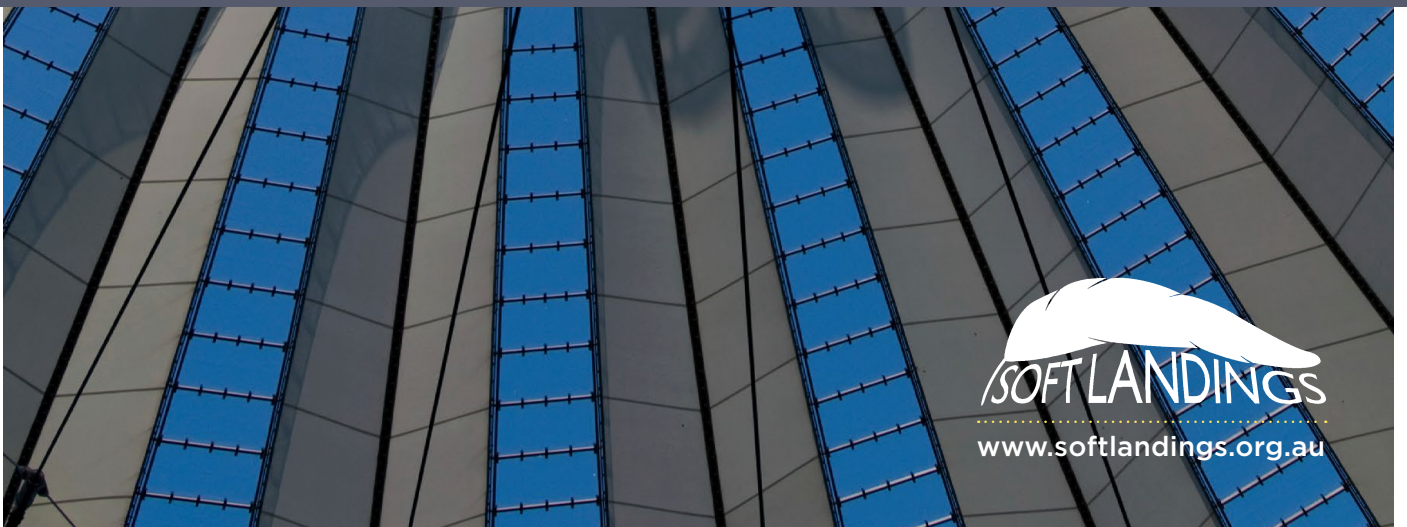# The Soft Landings Framework

Australia and New Zealand

For better briefing, handover and building performance in-use

SOFT LANDINGS

www.softlandings.org.au

Acknowledgements

In response to the on-going challenges of providing buildings that deliver best practice, not only in design but in construction and through into reliable long term operation, the Australian and New Zealand Region of the Chartered Institution of Building Services Engineers (CIBSE ANZ) hosted a series of seminars throughout the ANZ Region. The objective of the seminar series was to bring to the attention of building services professionals across all spectrums of the industry the benefits of applying the Soft Landings Framework to supporting building design and delivery.

Representatives attending the CIBSE ANZ seminar series included architects, services consultants, construction contractors, owner's, agents, occupiers and operations managers. The series culminated in the convening of an industry group to help broaden the scope and knowledge of Soft Landings within Australia and New Zealand.

This version of the Framework is the outcome of these efforts. It has been developed and tailored to the needs and specific contexts of Australia and New Zealand such that it can be more readily applied to the ANZ construction industry

This Soft Landings Framework has been adapted for Australia and New Zealand from the original authored by Mark Way of the Darwin Consultancy and Bill Bordass of the Usable Buildings Trust, with assistance from Adrian Leaman and Building Use Studies, and Roderic Bunn of BSRIA.

Soft Landings logo reproduced under licence from BSRIA

The Soft Landings Framework Australia and New Zealand

For better briefing, design, handover and building performance in-use

Introduction;
Why bother with Soft Landings?

All buildings are prototypes to one degree or another. No two are ever the same. To the untrained eye a fully-glazed office block may look identical to its neighbour, but such superficial similarities can be misleading. Every building is a response to its local context, the needs and expectations of its owner or developer, the budget, the time taken to build or refurbish it, and the use to which it is subsequently put. One of the problems of a one-size-fits-all perspective is that we often fail to recognise the inherent fragilities in design decisions, and the critical importance of installing, commissioning and finishing things off properly. On top of that, we presume that occupants and maintenance staff will instantly understand what they've been given. But all these assumptions are flawed. What works in one context might fail in another simply because a design feature isn't appropriate. It might be because of a lack of attention to detail, a failure to design or install properly, or simply unwillingness to support and familiarise occupants with often highly complex air-conditioning and lighting systems.

Construction professionals are also not incentivised to follow-through after completion to make sure everything works as it should, and to support the occupiers through the first few months of operation. Resolving defects and snags is not the same as ensuring good performance, and matching that performance against whatever targets the client has set. Furthermore, design professionals rarely go back to study and analyse their projects. It's not in their training, it's not part of their culture, and it's not what they are contracted to do. There is also a fundamental belief that design inputs are the same as operational outcomes, and that every input will work as intended. Builders and contractors fall into the same trap. They won't do anything outside the terms of their contract on the basis that it will increase their exposure to risk. The whole of construction can therefore operate as an open loop system, rather than a closed loop system where feedback from performance is captured to improve design and construction practice.

All this means that clients and their construction delivery teams are effectively flying blind in terms of delivering well-performing buildings. Is it any wonder that energy use, carbon dioxide emissions, and other performance targets, such as occupant satisfaction and well-being, rarely match the design ambitions? And the closer we try to get to the cutting edge of performance on any of these factors, the less likely we are to achieve it.

Soft Landings is the antidote to these problems. At its core is a greater involvement by designers and constructors with building users and operators before, during, and after building handover.
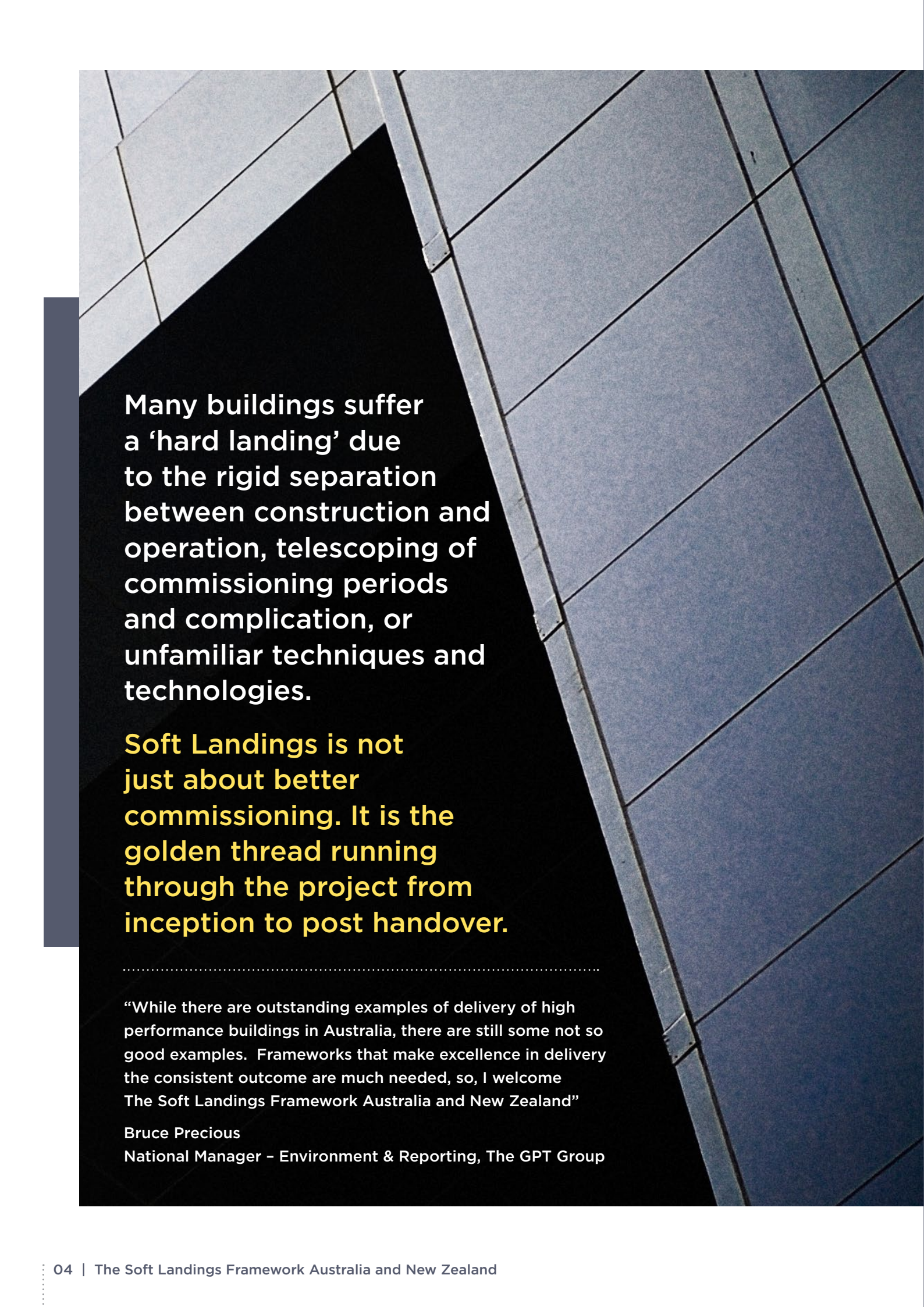
It emphasises the need for earlier and deeper dialogue between the client, end-users and operators in order to inform the client's requirements, and the design brief that flows from those requirements. It calls for feedback analysis of earlier projects, a greater understanding of the risks that may compromise performance, and a greater diligence in managing those risks during the project delivery phase. It introduces a period of extended handover and professional aftercare - the new professional duties which gives Soft Landings its name.

Many people say: "Hang on, I already do a lot of this, and it's mostly common sense anyway." That is true. If Soft Landings is anything, it's the application of common sense. The trouble is, along with quality, common sense tends to be sacrificed in the urge to design and build quickly, get paid and get off site as soon as possible. And while one individual may practice common sense, for some reason it seems to be in short supply elsewhere in the project team. The whole-team adoption and systematic application of Soft Landings worksteps, as laid out in this guide, will ensure that common sense is practiced by everyone on the entire project team, collaboratively, and to a shared set of objectives. What's more, it provides a robust chassis to carry other performance-enhancing mechanisms, such as the NABERS and NABERSNZ energy rating schemes.

From my perspective, it is both cheering and satisfying to see the Soft Landings Framework adopted in Australia and New Zealand. We in the UK look enviously at some of the real advances Australia and New Zealand has made, particularly the NABERS and Green Star schemes, and we acknowledge the evident commitment that construction professionals have in improving the performance of their buildings. I hope their efforts inspire other countries and regions to tailor Soft Landings to suit their needs and local contexts.

Roderic Bunn,
BSRIA Soft Landings, September 2014

Many buildings suffer a 'hard landing' due to the rigid separation between construction and operation, telescoping of commissioning periods and complication, or unfamiliar techniques and technologies.

Soft Landings is not just about better commissioning. It is the golden thread running through the project from inception to post handover.

"While there are outstanding examples of delivery of high performance buildings in Australia, there are still some not so good examples. Frameworks that make excellence in delivery the consistent outcome are much needed, so, I welcome The Soft Landings Framework Australia and New Zealand"

Bruce Precious
National Manager – Environment & Reporting, The GPT Group

Contents

The birth of Soft Landings

The following is the original introduction to the 2009 UK Soft Landings Framework, written by the method's creator, architect Mark Way.

As an architect I used to design buildings, get them built, hand them over, and then move on to the next job. This was rarely the end of the matter: I had to respond to things that came up during the defects liability period, and help with the final account – routine procedures that had to be followed. Along with most of my fellow professionals, my post-handover connection with the building in use was largely reactive. However, I felt that the accumulation of experience could be put to better use if one could head off issues before they happened. This meant knowing more about the building in use.

In the late 1990s, as a project director, I found myself regularly calling in to check progress with the client at the tail end of a particularly leading-edge building RMJM had designed for a major pharmaceutical company. My team had put a lot of brainpower into the project and it would be a pity if this was undermined by the usual post-handover minor glitches that could easily be allowed to mutate into chronic problems. This happened to coincide with a prolonged user occupation programme and offered a golden opportunity to be around while staff were beginning to work there. I borrowed a typical office as a base and used its facilities just like any member of staff, while observing the building in use and the occupants at work.

