Cabinet Office

Government Soft Landings

Section 7 - Commissioning, Training and Handover (CT&H)

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BIM

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Section 7 - Commissoning, Training and Handover

7.0. Commissioning, Training and Handover (CT&H)

7.1 Overview

Projects should be completed, and effectively handed over, so that managers understand how facilities/assets work and what needs to be done to optimise their performance, and end users know what they need to make their workplace environment conducive to good performance. This requires good planning for commissioning, training and handover of the facility to both the Estates/ Facilities Management Teams and the Occupiers. It should be a structured process, primarily managed to meet the needs of the occupancy phase. Structured transfer of project data, inclusive of asset management information, should be undertaken in this process. The delivery programme for CTH needs to be developed to suit the needs of the Facilities Management Team, and should extend beyond just obtaining the Practical Completion Certificate.

7.1.1 Stages 1- Brief and 2 - Concept

At this stage consider actions needed for the following phases and establish the outline strategy.

7.1.2 Stage 3 - Definition

CTH planning needs a strategy that should be developed and embedded into the Contractor and Consultant procurement briefs. Technical aspects of CTH should be detailed and specified as part of the Design Process and should be based on the complexity of the project, contractual arrangements and consultant engagement needed, e.g., commissioning consultants, or post occupancy support for fine tuning. In support, the Project Manager in conjunction with the GSL Champion should develop the CTH Plan focussed on the specific End User needs of the project; Occupiers and Facilities Management teams. This plan should address handover

programmes, phased occupation, occupier training and User Guides, Asset Register formats; all the elements needed by the end users and operators that are over and above effective technical commissioning.

The CTH Plan will need aligning with the Aftercare Plan, assigning clear responsibility for any post occupancy activity on building optimisation, inclusive of any seasonal commissioning requirements.

Useful references:

BSI PAS 55-1:2008 Asset management. Specification for the optimised management of physical assets.
http://shop.bsigroup.com/en/ProductDetail/?pid=000000000030171836
And a PAS 55 Assessment methodology from the Institute of Asset Management:
http://theiam.org/products-and-services/pas55-methodology

Chartered Institute of Building Services Engineers Commissioning Codes:
https://www.cibseknowledgeportal.co.uk/

7.1.3 Stages 4 - Design and 5 – Build and Commission

The output from the Design Development stage is a detailed CTH Plan, with all key requirements; roles, responsibilities, inputs, outputs and timeline embedded into specifications and procurement documents.

Specific Commissioning, Asset Register and Training and Handover procedures and meetings should be considered.

Information for the asset register is to be issued for the project at an appropriate and agreed time prior to practical completion and closed out at an agreed time immediately after practical completion. Where working with BIM the information for the asset register may be transferred automatically. Any subsequent variations or additions should be closed out by the Project Manager. The exact timings are project specific and are subject to confirmation by the Project Manager.

It will be the responsibility of the Project Manager to manage this across any parallel or ensuing contracts (e.g., fit out, specialist equipment) to ensure that complete and functional content for the Asset Register is delivered to the Facilities Management Team.

