Integrated Design:

Evolving the design process to deliver

Near Zero Energy Buildings

Llandudno

18th November 2014

ADEILADU ARBENIGRWYDD YNG NGHYMRU

CONSTRUCTING EXCELLENCE IN WALES

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MaTrID Project
presents

Integrated Design

starring in

Delivering near Zero Energy Buildings

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Part of the BRE Trust

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MaTrID Project

- MaTrID: "**Ma**rket **Tr**ansformation Towards Nearly Zero Energy Buildings Through Widespread Use of **I**ntegrated Energy **D**esign"
- European Union "Intelligent Energy Europe" funded project
- Being promoted as a means to deliver the Near Zero Energy Building's (nZEB) directive for 2019/20
- Developed from previous EU funded research in this field
- Involved countries are Austria, Greece, Italy, Latvia, Norway, Poland, Portugal, Slovakia, Slovenia, Sweden & the United Kingdom

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MaTrID Context – *Some of the looming requirements…*

- **Now** (July 2014) – Revised Part L in Wales (12 month's to start on site)
- **In 2 years** (2016) – Building Information Model (BIM) requirements on UK government departments' procurement of buildings
- **In 2 years** (2016) – Government Soft Landings requirements on UK government covering brief writing to handover and more
- ***In 3 years*** *(2016-17) – Revised Part L (committed to 2016 review)*
- **In 4 years** (2018) – NZEB for publicly owned buildings
- **In 6 years** (2020)- EU Near Zero Energy Buildings Directive (NZEB)
- ***In 6 years*** *(2020) – Revised Part L (probably required for the above)*
- **In 36 years** (2050) – Legal requirement to reduce carbon emissions by 80% compared to 1990 levels.

MaTrID Context – *The mammoth* requirement…*

EU Near Zero Energy Buildings Directive (NZEB)

- Requires national administrations to implement the requirements
- Uses “Energy” terms not “Carbon”, but in practice drives the same type of reduction in energy use and carbon emissions
- Does not require “Zero Energy Buildings” but pushes towards them
- Highlights operation & maintenance of buildings as well as construction
- Includes the tricky “Cost Optimal” term that is causing national governments (including Wales) a bit of a headache!

**a well insulated elephant!*

MaTrID Context – *NZEB "Cost Optimal"…*

EU Near Zero Energy Buildings Directive (NZEB)

– "Cost Optimal" term is currently unclearly defined

– **Won't** be Capital construction "lowest tender" price alone though!

– ***Likely*** *to include some mechanisms for considering Operational Costs*

– ***Potentially*** *uses "real" energy performance, not "design" energy*

– ***Potentially*** *considers maintenance and associated costs*

Integrated Design (ID) - *in a nutshell*

– **ID** is a method to deliver buildings that better fit a Client's requirements