This short period in residence was a transforming experience, providing major insights that I had suspected, but not experienced in thirty years of professional practice. I saw people not understanding how things were supposed to work, such as the BMS-linked solar blinds, and was able to explain the design intent to them. I could often spot things not working properly before the users did, such as over-zealous presence-detected lighting, head-off potential problems, and organise follow-up. I learnt about things that were good but which users didn't understand. I found well-intended design features that fell at the first fence when used by non-architects, in other words the average building user.

In a subsequent project at Cambridge University, David Adamson, the Director of Estates, asked me to give one of a series of lectures. It was around the time of the last financial crisis and there was much talk of hard or soft landing of the global economy (where clearly lessons are not learnt). I picked up the theme in my talk, and Soft Landings for buildings was born.

The Soft Landings research

David Adamson then wondered whether the approach might become more of a standard procedure, which resulted in the next stage of development. Supported by the University Estates Department I led a project guided by a panel of designers, project managers and client representatives that investigated what might need to be done. In time, we were joined by Bill Bordass of the Usable Buildings Trust (UBT), and the team drew on a rather similar idea known as Sea Trials, together with other recommendations from the PROBE series of post-occupancy surveys.

In 2004 we produced preliminary documentation, in the form of a scope of service document set for Soft Landings[1]. Since then, team members and others have been applying parts of the service in some of their projects. The results have been insightful, but mostly restricted to the firms that were members of the original development team, and those in close touch with them.[2]

When we began, some expected us to come up with a completely new procurement process. The difficulty of this soon became apparent as a wide range of contracts and processes are already deeply embedded with standard forms, agreed procedures and so on. So, at best, Soft Landings was likely to be regarded as yet another process among many. Instead, we saw it as a golden thread which could run alongside any procurement process, improving the setting of design targets, the managing of expectations with a focus on outcomes, reinforcing activities in the weeks immediately before and after handover, and providing a natural route for feedback and post-occupancy evaluation.

Some were keen to explore whether financial penalties could be attached to the attainment of agreed performance targets. After considering this in some depth, we recommended against it, owing to the expense of setting-up a legally-defensible system, uncertainties about metrics, the difficulties in dividing any responsibility for outcomes between all the parties concerned (not least the occupiers and facilities managers), and the fact that the industry is (as yet)

largely unfamiliar with the true in-use performance of the buildings it produces. Instead, we felt that Soft Landings needed to be undertaken in a spirit of learning and continuous improvement, or possibly with a financial incentive which would be easier to organise and to share out than a penalty. After a few years, designers and builders may have become sufficiently confident to be able to offer guaranteed performance. But to start with, we need to learn in a no-blame situation; otherwise onerous requirements may actually stifle the purposeful innovation that we need to produce better buildings with far fewer environmental consequences.

Next steps

With the challenges of more sustainable buildings now hard upon us, there has been increasing interest in scaling-up Soft Landings. This Framework is the fruit of these efforts and sets the overall scene. Detailed development will be tailored to the needs of specific contexts.

The world is becoming aware of the need to reduce building energy use and carbon emissions. There is also growing interest in post-occupancy evaluation (POE). Less well-appreciated is the fundamental importance of integrated feedback, feed-forward of lessons learned into the later stages of the construction and handover process and POE to the development and refinement of the new techniques and technologies. These actions are central to ensuring that sustainable strategies work in practice.

I hope that this Framework for Soft Landings will interest and inspire clients, designers, builders, occupiers and managers around the world, be of immediate practical utility to those who want to make building design and construction more performance-driven, and narrow the credibility gaps that often yawn between expectations and outcomes.

Mark Way, June 2009

1 WORKSHEETS IN THE APPENDIX TO THIS FRAMEWORK DOCUMENT ARE BASED ON AND ADAPTED FROM THIS SOURCE.

2 THE AWARENESS-RAISING DOCUMENTS ON SOFT LANDINGS, PUBLISHED IN 2008 BY BSRIA AND THE USABLE BUILDINGS TRUST, INCLUDE EXAMPLES FROM TWO AWARD-WINNING BUILDINGS: THE MATHEMATICS FACULTY AT CAMBRIDGE UNIVERSITY AND HEELIS, THE NATIONAL TRUST'S HEAD OFFICE IN SWINDON.

Background to Soft Landings

Over the past decade the ANZ region has seen a growing expectation for increased sustainability, energy efficiency and occupant satisfaction to be provided in new and existing buildings. Owners, occupiers, Governments, and society are looking to the construction industry to meet increasingly challenging targets: building owners seek robust sustainable investments, economically delivered to meet occupant demands whilst treading lightly on the environment.

Whilst a number of new buildings are being delivered to meet increasingly higher standards of sustainability and energy efficiency, through accreditation systems such as the Green Building Council of Australia Green Star rating, National Australian Built Environmental Rating Scheme (NABERS) and NABERSNZ, the construction industry and its clients do not yet have the right structures in place to reliably and repeatedly deliver these improvements. Surveys of recently completed buildings regularly reveal substantial shortfalls between client and design expectations and delivered performance – the performance gap – especially energy performance.

There are many reasons for this, including:

- Many designers do not take sufficient account of how occupiers will ultimately use and manage buildings and the equipment they introduce[1].

- General 'spec built' designs are not sufficiently flexible to accommodate tenancy fit-outs and their operating equipment without detrimental impacts to the base building performance and performance compromises to the fit-out.

- Achieving performance is becoming increasingly dependent on high technology solutions that require careful attention during installation and specialist aftercare if they are to work as intended. Pre-handover commissioning is seldom enough.

- Post tuning obligations are focused on the defects liability period and often concentrate on demonstrating delivery of the contract obligations without consideration to occupant comfort or operational efficiency opportunities.

- Solutions that look good in design calculations can often prove to be too complicated to be manageable, both through the design and delivery process and particularly in use. Designers can easily forget that management is a scarce resource, as can those procuring clients who do not have a direct involvement in building operation.

An underlying problem is that designers and builders are typically appointed on contracts that focus on achieving practical completion with obligations post practical completion focussed on the defects liability period, which is normally only 12 months. They are seldom asked or paid to follow-through afterwards, to pass on their knowledge to occupiers and management, or to learn from the interaction. Consequently, the industry is missing opportunities for improving the knowledge base of its people, its organisations, and indeed for everybody and not unlocking all the value in the buildings it creates. Nor does it fully understand what it is creating, what works well, and what needs to be improved. One might be tempted to blame the industry for this, but the causes are more deeply rooted, making it difficult for anybody to step far out of line.

The rigid separation between construction and operation means that many buildings are handed over in a state of poor operational readiness and suffer a 'hard landing', particularly – as often happens – when delays have led to the telescoping of the commissioning period. Problems can be worst where complicated or unfamiliar techniques and technologies are used and nobody can understand why, or what they need to do. If the problems are not dealt with rapidly, occupants' initial enthusiasm can easily turn into disappointment.

Designing for manageability; A note by the Usable Buildings Trust (UBT)

The UBT's studies of buildings in use suggest that they fall into four main groups.

TYPE A: These are complicated, require lots of management to look after the complication, and get it. They can work well, but tend to be expensive to run and fragile, as their performance can collapse in bad times.

TYPE B: These are less complicated, require less effort to run, and are more robust. We need many more of these, particularly in the public sector, as high maintenance is ultimately unaffordable and unsustainable.

TYPE C: This is unfortunately where all too many buildings that aspire to be Type A end up. They are too complicated, need too much money and management to look after, and end up delivering poor value.

TYPE D: These buildings receive more care and attention than they deserve. They are procured, designed, built, operated and often occupied by dedicated enthusiasts. They can achieve excellent performance – and sometimes they are demonstration projects – but they are not necessarily replicable in the real world.

As a general rule, beware Type A, try to do more of Type B, avoid Type C, and question Type D

Doing things differently

To meet these changing expectations and to reduce the gaps between predicted and achieved performance, the design and construction professions must not only focus on technical inputs, but also put much more emphasis on in-use performance strategies. The desired operational outcomes need to be considered at the very earliest stages of procurement, managed right through the project and reviewed in use.

This culture shift in the way buildings are delivered will require:

- Better and more direct understanding of how buildings are actually used and managed.

- Integration of follow-through and feedback into clients' appointments and industry procurement processes.

- Better review and reality checking and fine-tuning during the procurement process.

- Closer links between design, construction, operation, research and development, so that experience gained on all projects is rapidly internalised, digested and fed-forward to inform existing projects and future work.

The industry and its clients must move fast; especially to reduce greenhouse gas emissions, which otherwise threaten to trigger rapid climate change. The challenge is immense and time is short; buildings last a long time, but the industry changes slowly.
The required alterations are radical, but we need ways of making an orderly transition from existing procedures to improved procedures.

The purpose of Soft Landings

Soft Landings can be used for new construction, refurbishment and alteration. It is designed to smooth the transition into use and to address problems that post- occupancy evaluations (POE) show to be widespread. It is not just about better commissioning and fine tuning, though for many buildings commissioning can only be completed properly once the building has encountered the full range of weather and operating conditions.

Soft Landings starts by raising awareness of performance in use in the early stages of briefing and feasibility, helps to set realistic targets, and assigns responsibilities. It then assists the management of expectations through design, construction and commissioning, and into initial operation, with particular attention to detail in the weeks immediately before and after handover. Extended aftercare, with

monitoring, performance reviews and feedback helps occupants to make better use of their buildings, while clients, designers, builders and managers gain a better understanding of what to do next time. Soft Landings can run alongside any procurement process as well as environmental rating schemes[2], where it can also help achieve certain criteria. It also provides a natural route for POE and feedback.

Soft Landings provides additional support throughout the process, especially:

- During inception and briefing, to establish client and design targets which are better-informed by performance outcomes in use on previous projects. It also commits those joining the design and building team to follow-through after handover and for project management to begin to allocate responsibilities for on-going reviews of design intent and anticipated performance, and to prepare for the other activities required.

- Alongside the design and construction process, to review performance expectations as the client's requirements, design solutions, and management and user needs become more concrete and the inevitable changes are made. In addition the team must plan for commissioning, handover and aftercare, and involve the occupier much more closely in decisions which affect operation and management.

- In the weeks before and after handover. Although practical completion is important legally and contractually, with Soft Landings handover is no longer the end of the job, but just an event in the middle of a more extended completion stage. Before handover, the team prepares to deliver the building and its systems in a better state of operational readiness. When the occupants begin to move in, the aftercare team (or team member) will have a designated workplace in the building and be available at known times to explain the design intent, answer questions, and to undertake or organise any necessary troubleshooting and fine-tuning. Both before and after handover, the design and building team will work closely with client, occupiers, and facilities managers to share experiences and smooth the transition into use.

- During the first three years of occupancy: to monitor performance, to help to deal with any problems and queries, to incorporate independent post- occupancy surveys (such as occupant satisfaction, technical and energy performance), and to discuss, act upon and learn from the outcomes. Achievements and lessons should then be carried back to inform the industry and its clients.

---

1 FOR EXAMPLE, DESIGN ENERGY ESTIMATES HAVE OFTEN ONLY REPORTED THE ENERGY REQUIREMENTS OF THE LOADS SUBJECT TO BUILDING CODES, AND EVEN THEN OPTIMISTICALLY. THE UNREGULATED AND OCCUPIER LOADS HAVE FREQUENTLY GONE UNREPORTED.

2 REFER TO BSRIA BG28/2011 BREEAM 2011 AND SOFT LANDINGS – AN INTERPRETATION NOTE FOR CLIENTS AND DESIGNERS

Introduction to Soft Landings

Why use Soft Landings?

Soft Landings helps clients and occupiers to get the best out of their new or altered buildings. It is designed to reduce the tensions and frustrations that so often occur during initial occupancy, and which can easily leave residual problems that persist indefinitely. At its core is a greater involvement of designers and constructors with building users and operators before, during and after handover of building work, with an emphasis on improving operational readiness and performance in use.

Soft Landings is not just a handover protocol. It also provides the golden thread which links between:

- The procurement process: setting and maintaining client and design aspirations that are both ambitious yet realistic, and managing them through the whole procurement process and into use

- Initial occupation, providing support, detecting problems, and undertaking fine-tuning; and

- Longer-term monitoring, review, Post-Occupancy Evaluation (POE) and feedback – drawing important activities into the design and construction process which are both rare in themselves and often disconnected.

