor
CoPS role(s)	Superstructure, infrastructure
P/P/P/P	Product
I/M/A/R	Incremental
This is evidence of exploitative innovation which adds value for the contractor through reduced construction costs and for the Highways Authority through reduced maintenance and Section 106 payments. The Smith Lane development did not include a reduction in street area and the innovation process was not explored. However, it highlights the contractor's focus on cost reduction as a business strategy, and the Highway Authority's capacity to suggest street designs which can accommodate this.	

Innovation 11	"A master plan that changes everything"
Brief description	Adaptation of computer software to update all versions of plans following iterations
Regulation	None
Key organisation(s)	Architect
CoPS role(s)	Systems Integrator
P/P/P/P	Process improvement
I/M/A/R	Incremental
This is an example of incremental process innovation as an amendment to the organisation of work in an office situation by the individual who manages the task. The innovation adds value by saving time and increasing auditability on a critical, simple, and repetitive task. Although this is a classic example of incremental innovation, it does not justify additional research within the case study.	

Innovation 12	Past innovation in construction methods
Brief description	Examples of innovative thinking: timber frameworks, timber panels, steel frame homes. Higher costs and more time for all of them.
Regulation	None direct – as an ongoing response to MMC
Key organisation(s)	Architect
CoPS role(s)	Infrastructure
P/P/P/P	Product / process
I/M/A/R	Architectural – implications for supply chain.
The architect identified these construction techniques as innovative. At the point of their emergence they would have been innovative, involving new or improved models for construction of housing and its associated supply chain. The impact of these on the housing construction sector has been the subject of significant research.	

Innovation 13	Standardisation of house types
Brief description	Improving design and reducing costs by standardising house types, components and materials through framework agreements with selected contractors and consultants - “I hope that this is innovation” (Client)
Regulation	No specific regulatory driver, though HCA recommends this approach.
Key organisation(s)	Client
CoPS role(s)	Superstructure, though here responding to innovation driver from HCA – another superstructure org.
P/P/P/P	Product and process
I/M/A/R	Incremental
This regular revision of standard house types by the client contributes reflects the incremental improvements made to their development process. The HCA recommend a partnership approach to the development supply chain. The Code 4 housing for the Smith Lane project was not covered by the client’s existing Design Brief which identifies requirements for meeting Code level 3, as specified by the HCA criteria for NAHP funding. The regular revision of house types as an innovation is not directly relevant for the research.	

Innovation 14	Homebuyer Direct product
Brief description	Aimed at a client group that has a level of income and job security but is unable to access a mortgage because they do not have 25% cash deposit.
Regulation	None
Key organisation(s)	HCA
CoPS role(s)	Superstructure
P/P/P/P	Product
I/M/A/R	Incremental
This innovative product proposed by the Homes and Communities Agency extends the range of funding available for Low Cost Home Ownership, and is therefore incremental. It reflects the use by the HCA of the language of banking and private mortgages, which suggests the alignment of LCHO within this market. This is potentially interesting as an innovation in market position, though not relevant to this research. Neither is the Homebuyer Direct product directly relevant to the research on the innovation in response to regulation within the development of Project A.	

Innovation 15	**Code 5 housing with education / training / demonstration facilities.**
Brief description	Another idea by the LA Housing team, to develop Code 5 homes across 3 sites and some unused allotments.
Regulation	Code 5
Key organisation(s)	LA Housing
CoPS role(s)	Superstructure
P/P/P/P	Product / process
I/M/A/R	Modular
The assessment of this vision as an innovation may be justified from the definition of innovation as 'the successful application of a new idea that adds value'. Although the idea of a Code 5 development is not new for Smith Lane's local authority, the extension to include a combination of education, training and demonstration facilities, is new and adds value, in social terms, to the area. The innovation for the local authority is defined as incremental because it extends from Code 4 housing already developed, however for a project team this may be a more complex and challenging development, generating a range of exploratory product and process innovation.	

Appendix 4.5 Architect's energy options schedule for Smith Lane

Plot	1	1				11				15				43			
Options	2	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
TER	3	20.93				23.08				23.42				26.63			
Required DER - 44% saving	4	11.72				12.92				13.11				14.91			
Front Door U value	5	0.6				0.6				0.6				0.6			
Rear Door U Value	6	1.2				1.2				1.2				1.2			
Window U value	7	1.3				1.3				1.3				1.3			
Wall U value	8	0.2				0.2				0.2				0.2			
	9	0.2				0.2				0.2				0.2			
Roof U value	10	0.1				0.1				0.1				0.1			
Floor U value - ground	11	0.15				0.15				0.15				0.15			
suspended	12	n/a				n/a				0.17				n/a			
Light overshading assumed	13	Yes				Yes				Yes				Yes			
Air Pressure test levels	14	5				5				5				5			
L.E.Lighting	15	100%				100%				100%				100%			
High Efficiency Gas Boiler	16	BGD				BGD				BGD				BGD			
Time and temperature zone control CBI	17	CBI				CBI				CBI				CBI			
Cylinder 200 litre	18	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
100 foam insulation	19	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
100 Dedicated solar store	20	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Solar Panels net sq. m.	21	3	3.7	3	3	3	3.4	3	3	3	3.7	3	3	3	3.4	3	3
orientation	22	south	south	south	south	south	south	south	south	west	west	west	west	south	south	south	south
Photovoltaic Panels Peak Pwr	23	0.8				0.55				0.7				0.5			
orientation	24	south				south				west				south			
Air Source Heat Pump PED	25		300%	300%			300%	300%			300%	300%			300%	300%	
Time and temperature zone control CHD	26		Yes CHD	Yes CHD	Yes CHD		Yes CHD	Yes CHD	Yes CHD		Yes CHD	Yes CHD	Yes CHD		Yes CHD	Yes CHD	Yes CHD
Ground Source Heat Pump	27				320%				320%				320%				320%
Gas Fire Balanced Flue PAS42	28		YES		YES		YES		YES		YES		YES		YES		YES
Efficiency rating	29		58%	85%	58%		58%	85%	58%		58%	85%	58%		58%	85%	58%
Condensing RGE Pass 42	30			YES				YES				YES				YES	
	31																
	32																
Achieved DER	33	11.71	11.72	11.58	11.43	12.82	12.9	12.72	12.75	12.97	13.11	13.01	12.8	14.73	14.48	14.09	13.91

Appendix 4.6 Engineer's road layout