AND

– **ID** is a means to this whilst using less energy in the building operation

AND

– **ID** achieves this in a **"Cost Optimal"** fashion

Integrated Design - *in a nutshell*

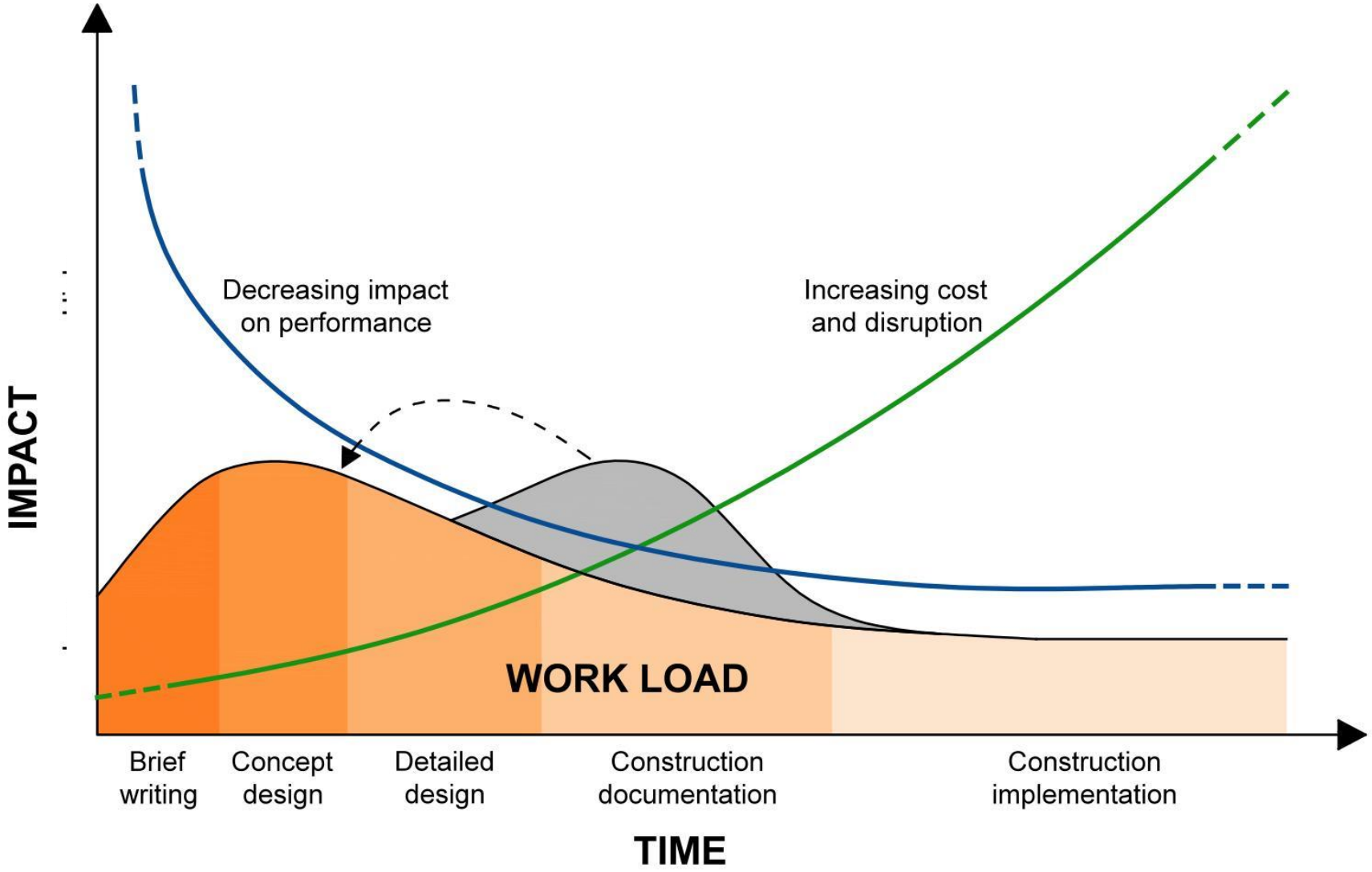
– **ID** is an evolution of current best practice collaboration & integration

