FORE·SCENE

Development of a Forecasting Framework and Scenarios to support the EU
Sustainable Development Strategy

SIXTH FRAMEWORK PROGRAMME PRIORITY 8.1
Policy-oriented research, Scientific support to policies, Integrating and Strengthening the European Research Area

Fore Scene Workshop: Infrastructure/built environment
Budapest, 26-27 October 2006

Towards Sustainable Construction – what are the potential Policy Measures and Actions in Europe?

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Towards Sustainable Construction – what are the potential Policy Measures and Actions in Europe?

This depends:

A. on how broadly you frame the landing point(s) you want to back cast from, and

B. the stages(s) in the development process that you are trying to impact

Presentation draws upon

- **EU Framework 5 'concerted action' and Framework 6 Roadmap:** *BEQUEST and the INTELCITY Roadmap*

- **DTI Review of UK Sustainable Construction Strategy:** *Where next for sustainable construction?*

- **EoE Sustainable Construction Task Group's review:** *Making the construction industry ready for a more sustainable East of England*

- **LSE SusCon Project:** *Sustainable construction and planning: the policy agenda*

- **Commission for Architecture and the Built Environment:** *Urban Futures Game - promoting stakeholder engagement in urban regeneration and neighbourhood renewal*

- **Land Securities study:** *Planned communities and sustainable development: a comparative review of recent UK and European examples*

BEQUEST was an international network of academic and commercial interests working towards sustainable urban development in order to protect the environment and the quality of life for future generations.

http://www.research.scpm.salford.ac.uk/bqextra/

Curwell, S., Deakin, M. & Symes, M. (eds.) 2005 **Sustainable Urban Development: Volume 1** *The framework and protocols for environmental assessment*, Routledge, London.

BEQUEST Framework 6

Development Activity

- **Planning**
  - Strategic
  - Local
- **Property Development**
  - Public
  - Private
- **Design**
  - Urban
  - Buildings
  - Components
- **Construction**
  - New Build
  - Refurbishment
  - Demolition
- **Operation**
  - Use
  - Facilities Man't
  - Maintenance

Environmental & Societal Issues

- **Environmental**
  - Nat'l Resources
  - Env'l Pollution
  - Land Use
  - Biodiversity
- **Economic**
  - Production
  - Building Stock
  - Trans't +Utilities
  - Finance
- **Social**
  - Access
  - Safety+Security
  - Health & Well-being
  - Community
- **Institutional**
  - Governance
  - Justice
  - Ethical Systems

Spatial level
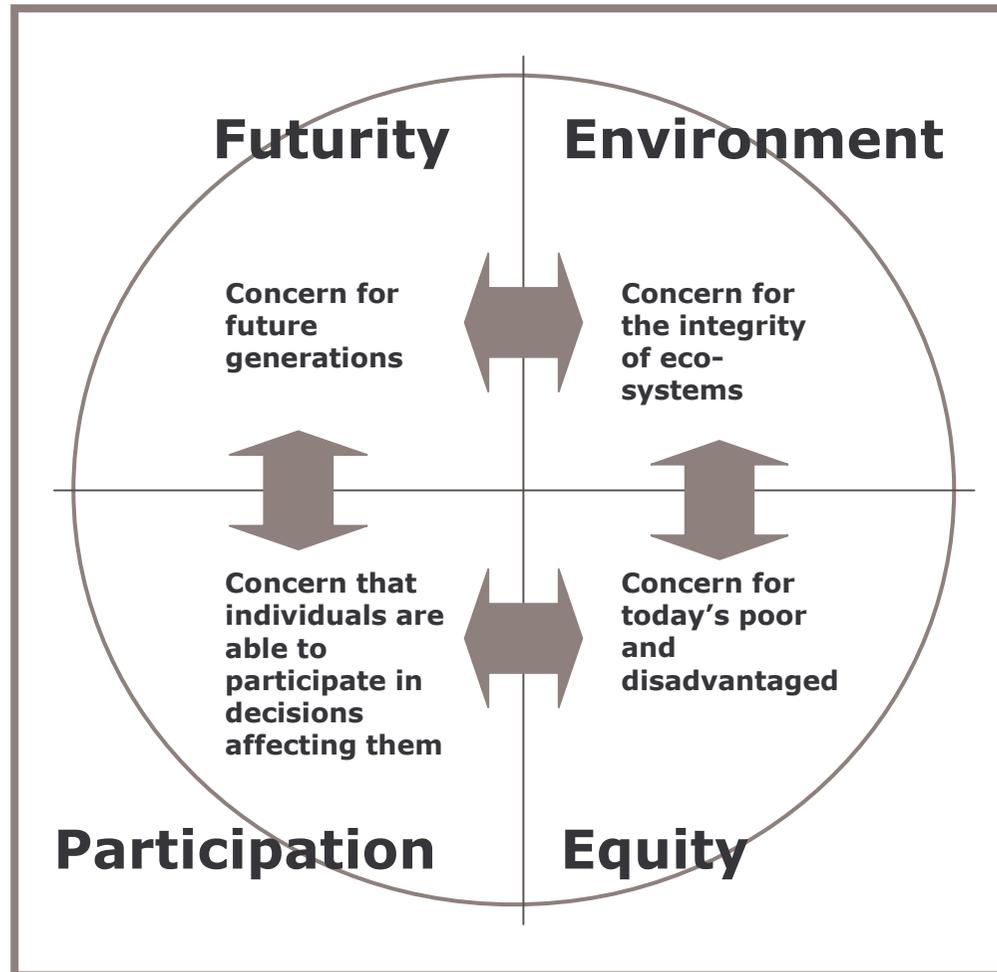
- Global
- National
- Urban region
- City
- District
- Neighbourhood
- Estate
- Building
- Compon't & Material

Time scale

- Long-term < 20yrs
- Mid-term 5-20yrs
- Short-term > 5yrs

BEQUEST Framework

BEQUEST: agreeing the underlying principles of sustainable development

Futurity   **Environment**

Concern for future generations   Concern for the integrity of eco-systems

Concern that individuals are able to participate in decisions affecting them   Concern for today's poor and disadvantaged

