This document proposes a new professional service that aims to augment the duties of the design and construct team in order to ensure that buildings are better able to meet their business, user and environmental demands.

Soft Landings is about making buildings perform better from day one. It enables clients to gain more value from their professional design teams at three key stages: briefing, pre-handover and long term operation.

- Soft Landings is a mechanism for ensuring that the operational needs of the building are fully considered and appreciated at the design stage and embedded in procurement and contractual obligations.
- Soft Landings means that designers and constructors will not disappear at practical completion but are motivated and engaged to help improve the performance of buildings in the crucial first months of occupation and beyond.
- Soft Landings identifies specific gateways in the design and construction process where performance issues need to be addressed. By using those gateways to make changes and monitor improvements, a building can pass more smoothly from its build phase into occupation.
- Soft Landings provides for professional aftercare that begins with graduated handover, through to operational readiness, and onto long-term, sustained high performance. Training can be provided so that users operate the building as designed.

**Soft Landings also provides:**

- A Scope of Service document set, that can sit alongside most existing procurement processes
- A closer match between client expectations, design predictions and operational performance
- The opportunity for facilities managers to understand the design of their buildings, and to get the best out of them
- The opportunity to fine-tune buildings to meet users’ specific needs
- A natural home for post-occupancy evaluation and evidenced-based design, and many opportunities for learning and feedback.
Greater demands are being placed on clients and the construction supply chain to deliver buildings that are right first time. But too many buildings are still being put into service without full commissioning or any kind of fine-tuning. Design and building teams rarely assess how their buildings perform, whether or not they meet the needs of users and management, and how they can be improved.

Many new buildings still have problems with airtightness, insulation and shading, while many control systems do not work well, waste energy and have poor management and user interfaces. Environmental assessment systems are mostly concerned with design features and management processes, and do not identify these problems.

Increasing use of complex technologies are straining attempts to make new buildings use less energy and reduce carbon dioxide emissions. Complexity is forcing facilities managers onto a maintenance and management treadmill that they are neither expecting nor trained for, and which their employers may not be able to afford to run, and which consequently may never work as intended.

Increasing use of on-site generation, particularly through renewable sources of energy like biomass boilers and solar power, is introducing higher levels of complexity which can be difficult and expensive to run.

Energy certification schemes are requiring architects and engineers to set robust and detailed energy consumption targets, and produce designs proven to meet those targets. At present this is difficult, because few designers have sufficient insight into what really happens.

Clients, government and society expect design and building teams to be able to predict how their buildings will perform. However, teams usually disband at practical completion and do not follow through into use and learn how their work performs in practice. Soft Landings shows how teams can be involved in follow-through and aftercare, pass on their knowledge, undertake post-occupancy evaluation and learn lessons – for themselves, their firms and the industry.

We need an industry-standard mechanism which helps the construction industry to address building performance in use and to learn from the successes and shortcomings revealed. Without this feedback, there is no learning, and anything that does not obviously fail can be regarded as a success and repeated, even where it leaves a lot to desired.
In Soft Landings, the duties of the client, design and building team are augmented during particular key stages: briefing, pre-handover, and professional aftercare. Involvement with the end users is increased, before and after handover

**Soft Landings** provides a process where a professional team can remain engaged beyond practical completion to help guide the building through the first crucial months of building operation and beyond. This period provides the opportunity for the professional team to undertake de-bugging, fine-tuning and amendments to settings

Soft Landings provides a process in which **post-occupancy surveys** can inform the client, the building users and the professional team about functionality, usability, manageability, energy efficiency, environmental performance and occupant satisfaction

The approach also enables **performance benchmarks** to become a means of improvement. Energy benchmarking augments the requirements of mandatory energy certification

Soft Landings requires **greater designer and constructor involvement** after handover of buildings. This helps clients to get the best out of their buildings, and to reduce the tensions and frustrations associated with moving into and working in new buildings

Soft Landings works by **extending the duties** of the professional team in both the handover stage and the occupation period beyond the defects liability period

Soft Landings includes **aftercare as an additional paid service** from the design and building team. This offers a greater likelihood of improved building performance, as the designers can work with the occupiers and detect and repair the fundamentals of complex systems, not simply treat symptoms. Clients can respond by setting specific roles, responsibilities, and sign-off duties

Soft Landings enables **briefing and commissioning** to be rethought. Performance targets can be set early on, and managed and monitored for three years

Soft Landings creates a **natural route for feedback** for all involved, and can incorporate a variety of post-occupancy evaluation (POE) methods

---

A summary chart produced from an occupant satisfaction survey. Results like these indicate where post-occupancy fine-tuning is needed.