– **ID** analyses Client Brief and enhances with cooperative input

– **ID** uses multiple early concepts and modelling to optimise scheme

– **ID** embeds quantifiable goals & checking into design & delivery

Integrated Design - *in a nutshell*



Integrated Design - *some things to note*

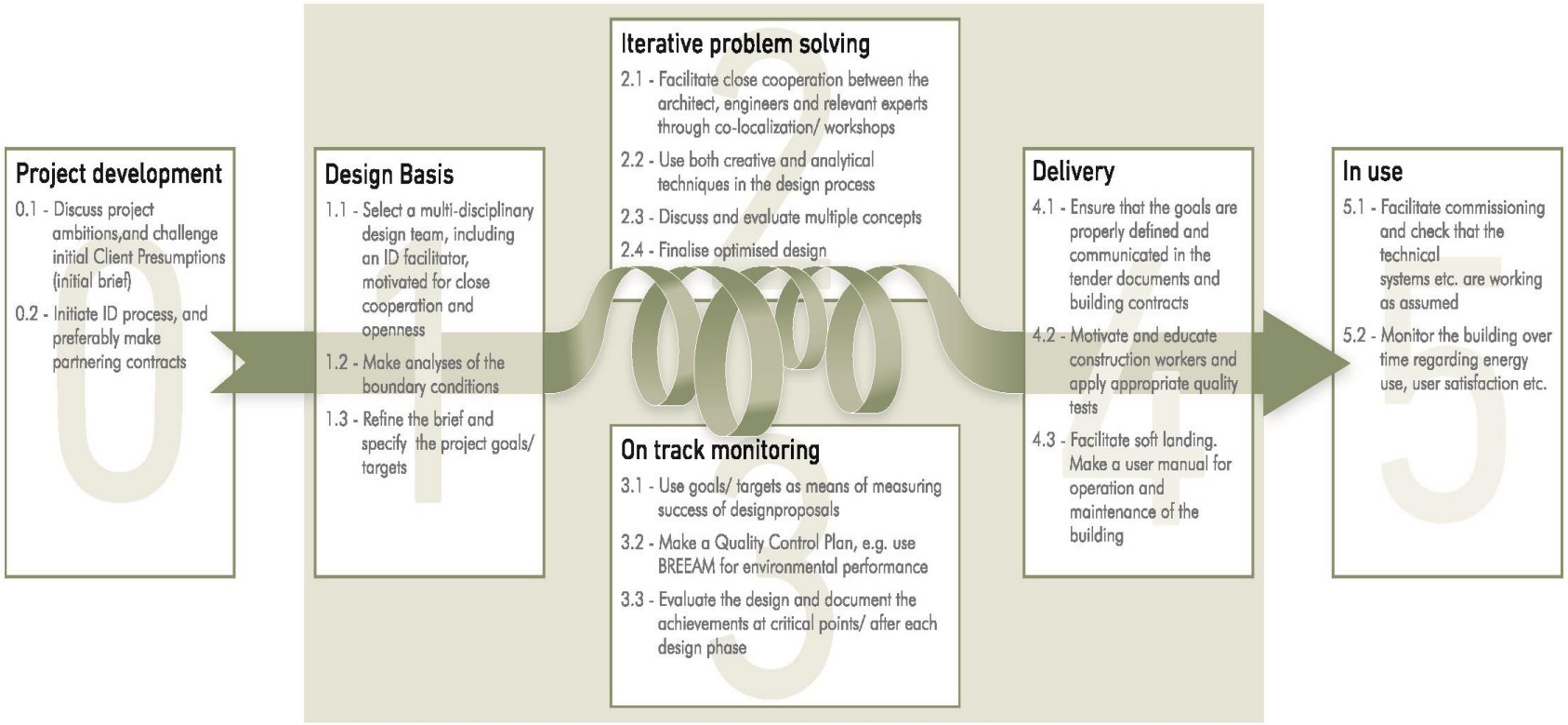
- **ID** does not have a rigid structure or formal assessment requirement
  BUT it does have recommended steps and key things to undertake