As part of the process, final details of any Occupier Guides should also be established. This needs to be incorporated into the Commissioning, Training & Handover element of the process and coordinated with the GSL Champion.
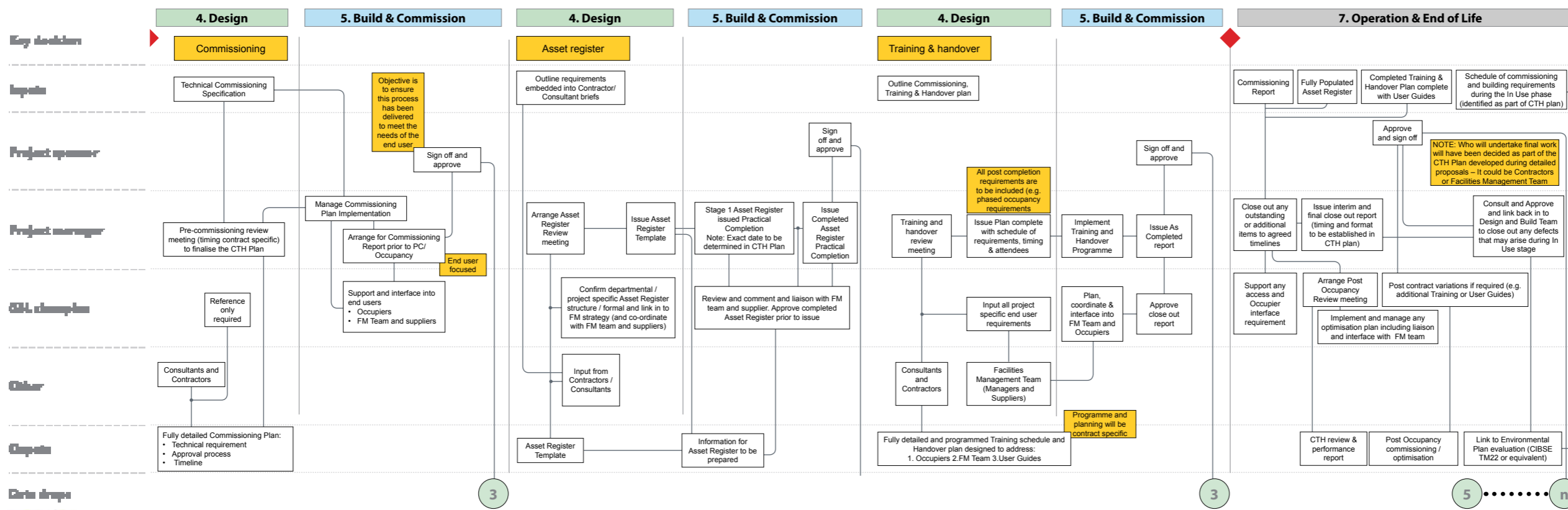
There should also be links back into the Design process to ensure that Construction Design and Management (CDM) Regulations requirements have been delivered. These requirements should be added to the Project Programme and monitored. It is the responsibility of the Project Manager to own these processes and seek engagement and ultimately approval from the GSL Champion. The GSL Champion should seek appropriate engagement, support and attendance from the end users and facilities management managers and suppliers.

7.1.4 Stage 7 Operation and End of Life

The immediate needs during occupancy, close out of outstanding actions and/or defects that may arise to agreed timescales, are to be managed by the Project Manager, seeking appropriate support (access and occupier interface) from the GSL Champion.

Specific to commissioning and optimisation of heating, ventilation, lighting and associated controls systems, there is a clear link into the Environmental Plan which contains specific requirements. The GSL Champion is to arrange a Key Performance Indicator meeting and issue a report to assess construction team performance in delivering the CTH plan. This can be used in feedback to seek any improvement in process, as well as providing performance management information to be used for Key Supplier and Consultant review meetings.

7.2 Process Map – Commissioning, Training and Handover

Top diagram - phase headers: 0. Strategy | 1. Brief | 2. Concept | 3.Definition

Swimlane rows: Key decision | Inputs | Project sponsor | Project manager | GSL champion | Other | Ouputs | Data drops

0. Strategy

- GSL champion: Identify key aspects of required operational performance. Appoint someone from client team for (GSL Champion). Identify previous learning.

1. Brief

- Project sponsor: Ensure CT&H needs addressed in procurement process'.
- Project manager: Identify key activities needed and structure of CT&H plan.
- GSL champion: Develop strategy for CT&H / Develop a CT&H plan and Aftercare plan.

2. Concept

- Project manager: Review CT&H plan. / Strategy for CT&H to be embedded into briefing / procurement. Plan Testing and Commissioning. Plan for Operational Handover to Asset / Facilities Managers. Agree roles, responsibilities and attendance. Plan the production of the asset register and operation and maintenance manuals.
- GSL champion: Identify skills available / needed from Operations side for CT&H.