- Recognises the importance of the end user ensuring that solutions are developed that are focused towards enhancing the users aspirations and experience

Other important, but less directly tangible benefits include client retention and - increased client satisfaction and trust owing to the improved levels of service, greater mutual understanding between designers, builders, clients, occupiers and managers, education of design and project team members in what works well and what may be causing difficulties. It also helps to develop industry skills in problem diagnosis and treatment.

What is special about it?

Soft Landings is embedded in the entire procurement process from initial scope to well beyond project completion. Traditionally, buildings are simply handed over to the client and the design and building team walk away, never to come back, except to deal with snags or reported failures. By contrast, Soft Landings helps to:

- Minimise the chances of unsatisfactory performance by strengthening the vulnerable areas of traditional scopes of service, which too often result in occupier complaints downstream.

- Address and even pre-empt problems during the early occupation phase, by providing an on-site designer/contractor representative or team that can assist occupiers and management.

- Ensure that lessons from closer interaction with the occupiers – and from evaluating actual building performance in use – are learnt and shared to the benefit of all stakeholders.

Soft Landings helps to bring things together

Many techniques of project feedback and Post-Occupancy Evaluation (POE) are aimed at one particular stage of a project or to suit a single discipline or element such as building services engineering. Many are used solely in the post-occupation phase when it is too late to tackle the strategic problems that originated in briefing, design and project management. Soft Landings provides a process carrier for these techniques, so helping to unite all disciplines and all stakeholders and to extend the procurement process beyond handover through adopting and following the Soft Landings core principals[1].

As POE becomes more routine, findings and benchmarks from previous POE surveys can be used to help calibrate client and design expectations. Where practicable, results from these surveys can also provide metrics that allow these expectations to be tracked from briefing, through design development, construction and commissioning, and into operation.

How do contractual duties change?

Soft Landings extends the duties of the team before handover, in the weeks immediately after handover, for the first year of occupation[2], and for the second and third years. In order to improve the chances of success, it reinforces activities during the earlier stages of briefing, design and construction. The overall objective is better buildings, with better performance which matches more closely the expectations of the client and the predictions of the design team.

Soft Landings creates opportunities for greater interaction and understanding between the supply side of the industry and clients, building users and facilities managers. It helps everybody concerned to improve their processes and products, and to focus innovations on things that really make a difference.

Is there a standard scope of service?

Soft Landings procedures are designed to augment standard professional scopes of service, not to replace them. They can be tailored to run alongside most industry standard procurement routes[3] to create the most appropriate service to suit the project concerned.

BSRIA BG45/2013 How to Procure Soft Landings, provides guidance on procuring Soft Landings and the requirements for the various roles of each party which can be incorporated into tender documents and conditions of engagement. Whilst this is currently written based on UK procurement routes, it still provides relevant guidance that can be applied to the various Australian and New Zealand procurement routes.

Major revisions to industry-standard documentation are not necessary. The main additions to normal scopes of service occur during five main stages:

1. Inception and briefing to clarify the duties of members of the client, design and building teams during critical stages, and help set and manage expectations for performance in use.

2. Design development and review (including specification and construction). This proceeds much as usual, but with greater attention to applying the procedures established in the briefing stage, reviewing the likely performance against the original expectations and achieving specific outcomes.

3. Pre-handover, with greater involvement of designers, builders, operators and commissioning and controls specialists, in order to strengthen the operational readiness of the building.

4. Initial aftercare during the users' settling-in period, with a resident representative or team on site to help pass on knowledge, respond to queries, and react to problems.

5. Aftercare in years 1 to 3 after handover, with periodic monitoring and review of building performance.

The following sections outline the content of the five stages in Soft Landings. Each section includes a checklist that summarises the specific activities in the particular stage, with notes on things to consider and pitfalls to avoid.

"In conjunction with our client, we applied the Soft Landings Framework to a major building refurbishment in the Adelaide CBD. We found applying the framework to be a positive experience that helped us to identify a number of design and delivery improvements whilst integrating and enhancing with our own existing quality management systems."

Michael Barnes, CEO, ISIS

1 REFER TO BSRIA BG38/2012 THE SOFT LANDINGS CORE PRINCIPALS

2 THE DEFECTS LIABILITY PERIOD USUALLY FINISHES ONE YEAR AFTER PRACTICAL COMPLETION AND HANDOVER.

3 FOR EXAMPLE THE LIKE OF NZ3910 AND AS4000 FORM. IT CAN BE EMPLOYED ON A RANGE OF OTHER PROCUREMENT ROUTES FROM CONSTRUCTION MANAGEMENT THROUGH TO PUBLIC PRIVATE PARTNERSHIP (PPP).
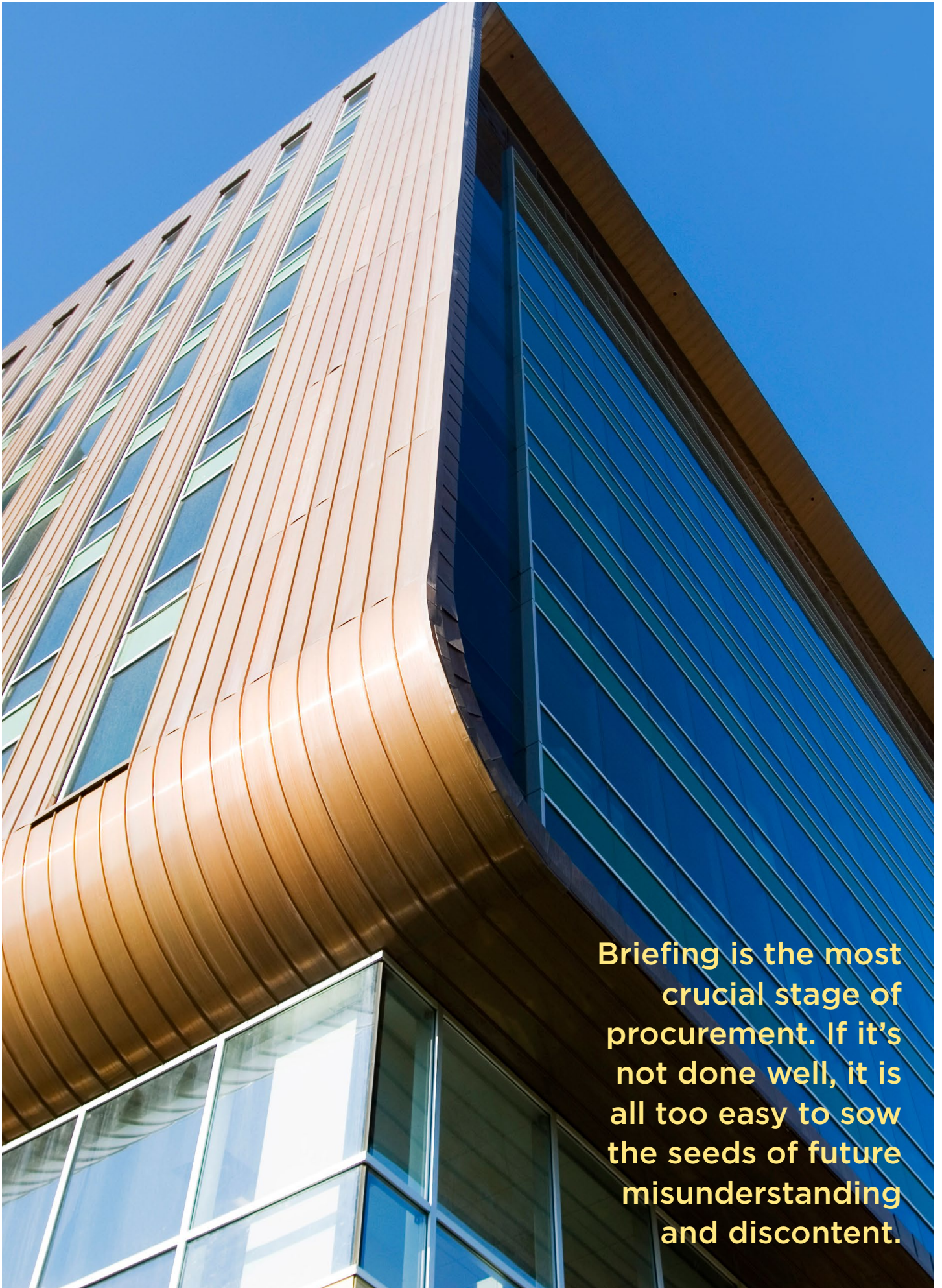
Briefing is the most crucial stage of procurement. If it's not done well, it is all too easy to sow the seeds of future misunderstanding and discontent.

Table 1: How the Soft Landings process can be generically integrated into the design and construction process. The Soft Landings worksteps are shown in the orange boxes with reality checking[1] in green.

	TYPICAL PLAN OF WORK		SOFT LANDINGS	
Phase of Work		**Main Activities**	**Principal Additions**	**Supporting Activities**
Preparation	Appraisal	Identify client needs Do feasibility studies	**Stage 1 (B). Briefing:** Identify all actions needed to support the procurement	Explain Soft Landings to all participants Define goals, roles and responsibilities Identify processes and sign off gateways Affirm Soft Landings principals, roles, objectives and goals
Preparation	Design brief	Develop an initial statement of requirements and procurement methods		
Design	Concept	Implement and expand the brief. Prepare the concept design. Review the procurement route	**Stage 2 (D). Design development:** Support the design as it evolves	Review past experience Agree performance metrics Agree design targets
Design	Design development	Develop concept design. Update design reports and costs. Complete project brief.	**Reality check 1:** Scheme design reality check	Global reality check of the entire design. Review design targets. Review usability and manageability
Design	Technical design	Prepare technical design and specification sufficient for coordination and costing	**Reality check 2:** Technical reality check	Conduct evidence based design risk review. Review against design target. Involve the future building managers
Pre-construction	Detailed design	Prepare detailed information for construction. Review information provided by specialists.		Review against design targets. Involve the future building managers
Pre-construction	Tender documentation	Prepare or collate tender information	Optional reality check revisit	Include additional requirements related to Soft Landings procedures. Ensure Principal Contractors understand and pass on clear obligations / introduce a Soft Landings Charter to Sub Contractors and let trade packages
Pre-construction	Tender Evaluation	Identify and evaluate potential contractors and/or specialists. Submit recommendations to client.	**Reality check 3:** Tender award stage reality check	Communicate reality checked items. Evaluation of tender responses to Soft Landings requirements
Construction	Mobilisation	Let the contract Issue information to the contractor. Arrange site handover to the contractor.	Reaffirmation of Soft Landings	Re-engagement workshop to celebrate the Soft Landings successes to date, explain to new parties and reconfirm to the existing team the Soft Landings principals, roles, objectives and goals
Construction	Construction Design	Preparation of shop/fabrication drawings including detailed coordination.		Review against design targets. Involve the future building managers
Construction	Construction to practical completion	Administer the contract. Provide further information as required. Review information provided.	**Reality check 4:** Pre-handover reality check	Check need for any extra support that has not yet been anticipated. Include FM staff and/or contractors in review. Demonstrate control interfaces. Liaise with move-in plans. Review and revise performance metrics and measureable design targets
Construction	Construction to practical completion		**Stage 3 (P). Pre-handover:** Prepare for building readiness. Provide technical guidance.	
Construction	Construction to practical completion		Reaffirmation of Soft Landings	Re-engagement workshop to celebrate the Soft Landings successes to date and reconfirm the Soft Landings principals, roles, objectives and goals
Use	Post-practical completion	Administer the contract after practical completion and make final inspections	**Reality check 5:** Post-handover sign-off review. Ensure all outstanding reality check items are complete and system is signed off as operational	Incorporate Soft Landings requirements
Use		Assist building users during the initial occupation period	**Stage 4 (A). Aftercare in the initial period:** Support in the first few weeks of occupation.	Setup home for resident on site attendance. Provide assistance as needed
Use		Review of building performance in use	**Stage 5 (Y). Years 1 to 3 Aftercare:** Monitoring, review, fine-tuning and feedback	Setup home for resident on site attendance. Provide assistance as needed
Use			Reaffirmation of Soft Landings prior to yearly review and feedback	Re-engagement workshop to celebrate the Soft Landings successes to date and reconfirm the Soft Landings principals, roles, objectives and goals

1 REFER BSRIA 27/2011 PITSTOPPING – BSRIA'S REALITY-CHECKING PROCESS FOR SOFT LANDINGS

Stage 1 (B):
Inception and briefing

Briefing is the most crucial stage of procurement. If it is not done well, it is all too easy to sow the seeds of future misunderstanding and discontent. A common problem is to put too much emphasis on the intended product, at the expense of the general background, performance requirements (both qualitative and quantitative), and the processes by which solutions should be developed and tested. The more time that can be made available for constructive dialogue, the greater the likelihood of success.