---

© Building Use Studies 2006

---

Effort needed during design to tune design outputs to project outcomes

---

Productivity (perceived) Decreased -20% Increased +20%
Workstep 1: Inception and briefing components

Too often the seeds of underperformance and client discontent are sown during the early stages of procurement. The process is often more important than the product, which means that professional teams need to spend more time on constructive dialogue, and in setting expectations and performance targets.

---

**Dialogue** structured and recorded, with key issues captured and used to inform next steps.

**Clients also need to take ownership** by informing all who join the design and building team that Soft Landings has been adopted and that they will need to participate fully.

**Pre-design research** This should include post-occupancy survey data from both existing and new buildings of a similar type, in order to gain insights and to calibrate expectations.

**Definition of roles and responsibilities** Who does what and when, and resources required.

**Evaluation of risky technologies and interfaces** (such as user controls), parallel with the normal process of design.

**Setting of environmental and energy targets** that are reasonable, achievable and measurable.

**A way of taking forward the outcomes** For example:

- Creating a structure for decision-making, with gateways and reality-check reviews built-in.
- Is the design solution within the users’ ability to comprehend, control, and to afford to operate and maintain?
- Are the energy targets reasonable, or too ambitious and fragile? Has everything been counted?
- What technologies and interfaces need additional care and be protected from cost-cutting? (Such as electronic controls and other co-dependent architectural and services elements)

---

**Soft Landings: briefing stage workplace (extract of first five worksteps)**

<table>
<thead>
<tr>
<th>Ref</th>
<th>Architecture</th>
<th>Initiator</th>
<th>Participants</th>
<th>Purpose</th>
<th>Scope of duties for</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>81</td>
<td>Definition of roles and responsibilities</td>
<td>Client</td>
<td>Design team, contractor</td>
<td>To review requirements and clarify responsibilities</td>
<td>To issue a list that narrows down the roles and responsibilities</td>
<td></td>
</tr>
<tr>
<td>82</td>
<td>Review of post-occupancy survey data</td>
<td>Client and design team</td>
<td>Design team, client, contractor, user representative, facilities manager</td>
<td>To identify key performance indicators and benefits design, construction and the soft landings process</td>
<td>Agree the issues that need to be taken into account</td>
<td>Thorough involvement may also be helpful</td>
</tr>
<tr>
<td>83</td>
<td>Intermediate outcomes</td>
<td>Design team</td>
<td>Client, design team, contractor, facilities manager, user representative</td>
<td>To ensure all key issues are resolved</td>
<td>Include evaluation and decision points in the design programme</td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>Setting environmental targets</td>
<td>Client and design team</td>
<td>Construction, user representatives, facilities manager</td>
<td>Ensure the actual performance of key issues is measured and compared to the targets</td>
<td>Agree targets, identify and appropriate measurement methods</td>
<td>Cannabis use may be required. Avoid unnatural, unsustainable and complex environments</td>
</tr>
<tr>
<td>85</td>
<td>Significant changes, including safety criteria</td>
<td>Client and user representative</td>
<td>Design team, client, contractor, user representatives, independent reviewer(s)</td>
<td>Create the structure for decision making</td>
<td>Agree decision-makers and criteria for sign-offs</td>
<td>Issues to be addressed at each gateway include whether the design brief is being met, whether risks have been removed, and whether targets are likely to be met</td>
</tr>
</tbody>
</table>
Soft Landings Case Studies

Centre for Mathematical Sciences
Soft Landings was developed by architect Mark Way of the Darwin consultancy and subsequently picked up and developed by the Director of Estates at the University of Cambridge following the construction of the Centre for Mathematical Sciences. The phased development of the Centre and a ‘no blame’ attitude adopted by the client permitted a continual assessment of the emerging design in actual physical performance and user expectation.

