HN2800/2

Development of Home*Smart* Home Procedures v.1 for piloting

Final

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About This Report

Title

Development of HomeSmart Home Procedures v.1 for piloting

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Reviewer

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Abstract

This report outlines the methodology and work undertaken to development the Version 1 HomeSmart Home Procedures for the NOW100 Project.

Reference

Easton L., Karlik-Neale M., Saville-Smith K. and Jaques R.. August 2009. Development of HomeSmart Home Procedures v.1 for piloting.Report HN2800/2 for Beacon Pathway Limited.

Contents

Tables

Figures

1 Executive Summary

The NOW100 Project aims to create clear documentation and tools – Home*Smart* Home Procedures (previously called NOW Home® Procedures) which codify the approach, specification and methodology for designing and constructing Home*Smart* Homes on a large scale. These Procedures are intended to be able to be used by the industry to produce Home*Smart* Homes and will be piloted in the NOW100 project in a range of localities across New Zealand.

The research hypothesis for the work in this report is:

- That **Home*Smart* Homes Procedures** can be developed, which, when used by stakeholders in the new homes value chain, will enable the development of new Home*Smart* Homes which meet Beacon's HSS High Standard of Sustainability®.

This report outlines the methodology and work undertaken to bring the NOW100 Project to develop the Home*Smart* Home Procedures.

A separate, companion Working Paper outlines the low cost monitoring procedure and the development of the research evaluation framework for the NOW100 Pilot Project. It also provides preliminary information on the methodology for the piloting of the Procedures through the recruitment of developer and builder partners who will be designing and constructing the pilot 100 Home*Smart* Homes.

The Home*Smart* Home Procedures have been developed through a partnership with building industry representatives, who have provided robust debate over parameters and methods to achieve Home*Smart* Homes. In particular they have provided valuable practical input – ensuring that the Procedures as developed are targeted and appropriate for their use by the sector. The following Version 1 Home*Smart* Home Procedures have been developed:

- Principles and Processes (including proposed uptake model)
- Home*Smart* Home Requirements and Best Practice Guide
- Business Case and Cost Benefit Table
- Product Selection Procedure
- Construction Manager's Checklist
- Site Management Checklist
- Home*Smart* Home Owner Manual

Two further pieces of information – Sales Material and Training Material – are proposed to be developed, directly in partnership with key providers in these areas. It should be noted that at this stage of the project issues of how the procedures might be managed remain unresolved. For example decisions will have to be made on management of IP in relation to the documents (copyright, conditions of use, e.g. licensing), how the procedures will be kept up to date, what QA would need to be set up to ensure procedures are being used appropriately. This work will

be picked up as the uptake pathways to ensure technical transfer of the knowledge are established.

Definitions

Within the context of this report and wider Sustainable Homes Research, the following definitions are used:

Home: The physical house with people in it: interacting with the systems of the house, and influencing its performance.

Procedures: These are codified knowledge around how to build or renovate homes to achieve the HSS High Standard of Sustainability®. They are targeted to the particular user (e.g. developer, home owner, designer, builder, plumber) and will be in different formats depending on the target audience. They include: protocols, guidelines, specifications, plans, checklists, detailed design methodologies, reports, spreadsheets, models, training materials, powerpoint presentations or any other way of presenting codified knowledge appropriate to the particular user.

2 Introduction

Beacon Pathway Limited (Beacon) has developed two prototype NOW Homes® in Waitakere and Rotorua and these have been comprehensively monitored by BRANZ to verify their performance (Pollard, French, Heinrich, Jaques and Zhao, 2008 and Jaques, Matthews and Pollard, 2007). To date, it appears that the initial NOW Home® hypothesis is correct: that it is possible with current knowledge and technology, and for a price which is affordable to most New Zealanders, to build homes which are substantially more sustainable than standard new homes. Given this, Beacon's aim is to see the initial NOW Home® model, progressed as Home*Smart* Homes, taken up by the mass market, and used to build new homes. It should be acknowledged however that in some areas better performing systems are still needed, and this is the focus of other research by Beacon.

The experience of building and operating the two prototype NOW Homes® has shown that there are a number of key requirements and high performance systems which are needed within the homes in order for them to perform to the HSS High Standard of Sustainability® (HSS®). It has also shown that there are many barriers to the successful implementation of mass market Home*Smart* Homes. This project aims to remove many of these barriers and create clear documentation and tools (the Home*Smart* Home Procedures) which, when used by the industry, across the value chain, will result in the ability to mass produce Home*Smart* Homes.

The research hypothesis for the work in this report is:

- That Home*Smart* Home **Procedures** can be developed, which, when used by stakeholders in the new homes value chain, will enable the development of new Home*Smart* Homes which meet Beacon's HSS High Standard of Sustainability®.

Overall the project has four objectives. To:

1) establish the credibility and robustness of the Home*Smart* Home by broadening the baseline numbers of monitored stock and the typology of stock meeting Home*Smart* Home standards
2) develop a robust set of procedures that Beacon can commercialise and which will allow builders to build homes that meet Beacon's HSS High Standard of Sustainability®
3) demonstrate that Home*Smart* Homes can be shifted from a prototype to a leading product in the new-build market which people associate with comfortable, quality living at an affordable price
4) act as a catalyst for market transformation and the wider uptake of building new homes to achieve the HSS High Standard of Sustainability® using a range of available products.

It is intended that the project as a whole will demonstrate, (from the learnings based on robust research outputs from previous Beacon projects), that New Zealand homes can be built using current building solutions to deliver warmer, healthier homes which are more comfortable, more affordable to run and have lower demand on our nation's resource supplies. The NOW100 project is also intended to engage with a number of key organisations, (some of whom have already successfully partnered in Beacon projects), which have a large vested interest in the residential built environment. These include product manufacturers / suppliers, local authorities, industry organisations and energy / water utilities.

The project commenced in September 2007 and has reached the end of the first stage – the development of the version 1 Home*Smart* Home Procedures. This report provides an overview of the research and project development to date. The next stage of the project is the piloting of the Home*Smart* Home Procedures and the low cost monitoring protocol through the design, construction and monitoring of the 100 Home*Smart* Homes,

3 Project Implementation: Procedures Development

The project implementation of the NOW100 Project falls into three broad sets of activities. Those are:

- Development of procedures for NOW100 Project partners.
- Development the research methodology for monitoring Home*Smart* Home performance and its transformational potential.
- Recruit industry partners and establish the relationship parameters between the industry partners and Beacon.

These sets of activities are typical of any demonstration research programmes. They are strongly inter-related and iterate off each other as the programme evolves. They require, however, different processes, resources and skills. Consequently, they tend to be managed as connected sub-components. This section is concerned with the development of procedures, specifications and guidelines. A separate Working Paper sets out the research and evaluative framework for NOW100 Project and the approach and progress on partner recruitment and relationship building.

To develop the procedures necessary to ensure that industry partners could build prospective Home*Smart* Homes, two sets of information were sought. Those were:

- Information about the type, form and substance of the guidance and specification that the industry partners would require if they are to build Home*Smart* Homes. The process around this is set out in Section 3.1.
- Information about Home*Smart* Home best practice drawn from the learnings of the Waitakere and Rotorua NOW Homes® respectively. Those are overviewed in Section 3.2.

On the basis of those two inputs and the expertise of the research team, a broad specification of what a Home*Smart* Home is has been prepared along with draft Home*Smart* Home procedures. The status of draft procedures and their future use are set out in Section 3.3.

3.1 Scoping Industry Needs

As a first stage in the development of the Home*Smart* Home Procedures, a process of scoping and specification development was undertaken.

This commenced with a series of interviews with representatives of the home building industry value chain. The following issues were discussed:

- Process for typical new home development
- Key people and roles involved in the process
- Key documentation used to facilitate the process
- Key learning practices in the building industry

The following stakeholders were interviewed:

Industry organisations
- Pieter Burghout, Registered Master Builders' Federation
- Don Bunting, Master Spec (Construction Information Limited)
- John Granville, NZ Institute of Quantity Surveyors

Materials providers
- Scott Duncan, Placemakers
- Peter Taylor, Winstone Wallboards
- Jane Cumming, Placemakers

Home builders and developers
- Mike Fox, Primesite Homes
- Mark Fraser, McConnell Property
- Bob Greenbury, GJ Gardner
- Noel Horan, Fletcher Residential
- Brent Mettrick, Stonewood Homes

Key people involved in Waitakere and Rotorua NOW Homes®
- Robin Allison, an independent architect (sustainable building advisor, Waitakere NOW Home®)

Following the value chain interviews, a specification for the Home*Smart* Home Procedures was developed. This is attached at Appendix One. This document was then reviewed by the project team and key partners for the project, including development partners interested in being involved in the NOW100 Pilot Project. The purpose of the review was to:

- Prioritise the Procedures developed
- Identify missing items or information
- Confirm roles in the Procedures development
- Confirm roles (as much as possible) for the NOW100 Pilot
- Run a reality check on the procedures

Key participants in the review process were:

Project partners
- Mark Fraser, McConnell Property
- Bob Greenbury, GJ Gardner
- Brent Mettrick, Stonewood Homes
- Don Bunting, Master Spec
- Pieter Burghout, Registered Master Builders
- Jane Cuming, Placemakers

Project team

- Roman Jaques, BRANZ (Technical advisor –building science)
- Andries Popping, Apsoltec (NOW100 Pilot Project Manager)
- Lois Easton, Lois Easton Consulting (Homes Research Team Leader)
- Kay Saville Smith, CRESA (Technical advisor – methodology and evaluation, Neighbourhoods Research Team Leader)
- Verney Ryan, Element Consulting (Technical advisor, Energy Research Team Leader)

Beacon Research Team Leaders and Research Guidance Committee

- Maggie Lawton (Water Research Team Leader)
- Vicki Cowan (Knowledge Manager)
- Kevin Golding (Winstone Wallboards, RGC)
- Wayne Sharman (Building Research, RGC)
- Peter Joyce (Waitakere City Council, RGC)
- John Gifford (Scion, RGC)
- Alistair Fleming (NZ Steel, RGC)
- Nick Collins (General Manager)

Following this review process, the Specifications for the Procedures was finalised and development commenced.

3.2 Learning from Waitakere and Rotorua NOW Homes®

NOW Homes® were conceived as live research projects, demonstrating that an environmentally sustainable, affordable and desirable home can be built today, using design concepts, products and materials which are available **now**.

When the Waitakere NOW Home® was developed, its design was based on the "Beacon Footprint" - the key features of sustainable home. The Beacon Footprint is displayed graphically in Figure 1.

Figure 1: The Beacon Footprint – the key parameters for the design and construction of the Waitakere NOW Home®

For the Waitakere NOW Home®, a number of performance measures were developed which related to the Beacon Footprint and the home design was also intended to address these. While the performance measures placed some weighting on aspects of the design of the Waitakere NOW Home®, to a large degree the components of the Beacon Footprint were given equal weighting (Bayne and Kane, 2004a). When the performance monitoring for the Waitakere NOW Home® was considered, however, many of these performance measures were not met, and, in some cases, the evaluation was not designed to assess them. Table 1 outlines the performance of the Waitakere NOW Home® in relation to the Beacon Footprint performance measures

Element	Measurement	Target	Actual Performance
Affordability	Total cost of construction	$180,000 + GST	$214,000 +GST
	Annual electricity bills	$550 or less per year (based on 2003 electricity prices)	Year 1: $1325 Year 2: $1640
	Annual maintenance bills	$600 or less per year for 15 years	Not measured
Desirability	Adherence to Ergonomic standards	"Good" rating POE[1] review	Not measured
	Aesthetics – PO review of occupier	"Good" rating POE review	Achieved
	Useability– PO review of occupier	"Good" rating POE review	Achieved
	Saleability – PO review	$180,000	Not evaluated
Performance	Thermal	Indoor temp between 18^0C and 25^0C for all but 10 days of the year	Not included in analysis to date. Mean temperatures collected.
	Noise (internal)	Quiet areas ≤ 27 dB(A). No plumbing noise.	Not measured
	Future proof -*Flexibility and services provision.*	"Good" rating POE review	Achieved
	Light	"Good" rating POE review	Achieved
	Durability	"Good" rating POE review	Achieved
Personal and Community Health	Privacy	"Good" rating POE review	Achieved
	Security	"Good" rating POE review	Achieved
	Comfort	"Good" rating POE review	Achieved
Resource Use	Water consumption	90 litres/per person/day reticulated water use	Year 1: 100 l/pp/day Year 2: 83 l/pp/day
	Energy consumption	Less than 5070 kWh/year	Year 1: 7400kWh/yr Year 2: 8500 kWh/yr

[1] ***Post Occupancy Evaluation***

	Embodied energy	890 MJ/m^2 for floors, wall and roof only	Not measured[2]
	CO2 emissions	3250 kg CO2/year	Not measured
	Waste	Less than 4 m^3 construction waste Less than 5kg/household/week	2.6 tonnes of construction waste Not measured

Table 1: Performance of the Waitakere NOW Home® against the Beacon Footprint Performance Measures (Derived from Bayne et al, 2005, French et al, 2006 and Pollard et al, 2008)

Analysis of the monitoring data for the Waitakere NOW Home® has also been undertaken with reference to the HSS®-2006 benchmarks. In the first year of operation, the dwelling met or exceeded the performance required to meet the benchmarks (French et al, 2006). The HSS® benchmarks have now been adopted by Beacon as the primary basis to assess the sustainability of new and existing dwellings, rather than the Beacon Footprint (Easton, 2006). Table 2 outlines the current HSS® benchmarks for new homes.