To obtain the greatest value from Soft Landings, the expectations and performance targets that emerge from the briefing process should be arrived at within a well-structured, logical and recorded context. However, for various reasons it may not always be possible to give the briefing stage all the time it deserves at the outset. Consequently, Stage 1 of Soft Landings also establishes tasks, responsibilities and review procedures that allow the brief to be re-examined in response to new findings, and to help ensure that critical issues are not lost along the way.

NOTES ON BRIEFING AND
DESIGN BRIEF MANAGEMENT

Post-occupancy reviews often reveal major differences in performance between ostensibly similar buildings. For example, energy use can be higher by a factor of two or three, while self-assessed productivity scores from occupant surveys can differ by 15–20 percentage points. In the best buildings, high levels of occupant satisfaction and good energy performance often go together. The unifying reason is usually that good committed people with good processes are able to achieve good all-round outcomes which enable multiple objectives to be met. By encouraging design brief management Soft Landings will help to ensure that this happens.

An effective briefing process needs to seek clarity in three main areas:

- The context for the project: the client's goals, the site and neighbourhood, environmental objectives, and wider social, economic and environmental trends and how the building should adapt to them.

- The qualities of the solution: the client's ends. Commonly included are space requirements and relationships, operational characteristics, indoor environment, mechanical, electrical and information services, costs, and image. Interest in building and environmental performance has been growing rapidly, but there still tend to be major differences between expectations and outcomes. Soft Landings helps teams to improve clarity of purpose, attention to detail, and include follow-through and feedback arrangements.

- The implications of the solution. The implications of the above become expressed in the emerging building design. However, what this really means in terms of performance is often less clearly examined, or examined under modelling assumptions rather than in relation to real life. How will people actually use it? How will it affect organisational effectiveness? Who will be needed to manage it? What if the building (or part of it) is no longer needed?

As a design develops, the emerging solutions should be tested against the brief, and vice-versa, as insights, opportunities and sometimes constraints emerge that may not have been envisaged when the brief was originally formulated. The tests should include:

- A review of the assumptions. Has the context changed? Does physical representation of the requested qualities cause the client to have second thoughts? Have all the stakeholders been properly identified?

- Checks on the needs and demands of the proposed solution. Post-occupancy surveys reveal that buildings can easily become too complicated, sometimes in the name of labour-saving automation. If not carefully evaluated, this can make things difficult for their users, expensive to operate and maintain, and demanding of management time. The quest for simpler solutions can be rewarding.

- Tests of the design expectations. Designers are not users, though they often think they are, so designers can easily make optimistic assumptions about user behaviour. If design intent is not clear to users, it can be difficult for the building to perform as intended. A widespread problem is where user interfaces to manual and automated controls are poorly considered, specified, located or signposted.

- Review of likely and actual outcomes. Soft Landings supports this, with regular reviews of client and design expectations during procurement; and by monitoring, fine-tuning, post-occupancy evaluation and feedback once the building is occupied.

by Adrian Leaman, Building Use Studies

STAGE 1 (B) CHECKLIST: INCEPTION AND BRIEFING

B1. Define roles and responsibilities

Roles and limits of responsibility must be spelt out clearly from the very beginning. If nothing else, this will highlight any gaps. Sometimes the project leader may also need to review how well certain individuals are suited to their assumed roles. It is not enough to have the right job titles: individuals also need the right mix of ability, experience and temperament.

To ensure that the design reflects operational needs, it is important to involve the client's facilities management team early on, ideally with the individuals who will take over the installed systems. If staff are not yet appointed (for example because the building will be sold on, or operations outsourced), then independent advice will often be desirable.

B2. Review past experience

Past experiences of team members and others will benefit the briefing, design, and construction process, and allow better and more realistic targets to be set. The project manager should seek to elicit all relevant experiences – good and bad – in a spirit of openness. These will be hugely beneficial to the project.

B3. Plan for intermediate evaluations and evidence based reality checks

The programme should incorporate opportunities for intermediate evaluation workshops. These will help to ensure that stakeholders are fully engaged as the design develops and that input from key users is obtained and not lost along the way. The workshops will help to flush out misconceptions on all sides. Topics will also come up which may seem incidental at the time but which can help to identify and sometimes to resolve decisions on things which might otherwise be overlooked, or taken for granted.

B4. Set environmental and other performance targets

The processes of target setting, prediction and measurement will highlight the need for roles and expertise on the client side. Clients may not have anticipated some of the skills and activities required. Targets will normally have to satisfy the criteria of being unambiguous, measurable and of some value. The design targets should include human factors issues, even if they are descriptive in nature rather than numerical or statistical. Independent occupant satisfaction surveys of similar buildings (or in a refurbishment situation, the existing building) can inform many aspects of a new building's design and future operation. The survey can be repeated in Stage 5: Years 1 to 3 Aftercare to verify achievement and highlight areas for improvement.

B5. Sign-off gateways

Premature decision-taking can blunt innovation. However, there will be no chance of optimum success if one leaves too many loose ends for too long. Sign-off gateways create the structure for fixing decisions. Gateways are both entry and exit points, but different criteria may be applied depending on entry and on exit, after which the requirements will be more binding on all parties.

B6. Incentives related to performance outcomes

For the environmental and other targets set in B4, the team needs to agree how to measure performance in use, and what action is appropriate if anything falls short. A suitable action might be for the design and building team to agree to follow-up any shortcomings and to suggest how performance might be improved.

SUPPORTING NOTES

Clarity on the client side is absolutely essential, particularly in defining responsibilities, identifying the chain of command and agreeing the decision- making protocols. If any independent advisers are involved, it is important to clarify what authority they have, and that everyone in the project team is aware of it.

The client and the project team should each identify their Soft Landings champion(s) who have the responsibility to ensure that the Soft Landings process is developed to suit the project and is followed through the entire procurement process and on into use. Ideally the client champion should be mirrored on the project team side. There may also be other nominated champions further down the contractual chain. The Champions should also ensure that Soft Landings principles take their proper place as part of the routine management of the project and are properly resourced. The Champions need to be individuals who have an interest in the in-use performance of the building, and are likely to be on the team for the full duration of the project, for example the client representative, the job architect, or the project manager.

Communication between designers and facilities managers can be difficult owing to their often very different perspectives. It is unlikely to happen automatically, so the client's project manager needs to make sure that it does. If not, senior clients and designers may well have ideas that in practice prove to be too complicated, or too difficult to look after. As unmanageable complexity is often the prime cause of occupant dissatisfaction with the indoor environment (and of excessive energy use), it is vital to address complexity problems by designing for usability and manageability, either simplifying the solutions or increasing the levels of facilities management budget and skills.

Where quantified targets are not practicable, for example owing to the difficulty of calculation, or a lack of suitable metrics, qualitative indicators (for example, on a scale of good practice – best practice – innovative – pioneering) can be useful guides in helping to calibrate client aspirations, and to revisit them during design reviews. A suitable action might be for the design and building team to agree to follow-up any shortcomings and to suggest how performance could be improved.

Some people would like to see financial incentives, such as a bonus to the design and building team for meeting certain performance levels. Penalties for falling short are more contentious and could be expensive and complicated to make legally bulletproof: a requirement to investigate and report may be preferable.

Stage 2 (D): Design development and review

Once a project team has adopted Soft Landings at Stage 1: Inception and briefing, then design development, technical design, production information and tendering will proceed much as usual. However, people will need to bring a somewhat different approach to the process. In particular:

- Everyone joining the client, design and construction teams will need to be made aware that Soft Landings is in operation and commit to adopting its principles.

- All team members will be encouraged to obtain and contribute insights from the performance-in-use of comparable projects.

- Client and design targets will be informed by actual performance in use, reviewed at intervals as the project progresses, and have any adjustments agreed and signed-off.

- Requirements for independent post-occupancy evaluation (POE) services will need to be verified. To assist comparability and transparency, where appropriate and practical, the same metrics should be used for the design targets and what the POE will measure.

- The design process should include reality checking workshops, including reviews by experts in building performance. Evidence based design risk reviews should form part of this process.

- To accompany the design data, an illustrated narrative will be developed on how the building will work from the point of view of the manager and the individual user. This can evolve into the technical and user guides that will be issued to managers and occupiers at handover.

- Close attention needs to be given to the usability and manageability of the proposed design solutions, and in particular moving parts, electrical components and their control interfaces. Where the occupiers are known, their facilities managers and user representatives should be involved in reviewing the proposals and commenting not just on the design intent but also on the details of the management and user interfaces, including the equipment selected and its location.

- Suitable preparations must be made during design and construction to plan, programme and resource the critical periods in the weeks immediately before and after handover.

To make sure that all angles are covered, tender documentation may require unfamiliar interventions by other design team members.

Reality Checking

There is a need for Soft Landings project teams to regularly conduct reality checking reviews on selected design issues. These are issues selected by the project team for extra attention, either because they are regarded as particularly risky, or because they are innovations for which risks would be unknown or not identifiable during the design period, or because of the feedback from the review of past experience. A method for conducting reality checking reviews is provided in BSRIA BG27/2011 Pitstopping – BSRIA's reality checking process for Soft Landings.

Reality checking requires a project team to plan ahead and limit any risks of under-performance. This might involve planning for extra care during installation and commissioning, seasonal commissioning after occupation, and/or fine-tuning during Soft Landings aftercare.

Whilst it is obvious what this speed controller is and does and how to use it, it is possibly not the most user-friendly of controllers being at ceiling level and above spinning metal blades!

There are lots of these types of control devices in buildings that confuse or alienate occupants. In this Australian office example, the standard air conditioning controller with its multi-functional LCD screen and wide range of control options has frustrated the occupants enough for it to be taped-off and a simple control switch added. While it is not clear what the replacement controller does, it does at least speak to the occupants in terms they understand: "When you have lots of people in the room and you want better comfort conditions, press the button". The device has a useful light to show its status. Occupants don't really care what it does, or how it does it, so long as it solves their problem, simply and immediately.

This replacement controller is a response to over-complicated controllers supplied by air-conditioning suppliers. Its attempt to simplify everything the LCD controller can do into a single switch could have adverse effects for comfort and energy use. But, overall, it demonstrates is that greater care needed to be taken with the design and specification of the original controller in the first place.

For more examples of controls usability problems and ways to avoid them, download Controls for End Users – a guide for good design and implementation free from www.bsria.co.uk/bookshop

STAGE 2 (D) CHECKLIST: DESIGN DEVELOPMENT

D1. Building Revisits – review past experience

Reviewing the good and bad aspects of relevant previous projects can generate a list of technical and non-technical watch points that should be fed-forward into the design. These can be used to refine the client's requirements and better inform the design brief as well as providing insights into the reality-checking process. These issues should be recorded such that they are not forgotten and can be addressed and revisited as the design progresses. Consider maintaining a living design risk register that includes reasons for the risks, mitigation measures detailed and an owner appointed to each.

D2. Buildability, Commissionability and Maintainability Review

It is important to design for buildability, commissionability and maintainability. From the outset designers and clients must think realistically about the design concepts with respect to the budget, the construction skills and resources needed to turn ideas into a physical reality. The in-use performance implications should be clearly identified, agreed by all and approved by the client. Record issues arising in the design risk register.

A Safety in Design review further encourages the team consider not only the construction and installation, but also ease of maintenance, decommissioning, removal and replacement.

D3. Usability and Manageability Review

It is important to design for usability, manageability and successful operation and review these aspects from the perspective of those who will ultimately control and manage the building. It is important to identify how the environmental control needs of the end-users will be met, such that it suits the occupiers and doesn't demand too much of them. Controls usually play a significant role in this regard, it is therefore beneficial to engage with a controls company early and involve them in these reviews. Record issues arising in the design risk register.

D4. Reality Checking

A reality checking process for selected elements of the building (using a systematic method, such as BSRIA's process called Pitstopping) can build on the process started in the briefing stage and incorporating the outcomes from Stage 1: B1, B2 and B3. The reality checking process allows the project team to give specific elements closer attention through the design, construction and installation. Use a matrix to record the outcomes and for each identify those that need to be held responsible, accountable, supported, consulted or informed. Honesty and openness are required to create the right conditions for reality checking such that the critiquing is healthy and productive. Be under no illusion; passing on responsibility and risk to others through contract conditions will not achieve the outcomes required, an 'all-in' approach is required. It is prudent to hold mid-stage review meetings and get 'end of stage' sign-off from the identified parties, before proceeding to the next stage.