3. Definition

- Inputs: Aftercare strategy / CDMC Health & Safety Plan
- Project sponsor: • Commissioning – By whom? • Training – To Whom • Handover – Programme/phasing Occupier requirements – User guides Asset Registers – Format Post Occupancy requirements / Sign off and approve
- Project manager: Arrange Commissioning, Handover & Training Guiding Principles Meetings / Issue CTH Pan / Consult and approve
- Other: Financial Approval
- Ouputs: CTH Plan / Embed into Contractor and Consultant procurement briefs

Data drops: 1 ... 2

Bottom diagram - phase headers: 4. Design | 5. Build & Commission | 4. Design | 5. Build & Commission | 4. Design | 5. Build & Commission | 7. Operation & End of Life

Swimlane rows: Key decision | Inputs | Project sponsor | Project manager | GSL champion | Other | Ouputs | Data drops

4. Design / 5. Build & Commission (Commissioning)

- Key decision: Commissioning
- Inputs: Technical Commissioning Specification
- Project sponsor: Objective is to ensure this process has been delivered to meet the needs of the end user / Sign off and approve
- Project manager: Pre-commissioning review meeting (timing contract specific) to finalise the CTH Plan / Manage Commissioning Plan Implementation / Arrange for Commissioning Report prior to PC/ Occupancy / End user focused
- GSL champion: Reference only required / Support and interface into end users • Occupiers • FM Team and suppliers
- Other: Consultants and Contractors
- Ouputs: Fully detailed Commissioning Plan: • Technical requirement • Approval process • Timeline

4. Design / 5. Build & Commission (Asset register)

- Key decision: Asset register
- Inputs: Outline requirements embedded into Contractor/ Consultant briefs
- Project manager: Arrange Asset Register Review meeting / Issue Asset Register Template / Stage 1 Asset Register issued Practical Completion Note: Exact date to be determined in CTH Plan / Issue Completed Asset Register Practical Completion
- GSL champion: Confirm departmental / project specific Asset Register structure / formal and link in to FM strategy (and co-ordinate with FM team and suppliers) / Review and comment and liaison with FM team and supplier. Approve completed Asset Register prior to issue
- Other: Input from Contractors / Consultants
- Ouputs: Asset Register Template / Information for Asset Register to be prepared

Data drops: 3

4. Design / 5. Build & Commission (Training & handover)

- Key decision: Training & handover
- Inputs: Outline Commissioning, Training & Handover plan
- Project sponsor: Sign off and approve / All post completion requirements are to be included (e.g. phased occupancy requirements) / Sign off and approve
- Project manager: Training and handover review meeting / Issue Plan complete with schedule of requirements, timing & attendees / Implement Training and Handover Programme / Issue As Completed report
- GSL champion: Input all project specific end user requirements / Plan, coordinate & interface into FM Team and Occupiers / Approve close out report
- Other: Consultants and Contractors / Facilities Management Team (Managers and Suppliers) / Programme and planning will be contract specific
- Ouputs: Fully detailed and programmed Training schedule and Handover plan designed to address: 1. Occupiers 2.FM Team 3.User Guides

Data drops: 3

7. Operation & End of Life

- Inputs: Commissioning Report / Fully Populated Asset Register / Completed Training & Handover Plan complete with User Guides / Schedule of commissioning and building requirements during the In Use phase (identified as part of CTH plan)
- Project sponsor: Approve and sign off / NOTE: Who will undertake final work will have been decided as part of the CTH Plan developed during detailed proposals – It could be Contractors or Facilities Management Team
- Project manager: Close out any outstanding or additional items to agreed timelines / Issue interim and final close out report (timing and format to be established in CTH plan) / Consult and Approve and link back in to Design and Build Team to close out any defects that may arise during In Use stage
- GSL champion: Support any access and Occupier interface requirement / Arrange Post Occupancy Review meeting / Post contract variations if required (e.g. additional Training or User Guides) / Implement and manage any optimisation plan including liaison and interface with FM team
- Ouputs: CTH review & performance report / Post Occupancy commissioning / optimisation / Link to Environmental Plan evaluation (CIBSE TM22 or equivalent)

Data drops: 5 ... n

Section 7.3 Commissioning, Training and Handover - Guidance

This section of the document is intended to give guidance on the development of an effective Commissioning, Training & Handover (CTH) Plan, starting at the Stage – 2 Concept Stage, of the project.

Early development of a clear CTH Plan will ensure that operators and maintainers understand how the facilities work and what needs to be done to optimise its performance. This should be embedded in the Consultant, Contractor and Facilities Management Team, procurement and contractual arrangements.

It is the responsibility of the Project Manager to initiate the development of the CTH Plan, liaising with the GSL Champion, Design Consultants and Contractors.