[2] ***This is the subject of current research by the Systems Team.***

		Benchmark in Climate Zone 1	Benchmark in Climate Zone 2	Benchmark in Climate Zone 3
Energy Use		New homes: 7,600 kWh/yr Existing homes: 9,050 kWh/yr	New homes: 8,500 kWh/yr Existing homes: 11,000 kWh/yr	New homes: 9,800 kWh/yr Existing homes: 12,000 kWh/yr
Water Use		180 litres per person/day		
IEQ	**Temperature**	16°C bedroom mean min temp 18°C living room mean min temp		
	Ventilation	New homes: 0.4-0.6 air changes per hour Existing homes: 0.5 – 0.75 air changes per hour		
	Relative humidity	Mean relative humidity 20-70% in bedrooms and living space		
	Checklist	Mechanical extract ventilation of kitchen, bathroom and laundry Windows with passive venting No unflued gas heaters Environmental Choice certified paints and finishes No air conditioning		
Waste		Provision for kitchen waste composting or storage space for kitchen waste collection Space for recyclables storage No in-sink waste disposal unit[3] New building construction or renovation in accordance with REBRI construction guidelines		
Materials		**New Homes:** materials which promote good indoor air quality have minimal health risks during construction or retrofitting are durable and have low maintenance requirements incorporate recycled content or can readily be recycled reuse existing or demolished building materials or can readily be reused are made from renewable or sustainably managed resources have low embodied energy including minimal impacts due to transport have low impact on landfill or are biodegradable minimal impact on the environment (air, water, land, habitats and wildlife) have third-party certification (e.g. NZ Environmental Choice, Forest Stewardship Council) **Existing Homes:** Retrofit or renovation applies principles from materials checklist where appropriate		

Table 2: Beacon's HSS High Standard of Sustainability® Benchmarks (2006)

[3] ***This provision has not been included within the HomeSmart Home Procedures due to recommendations which arose from the review of the HSS undertaken in 2008 (Howell, 2008).***

When it came to designing the Rotorua NOW Home®, a number of key documents from the Waitakere NOW Home® project (Report Titles: NOW Home® Protocols, NOW 1 Construction Process Learnings and NOW House Features) were provided to the architects (Easton et al., 2007). The architects were commissioned by Housing New Zealand Corporation (HNZC) as the funders of the Rotorua NOW Home® design and construction and ultimate owners of the home. The Beacon input to the design was in providing information which reflected the Beacon Footprint, but no specific performance measures were set.

Housing New Zealand also had guidelines required to be met for the Rotorua NOW Home® (Eaton et al, 2007). Where conflict arose between Beacon and Housing New Zealand over design issues, objectives or requirements, the Housing New Zealand view held sway (Jaques et al, 2007). The performance monitoring of the Rotorua NOW Home® against the HSS® benchmarks, and the information gained from the occupancy surveying, indicates that the Rotorua NOW Home® is not performing to the HSS® (Jaques, Mathews and Pollard, 2007). While some of the reasons for this undoubtedly lie with the occupiers (for example, covering the thermal mass with a carpet), there are some fundamental aspects of the house design and construction which are acting to reduce its high performance potential. In particular the poorly installed solar hot water system, the water system and pump, and the location of the fixed heating and lack of method to transfer heat to the bedrooms are having an impact on the performance of the home.

3.3 Draft Specifications and Procedures for NOW100 Project

In order to be able to develop Procedures for the consistent development of Home*Smart* Homes it was necessary to clearly define what attributes were required in a Home*Smart* Home. This was undertaken by reviewing the approach used in the Waitakere NOW Home® (Bayne and Kane, 2004 a; Bayne and Kane 2004b; Bayne, Jaques, Lane, Lietz and Allison, 2005**)** and Rotorua NOW Home® (Easton et al., 2007) to set specifications, and the outcomes of these in light of the construction experience and performance of the homes.

Based on the review of the experience of design, construction and performance monitoring of the two NOW Homes®, it was determined that there would need to be two components to the definition of "What is a Home*Smart* Home?" as follows:

- A set of performance standards and clear identification of methods to achieve these. It was determined that these Performance Standards need to be a mandatory requirement – i.e. that a home cannot be called a "Home*Smart* Home" unless it meets these standards. The performance standards largely relate to achieving the HSS® benchmarks (Easton, 2006) in the areas of Energy, Water, Indoor Environment Quality, Waste and Materials. In addition those aspects of the Neighbourhood Sustainability Framework as developed by Beacon which were considered absolute requirements are also included in this component. The developer is offered a choice of either following a proposed solution approach to meet the "What is a Home*Smart* Home?" requirements, or developing their own to an identified

performance standard. In the latter case the developer must provide a proof of meeting the standard at the design stage.

- Secondly, a guideline of performance standards and methods to achieve these. This is based on the other aspects of the Beacon Footprint which are not addressed by the HSS®. These components are recommended but not required, in order for a home to be considered a Home*Smart* Home.

In essence, then, the approach has moved from one where all aspects of the Beacon Footprint were considered to have equal weight and merit, to one where a weighting is given to those aspects which contribute to the achievement of the HSS® performance benchmarks.

Following the development of the draft Performance Requirements for "What is a Home*Smart* Home?", these were work-shopped with the project team, and reviewed and commented on from a practicality and cost perspective by an industry reference group. This reference group was made up of development partners (Brent Mettrick, Bob Greenbury and Mark Fraser) and industry representatives (Don Bunting and Jane Cuming). The final draft "What is a Home*Smart* Home?" provided the underpinning basis for the development of the draft Home*Smart* Home Procedures and is included in Appendix 2.

Once the "What is a Home*Smart* Home?" and Procedures scope was developed, the project team embarked on the development of the draft Home*Smart* Home Procedures. These were developed in an iterative manner, with input from the project partners. Preliminary examples of draft Procedures were developed, this was then discussed and work-shopped with the project partners. Input on usability, target audience, language and content of the Procedures was received. The notes from this workshop are attached as Appendix 2.

Following the workshop process, the draft Procedures were developed in their entirety, with reviews undertaken by the members of the project team and project partners.

A Work in Progress Workshop was held with Beacon shareholder representatives and research team leaders to provide an overview of the content of the draft Procedures and seek feedback.

The final draft Procedures were then sent to Karen Bayne (Scion) for Peer Review. The content of the Peer Review and response to this from the Project Team is attached as Appendix Three.

The final stage in finalising the Procedures was a rewriting by a technical writer from Consumer and formatting as the Version 1 Procedures for use during the NOW100 Pilot Project. These final Version 1 Procedures are attached as Appendix Four.

4 Results

4.1 Value Chain Interviews and Procedures Scoping

The value chain interview process targeted a range of stakeholders across the home building industry, with an aim of developing an understanding of what was needed to support the NOW100 programme. This process delivered a range of useful information, which informed both the development of the Procedures and also the research framework for the NOW100 Pilot Project.

4.1.1 Sector Breakdown

According to the interviewed stakeholders, there are approximately 10,000 building companies and individual builders in New Zealand, employing approximately 24,000 staff in 2004. These companies construct 26,000 homes a year (2006 data). Group builders (build more than 5 houses a year) constitute only 4% of building companies but deliver 35% of New Zealand homes – over 7,000 homes a year. The group builders segment is experiencing the strongest growth. Individual builders are often brought in after the specifications are signed off by the council.

By focusing on group builders (companies building more than 30 houses a year), the NOW100 Homes Pilot project is likely to have impact on a significant proportion of the market, while benefiting from efficiency of working with a less fragmented segment. Companies building 20 to 49 houses a year build the highest number of houses and they are not strongly fragmented. In the future stages Beacon will have to engage with the individual builders as well as they constitute a large proportion of builders. The majority of houses built by group builders are detached medium or low density houses – a good fit with the Home*Smart* Homes typology.

4.1.2 Process

In the group builder segment, three key processes for the house development were identified:

- Master Plan Development
- Speculative Build
- Contract Build

All three were reviewed in detail and are outlined in the "Development process in New Zealand" table below.

Key documents used in the process are:

- Sales documents for the clients
- QS data (e.g. cost estimates)
- Specifications including product information
- Detailed designs including working drawings

In development of Home*Smart* Homes the document specifying design requirements "What is a Home*Smart* Home?" will also play a key role.

The industry is undergoing a period of intensive change and there is a level of information overload or resentment among the building profession. As a consequence the majority of trades people do not change their practices unless forced by legislation or clients prepared to pay higher margins. The following learning channels were identified:

- Higher education degrees
- Apprenticeship
- Product information provided by manufacturers and retailers
- Building code updates provided by DBH and professional associations

Based on the review of these processes the people who were considered critical and therefore should be targeted directly in the Home*Smart* Homes process are:

- Overall project manager
- Sales personnel
- QS and design specialists
- Site supervisor
- Trades people
- Occupier/customer

Retailers and producers are also likely to play a strong role and they are considered potential partners in the project. An additional group highlighted by the project team is the financial sector offering construction loans and mortgages. An engagement with this group could result in preferential loan conditions for Home*Smart* Homes, based on the fact that they offer more secure resell value.

The interviews provided a very useful insight into the way the industry operates. This is reflected below in "Lessons and Conclusions" and "Development process in New Zealand" tables below.

Lessons	Conclusions and Recommendations
Specification requirements of the council don't always correspond with the needs of the contractors on site. They are too wordy and complex. As a result specifications rarely drive performance on site, as they are not read in detail and not used for reference.	Specifications should be kept simple and lower level of effort should be put into generating them as part of the Home*Smart* Home procedures. The councils should be engaged in the development of the Home*Smart* Home specifications procedures to ensure that they will be appropriate for the building consenting process.
Detailed plans and working details are a more accepted form of reference at the site but the current format (A3) is difficult to use while performing a task.	A5 ring binder working details book has been recommended as the most effective. Create paragraphs and drawings that can be easily dropped into CAD and standard plans.
In order to minimise time spent on producing documentation, use of templates is prevalent and each group builder has a set of their own standard documents.	Procedures content should focus on Home*Smart* Home points of difference in a format that can be easily slotted into standard templates.
A lot of mistakes during construction stages come from time pressure and trades working without a context and understanding of the wider project.	Trade information to include communication on the "why" and connection with the rest of the project.
Trades people learn best on the job, from practical examples, in short bursts of information and from a credible (builder with grey hair or a specialised third party e.g. Forest Research/BRANZ) person.	Critical information to be provided to trades people in person, using visuals and practical examples. This cannot take much time. Use a good environment so that people can understand the details – possibly group builders' offices.
A lot of problems in house development arise from the fact that the site manager has low involvement in the project.	Develop training and tools (e.g. checklists) for the site manager to enable him to brief contractors and track performance.
A lot of sustainability features are cut out from the process at the QS, business planning stage.	Provide reliable information on costs (capital and maintenance), risk (reliability and availability) and benefits of sustainable options in a format used by QS (Rawlinsons handbook, Excel spreadsheet, trades price lists). Work with retailers to include sustainable options in the special deals with group builders. Collect information on re-sale value. Develop or recommend an existing modelling tool to predict Home*Smart* Home performance at the design stage. Beacon will not interfere in the costing of the Home*Smart* Homes developed by our partners but will need to monitor closely the costs and the value generated.