D5[1]. Iterative Reviews

Iterate between stages D1 to D4 during the design process as required. The sequence, number of iterations and participants will depend on the procurement route and timing of engagement with various parties.

D6[1]. Revisit and Update Early Performance Targets

The early simplistic energy targets should be developed by the project team to provide greater detail of the building's energy and environmental performance and should be benchmarked. Early modelling will use notional values, however these can be updated and refined as the design progresses. Consideration should be given to using tools (such as Excel) that the FM team will understand, as the FM team should inherit the modelling information after handover and update over time and used to inform POEs. An Excel-based tool is provided by CIBSE in its TM22 Energy Assessment and Reporting Methodology.

D7[1]. Tender documentation and evaluation

The requirements related to Soft Landings procedures need to be incorporated as part of conventional contract documentation and included in the tender documentation. The requirements will need to reflect the outcomes of the various reviews and reality checks.

The evaluation of submissions from the lead contractor, key sub-contractors and suppliers must include an assessment of their understanding and acceptance of the Soft Landings procedures and the outcomes of the various reviews and reality checks. Any shortfall must be rectified and the arrangements clarified prior to final acceptance.

D8[1]. Contractor mobilisation and construction design

At this stage there is still an element of design and coordination required which can still influence the Soft Landings outcomes. Engagement between the designers, constructors and facilities maintenance is key.

The principals, roles, objectives, goals and requirements related to Soft Landings need to be explained and re-enforced to the construction team. This is also an opportunity to celebrate the Soft Landings successes to date and refresh the client's and design team's commitment to Soft Landings moving forward

SUPPORTING NOTES

It is vital to engage with the facilities and maintenance people, as they can be very insightful with regards construction, maintenance and end-user experiences.

At the simplest level this can be detailing for airtightness, making sure that lamps can be reached and changed, and that electrical connections are provided for actuators. At a more complex level, it might be digital communications between separate systems. In particular, interfaces to controls must be well thought-through in relation to the technical requirements and their intelligibility to management and a range of different users.

Reviews can be undertaken as part of normal design meetings. However, well- organised peer reviews (with independent experts at key stages in the design) can be effective in helping to pinpoint issues that may prove problematic. They will also help to identify solutions which may have been tried elsewhere. Including a cross-section of people with different jobs and seniority will provide valuable perspectives on aspects of building usage and operation that may otherwise emerge too late and compromise the design. For example, natural cooling strategies have been undermined when security staff close night ventilation openings or insurance policies require it. The openings could have been designed differently had these concerns been identified earlier.

Design review meetings require sensitive preparation and chairing if they are to be constructively critical. A trained facilitator can unlock tacit knowledge that may otherwise not surface and is also experienced in dealing with design team egos and ensuring all voices are heard. Timing is important; reviews are best undertaken when options are relatively clear, allowing discussion to be focused, but with solutions not so well crystallised that the design team finds it difficult to respond to important comments.

At review meetings, designers should not sell design themes and solutions too forcefully, as clients, managers and users may then be reluctant to offer their comments and to share their experiences of buildings in use. This may deny the project the benefit of the management and user experience and insights that are often crucial to a building's ultimate performance.

Ensure that the requirements of Soft Landings are thoroughly written into the scope. Refer to BG 45/2013 how to Procure Soft Landings for further information. Check any contractual clauses for legal appropriateness.

Under Soft Landings the relationship is one of mutual collaboration and shared responsibility. As the project progresses it is easy to gravitate back to the conventional customer/supplier roles. Therefore at each major milestone take time to revisit why Soft Landings was adopted, celebrate successes to date, and reaffirm commitment to the process. This includes defining/re-defining all stakeholders' roles and responsibilities and re-articulating the goals.

---

1 Stage numbers differ from other Soft Landings documentation due to re-sequencing

Stage 3 (P): Pre-handover

The main purpose of the pre-handover stage is to help to ensure that by the time the building is handed over it is not just physically complete, but ready for operation. A building readiness sub-programme therefore needs to be developed in good time, and well ahead of the start of commissioning work. Activities by the design and building team must also include static commissioning (such as inspections of airtightness details, checks of window opening devices and linkages, and envelope pressure tests). Commissioning of building services needs extending to include, for example, natural ventilation, renewable energy systems, metering installations and effective user interfaces. Great care needs to be given to demonstration, training and documentation. Proposed activities by the client and occupier also need to be reviewed, for example staffing, operation and maintenance contracts, and move-in plans including fit-outs where relevant.

It is essential that the client's management team takes over the operation of the building in a timely fashion. Problems that occur after handover can often be traced back to insufficient understanding by the occupier's staff of technical systems (particularly building services) and their user interfaces, or where solutions have been developed without enough understanding of user and operator requirements. Too often, buildings start their operational lives with too few operating staff, who are not sufficiently trained, know little about the design intent, have had no opportunity to attend a demonstration, and are unfamiliar with the systems provided and how to use them.

To avoid problems, the project team should take more care in design and specification and to pay more attention to the contractor's proposals for commissioning and handover. They will also need better understanding of operator skills and requirements and better arrangements for demonstrating interfaces and systems properly to operating staff before handover. The time spent will lay the foundations for future co-operation.

Clients play a vital part in ensuring building readiness. If they leave staffing too late (as they often do), problems with initial performance can be virtually guaranteed. However much the designer and constructor do to help, resolution is nearly impossible if there are no good operators available on site.

A design and construction team is often told very little about how the occupier intends to move themselves into the building. As a result, occupiers can easily make incorrect assumptions about how ready the building will be to receive them, and what access and services will be available. This in turn can cause clashes and disappointments while the move is under way, and sour initial user experiences of their new or altered building. With Soft Landings, designers and builders need to be involved with the occupier's logistics planning, if only to a small extent.

Even in the best-managed projects, the commissioning period can get squeezed, owing to delays outside the control of the design and building team, and an occupier's business requirement for a non-negotiable handover date. Soft Landings will help to reduce the effects of any such slippages as the continuity

it provides between the pre-handover and aftercare stages makes it much easier for any outstanding commissioning activities to be continued after handover.

Shell, core and fit-out

In some buildings, particularly rented ones, spaces are handed over in an unfinished state, to be fitted out by others, or for specialist purposes.

It is vital that design intent is made clear to the fit-out team, with rules on what to do and what to avoid. This can be done through the likes of a tenancy fit-out manual prepared in advance by the original design team. It is also important for the original design team to review fit-out proposals thoroughly, but with a quick turnaround as tenants will be in a hurry. Otherwise, major problems can easily arise, particularly affecting control systems and HVAC services, especially for more innovative designs which may have characteristics unfamiliar to the fit-out team.

Rented buildings

In speculative buildings (apart from pre-lets), it is more difficult to maintain the continuity that is the hallmark of Soft Landings owing to a lack of information on the occupier and the delays that can occur between the physical completion of the building and the arrival of the first tenant. Reviewing fit-outs by incoming tenants does not form part of core Soft Landings activities. However, clients for such projects should consider appointing the original design team to do reviews of this kind and again, should also consider the preparation of a tenancy fit-out manual by the original design team.

STAGE 3 (P) CHECKLIST: PRE-HANDOVER

P1. Environmental and energy logging review
Responsibilities and routines for data recording must be agreed and related to the targets that are established. Where required, these roles and responsibilities need to be coordinated with the building's logbook and its metering strategy.

P2. Building readiness programme
This building readiness programme needs to be prepared well in advance of move-in. Site completion and commissioning activities need to be coordinated, training activities written, and other records finalised. This should include the setting-up of energy meters, their recording accuracy, their reconciliation with fiscal meters and the data recorded by energy monitoring software.

P3. Commissioning records check
Commissioning records should include energy data where available (such as true power consumed by fan motors, and not just current readings). There should also be a programme for post-completion commissioning and fine-tuning.

P4[1]. Review Performance Metrics
Review and revise performance metrics and design targets taking account of any changes that have occurred through the construction.

P5[1]. Maintenance contract
Ensure that the contract is appropriate and that the service is in place immediately after handover.

P6[1]. Compile a guide for occupants
A simple guide for occupants will help individual users to understand the design intent and use the building effectively. It will complement the required O&M manuals and logbook, within which copies of the user guide should be filed.

P7[1]. Compile a technical guide
The technical guide should provide a succinct introduction for the facilities management team to help to smooth the transition to local operation. Ideally, it will have been developed in the course of design and construction, so that at any stage in the project people can find a clear description of how the systems in the building are supposed to work. This should also be incorporated into the O&M manual.

P8[1]. Training
Adequately trained operation and maintenance staff must be in place before handover. They will need proper familiarisation and training about the building and its systems in good time – not at the last minute.

P9[1]. Building management system interface completion and demonstration
A demonstration to the building operators of the building management system (BMS) and any allied controls helps to ensure that the systems are familiar, operating appropriately, and that staff have some understanding of how to use and fine-tune them. These actions will identify any need for additional work. A list of items requiring, or likely to require, fine tuning should be prepared and trend logs setup to collect data to aid in fine tuning. Trend logs also setup to compare against performance metrics and design targets.

P10[1]. Migration planning
The occupier's move-in programme needs to be coordinated with the design and building team. A small involvement of the design and building team in the occupier's logistics planning can help minimise the upsets that can easily arise if moving-in operations clash with site activities, for example if an access is obstructed, a lift is not available, rooms or services are being finished off, or floor finishes curing and not able to carry heavy loads.

P11[1]. Aftercare team home
The occupier must provide a visible and accessible workplace in the new building for the aftercare team from day one. The size and complexity of the project will determine whether the presence is permanent or at specified hours, and whether by one or more people.

P12[1]. O&M manual review
The team should review the content of the O&M manual with the facilities manager, who should sign it off when it is complete and acceptable.

SUPPORTING NOTES

The lead-up to handover can be a good time to reaffirm the commitment of the client and the team to Soft Landings prior to moving into a phase of practical completion, sign off of defects, performance metrics and the like and construction completion. Traditionally relationships can be at their most strained during this period and it is easy for clients, contractors and designers to gravitate back to their traditional roles and a customer/supplier relationship, which will not achieve the Soft Landings outcomes. It is therefore important to take time to celebrate the Soft Landings successes to date and reaffirm the Soft Landings objectives and goals and the teams roles, responsibilities and commitment to achieve these.

A review is necessary to ensure design and measured in-use comparisons are relevant. Changes during construction e.g. lower efficiency lamps or the addition of a server room, will affect the performance metrics and design targets established during Stage 2.

Develop maintenance scopes and identify performance metrics as part of the design , including long term post defects liability period maintenance obligations can assist in evaluating installation tenders and the quality of the aftercare service that may follow construction

The guide should be completed in good time, with input from facilities management staff and user representatives if possible. It may well need revisions after operational experience is gained. It will save time by reducing the number of questions when the building is first occupied and the complaints that arise from misunderstanding or misuse.

Written material must be made available in good time so that edits and improvements can be made and should be organised to make revisions easy in the light of initial experience and fine-tuning. Including the clients / occupants Facilities Manager (FM) enables early building and systems orientation and enables seamless transition from control and management by the contractor and design team to the occupants

Operating staff will be happier to take ownership of the installation when they are comfortable with the design concepts, understand their roles, and have commented on interface development.

Soft Landings representatives must make themselves visible to the occupants of the building. Staying off-site, or hiding in the contractor's hut will defeat the objective.

Guidance for occupiers and managers need revising after in-use operational experience has been gained.

Stage 4 (A): Initial aftercare

The service during the initial aftercare period is intended to help the occupiers to understand their building, and the facilities managers to operate its systems. The aftercare team is there to provide information and support, to respond to any questions that arise and to investigate any problems that emerge. It is important that the building's facilities or management team is properly resourced, so they have the skills and time to take advantage of this service. Soft Landings will not work properly if the occupiers think they can sit back and leave things to the aftercare team.

During the initial aftercare period, one or more members of the design and building team will be present on site for typically four to six weeks immediately after move-in. After this initial period, the residential presence of design and construction team members will taper off, but periodic reviews will continue, as outlined in Stage 5.

The size and complexity of the project and the occupants' move-in timetable will determine how much time will be required, over what period, and for how many people. It could be as little as one day per week, but much will depend on what actually happens once the occupier moves in.