Participation   **Equity**

PICABUE

BEQUEST: building a boundary-crossing coalition
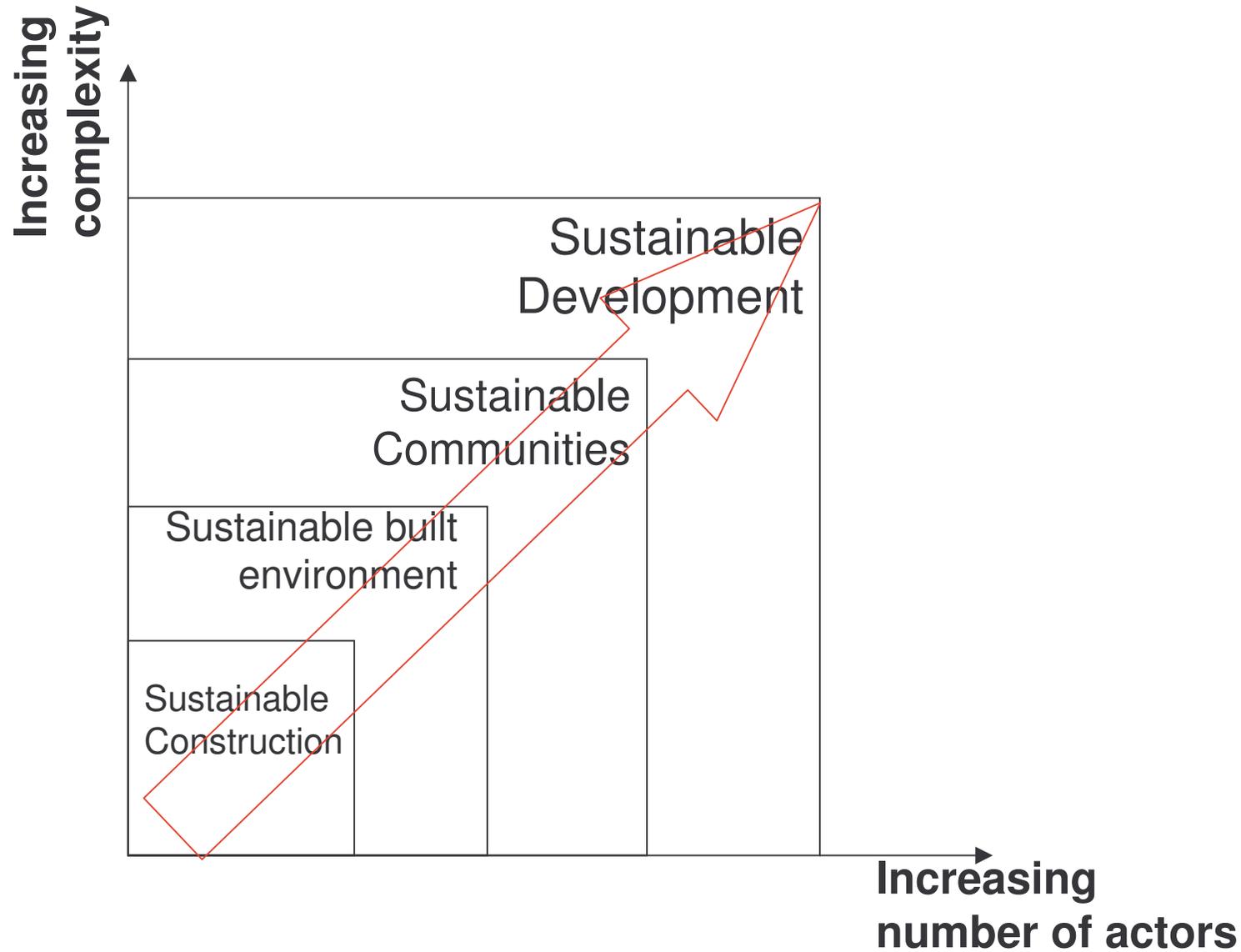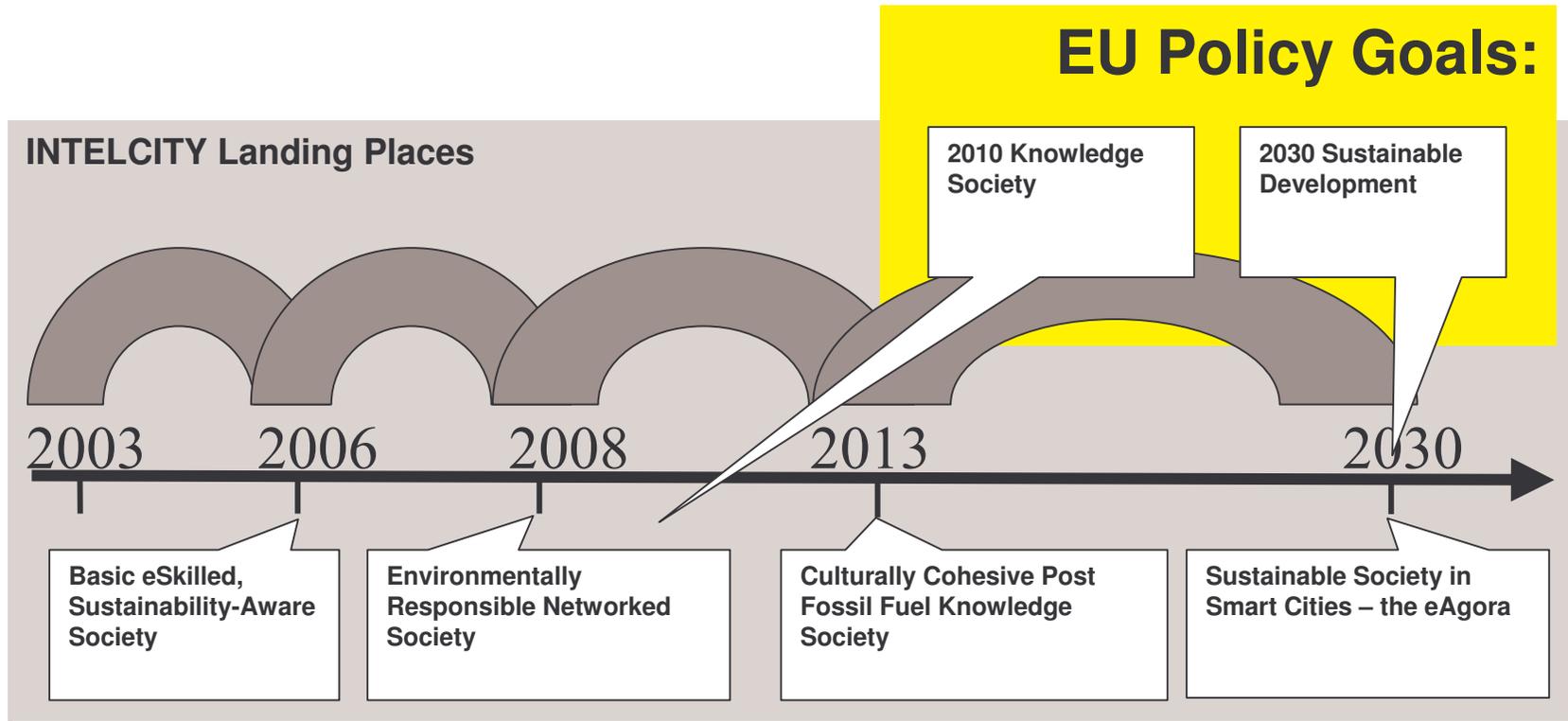
INTELCITY

Towards Intelligent Sustainable Cities

INTELCITY was a one-year RTD roadmap project funded by the E.U until 31st June 2003 (IST-2001-37373)

The aim of INTELCITY was to explore new opportunities for sustainable development of cities through the intelligent use of Information and Communication Technologies (ICTs). It sought to integrate the knowledge of experts in sustainable urban development (SUD) and ICTs to deliver a roadmap that relates the range of potential ICT development options to planning and urban re/development processes.
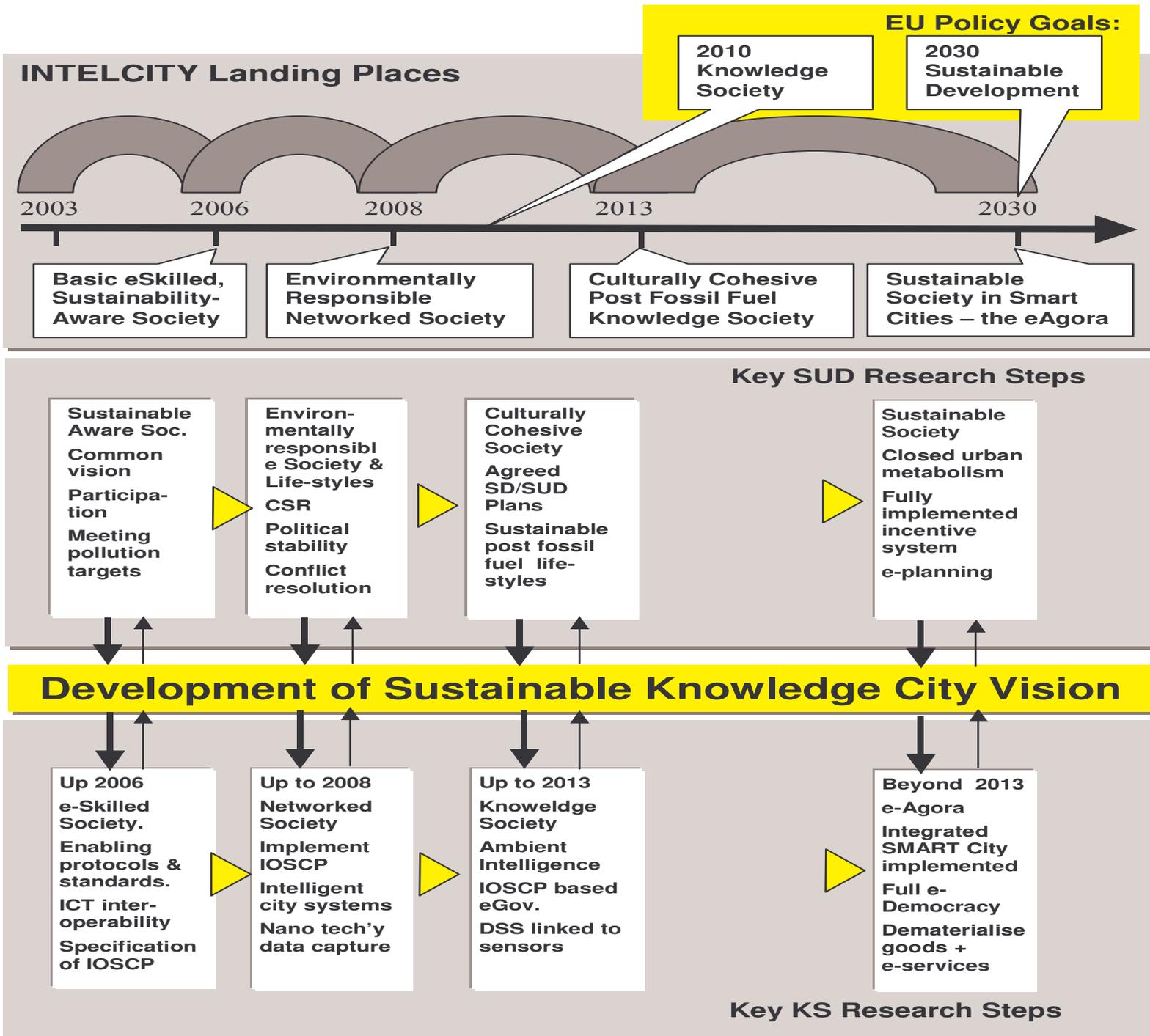
http://ndmodelling.scpm.salford.ac.uk/intelcity/

INTELCITY ROADMAP: Part 1

INTELCITY Landing Places

EU Policy Goals:

2010 Knowledge Society

2030 Sustainable Development

2003   2006   2008   2013   2030

Basic eSkilled, Sustainability-Aware Society

Environmentally Responsible Networked Society

Culturally Cohesive Post Fossil Fuel Knowledge Society

Sustainable Society in Smart Cities – the eAgora

Summary Roadmap diagram

INTELCITY Landing Places

EU Policy Goals:

2010 Knowledge Society

2030 Sustainable Development

Timeline: 2003 — 2006 — 2008 — 2013 — 2030

- Basic eSkilled, Sustainability-Aware Society
- Environmentally Responsible Networked Society
- Culturally Cohesive Post Fossil Fuel Knowledge Society
- Sustainable Society in Smart Cities – the eAgora

Key SUD Research Steps

Sustainable Aware Soc.	Environ-mentally responsible Society & Life-styles	Culturally Cohesive Society	Sustainable Society
Common vision	CSR	Agreed SD/SUD Plans	Closed urban metabolism
Participa-tion	Political stability	Sustainable post fossil fuel life-styles	Fully implemented incentive system
Meeting pollution targets	Conflict resolution		e-planning