Lessons	Conclusions and Recommendations
Retailers and producers have a strong relationship with trades people and often are the key source of information on new products and methods.	Work with retailers to provide sustainable options catalogue and training sessions.
A significant proportion of New Zealand homes are built through customer sale process where the client is the key decision-maker lead through the process by a sales consultant providing a range of supplier defined options. Often, the sustainability features are not among those options that are offered or they are treated as add-ons that can be easily excluded.	Develop Home*Smart* Home planning tool for customers including example floor plans and elevations, explanations about points of difference and benefits, selection checklist, product information and samples where sustainability features form an inherent part. Use plain English. Provide training for sales people to lead customers through the process.
The building industry is going through a lot of change and its members are tired of it. There is a strong resistance to change and a lot of defensive feelings. There are two segments of builders: boomers (older builders with lower awareness of green issues) and greens (younger below 30 year old, keen on green features but restricted in what they can do by the boomers who are the decision makers at the moment)	Prioritise what are the most performance enhancing options and focus on these.
Mistakes made by installers and trades people are often only discovered by the owners when carrying out a building inspection before purchase.	Develop a schedule of inspections so that work can be rectified before next steps are completed. People to carry out the inspections on behalf of Beacon could be qualified building inspectors so that their statements can be used with the council.
In a master planning or speculative build the developer oversees the project and sets the ground rules.	Provide training for developers and tools to set vision, principles and processes.
The projects always operate under a lot of pressure driven by financial constraints and as a result sustainability objectives are easily sidelined.	Provide an external person for Home*Smart* Home project (co-ordinate flow of information with Beacon, catalyst/motivator, check the progress, put sustainability back onto the agenda, education).

Table 3: Lessons and Conclusions from Value Chain Interviews

Master Plan Development (e.g. McConnell Property)						
Process	Site Selection	Vision and team selection	Master Planning (Consent)	Business Planning	Delivery (CCC)	Sale and occupation
Information	District Plans	Documents outlining project principles, context and process.	Orientation plans and urban design documentation Detailed house designs Specifications	Commercial modelling Business plan Business case	Approved Designs and Specifications Working drawings Project Plans	High level marketing materials
People	Developer Surveyor Council	Developer architect Urban designer Stakeholders/partners	Architect engineer Landscape architect Urban designer	Project Manager QS Contractors Retailers & Producers	Project Manager & Site Manager Delivery contractors and Installers Retailers	Delivery contractors Occupier
Speculative Build (e.g. Fletcher Residential)						
Process	Site Selection	Preliminary design	Detailed design (Consent)	QS and team selection	Construction and supervision (CCC)	Sale and occupation
Information	District Plans	Section plans House lay-outs	Detailed plans as required by council Specifications (including construction methods, site practice, product information and appraisal certificates, specialists statements)	Contracts QS templates QS records Retail contracts Contractors documents	Approved Designs and Specifications Working drawings Project Plan (schedule of trades and council inspections)	Advertising for property press Lists of potential customers
People	Group builder Council	Group builder (in-house draftsmen)	Group builder (project manager and draftsmen) Retailers and producers Engineer BRANZ	Group builders (QS, project manager, CEO) Retailers and producers Contractors	Project Manager Site Manager Contractors and installers Retailers	Project Manager Occupier

Contract Build (e.g. GJ Gardner, Primesite, Stonewood)						
Process		Sale, pre-design and QS with the client	Detailed design (Consent)		Construction (CCC)	Occupation
Information		Standard lay-outs and elevations, marketing brochures, selection checklists, samples, outline specifications, cost estimate	Detailed plans as required by council Specifications (including construction methods, site practice, product information and appraisal certificates, specialists' statements)		Approved Designs and Specifications Working drawings Project Plan (schedule of trades and council inspections) Training??	
People		Group builder (sales person, QS, draftsmen) Retailer Occupier	Group builder (draftsman, Project Manager)		Project Manager Site Manager Contractors and Installers Retailers	Occupier
HomeSmart Home Procedures – Beacon's point of intervention						
	Neighbourhood Tool (NSF, Build Environment Tool)	Sales brochure Selection checklist Cost and benefits guide HomeSmart Home vision (principles & process). Sales training	Standard specifications or paragraphs to include in the specifications Drawings and paragraphs to be included on the plans Product information	Modelling for HomeSmart Home performance Cost and benefit guide	Working details book Site manager training Toolbox talk	HomeSmart Home Occupier Manual

Table 4; Housing Development Process in New Zealand

4.2 Proposal for a Home*Smart* Home development process

In order to fully understand the role that the Home*Smart* Home Procedures will play in development of the Home*Smart* Homes, it is necessary to envisage what process the NOW100 pilot project will follow and what could be the future of the Home*Smart* Homes beyond that. The process proposed below is in now way final, this is a suggestion to commence a discussion and start forming options.

The following text outlines how the project team envisaged the future process for development of a Home*Smart* Home. It should be noted that, as outlined by the researchers, this process does not address issues of IP management, maintaining the resource over time, and other institutional issues in relation to the ongoing uptake and use of the procedures. These aspects of the project are picked up in subsequent activities as Beacon engages with partners. The best pathways for Beacon to achieve its transformative goals will be developed with guidance from the IP committee, IP lawyers and Beacon's board.

Engagement Group builders, developers or others wishing to build a Home*Smart* Home (builders) approach Beacon (or in the future a support organisation established to manage the Home*Smart* Home process) and purchase the Procedures (includes the documents, training, self assessment checklists). Engagement and sales of Home*Smart* Homes are supported by Home*Smart* Home promotion (advertising, public relations, sales material).

- **Design and Construction** During the design and construction process the builders use the provided information and training materials to design and construct the home. They fill out self assessment checklists and submit that documentation and a copy of the house design to Beacon. The standard lay-outs and designs are developed by each partner individually and provided to Beacon. A random sample of these may be audited by Beacon against the Procedures.
- **Design and Construction Home*Smart* Home** Once the design and construction self assessment checklists are reviewed by Beacon, Beacon will issue a Home*Smart* Home Design and Construction Certificate (after a Code Compliance Certificate is received).
- **Occupation** The occupier receives a Home*Smart* Homes *Manual* (completed jointly by the builder and Beacon) with advice on how to get the best performance out of their home. They are also able to participate in an on line community of homeowners with Home*Smart* Homes and Home*Smart* Renovations. Their home performance can be self-assessed at any time using the HomeSmarts tool.

The pilot partners will be involved in development of the procedures and therefore there is no participation fee. It is envisaged that a licence fee will be required in the future to fund the support organisation. During the pilot stage the above process and the procedures will be tested with participants and other industry/council representatives, learning documented and reflected in a new Version 2 (it is envisaged that these procedures will need to be up-dated periodically. It

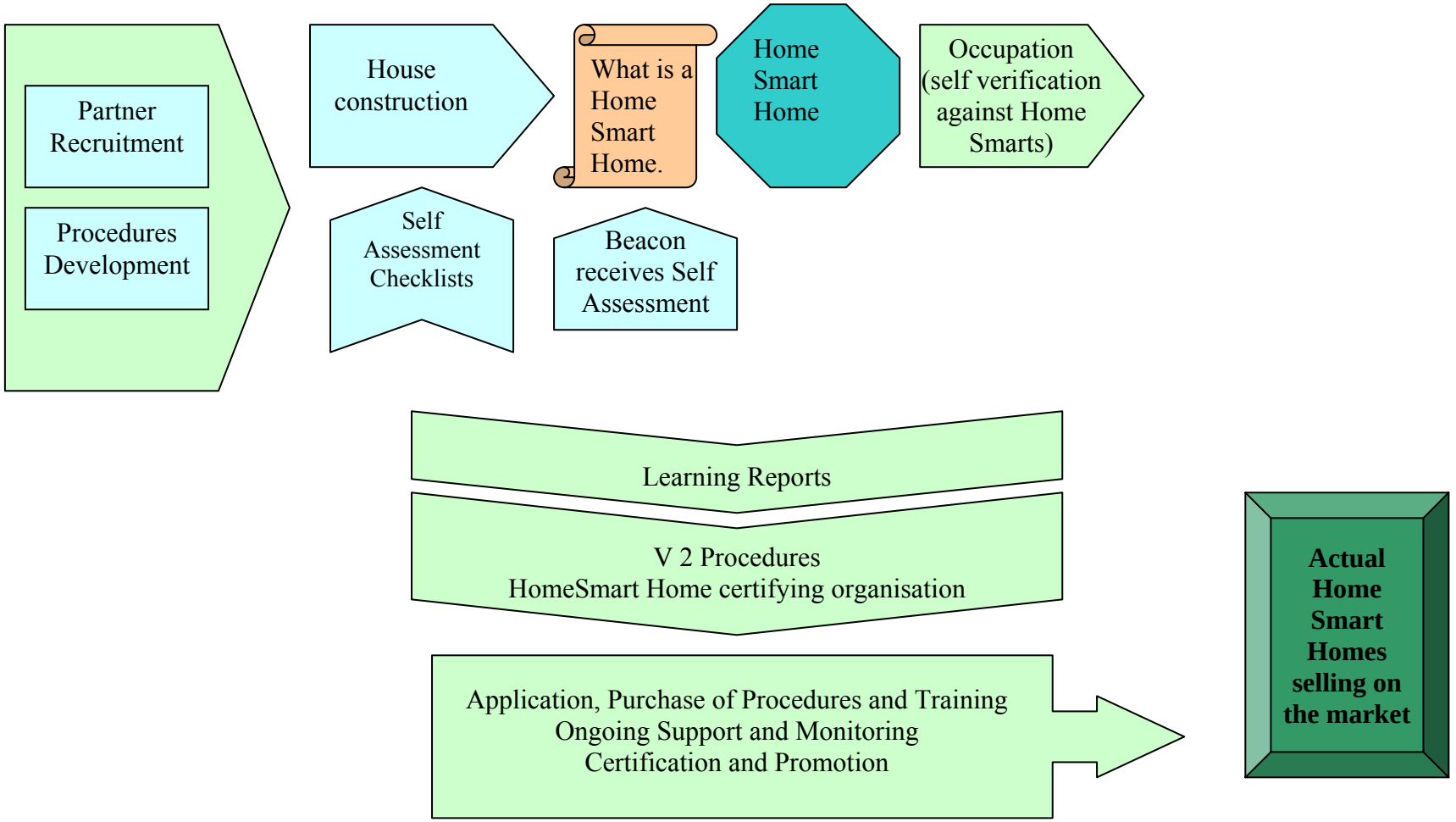
is envisaged that new locations and house typologies will be added, for example medium density/attached housing).

The learning from the project will also be used to decide whether a separate support organisation is required. It is envisaged that the role of this organisation would be to:

- Manage applications, sell procedures and training. Award certification.
- Promotion and protection of the Home*Smart* Homes brand

Appropriate language requirements and branding will need to be developed.

Figure 2: A proposal for a HomeSmart Home Development Process



5 Discussion

5.1 Use of Existing Beacon Material

At the commencement of the NOW100 project, it was anticipated that much of the material required to develop the Home*Smart* Home Procedures would already be in existence in the form of the NOW Home® Protocols. The scoping work undertaken at the start of the project, however, identified a range of requirements from the sector which were quite different to the information held by Beacon. This required the development of a wide range of new material, starting with the key definition of "What is a Home*Smart* Home?"

5.2 Process of Procedures Development

The process of scoping the Procedures through consultation with industry partners was considered to be a very effective one for Beacon – it both provided significant input from a user perspective and enabled the profile of the project to be built – attracting partners for the second phase Pilot Project.

Because the scope of the Procedures turned out to be different to what had been envisaged in the initial RIB, time delays occurred. In particular, these were because there was a requirement to develop a wide range of new material, and there was a reliance on project partners (for whom the NOW100 Project was not a top priority) for input.