- **ID** is usually more effective with an Integrated Design Facilitator,
  BUT it can be led by the Architect, Project Manager or Client

- **ID** will almost certainly cost slightly more at early design stage
  BUT will almost certainly save notably more at construction stage

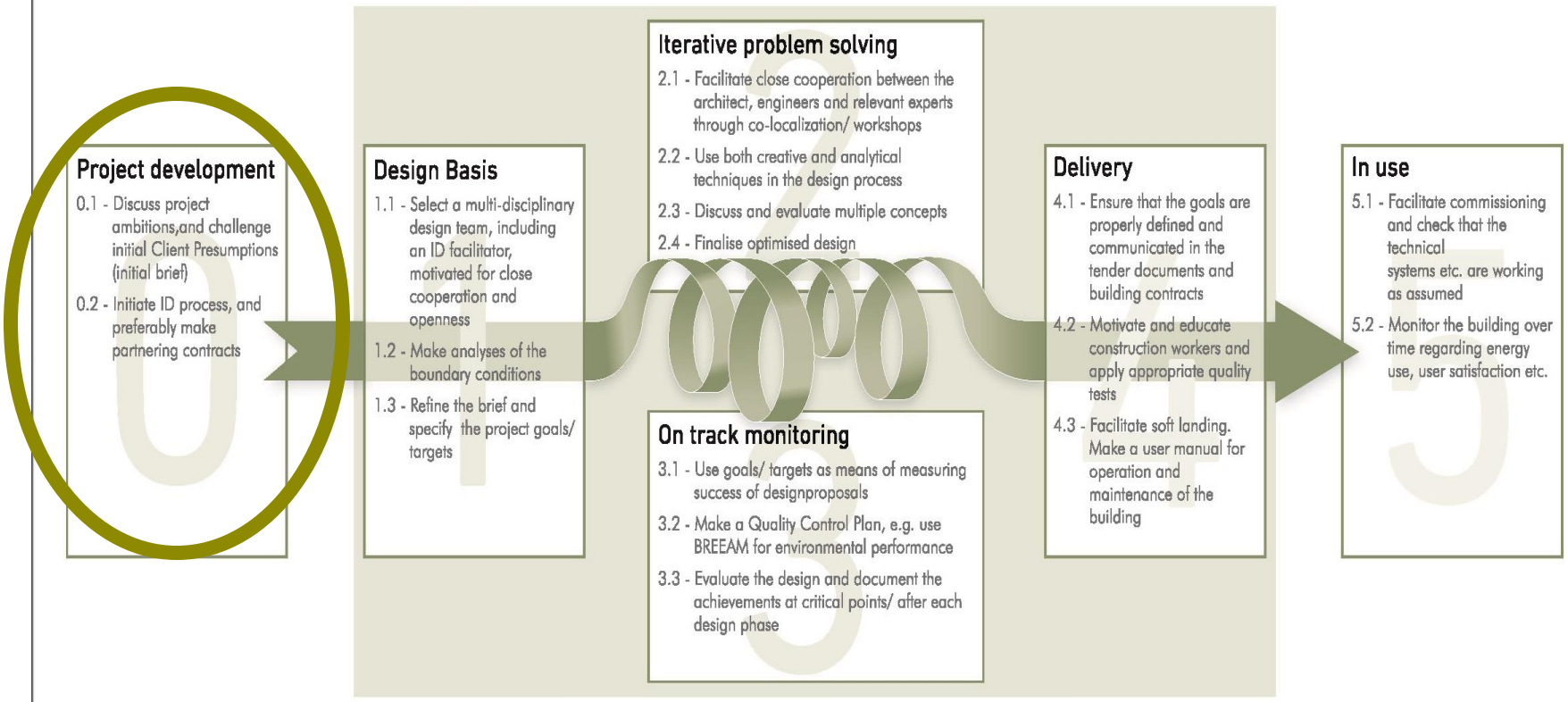
- **ID** will almost certainly take slightly longer at early design stage
  BUT will almost certainly save notably more at construction stage