Consultation led by the GSL Champion should be taken with stakeholder groups, e.g., occupiers, users, facilities managers and visitors to identify their needs. The specific needs of these user groups can then be represented during the development and ultimate implementation of the CTH Plan.

The GSL Champion will need to approve the format of the plan prior to issue and approval.

The CTH Plan should address the items shown below:
A. Project Details
B. Commissioning
C. Training and Handover
D. User Guides
E. Asset Registers

The CTH Plan should be drafted and first issued at Design Development. It is designed to be a live document, managed by the Project Manager but directly populated by those who support the plan; Soft Landings Champion, Consultants and Suppliers.

A. Project Details
These are designed to ensure that all those who input into the CTH Plan are aware of the project objectives, buildings and intended use.

The following list provides guidance as to the factors to be considered when developing the Project Details for the CTH Plan:

- Project Overview, including required performance outcomes, project brief and purpose of the facility;
- Plans and outline specification;
- Key Stakeholders (Occupiers, Estates/Facilities Management Teams, Visitors and Users);
- Operational requirements of the facilities in use (based on the Project Brief);
- Consultant and Contractor design development & appointments (from the build phase);
- Facilities Management Target Operating Model (from the FM Brief);
- Programme inclusive of any phased handover and occupancy requirements;
- Procurement and mobilisation of the Facilities Management contracts;
- Identification of any parallel or ensuing contracts (e.g., ICT, fixtures and fittings); and
- User occupation profile immediately following completion and handover of the works.

B. Commissioning

Commissioning of systems should be delivered in accordance with Approved Documents - Conservation of fuel and Power-L2A, Section 5: Quality of Construction and Commissioning. The following links below provide access to further information on this:

http://www.planningportal.gov.uk/uploads/br/AD_L2A_wm.pdf10   Commissioning, training & handover Draft for consultation_31 July 2012

Section 5.19 advises that CIBSE Commissioning Code Part M: Commissioning Management is to be followed. https://www.cibseknowledgeportal.co.uk/cibse-commissioning-codes.

The Project Manager will need to assign responsibilities for managing the technical aspects of the commissioning. This will need to be reflected in the consultant and contractor appointments.

This extract from CIBSE Commissioning Code Part M sets out the structure and content of the standard Commissioning Plan

M1   Legislation
M1.1   Safety requirements
M1.2   Statutory regulations

M2   General considerations
M2.1   Commissioning management
M2.2   Selection and appointment of a commissioning management organisation (CMO)
M2.3   Communications

M3   Design for commissionability
M3.1   Inherent commissionability
M3.2   Design responsibility
M3.3   Ease of access
M3.4   Design requirements

M4   Programming and co-ordination of the commissioning process
M4.1   General considerations
M4.2   Specifying requirements for commissioning

M5   Installation quality assurance

M6   Pre-commissioning
M6.1   Risk analysis
M6.2   Plant ready for commissioning
M6.3   Control system requirements for commissioning

M7   Commissioning
M7.1   Commissioning certification
M7.2   Phased completion
M7.3   BMS as a commissioning tool

M8   Witnessing compliance
M8.1   Objective
M8.2   Witnessing arrangements
M8.3   Witnessing duties

M9   Building log book

M10   System handover

In developing the detail of the CTH Plan, consideration needs to be given to the following:

- GSL Champion and stakeholder groups and the proposed FM team and supplier;
- Phased occupancy (not necessarily the same as phased handover) and occupancy patterns over the first 3years of the design life and links from this to building optimisation and fine tuning required;
- Departmental feedback from similar projects;
- Original Equipment Manufacturer (OEM) information and how the requirements feed into the the FM asset management plan;
- Building optimisation how this is assessed and achieved, e.g., consultant and contractor engagement in this; and
- Warranty requirements (and how they link into the Facilities Management Target Operating Model and Service Standards).

C. Training and Handover

The responsibility of the Project Manager is to develop and implement a Training and Handover section to the plan designed to meet the needs of the End Users; Occupiers and Facilities Management.

The GSL Champion provides an input into this element of the plan.

This section of the plan needs to consider:

- Compliance process- formal handover procedures of facilities to appointed persons;
- Named responsibility for the implementation of all stages of the process. This should also be incorporated into the Consultants and Contractors contracts (linked back into procurement);
- Key equipment schedules and associated training needs; and
- Training and Handover programme to suit occupancy needs (likely to extend beyond completion of the build phase), lists of attendees.