The input from the project partners has been invaluable, as this is practical and real information about how homes are actually built. In particular, the input has reinforced to the project team the need to use language which is targeted at the users of the Procedures (e.g. tradespeople, quantity surveyors, real estate agents and consumers) rather than the language of technical and research specialists.

5.3 Next Steps

In order to proceed to the piloting of the Version 1 Procedures through the NOW100 Pilot, a number of further steps are underway. These include:

- Development of the research and evaluation frame for the Pilot
- Development of the cut-down monitoring protocol
- Development of the partnerships which will lead to the 100 homes being built
- Recruitment of homeowners to participate in the project.

Due to the changes in the construction sector resulting from the very significant slowdown which has occurred in new home construction over 2008, consideration of how to best adapt the research programme to these circumstances is currently being made. A working paper on the implications for the research and evaluation process will be developed, which will inform the finalisation of the cut down monitoring, partnership process and methodology for the pilot.

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Appendix One: Home*Smart* Home Procedures Specification

The following table sets out the proposed content, format and target audience for the **Home*Smart* Home Procedures**. It also indicates responsibilities and deadlines for their development. The table is based on the information needs analysis, interviews with the value chain representatives and workshops with NOW100 team members. The procedures have been designed to facilitate the process of building Home*Smart* Homes, to avoid quality issues and poor final performance. They respond directly to the requests from value chain interviewees and current practice of the industry – it is envisaged that they would complement current tools and documents used in the process. Both pull (customer driven) and push (on site checklists and training) strategies are applied to improve buy-in from the tradespeople.

The outcomes of the NOW100 project will to a large extend depend on successful partnerships with variety of industry representatives. While majority of the procedures will be developed by Beacon team, we see a potential for co-operation in regards to some types of information e.g. business case, sales materials, specifications and consent drawings, product information, training material and delivery. These elements are also outlined in the table and are highlighted in blue.

Procedure	Audience/ Purpose	Content	Format	Responsible (source information)	Deadline/ Budget
Home*Smart* Home principles and process.	Overall PM/ Decision Maker. To support development of the vision and to bring new partners on board. To be used during kick-off meetings.	What is Beacon? What is a Home*Smart* Home? – technical requirements and philosophy Why a Home*Smart* Home? (benefits, market positioning) Overview and lessons from the prototype NOW Homes® (to be expanded to 100 in version 2) What is a process for developing and selling a Home*Smart* Home? What is the future for Home*Smart* Home and how do they sit alongside the Building Code and other sustainability initiatives?	PowerPoint presentation and a PDF handout (4 pages).	Writer: Marta Review: Nick (Beacon website, What is a Home*Smart* Home? (LE), How to make trade-offs (LE), positioning against other tools (VR), design briefs (LE))	December MK 16 hours LE 12 hours VR 5 hours
Business case	Overall PM/Decision Maker and QS specialist/ customer To support sale of Home*Smart* Home, cost estimate and engagement of new partners.	Example based benefits (health, comfort, environmental, regulatory, financial, community, grants and incentives) of a Home*Smart* Home. Maintenance costs and savings based on the prototype NOW Homes® (whole life perspective). Resale value Development costs (design, construction, materials, management, sales). QS spreadsheet for the prototype NOW Homes®. Potential for developing Home*Smart* Home price lists with retailers.	Business case overview – word document (4 pages). Excel spreadsheet with all the costs (based on typical QS spreadsheet).	Writer: Marta Review: partner QS (costs (AB), what incentives are available (DB), whole life costing info (AB), technical benefits (AB), typical spreadsheet from one of the partners)	December MK 20 hours AB 5 hours DB 5 hours

Procedure	Audience/ Purpose	Content	Format	Responsible (source information)	Deadline/ Budget
Sales materials	Sales personnel/ Home*Smart* Home consultants/ Customer To support pre-design and sale of Home*Smart* Homes in the Customer Sale process. Partners' sales personnel to use in discussing with clients.	Examples of lay-outs and elevations (3D visualisation) of possible Home*Smart* Homes or existing Home*Smart* Homes. Explanation of Home*Smart* Home benefits. Explanation of differentiating technology/features – bubbles with explanatory text (how does it work and what's good about it) and detailed drawings. Sample photographs Technology/ features selection checklist (going through home from foundation to roof – explaining options including costs and benefits) Explanation on how the Home*Smart* Home will perform in the rating schemes and Building Code. Information about the occupation manual and monitoring – How to get the final Home*Smart* Home tick (see the proposed process). Work with development partners during the pilot to generate new lay-outs unique for each developer or come up with a system where standard designs can be adapted to become Home*Smart* Home.	Sales brochure – full colour, photographs, good looks (12 pages) Working book with the technology and material selection checklist (12 pages).	Writer: Marta Review: Roman, partner sales personnel (AP and GJ Gardner, based on the website and other existing materials. Photographs (AB) Monitoring (DP) Other tools (VR))	April MK 24 hours Design $5,000 Print (500 copies – tbc) $10,000 (costs to be covered by partners, $30 per brochure)

Procedure	Audience/ Purpose	Content	Format	Responsible (source information)	Deadline/ Budget
Specifications and consent drawings support tool	Design specialist To support development of specifications. Partners' designers and project managers to use to put together the specifications for the project.	List of unique features and paragraphs about each option ready to be included in the specifications. Detailed drawings to be included within the detailed plans. Drawings of unique details accompanied by abbreviated text to be included on the plans. The text should be compatible with the specifications – an objective is to include all the critical information on the plans so if the trades people don't read specifications in detail they can still do a good job based on the plans. How to launch a resource consent. Keep the document short and easy and allow for adapting standard documentation to include Home*Smart* Home requirements. A co-operation with MasterSpec and use of their group builder specifications should be investigated.	Word document, easy to navigate and find appropriate paragraphs. Could be based on Master Spec or a graphic map of content. Jpgs and word document (easy to navigate and find). Or any other format that makes it easy to slot information into CAD e.g. DWG files.	Writer: Roman, Andries, Marta Review: council, partner designer, ISF ("What is a Home*Smart* Home?" to select a list of features. Existing words from NOW Homes® specs, BRANZ, drawings provided from partners and existing sources e.g. EBOS, consent info (DP))	January RJ 30 hours AP 20 hours MK 8 hours DP 1 hour Additional drawings: ($5,000)

Procedure	Audience/ Purpose	Content	Format	Responsible (source information)	Deadline/ Budget
Technical drawings	Trade specialists. To provide support during the construction and encourage learning.	Working drawings of all the unique options. At a level of detail sufficient for somebody who's never done this before to follow. Additional text bullet points explaining critical points and connections with other trade work. See What is a Home*Smart* Home? for the list of features.	A5 ring bound booklet. Strong glossy paper that will take site conditions well. Appropriate font and clarity of drawings.	Marta to format. Review: ISF, training partners (based on specifications, and drawings tool)	April MK 20 hours Design $5,000 Print (500 copies - tbc) $10,000 (to be purchased by partners at $30 ea or sponsored)

Procedure	Audience/ Purpose	Content	Format	Responsible (source information)	Deadline/ Budget
Product information	QS specialist Design specialist Trade specialist To support selection of products and materials.	A short document with advice on product selection – what to consider, what are the available tools, where to find producer information. How to evaluate costs and benefits using more than just short term financial models. Guide on sourcing and using recycled materials Produce a list of products and materials used in the prototype NOW Homes® (those that performed). To be updated in version 2 based on NOW100. To be accompanied by careful wording stating that inclusion on this list is not an endorsement and won't guarantee performance or suitability. Some builders would like a portfolio of approved products – could we use Greenbuild for that? Portfolio of current product information generated by producers including linkages to the websites where up-dated information can be found. Develop partnerships with third party organisations to provide Home*Smart* Home products and materials information e.g. Green Build, Environmental Choice. Work with producers and retailers to develop a Home*Smart* Home catalogue and training sessions on the unique products and materials. Use their existing relationships with the building industry to generate acceptance for change in the building practices. Encourage the usual discounts to be extended to the Home*Smart* Home products.	PDF document outlining the process for selection and providing data sources (4 pages). On-line list of products (on the Beacon website) with links to producers (to be confirmed). PDF documents – copies of producers' information.	Writer: Lois (making decisions on products from website, using recycled materials (RJ)). Writer: Andrea Review: Nick Roman and Andries (to collect producer info during the pilot stage, and from existing NOW Homes®)	PDF – Jan LE 16 hours RJ 4 hours List – Jan AB 16 hours Product information – 2008

Procedure	Audience/ Purpose	Content	Format	Responsible (source information)	Deadline/ Budget
Site management checklist	Site supervisor To encourage quality construction and facilitate audit process. To outline site supervisor duties and warn him about where he will need to support trades more effectively.	A processes/supervision schedule and checklists to be completed by the site supervisor at the critical times in the construction stage. An outline of all duties that site supervisor has in leading trades to deliver performing Home*Smart* Home. Instructions specific to unusual site practices e.g. waste management. To be based on key issues, critical points, common mistakes. To outline where a Home*Smart* Home is different from normal construction and where more attention is needed.	A printed checklist with a clipboard. A 4 page PDF with advise and explanation of the process) Maybe an envelope to document work with photographs? Provide space for comments by an auditor.	Writer: Andries, Robin Allison and Roman. Review: ISF, development partner (REBRI and SH site practice (MK), issues from Robin (LE), Waste MINZ and info from LEVEL (RJ), how to work with the council (DP), procedures for spot checks (MK & RJ), how to work with other trades (LE), key points that are different when installing anything in a Home*Smart* Home (RJ, AP))	February AP 30 hours RJ 10 hours RA 5 hours DP 2 hours LE 3 hours MK 5 hours

Procedure	Audience/ Purpose	Content	Format	Responsible (source information)	Deadline/ Budget
Toolbox Talk material*	Trade specialist To introduce the trade people to the bigger picture and the why of the project and generate motivation to do a good job and learn something new.	Information about environmental impacts of buildings and what are the available technologies that can be applied. Trade specific information about what will be different on this job and how to go about it. There is an opportunity to cooperate with professional associations and/or retailers to deliver/ produce this and other training modules.	Trainers' notes. A set of drawings on board that can be easily taken to the construction site. Posters to be displayed at the site?	Writer: Marta Review: ISF (based on specifications and site management checklist, photographs and case studies from existing NOW Homes® (AB))	April MK 8 hours AB 4 hours
Training for sales*	Sales personnel To support use of sales materials and provide skills to sell Home*Smart* Homes.	Why the Home*Smart* Home More in-depth explanation about different options for Home*Smart* Homes – what are the differences, benefits and problems. Explanation on how to use the brochure and the checklist. Explanation on Home*Smart* Home process and tick. Explanation how to check the modelled performance and rating using existing tools.	Trainers' notes. PPP Handout (2-4 pages)	Writer: Marta Review: ISF (based on sales material)	April MK 8 hours

Procedure	Audience/ Purpose	Content	Format	Responsible (source information)	Deadline/ Budget
Training for design*	Design specialist To support use of Home*Smart* Home specifications tool and provide skills to design a Home*Smart* Home.	Why the Home*Smart* Home? Overview of possible technologies – their benefits and possible issues. How to use the specifications and design tool.	Trainers' notes. PPP Handout (2-4 pages)	Writer: Roman and Andries Review: ISF (based on specifications)	February RJ 4 hours AP 4 hours
Training for QS*	QS specialist To support use of NH QS spreadsheet and provide skills in costing a Home*Smart* Home.	Why the Home*Smart* Home? Overview of possible technologies – their business case and cost. How to use the spreadsheet.	Trainers' notes. Handout (2-4 pages)	Writer: Marta supported by a QS Review: ISF (based on business case)	January MK 8 hours
Training for site supervisor*	Site supervisor To support use of the checklist and provide skills in supervising construction of the home.	Why the Home*Smart* Home? Overview of possible technologies – what are the differences during the construction stage. What is the process and how to use the checklist What were the things that went wrong in the past and what people should watch out for? Contact information for a Beacon person who will be conducting audits and is available to answer questions.	Trainers' notes. Handout (4 pages)	Writer: Andries Review: ISF (based on site management checklist)	March AP 8 hours

Procedure	Audience/ Purpose	Content	Format	Responsible (source information)	Deadline/ Budget
Occupier manual	Occupier To provide the occupier with information on how to best use their home, how to maintain it and how to ensure Home*Smart* Home certification)	Information on how to take the best advantage of your Home*Smart* Home and how to best maintain it. Information on how to monitor on-going performance. Process for ensuring the Home*Smart* Home tick for the re-sale – How to book the auditor to collect data. General information and template to be filled in by the builder for the specific house. Information on materials used. How to maintain and regulate the equipment. How to achieve the HSS High Standard of Sustainability®.	A word document to be adapted by the builder/seller/ developer. A hard back folder to hold the full document.	Writer: Roman Marta to format Review: ISF (based on trouble shooting tips for home owners (AP), BRANZ manual, monitoring process (PA), specifications and producer information)	April (draft 1) RJ 25 hours MK 16 hours Folder costs (100) - $1,000

* Training sessions to be developed as an integrated workshop.