One of the team should act as the main point of contact for overall liaison. This will usually be the architect, but that depends on the project. Building services and commissioning engineers always need to be closely involved and readily available, because many initial queries are often related to the use and performance of unfamiliar mechanical, electrical and control systems and environmental control strategies.

The aftercare team must be visible, with a workplace in a readily-accessible location and not hidden away. Team members must work not just with the facilities management team, but be accessible to anyone. Occupants must therefore be told that the aftercare team is operating, what it will be doing, where it will be and when. The times of residence need to be regular (such as every morning, or every Tuesday) so everybody knows what to expect.

Team members must make themselves available to deal pre-emptively with queries and misunderstandings. The observations they make, the questions they answer, the responses they get and the insights they derive will help prevent minor problems developing into longer term chronic irritants for the occupants and the client alike. Their period of residence also provides an opportunity to observe and learn from initial feedback and problem-solving.

Visibility also includes sessions at which the aftercare team describes the building and its systems to groups of occupants as soon as possible after they move in, and introduces them to the guide for occupants (see box). The aftercare team will also provide news on issues, problems and progress, possibly via the occupier's intranet, email newsletter, or other medium.

Aftercare is not an administrative exercise or a superficial attempt at marketing, but a service which will generate a lot of goodwill if it is effective. Being seen to be on the side of the users helps a lot – and ensures a meaningful invitation to the official opening.

Tips for a technical guide

A good technical guide will incorporate a Logbook on Building Services, and a strategy for energy and metering in accordance with prevailing technical guidance from CIBSE and BSRIA and any other regulatory requirements. Refer to CIBSE TM39: Building Energy Metering and CIBSE TM31: Building logbook toolkit. Where applicable it should also fulfil the requirements of any rating schemes being used such as Green Star, NABERS and NABERSNZ .

The technical guide explains to the owners and operators (not the individual users) how the building and its systems work and the performance that is expected. This guide is not the same as an O&M manual, which contains far more detail.

Even though it is technical in nature, the guidance should still be written in relatively simple language.

Tips for an occupants' guide

A guide for building occupants is a practical method of informing individuals about a building's systems and procedures.

There are no strict rules on content or style, but ideally the guidance must be written for lay users, should avoid using technical jargon, be illustrated to assist comprehension, and be available in both electronic and printed form. It should also fulfil the user guide requirements of requirements of any rating schemes being used such as Green Star.

The content should include information on general features of the building such as security, safety and access, and environmental features (including energy and water efficiency and waste management). It should also cover principles of design and operation, particularly where the environmental systems rely partially or wholly on local controls for heating, lighting, cooling, and ventilation.

Other issues that may be important to cover include furniture, space use and cycle storage, and where to go for help and more information.

User guides mounted adjacent the like of controllers, switches, etc. can also prove useful in helping occupants identify with them and understand how they can use them.

STAGE 4 (A) CHECKLIST: AFTERCARE

The aftercare checklist covers the initial period of occupation, typically four to six weeks after handover.

A1. Resident on-site attendance
Confirm who will be there, where and when.

A2. Provide workplace with data and communications links
The occupier must provide an appropriate and well-located workstation for the aftercare team.

A3. Introductory guidance for building users
The occupier's representative should organise informal user meetings as soon as possible after the building has been occupied. The size of the meetings and who exactly should go will depend on the size of the project and the nature of the occupying organisation. The prime purpose is for the aftercare team to explain why they are there, to present key information on how the building operates, introduce the guide for occupants, and answer questions. Anticipate the need to hold at least two meetings.

A4. Technical guidance
The purpose is to smooth the transition of responsibility from the project team to the client's facilities management team and to help them gain a good understanding of the building and be able to take full authority over operating and fine-tuning its systems. The ground will have been prepared in the pre-handover stage, but further support may often be necessary in the light of issues that emerge over the first weeks of operation, and to accommodate new people arriving as part of the move.

A5. Communications
It is important that users are kept informed of progress on operational issues, for example via regular newsletters or other bulletins.

A6. Walkabouts
Members of the Soft Landings aftercare team (preferably those most familiar with the design intention and the controls systems) should roam the building informally on a regular basis, to examine the building in use, observe occupation and spot emerging issues. Walkabouts can be combined with other visits as appropriate. They should make spot-checks with instruments if necessary; these also provide opportunities to discuss with individuals their experience of the building, its systems and the indoor environment.

SUPPORTING NOTES

Aftercare team members should have good 'people skills', a hands-on approach to problem solving and continuity with the project. The leader will require regular support from the team, in particular the building services contractor and commissioning team, and the mechanical and electrical designers.

In addition to responding to day-to-day comments, allow for two dedicated meetings with facilities management representatives to explain systems and discuss their views.

Keep communications simple, not too technical and easy to update. The occupier's intranet, a website or a similar service can also be effective and time-efficient. Fortnightly updates will usually suffice.

Stage 5 (Y): Years 1–3 Extended aftercare and post-occupancy evaluation

Once the initial aftercare period is over, the Soft Landings service moves from regular visits to periodic reviews. The aftercare team is there to provide insights, review performance, and help the users and operators to get the best out their building, not to run it on their behalf. Responsibility for operation and provision and initial review of routine information (such as BMS logs and meter readings) must lie firmly with the building's facility manager or team.

In Year 1 (the traditional defects liability period), the primary focus is on settling everything down, making sure that the design intent is well understood, identifying any problems, and logging usage and change. There may well also be a need to fine-tune systems, particularly lighting controls and HVAC systems, in order to optimise effective and energy-efficient operation and to take account of occupant feedback and changes in weather and occupancy.

In Years 2 and 3 the reviews become less frequent, concentrating on recording the operation of the building and reviewing performance. By then the facilities management team should be fully in command of the building's systems, be dealing with all problems (usually without reference to the design and building team). They should also be collecting and reviewing their own data, and refining their operational strategies. The Soft Landings process will have helped them to overcome any initial difficulties.

The Aftercare period will also include a number of independent post-occupancy surveys. The type, coverage, method and timing of these surveys will depend on what has been agreed for each project. An occupant questionnaire survey can be undertaken at a number of different times:

- Year 3 is the best time for a single survey to summarise the occupants' views on the performance of a new building and to make comparisons with results other projects. It allows enough time for the building and its systems to have settled down, for occupants to draw on a relatively long experience of the building in use, and for any initial problems to be long past.

- Where the design and building team has committed to undertaking an occupant survey and following-up any problem areas, the brief should include suggested survey timings. The timing of the occupant survey depends on the project in question. It is best to wait until occupants have experienced one full heating and cooling season, but phased handover, phased occupation, or additional fit-out works may justify a delay beyond 12 months. The Soft Landings team need to judge carefully the point at which survey results are likely to reflect the building's steady pattern of operation. Performing a survey too soon may mean the results will carry too many caveats to be of much value.

- Occupant focus groups held in the initial aftercare period can provide valuable initial reactions and help to target early action. However, this may be premature, particularly if initial teething problems are still fresh in peoples' memory. Focus groups can also be dominated by a vocal minority who set the agenda on behalf of the others who may be meeker, or for the majority not attending the focus group who may be quite happy. There is also a tendency for the project team to only listen to opinions that chime with their views, or for facilities managers to seek confirmation of their prejudices. Focus groups therefore need to be used with great caution.

Everybody involved in the extended aftercare service will gain valuable information and insights. This feedback will help the building to work better and the client and occupiers to get the best out of the design. The feedback also provides valuable intelligence that all those involved will take back to their work, their organisations and the industry. This in turn will help to improve the goods and services they and the industry provide and make sure that their future efforts are targeted more accurately on the things which will really make a difference.

Alterations to the building

The aftercare service in Years 1 to 3 assumes that the building continues to be used in general accordance with its design intent. It does not anticipate major alterations in occupancy or space planning. However, sometimes the owner or occupier may need to make significant physical changes to all or part of building, or to its use.

In the past, owners and occupiers have often embarked on such changes without appreciating the adaptability potential that the designer may have provided and the constraints that may also exist. The Soft Landings team's knowledge of both the design potential and its performance-in-use will help to inform the occupier's decision-making processes, and may allow before-and-after comparisons to be made.

A readily available, up-to-date, evidence base will improve insights and outcomes and sustain a positive relationship with the design and building team.

STAGE 5 (Y) CHECKLIST: YEARS 1–3 EXTENDED AFTERCARE

The activities below are repeated each year, though at a reducing frequency (see Appendix A).

Y1. Aftercare review meetings

Once the initial period of intensive aftercare is over, regular meetings should continue in order to review progress with the user representatives and facilities management. The frequency of meetings will depend on the project. Intervals of 3–4 months may be appropriate in Year 1, decreasing to six months in Years 2 and 3.

Y2. Logging environmental and/or energy performance

The facilities manager must take the lead in monitoring energy consumption and usage. Logging provides the basis for comparison with the energy plan and will assist fine-tuning of the systems. The frequency will depend on extent of sub-metering and the provision of energy data gathering, monitoring and analysis software running on the building management system.

Y3. Systems and energy review

A written review of overall energy and systems performance is desirable. Six-month intervals will normally be adequate, though some can be done remotely and much of the rest combined with activities Y1 and Y4.

Y4. Fine tune systems

Seasonal changes and any particular issues emerging (for example from environmental and energy monitoring and occupant comments) will dictate when this needs doing and whether it needs repeating. The facilities management team and commissioning engineers may need to be involved as well as the building services contractor.

Y5. Record fine-tuning and usage change

Dependable comparison of actual and forecast performance will be impossible unless the facilities manager records changes routinely. The O&M manuals and building logbook will also need updating to reflect alterations to systems and equipment and any changes to standard control settings and operating schedules.

Y6. Communications

Updates to newsletters and websites will be less frequent, and may cease before the end of Year 3 if felt appropriate.

Y7. Walkabouts

As in the first weeks of occupation, when on-site members of the design and building team must not just do technical things and attend meetings. They must also take the opportunity to walk around the building, make observations and where possible discuss performance with occupiers, management and maintenance staff. This provides opportunities for spotting actual or emergent changes which may go unrecorded, and may otherwise compromise performance or not make the most of the latent potential in the design.

Y8. Measure environmental and energy performance

A key part of the annual end of year review is to compare environmental, energy and human factors performance with the design targets. The performance metrics will be a mix of scientific data, statistical data, and anecdotal feedback. The most informative performance feedback may come from the stories rather than hard data. Independently-curated occupant surveys (held not less than 12 months apart) help to put energy consumption and other scientific data into a human and operational context.

Y9. End of year review

An annual meeting is required to review the general and environmental performance of the building. This also allows all parties (client, design and building team, users and facilities managers) to maintain a positive relationship and decide any change in focus for the next year. The final review at the end of Year 3 provides a well-structured wrap-up of lessons learned, and an opportunity to celebrate success and prospects for future collaboration.

SUPPORTING NOTES

Several key actions can be combined on one visit.

Monthly reviews of energy performance would be a minimum, but much more frequent checks will often be rewarding. For example, logs of half- hourly electrical consumption can indicate whether equipment is coming on too early; or being left on unnecessarily overnight, at weekends, or over holiday periods. A change in energy use patterns can also give early warning of equipment failure or underperformance and permit rapid corrective action. Such logging can also help to determine the effects of operating systems differently. The designers may be able to log consumption directly via the BMS but this must not replace the FM's monitoring responsibility for routine monitoring and review.

In order to make meaningful comparisons between forecast and actual energy use, it will be essential to understand how control and operation differs from the assumptions made at the design stage.

Combine walkabouts with other visits as appropriate. Every three months is a good baseline. See and be seen.

This activity can be combined closely with Y3 above.

Be careful not to over-survey the occupants. People can suffer from survey-fatigue very quickly, and this may distort the results.

The review at the end of Year 1 can be coordinated with the Defects Liability Period sign-off and can also allow any performance targets for future years to be re-visited in the light of experience.

As an introduction and scene setting for the end of year review, revisit why Soft Landings was adopted and the successes realised. Reaffirm the Soft Landings goals and the teams roles, responsibilities and commitment to these to ensure the mutual collaboration and shared responsibility relationship is maintained.

Appendix A:
Example worksheets

These generic worksheets were developed as part of the original Soft Landings research, and have formed part of the background to writing this Framework document.

The worksheets cover all five stages of the Soft Landings process. Stage 2 (design), varies much more with procurement route than the four other stages and therefore should be used as a guide and tailored to suit the actual procurement route.