Integrated Design - *the steps*



(don't panic, we walk through each step next)

Integrated Design – *step **0**; Project Inception*



Integrated Design – *step **0**; Project Inception*

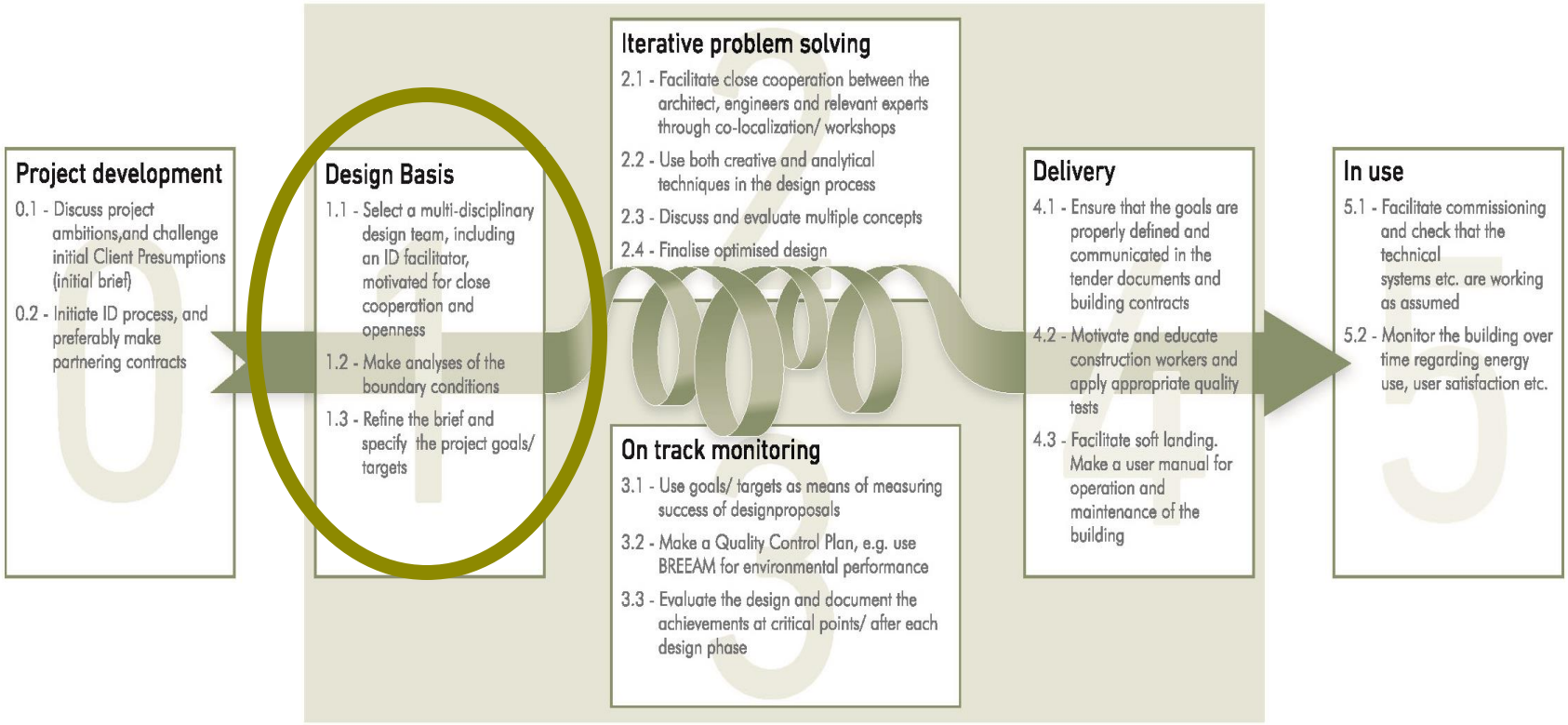
- Agree to use the ID approach to design and create a Core Team of:
  - Client
  - End User *(if possible, and if not the Client)*
  - Architect
  - Service Engineer
  - Facilities Manager *(if not already above)*
  - Contractor *(if available)*
  - Other specialisms where suited to the project
- Initial Client (pre)conceptions are written as the first Client Brief, with:
  - The operational requirements *(size, activities etc.)*
  - Any organisational requirements *(C.S.R. etc.)*
  - Any funding or market requirements
  - Specific known goals or targets for the project