Following the feedback from the partners during the development stage of the project the scope of the procedures was alerted in the following way:

Home*Smart* Home Principles and Process	
Purpose	The Principles and Process Procedure has been written to support development of the vision of the projects that include Home*Smart* Homes and to introduce their philosophy, processes and associated requirements.
Target audience	Project Managers, Developers, other decision makers
How to use them	This procedure has been written as background information to brief the decision makers. Word document is designed as a hand-out and the accompanying presentation can be used during kick-off meetings.
Content	4 page overview: ■ What is Beacon ■ What is a Home*Smart* Home? ■ Waitakere NOW Home® case study ■ Why Home*Smart* Homes? - national business case ■ Principles of Home*Smart* Homes - HSS ■ How to develop a Home*Smart* Home - process ■ Future of Home*Smart* Homes and Market Positioning ■ Powerpoint presentation
Status	Draft in review by Beacon

HomeSmart Homes Business Case	
Purpose	The Business Case Procedure has been written to support the sale of HomeSmart Homes, and to support development of a cost estimate for HomeSmart Homes.
Target audience	Overall Project Manager and Decision Maker, QS specialist/customer
How to use them	This document provides an introduction to a cost benefit analysis of HomeSmart Homes. The associated table provides the detail review of costs and benefits for individual features. These can be used to respond to customer questions and in compiling a preliminary cost estimate.
Content	2 page overview: ■ Basis of the business case ■ HomeSmart Home Added Value – health, warmth, regulation, investment ■ Utility savings ■ Grants and Incentives ■ Undertaking a cost estimate for a HomeSmart Home ■ Table with detailed costs and benefits for each feature required in for a HomeSmart Home.
Status	Draft in review by Beacon

HomeSmart Home Requirements and Best Practice Guide	
Purpose	The Home*Smart* Home Requirements and Best Practice Guide were developed to specify the performance required for a house to be a Home*Smart* Home and to outline a number of solutions that would lead to the required performance. Further information on the most unique features is also added.
Target audience	Overall Project Manager and trade people
How to use them	The Project Manager can simply implement the suggested solutions. In that case the performance of the house is assumed. Other solutions are also acceptable but the Project Manager will be responsible for modelling their performance to prove compliance with requirements. Additional information included in the Best Practice Guide has been designed to form a simple overview of the key issues and sources of more detailed information that can be used to support trade people during the construction stage.
Content	Minimum design requirements and features for future Home*Smart* Homes Recommended Design features for Home*Smart* Homes Home*Smart* Home guidance Series: ■ Shading Features ■ Installation of Insulation ■ Solar boosted and heat pump hot water systems ■ Wet area mechanical control systems ■ Reducing indoor pollutants ■ Rainwater and grey water systems ■ Construction material waste ■ Minimising high risk features
Status	Draft in review by Beacon. Drawings and photos to be sourced.

HomeSmart Home Product Selection Guide	
Purpose	The Product Information Procedure has been written to support the choice of materials for the construction of HomeSmart Homes.
Target audience	Overall Project Manager, QS specialist/customer
How to use them	This document provides an overview of the key principles that should guide choice of materials for the construction of the HomeSmart Home as well as an introduction to existing tools and labelling schemes that can be used to assist product selection. It also provides overview of the materials and products used in the existing NOW Homes.
Content	■ Key principles ■ Available tools ■ Certification, accreditation and product labelling ■ Green Build ■ Sourcing and using recycled materials ■ Products and materials used in prototype NOW Homes®
Status	Draft in development

HomeSmart Home Site Management Checklist	
Purpose	To encourage quality construction and facilitate audit process. To outline site supervisor duties and warn him about where he will need to support trades more effectively.
Target audience	Site supervisor
How to use them	A processes/supervision schedule and checklists to be completed by the site supervisor at the critical times in the construction stage.
Content	An outline of all duties that site supervisor has in leading trades to deliver performing HomeSmart Home. Description of the supervision process Instructions specific to unusual site practices e.g. waste management. To be based on key issues, critical points, common mistakes. To outline where a HomeSmart Home is different from normal construction and where more attention is needed.
Status	Draft in development

HomeSmart Home Owner Manual	
Purpose	To provide the occupier with information on how to best use their home, how to maintain it and how to ensure HomeSmart Home certification)
Target audience	Occupier
How to use them	The document provides a template for the building partners to develop home specific manual for the house owners. It includes a structure of the manual and some suggested content that can be copied and pasted.
Content	1. Introduction for Builders on how to compile a Home Manual 2. Monitoring and achieving the HomeSmart Home status 3. How to run your house (ventilation, hot water, concrete floors, window shading, space heating, water management, waste) 4. How to maintain your house (timeline of maintenance schedule, summary of key issues based on/referring to BRANZ manual 5. Template (shell) for builders to include product information, materials information and plans
Status	Draft in development

HomeSmart Home Training	
Purpose	To provide information on who should receive the training and how to go about it.
Target audience	Project Manager
How to use them	Use the document as a guide in developing toolbox talks and briefings.
Content	HomeSmart Home training requirements Examples of content
Status	Scheduled for April

HomeSmart Home Sales	
Purpose	To provide advice on how to sell HomeSmart Homes to customers
Target audience	Sales personnel
How to use them	Use the document as a guide in talking to clients about possible HomeSmart Home development.
Content	Approach to selling HomeSmart Homes Examples of sales materials
Status	Scheduled for April

Appendix Two: Notes from Workshop on NOW Home® Procedures[4] 18 December 2007

Date	18 December 2007
Present	Marta Karlik-Neale, Andries Popping, Lois Easton, Roman Jaques, Bob Greenbury, Julie Green, Jane Cuming, Brent Mettrick, Don Bunting, Robin Allison, Mark Fraser
Minutes	Andrea Blackmore

Introductions

Who	Role in NOW 100
Lois Easton, Beacon Pathway Ltd	Research Team Leader for the Retrofit 1000 programme. In the process of handing over NOW100 to Andries, and will continue to be involved with technical aspects of the research.
Andries Popping, Beacon Pathway Ltd	Research Team Leader for the NOW100 programme. Main point of contact and project manager role.
Bob Greenbury, GJ Gardner	GJ Gardner built the Waitakere NOW Home
Julie Green, Trade Marketing Manager, PlaceMakers	Has been involved with Frame and Truss marketing and Engineering Solutions
Jane Cuming, PlaceMakers	Ensures materials are fit for purpose and work; targeting group housing companies and larger builders
Brent Mettrick, Stonewood Homes	Also on NZGBC Board, EECA HERS Board and NZRMBF Board
Roman Jaques, Sustainable Building Scientist, BRANZ Ltd	Involved in physical and social monitoring for Waitakere and Rotorua NOW Homes. Will be assisting with defining a NOW Home® and visiting homes to ensure procedures are being followed. Author of the specifications and drawings procedures.
Don Bunting, CEO, MasterSpec	Architect by trade. MasterSpec are developing a volume homes specification system. Also a director of Greenbuild
Robin Allison, Earthsong	Involved in Waitakere NOW Home® as on-site architect. Will be supporting the project with advice based on the Waitakere NOW Home® experience.
Marta Karlik-Neale, URS NZ	Managing the development of the NOW Home® procedures.
Mark Fraser, McConnell Property	Has worked for the last 12-18 months on a McConnell residential development at Papakura.

[4] *Later renamed HomeSmart Home Procedures*

Introduction to NOW100 Programme

Key features of the NOW100 Programme:

Collaborative – Beacon already has skills in working collaboratively and wants to work with partners to achieve this project

NOW 100 is scaling up the learnings from the first two NOW Homes® to 100 houses

Monitoring will focus on energy use, water use, indoor environment quality, waste (especially construction waste), and materials

NOW Homes® need to have future flexibility and affordability (targeting the middle part of the market)

Beacon has set benchmarks for NOW Homes® to achieve. These are easily achievable but need attention at design phase. Broadly, they are:

- Energy use 25% less than average
- Water use 40% less than average
- Temperatures better than WHO minimums all the time (above 16°C in bedrooms and above 18°C in living areas)
- Humidity between 20-70%
- Ventilation rate of 0.6 air changes per hour without mechanical ventilations

Houses to be built over four climate zones

Timeline

5) Draft NOW Home® procedures (v.1) due out April 2008.
6) Over 2008 work will be underway on designing and constructing houses, and developing cost-effective monitoring systems. This year will provide a learning process for testing and refining the procedures (an iterative process).
7) NOW Home® procedures (v.2) will be out at the end of 2008.
8) Roll out of rest of NOW 100 pilot in 2009

Partnership Agreements

Next step is to develop terms of reference for how partners will work together. These should cover:
IP (joint and individual)
Confidentiality
Media and Communications
The suggestion was that these should be short and commonsense.

ACTION: Beacon (Andries) to develop a draft Agreement in bullet points

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What is a NOW Home?

This part of the meeting was to review the current draft requirements for the NOW Homes® (What is a NOW Home® attachment to the Procedures specification document) and reach agreement on the non-negotiable elements of a NOW Home.

Solar orientation and passive temperature control
Issues raised in discussion:

20% glazing on south and west side may be difficult to achieve in high density developments where warmth and glazing (to increase the amount of the natural light) need to be maximised. West side is often where the outdoor living space is provided which would make a glazing minimum difficult.

Lois noted that this draft of Procedures was written to apply to sections over 350 sq.m. In medium/high density it will be difficult to orient whole developments towards the north as this would force south orientation of some houses.

Overheating is an Auckland issue. In rest of country, cold is a bigger issue and the goal is to maximise heat. Alternatives should be considered to reduce overheating e.g. use blinds or to have two sets of windows allowing cross ventilation. Do not want to spoil liveability of house.

Roman noted that overheating needs to be addressed from start to end of day.

Should all the houses be modelled using HERS? Initial thought was not to require HERS modelling for simplicity and cost. Roman argued that complex problems need to be treated using sophisticated tools, rather than by rules of thumb, and that HERS was the best tool available. One thought was to have a thresh-hold point (e.g. minimum requirements based on ALF 3.2) at which a design could be required to be modelled on HERS.

Procedures do not specify northern orientation or maximising north facing windows which is intrinsic to passive solar design. Mark noted that most high density developments tend to face east / west and this worked well due to the usual occupancy times for 5/7 days of the week.

Procedures could refer to good passive solar design guides, especially some from Australia.

Brent noted that full height doors have been very effective in distributing heat flow – simple easy and inexpensive.

Procedures need to cater for regional variation

NOTE: Develop Procedures as applicable to a single detached 350 sqm house. Later work should expand the Procedures for higher density.

ACTION: Don to pass on good passive solar design guides (Australian) to the NOW Home® procedures team

ACTION: Roman to review passive solar design requirements and suggest recommended amendments based on the received feedback.

Insulation, windows and thermal mass

Issues raised in discussion:

Confirmation that R2.6 batts fit into a 90mm frame (done in both NOW Homes® and GJ Gardner uses in HNZC specs)

R4.6 batts will not fit in some types of ceilings (e.g. Lockwood)

If a HERS rating is set, it needs to be achievable. HERS rating levels are likely to be refined after its release.

There is a wider variability in climate than is recognised in the new insulation Code.