Development of Sustainable Knowledge City Vision

| Up 2006	Up to 2008	Up to 2013	Beyond 2013
e-Skilled Society.	Networked Society	Knoweldge Society	e-Agora
Enabling protocols & standards.	Implement IOSCP	Ambient Intelligence	Integrated SMART City implemented
ICT inter-operability	Intelligent city systems	IOSCP based eGov.	Full e-Democracy
Specification of IOSCP	Nano tech'y data capture	DSS linked to sensors	Dematerialise goods + e-services

Key KS Research Steps

The EU Sustainable Construction agenda

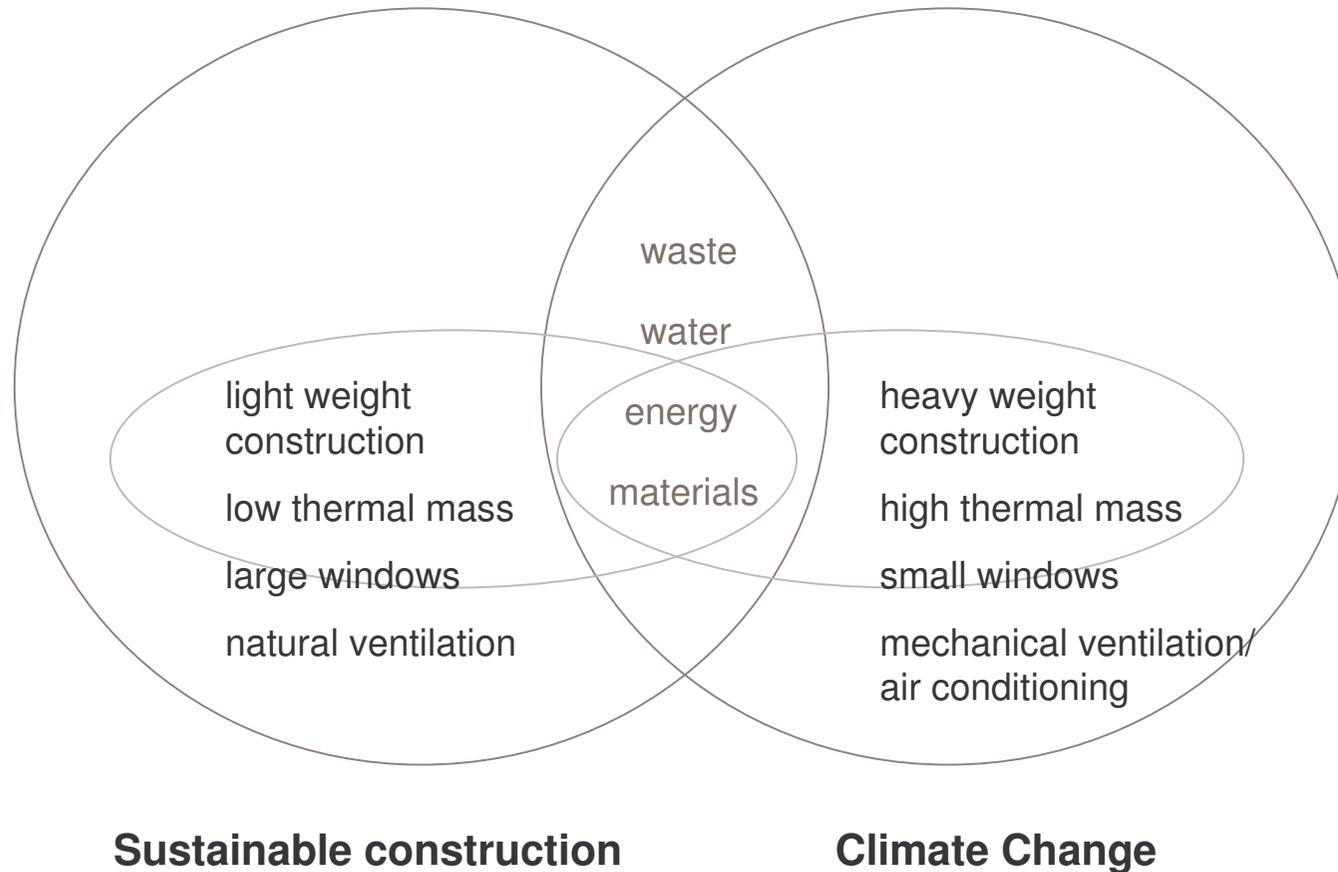- **European Working Group for Sustainable Construction** produced agenda report in 2001 - focused on promoting competitiveness of construction sector
- 2002 **Directive on Energy Performance of Buildings**
- **Standing Committee on Construction** - standardised methods for assessment of building through life-cycle analysis
- The draft for consultation of the **Urban Thematic Strategy** in 2004 saw sustainable construction as:

    "a process where all the actors involved … integrate functional, economic, environmental and quality considerations to produce and renovate buildings and a built environment that is:

    - attractive, durable, functional, accessible, comfortable and healthy to live in and use, promoting the well-being off all that come into contact with it
    - resource efficient, in particular with respect to energy, materials and water, favouring the use of renewable energy sources and needing little extra energy to function, making appropriate use of rain water and ground water and correctly handling waste water and using materials that are environmentally friendly, that can be readily recycled or reused, that contain no hazardous compounds and can safely be disposed of
    - respects the neighbourhood and local culture and heritage
    - is competitively priced, especially when taking into account longer term considerations such as maintenance costs, durability and resale prices."

- The final **Urban Thematic Strategy** in 2005 emphasised process rather than substantive themes and mentioned sustainable construction specifically as a means of addressing climate change.

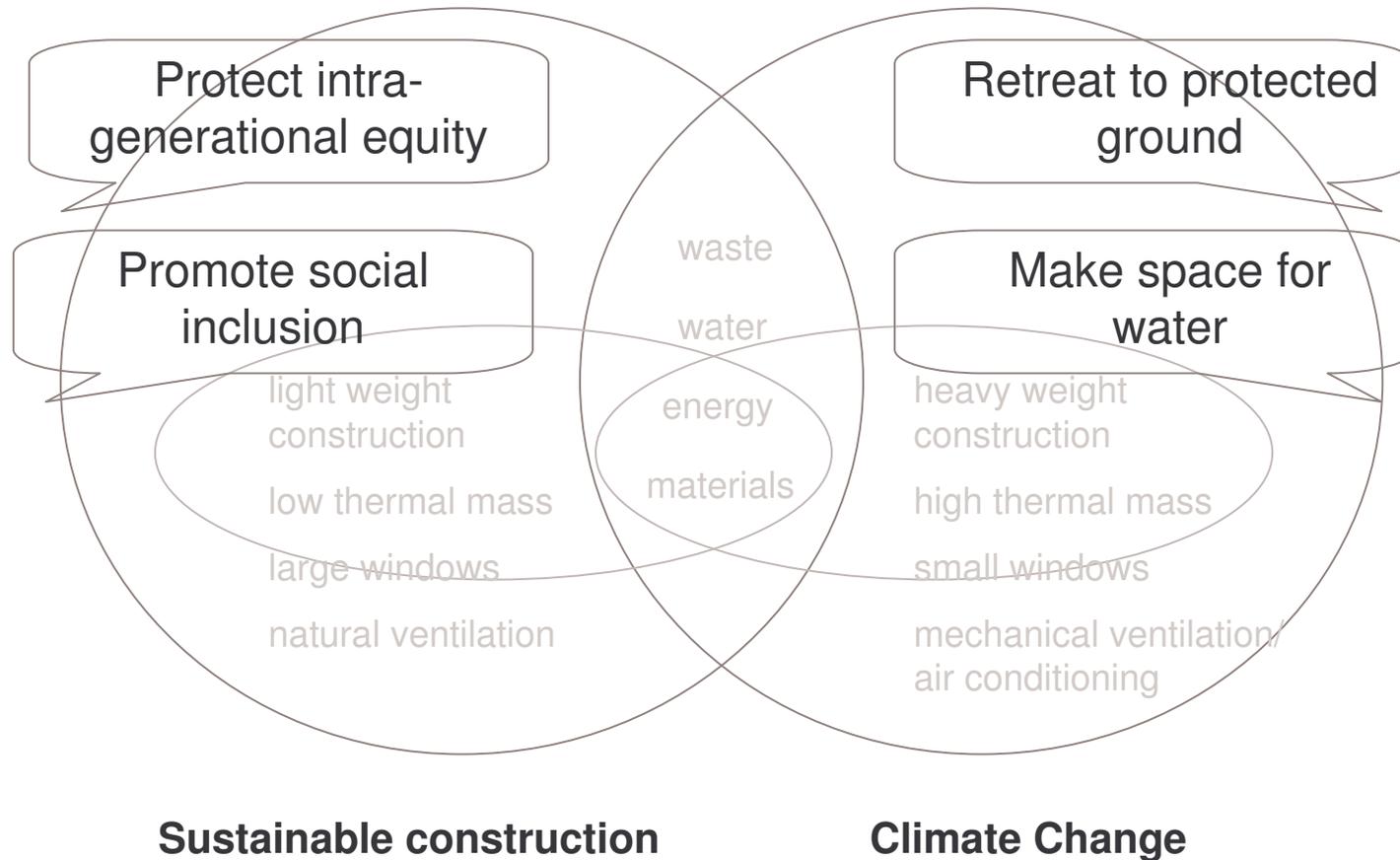# The Sustainable Construction and Climate Change agendas