Following completion of the first phase of construction a post-occupancy evaluation was carried out to measure the building performance of the recently occupied buildings. As part of this study an occupant survey and a full building pressure test was also conducted. Many of the results were incorporated into design changes for the subsequent building phases.

The results revealed the importance of adequate user feedback from automatic environmental systems. For example, should a user wish to override a window, the controls should be capable of acknowledging the users’ input. Without such feedback the controls can be operated repeatedly, leading to frustration.

The final appraisal revealed that the occupants, and the University viewed the project as a great success.

Johnny Winter, Edward Cullinan Architects

The Heelis, National Trust
Heelis, the central office for the National Trust, is a two-storey, deep-plan, naturally ventilated and daylit building. A number of initiatives were set up to help the new users to settle in and to bed-in the building. For example, simple user guides were accessible on staff PCs, and introduced as part of the staff induction.

The National Trust also operated a 100-day rule: the facilities manager logged any staff complaints but did not action them unless they persisted after 100 days, thus giving staff time to settle and avoiding knee-jerk responses. In their staff newsletters, the National Trust gives advance information about how the building will respond to changes in season, such as automatic windows starting to open as the weather warms.

The design team were appointed for the first year to monitor the building performance and to fine-tune the controls. Two post-occupancy studies were also commissioned: an overview of the building’s operation and energy use, and an occupant satisfaction survey. The results revealed that half the building’s energy use was due to the equipment installed, in particular the IT server room and the way the commercial kitchen was being run. The occupant survey led to a better understanding of how the users are responding to the natural ventilation and daylight strategies and the balance between the building design and the controls.

The soft landing principles not only helped the users to settle into and enjoy their new building but also informed our approach to the design of future projects.

Guy Nevill, Max Fordham LLP
Soft landings components

Workstep 2: Pre-handover components

Many common post-handover problems can be traced back to inadequate preparation for handover. This means that buildings – although physically complete – are not operationally ready. Soft Landings stresses the need for operators and users to spend time with the design team in order to understand how the building operates.

A building readiness programme should be created, to ensure coordination of site activities and witnessing by the designer and the client.

Testing and demonstration of key interfaces and systems (such as building management systems and controls) should be carried out by the design and building team. This should also cover any user controls that prove unintuitive for occupants to use.

A check of the commissioning records and building logbook should be made to ensure they are in order. Items that require post-handover commissioning need to be identified.

The metering strategy and the gathering of energy data should also be checked. Energy reporting should be in a form that is understandable by the facilities manager.

Training for operating and maintenance staff should be provided, and a Building Users Guide produced to assist the occupants.

A migration plan should be developed in order to co-ordinate the move with continuing site activities.

An on-site home should be provided for the aftercare team. This should be visible and accessible, and equipped with workstations and data-communications links to enable the team to be effective.

Professional design team help with designing the facilities management and maintenance contracts to ensure that there are no gaps, post-handover.