Procedures should not prescribe particular products or suppliers. Brent noted that many builders have suppliers who they will not deal with. Procedures need to be pan-industry. Don noted that product specification can be done by reference to Greenbuild or other resources.

"What is a NOW Home®?" requirements need to be split into two columns: 1.to define the performance required from the house, 2. to identify possible methods that can be used ('acceptable solutions' or checklists) to achieve this performance. However designers could also offer alternative means to achieve the performance, provided its success could be demonstrated via modelling.

Thermally broken windows are too expensive (add 40% of costs) and are not easily available but that might change with increased demand. They do double the performance but it would be hard to sell these benefits to consumers. Thermal drapes, if used properly, could be a better solution than aluminium frames. PVC frames have maintenance costs, don't comply with New Zealand guidelines and have no buy-in from New Zealand consumers. Wood frames are 40-100% higher in cost.

APL have engaged with DBH and have influenced the Acceptable Solution E2/AS1 so their type of thermally broken windows work, however China/US manufactured windows, though ½ the price don't fit with E2/AS1

Raft type concrete flooring is an Auckland norm. Has no insulation benefit because of thermal leakage but is cheaper and quicker. Rafts are $96/m2 vs solid concrete floors at $127/m2 – are also faster to install.

Insulation materials may have health impacts

Lois noted that, with little detailed research, the best option for materials was to specify Environmental Choice certified products if available. Focus on performance and not specific materials. This could be changed as information is generated by Beacon research.

ACTION: Lois to revise the What is a NOW Home® requirements table to reflect Performance standard/ ways to achieve it split. Performance targets can be raised over time.

ACTION: Roman to review insulation/ thermal mass section in light of comments.

Hot water system
Issues raised in discussion:

Beacon prefers electricity or solar water heating over instant gas because they use lower carbon power. Solar water heating with gas booster would be an acceptable option.
This is an area with a lot of change and innovation currently
Need to consider the storage factor of the cylinder
Pellets are not available everywhere.

Lighting
Issues raised in discussion:

High efficiency LEDs are currently poor quality and need replacing. These will improve over time.
Does the heat loss from recessed light cans have a major impact? There must be heat gain from halogen downlights.
Insulated, contact-rated downlights are available but are harder to install and council inspectors are reluctant to accept them.
Too extreme to ban recessed light cans, and limiting to two per room will not work from a consumer point of view. Overlighting is the fashion trend and customers demand recessed downlights.
The new insulation installation standard addresses the issue of loss of thermal performance and includes a table on effect of inset lights and decrease in R values. May be useful to refer to this.

ACTION: Lois and Roman to review wording and refer to NZ Standard around effect on R values

Heating
Issues raised in discussion:

Heat pumps are an issue in Auckland because of the likelihood that they are used for air conditioning.

Having no heating source is not attractive to consumers. There are social reasons for heating (gather around the fire). This is an issue of want vs need. What people want is still valid. This may be a question of education of both sales staff and consumers. What is required to convince people that they don't need inbuilt heaters?

No mention of indoor-outdoor flow/connection. This is something people want but is it a requirement for a NOW Home?

ACTION: Marta and Roman to include information to convince people not to have inbuilt heaters in the sales procedure.

Appliances
Issues raised in discussion:

Need to prove/know that appliances in known brands are available to meet the requirements. The website on appliance rating is poorly laid out.

Condensing dryers still add humidity and may require ventilation. Brent noted that they refuse to install vent kits as they are a fire trap. Could either specify condenser dryer or putting drier in garage.

Dwelling size
Issues raised in discussion:

Restrictions on dwelling size will reduce the market available. The average new home is 220 sq.m. compared to the Rotorua NOW Home® 140 sq.m. plus garage.

Lois noted that restricting dwelling size was because bigger houses used more materials and energy. However Brent noted that many people only live in part of their larger houses

Some extra (NOW Home) cost would be less significant and easier sold over large m2

Mechanical venting
Issues raised in discussion:

This is based on 20 air changes of room, not whole house. Need to consider length of vent. Air changes per hour not the best measure – as how deal with open plan living – move to litres/second as a measure would be better. Need to have shuttable vents also.

Garage venting – what about mechanical venting of garage with a fan?

APL does not provide passive vents with double glazed window frames as it eliminates solar gain. How does passive venting fit with colder climates?

Why not relate distance of vent to Building Code?

Indoor Environment Quality
Issues raised in discussion:

Data on VOCs is vexed. Will refer to standards and Environmental Choice certified products

Passive venting in garage is suggested to avoid car gasses into house. Some garages are on the boundary and have few windows. This problem is partly behavioural – shutting garage doors before shutting down engine. Can this be fixed by homeowner education?

Water

Issues raised in discussion:

How available are AAAA rated products? It can be hard to get AAA rated products in specified brands. In Australia, Code only specifies AAA rated products. Some overseas products are not rated and would not be able to be used. Can double the tap price.

Swimming pools are discretionary and have a limited water use provided there is no heating. Spa pools use energy though.

Further issues

Issues raised in discussion:

A plethora of rating systems is coming onto the market. Need to be clear that the NOW Homes® are about performance and use a rating tool to help attain their status. Need to spend money on branding to make this clear.

Need a mix of homes in different climates, location and housing type for research purposes. Type of resident is not a factor.

Standard sheet sizes do not save waste as there is not enough modular design. Better to make contractors order and pay for their own suppliers, either by ordering 6 m sheets or ordering by measurement.

Wording needs to be changed around locating NOW Homes® in developments with affordable housing. Needs to be clear that affordable housing is not required, but only should not be excluded.

Recommending single garages is not realistic for most of the country which does not have accessible public transport

Greywater systems will not get consent from most councils.

ACTION: Roman to review the What is a NOW Home®? requirements to take into account the received feedback.

Specifications and Product Information

Format

Drawing size is not an issue as long as they are available as PDFs

Could have a DVD to help with installation and details

Could have PDFs available on website (contractors' portal where they can click to download or be sent) or printed in a large format chart. Preferable to printed procedures.

ACTION: Marta to review the Procedures specifications in light of the received feedback.

Product information
Don't have recommended lists but rather how to choose products

Increasingly local councils are developing and sharing lists of 'white' products which they considered pre-approved. These can be somewhat random. BOINZ is also preparing a resource of all acceptable products for councils. Investigate Council "white lists" for acceptable products (primarily around weathertightness)

Specifications
Rather than full information, concentrate on details that are different to standard so can use to help or adapt own templates

Don't put too much information on actual plans – these should go in Scope of Works

Develop a 'best practice guide' handbook. Would give it to building company as the standard required. Would also use for checking by supervisors.

Each company likely to use their own specifications and their own systems which are likely to vary.

Parts of guide could be extracted for building consent applications (consider formatting so that this is easy).

Need diagrams of acceptable solutions (principles and examples of specific details) Could call them advice notes. BRANZ technical writers could help advise on showing the principles without tying down details. Cannot have separate drawings on site to those approved. This would build up a library over time

Needs to be written with less legalese language, more appropriate to advise. Examples discussed could be simplified

Should be available as both PDF and Word documents

ACTION: Roman to develop specification and technical manual procedures as a 'best practice guide'. Keep short, simple, and provide appropriate drawings and photos. Develop a sample for internal and external review first.

Site Management Checklist

Who has oversight of construction? This varies by company. Often a construction manager might oversee 15 homes at a time, spending only an hour per day at any one home, coordinating people and material, and attending building inspections. Ways of working can vary regionally, and between volume vs owner builders.

On average 3 skips of waste per house are produced.

ACTION: Brent and Bob to send a copy of site management checklists to Andries and Roman as examples

ACTION: Don to send REBRI section from MasterSpec to Roman

Final issues

To be successful, the NOW Homes® need to sell. Must be able to demonstrate their advantages and must be attractive to consumers

There is a tension between what is theoretically the best and what practically can be done or will sell

Need to tap people into sustainable brands

Gives volume builders a point of difference and they have a known ability to sell houses

NOW Home® as a brand is not strong for selling. Name should speak for itself and be aspirational.

Don't build in a liability factor

Part of success of house is about behaviour of occupants. Need to consider manual for owners (some companies have a presentation pack with subtrade details and warranty). Current manuals are more maintenance related and NZRMBF has a generic one. No focus on trouble shooting.

ACTION: Nick to discuss NOW Home® band/name issue with a team.

Next steps

Minutes from this meeting circulated

Terms of agreement between partners developed

Specifications and procedures developed

Work continuing on defining What is a NOW Home?

No meeting to be called until further discussion necessary. Communication to be maintained over e-mail.

Appendix Three: Peer Review of Draft Procedures

Wednesday, 21 May 2008

Beacon Pathway Ltd
PO Box 11 338
Auckland

Attention: Lois Easton

Dear Lois,

RE: PEER REVIEW OF NHPR PROTOCOLS[5]

Thank you for the opportunity to peer review these documents.

This peer review will give some overall comments regarding the documents as a set, and then some comments pertaining to each of the documents in turn, with greater detail and explanation. The documents themselves are also appended with individual comments from Karen Bayne and Dave Moore.

Overall comments:

The documents appear to have captured the essence of what a NOW Home® embodies very well, and includes much of the knowledge developed during the design, build and monitoring of both the Waitakere and Rotorua NOW Home® projects. It is pleasing to see the information generated since 2001 flowing through to the present NOW Home® thinking over time, and the concept developing into a fully commercial operation with the launch of the NOW 100 programme. There is substantial information contained within the documents that will be useful for the new NOW Home® projects, and these will certainly provide a helpful basis for the project manager and site managers.

While each document is important in its own right, it is suggested that some work could be done to ensure that the set of documents fit well together as an overall package. Currently, it is not clear which documents need to be read first, or whether there is an order or priority to the documents and what documents contain which pieces of information. In this regard, an overall

[5] ***Now renamed HomeSmart Home Procedures***

motivational and encouraging introduction to the documents, perhaps as a first page, would be a helpful introduction to the set of documents, and would help in establishing quickly:

- what a NOW Home® is
- who owns the concept
- why is it important
- what's in it for me (as developer, builder, designer, owner/occupier)
- what is covered in this Protocols set
- what bits do I read first? how do I get started?

Following on from the theme of building this into a set of documents for presentation as a package, a contents page, both for the document set as a whole, and also for each document, would be helpful to clarify what information is available, and where it can readily be found during the design process. As designers and industry practitioners are not academics, the presence of pictures would better enable them to grasp the concepts and ideas contained within the documents, and therefore we recommend the inclusion of graphics and diagrams for this visually–oriented audience. Additionally, simple cross-referencing between the documents would be beneficial and assist in the end usability.

It may be useful to look at some of the recent design guides and policy or review documents from Government agencies to aid in the collation and packaging of this information.

The reviewer's felt the tone of language used (in particularly the business case and owners manual) could be more encouraging and persuasive. The current tone of the business case doesn't adequately capture the value proposition of the NOW Home® ('what's in it for me' written in the gripping language of business). In addition, the owners' manual appears a little demanding and instructive rather than informative. These two documents may benefit from being rewritten to reflect a change in tone.

The 'Requirements for a NOW Home® ' and the evaluation steps in issuing compliance certificates needs to be thought through carefully. Beacon wishes to bring a vast majority of houses up to a 'high standard', within a very short timeframe. If the design requirements and hurdles appear too much effort and very demanding in order to gain NOW Home® compliance, then it is possible very few developers and site managers will come on board the programme, or that short-cuts and/ or sloppy recording of the signoffs and procedures will occur. This programme rollout needs to be exciting enough, encouraging and beneficial enough that a market demand for the programme occurs. The reviewers' suggest a less black-and-white approach to compliance, and have outlined a proposed simple graduated star system to evaluate the home, using the existing NOW Home® branding.

The documents would benefit from editing and formatting – there are still typos and grammatical errors present, and the documents need to be visually appealing and easy to follow.

The reviewers therefore recommend that the documents be edited with the following comments in mind, packaged into a visually appealing and cross-referenced package with a motivational and encouraging overview section. As well as a welcoming and exciting introduction from the Beacon Chairman or CEO, the overview should highlight the point of difference and major objectives of NOW Homes®, and the benefits of engaging with Beacon in adopting the NOW Home® procedure, building NOW Home® developments, and living in a NOW Home® . It should also include a table of contents, and a date of issue.