Sustainable construction

Climate Change

waste

water

energy

materials
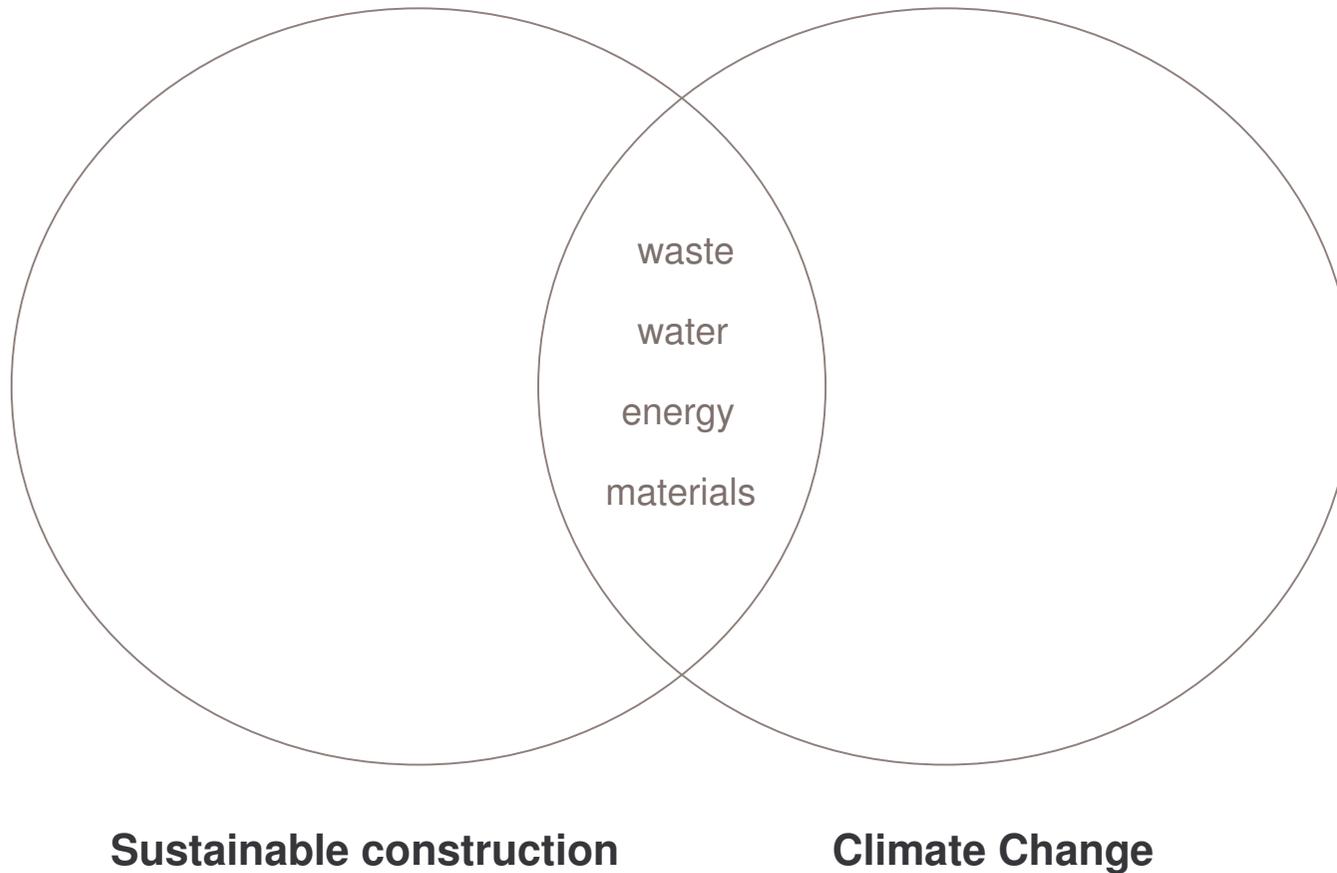
Two overlapping but not mutually compatible agendas

The Sustainable Construction and Climate Change agendas

waste

water

energy

materials

light weight construction

low thermal mass

large windows

natural ventilation

heavy weight construction

high thermal mass

small windows

mechanical ventilation/ air conditioning

Sustainable construction

Climate Change

We might expect these tensions and differences on environmental design and performance to become more evident in future

The Sustainable Construction and Climate Change agendas

Protect intra-generational equity

Retreat to protected ground

Promote social inclusion

Make space for water

waste

water

energy

materials

light weight construction

low thermal mass

large windows

natural ventilation

heavy weight construction

high thermal mass

small windows

mechanical ventilation/ air conditioning

Sustainable construction

Climate Change

These tensions are likely to become more difficult to manage in the future as the impact of climate change becomes more severe.

Fore Scene Workshop: Infrastructure/built environment
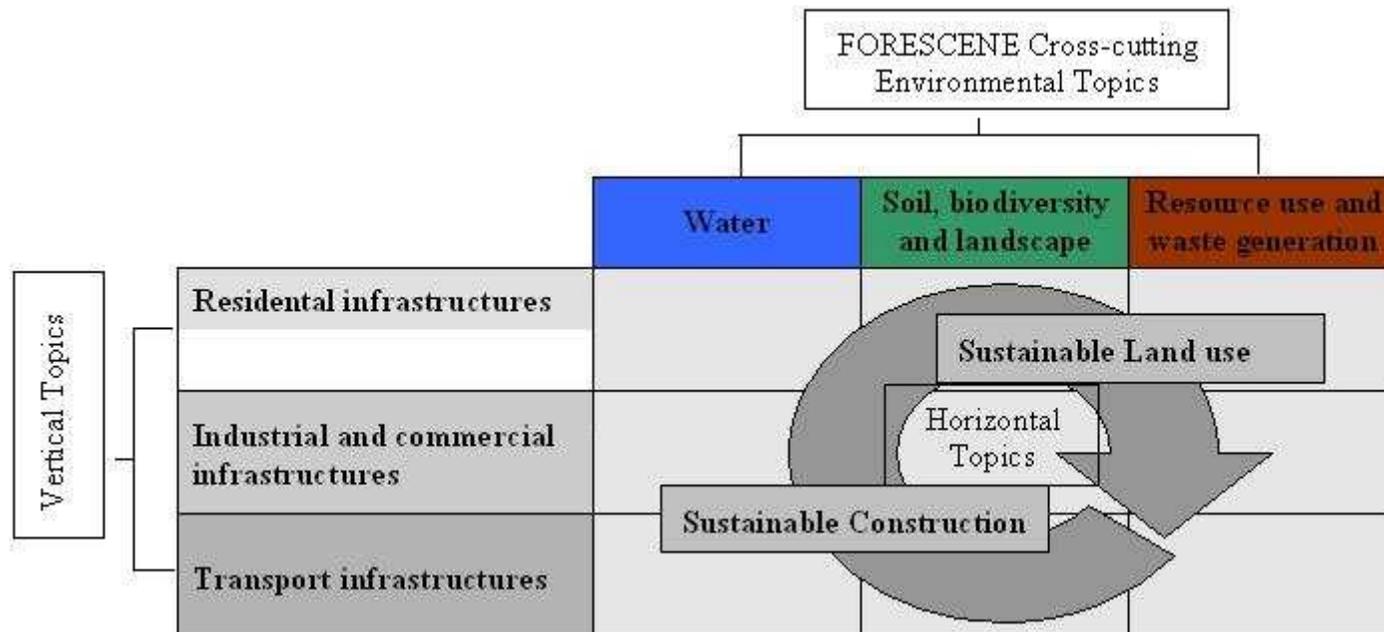
Does Fore Scene share, and is it restricted to, the the EU's prevailing and predominant focus on sustainable construction as mainly restricted to the environmental performance of buildings?

The UK as a worked example:
What does the UK construction industry want to offer?
Case study of service providers in the UK construction industry

Engagement through a series of workshops* undertaken in 2005-6 on behalf of the **Sustainability Forum** and the UK's Department of Trade and Industry as part of the current review of the UK's *Sustainable Construction Strategy.*

> The **Sustainability Forum** is an advisory body made up of representatives from across the UK construction industry. It provides advice to the Department of Trade and Industry, the sector's Strategic Forum, and Constructing Excellence on sustainability issues.