Integrated Design – *step **0**; Project Inception*

- Meet to review the initial Client Brief as a Core Team
- Remove or rewrite any <u>unintentionally</u> specific requirements in the Client Brief *i.e. "500lux on working plane" might become "lit suitably for desk-based working"*
- Agree clear, measurable project goals and add to the Brief *(if not already included)*
- Goals could be BREEAM credits or other specifics

What Bob thought outside the box.

Integrated Design – *step **1**; Design Basis*

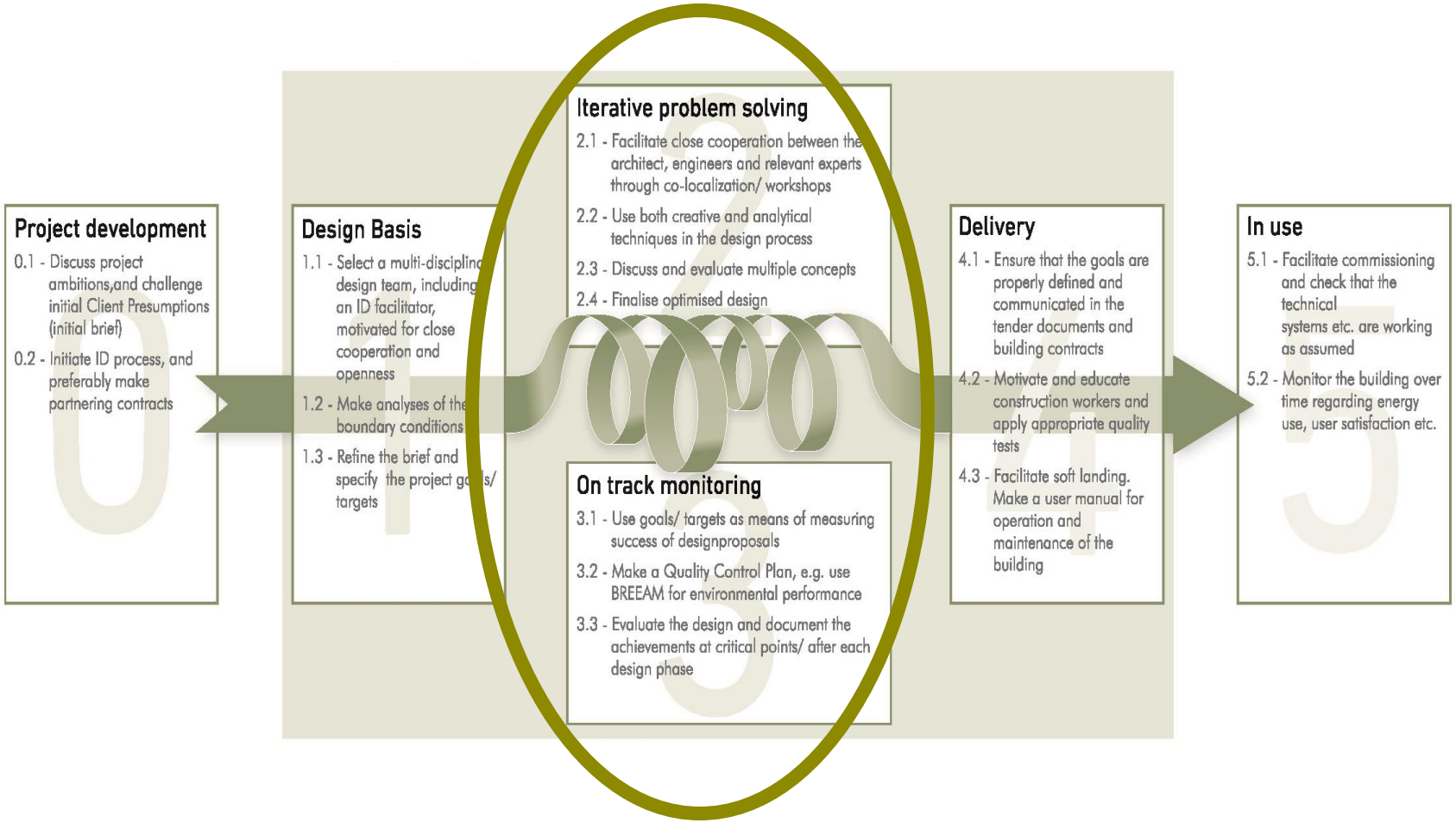


Integrated Design – *step **1**; Design Basis*

– Undertake a thorough site analysis, including;
  - Sun, wind & rain conditions across the site
  - Noise & light pollution and overlooking & views
  - Boundary conditions & neighbouring issues
  - Topology, ground conditions and renewable resources
  - Ecology, both native, transient & migrant
  - Connectivity and infrastructure

– Review the Client Brief and ensure no site conditions suggest a change to any goals or requirements

Integrated Design – *steps **2&3**; Problem Solving & Checking*



Integrated Design – *steps **2&3**; Problem Solving & Checking*

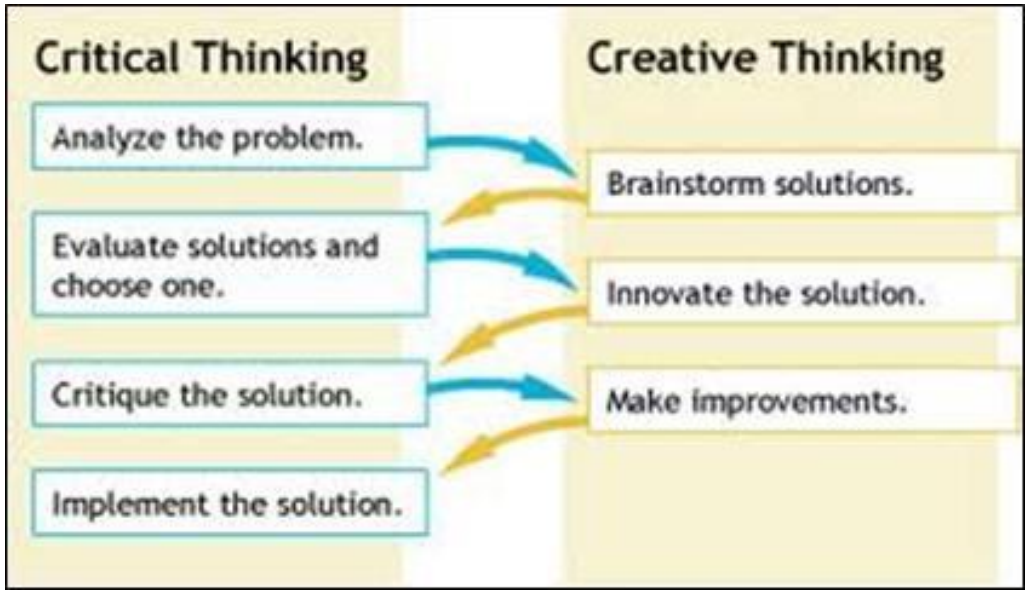
- Time to design! Produce more than one initial concept design *(agree with Client & Core Team a target number)*
- Where possible, produce concept designs with early team workshops
- When concept designs are simple ‘massing models’, ensure all Core Team members conduct an initial review, including specifically rough energy modelling *(this will be based on broad assumptions but the same should be used for each model)*
- Hold a workshop to discuss the Core Team members review and identify strengths and weaknesses for each initial concept design
- Repeat the above steps to “evolve” the multiple concept designs