D. User Guides

The GSL Champion has the responsibility to specify the format and range of User Guides that are required, in particular the CIBSE TM 31 Log Book. These are to be designed specifically to support the Occupiers, facilitating ease of operation of basic controls, inclusive of; heating, lighting, alarms, access and security, conference and meeting room facilities.

E. Asset Register Production

The overall objective is the delivery of a fully populated Asset Register, completed prior to occupancy to enable the Estates/Facilities Management Team to input all the asset data into their Computer Aided Facilities Management (CAFM) operating systems. This enables smooth and effective mobilisation of service contracts at the onset of the occupancy phase.

The timeline for issue of the final asset information is to be set out by the Project Manager, based on the Facilities Management procurement programme. Information for the asset register is to be issued for the project at an appropriate and agreed time prior to practical completion and closed out at an agreed time immediately after practical completion.

Where BIM is in use the asset data should all be readily available from the standard build procurement processes, logged through BIM Data Drops into the Construction Operations Building Information Exchange (COBie) database. It is essential that this information is sequentially exported at time of design and installation from the Build Contractors into the Asset Register template. Therefore, it is a critical requirement to establish the precise format of the Asset Register during Stage 3 - Definition. Ideally, this format should be standard across all Departmental projects.

Asset registers are based on a standard hierarchy of information. An example of this has been shown below:

1. Contract Name		
2. Building Location		possibly various buildings as part of one project
3. Reference Code		
4. Asset Log Number		based on Departmental/Project specific guidelines
5. Asset description		e.g., split AC unit
6. Asset Class		
	1. Level 1	HVAC
	2. Level 2	AC system
	3. Level 2	Fan coil unit
7. Asset location		
	1. Level 1	Building
	2. Level 2	Floor
	3. Level 2	Room
8. Equipment Reference Number		Standard equipment serial number
9. Manufacturer		
10. Installation date		
11. Design Life		
12. Warranty		
13. Equipment cost		guidance on replacement cost for use by FM
14. Asset condition		not all equipment is new at time of handover
15. Date of report		to identify date when asset last inspected and Asset Register updated

Having established the importance of timely production of Asset Register information from the Build Contractors, it is essential that this requirement is embedded into contracts during the procurement process.

This asset information can then be exported to the Facilities Management companies to enable them to build up their management systems. In the BIM environment, if necessary, this information can be requested to be imported into COBie database at advanced dates, designed to support the actual procurement of the service contracts. This should be confirmed with the GSL Champion.

Through review of the draft format of the asset register it can also be established if there are any requirements to extend warranty agreements for key equipment prior to purchase.

Also, through simple analysis of the asset information in the completed database, it can be used to assess the condition of the assets at the point of contractual handover; some equipment may well have been in use through the construction period e.g., heating, lighting. This may impact on maintenance requirements and warranty provision, especially on larger, complex projects.

Design and production of the Asset Registers whilst managed by the Project Manager, clearly involves input from Consultants, Contractors, Suppliers and Facilities Management Contractors, the latter co-ordinated by the Soft Landings Champion.

e-PIMS™ Property Database

e-PIMS™ is the central database of Government Central Civil Estate properties and land. It records the precise location of property, along with the associated information such as landlord, lease details and usage. Users are able to locate/view individual properties on an electronic map, access and amend their core property details online, and interrogate the system to identify vacant space.

e-PIMS™ is mandatory for all Government Departments (including non ministerial Departments) and their Executive Agencies, Arms Length Bodies and non-Departmental Public Bodies. The mandate does not cover local authorities, the NHS (except for Special Health Authorities), Public Corporations, Privatised Railways, The Crown Estate or the Defence Estate (subject to some exceptions).

A unique reference number should be obtained from the e-PIMS™ team in the Government Property Unit for all new buildings and this should be used for all construction and design purposes and assigned to the BIM model.

Further information and guidance documents on e-PIMS™ can be found from the following:

http://www.civilservice.gov.uk/networks/pam/property-asset-management-in-government/epims

The e-PIMS™ Service Desk is available from 09:00 – 17:00 to help with enquiries: Tel 0113 203 3818 or email epimsservicedelivery@cabinet-office.gsi.gov.uk