Workshops were held with a wide range of service providers in the construction industry - designers, contractors, product manufacturers and facilities managers

Participants were asked to identify how the construction industry's contribution to sustainable development should be prioritised and its progress measured

* Department of Trade and Industry, 2006 (forthcoming) Review of the UK Sustianble Construction Strateg DTI, London
http://www.dti.gov.uk/sectors/construction/sustainability/strategy/page13543.html

* Eclipse Research Consultants, 2006 **Where next for sustainable construction?** Report to the Sustainability Forum, London
www.constructingexcellence.org.uk/zones/sustainabilityzone/forum.jsp
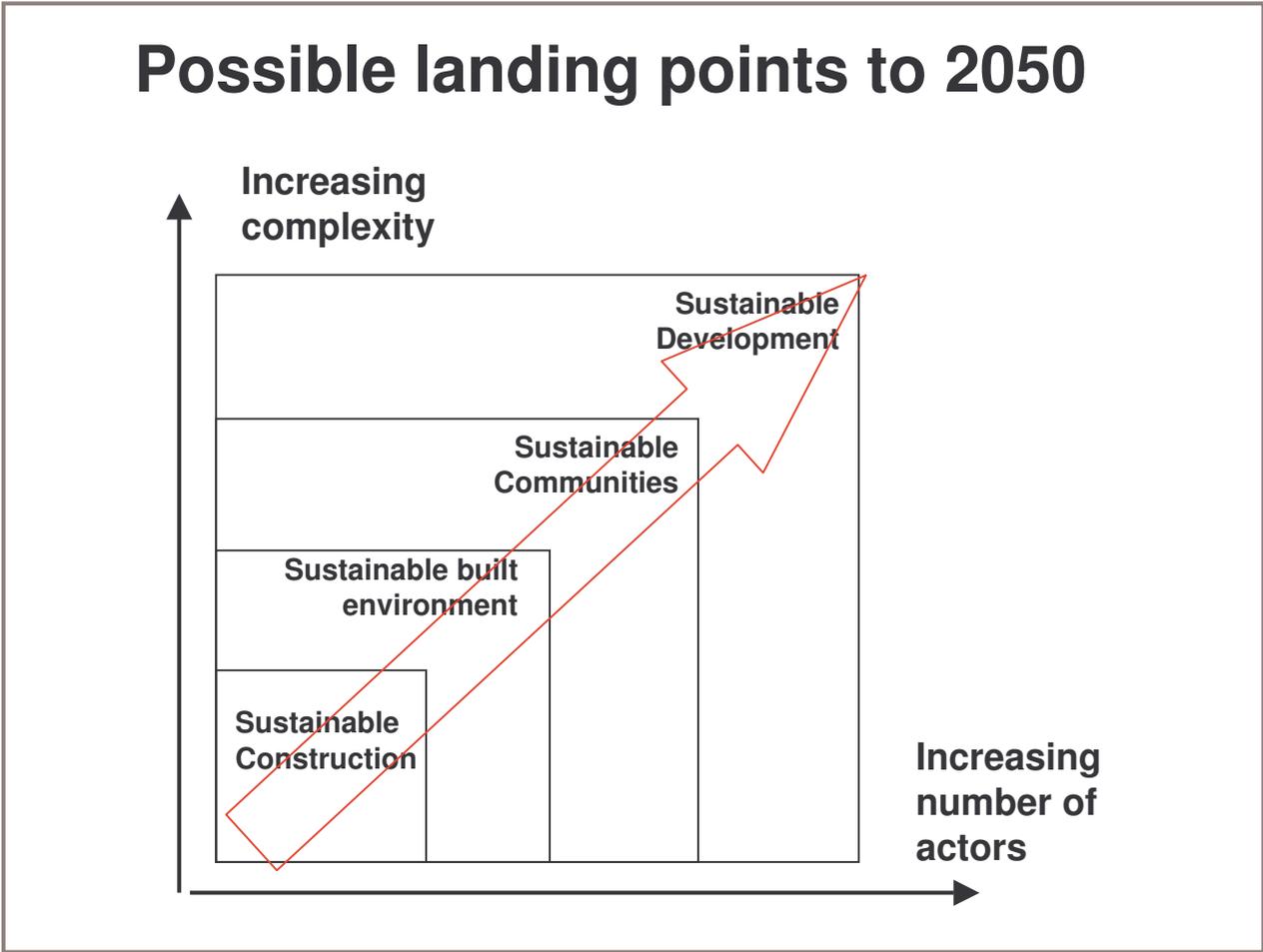
Stakeholder Workshops 2005-6

During the workshops, participants* were asked to work through a series of exercises gauging:

❑ **what types of changes (small v. large, voluntary v. involuntary, sector-specific v. cross sector) the industry should be pursuing to implement sustainable construction, and**

❑ **what targets, measures, mechanisms, should be pursued by whom, over what timescales**

* A small number (<50) of self-selected, leading edge/early adopters attended the original workshops. The results then taken to a Stakeholders' Workshop, held by DTI and scrutinised by another set of (>100) equally self-selected participants. Tables generated were subsequently circulated for comment/amendment in the DTI's Consultation Document used in the review of the UK's Sustainable Construction Strategy.

The Review now due for publication in late October.

Where should construction industry be heading?

Possible landing points to 2050

Increasing complexity

Sustainable Development

Sustainable Communities

Sustainable built environment

Sustainable Construction

Increasing number of actors

Which landing point do you want to back cast from in your Forecasting Framework?

UK participants' referred landing points

	Landing points			
	Sustainable construction	Sustainable built environment	Sustainable communities	Sustainable development
Where should the construction industry be in 2010?	☐☐☐☐☐ ☐☐☐☐☐ ☐☐☐☐☐ ☐☐☐☐☐	☐☐☐☐☐ ☐☐☐☐☐ ☐☐☐☐	☐☐☐☐☐ ☐☐☐☐	☐☐☐☐☐ ☐☐
Where should the construction industry be in 2020?	☐☐☐☐☐ ☐☐☐☐☐ ☐☐	☐☐☐☐☐ ☐☐☐☐☐ ☐☐☐☐☐ ☐	☐☐☐☐☐ ☐☐☐☐☐ ☐☐☐☐ ☐	☐☐☐☐☐ ☐☐☐☐☐ ☐☐
Where should the construction industry be in 2030?	☐☐☐☐☐ ☐☐☐☐☐	☐☐☐☐☐ ☐☐☐☐☐	☐☐☐☐☐ ☐☐☐☐	☐☐☐☐☐ ☐☐☐☐ ☐☐☐☐
Where should the construction industry be in 2050?	☐☐☐☐☐ ☐☐☐	☐☐☐☐☐ ☐☐☐☐☐ ☐	☐☐☐☐☐ ☐☐☐☐☐	☐☐☐☐☐ ☐☐☐☐☐ ☐☐☐☐☐ ☐

What time scales does your Forecasting Framework employ?

Types of change described

Business as usual

This assumes that the construction industry will continue to act as it does now.

Incremental change

This assumes that the construction industry will make small, regular, incremental changes in the direction of sustainable construction. This notion of change currently underpins Constructing Excellence KPIs. Here adoption of 'continuous improvement' delivers small annual incremental improvements that, however, over extended time add up to a significant degree of change, **http://www.constructingexcellence.org.uk/productivity/kpis/kpis.jsp**.

Step change

This assumes that the construction industry will make large changes over a shorter period of time. A good comparison is the Step Change programme in the Oil and Gas industry. This undertook in 2000 to deliver a 50% improvement in the whole industry's safety performance over 3 years, **http://step.steel-sci.org/general/main_general_fs.htm**.
Other examples of step change are Factor 4, 10 and 20, e.g. **www.wupperinst.org/FactorFour/**, **www.factor10-institute.org/**, and **http://mitpress.mit.edu/catalog/item/default.asp?tid=4065&ttype=6** (Designing for Factor 20).

Paradigm Shift

This assumes that the construction industry will change its view of the world and that this will occur very quickly once it has accepted irrefutable evidence that change is completely unavoidable. An example of this approach is the joint BioRegional and WWF One Planet Living initiative. This takes as its starting point that we would need 3 planets if everyone alive today were to have access our European standard of living. Instead the initiative's vision is of a world where everyone can live happy, healthy lives within their fair share of the earth's resources, **www.wwf.org.uk/filelibrary/pdf/opl_brochure.pdf**

What types of change does your Forecasting Framework employ?

Mapping types of change

large change

Factor 20

One Planet Living

Factor 10

High-level climate change scenario

voluntary change

involuntary change

Factor 4

Constructing Excellence

Low-level climate change scenario

Business as usual

small change
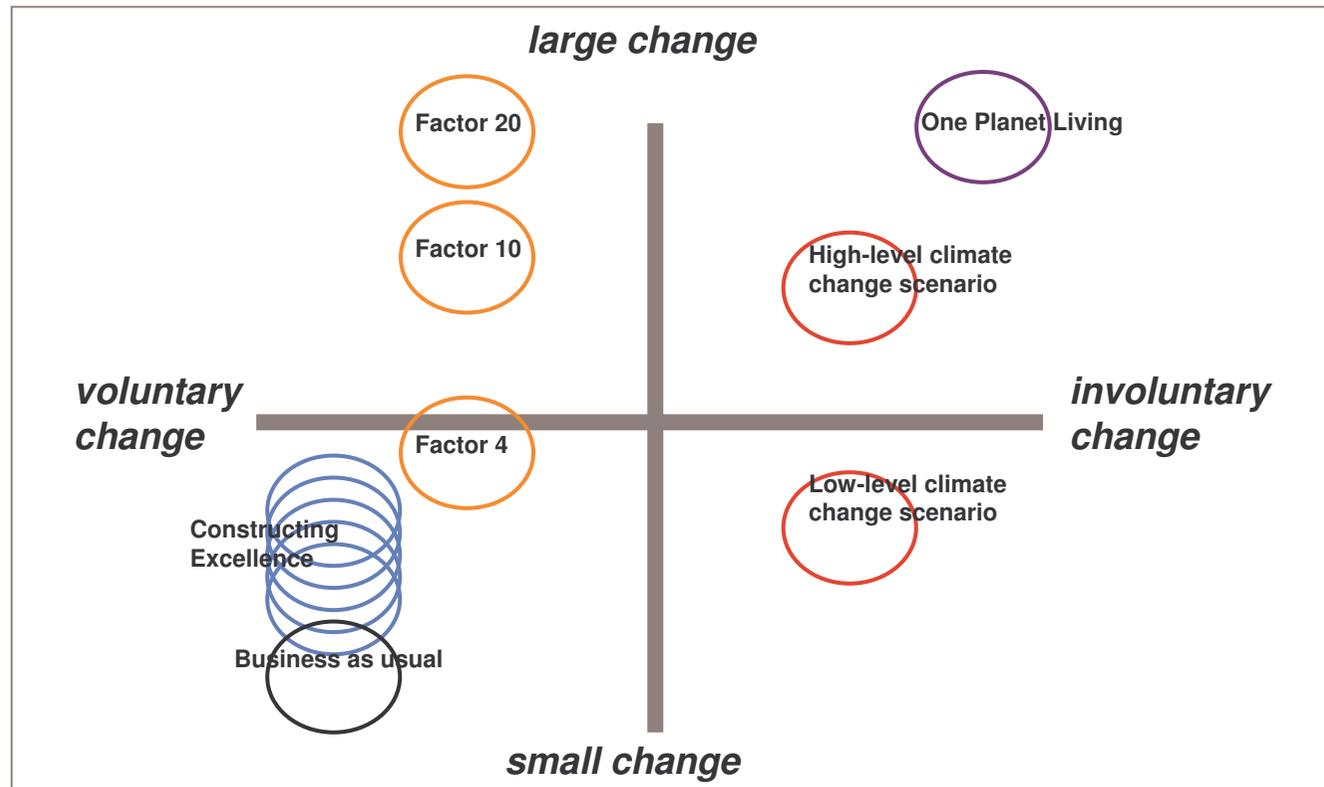
Where does your Forecasting Framework fit on this 2 x 2 matrix? Or are you employing entirely different underlying dimensions for your scenarios? If so, what are these?