Integrated Design – *steps **2&3**; Problem Solving & Checking*

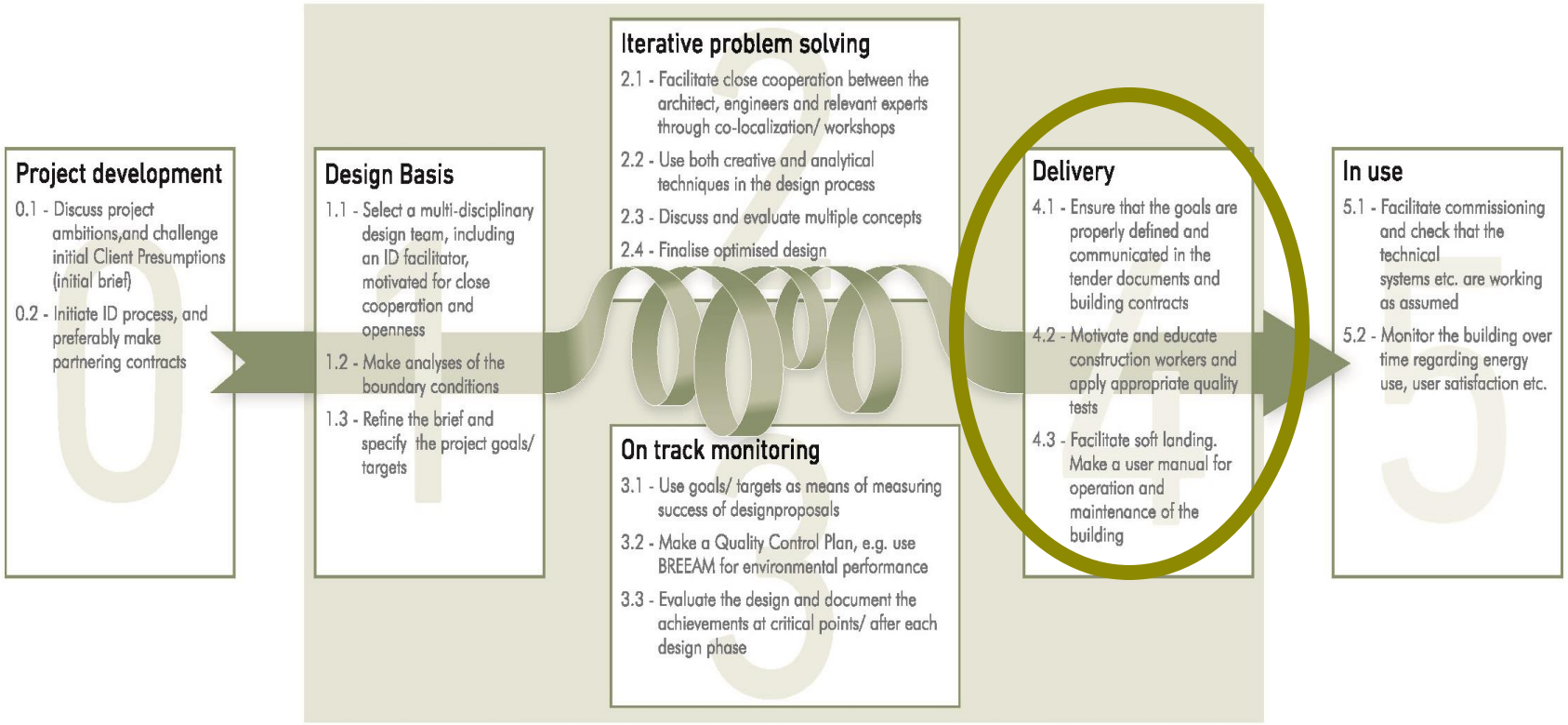
- The precise number of design iterations can be pre-agreed or left such that the Core Team agree they have reached a natural conclusion
- Ensure all Core Team members conduct an final review, including specifically rough energy modelling, on the last versions
- Hold a workshop to discuss the Core Team members review and agree the preferred concept design to be adopted
- Review the preferred concept design against the Client Brief. If necessary, agree variations to either the Client Brief or the preferred concept design to ensure they match, particularly on the project goals

Integrated Design – *steps **2&3**; Problem Solving & Checking*

- As can be seen, Steps 2&3 work in tandem between creative problem solving and critical analysis
- This approach ensures the best scheme is selected, however it does not oblige the Client & Core Team to pick the lowest energy proposal.