Principles and Process (NHPR Principles and Process Draft 5; and Powerpoint file)

- The reviewers understand the key point of difference between the NOW Home® concept and the vast number of green/sustainable/ eco homes to be that NOW Homes® seek to provide a *balance* between environmental, affordable and desirable aspects through design excellence – no one aspect should take precedence, as all are regarded as important. This is reflected in Beacon's HSS being underpinned by affordability and desirability aspects. This is the key selling feature and sets it apart from other sustainable housing programmes. The reviewers believe that this important point is not adequately outlined or addressed in the 'What is a NOW Home® ' section of the document. Without spelling out this key aspect, Beacon runs the risk of the NOW 100 programme being seen as yet another 'sustainable homes' commercial initiative, with little difference to equally green-branded new home building schemes, and may potentially affect uptake of the programme.
- The list of sustainable design features for the Waitakere NOW Home® has some odd descriptions, and in some cases the rationale given for the design feature is inaccurate. Reviewing the design process documents from this project, or talking with Greg Burn or Robin Allison for clarification and verification of the design features would ensure consistency with past information releases.
- A repeat of similar information about the Rotorua NOW Home® would be useful. Especially as the Rotorua project is introduced earlier in the piece.
- The section 'Why NOW Home® houses' seems to imply the reason behind the development of the NOW Home® idea, but does not explicitly state it. This area could be strengthened to explicitly state that the current housing stock needs to be brought up to a higher 'futureproof' standard in terms of health, affordability, and environmental issues. In addition, it should be raised that while the NZBC requires Whole of Life minimum standards, Beacon feels there are also minimum acceptable standards around Quality of Life that Beacon has set specific targets for in the HSS.
- The table outlining the HSS is very easy to read, simple and gives an excellent reference guide to what needs to be achieved in the design of a NOW Home® .
- The section ' How to develop a NOW Home® ' needs to be read in conjunction with the .ppt file.
- The NOW Home® Performer auditing process is a little confusing – you refer to the "*What is a NOW Home*® ?" checklist – it is not clear where to find this or which checklist this refers to…??

- The rationale behind the use of the HERS and Greenstar rating scheme over other schemes to determine who gets a NOW Home® Performer status seems misguided and will inadequately assess the design performance against the NOW Home® HSS, because HERS and Green Home schemes are primarily environmental schemes. Additionally, the HERS scheme is an *energy* rating scheme, and will not assess other environmental aspects such as water, waste, etc., let alone future-proofing, desirability or affordability.
- If getting 70 points using the Green Home scheme gets you 'NOW HOME® Performer' status, or a HERS rating of 6 stars…why use the NOW Home® Protocols at all to design the home?? The reviewers believe that as Beacon has developed a 'What is a NOW Home® ' checklist, and the required NOW Home® protocols including HSS targets, then evaluation of the adequacy of the resultant design using another scheme in order to get NOW Home® Performer status is not needed.
- Design processes are a tradeoff, and must take into account the site, the client, the performance standard, the Council, etc...it is unrealistic to expect the designer to be able to ensure they meet *all* of the requirements, as monitored 18 months later. What if they fall down on one aspect like water, but have over-performed in another area like waste or energy?? This is bound to occur. The lessons from monitoring of the past two homes built show that intentions are well and good, but despite best intentions things can perform slightly differently beyond the designer's / practitioner's control.
- The statement "if the performance is in line with the HSS benchmarks" seems a little inflexible and discouraging (do they need to meet ALL these benchmarks – what if they fail on one of the targets?), and seems to be monitoring only the environmental aspects of the home rather than ensuring a good balance between environmental, affordable and desirable features are present, having raised the bar to an acceptable level. While The Green Home Scheme allows for design flexibility through a points scheme, as indicated before, this is weighted heavily towards environmental and health issues only, and doesn't include affordability and desirability aspects.
- As Marta has stated already that the 'NOW HOME® Performer' section is still in draft form, and will be updated in future, the reviewers suggest an alternative that could be considered by Beacon. The alternative proposition for determining if the home is a 'NOW HOME® Performer' would be to allocate two stars to each of the three aspects of:
  - Environmental aspects
    - 1 star if majority of HSS targets met
    - 2 stars if all of HSS targets are met
  - Affordability standard
    - 1 star if budget was within x% over-run of target budget
    - 2 stars if budget was met or under-budget
  - Desirability standard (via POE)
    - 1 star if POE acceptable
    - 2 stars if POE favourable

  and then give the 'NOW HOME® Performer' certificate to those who achieve at least 5 stars.

Requirements and Best Practice Guide (NHPR Requirements and Best Practice Guide Draft 6)

- Overall, the main elements of the NOW Home® concept, and its intent, is well captured by the requirements and recommended features.
- A large oversight appears to be that there is no performance standard for affordability included at all. Without a budget cap, the HSS is very easily achieved. As per the Waitakere NOW Home® budget, the budget can be set by ensuring no more than 30% of the net median income of the neighbourhood mesh block would be required to service the mortgage, given a deposit of 10%.
- There should also be provision for a Desirability POE by the occupants, as this as indicated in other documents (such as the Manual) as a monitoring aspect.
- The tables give a performance standard, and also required features. It is unclear whether both these are needed for compliance, or whether the left hand column entitled "Performance Standard Required" or the right hand column entitled "Features to Achieve Standard {yet }to be reviewed" take precedence.
- Is this a performance based or a prescriptive requirement checklist?
- The target audience seems strange given the amount of detail in the tables….tradespeople won't be interested in this level of detail, and this is the information that ought to be provided to the designer/ architect, unless the assumption is that this person is also the Project Manager?
- While the table has incorporated much of the prior knowledge from (particularly) the Waitakere NOW Home® design brief, and subsequent Draft protocols, bear in mind that these document were written in 2003, and 2005 respectively. It may pay to check the a) relevance and b) technological advancement of some of these design elements, given chances to policy and regulation, newer research findings, and advancements in technology diffusion. For example, some of the 'Smart' technologies of 2003 such as sensor lighting, compact fluorescent bulbs, heat pumps and home ventilation systems that were 'pushing the boundaries' are now commonplace. The guidance series accounts for this in some ways, but seems incomplete.
- The layout and format of The NOW Home® Guidance Series means they are easy to read and quick to understand. Graphic design of the information to fit onto one double-sided sheet, and including graphics and diagrams would help.
- The Guidance series, however, is very selective in which products and systems are included, so one assumes there will be updates over time as more are written up. The headings of these seem inconsistent with the headings in the column 'Aim' of the tables previously, or the main HSS elements. Alignment to one or other of these would aid cross –referencing of information.
- More detailed comments and edits have been provided in the appended document itself.

Product Information (NHPR Product Selection Draft 4)

- This is a very useful information tool for quantity surveyors and the specification team, but the usefulness for the designer and project manager could be minimal, as much of what is stated is at a very basic level. It would be very surprising if house-designers and drafts-people were not already aware of much of this, but the links to sites where further information is obtainable, and also the list of what has been used in previous projects is certainly useful.
- There needs to be a strong statement that materials and products choice alone do not maketh a NOW Home® ….no one material or product as an add-on feature will provide sustainability, it is about how these are combined together through good design. A badly designed home using all the 'right' materials and systems will never be a NOW Home® because it will fail the Desirability test. There is a need for 'Every material in its place'…without such a statement it may come across that Beacon is advocating certain materials and systems over others, unless it is intended that certain materials and systems become NOW Home® 'standards'.

Site Management Checklist (NHPR Product Selection Draft 4)

- The document seems coherent and easy to follow, if a little prescriptive.
- That the first table is for Required features, and the second for Recommended, needs to be emphasised.
- As projects do not always go to plan, provision for capturing where the design did not become constructed reality is needed, also. There is an excellent provision in the table for the designer to specify where the performance deviates from the NOW Home® best practice guide. Another column is needed in the table, or some space allocation for the construction manager to indicate where there were construction deviations to the design (e.g. a different specified material or system was installed, or the design was changed due to site idiosyncrasies etc. unknown until the construction was underway.)

Business Case (NHPR Business Case Draft 5)

- The front page of the document could benefit from an image encapsulating the Cost/Benefit arguments that are put forward. One example might be a summary illustration showing a 3D line drawing of a NOW Home® with labels to identify the main features included and the cost implications as a + or -. A box could show total extra capital outlay but overlaid on a two line mortgage repayment chart showing the faster payoff than for a slightly cheaper ordinary house due to the lower running costs and hence less years to pay back the principal.
- The 'What's in it for me' and punchy statements of benefit are not pronounced enough. What are the key business or lifestyle benefits for the developer/ designer for adopting the NOW Home® protocols and developing a NOW Home® site over standard business-as-usual homes? What is the advantage of a NOW Home® over:

- any other ‘sustainable’ or ‘green’ branded home (e.g. Lockwood’s Ecosmart range or Stonewood homes),
- continuing standard building practice and offering the purchaser a Westpac Green Home Loan scheme that provides solar heating, eco-paint and energy efficient appliance discounts to the purchaser…?
  This ties back into earlier comments that the key point of difference of a NOW Home® is in providing green credentials *with an affordability and desirability balance.*

- Some of the cost benefits could be expressed in a harder hitting way. For instance “give owners around $100 a month more to reduce mortgage principal by”
- A number of the statements need qualification with a reference.
- Getting a Quantity Surveyor to look over Business Case V. 30/4 would be useful if it hasn’t already been done.
- More detailed comments and edits have been provided in the appended document itself.

Manual (NHPR NOW Home® draft 1)

- The tone of this document should be more encouraging and motivational. You want these people to come along with you on the journey, and enjoy living in the home that they have bought or rented, rather than feeling obliged to conform with a set of requirements. Addition of an opening personal letter signed by someone high in government and the Beacon CEO, saying something like :

  “Congratulations on having the vision and strength of character to take a lead in your community and provide a role model for how we need to be living our lives increasingly in the future. You are part of an exciting initiative of families and scientists and business leaders in NZ looking to establish a new approach. This manual tells you how to get the very best from your home.…… you can also call us for specific advice, and we will keep you all informed …. as part of the network. Looking forward to working with you etc etc always keen for feedback and good ideas of how to improve etc.”

  would certainly set the right tone at the start of such a manual. Unfortunately at present it is a little dictatorial in tone.
- The manual is an interesting addition to the set. On the one hand, this was seen as an important aspect of NOW Homes® from the first Waitakere design, in terms of providing information and suggestions on how to achieve the most from your new home. But on the other hand, there are certain parts which seem to have crossed the line of suggestion and information into ‘shoulds’ and ‘needs to be’…. the home belongs to the purchaser, or the developer until a purchaser buys it…. bear in mind that no-one likes to be told how to live in their own home.
- In this context, it is important to spell out what has been provided to the homeowner, and why, even to show how to get the best from them, but stop short of instructing or requesting actions or behaviours from the homeowner – it is still the prerogative of the occupier to use the devices as he/ she sees fit.
- There is nothing informing the occupant as to why the house is being monitored / why it needs to be monitored by Beacon. This section also coming at the front of the document

seems like an obligation and an intrusion. It may be best placed at the back of the section, after introducing the special features of the house. Also the reviewers suggest the section be retitled 'how to get the best from the special features of your house', rather than 'how to run your house…' (which sounds like a home-economics class on good house-husbandry!)

- The section on "effective waste management" is good in that it gives the option of composting and worm farming, however, the tone needs rewording. Here's an example:

  " The management of two waste types are looked at:
  ***A**. wastes from the kitchen and garden (organic and recyclables)*
  ***B**. hazardous wastes."*

  Could be reworded to state that *'Provision has been made in your home to recycle organics and dispose safely of hazardous substances'*

- *(Firstly, try not to use a waste disposal unit, as you're getting rid of valuable nutrients and you are creating an environmental problem elsewhere. If you view waste as a mislaid resource, the chances are you'll treat it how it should be treated!)*
  Remove the above statement as having no in-sink waste disposal unit is an HSS checklist requirement, and also it sounds rather judgemental.
- The maintenance checklist column entitled 'period' needs to be a suggested service schedule. This checklist is a very important aspect of the manual, and we recommend retaining it.
- The manual could also include the service warranties and instruction manuals for the appliances, heating and ventilation systems and lighting etc. that are included in the home. These are important documents for subsequent owners, and the manual needs to state that it is intended to be left in the house for subsequent owners, should the occupiers vacate the premises.