Participants' preferred types of change

No change (business as usual)	0
Incremental change	
Step change	
Paradigm shift	
Voluntary change	
Involuntary change	

How does your Forecasting Framework line up against voluntary/involuntary change?

UK participants' priority issues for measuring sector's progress on sustainable construction

Issue	Aggregated priority	Aspect of sustainability addressed
Climate change/energy	1	Environmental
Waste	2	Environmental
Materials	3	Environmental
Costs	4	Economic
Water	5	Environmental
Quality/aesthetics	6	Social
Skills	7	Social
Safety	8	Social
Equity/Respect4People	9	Social

Where are these second order priorities in your Forecasting Framework?

Participants' views of priority issues

❑ **In aggregate, workshop participants strongly prioritised environmental aspects of sustainable construction**

❑ **Four of the top five priority issues are environmental - climate change/energy, waste, materials and water**

❑ **Social aspects were also priorities but typically only as second order concerns**

Do these priorities map on to/reflect those in your Forecasting Framework?

Participants' views on targets

❑ Workshop participants were highly ambitious about what should be done to implement sustainable construction

❑ The targets they set frequently employ the term 'zero' - zero energy, zero CO_2 emissions, zero waste, zero accidents, zero skills shortages

❑ They frequently defined (very short) to medium time scales for delivery against targets set

❑ Achievement of targeted improvements by 2010 or earlier is common: only climate change typically attracted a longer time scale running on to 2030

❑ The metrics for measuring progress are typically under-developed

What targets and time scales are you employing in your Forecasting Framework?

Targets, metrics, milestones and mechanisms

Issue	Target	Metric	Interim progress date	Final achieve-ment date	Primary respons-ibility	Mechanism	Secondary respons-ibility
Climate change/ energy	Zero CO_2 emissions	CO_2 emissions $/m^2/yr$, predicted and measured	20% of new build by 2010; existing by 2015	100% of new build by 2020: existing by 2030	ODPM; Treasury; planners; designers	Building regulations; planning; taxation; incentives; enforcement	Developers; clients; designers; contractors
Waste	Zero waste	Tonnes to landfill	2006; annual review	2020	Government; developers; clients: manufacturers	Legislation; regulations; enforcement; demolition protocol; taxes; incentives	Local authorities; designers; contractors
Materials	Use of sustainable materials/ reduced materials consumption	'A' rated materials used/% reduction/LCA declaration for products	50% by 2015; annual review	90% by 2025	Treasury; ODPM; manufacturers; developers; contractors	Regulation; codes; green guide; supply chain monitoring	Local authorities; planners; companies; specifiers
Costs	Change to whole life costing of (public) assets	% deployment (new build selected on basis of WLC); Construction Inflation Index	2010	2020	Treasury; city institutions and funders; clients	Changed policy – new public finance paradigm/ voluntary (market mechanisms)	PFI bidders; designers
Water	Reduced consumption (especially potable)	Litres/person	30% by 2010	50% by 2015	ODPM; OFWAT; local authorities; planners	Building regulations; planning; enforcement; billing and metering; water trading	Developers; companies; public demand

In the version of the table circulated in the DTI's Consultation Document, an extra column was added showing what the UK Government is already committed to doing. Uniformly it is less than the workshop participants called for.

Targets, metrics, milestones and mechanisms

Table continued

Issue	Target	Metric	Interim progress date	Final achieve-ment date	Primary respons-ibility	Mechanism	Secondary respons-ibility
Quality; aesthetics	Quality and aesthetics standards c.f. Sweden/ publicly accessible buildings	CABE-provided exemplar buildings/ DQI	Summer 2006/ --	2008/ 2010	ODPM; CABE; professional institutions; BRE	Measurement against exemplars; increased legislation	Finance institutions; developers; construction industry
Skills	Zero skill shortage (trades and professions; existing workforce and trainees)	Capacity building; number of skilled shortfall; % trained annually; quality of life measurement	25% of existing workforce trained; 100% of trainees	Annual review	Government; CITB-Construction Skills; professional organisations	Conscription; mandatory courses	Training organisations; clients; designers; contractors; CPD
Safety	Zero RIDOR	AFR	2006; annual review	2020	Clients; HSE	Process actions; training	Designers; contractors
Equity/ Respect for People	Fair trade & R4P commitment	Number of commitments; DQI assessment	--	2010	Government lead; CABE; H&S	Participatory processes: DQI	ODPM; planners; peer pressure

Participants' views on responsibilities and mechanisms

❑ Participants commonly identified central government, particularly the ODPM (DCLG) and the Treasury - aided by local planning authorities - as primarily responsible for initiating the actions required

❑ They often expressed a strong appetite for regulation and enforcement, backed up by taxes and financial incentives

❑ They identified a wide range of stakeholders as having primary or secondary responsibility for implementing aspects of sustainable construction - from financial institutions and funders, developers, clients, designers and contractors, through to product manufacturers, along with training and professional organisations

Would your country's 'leading edge/early adopters' in the construction industry see the Forecasting Framework as sufficiently aspirational?

Sustainability Forum Framework

The Vision

A UK construction industry that is capable of delivering its services to customers with zero negative impacts on the environment, society and the economy by 2030.

The Strategy

The Sustainability Forum will:

o   help to develop the leadership necessary to implement the vision

o   build an alliance within the industry and beyond to achieve it

o   identify the issues on which action is required, and

o   assemble an inventory of the tools available to tackle these issues effectively.

The Issues

- Zero CO_2 emissions from new and existing buildings
- Zero waste to landfill from construction sites
- 100% use of sustainable materials in construction activities
- 100% use of whole life costing in the procurement of public and private assets
- 50% reduction in the use of water in both the construction and operation of buildings
- Application of high aesthetic and quality standards in all building procurement
- Zero skill shortages amongst trainees and the existing workforce in both the professions and trades
- Zero reported injuries, diseases and dangerous occurrences on construction sites
- 100% commitment to fair trade and Respect for People within the industry and its suppliers.

A description of how to tackle these issues is presented in Table 1.

The Tools

An inventory of tools available for tackling these issues is provided in Table 2.

Productionist view of sustainable construction
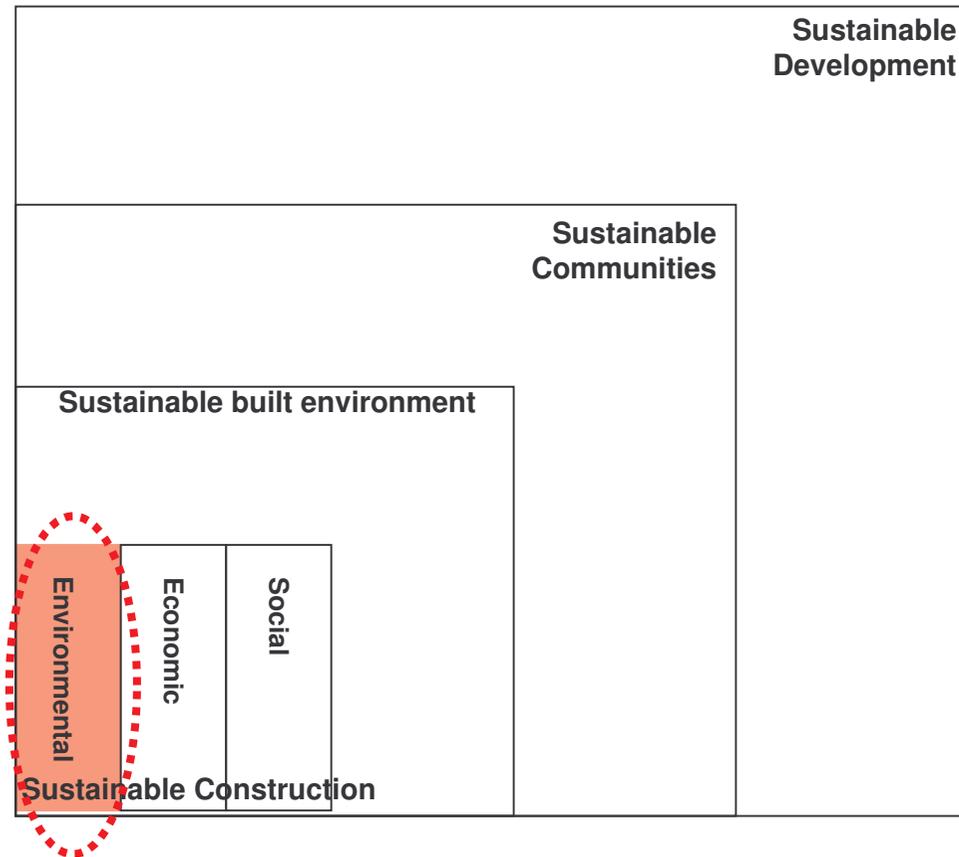
This narrow supply-side definition confines the construction industry's contribution to sustainable development to smallest 'solution space' available

What regulatory and sector-based mechanisms are there for *implementing* sustainable construction in the UK?