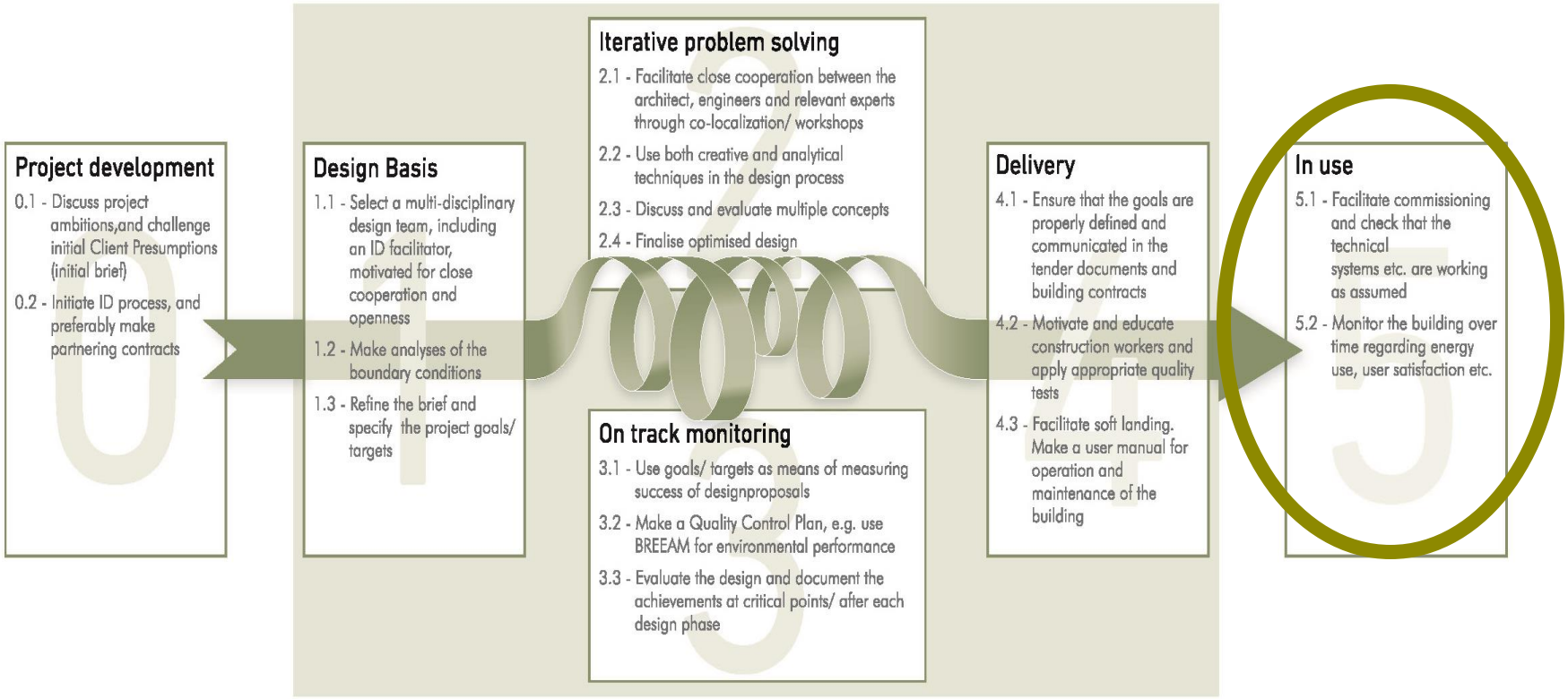
Integrated Design – *step **4**; Delivery*



Integrated Design – *step **4**; Delivery*

- Now tender, develop and construct the scheme!
- During this process, ensure the Client Brief's goals AND the findings from the multiple concept designs are available to new team members
- Ensure quantifiable goals are written in to all relevant Contracts and tracked with a QA or other tracking system
- Ensure goals are included in team & site meeting agendas to review and check they are still be delivered

Integrated Design – *step **5**; Use*



Integrated Design – *step **5**; Use*

- Once the scheme is completed, conduct a final review of the goals
- If possible, include Post Occupancy Assessment studies to feed in to the review of the goals

- At this stage, if a way has been found, the Core Team should receive any Performance Related fees that may have been agreed at the start. *These are proposed as a way to encourage the Core Team to collaborate and exceed the Client goals, but means of assessing their success are potentially difficult and possibly controversial.*

Integrated Design – *completed!*

– **ID** is an evolution of current best practice collaboration & integration

– **ID** analyses Client Brief and enhances with cooperative input

– **ID** uses multiple early concepts and modelling to optimise scheme

– **ID** embeds quantifiable goals & checking into design & delivery

Integrated Design – *completed!*

– **ID** will have delivered a better fit to the Client's requirements

AND

– **ID** will have delivered a lower operational energy building

Integrated Design – *more information*

- http://www.integrateddesign.eu/about/index.php

- http://www.bre.co.uk/matrid

Integrated Design

Any questions?

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