Regards

Karen Bayne
Senior Technologist
Scion
Karen.bayne@scionresearch.com

Appendix Four: Response to Peer Review

Working Paper

Beacon NOW Home® Procedures – Response to Peer Review

Date	26th May 2008
Author	Lois Easton
Position	Existing Homes Research Team Leader

Karen Bayne and Dave Moore have undertaken a Peer Review of the final draft NOW Home®[6] Procedures. This report outlines the key points raised in the Peer Review and suggests action to be taken around the recommendations.

Comment	Proposed Response
Overview	
Need for an overarching introduction/packaging of the documents. Welcome from the Beacon GM, overview of point of difference and major objectives of NOW Homes and the benefits in engaging with Beacon in adopting the NOW Home® Procedures, building NOW Home® developments and living in NOW Homes.	Include. Include reference to NOW Home® Community.
Need for contents page for the set and for each Procedure.	Include.
Need for date of issue for the Procedures	Include.
Overall tone of language needs to be rewritten – encouraging and persuasive	Already part of process – Bernard from Consumer will be doing this

[6] *Now called HomeSmart Home Procedures*

Comment	Proposed Response
Editing and formatting required.	Andrea to develop a template for look and forward to Bernard and include in template.
Business Case Procedure	
Not sufficiently persuasive – needs to be much more "What's in it for me"	Is new information which needs to be incorporated based on Stonewood input and Waitakere NOW Home® Occupancy Report. Already part of process – Bernard from Consumer will be doing this
The front page of the document could benefit from an image encapsulating the Cost/Benefit arguments that are put forward. One example might be a summary illustration showing a 3D line drawing of a NOW Home® with labels to identify the main features included and the cost implications as a + or -. A box could show total extra capital outlay but overlaid on a two line mortgage repayment chart showing the faster payoff than for a slightly cheaper ordinary house due to the lower running costs and hence less years to pay back the principal.	Nice idea – can we investigate this?

Comment	Proposed Response
The 'What's in it for me' and punchy statements of benefit are not pronounced enough. What are the key business or lifestyle benefits for the developer/ designer for adopting the NOW Home® protocols and developing a NOW Home® site over standard business-as-usual homes? What is the advantage of a NOW Home® over: any other 'sustainable' or 'green' branded home (e.g. Lockwood's Ecosmart range or Stonewood homes), continuing standard building practice and offering the purchaser a Westpac Green Home Loan scheme that provides solar heating, eco-paint and energy efficient appliance discounts to the purchaser…?	Need to address.
Some of the cost benefits could be expressed in a harder hitting way. For instance "give owners around $100 a month more to reduce mortgage principal by"	Need to address – consider in light of what Stonewood provide for their eco smart homes – or the online calculator Energy Mad provide for their clients.
Key point of difference (balance between environmental, social and economic aspects) of NOW Homes not clearly spelled out.	Include. .
A repeat of similar information about the Rotorua NOW Home® would be useful. Especially as the Rotorua project is introduced earlier in the piece.	No action Procedures are meant to be short and to the point, no need to repeat information about Waitakere.

Comment	Proposed Response
The list of sustainable design features for the Waitakere NOW Home® has some odd descriptions, and in some cases the rationale given for the design feature is inaccurate. Reviewing the design process documents from this project, or talking with Greg Burn or Robin Allison for clarification and verification of the design features would ensure consistency with past information releases.	Review wording and rationale. It is noted however that the NOW Home® Protocols have been superseded by the NOW Home® Procedures and that some information which has proved to be inaccurate in the former documents have been "retired" from Beacon information. It is considered more important to be accurate in 2008 terms than to be consistent with past information releases.
The NOW Home® Performer auditing process is a little confusing – you refer to the "*What is a NOW Home*® ?" checklist – it is not clear where to find this or which checklist this refers to…??	No action The NOW Home® Performer aspect has been deleted in the V6 Procedure.
Various comments about NOW Home® Performer.	No action The NOW Home® Performer aspect has been deleted in the V6 Procedure.
The section 'Why NOW Home® houses' seems to imply the reason behind the development of the NOW Home® idea, but does not explicitly state it. This area could be strengthened to explicitly state that the current housing stock needs to be brought up to a higher 'futureproof' standard in terms of health, affordability, and environmental issues. In addition, it should be raised that while the NZBC requires Whole of Life minimum standards, Beacon feels there are also minimum acceptable standards around Quality of Life that Beacon has set specific targets for in the HSS.	Review wording. It should be noted that the term "NOW Home® Houses" is NOT too be used. They are NOW Homes®. (Nick is totally adamant on this issue) "Futureproof" is a trademark of another building scheme so can't be used either.

Comment	Proposed Response
Homeowners Manual	
Not sufficiently persuasive – needs to be much more "What's in it for me" . The tone of this document should be more encouraging and motivational. You want these people to come along with you on the journey, and enjoy living in the home that they have bought or rented, rather than feeling obliged to conform with a set of requirements.	Need to address. Rewrite in more persuasive language. Add in maintenance words and where to go to get additional information.
Addition of an opening personal letter signed by someone high in government and the Beacon CEO.	Good idea.
There is nothing informing the occupant as to why the house is being monitored / why it needs to be monitored by Beacon. This section also coming at the front of the document seems like an obligation and an intrusion. It may be best placed at the back of the section, after introducing the special features of the house.	Review and amend.
Also the reviewers suggest the section be retitled 'how to get the best from the special features of your house', rather than 'how to run your house…' (which sounds like a home-economics class on good house-husbandry!) In this context, it is important to spell out what has been provided to the homeowner, and why, even to show how to get the best from them, but stop short of instructing or requesting actions or behaviours from the homeowner – it is still the prerogative of the occupier to use the devices as he/ she sees fit.	Review and amend as appropriate.

Comment	Proposed Response
The section on "effective waste management" is good in that it gives the option of composting and worm farming, however, the tone needs rewording.	Need to address. Rewrite in more persuasive language.
Remove the above statement as a) having no in-sink waste disposal unit is an HSS checklist requirement, and also it sounds rather judgemental.	We have deleted no in sink waste disposal from the Procedures but it is still (for a couple more months anyway) in the HSS checklist. Perhaps we just delete it from the version in the Procedures.
The manual could also include the service warranties and instruction manuals for the appliances, heating and ventilation systems and lighting etc. that are included in the home. These are important documents for subsequent owners, and the manual needs to state that it is intended to be left in the house for subsequent owners, should the occupiers vacate the premises.	Is intended to do this. Need to write an introduction to this section and develop a list of what service warranties should be provided as a prompt for the house builder.
Requirements for a NOW Home® / What is a NOW Home?	
Too black and white and may be too demanding	Review requirements and recommendations and determine whether bar has been set too high – and whether some "required" features may be better made "recommended features"
Suggest a graduated star system instead of "pass/fail"	No action. Beacon has reviewed the HSS and determined that a "pass/fail" is the approach it is pursuing. Beacon is not developing a rating tool, but supporting other tools (Greenstar/HERS/TUSC) developing a star rating system would undermine this approach.

Comment	Proposed Response
Desirability not identified in requirements.	No action. Evolution of the NOW Home® concept has removed "desirability" from a core "requirement" – developers have indicated that they anticipating adapting their designs and reflect customer (i.e. the person who commissions/buys the house) requirements on this. Desirability is not something which can be objectively measured – beauty is in the eye of the beholder. In addition, some measures to promote "desirability" in the NOW Homes (eg solar hot water panel flat on roof) undermine the ability of the house to perform well. Meeting HSS benchmarks is considered an absolute and priority is placed on this.

Comment	Proposed Response
Affordability not identified in Requirements – and no performance standard for affordability.	No action This is a difficult issue for Beacon. Affordability reflects the ability of the person to pay – rather than the actual cost of something. Beacon has commissioned a review of it's approach to affordability as it has not got a clear understanding of how this applies. In the HSS and NOW Home® definition it has been taken to mean that features with a low-moderate additional cost (eg double glazing, solar hot water) are included, but that expensive features (such as photovoltaics) have not been. It has also been considered that affordability of *operation* of the building is a significant factor – so features such as energy and water efficiency which will directly save operating costs have been prioritised. The "What is a NOW Home" requirements have included maximum dwelling sizes in order to address energy efficiency concerns, but this will also have a direct impact on holding down the cost of the dwelling. Discussion with some developer partners is Could add in a requirement that the overall costs of the home should not be more than 10% more than a comparable home in the surrounding location
The tables give a performance standard, and also required features. It is unclear whether both these are needed for compliance, or whether the left hand column entitled "Performance Standard Required" or the right hand column entitled "Features to Achieve Standard {yet }to be reviewed" take precedence. Is this a performance based or a prescriptive requirement checklist?	Insert an explanation up front – we have proposed a number of solutions, but if you don't to use those solutions need to make sure meet a performance level.

Comment	Proposed Response
The target audience seems strange given the amount of detail in the tables….tradespeople won't be interested in this level of detail, and this is the information that ought to be provided to the designer/ architect, unless the assumption is that this person is also the Project Manager?	I think this is an issue about where we have stuck the Requirements – maybe we need to put in a separate Procedure – they are really aimed at the designer/project manager not the tradespeople. Note that totality of requirements included in the Training.
While the table has incorporated much of the prior knowledge from (particularly) the Waitakere NOW Home® design brief, and subsequent Draft protocols, bear in mind that these document were written in 2003, and 2005 respectively. It may pay to check the a) relevance and b) technological advancement of some of these design elements, given chances to policy and regulation, newer research findings, and advancements in technology diffusion. For example, some of the 'Smart' technologies of 2003 such as sensor lighting, compact fluorescent bulbs, heat pumps and home ventilation systems that were 'pushing the boundaries' are now commonplace. The guidance series accounts for this in some ways, but seems incomplete.	Review table. Note however that a substantial review of all material for NOW Homes, checking their current relevance and input from the developer partners has been undertaken here. We have not just used 2001 – 2005 material.
Best Practice Guide	
The Guidance series, is very selective in which products and systems are included, so one assumes there will be updates over time as more are written up. The headings of these seem inconsistent with the headings in the column 'Aim' of the tables previously, or the main HSS elements. Alignment to one or other of these would aid cross –referencing of information.	Review specific comments and add introduction. Is intended to include diagrams and technical drawing.

Comment	Proposed Response
Product Selection	
This is a very useful information tool for quantity surveyors and the specification team, but the usefulness for the designer and project manager could be minimal, as much of what is stated is at a very basic level. It would be very surprising if house-designers and drafts-people were not already aware of much of this, but the links to sites where further information is obtainable, and also the list of what has been used in previous projects is certainly useful.	Clarify audience as QS and Specification Team
There needs to be a strong statement that materials and products choice alone do not maketh a NOW Home® ….no one material or product as an add-on feature will provide sustainability, it is about how these are combined together through good design.	Good point. Review and amend to include importance of the whole being greater than the sum of the parts.
A badly designed home using all the 'right' materials and systems will never be a NOW Home® because it will fail the Desirability test. There is a need for 'Every material in its place'…without such a statement it may come across that Beacon is advocating certain materials and systems over others, unless it is intended that certain materials and systems become NOW Home® 'standards'.	No action. Covered off in the requirements in that requires good practice in terms of Green Homes Scheme. Measure is what is good design practice.
Site Management Checklist	
That the first table is for Required features, and the second for Recommended, needs to be emphasised.	Reword to clarify.

Comment	Proposed Response
As projects do not always go to plan, provision for capturing where the design did not become constructed reality is needed, also. There is an excellent provision in the table for the designer to specify where the performance deviates from the NOW Home® best practice guide. Another column is needed in the table, or some space allocation for the construction manager to indicate where there were construction deviations to the design (e.g. a different specified material or system was installed, or the design was changed due to site idiosyncracies etc. unknown until the construction was underway.)	Good point, need to capture the variation and rationale for change.