❑ **National planning regulations**

❑ **Building Regulations and the Code for Sustainable Homes**

❑ **Public Sector Sustainable Procurement practices**

❑ **Regional (economic and spatial) strategies**

❑ **Local Development Frameworks, Development Control and Supplementary Planning Guidance**

❑ **The construction industry's own sectoral performance improvement programme**

This should be a formidable array of mechanisms for implementing sustainable construction. In practice, this is hampered by the lack of alignment/disconnections between them

Sustainable construction and Supplementary Planning Documents

It is this same narrow

❑ **supply-driven**

❑ **focused on environmental performance, and**

❑ **the production stages (design and construction)**

view of sustainable construction that is typically being captured and embedded in UK Planning Authorities' Supplementary Planning Guidance

The Mayor's Supplementary Planning Guidance   Sustainable Design and Construction

MAYOR OF LONDON

**Sustainable Design and Construction
The London Plan Supplementary Planning Guidance**
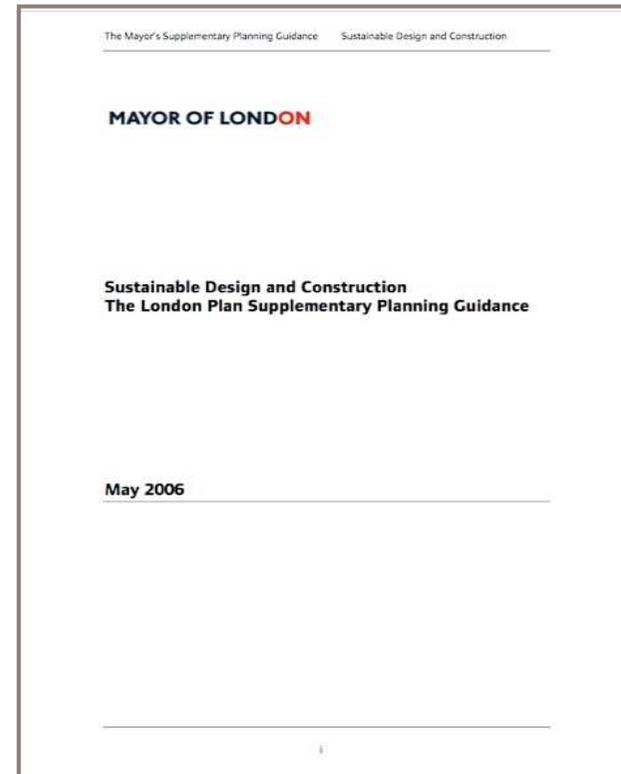
May 2006

The Greater London Authority's SPD

The Mayor's Code for London

This Supplementary Planning Guidance covers:
- re-use of land and buildings
- maximising use of natural systems
- conserving energy, water and other resources
- reducing noise, pollution, flooding and microclimatic effects
- ensuring developments are comfortable and secure for users
- conserving and enhancing the natural environment and biodiversity
- promoting sustainable waste behaviour

Appendix A contains Sustainability Appraisal methodologies and checklists and Appendix B lists Supplementary Planning Guidance and Best Practice guidance. The whole document runs to 65 pages.

The Mayor's Supplementary Planning Guidance   Sustainable Design and Construction

MAYOR OF LONDON

**Sustainable Design and Construction
The London Plan Supplementary Planning Guidance**

May 2006

What impact are SPDs likely have?

Energy-based examples of essential and preferred standards in the Mayor's London Code

Essential standards
- Carry out energy demand assessment
- Maximise energy efficiency
- Major commercial and residential developments to demonstrate that consideration has been given to the following ranking method for heating and, where necessary, cooling systems
  - passive design
  - solar water heating, then
  - combined heat and power for heating and cooling (i.e. trigeneration), preferably fuelled by renewables, then
  - community heating and cooling, then
  - heat pumps, then
  - gas condensing boilers
- Wherever on site outdoor lighting is proposed as a part of a development, it should be energy efficient, minimising light lost to sky
- Carbon emissions from the total energy needs (heat, cooling and power) of the development should be reduced by at least 10% by the on-site generation of renewable energy

Preferred standards
All developments to demonstrate that consideration has been given to the following ranking method for heating and where necessary cooling systems and should incorporate the highest feasible of the following options:
- solar heating, then
- combined heat and power/trigeneration, preferably fuelled by renewables, then
- community heating

New developments should always be connected to existing community heating networks preferably fuelled by renewables where feasible.

Where outdoor lighting or other electrically powered street furniture is proposed on site, it should be solar powered and minimise light lost to the sky.
Lighting, heating and cooling controls should enable services to operate efficiently under different loadings and allow for localised control
Major developments should be zero carbon developments
Major developments should make a contribution to London's hydrogen economy through the adoption of hydrogen and/or fuel cell technologies and infrastructure.

The 'preferred standards' of the London Code would deliver a 38% reduction in ecological footprint for new housing. *One Planet Living* requires 66% reduction.

What level of reduction is your Forecasting Framework based on trying to achieve?

Which aspects of SPDs have the most impact?

Best case (preferred standards) analysis of the London Code - listed in order of magnitude

- ❑ **recycling household waste**
- ❑ **CHP/gas condensing boiler/solar water heating**
- ❑ **photovoltaics**
- ❑ **High mass/passive solar**
- ❑ **recycled materials**
- ❑ **re-use of existing buildings**
- ❑ **increased density**
- ❑ **shading/green roofs/reflective paint**
- ❑ **local sourcing of materials**
- ❑ **water saving measures**
- ❑ **recycled aggregates**

The LSE's REAP analysis suggests that 90% of the footprint savings come from the first two aspects

There are alternative framings of sustainable construction

Just offer one alternative framing that is

❑ **demand-driven**

❑ **economics/community benefits-focused**

❑ **post-production/legacy-focussed.**

Developed by Urban Vision using public sector 'sustainable procurement' practices, embedded in Framework and Partnership Agreements with its supply chain.

Urban Vision Partnership Limited

Vision's overall remit is to manage, protect, maintain and enhance development within the city. This task is undertaken by bringing together the talents and expertise of a wealth of professional disciplines contained within the partnership, including Engineering, Highways, Planning, Property, Architectural and Landscape design,

UrbanVision: keeping regeneration investment in the local economy

**Estimated revenue impact, based on £300m investment over 10 years**

Aim to keep as much revenue impact as possible within the local economy

- ❑ £21m trading profits for developers
- ❑ £20m trading profit for local main contractors
- ❑ £7m trading profit for local sub-contractors
- ❑ £9m trading profit local materials suppliers
- ❑ 476 local people employed for 10 years
- ❑ £125m of materials supplied by local suppliers (creates/secures 100 local jobs for 10 years)

This reframing of the construction sector's activities emphases its potential contribution to the (socio-economic) legacy aspects of sustainable development