---

**Soft Landings pre-handover stage workplan**

<table>
<thead>
<tr>
<th>Ref</th>
<th>Action</th>
<th>Initiator</th>
<th>Participants</th>
<th>Purpose</th>
<th>Scope of duties for tenderers</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>Environmental and energy logging review</td>
<td>Facilities manager</td>
<td>Design team, contractor</td>
<td>To identify responsibilities and scope of energy logging and review</td>
<td>Review and agree contract for energy logging, integrate with building regulations for carbon footprint and environmental commitments</td>
<td>The environmental and energy provisions should be comprehensive, covering all relevant data (such as emissions, energy consumption, water supply, etc.).</td>
</tr>
<tr>
<td>S2</td>
<td>Building readiness programme</td>
<td>Contractor</td>
<td>Design team, contractor, building management system, facilities manager</td>
<td>To ensure co-ordination of site activities and witnessing by designer and client</td>
<td>Ensure that all necessary information is provided for the commissioning process.</td>
<td>Essential if the building readiness process is to be effective.</td>
</tr>
<tr>
<td>S3</td>
<td>Commissioning records check</td>
<td>Facilities manager</td>
<td>Design team, contractor, facilities manager</td>
<td>To verify adequacy of records</td>
<td>Review commissioning records and add to the QM checklist.</td>
<td>Include energy performance checks.</td>
</tr>
<tr>
<td>S4</td>
<td>Building services maintenance contract</td>
<td>Facilities manager</td>
<td>Design team, contractor, maintenance contractor</td>
<td>To ensure there are no gaps in support post-handover</td>
<td>Agree scope and support post-handover</td>
<td>Important to avoid potential maintenance issues and responsibilities post-handover.</td>
</tr>
<tr>
<td>S5</td>
<td>Training programme</td>
<td>Facilities manager</td>
<td>Building services, maintenance contractor</td>
<td>To ensure adequately trained O&amp;M staff are in place pre-handover</td>
<td>Draw up programme and timetable.</td>
<td>Only needs to be kept up to date in the form of operational changes.</td>
</tr>
</tbody>
</table>
Workstep 3: Professional aftercare components

While the responsibility for operating the building will rest with the facilities managers, the continued involvement by the client, design and building team during a three-year aftercare period will help the operators get the best out of the building. Everybody involved will benefit from the lessons learned.

Organising a moving-in celebration party will help create a positive atmosphere and the basis for informal contact between building users and the on-site design team.

A helpdesk and/or intranet bulletin board will encourage local feedback and communicate the status of issues being resolved by the aftercare team. The bulletin board should be updated regularly.

All the building’s users need to receive the guide which tells them how the building is supposed to operate, with explanations of local controls. This guide may need to be modified in the light of user feedback, so it should be in a form that enables new editions to created quickly, easily and cost-effectively.

Building manuals should be amended in the light of experience and modifications to systems, equipment and operating parameters, and logbooks kept up to date.

On-site professional presence, informal walkabouts and surgeries are invaluable for spotting actual or emerging issues which would otherwise go unrecorded, and to witness how occupants use their building.

Regular review meetings and focus groups should be held so the design and construct team can obtain feedback and explain the design intent to the occupants.

Energy use should be logged and reviewed against the design targets and to assist with system fine-tuning.

System performance should be reviewed as weather and occupancy changes, and adjustments made as necessary to match emergent patterns of use.

An independent occupant satisfaction survey in...
Why bother?

Fine-tuning and post-handover surveys are crucial for ensuring sustainability targets are realised. The setting of new targets for zero-carbon buildings by government means that greater emphasis has to be placed on obtaining more certainty in delivering buildings that achieve a closer match between client and user expectations and the predictions of the delivery team. We also need to know what works in practice and what needs to be improved.

Soft Landings provides a unified vehicle for achieving tighter environmental performance and the best opportunity for producing zero-carbon buildings that actually meet their design targets.

Soft Landings shifts the emphasis for good performance away from just design aspiration to the way buildings are actually managed and maintained. This dovetails with energy performance certification, building logbooks, green leases, and corporate social responsibility.

Soft Landings only requires small extra funding, well within the margin of competitive bids. Many functions of the Soft Landings process are already part of the current construction process, but perhaps not carried out systematically. The three-year aftercare period, typically involving the architect and building services engineer, does involve extra costs, but these are modest in relation to the value added to the client’s building.

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

Next steps

A Soft Landings Task Group has been convened to turn Soft Landings into formal documentation that clients and professional teams can adopt and adapt for their construction projects. The Soft Landings project is led by BSRIA with the Usable Buildings Trust (UBT).

A Soft Landings Code of Practice, with framework documentation and enabling tools, will be published in November 2008. The Task Group is seeking industry and government support and adoption.

A Soft Landings User Group will be formed to enable early adopters to develop and test Soft Landings on real projects, with facilitation and assistance on the Soft Landings worksteps.

A licensed Scope of Service Document Set, designed to sit alongside most existing procurement processes, will be produced for use by clients and construction teams. Training and certification schemes will follow.

For more details contact roderic.bunn@bsria.co.uk