For each activity outlined in the Framework, clients, project managers and design and building teams can use the worksheets to help them identify the actions required, who should initiate them and who needs to participate. The participants can then agree how they propose to carry them out, and assign responsibilities for doing so. The worksheets include notes to assist implementation.

Teams may wish to use a similar format to assist their project management, by recording what they have decided to do, who is responsible, the actions agreed, and the programme for undertaking them. They can also identify techniques to be used, who may need to be brought in for specialist support or advice, when and how post-occupancy surveys should be carried out, and so on.

Do not attempt to use the generic worksheets exactly as written. You will need to think how the concepts should be applied to suit the requirements of your particular project, for example different forms of procurement and contract. The initiator of certain tasks may also differ from project to project, as may the participants. For example, if the team includes specialist advisors on, say, acoustics or information technology, they might be selected to lead (or otherwise participate) in certain activities.

As the Framework is tested in practice on a variety of projects, in different countries and sectors and using different procurement systems, progress will be monitored by the Soft Landings user groups and the worksheets will be revised.

Go to www.softlandings.org.uk, www.softlandings.org.au and www.usablebuildings.co.uk for up-to-date downloads of worksheets in Excel and PDF, together with advice, support and guidance on Soft Landings techniques and applications.

Soft Landings helps teams to improve clarity of purpose, attention to detail, and include follow-through and feedback arrangements.

At its core is a greater involvement of designers and constructors with building users and operators before, during and after handover of building work, with an emphasis on improving operational readiness and performance in use.

Stage 1 (B) Worksheet Example: Inception and briefing

Stage	Action	Purpose	Initiator	Participants	Scope of duties	Notes
B1	Define roles and Responsibilities Project teams should identify their Soft Landings champions. Others may be identified later	To review individual roles, highlight any gaps and clarify the scope of individual's responsibilities	Client	Design team Constructor (where appointed) The Soft Landings champions can either attend all meetings, or nominate rapporteurs for all Soft Landings stages	Client: Issue a list that states clearly the roles and scope of responsibilities	Roles and limits of responsibility must be clear from the start. If nothing else, this will highlight any gaps and, possibly, the unsuitability of individuals in their assumed roles. Titles are less important than an individual's ability and temperament. While the focus is often on the supply-side (the design team and constructors), it is equally important that the roles and responsibilities in the demand-side client team are equally well defined. The team should involve the project sponsor, Soft Landings Champions, building users representative, facilities manager, client advisors, and the project manager.
B2	Review past experience	To identify past experience (good and bad) which may benefit the design and construction and the Soft Landing process	Client and design team	Design team Client Constructor (where appointed) User representative Facilities manager	Agree which issues need to be taken into account	Include feedback for reality checking, quality assurance and awareness of constraints, past experience and past performance. What has worked before in similar situations? Third party involvement may be helpful in unearthing this information.
B3	Intermediate evaluation programme	To ensure stakeholders are engaged in the process and that input from key users is not lost along the way	Design team	Design team Client Constructor (where appointed) User representative Facilities manager	Include evaluation and decision points in design programme	Intermediate evaluation workshops during the early design stages are very effective in flushing out misconceptions on all sides. They ensure stakeholders are fully engaged in the process and that input from key users is obtained and is not lost along the way. In particular the workshops will help to incrementally fix decisions on the many smaller (but still important) issues during this stage.
B4	Set environmental and other performance targets	Ensures that the actual performance of key issues is realised	Client and the design team	Constructor (where appointed) User representative Facilities manager	Agree subjects, target(s) and appropriate measurement methods	All targets should be unambiguous, measurable and of some value. Design targets should be a mix of the scientific, statistical and the subjective – do not try to distil occupant comfort and wellbeing into numerical proxies. The setting of environmental and energy targets (whether with some financial incentive or not) raises a number of issues that need consideration: • The design solution must be within the ability of the users to control it • There will be a greater dependency on a good building energy management systems (BEMS), effectively used • Common sense must be applied to averaging out expectations. Ideally, the processes of target setting, prediction and measurement should be able to identify the roles of client requirements, design solutions and user and management behaviour in achieving the desired outcomes. The level of expertise within the client body to maintain and control the internal environment needs clarification at the start of the early design stage, so that design for manageability can be realistically undertaken. The individuals who will take over the installed systems must be involved.
B5	Sign-off gateways, including reality checks	Creates the structure for fixing decisions	Client and user representative	Client User representative Design team Constructor Independent reviewer(s)	Agree decision makers and criteria for sign-offs	Sign-off gateways create the structure for fixing decisions. The following questions should be addressed at each gateway: Is the strategic brief being met? Are intermediate evaluation decisions incorporated? Have risks been assessed and are they acceptable? Is it still what is wanted? Are targets likely to be met? Are we ready to move on to the next stage?
B6	Incentives including independent occupant surveys	Incentivises both the demand and supply sides of team	Client	Design team Constructor	Decide form of incentives. Agree targets and define measurement criteria	An independent occupant survey provider should be appointed early, based on a proven, robust survey methodology, and the ability to benchmark the results against a relevant dataset.

Stage 2 (D) Worksheet Example: Design

Stage[1]	Action	Purpose	Initiator	Participants	Scope of duties	Notes
D1	Continue building revisits for specific design options, and use the findings to inform design decisions	To refine the design in the light of information from feedback of other relevant projects and/or properties owned by the client	Client	Client Design team Facilities/ premises managers Maintenance personnel Constructor (where appointed) End-user representative(s)	Building revisits, talks between property managers and maintainers and the design team. Checklists created of both well-functioning and dysfunctional systems, and occupant experiences. Tie-in findings with project reality-checking procedures.	Building revisits can generate checklists of technical and non-technical watch points. The checklists can be used to refine the client requirements, to inform the design brief, and to provide insights for reality-checking meetings throughout the construction process. It is vital to engage with facilities and maintenance people. They can be very insightful about construction details, items of plant, commissioning, and end-user experiences. Some effort may be required to persuade them to take part in discussions as they may not be used to it. Issues should be recorded in such an way that the feedback doesn't get forgotten as the design develops. An operational risk register may be a useful working document, particularly for those joining the project later.
D2	Review design for buildability, commssionability and maintainability	To ensure that the design concepts can be built, commissioned and operated successfully	Constructor	Client, Constructor, Design team, Project manager, Key sub-contractors (or proxies), Cost consultant, Facilities manager, Commissioning manager, Maintenance personnel, End-user representative(s)	Identify key sub-contractors to attend pre-contract, or find proxies. Tie-in outputs with project reality-checking procedures.	The review process may be a single meeting or a series of meetings. If time and budget only allows for one review meeting, its timing will be crucial. It will be of little value if the meeting occurs before the main contractor, M&E contractor and commissioning manager have been appointed. Deliberations and decisions should be related to the cost plan, and any cost implications discussed with the client and cost consultant. The in-use performance implications should be made clear, agreed by all, approved by the client, and recorded in the project documentation.
D3	Review design for usability and manageability	To review the design from the perspective of those who will control and manage the building after handover, and to identify how the environmental control needs of end-users will be met	Lead designer or Constructor	Client, Constructor Design team, Project manager, Facilities/ premises managers, Maintenance personnel, Controls specialist (or proxy), Commissioning manager, M&E contractor	Identify gaps in knowledge and spot specific risks for building management and end-users. Determine the end-user control systems. Tie-in findings with reality-checking (see D4).	The review process may be a single meeting or a series of meetings. A workshop can still be useful even where time and budget restrictions only allow for one review meeting, but expectations will need to be realistic. Controls usually play a significant role in usability and manageability. Where the controls company has not been appointed, efforts should be made to find a proxy. Many controls companies will be jump at the chance to give pre-contract advice.
D4	Undertake the reality-checking process started in the Briefing stage worksheet and import the outcomes from Stage 1: B1, B2 and B3.	Chose a reality-checking process and reality-check selected elements (see notes)	Project manager	Client, Project manager, Design team, Selected sub-contractors or proxies, End-user representative(s)	Duties in line with the BSRIA process BG27/2011 Pitstopping. Create RASCI[2] charts, or similar.	BSRIA BG 27/2011 Pitstopping describes a process for reality-checking, the process whereby the project team gives specific elements closer attention during design, construction and installation. Outputs from reality-checking should inform the activities for the pre-handover, handover and aftercare stages. It is important to create the right conditions for reality-checking. The required honesty, openness, and critical analysis by attendees won't come easy. People will buy into it if the first meeting is a success.
D5	Iterate between stages D1 to D4 during the design process as required. The sequence, number of iterations and participants will depend on the procurement route					
D6	Revisit and update early performance targets	To ensure that targets remain realistic and appropriate	Lead designer or Constructor	Client, Project manager, Constructor, M&E contractor, Design team, Facilities manager, Any rating scheme advisors such as Green Star, NABERS(NZ) (optional)	Identify and describe the performance targets, such as energy, environmental, social and other performance targets (such as water and embodied energy). Review, and communicate to all relevant parties	By their nature, early energy targets generated for planning compliance are simplistic and do not require designers to break down energy consumption by end-use. Soft Landings requires the project team to develop more detailed models of the building's energy and environmental performance, including unregulated (plug-in) power loads and hours of operation. Early modelling will use notional values, but these can be progressively refined during later Soft Landings stages. The team should use tools that can be understood by facilities managers (such as Excel charts). Facilities teams should inherit the spreadsheets after handover. They should be updated over time, and used to inform formal post-occupancy evaluations.
D7	Incorporate Soft Landings requirements in tender documents, and evaluate tender responses and results from interviews	To ensure that contract requirements are worded to reflect outputs from reviews	Project manager	Client, Project manager, Lead designer, Constructor, M&E contractor	Create contract documents, review and sign-off in accordance with design review and reality-checking findings. Review tender responses against requirements.	The review and reality-checking decisions need to find their way into sub-contract tender documents, which should be evaluated by the designers before going out to tender. A process also needs to be set up to review the tender submissions and results from tender interviews. Some sub-contracts will be more important than others. The increasing preponderance of specialist sub-contracts that include bespoke controls systems will need extra attention to ensure the vendors' systems will satisfy the requirements.
D8	Appoint contractor and explain and re-enforce Soft Landings to the construction team	To celebrate Soft Landings successes to date and bring on-board the construction team	Project Manager	Client, Project Manager, C0nstructor, M&E contractor, Design team, Facilities manager, Commissioning manager, Controls specialist	Define/re-define Soft Landings roles and responsibilities and articulate goals	Under Soft Landings relationships are one of mutual collaboration and shared responsibility. Over time and in adversity, it is easy to gravitate back to traditional customer/supplier roles. It is prudent therefore to take time to revisit the reasons why Soft Landings was adopted, celebrate the successes to date, and reaffirm commitment to the process and re-articulated objectives and goals.