Sustainable procurement view of sustainable construction
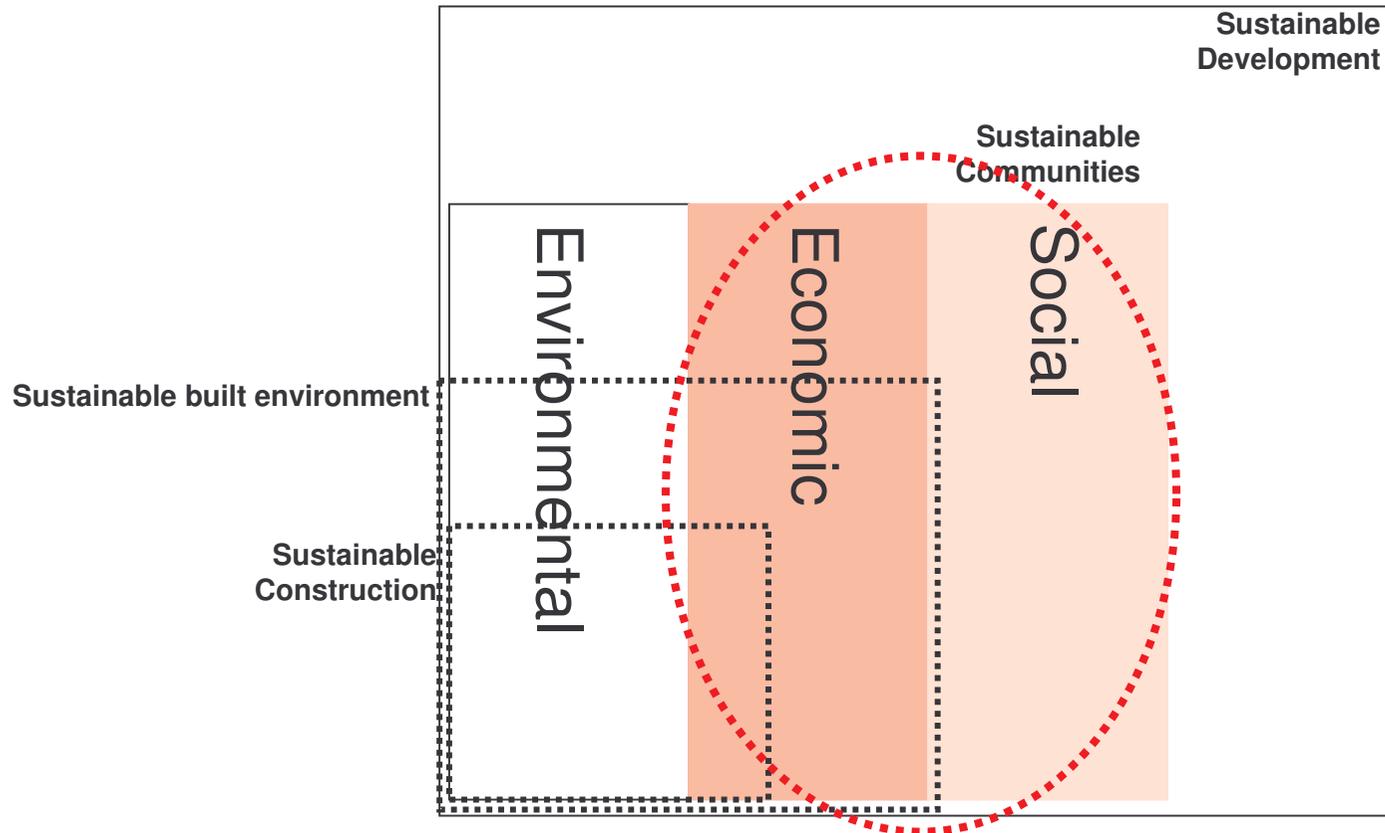
This broader demand side definition, focussed on legacy impacts, expands the contribution of the property development and construction industries to sustainable development to more extensive 'solution spaces' - so that they help, rather than hinder, the delivery of sustainable communities
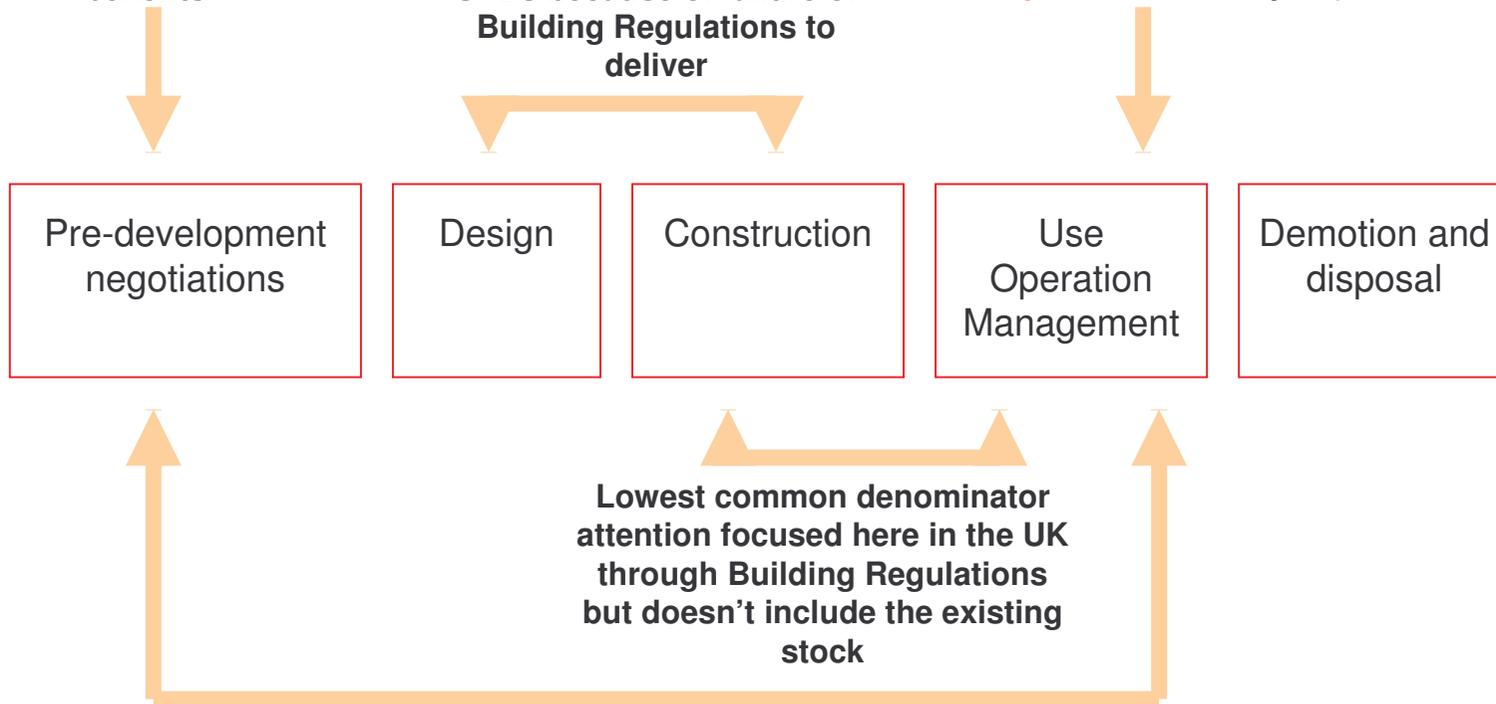
How will your Forecasting Framework deal with these sectors' delivery at these higher levels ?

Development process: focus of attention

Public sector Sustainable Procurement practices suggest the importance of pre-contractual frameworks and agreement with service providers to achieve legacy benefits

Currently in UK most attention being focused here through Planning Authority SPDs because of failure of Building Regulations to deliver

LSE Ecological footprinting suggests most *building-based* impact here (but WWF suggest transport is 27% of *development-based* impact)

Pre-development negotiations	Design	Construction	Use Operation Management	Demotion and disposal

Lowest common denominator attention focused here in the UK through Building Regulations but doesn't include the existing stock
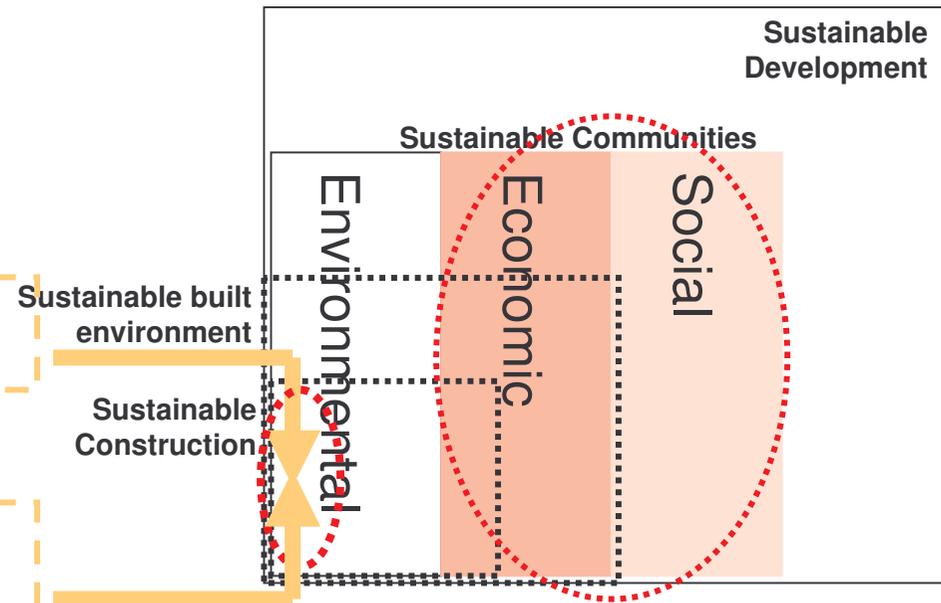
The UK-Sweden Initiative indicates the importance of early developer/planning authority engagement to achieve strategic, whole district, economies of scale and opportunity, e.g. integrated resource management/service/infrastructure provision (energy, water, waste, ICTs, transport)

The potency of particular Policy Measures and Actions depends on the stage of the process being tackled

Where is European effort exerted to best effect?

- ❑ **EU directives**
- ❑ **Central government policies**
- ❑ **Regional (economic and spatial) strategies**
- ❑ **Planning Regulations, Local Development Frameworks, Development Control and Supplementary Planning Guidance**
- ❑ **Public Sector Sustainable Procurement practices**
- ❑ **Building Regulations and Codes**
- ❑ **The construction industry's own sectoral performance improvement programme**

Sustainable Development

Sustainable Communities

Environmental

Economic

Social

Sustainable built environment

Sustainable Construction

In your country, which mechanisms should be pursued as *the most appropriate* for making particular aspects of construction/built environment/communities more sustainable?

Questioning framework

1. **Where should you be putting effort to get the greatest effects?**

2. **Are you focusing on sustainable development or climate change?**

3. **Which point(s) in the life cycle process - pre-development/design/ construction/use/demolition – are you seeking to impact?**

4. **Which landing point - sustainable construction/built environment/ communities/development - are you backcasting from?**

5. **What type(s) of change are you assuming - incremental/ step/paradigm shift?**

6. **What issues are you prioritising? (And why, see 11?)**

7. **What targets have you set?**

8. **What metrics are you using to measure them?**

9. **What time scales are you measuring performance against?**

10. **Are you aligned with/exploiting Sustainable Procurement practices?**

11. **How much (ecological footprint) impact will your targets have?**

12. **Have you explored which specific mechanisms should you be pursuing as the most appropriate for making particular aspects of construction/built environment/communities more sustainable?**