1 Stage numbers differ from other Soft Landings documentation due to re-sequencing
2 RASCI. A simple matrix for those in a team who need to be either held Responsible, Accountable, Supported, Consulted or Informed about a particular topic. Window motors, for example, require people to specify, install, commission and witness their testing

Stage 3 (P) Worksheet Example: Pre-handover

Stage[1]	Action	Purpose	Initiator	Participants	Scope of duties	Notes
P1	Environmental and energy logging review	To clarify responsibilities and the scope of energy logging and review	Facilities Management	Design team Constructor	Review and agree routine for future logging. Integrate with the requirements of the Building Logbook and any rating schemes being used such as NABERS(NZ)	The energy and environmental plan and the targets set earlier will influence logging demand. Soft transfer of data will help reduce visits by the design team
P2	Building readiness programme	To ensure coordination to site activities and witnessing by the designer and/or client representative	Constructor	Design team, Client, Constructor, End-user representative, Facilities manager	Provide updated sub-programme in good time ahead of any commissioning start	Essential if the building readiness team are to be effective. Static commissioning (such as inspections, airtightness checking, and window operation) should be included
P3	Commissioning records check	To verify adequacy of records	Facilities Manager	Design team, Constructor Facilities Manager, Commissioning Manager	Include evaluation and decision points in design programme	Include energy performance checks
P4	Review performance metrics	To ensure the design performance metrics are still relevant	Design team	Client, Constructor, M&E contractor, Design team, Facilities manager, any rating scheme advisors such as Green Star, etc. (optional)	Revisit the design performance targets set during Stage 2 against which the building in use performance will be measured	Changes during the construction may require the performance metrics to be revised to suit. For example, the addition of a server room will increase the in-use electrical consumption, the use of higher efficiency lights or fans will reduce the in-use energy consumption. The metrics against which the building is measured need to be relevant and as accurate as possible to make the comparisons meaningful and useful
P5	Building services maintenance contract	To ensure there are no gaps in support, post-handover	Facilities Manager	Design team, Constructor Facilities Manager	Agree subjects, target(s) and appropriate measurement methods	Important in helping to avoid confusion of roles and responsibilities post-handover
P6	Compile building users guide	To help building users to better understand and operate the building efficiently in the manner envisaged by the design team	Design team	Client End-user representative	Compile guide in book form. Content to include information on local HVAC and lighting controls, energy and water efficient features, security and access, furniture, space use, cycle storage, and the principles of design and operation.	The guide should be written clearly and avoid overuse of technical jargon. Illustrations aid comprehension. The guide should be made available in hard and electronic formats (consider also other digital formats such as intranet video clips, etc.). Consult the facilities team and building users on content. File a copy in the O&M records. Be prepared for revisions after operational fine-tuning Incorporate the requirements of any rating schemes being used such as Green Star
P7	Technical Guidance	To smooth transitions to local operation by the client's facilities management team.	Design team	Facilities management	Provide a building operations technical guide. Relate to the Building Logbook. Liaise with the facilities manager over content	Copy filed in the O&M records and/or the building logbook
P8	Training programme	To ensure adequately trained operation and maintenance staff are in place, pre-handover	Facilities Manager	Facilities Manager Building services maintenance contractor/personnel	Agree decision makers and criteria for sign- offs	As P4. Designers also need to be open to the views of operational staff
P9	BMS Interface demonstration	To demonstrate operation and fine-tuning of systems	Design team	Design team, Constructor End-user representative, Facilities Manager, Building services maintenance contractor/personnel	Decide form of incentive. Agree targets and define measurement criteria	As P4. Operational staff also need to be involved in interface development, specification and review where possible
P10	Migration Planning	To coordinate move-in with site continuing activities	End-user representative Facilities Manager	Design team Constructor	Set up meetings	It's important that the design team and constructor are not left out of the loop during user logistics planning
P11	Aftercare team home	To provide visible and accessible home for the aftercare team during the initial post-handover phase	End-user representative Facilities Manager	Design team Constructor	Arrange suitable workplace with datacoms links	Essential if the aftercare team is to be effective
P12	O&M manual review	To check content of the O&M manuals	Facilities manager	Facilities management Design team	Verify content and sign off	Should be coordinated with P4, P5, P9 and P10.

1 Stage numbers differ from other Soft Landings documentation due to re-sequencing and the addition of stage P4
Note: The lead up to handover can be a good time to revisit why Soft Landings was adopted and the successes that have been realised and re-affirm the commitment to Soft Landings prior to moving into a phase of sign off

Stage 4 (A) Worksheet Example: Initial aftercare

Stage	Action	Purpose	Initiator	Participants	Scope of duties	Notes
A1	Resident on-site attendance	Spot, respond to and help to deal with emerging issues	Design team Constructor	Design team Constructor	Team members resident in the building for (n) days per week	The number of days per week will depend on the size and complexity of the building. Team members should have good people, practical capability and continuity with the project
A2	Provide workplace and datacomms links	To give resident team members a visible home within the new building	User or client representative	User representative Client representative	Set up and make available prior to actual handover	See pre-handover actions. The workplace must be available from the first day of occupation
A3	Building use guidance	To introduce users to how their building operates and the use of local controls. This stage is useful for obtaining feedback.	Design team Constructor	Design team Constructor Typical user groups	Participate in (n) focus groups of building users to present key information. Introduce the building user guide and discuss views and queries.	Anticipate at least two meetings. See pre-handover actions. Mention the helpline and/or newsletter
A4	Technical guidance	To smooth transition to local operation by the client's facilities management team	Design team Constructor	Building facilities management representatives Design team Constructor	Participate in (n) meetings with the facilities management representatives to introduce content of the technical guidance and explain systems and discuss views.	Anticipate two meetings. Ideally, this should have already happened during the pre-handover stage.
A5	Helpline/ Newsletter	To encourage local feedback and communicate status of issues	Design team User Representative	Building operator and user representatives. Constructor Design team	The design team to set up a simple bulletin board possibly linked to the client's intranet, for email dialogue and posting of information updates. The user representative should aim to update the website or newsletters fortnightly and to moderate user comments.	Keep this simple, not too technical and easy to update. It's best if the newsletter or helpline is available electronically
A6	Walkabouts	To spot emerging issues and observe occupation usage	Design team Constructor	Design team Constructor If required, the users, the maintenance team, and the commissioning engineers	Roam building informally on a regular basis. Make spot checks with instruments if necessary.	Combine with other visits as appropriate. See and be seen.

Stage 5 (Y) Worksheet Example: Extended Aftercare Years 1–3

Stage	Action	Purpose	Initiator	Participants	Scope of duties	Notes
Y1	Aftercare review meetings	Review progress	Design team Constructor	Design team Constructor Client representative User representative	Participate in onsite meetings	Four to six meetings in the 10 months following weeks 1-8 should be adequate.
Y2	Log and review energy use	To provide the basis for comparison with the energy plan and to assist fine-tuning of systems.	Facilities management	Design team	Facilities management to monitor and forward-read every (n) weeks. Design team member to review readings every (n) weeks.	The frequency will depend on the extent of sub-metering and the quality of the BMS links. Monthly readings should be a minimum. the design may be able to log consumption directly via the BMS, but this must not replace the facilities manager's monitoring. Try and coordinate with the requirements of any rating schemes being used such as NABERS(NZ)
Y3	Systems and energy review	To monitor overall energy usage and systems.	Design team Facilities management	Design team Facilities management Client representative User representative Maintenance team	Participate in review meeting every (n) weeks.	Six-monthly is suggested. This activity may need to be more frequent, though some can be done remotely and much of the rest absorbed into stages Y1 and Y4
Y4	Fine-tune systems	To adjust systems for seasonal change and any emerging usage patterns.	Facilities manager	Design team Constructor Facilities management	Carry out fine-tuning at every (n) month(s)	The frequency will depend on seasonal timing and any particular emergent issues. The maintenance team and commissioning engineers may sometimes need to be involved. Tie in with outcomes of Y2 activities
Y5	Record fine-tuning and changes of use	To help progressive changes	Facilities manager	Design team Constructor Facilities management	Record changes to systems in the building logbook and add to the O&M manuals	Essential for accurate comparison of forecast energy use.
Y6	Helpline/ newsletter	To encourage local feedback and communicate status of issues	Design team	Facilities management and user representatives	Update every (n) weeks	A monthly update should be adequate.
Y7	Walkabouts	To spot emerging issues and observe occupation usage	Design team	Design team Constructor	Roam building informally on a regular basis.	Every two months is a good baseline; combine with other visits as appropriate. See and be seen
Y8	Measure energy and environmental performance and obtain occupant feedback.	To compare actual against forecast targets	Design team Constructor	Design team Constructor	Measure performance to agreed programme and against any agreed performance metrics and targets.	Feedback used to inform the end of Year review meeting agenda. Year 1 reporting may only include partial data and feedback if the building has not operated in a stable condition for at least 12 months. Do not rush to judgement before the building has settled down into a steady pattern of operation.
Y9	End of year review and reaffirmation of Soft Landings	To review overall building performance	Design team Constructor	Design team Constructor User representative Facilities management Client representative	Participate in annual meeting	Revisit why Soft Landings was adopted and the successes that have been realised. At the same time the Soft Landings objectives and goals and the teams roles, responsibilities and commitment to Soft Landings can be reaffirmed to ensure the mutual collaboration and shared responsibility relationship is maintained. Coordinate with the end of defects liability sign-off. This is also the opportunity to decide any change of focus for the coming year

Soft Landings provides a unified vehicle for engaging with outcomes throughout the process of briefing, design and delivery. It dovetails with energy performance certification, building logbooks, green leases, and corporate social responsibility.
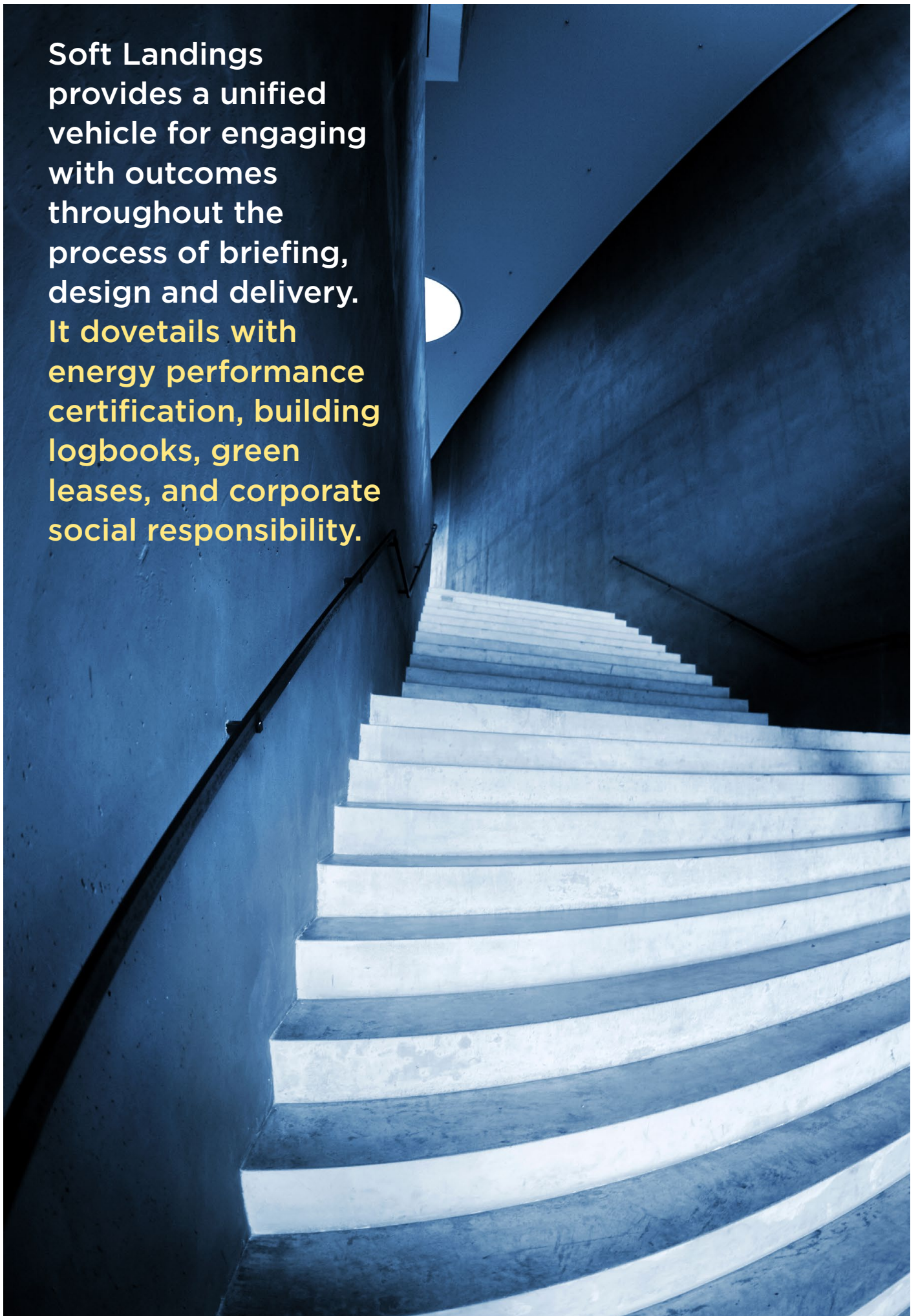
Soft Landings
why bother?

Soft Landings:

Provides a unified vehicle for engaging with outcomes throughout the process of briefing, design and delivery. It dovetails with energy performance certification, building logbooks, green leases, and corporate social responsibility.

It can run alongside any procurement process. It helps design and building teams to appreciate how buildings are used, managed and maintained.

It provides the best opportunity for producing low-carbon buildings that meet their design targets. It includes fine-tuning in the early days of occupation and provides a natural route for post-occupancy evaluation.

It costs very little, well within the margin of competitive bids. During design and construction, Soft Landings helps performance-related activities to be carried out more systematically. There is some extra work during the three-year aftercare period, but the costs are modest in relation to the value added to the client's building.

Most of all, Soft Landings creates virtuous circles for all and offers the best hope for truly integrated, robust and sustainable design.

SOFT LANDINGS

CIBSE
Australia & New Zealand

BSRIA

UBT
Usable Buildings Trust